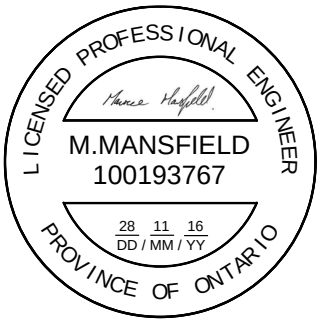
Project Title KINGSTON ONTARIO
LASALLE CAUSEWAY BASCULE BRIDGE
REPLACEMENT OF SPAN LOCKS

Project Number R.082857.001

Project Date 2016-11-28

END OF SECTION

Consultant for General, Structural, Construction Specifications



Consultant for Mechanical and Electrical

END OF SECTION

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Title and description of Work.

.2 Contract Method.

.3 Cost Breakdown

.4 Contractor use of premises.

.5 Owner occupancy.

.6 Alterations to existing bridge.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises general repair and construction of the La Salle Causeway Bascule Bridge located at Kingston, Ontario; and further identified as PWGSC Project Number R.082857.001.

1.3 CONTRACT METHOD

.1 Construct Work under lump sum contract.

1.4 COST BREAKDOWN

.1 Within 48 hours of notification of acceptance of bid furnish a cost breakdown by Section aggregating Contract amount.

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

1.5 CONTRACTOR USE OF PREMISES

.1 Contractor shall limit use of premises for Work, for storage, and for access, to allow:

.1 Owner occupancy.

.2 Public usage.

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

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

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

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

.6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.6 OWNER OCCUPANCY

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

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

1.7 ALTERATIONS TO EXISTING BRIDGE

.1 Execute work with least possible interference or disturbance to bridge operations, pedestrians, vehicles, navigation and normal use of bridge. Arrange with Departmental Representative to facilitate execution of work.

1.8 SCHEDULING

.1 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed and approved by the Departmental Representative take necessary measures to complete work within scheduled time. Do not change schedule without notifying 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 SECTION INCLUDES

.1 Cash allowances.

1.2 REFERENCES

.1 Project Supplementary Conditions

1.3 CASH ALLOWANCES

.1 Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for any excess incurred and substantiated plus an allowance for overhead and profit as set out in Contract Documents.

.2 Progress payments on accounts of work authorized under cash allowances shall be included in Departmental Representative's monthly certificate for payment.

.3 Schedule shall be prepared jointly by Departmental Representative and Contractor to show when items called for under cash allowances must be authorized by Departmental Representative for ordering purposes so that progress of Work will not be delayed.

.4 Amount of each allowance, for Work specified in respective specification Sections is as follows:

.1 Section 01 35 00.06 include an allowance of $ 7000 for provision of taxi service during bridge closure.

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 a maximum of two week intervals and at the call of Departmental Representative.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting 5 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 3 days after meetings and transmit to meeting participants and, affected parties not in attendance, Departmental Representative.

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

1.2 PRECONSTRUCTION MEETING

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

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

.3 Establish time and location of meeting and notify parties concerned a minimum of 5 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement.

.5 Agenda to include:

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

.2 Schedule of Work.

.3 Schedule of submission of shop drawings, samples, and colour chips.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences.

.5 Site security.

.6 Traffic Plan.

.7 Allowances.

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

.9 Record drawings.

.10 Maintenance manuals.

.11 Take-over procedures, acceptance, warranties.

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

.13 Appointment of inspection and testing agencies or firms.

.14 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 Throughout the course of Work immediately inform the Departmental Representative of any issues or concerns arising during the Work. The Contractor shall keep a journal of progress on site, including:

.1 Reports all safety related issues and subsequent resolutions.

.2 Regular accounts of work progress.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule and site resolutions as agreed by the Departmental Representative

.5 Revisions to construction schedule.

.6 Maintenance of quality standards.

.2 At the end of construction, submit both a scanned original of the journal and a transcribed Microsoft Word format copy to the 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 PRICE AND PAYMENT PROCEDURES

.1 In accordance with Section 01 22 01, payment for work associated with this section is included in the Lump Sum Price.

1.2 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 Actual Finish Date (AF): point in time that Work actually ended on activity.

.3 Actual Start Date (AS): point in time that Work actually started on activity.

.4 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.

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

.6 Cash Flow: projection of progress payment requests based on cash loaded construction schedule.

.7 Completion Milestones: they are firstly Interim Certificate or Substantial Completion and secondly Final Certificate.

.8 Constraint: applicable restriction or limitation, either internal or external to project, that will affect performance of Project. Factors that affect activities can be scheduled.

.9 Control: process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.

.10 Critical Activity: any activity on a critical path. Most commonly determined by using critical path method.

.11 Critical Path: series of activities that determines duration of Project. In deterministic model, critical path is usually defined as those activities with float less than or equal to specified value, often zero. It is longest path through Project.

.12 Critical Path Method (CPM): network analysis technique used to predict Project duration by analyzing which sequence of activities (which path) has least amount of scheduling flexibility (least amount of float).

.13 Data Date (DO): date at which, or up to which, Project's reporting system has provided actual status and accomplishments.

.14 Detailed Schedule: Comprehensive construction schedule showing sequence of activities, activity interdependencies and duration, and critical path activities.

.15 Duration (DU): number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element. Usually expressed as workdays or work weeks.

.16 Early Finish Date (EF): in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints. Early finish dates can change as Project progresses and changes are made to Project plan.

.17 Early Start Date (ES): in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can start, based on network logic and schedule constraints. Early start dates can change as Project progresses and changes are made to Project Plan.

.18 Finish Date: point in time associated with activity's completion. Usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.

.19 Float: amount of time that activity may be delayed from its early start without delaying Project finish date. Float is mathematical calculation, and can change as Project progresses and changes are made to Project plan. This resource is available to both Departmental Representative and Contractor.

.20 Impact Analysis: schedule analysis technique that adds a modeled delay to an accepted construction schedule to determined possible outcome of that delay on project completion.

.21 Lag: modification of logical relationship that directs delay in successor activity.

.22 Late Finish Date (LF): in critical path method, latest possible point in time that activity may be completed without delaying specified milestone (usually Project finish date).

.23 Late Start Date (LS): in critical path method, latest possible point in time that activity may begin without delaying specified milestone (usually Project finish date).

.24 Lead: modification of logical relationship that allows acceleration of successor task.

.25 Logic Diagram: see Project network diagram.

.26 Master Schedule: summary-level schedule that identifies major deliverable; work breakdowns structure and key milestones.

.27 Milestone: significant event in Project, usually completion of major deliverable.

.28 Monitoring: capture, analysis, and reporting of Project performance, usually as compared to plan.

.29 Non-Critical Activities: activities which when delayed, do not affect specified Contract duration.

.30 Project Control System: fully computerized system utilizing commercially available software packages.

.31 Project Network Diagram: schematic display of logical relationships of Project activities. Always drawn from left to right to reflect Project chronology.

.32 Project Plan: formal, approved document used to guide both Project execution and Project control.

.1 Primary uses of Project plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines.

.2 Project plan may be summary or detailed.

.33 Project Planning: development and maintenance of Project Plan.

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

.35 Project Schedule: planned dates for performing activities and planned dates for meeting milestones.

.36 Quantified days duration: working days based on work week specified by Contractor, discounting statutory holidays.

.37 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.

.38 Scheduled Finish Date (SF): point in time that Work was scheduled to finish on activity. Scheduled finish date is normally within range of dates delimited by early finish date and late finish date.

.39 Scheduled Start Date (SS): point in time that Work was scheduled to start on activity. Scheduled start date is normally within range of dates delimited by early start date and late start date.

.40 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.

.41 Work Breakdown Structure (WBS): deliverable-oriented hierarchical decomposition of Work to be executed by Contractor to accomplish project objectives and create required deliverables. It organizes and defines total scope of Project. Each descending level represents an increasingly detailed definition of Project Work. WBS is decomposed into Work packages.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Project Meeting:

.1 Meet with Departmental Representative within 10 working days of Award of Contract date, to establish Work requirements and approach to project construction operations.

.2 Participate in regular project progress meetings with Departmental Representative specifically intended to discuss update of detailed schedule and contract changes.

.2 Scheduling:

.1 Planning: ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made.

.2 Ensure project schedule efficiencies through monitoring of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.

.3 Monitor sufficiently often so that causes of delays can immediately be identified and removed.

.3 Project monitoring and reporting:

.1 Keep team aware of changes to schedule, and possible consequences as project progresses.

.2 Use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.

.3 Begin narrative reporting with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.

.4 Critical Path Method (CPM) Requirements:

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

.2 Revise Master Schedule and Detail Schedule deemed impractical by Departmental Representative and resubmit for approval.

.3 Change to Contract Duration:

.1 Acceptance of Master Schedule and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract.

.2 Duration of Contract may only be changed through bilateral Agreement.

.4 Consider Master Schedule and Detail Schedule deemed practical by Departmental Representative, showing Work completed in less than specified Contract duration, to have float.

.5 First Milestone on Master Schedule and Detail Schedule will identify start Milestone with an "ES" constraint date equal to Award of Contract date.

.6 Calculate dates for completion milestones from Plan and Schedule using specified time periods for Contract.

.7 Interim Certificate or Substantial Completion with "LF" constraint equal to calculated date.

.8 Calculations on updates to be such that if early finish of Interim Certificate falls later than specified Contract duration then float calculation to reflect negative float.

.9 Delays to non-critical activities, those with float may not be basis for time extension.

.10 Do not use float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times or imposed dates other than required by Contract.

.11 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated.

.1 Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.

.12 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration.

.1 Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.

.13 Arrange participation on and off site of subcontractors and suppliers, as required by Departmental Representative, for purpose of network planning, scheduling, updating and progress monitoring.

.1 Approvals by Departmental Representative of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract.

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

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit to Departmental Representative Project Control System for planning, scheduling, monitoring and reporting of project progress.

.3 Submit Project Control System to Departmental Representative for approval.

.1 Failure to comply with each required submission, may result in progress payment being withheld in accordance with Federal Government's GC 5 Terms of Payment.

.4 Include costs for execution, preparation and reproduction of schedule submittals in bid documents.

.5 Submit letter ensuring that schedule has been prepared in co-ordination with major sub-contractors.

.6 Refer to article "PROGRESS MONITORING AND REPORTING" of this specification Section for frequency of Project control system submittals.

.7 Submit impact analysis of schedule for changes that result in extension of contract duration.

.1 Include draft schedule update and report as outlined in article "PROGRESS MONITORING AND REPORTING".

.8 Submit Project planning, monitoring and control system data as part of initial schedule submission and monthly status reporting as required by Departmental Representative in following form.

.1 CD files in original scheduling software containing schedule and cash flow information, labelled with data date, specific update, and person responsible for update.

.2 Master Schedule Bar Chart.

.3 Construction Detail schedule Bar Chart.

.4 Listing of project activities including milestones and logical connectors, networks (sub-networks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.

.5 Criticality report listing activities and milestones with zero days total float used as first sort for ready identification of critical or near critical paths through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.

.6 Progress report in early start sequence, listing for each trade, activities due to start, underway, or finished within 2 months from monthly update date. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.

.9 As part of the initial submission of the Progress Construction Schedule, include the name(s) and qualifications of the person(s) responsible for the scheduling, monitoring, updating, and reporting of the schedule. Make revisions to personnel responsible for scheduling in writing to the Departmental Representative at least two weeks prior to submission of a progress schedule.

.10 Submit a letter, stamped and signed by a Professional Engineer registered or licensed in the Province of Ontario, stating that the schedule has been prepared in co-ordination with major subcontractors and suppliers. For the purposes of this Section, "major" is considered as any amount of work and/or supply of material equal to or greater than 5% of the total contract amount, excluding applicable taxes.

.11 Include in monthly submissions the following:

.1 Updated Master Plan Bar Chart showing the original and updated scheduling on the same bar chart, in hardcopy and digital (.pdf) format.

.2 Updated Construction Detailed Schedule in hardcopy and digital (.pdf) format.

.3 Updated Cash Flow Forecast.

.4 Updated Waste Audit and Management Plan.

.5 Progress Report per 1.15 - Progress Monitoring and Reporting.

.12 Make monthly submissions prior to or on the cut-off date for Progress Payments.

.13 Submit Mechanical and Electrical shop drawings within 30 working days of contract award.

.14 Submit Structural shop drawings within 30 working days of contract award.

1.5 QUALITY ASSURANCE

.1 Use experienced personnel, fully qualified in planning and scheduling to provide services from start of construction to Final Certificate, including Commissioning.

1.6 WORK BREAKDOWN STRUCTURE (WBS)

.1 Prepare construction Work Breakdown Structure (WBS) within 5 working days of Award of Contract date.

.1 Develop WBS through at least five levels: project, stage, element, sub-element and work package.

1.7 CONSTRUCTION COST BREAKDOWN (CCB)

.1 Prepare and submit Construction Cost Breakdown (CCB) within 5 working days of Award of Contract date. Develop CCB through at least five levels: Project, stage, element, sub-element and work package.

1.8 PROJECT MILESTONES

.1 Include mandatory project milestones for both Master Plan and Detailed Schedule, but not be limited to, the following:

.1 Project award.
.2 Obtain necessary permits.
.3 Contractor mobilization.
.4 Implement and maintain traffic control plan.
.5 Utility protection.
.6 Establish temporary staging area.
.7 Construct any temporary works
.8 Traffic control and detour
.9 Removal of existing components
.10 Installation of new components
.11 Commission rehabilitated structure.
.12 Removal of traffic detour
.13 Demobilize.

.2 Suggested project milestones for both Master Plan and Detailed Schedule include, but not be limited to, the following dates:

.1 Commissioning Rehabilitated Bridge: April 1st, 2017
.2 Demob: April 7th, 2017.

.3 Project key dates:

.1 Waterway opens for 2017 navigation season May 1st, 2017.

.2 Waterway end of 2016 navigation season November 30th, 2016.

.3 Rehabilitated Bridge to be operational for marine navigation May 1st, 2017.

1.9 MASTER SCHEDULE

.1 Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project.

.2 Prepare comprehensive construction Master Schedule (CPM logic diagram) and dependent Cash Flow Projection within 5 working days of finalizing Agreement to confirm validity or alternates of identified milestones.

.1 Master Schedule will be used as baseline.

.1 Revise baseline as conditions dictate and as required by Departmental Representative.

.2 Departmental Representative as Project progresses will review and return revised baseline within 5 work days.

.3 Reconcile revisions to Master Schedule and Cash Flow Projections with previous baseline to provide continuous audit trail.

.4 Initial and subsequent Master Schedule will include:

.1 CD containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.

.2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.

.3 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status and durations.

.4 Actual/projected monthly cash flow: expressed monthly and shown in both graphical and numerical form.

1.10 DETAILED SCHEDULE

.1 Provide detailed project schedule (CPM logic diagram) within five (5) working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:

.1 Shop drawings.

.2 Samples.

.3 Approvals.

.4 Procurement.

.5 Construction.

.6 Installation.

.7 Site works.

.8 Testing.

.9 Commissioning and acceptance.

.2 Detailed CPM schedule to cover in detail the entire construction period to Final Completion beginning from Award of Contract.

.1 Show remaining activities for CPM construction network system up to Final Certificate and develop complete detail as project progresses.

.2 Detail activities completely and comprehensively throughout duration of project.

.3 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Schedule.

.4 Clearly show sequence and interdependence of construction activities and indicate:

.1 Start and completion of all items of Work, their major components, and interim milestone completion dates.

.2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:

.1 Time for submittals, resubmittals and review.

.2 Time for fabrication and delivery of manufactured products for Work.

.3 Interdependence of procurement and construction activities.

.3 Include sufficient detail to assure adequate planning and execution of Work.

.5 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.

.6 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form "Critical Path". Increased number of critical activities is seen as indication of increased risk.

.7 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to Departmental Representative for review effects created by insertion of new Change Order as part of Monthly Progress Report.

1.11 REVIEW OF THE CONSTRUCTION DETAIL SCHEDULE

.1 Allow 5 work days for review by Departmental Representative of proposed construction Detail Schedule.

.2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit to Departmental Representative for review within 5 work days.

.3 Promptly provide additional information to validate practicability of Detail Schedule as required by Departmental Representative.

.4 Submittal of Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.

1.12 COMPLIANCE WITH DETAILED SCHEDULE

.1 Comply with reviewed Detailed Schedule.

.2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after [written] receipt of approval by Departmental Representative.

.3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.

.1 Corrective measures may include:

.1 Increase of personnel on site for effected activities or work package.

.2 Increase in materials and equipment.

.3 Overtime work.

.4 Submit to Departmental Representative, justification, project schedule data and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. Include as part of supporting evidence:

.1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule.

.2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.

.3 Other supporting evidence requested by Departmental Representative.

.4 Do not assume approval of Contract extension prior to receipt of written approval from Departmental Representative.

.5 In event of Contract extension, display in Detail Schedule that scheduled float time available for work involved has been used in full without jeopardizing earned float.

.1 Departmental Representative will approve number of allowable days for extension of Contract based on project schedule updates for period in question, and other factual information.

.2 Construction delays affecting project schedule will not constitute justification for extension of contract completion date.

1.13 PROGRESS MONITORING AND REPORTING

.1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Departmental Representative at least once monthly to establish progress on each current activity shown on applicable networks.

.2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.

.3 Perform Detail Schedule update monthly with status dated (Data Date) on last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.

.4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.

.5 Submit to Departmental Representative copies of updated Detail Schedule.

.6 Requirements for monthly progress monitoring and reporting are basis for progress payment request.

.7 Submit monthly written report based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:

.1 Description of progress made.

.2 Pending items and status of: permits, shop drawings, change orders, possible time extensions.

.3 Status of Contract completion date and milestones.

.4 Current and anticipated problem areas, potential delays and corrective measures.

.5 Review of progress and status of Critical Path activities.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

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

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

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

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

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

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

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

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

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

.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 as applicable to the documents being submitted on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

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

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

adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

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

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

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

.7 Accompany submissions with transmittal letter, in duplicate, containing:

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

.8 Submissions shall include:

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

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

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

.11 Submit 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 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 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 one electronic copy of manufacturers' instructions for requirements requested in specification Sections and as requested by Departmental Representative.

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

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

.18 Delete information not applicable to project.

.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, an electronic response will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted an electronic response 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.

1.3 SAMPLES

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

.2 Deliver samples prepaid to Departmental Representative's site office.

.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 Amount. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

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

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

1.4 CERTIFICATES AND TRANSCRIPTS

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

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

1.5 FEES, PERMITS AND CERTIFICATES

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates and permits required.

.3 Furnish certificates and permits.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Traffic control, traffic and pedestrian protection.

1.2 ALLOWANCES

.1 Include, as cash allowance, $7000.00 to cover provision of taxi transportation services in accordance with Section 01 21 00, and as outlined in this Section.

.2 All remaining Work of this Section shall fall under the lump sum arrangement.

1.3 REFERENCES

.1 Ministry of Transportation, Ontario (MTO)

.1 Ontario Traffic Manual, Book 7: Temporary Conditions – January 2014

1.4 PROTECTION OF PUBLIC TRAFFIC AND OF THE WORK ZONE

.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 The Contractor shall be responsible for the complete safety and protection of his workers and of the bridge structure, including all necessary provisions to prevent unauthorized vehicular or pedestrian access to the work zone.

.3 When working within the publicly travelled portions of the roadway/sidewalk (travelled way):

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

.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.

.4 Institute work zone protection and ensure that traffic control measures are fully implemented and that all traffic across the LaSalle Causeway has cleared the work zone.

.5 Outside of the closure window, the Contractor shall keep travelled way graded, free from pot holes and of sufficient width for required number of lanes of traffic.

.1 Provide 7.0 m wide minimum temporary roadway for traffic in two-way sections through Work and on detours.

.2 Provide 5.0 m wide minimum temporary roadway for traffic in one-way sections through Work and on detours.

.6 Provide and maintain road access and egress to property fronting along the LaSalle Causeway affected by the work zone, except where other means of road access exist that meet approval of Departmental Representative.

.7 Provide traffic management plan at least two weeks prior to closures to the Departmental Representative. Coordinate with affected stakeholders.

1.5 CONTROL OF PUBLIC TRAFFIC

.1 All work shall be conducted within a single, continuous 48 hour closure of the bridge. The Contractor shall assume that this closure may be scheduled by the Departmental Representative at any time during the week (weekdays/weekend or a combination of both); the bid price shall accommodate all of the aforementioned scenarios.

.2 If and when the following scenarios are authorized to exist by the Departmental Representative, provide competent flag personnel, trained in accordance with, and properly equipped to Ontario Traffic Manual, Book 7: Temporary Conditions for situations as follows:

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

.2 Where roadway, carrying two-way traffic, is restricted to one lane on the bridge, provide competent flag personnel, trained in accordance with, and properly equipped to Ontario Traffic Manual, Book 7: Temporary Conditions.

.3 When labourers or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

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

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

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

.7 At each end of restricted sections where pilot cars are required.

.8 Delays to public traffic due to Contractor's operators: 15 minutes maximum.

.3 Provide temporary detour signage indicating traffic detour route. This item to be paid under cash allowance.

1.6 OPERATIONAL REQUIREMENTS

.1 The Contractor shall maintain existing conditions for traffic throughout period of Contract except that, when required for construction under Contract and when measures have been taken as specified and approved by Departmental Representative to protect and control public traffic.

.2 Any work requiring closures of the bridge shall be restricted such that bridge closures are limited to the window between 9:30 P.M. and 6:00 A.M. the following day. No work requiring bridge closures outside of this window will be permitted.

.3 The Contractor shall schedule his operations in such a manner that the duration of activities which prevent emergency vehicle crossing of bridge are kept to an absolute minimum.

.4 During periods of bridge closure; provide taxi service for pedestrians and cyclists requiring passage to other side of structure. This item to be paid under cash allowance.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 29.06 – Health and Safety Requirements.

1.2 REFERENCES

.1 Fire Protection Standards issued by Fire Protection Services, Labour Program Division of Service Canada:

.1 FCC No. 301-June 1982 Standard for Construction Operations.

.2 FCC No. 302-June 1982 Standard for Welding and Cutting.

.2 FCC standards may be viewed at:

.1 http://www.hrsdc.gc.ca/eng/labour/fire_ protection /policies_standards/commissioner/inde .shtml

1.3 DEFINITIONS

.1 Hot Work defined as:

.1 Welding work.

.2 Cutting of materials by use of torch or other open flame devices.

.3 Grinding with equipment which produces sparks.

.4 Use of open flame torches such as for roofing work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit copy of Hot Work Procedures and sample of Hot Work permit to Departmental Representative for review, within 14 calendar days of acceptance of bid.

1.5 FIRE SAFETY REQUIREMENTS

.1 Implement and follow fire safety measures during Work. Comply with following:

.1 National Fire Code 2010.

.2 Fire Protection Standards FCC 301 and FCC 302.

.3 Federal and Provincial Occupational Health and Safety Acts and Regulations.

.2 In the event of conflict between any provisions of above the authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.6 HOT WORK AUTHORIZATION

.1 Obtain Departmental Representative's written "Authorization to Proceed" before conducting any form of Hot Work on site.

.2 To obtain authorization, submit to Departmental Representative:

.1 Contractor's written Hot Work Procedures to be followed on site as specified below.

.2 Description of the type and frequency of Hot Work required.

.3 Sample Hot Work Permit to be used.

.3 Upon review and confirmation that effective fire safety measures will be implemented and followed during performance of hot work, Departmental Representative will give authorization to proceed as follows:

.1 Issue one written "Authorization to Proceed" covering the entire project for duration of work or;

.2 Subdivide the work into pre-determined, individual activities, each activity requiring a separately written authorization to proceed.

.4 Requirement for individual authorization will be based on:

.1 Nature or phasing of work;

.2 Quantity of various trades needing to perform hot work on project or;

.3 Other situation deemed neccessary by Departmental Representative to ensure fire safety on premises.

.5 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of work.

1.7 HOT WORK PROCEDURES

.1 Develop and implement safety procedures and work practises to be followed during the performance of Hot Work.

.2 Hot Work Procedures to include:

.1 Requirement to perform hazard assessment of site and immediate work area beforehand for each hot work event in accordance with Safety Plan specified in section 01 35 29.

.2 Use of a Hot Work Permit system with individually issued permit by Contractor's Superintendent to worker or subcontractor granting permission to proceed with Hot Work.

.3 Permit required for each Hot Work event.

.4 Designation of a person on site as a Fire Safety Watcher responsible to conduct a fire safety watch for a minimum duration of 60 minutes immediately following the completion of the Hot Work.

.5 Compliance with fire safety codes, standards and occupational health and safety regulations specified.

.3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Label document as being the Hot Work Procedures for this contract.

.4 Procedures to clearly establish responsibilities of:

.1 Worker performing hot work,

.2 Person issuing the Hot Work Permit,

.3 Fire Safety Watcher,

.4 Subcontractor(s) and Contractor.

.5 Brief all workers and subcontractors on Hot Work Procedures and of Permit system. Stringently enforce compliance.

1.8 HOT WORK PERTMIT

.1 Hot Work Permit to include the following:

.1 Project name and project number;

.2 Specific area where hot work will be performed;

.3 Date of issue;

.4 Description of hot work type needed;

.5 Special precautions to be followed, including type of fire extinguisher needed;

.6 Name and signature of permit issuer;

.7 Name of worker to which the permit is issued;

.8 Permit validity period not to exceed 8 hours. Indicate start time/date and termination time/date;

.9 Worker's signature with time/date of hot work completion;

.10 Stipulated time period of safety watch;

.11 Fire Safety Watcher's signature with time/date.

.2 Each Hot Work Permit to be completed in full, signed and returned to Contractor's Superintendent for safe keeping on site.

1.9 FIRE PROTECTION

.1 Do not use fire hydrants, standpipes and hose systems for purposes other than fire fighting.

1.10 DOCUMENTS ON SITE

.1 Keep Hot Work Permits and Hazard assessment documentation on site for duration of Work.

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

Part 2 Products

2.1 NOT USED.

Part 3 Execution

3.1 NOT USED.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 29.06 Health and Safety Requirements.

1.2 REFERENCES

.1 CSA C22.1-12, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

.2 CAN/CSA-C22.3 No.1-06, Overhead Systems.

.3 CSA C22.3 No.7-06, Underground Systems.

.4 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

1.3 DEFINITIONS

.1 Electrical Facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons.

.2 Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment has been isolated.

.3 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).

.4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.

.5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.

.6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit copy of lockout procedures, sample of lockout permit and lockout tags proposed for use in accordance with Section 01 33 00. Submit within 14 calendar days of acceptance of bid.

1.5 COMPLIANCE REQUIREMENTS

.1 Comply with the following in regards to isolation and lockout of electrical facilities and equipment:

.1 Canadian Electrical Code.

.2 Federal and Provincial Occupational Health and Safety Acts and Regulations.

.3 Regulations and code of practise as applicable to mechanical equipment or other machinery being de-energized.

.4 Procedures specified herein.

.2 In event of conflict between any provisions of above authorities the most stringent provision will apply.

1.6 ISOLATION OF EXISTING SERVICES

.1 Obtain Departmental Representative's written authorization prior to working on existing live or active electrical facilities and equipment and before proceeding with isolation of such item.

.2 To obtain authorization, submit to Departmental Representative the following documentation:

.1 Written request to isolate the particular service or facility and;

.2 Copy of Contractor's Lockout Procedures.

.3 Make a Request for Isolation for each event, unless directed otherwise by Departmental Representative, as follows:

.1 Fill-out standard form in current use at the Facility as provided by Departmental Representative or;

.2 Where no form exist, make written request indicating:

.1 The equipment, system or service to be isolated and its location;

.2 Duration of isolation period (ie: start time & date and completion time & date).

.3 Voltage of service feed to system or equipment being isolated.

.4 Name of person making the request.

.4 Do not proceed with isolation until receipt of written notification from Departmental Representative granting the Isolation Request and authorization to proceed with the work.

.1 Note that Departmental Representative may designate another person at the Facility being authorized to grant the Isolation Request.

.5 Conduct safe, orderly shutdown of equipment or facility. De-energize, isolate and lockout power and other sources of energy feeding the equipment or facility.

.6 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of situations which will require isolation of existing services.

.7 Plan and schedule shut down of existing services in consultation with the Departmental Representative.

.8 Conduct hazard assessment as part of the process in accordance with health and safety requirements specified Section 01 35 29.06.

1.7 LOCKOUTS

.1 De-energize, isolate and lockout electrical facility, mechanical equipment and machinery from all potential sources of energy prior to working on such items.

.2 Develop and implement clear and specific lockout procedures to be followed as part of the Work.

.3 Prepare written Lockout Procedures describing safe work practices, procedures, worker responsibilities and sequence of activities to be followed on site by workforce to safely isolate an active piece of equipment or electrical facility and effectively lockout and tagout it's sources of energy.

.4 Include as part of the Lockout Procedures a system of lockout permits managed by the Contractor's Superintendent or other qualified person designated by him/her as being "in-charge" at the site.

.1 A lockout permit is to be issued to specific worker providing a Guarantee of Isolation before each event when work must be performed on a live equipment or electrical facility.

.2 Duties of person managing the permit system to include:

.1 Issuance of permits and lockout tags to workers.

.2 Determining permit duration.

.3 Maintaining record of permits and tags issued.

.4 Making a Request for Isolation to Departmental Representative when required as specified above.

.5 Designating a Safety Watcher, when one is required based on type of work.

.6 Ensuring equipment or facility has been properly isolated.

.7 Collecting and safekeeping lockout tags returned by workers as a record of the event.

.5 Clearly establish, describe and allocate responsibilities of:

.1 Workers.

.2 Person managing the lockout permit system.

.3 Safety Watcher.

.4 Subcontractor(s) and General Contractor.

.6 Generic procedures, if used, must be edited and supplemented with pertinent information to reflect specific project requirements.

.1 Incorporate site specific rules and procedures in force at site as provided by Facility Manager through the Departmental Representative.

.2 Clearly label the document as being the Lockout procedures applicable to work of this contract.

.7 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.

.8 Use industry standard lockout tags.

.9 Provide appropriate safety grounding and guards as required.

1.8 CONFORMANCE

.1 Brief all workers and subcontractors on requirements of this section. Stringently enforce use and compliance.

1.9 DOCUMENTS ON SITE

.1 Post Lockout Procedures on site in common location for viewing by workers.

.2 Keep copies of Request for Isolation forms and lockout permits and tags issued to workers on site for full duration of Work.

.3 Upon request, make available to Departmental Representative or to authorized safety representative for inspection.

Part 2 Products

2.1 NOT USED.

Part 3 Execution

3.1 NOT USED.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA): Canada

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

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

.1 Material Safety Data Sheets (MSDS).

.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.

.5 Province of Ontario

.1 Occupational Health and Safety Act, R.S.O. 1990, Chapter O.1 as amended, and regulations for Construction Projects, O. Reg. 213/91 as amended.

.2 O. Reg. 490/09, Designated Substances.

.3 Workplace Safety and Insurance Act, 1997.

.4 Municipal statutes and authorities

1.2 ACTION AND INFORMATIONAL 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 operation found in work plan.

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

.4 Contractor’s and Sub-contractors’ Safety Communications Plan.

.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 requirements and procedures provided by Departmental Representative.

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

.9 Submit copies of incident and accident reports.

.10 Submit WHMIS MSDS - Material Safety Data Sheets.

.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 beginning of Work.

1.4 WORK PERMIT

.1 Obtain building and other permits related to the project prior to beginning of Work

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

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

1.7 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.

1.8 PROJECT/SITE CONDITIONS

.1 Work at site may involve contact with:

.1 Silica in concrete.

.2 Lead in paint. (Believed to have been removed from all painted surfaces of the bridge in previous painting contract).

.3 Guano on bridge surfaces

.4 Rusted metals from structure

.5 Work near water

.6 Work near utilities

.7 Arsenic (CCA) in preserved wood

.8 Contact with moving equipment

.9 Work on the roadway

.10 Falling hazards

.11 Animals and pests

.12 Low temperatures

.13 Ice

.14 Heating equipment

.15 Air quality/vapours inside enclosures

.2 The Contractor shall comply with the PWGSC lock out/tag out procedures for the equipment at the site.

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 the Departmental Representative in writing. .

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Health and Safety Act, R.S.O. 1990 Chapter O.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 Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with abatement of lead and guano containing materials.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work and report directly to and be under direction of 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 (if applicable).

.5 Ministry of Labour Orders and reports.

.6 Occupational Health and safety Act and Regulations for Construction Projects for province of Ontario.

.7 Address and phone number of nearest Ministry of Labour office.

.8 Material Safety Data Sheets.

.9 Written Emergency Response Plan.

.10 Site Specific Safety Plan

.11 Valid certificate of first aider on duty.

.12 WSIB :In case of Injury at Work: poster.

.13 Location of toilet and cleanup facilities.

1.15 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 POWDER ACTUATED DEVICES

.1 Use powder actuated devices only after receipt of written permission from Departmental Representative.

1.18 WORK STOPPAGE

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

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

1.19 DESIGNATED SUBSTANCES

.1 The Contractor is to familiarize himself with the designated survey reports provided by the 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 DEFINITIONS

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

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 REFERENCES

.1 Reference Standards:

.1 U.S. Environmental Protection Agency (EPA)/Office of Water

.2 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.

.3 EPA General Construction Permit (GCP) 2012

.2 Guidelines and Guidance Documents (as amended)

.1 Canadian Council of Ministers of the Environment (CCME), 2011. Protocols Manual for Water Quality Sampling in Canada.

.2 Canadian Council of Ministers of the Environment (CCME), 1999 (and as Updated). Canadian Environmental Quality Guidelines, Water Quality Guidelines for the Protection of Aquatic Life.

.3 Public Works and Government Services Canada, The Environmentally Responsible Construction and Renovation Handbook – Second Edition (2000)

.3 Ontario Acts and Regulations

.1 Environmental Protection Act, R.S.O. 1990, c. E.19

.4 Federal Acts and Regulations

.1 Fisheries Act, R.S.C. 1985, c. F-14

.2 Canadian Environmental Protection Act, S.C. 1999, c.33

.3 Migratory Birds Convention Act, S.C. 1994, c.22

.4 Species at Risk Act, S.C. 2002, c.29

.5 Canadian Environmental Assessment Act, 2012

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Comply with all applicable Federal, Provincial and Municipal environmental protection laws and regulations. Make the appropriate submissions and obtain all environmental approvals that may be necessary to complete the work in the Contract.

.3 Address all topics at a level of detail commensurate with environmental issues and required construction tasks.

.4 Prior to commencing construction activities or delivery of materials to site provide an **Environmental Protection Plan** which must provide a comprehensive overview of known or potential environmental issues to be addressed during the project. This plan is subject to review and approval by the Departmental Representative.

.5 Provide **Erosion and Sediment Control Plan** identifying type and location of erosion and sediment controls including monitoring and reporting requirements to assure that control measures are in compliance with Federal, Provincial, and Municipal laws and regulations and best management practices. The ESC Plan will consist of a written description and detailed drawings indicating the on-site activities and measures to be used to control erosion and sediment movement for each step of the Work. Erosion and Sediment Control Plan is subject to review and approval by the Departmental Representative.

.6 **Spill Response and Action Plan** subject to review and approval by the Departmental Representative. Include prevention and response procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance within the Plan.

.7 **Dust Management Strategy** subject to review and approval by the Departmental Representative. Strategy is to be designed to document how dust generated from construction activities will be mitigated and address such issues as weather events. Design, purchase and operate equipment in accordance with applicable regulatory requirements, land use permits, and industry best management practise for air quality management.

.8 **Waste Water / Dewatering Management Plan** subject to review and approval by the Departmental Representative. The plan Identify selected methods of management and environmental protection measures and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.9 **Waste Management Plan** is to be prepared and submitted for review and acceptance by the departmental representative.

.10 **Contaminant Prevention Plan** to identify potentially hazardous substances to be used on the 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 for the storage and handling of these material. Plan subject to review and acceptance by a departmental representative.

1.4 ENVIRONMENTAL PROTECTION

.1 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.

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

.3 Include in Environmental Protection Plan:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Names and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.4 Environmental Protection Plan that will take such measures and provide such protection system or systems to ensure that no construction material or debris is to be allowed to fall into or otherwise enter the waterway.

.5 Immediately remove any material which accidentally enters the Canal.

.6 Construct splash pads of riprap to reduce runoff velocity and to promote settlement.

.7 Protect shores, beds of waterbodies, and floodplains to minimize the impact on natural water flow and to prevent degradation and erosion.

.8 Clean any equipment operating in waterbodies prior to entering the water and inspect daily for leaks. Do not store/leave equipment in the watercourse overnight or for extended periods of time.

.9 The use and discharge of chemicals and cleaning agents is prohibited near aquatic habitats.

.10 Ensure all painting and staining is done upland, well above the high water mark or within an enclosed system.

.11 All above grade bulk fuel storage tanks are to be adequately bermed and/or have double walled tanks, and be lined with an impermeable liner to contain spillage. Containment berm to be capable of holding a minimum of 110% of the largest storage tank.

.12 If dewatering of groundwater at or below the water table is required, complete geotechnical testing prior to commencement of dewatering activities to determine and verify any impacts and required mitigation for potable well water users.

1.5 EROSION AND SEDIMENT CONTROL

.1 The Contractor acknowledges that surface erosion and sediment runoff resulting from his construction operations will have a detrimental impact to any downstream watercourse or sewer, and that all construction operations that may impact upon water quality is to be carried out in a manner that strictly meets the requirements of all applicable legislation and regulations. As such, the Contractor is responsible for carrying out operations, and supplying and installing any appropriate control measures, so as to prevent sediment laden runoff or discharge from entering any sewer or watercourse within or downstream of the working area.

.2 Prior to commencing construction activities or delivery of materials to the site, provide an Erosion and Sediment Control Plan for review and approval by the Departmental Representative and appropriate Regulatory Agencies.

.3 The Erosion and Sediment Control Plan (ESCP) is to identify the 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 objectives, and all Federal, Provincial, and Municipal laws and regulations. The ESCP is to include but not be limited to:

.1 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary

facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.2 Written description and detailed drawings indicating the on-site activities and measures to be used to control erosion and sediment movement for each step of the work.

.4 Where, in the opinion of the Departmental Representative or Regulatory Agency, the installed control measures fail to perform adequately, supply and install alternative measures as directed by the Departmental Representative or authority having jurisdiction.

.5 Have additional control measures on site at all times which are easily accessible and may be implemented by the Contractor at a moment's notice.

.6 All workers, including sub-contractors, in the Working Area are to be made aware of the importance of the erosion and sediment control measures and to be informed of the consequences of the failure to comply with the requirements of all Regulatory Agencies and the specifications detailed herein.

.7 Periodically and when requested by the Departmental Representative, clean out accumulated sediment deposits as required at the sediment control divides, including hose deposits that may originate from outside the construction area. Remove accumulated sediment in such a manner that prevents the deposition of this material into any sewer or watercourse and avoids damage to the control measure.

.8 Sediment is to be removed from the site at the Contractor's expense and managed in accordance with the requirements for excess earth material, as specified elsewhere in the Contract.

.9 Immediately report any accidental discharges of sediment material into either the watercourse or the storm sewer system to the Departmental Representative. Failure to report constitutes a breach of this specification and the Contractor may also be subject to the penalties imposed by any applicable Regulatory Agency. Appropriate response measures, including any repairs to existing control measures or the implementation of additional control measures, are to be carried out by the Contractor without delay.

.10 The sediment control measures are only to be removed when, in the opinion of the Departmental Representative, the measure or measures is no longer required. No control measure may be permanently removed without prior authorization form the Departmental Representative. All sediment and erosion control measures are to be removed in a manner that avoids entry of any equipment, other than hand-held equipment, into any watercourse, and prevents the release of any sediment or debris into any sewer or watercourse within or downstream of the Working Area at the Contractor's expense and managed in compliance with the requirements for excess earth material, as specified elsewhere in the Contract.

.11 No claims can be made for extra compensation for the cost of fulfilling the obligations set out in this operational constraint.

1.6 DRAINAGE

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

.2 Divert drainage ditches to areas of stable vegetation located more than 30 m from the natural high water mark.

.3 Ensure any pumped water into waterways, sewer or drainage systems is free of suspended materials. Sediment laden discharge is prohibited from directly entering the Canal or any other watercourse.

.4 In order to prevent silt and sedimentation from entering the watercourse, use a pump to remove the silted water from the work area. Treat silted water by discharging into settling basins, vegetated areas or sediment traps prior to release into the Canal.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with any pending municipal, provincial and federal approvals.

1.7 SITE CLEARING AND PLANT PROTECTION

.1 Ensure that all equipment stays within the confines of the work area during site clearing activities so as not to disrupt any turf or tree roots unnecessarily.

.2 Remove all cleared material immediately and do not place it on grass or near trees for any length of time unless the area has been identified as a storage and/or stockpiling area. This also applies to imported material, i.e. topsoil.

.3 Fuel is not to be stored within the drip line of any tree, and exhaust fumes from all equipment is not to be directed towards any tree's canopy.

.4 Vegetation removal must be conducted outside of Environment Canada Migratory Bird Nesting window (April 1 – August 31) or on the advice of a qualified biologist following an active bird nest survey.

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

.6 Minimize stripping of topsoil and vegetation.

.7 Minimize clearing, grubbing and grading to the extent possible. If buffers cannot be maintained, avoid grubbing of vegetation root mass on slopes adjacent to the canal.

1.8 WORK ADJACENT TO, IN AND OVER WATERWAYS

.1 Obtain all regulatory approvals for any in-water works that are anticipated.

.2 Do not dump excavated fill, waste material or debris in waterways.

.3 Ensure excavated material is situated in such a manner and location to prevent the erosion and/or deposition of this material into waterways.

.4 Store heavy equipment a safe distance to any watercourse when not in use.

.5 Refueling of equipment to occur away from slopes and at least 30 m from any surface water.

.6 The use and discharge of chemicals and cleaning agents is prohibited within 30 m of aquatic habitats.

.7 Store all oils, lubricants, fuels and cleaning agents in secure areas on impermeable pads and away from aquatic habitats and waterbodies. Provide berms if necessary.

.8 Only the working end of machinery and is to directly enter the water. Clean the working end of machinery and maintain free of fluid leaks. If oils are to be used, they are to be vegetable based oils.

.9 Take measures and provide a protection system or systems to ensure that no construction material or debris is allowed to fall into the waterway.

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

.11 Stabilize any waste materials removed from the work site, upland to prevent them from entering the watercourse.

.12 Deploy containment measures during demolition of the existing bridge, to prevent potential deposition of deleterious substances into the receiving environment, including the waterway.

.13 Discharge sediment laden or turbid waters generated from activities, into proper sediment containment system for settling and filtration.

.14 Dumping excavated fill, waste material, or debris in the watercourse is prohibited.

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

.16 Do not blast under water.

1.9 POLLUTION CONTROL

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

.2 Control emissions from equipment to local authorities' emission requirements.

.3 Unnecessary idling is not permitted.

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

.1 Provide temporary enclosures where required by applicable regulations.

.5 Take whatever measures necessary to ensure that pollutants do not enter the watercourse

.6 Do not allow debris, residue of wet concrete or mortar in the aquatic environment.

.7 All lubricants, petroleum products and chemicals to be stored in secure impermeable area

.8 Remove all debris accidentally introduced into the environment as soon as possible.

.9 Prepare a Spills Response and Action Plan and implement immediately in the event of a spill of a deleterious substance (i.e. during construction or refuelling of equipment) or upon the detection of sediment release (i.e. debris from rehabilitation works).

.10 The Spills Response and Action Plan is to address how to react to and clean-up any hazardous spills that may occur and is to also identify equipment refuelling and maintenance areas. This plan may include, but is not limited to proper containment, clean-up and reporting protocols, in accordance with various federal and provincial requirements.

.11 Should a spill take place during the Works:

.1 Stop work, contain the spill of deleterious substance and/or sediment-laden release, debris and other waste materials and prevent their further migration into the environment including the waterway;

.2 Notify all applicable authorities including Environment Canada and the Departmental Representative and Ontario Department of the Environment;

.3 Promptly clean–up and appropriately dispose of the deleterious substances and/or the sediment-laden water, construction debris and other waste material in a location where it cannot enter/re-enter any watercourse;

.12 Ensure clean-up measures are suitably applied so as not to result in further degradation of the canal.

.13 Perform the operation and refueling and maintenance of equipment with the use of toxic materials offsite.

.1 Refuel and maintain machinery or equipment, and store materials at least 30 m away from the water.

.14 An adequate supply of clean-up materials are to be on site with a work crew that is fully trained to prevent and respond to accidental spills

1.10 PROTECTION OF FISH AND WILDLIFE

.1 If in-water works are required, additional approvals may be necessary. The Contractor is advised that there may be additional mitigation measures prescribed by the Department of Fisheries and Ocean Canada in accordance with applicable legislation.

.2 Consult with regulatory agencies regarding all habitat/species protection mitigation options and methods prior to commencing work. Ensure that all permits are in place prior to commencing activities.

.3 Vegetation removal must be conducted outside of Environment Canada Migratory Bird Nesting window (April 1 – August 31) or on the advice of a qualified biologist following an active bird nest survey.

.4 Erosion and Sediment Control measures installed during construction are to be installed and maintained.

.5 Seek consultation with applicable Federal /Provincial Jurisdiction prior to development to determine, which permits, if any, may be required to complete the proposed development.

.6 If wildlife is encountered within the confines of the construction envelope, implement humane trapping and relocations under the direction of a qualified professional.

.7 Erosion and Sediment Control Plan (ESCP) measures and construction fencing are to be designed, maintained and regularly inspected to ensure it does not entrap wildlife.

.8 Bird nest removals from structures are to occur outside of the migratory breeding bird season or based on the advice of the qualified biologist.

.9 Collect and remove all waste and litter from the work site on a daily basis, or store in secure containers to prevent scavenging by birds and wildlife.

1.11 HISTORICAL/ARCHAEOLOGICAL CONTROL

.1 If unexpected archaeological resources are uncovered, contact the Departmental Representative so that they can determine what additional mitigation will be necessary to protect and salvage the cultural resources.

.2 If unknown archaeological resources are discovered, immediately cease alteration of the site and engage a licensed consultant archaeologist following approval by the Departmental Representative, to carry out field work in compliance with applicable legislation.

.3 If deeply buried deposits are found during any construction activities, immediately notify appropriate agencies.

.4 In the event that human remains are encountered during construction activities, immediately notify local law enforcement authorities and/or the coroner, followed by the appropriate agency.

1.12 HAZARDOUS MATERIALS AND DESIGNATED SUBSTANCES

.1 Refer to Section 02 81 01 – Hazardous Materials for further information regarding the use of hazardous materials

.2 Proper spill control equipment/items (spill kits, MSDSs, absorbents, containers, caution signs/tape, etc.) will be readily available in areas where large quantities of hazardous materials are to be stored.

.3 Although the bridge was blasted and recoated circa 2007 there still may be some remaining levels of lead in the paint. Handling, disposal and recycling requirements in accordance with provincial and federal regulations.

1.13 FIRES

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

1.14 SITE RESTORATION

.1 Cover or stabilize all disturbed soils and grass as soon as possible upon completion of work, and maintain erosion and sedimentation control measures in place until slopes are stabilized, as approved by Departmental Representative.

.2 Restore the area following construction with a fast-growing, low maintenance, diverse native species adapted to the project area to enhance the local plant community.

.3 Following removal of all temporary works, a post-construction survey will be completed to ensure site re-instatement.

.4 Ensure that site re-instatement following construction/demolition is to the satisfaction of regulating authorities.

1.15 NOTIFICATION

.1 Departmental Representative will notify the contractor in writing of observed noncompliance with federal, provincial and municipal environmental laws and regulations, permits and other elements of the Contractors Environmental Protection Plan.

.2 Contractor: after receipt of the 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 work order until satisfactory corrective action has been taken

.4 No time extensions granted or equitable adjustment allowed to the Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 CLEANING

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

.2 Maintain the site in a tidy condition, free from the accumulation of waste products, debris and litter

.3 Do not deposit demolition or construction debris in the waterway; inert concrete/asphalt debris will be considered a deleterious substance.

.4 An emergency spill kit is to be kept on site in case of fluid leaks or spills from machinery.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 - General Instructions.

.2 Section 01 35 00.06 – Special Procedures for Traffic Control.

.3 Section 01 35 29.06 – Health and Safety Requirements.

.4 Section 01 35 43 - Environmental Procedures.

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

1.2 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 CSA S6-14, Canadian Highway Bridge Design Code.

.3 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.3 HAZARDOUS MATERIAL DISCOVERY

.1 Stop work immediately when material suspected as being hazardous is encountered during demolition work. Notify Departmental Representative immediately.

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, testing, administrative and enforcement requirements.

.2 Tests.

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

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

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

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and 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 orderly sequence to not cause delays in Work.

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

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

1.7 REPORTS

.1 Submit 4 copies of inspection and test reports to Departmental Representative.

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

1.8 TESTS

.1 Furnish test results as requested.

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

1.9 MILL TESTS

.1 Submit mill test certificates for all steel.

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 This section covers the work of supplying, maintaining, and removing, temporary access, housing, lighting, and supplementary heating and ventilating for the workspaces and the work described by the drawings and the specification.

.2 Additional requirements for sealing and containment of areas during paint removal and surface preparation are provided in Section 01 35 43 – Environmental Protection.

.3 Note that the existing operator's building and main building are not available for use, by this Contractor, at any time during this Contract.

.4 The access, housing, lighting, heating and ventilating must be sufficient:

.1 To ensure a safe working environment.

.2 To facilitate progress of Work in an efficient manner.

.3 To eliminate any chance of debris falling to the waterway below.

.4 To protect areas or features adjacent to the Work during procedures which may damage those areas or features.

.5 To protect the Work and products against dampness and cold.

.6 To prevent moisture condensation on surfaces.

.7 To provide ambient temperatures and humidity levels for storage, application, installation and curing of materials.

.8 To provide sufficient lighting to work areas.

.5 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 is required to achieve the best quality of the finished product. This section is especially important to all painting operations.

1.2 RELATED REQUIREMENTS

.1 Section 05 12 33 – Structural Steel for Bridges

.2 Section 09 79 19 – Painting Exterior Metal Surfaces

1.3 DEFINITIONS

.1 Scaffolding: any method used for access to carry out the Work such as a barge, rigid framed scaffolding, mobile access buckets, cranes, ladders, etc. Scaffolding includes swing staging.

.2 Housing: enclosure placed around Work to provide protection for the work taking place, and to the waterway and, to provide an air tight micro-climate more suitable to the work than ambient atmospheric conditions.

1.4 REFERENCES

.1 SSPC Guide 6 – Steel Structures Painting Council Guide for Containing Surface Preparation Debris During Paint Removal Operations.

.2 SSPC Guide 16 – Steel Structures Painting Council Guide for Specifying and Selecting Dust Collectors.

1.5 DESIGN

.1 It is anticipated that a full air tight enclosure will not be required as lead based paints have been previously removed. Containment of dust and removed material will be required when the small areas of paint are removed from the old structure.

.2 General design concepts and detailing relative to the containment of debris and the provision of dust collection will be in accordance with this specification and SSPC Guide 6 and SSPC Guide 16.

.3 Engage a Professional Engineer licensed in the Province of Ontario, who is experienced in this work, to design, draw and inspect the scaffolding, temporary housing, temporary lighting and heating and humidity measures. All drawings shall be sealed and signed by this Professional Engineer.

.4 All temporary work required to under this Contract shall be erected and removed within the scheduled closure duration.

1.6 SUBMITTALS

.1 Submit in accordance with Section 01 33 00:

.1 Drawings for all scaffolding, temporary housing and temporary lighting.

.2 Heating and humidity control measures.

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

1.7 SCAFFOLDING

.1 Provide all scaffolding, ladders, access lifting equipment, to carry out the work and protect the public.

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

.3 Make periodic inspections of the scaffolding as the work progresses.

.4 Make no holes in the structural steel nor any welds to the structural steel to attach the scaffold.

1.8 HOUSING

.1 Provide strong and durable housing for portions of the work which must be protected, heated, and/or ventilated during the work. Design housing to withstand rain, wind and snow.

.2 Install and maintain temporary coverings to protect existing features, such as gearing, limit switches and electrical equipment from damage in the course of the work. Remove these at the end of the work. Make good all damage to the satisfaction of the Departmental Representative.

.3 For coating application:

.1 Temperature and relative humidity requirements refer to Section 09 97 19 – Painting Exterior Metal Surfaces

.2 The Contractor shall manage water from precipitation to prevent fouling or damage to the coating system or prepared surfaces.

1.9 AIR QUALITY

.1 Monitor air quality inside the enclosure and the integrity of the housing to ensure temperature and relative humidity requirements set forth in Section 09 97 19 are satisfied, and that all requirements of the coating manufacturer are additionally satisfied.

.2 Provide separate air supply for workers.

.3 Implement and maintain dust control measures in accordance with Province of Ontario regulations.

.4 Monitor temperatures, humidity and minimum air exchange rates within enclosures.

1.10 LIGHTING

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

.2 During night time work provide additional lighting in work areas to compensate for the lack of natural lighting.

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

1.11 TEMPORARY HEATING

.1 Provide temporary heating required during the construction period.

.2 For coating application:

.1 Temperature and relative humidity requirements refer to Section 09 97 19 – Painting Exterior Metal Surfaces.

1.12 TEMPORARY VENTILATING

.1 Ventilate storage spaces containing hazardous or volatile materials but in a manner not to reduce the containment of dust.

1.13 PROTECTION

.1 As part of this work protect all greased surfaces which may be affected by the work by covering with tarps or and or plastic wrapped or taped to form an effective barrier.

1.14 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 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 Departmental Representative as to type, materials and detail.

Part 3 Execution

3.1 HEATING EQUIPMENT

.1 Use only heating equipment types acceptable to the Departmental Representative

.2 Use electricity, gas, diesel oil or other fuels approved by the Departmental Representative

.3 Store fuel to the requirements of the Fire Commissioner of Canada.

.4 Provide and maintain temporary fire protection equipment during performance of Work commensurate with fuel source selected.

.5 Locate fuel storage facilities away from the water and structural components of the bridge.

.6 Ensure that the heating requirements are met by providing, at optimum efficiency of the equipment, a capacity of 125% of the heat requirement and a sufficient number of standby heaters ready for use at the site.

.7 Vent the exhausts of heating equipment to the outside of the housing and well clear of combustible materials. Maintain air quality within the enclosure and do not pollute the environment. If the products of combustion enter the enclosure provide regular (minimum twice a week) air sampling for products of combustion.

.8 Upon receipt of the Departmental Representative's approval:

.1 Discontinue heating operations;

.2 Remove the housing and heating equipment from the site.

3.2 FIELD QUALITY CONTROL

.1 Provide maximum-minimum thermometers inside the housing.

.2 Measure and monitor humidity levels to ensure they are compatible with painting operations.

.3 Ensure continuity of protection by providing a Watchkeeper to make periodic checks, at all times when work is and is not in progress. The Watchkeeper's qualifications are to be sufficient to perform maintenance on heating and ventilating equipment:

.1 Maintain strict supervision of the operation of heating and ventilating equipment.

.2 Enforce safe work practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes due to mis-use of the heating and ventilating equipment.

.5 Undertake preventative maintenance and re-fuelling.

.6 Complete emergency repairs of minor complexity.

.7 Place standby items into service.

.8 Record maximum and minimum temperatures.

.9 Make the written temperature records available to the Departmental Representative.

.10 In the event that heating or humidity levels are not maintained all suspect work shall be replaced.

3.3 REVIEW OF WORK

.1 In the event that heating or humidity levels are not maintained all suspect work shall be replaced.

.2 Suspect work shall be considered to include all work that is not fully cured based on 150% of manufacturer's written curing times.

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 each specifications section, reference may be made to reference standards.

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

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

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

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

.6 OPSS Ontario Provincial Standard Specifications and OPSD Ontario Provincial Standard Drawings quoted in these specifications are available online at http://www.raqsa.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage .

1.3 QUALITY

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

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

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

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

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

1.4 AVAILABILITY

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

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

1.5 METRIC SIZED MATERIALS

.1 SI metric units of measurement are used extensively on the drawings and in the specifications for this project.

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

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

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

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

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

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

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

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

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

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

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

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

1.7 TRANSPORTATION

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

1.8 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.9 QUALITY OF WORK

.1 Quality of Work shall be of the highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if site conditions will impact the quality of the work.

.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.

1.10 CO-ORDINATION

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

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

1.11 REMEDIAL WORK

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

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

1.12 STRUCTURAL FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise. Torque bolts in accordance with manufacturer’s instructions; structural bolts shall be installed as specified elsewhere in the Contract Documents.

.2 Prevent electrolytic action between dissimilar metals and materials.

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

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

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

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

.7 Re-drilling of holes on site is not permitted.

1.13 EQUIPMENT - FASTENINGS

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

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

.3 Prevent electrolytic action between dissimilar metals and materials.

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

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

1.14 PROTECTION OF WORK IN PROGRESS

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

1.15 EXISTING UTILITIES

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PRICE AND PAYMENT PROCEDURES

.1 In accordance with Section 01 22 01, payment for work associated with this section is included in the Lump Sum price.

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

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

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

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

.6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.7 Dispose of waste materials and debris off site.

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

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

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

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

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

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

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

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

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

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

.7 Remove dirt and other disfiguration from exterior surfaces.

.8 Sweep and wash clean paved areas.

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

.10 Remove snow and ice from access to bridge and off the bridge.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 CONSTRUCTION & DEMOLITION WASTE

.1 Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. Target for this project is 75% diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.

.2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.

.1 Provide facilities for collection, handling and storage of source separated wastes.

.2 Source separate the following waste:

.3 Brick and portland cement concrete.

.4 Corrugated cardboard.

.5 Wood, not including painted or treated wood or laminated wood.

.6 Gypsum board, unpainted.

.7 Steel.

.8 Items indicated in Section 02 42 93, Deconstruction and Waste Products Workplan Summary.

.3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.

.1 Indicate how material being removed from the site will be reused, recycled, composted or anaerobically digested using Section 02 42 93, Deconstruction and Waste Products Workplan Summary.

.4 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.

1.2 WASTE PROCESSING SITES

.1 Province of: Ontario.

.1 Ministry of Environment and Energy, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.

.2 Telephone: 800-565-4923 or 416-323-4321.

.3 Fax: 416-323-4682.

.2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.

.1 Telephone: 416-657-2797.

.2 Fax: 416-960-8053.

.3 Email: rco@rco.on.ca.

.4 Internet: http://www.rco.on.ca/.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Government Chief Responsibility for the Environment.

Ontario Ministry of Environment and Energy
135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5

General Enquiries
(416) 323-4321
(800) 565-4923

Fax
(416) 323-4682

Environment Canada
Toronto, Ontario
General Enquiries
(416) 734-4494

END OF SECTION

Part 1 General

1.1 INSPECTION AND DECLARATION

.1 Acceptance of Work Procedures:

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

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

.2 Request Departmental Representative’s inspection.

.2 Departmental Representative Inspection:

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

.2 Contractor to correct Work as directed.

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

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

.2 Defects: corrected and deficiencies completed.

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

.4 Certificates required by Utility companies: submitted.

.5 Operation of systems: demonstrated to Departmental Representative's personnel.

.6 Work: complete and ready for final inspection.

.4 Final Inspection:

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

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

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

.6 Commencement of Lien and Warranty Periods: date of Departmental Representative's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment:

.1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

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

.8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.2 CLEANING

.1 Maintain project free of accumulated waste and rubbish.

.2 Final cleaning:

.1 Remove temporary protection.

.2 Remove dust, dirt and foreign matter from surfaces.

.3 Broom clean paved exterior surfaces, rake clean other exterior surfaces.

.4 Remove snow and ice from access to building and parking lots.

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

1.3 COMMISSIONING

.1 Verify operation of limit switches and span lock mechanism and adjust as necessary.

.2 Verify equal seating of lift span on bearing seats and adjust as necessary.

.3 Verify no displacement (0±1 mm) in the bridge truss (with respect to existing condition) using established reference lines as shown on the Contract Drawings and measuring geometry before and after partial replacement of bottom chord. Measurements shall be taken with equipment capable of measuring to the nearest 0.5 mm.

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 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to conclusion of Contract with Contractor's representative, Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review warranty requirements, manufacturer’s installation instructions.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

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

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Copy will be returned after final inspection with Departmental Representative’s comments.

.4 Revise content of documents as required prior to final submission.

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

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

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

1.4 FORMAT

.1 Organize data as instructional manual.

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

.3 When multiple binders are used correlate data into related consistent groupings. 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 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 AutoCAD dwg format on CD. The drawings shall conform to PWGSC National CADD Standards and Supporting Documents.

1.5 CONTENTS – EACH VOLUME

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

.1 Date of submission; names.

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

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

.2 For each product or system:

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

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

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

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

1.6 AS -BUILTS AND SAMPLES

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

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

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

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. 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. The CADD files shall conform to PWGSC National CDD Standards and Supporting Documents. Submit pdf and CADD files on USB compatible with PWGSC encryption requirements; 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".

1.7 RECORDING ACTUAL SITE CONDITIONS

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

.2 Use 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 Specifications: 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, and field test records, required by individual specifications sections.

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

1.8 EQUIPMENT AND SYSTEMS

.1 Carefully document position and orientation of all equipment, control systems and sensors required to be removed to do the work of this Contract. Submit documentation to the Departmental representative a minimum of 10 days prior to commencing removals.

.2 Partially remove existing equipment, control systems and sensors only if absolutely necessary to do the work of this Contract.

.3 Upon completion of the work, reinstate all removed equipment, control systems and sensors to their original position and verify proper function. Function verification to be witnessed by the Departmental Representative.

.4 Submit written documentation of the verification of proper function to the Departmental Representative.

1.9 MATERIALS AND FINISHES

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

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

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

1.10 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

1.11 WARRANTIES AND BONDS

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

.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 applicable item of work.

.4 Except for items put into use with Departmental Representative'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.

1.12 COMMISSIONING REPORT

.1 Provide Commissioning Report and certify all findings, tests and measurements obtained during commissioning.

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 General requirements for commissioning bridge span locks and limit switches.

1.2 CONTRACTOR'S RESPONSIBILITIES

.1 Completion of construction works and subsequent notification to the Departmental Representative that systems are ready for commissioning

.2 Adjustment of limit switch position as directed by the Departmental Representative including repeated bridge lifts and readjustment to set the limit switches in the correct position for proper bridge operation

.3 Cooperation with the Departmental Representative for commissioning measurements deemed necessary by the Departmental Representative to confirm span lock function in accordance with the Contract Documents

.4 Adjustments to span lock installation to rectify deficiencies identified by the Departmental Representative.

1.3 PREPARATION

.1 Confirm installation is complete in accordance with the Contract Documents prior to notification of the Departmental Representative to commence commissioning of span locks and limit switch installations

.2 Coordinate with bridge operation to arrange for bridge movements deemed necessary by the Departmental Representative

1.4 1.9 EXECUTION

.1 Make adjustments to Span Locks and Limit switch components as directed by the Departmental Representative to establish correct component function to the satisfaction of the Departmental Representative.

Part 2 Products

2.1 2.1 NOT USED

.1 Not Used.

Part 3 PART 3 - EXECUTION

3.1 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 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 Definitions:

.1 Demolition: selective removal of components following removal of hazardous materials.

.2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly.

.3 Waste Audit (WA): detailed inventory of materials in building. Indicates quantities of reuse, recycling and landfill.

.4 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

.2 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 ADMINISTRATIVE REQUIREMENTS

.1 Site Meetings.

.1 Convene pre-demolition meeting one week prior to beginning work of this Section to:

.1 Verify project requirements.

.2 Review removal procedures.

.3 Review installation and substrate conditions.

.4 Co-ordination with other sub-trades.

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

.6 Review bridge operation and vehicular traffic restrictions.

.2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.

.2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.

.1 Notify Departmental Representative in writing when unforeseen delays occur.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Shop Drawings:

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

.2 Submit for approval: drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.

.3 Hazardous Materials:

.1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

.4 Waste Reduction Workplan:

.1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 20 and indicate:

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

.2 Schedule of selective demolition.

.3 Number and location of dumpsters.

.4 Anticipated frequency of tippage.

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

.5 Certificates:

.1 Submit certified bills of lading, receipts from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of Departmental Representative.

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

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, CEAA, TDGA, applicable Provincial regulations.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with Section 01 35 43 - Environmental Procedures.

.2 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.

.2 Remove and store materials to be salvaged, in manner to prevent damage.

.3 Store and protect in accordance with requirements for maximum preservation of material.

.4 Handle salvaged materials as new materials.

.3 Develop Waste Reduction Workplan related to Work of this Section

.4 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 20.

1.8 SITE CONDITIONS

.1 Site Environmental Requirements.

.1 Perform work in accordance with Section 01 35 43 - Environmental Procedures.

.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.

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

.2 Existing Conditions.

.1 Remove contaminated or hazardous materials as defined by authorities having jurisdiction and as directed by Departmental Representative from site, prior to start of demolition Work, and dispose of at designated disposal facilities in safe manner in accordance with TDGA and other applicable regulatory requirements.

.2 List of hazardous materials: None.

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 Item 3.3 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 utilities. Preserve active utilities traversing site in operating condition. There are utilities immediately to the north and south of the bridge for the full length of the bridge and in the abutments.

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

3.2 SHORING AND BRACING

.1 Provide all temporary bracings and shoring to the structure so that stability is maintained throughout the project.

.2 Provide bracing to prevent overloading of members and to maintain alignment of components. Do not allow forces in connection and adjacent connections to increase such that any loosening of the riveted connections could occur.

.3 All bracing and shoring design and drawings are to be completed by a Professional Engineer licensed in the Province of Ontario engaged by the Contractor and shall be stamped, sealed and dated. The installation and final configuration of the bracing and shoring shall be reviewed by the Contractor's Engineer.

3.3 REMOVAL OF HAZARDOUS WASTES

.1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

3.4 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 approved in Waste Reduction Workplan and as instructed by Departmental Representative.

.4 Provide adequate access to facilitate, determination of location and extent of repair, performance of the work and inspection of the work.

3.5 RESTORATION

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

.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

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.

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

3.7 PROTECTION

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 29 - Health and Safety Requirements

.2 Section 01 35 43 - Environmental Procedures

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

.4 Section 02 08 00 – Asbestos Abatement

1.2 REFERENCES

.1 Canadian Environmental Protection Act,1999 (CEPA 1999)

.1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).

.2 Department of Justice Canada (Jus)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA) 1992, (c. 34).

.2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).

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

.1 Material Safety Data Sheets (MSDS).

.4 National Research Council Canada Institute for Research in Construction (NRC-IRC)

.1 National Fire Code of Canada-2010.

1.3 DEFINITIONS

.1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.

.2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.

.3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

1.4 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 The work under this section will not be measured and is deemed to be included in the cost for the work associated to Section 02 42 13 – Deconstruction of Structures.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Submit WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements, to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.

.3 Submit Hazardous Materials Management Plan to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.

.4 Construction Waste Management:

.1 Submit project Waste Reduction Work Plan in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75 % of construction/demolition wastes were reused, recycled or salvaged.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

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

.3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and all other applicable federal, provincial and municipal regulations.

.4 Storage and Handling Requirements:

.1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.

.2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.

.4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.

.1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.

.2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.

.5 Transfer of flammable and combustible liquids is prohibited within buildings.

.6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.

.7 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.

.8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.

.9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

.10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers.

.2 Label containers of hazardous materials and wastes in accordance with WHMIS.

.3 Store hazardous materials and wastes in containers compatible with that material or waste.

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.

.6 Store hazardous materials and wastes in secure storage area with controlled access.

.7 Maintain clear egress from storage area.

.8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

.9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.

.10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

.11 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.

.12 Report spills or accidents immediately to Departmental Representative, and in accordance with Section 01 35 43 – Environmental Procedures. Submit a written spill report to Departmental Representative within 24 hours of incident.

.5 Develop Waste Reduction Work Plan related to Work of this Section and in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.6 Packaging Waste Management: remove for reuse as specified in Waste Reduction Work Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Description:

.1 Bring on site only quantities hazardous material required to perform Work.

.2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

Part 3 Execution

3.1 HANDLING OF ON-SITE HAZARDOUS MATERIALS

.1 Asbestos: Asbestos Containing Materials were identified in the watermain running along Denys Street. Handling and disposal procedures is to be done in accordance with provincial and federal legislation.

3.2 CLEANING HANDLING OF ON-SITE HAZARDOUS MATERIALS

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

.2 Recycle hazardous wastes for which there is approved, cost effective recycling processing available.

.3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.

.4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.

.5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

.6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.

.7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

.8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:

.1 Hazardous wastes recycled in manner constituting disposal.

.2 Hazardous waste burned for energy recovery.

.3 Lead-acid battery recycling.

.4 Hazardous wastes with economically recoverable precious metals.

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.
- .4 All other work as shown on the Contract Drawings

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-13, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength Metric.

.2 CSA International

- .1 CSA G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/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 W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
- .6 CSA W59-03 (R2008), Welded Steel Construction, (Metal Arc Welding).
- .7 CSA W47.1-09 Certification of companies for fusion welding of steel.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Removals and Pre-Installation Meetings:

- .1 Convene pre-removals and pre-installation meeting one week prior to beginning work of this Section, with Contractor’s Representative and Departmental Representative 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 manufacturer's written installation instructions and warranty requirements.
  - .6 Review bridge operation, marine and vehicular traffic restrictions.

.2 Prior to start of Work arrange for site visit with Departmental Representative to examine existing site conditions.

.3 Ensure Departmental Representative, site supervisor, project manager, subcontractor representatives attend.

.4 Departmental Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

1.5 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 for structural steel and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:

.1 All submissions below to be stamped and signed by a Professional Engineer registered or licensed in the Province of Ontario.

.2 Submit shop drawings.

.3 Indicate shop and erection details including shop splices, cuts, copes, connections, holes, bearing plates, threaded fasteners, rivets and welds. Indicate welds by CSA W59, welding symbols.

.4 Proposed welding procedures to be approved by Canadian Welding Bureau. Welding to the original members of the bridge is not anticipated on this project. The bridge is a dynamic structure and welding would be contingent on the details exceeding the fatigue life of the original structure.

.5 Submit description of methods, temporary bracing and strengthening, sequence of erection and type of equipment proposed for use in erecting structural steel signed and sealed by a Licensed Professional Engineer.

.6 Submit description of methods, temporary bracing and strengthening, sequence of removals and type of equipment proposed for use in removing structural steel signed and sealed by a Licensed Professional Engineer.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

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

.1 Ensure Departmental Representative has delivery schedules 7 days minimum prior to shipping.

.3 Storage and Handling Requirements:

.1 Provide protective blocking for lifting, transportation and storing.

.1 Exercise care during fabrication, transportation and erection plates and sections.

.2 Do not notch edges of members.

.3 Do not cause excessive stresses.

.2 Mark mass on members weighing more than 3 tonnes.

.3 Protect unpainted weathering steel, before erection, with waterproof covering.

.4 Ensure that no portion of steel comes into contact with ground.

.1 Replace defective or damaged materials with new.

1.7 QUALITY ASSURANCE

.1 Preconstruction Testing:

.1 Provide suitable facilities and cooperate with Departmental Representative in carrying out inspection and tests required.

Part 2 Products

2.1 MATERIALS

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

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

2.2 FASTENERS

1. Bolts smaller than 1 ½ in. (38mm): high strength heavy hex bolts made from material equal to ASTM A325M unless otherwise specified on the Contract Drawings.
2. Bolts larger than 1 ½ in. (38mm) made from material equal to ASTM A449-07b.
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 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.
4. Turned bolts are called out by nominal thread diameter on the Contract Plans. The bodies of turned bolts shall be 63 micro-inch finish or finer, and as defined by CHBDC 13.8.17.8, unless noted otherwise on the Contract Plans. 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 Plans. 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 sockethead cap screws: ASTM A574-08.
6. Hex socket flat countersunk head cap screws: ASTM F835-04el.
7. Stainless steel hex cap screws ASTM F593-02 (2008)
8. Hex cap screws ASTM A449-07b

9. Lock Washers: ASME B18.21.1-2009
10. Brass hex socket flat countersunk head cap screws: ASTM F468-06el
11. 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 A563-07a are required unless indicated otherwise on the Contract Drawings. Submit alternate locking methods to the Departmental Representative for approval. All hardened steel washers: in accordance with ASTM F436-09.
12. 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 approval by the Departmental Representative.

2.3 SOURCE QUALITY CONTROL

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

.2 Submit to Departmental Representative 2 copies of certified test reports for Charpy V-notch test.

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

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

.5 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 previously installed under other Sections or Contracts are acceptable for structural steel installation in accordance with manufacturer's written instructions.

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

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

3.2 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 Work near river banks or embankments in accordance with the Contractor’s Health and Safety Plan submitted to the Departmental Representative prior to commencing work.

.4 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.

.5 Place anchor bolts at elevations and locations indicated.

.1 Protect holes against entry of water and foreign material.

.2 Provide heating and protection as directed by Departmental Representative and completely fill space around anchor bolts with grout.

3.3 REMOVALS

.1 Cutting of existing structural steel is not anticipated to be required to do the work of this Contract. 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 cutting and 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.

3.4 REMOVAL OF EXISTING FASTENERS

.1 It is anticipated that removal of existing fasteners (rivets and bolts) may be required to complete the designated repairs. It is further 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 price.

.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 or 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 CAN/CSA S6, Design of Highway Bridges and CAN/CSA-S16-09, Design of Steel Structures.

.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 permitted by Departmental Representative.

.3 Weld only at locations indicated on shop drawings.

.4 High strength bolting: in accordance with CAN/CSA S6. 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 Span length tolerances:

.1 Girders and beams: plus or minus 3 mm

.2 Centre-to-centre of bearing stiffeners and bearing plates: plus or minus 3 mm.

.9 Do not shop splice.

.10 Field splices: to approval of Departmental Representative.

.11 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.

.12 Match marking: shop mark.

.13 Provide temporary support to items attached to the steel members to be replaced including span lock mechanism, electrical equipment, limit switches etc.

3.6 CLOSURE

.1 Work of the Contract shall be performed within the closure duration set forth elsewhere in the Contract Documents

.2 The Contractor shall provide a method of securely holding the bridge in position to prevent unintended movement, either up or down, when Construction operations necessitate a partial opening of the bridge. The Contractor shall submit the proposed methodology to the Departmental Representative two weeks prior to the planned closure for review and acceptance.

.3 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.

.4 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.

.5 The Contractor shall demonstrate and submit for review a written plan methodology including an itemized step by step sequence of every task required to fully complete the project 14 days before the planned closure and demonstrate the availability of all necessary material, equipment and labour on site.

3.7 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 SECTION INCLUDES

.1 This section covers the requirements for the painting of all new and existing steelwork affected by all 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.

1.2 RELATED SECTIONS

.1 Section 01 55 00 - Access, Housing, Heating and Ventilation

.2 Section 05 12 33 – Structural Steel for Bridges

1.3 REFERENCES

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

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

.3 American Society for Testing and Materials

.1 ASTM D160-01, Standard Practice for Degree of rusting on Painted steel Surfaces.

.2 ASTM D2369-03, 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 1-82(R2004), 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, Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs) Editorial Changes September 1, 2000 (Steel Structures Painting Manual, Chapter 2 – Surface Preparation Specs).

.8 SSPC-PA 2-04, 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 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00

.2 Submit painting plan designating the locations and order of painting as well as locations of laps in coating system layers.

.3 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for painting exterior metal surfaces and 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 Submit for review and acceptance 1 L of each unit to the Department Representative for analysis and acceptance prior to commencing work.

.3 Mark samples with name of project, its location, paint manufacturer's name and address, name of paint and manufacturers paint code number.

.4 Enable Departmental Representative to take 1 L samples of each paint delivered to site, one sample from manufacturer's containers and one sample from painters' pot.

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

.6 Test Reports:

.1 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 Section 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 April 2010.

.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 known to be compatible with the existing bridge coating system:

.1 Primer Coat 1: shall be aluminum flake filled epoxy mastic, applied to a dry film thickness of 5 to 7 mils DFT. (Carbomastic 15FC or approved equivalent)

.2 Intermediate Coat 2: to conform to the requirements of the IZEP system according to MTO designated Sources of Materials DSM # 9.20.39. (Carboguard 893 or approved equivalent)

.3 Topcoat 3: Aliphatic Polyurethane to CAN/CGSB-1.177. (Carbothane 134HG or approved equivalent)

.5 Colours: Match existing paint colour where painting affected steel work. Colours to be approved by Departmental Representative.

.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 and rusted paint from exterior metal surfaces.

.2 Metal surfaces to be repainted in the field:

.1 Clean surfaces by removing loose, cracked, brittle or non-adherent paint, rust, loose mill scale, welding slag, dirt, oil, grease 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 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-Vis3 for field painting and SSPC-Vis1 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 175 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. Touch-up over sealant to match bridge colour

.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.

.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 surfaces which are to be embedded in concrete.

.4 Paint metal surfaces to be in contact with wood with either full paint coats specified or three shop coats of specified primer.

.5 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.

.6 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.

.7 Protect machine finished or similar surfaces (i.e. underside of sole plate and shims on bearing pedestal) that are not to be painted but that do require protection, with coating of rust inhibitive petroleum, molybdenum disulphide, or other coating approved by Departmental Representative.

.8 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 Departmental Representative may engage the services of a coating inspector for quality control purposes.

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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle Causeway electrical work.

1.2 REFERENCES

.1 Definitions:

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

.2 Reference Standards:

.1 CSA Group

.1 CSA C22.1, Canadian Electrical Code, Part 1 (23nd Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No. 0 Through 10 as Applicable.

.3 CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.4 Do underground systems in accordance with CSA C22.3 No.7-06, Underground Systems, except where otherwise specified.

.5 CAN/CSA-S6-14, Canadian Highway Bridge Design Code

.6 CAN/CSA-S6.1-14 - Commentary on CAN/CSA-S6-14, Canadian Highway Bridge Design Code.

.7 CAN/CSA-Z462-11, Workplace Electrical Safety.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

.3 Electrical and Electronic manufacturer's Association of Canada (EEMAC)

.1 EEMAC 2y-11958 and amendment thereto, Light Gray Colour for Indoor Switchgear.

.4 Heath Canada/ Workplace Hazardous materials Information System (WHMIS).

.1 Material Safety data Sheets (MSDS).

.5 National Electrical Contractor Association (NECA)

.1 NECA 1-2010 - Standard Practice of Good Workmanship in Electrical Contracting.

.6 National Fire Protection Agency (NFPA)

.1 NFPA 79-2012 – Electrical Standard for Industrial Machinery.

.7 The Ontario Electrical Safety Code 2012, and all bulletins (Ontario).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for all items described in these specification and include product characteristics, performance criteria, physical size, finish and limitations.

.2

.3 Shop drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada within 30 days of Award of Contract.

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 Submit six (6) copies of 600 x 600 mm minimum size drawings and product data to authority having jurisdiction.

.6 If changes are required, notify Departmental Representative of these changes before they are made.

.7 Conduct field surveys to verify existing dimensions shown on the plans, prior to development of submittals. Identify field verified dimensions on submittals. Conduct field measurements and surveys as required to supplement the information provided in the plans and to provide a complete and satisfactory fitting and operational installation.

.4 Certificates:

.1 Provide CSA certified equipment and material.

.2 Where CSA certified equipment and/or material is not available, submit such equipment and/or material to authority having jurisdiction for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.5 Manufacturer's Field Reports: Submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and electrical power and control testing, as described in PART 3 - FIELD QUALITY CONTROL.

.6 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.2 Building Energy Consumption: submit Measurement and Verification Plan following IPMVP for monitoring end-uses as follows:

.1 Lighting systems and controls.

.2 Constant and variable motor loads.

.3 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

.4 Regional Materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for electrical equipment and installations for incorporation into manual.

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Provide temporary electrical connections to equipment heaters, or provide temporary heaters, as required to prevent damage from moisture and as required in other Sections of these Specifications.

.2 Provide climate controlled environment for the storage for control equipment/ assemblies during construction. Thoroughly dry out and put through special dielectric test as directed by the Departmental Representative or replace if not tested to the satisfaction of the Departmental Representative, any apparatus that has been subjected to possible injury by water or dampness (including the interiors of motor control equipment or any other electrical devices). Store and protect equipment from damage from mishandling, dropping or impact. Do not install damaged equipment.

.3 Replace defective or damaged materials with new at no cost to Departmental Representative.

.4 Develop Construction Waste Management Plan related to the Work of this Section.

.5 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control, lighting and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in English and French.

.4 Use one nameplate or label for each language.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

.2 Control wiring and conduit: in accordance with Section 26 29 03 - Control Devices except for conduit, wiring and connections below 50 V.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of Departmental Representative.

.2 Porcelain enamel signs, minimum size 175 x 250 mm.

.3 Electrical equipment Arc Flash and Short Circuit Current to CSA C22.1-2015.

2.5 WIRING TERMINATIONS

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

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates labels as follows:

.1 Nameplates: plastic laminate 3 mm thick plastic engraving sheet, matt white finish face, black core, lettering accurately aligned and engraved into core mechanically attached with self-tapping screws.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates labels to be approved by Departmental Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate or label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. XXXX" as directed by Departmental Representative.

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.7 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.8 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Cover with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

Prime	Auxiliary	
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.9 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint outdoor electrical equipment "equipment green" finish.

.2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for electrical installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

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

3.2 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where otherwise specified.

3.3 NAMEPLATES AND LABELS

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

3.4 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: plastic, sized for free passage of conduit, and protruding 50 mm.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 LOCATION OF OUTLETS

.1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.

3.6 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: 1400 mm.

.2 Wall receptacles:

.1 General: 300 mm.

.2 In pivot pier vaulted hydraulic equipment room: 1400 mm.

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

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.8 FIELD QUALITY CONTROL

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Testing of Electrical Installation. The testing of the electrical installation shall be carried out during and following complete installation of the electrical items.

.1 General.

Electrical testing shall be performed during equipment manufacture and procurement, the electrical installation process and following completion of the installation. The electrical testing shall consist of the following:

.1 Factory Testing

.2 Field Testing

.3 Adjustments

.4 Performance Acceptance Testing

.5 Endurance Testing

.6 Training

.7 Supervision of Operations

.2 Factory Testing.

The electrical testing shall consist of factory testing of the major items of electrical equipment procured for installation at the bridge. The major items of electrical equipment shall include the integrated bridge power and control system to prove the operating and functionality and control logic. These tests shall be conducted by the equipment manufacturer and witnessed by the Engineer as specified herein. The manufacturer shall submit test certificates and supporting data corroborating that the testing was performed and successfully completed in accordance with this specification. The Engineer testing shall be

conducted at the manufacturer's plant or as elsewhere approved by the Engineer. The manufacturer shall submit his test procedure to the Engineer for approval prior to conducting the tests that would constitute acceptance of the manufactured equipment.

.1 The following items of equipment shall be factory tested in the presence of the Engineer:

.1 The integrated testing of motor control center, , operator controls and limit switches

.2 In the absence of the hydraulic system, operation of the system shall be performed by simulating the integrated functionality of the operation of the hydraulic system with the electrical control system.

.2 The factory testing of each system described above shall consist of completely wiring and cabling the systems as defined on the approved shop drawings in preparation for the tests.

.3 Performing complete functional tests shall be in accordance with the Engineer approved test procedure.

.4 The MCC/PLC system functional tests shall verify the bridge operating sequences for all modes of operation, prove the PLC logic in accordance with the specified sequence, and correct functionality of all control system interlocks and permissives.

.3 Field Testing.

The Contractor shall employ the services of an approved electrical testing company to test the bridge. The testing company shall be qualified for the defined and specified work and submit his qualifications and electrical testing experience for Engineer approval. The proposed electrical testing company shall be experienced in the testing of electrical power, control and instrumentation systems. The testing company shall furnish all test equipment, materials, labor and technical supervision required to perform all of the tests to demonstrate that the equipment and installation comply with the requirements of the Contract Drawings and this specification. Testing procedures shall conform to applicable standards of the ANSI, IEEE, NEMA, NEC and NETA.

.1 Test equipment shall include, but not be limited to, the following:

.1 500 and 1,000 volt megger test sets

.2 Relay and metering primary injection test set

.3 AC and DC digital and analog multi-meters

.4 Ground ohmmeter

.5 Multi-channel chart recorder with digital output

.6 Power quality recorder

.2 Following installation of wiring and cabling and prior to final termination, the Contractor shall insulation resistance test all conductors with respect to ground using an appropriate voltage based on the service voltage of the installation, 500 volt for control conductors and 1,000 volt for 575 volt power circuits.

.3 Following final termination of all wiring and prior to applying power (DC, single or three phase), the contractor shall perform a comprehensive continuity check of all wiring and provide evidence of completion of the continuity check in the form of a complete set of highlighted wiring diagrams to the Engineer for approval prior to proceeding with powering up a part of the bridge electrical system.

.4 All tests shall be conducted in the presence of and with the approval of the Engineer. Any deviation from the prescribed requirements shall be corrected to the satisfaction of the Engineer. The Contractor shall develop and submit comprehensive test procedures for all tests to be performed on the bridge power; control and instrumentation systems to assure all systems and sub systems are operating within their designed parameters and function as herein specified and in accordance with the manufacturer's specifications. The test procedures shall be submitted to the Engineer for approval and no tests shall be performed prior to Engineer approval of the procedures. The Contractor shall give the Engineer written notice of the tests at least two (2) weeks in advance of testing.

.5 The Contractor is responsible for all tests and test records. Testing shall be performed by and under the immediate supervision of the Contractor. The Contractor for each piece of equipment shall keep test records. Copies shall be furnished to the Engineer for his approval.

.6 The Contractor shall calibrate all test equipment. Tests shall be carried out in a safe and orderly manner. Care shall be taken to insure the safety of all personnel (authorized or unauthorized) who may be exposed to equipment or wires which are energized during tests.

.7 The Contractor shall be responsible for visual inspection of the equipment, which shall be made immediately prior to the testing, and/or energizing of that equipment.

.8 The Contractor shall prepare and submit to the Engineer for approval an electrical testing schedule including a detailed description of the tests to be conducted prior to carrying out any electrical tests on the system.

.9 No adjustments or performance acceptance tests shall be conducted on the installation until all prescribed electrical tests have been carried out and approved by the Engineer.

.4 Adjustments.

Test instrumentation: During all adjustments described herein, where instrumentation is required the following data shall be recorded with recording meters equivalent to Fluke 1735 equipment.

.1 Line-to-line voltage on one phase at the control panel main bus.

.2 Current through one phase of each of the HPU pump motors furnished by others.

.3 Total input power to the MCC during bridge operation (complete operating cycle).

.4 Input power and power factor by phase of the input power to the MCC during bridge operation (complete operating cycle).

.5 Harmonic data during bridge operation.

Adjust fully open and closed limit switches of all devices and the bridge to operate in accordance with the approved shop drawing schematic control diagram and prevailing field conditions.

.5 Performance Acceptance Testing.

.1 After all machinery, electrical equipment and structural work have been installed to the satisfaction of the Engineer, the Contractor shall run tests on the respective mechanical and electrical systems and controls. These tests to demonstrate to the complete satisfaction of the Engineer all components and the complete assembly meet the intended requirements of the drawings and specifications and are capable of performing the work intended. These shall include but not be limited to all power, control (analog and digital) and instrumentation. Evidence of binding, vibration, uneven operation or faulty operation shall be cause for postponement of final acceptance. The Contractor shall make the necessary adjustments and/or replacements required to correct alignment, tolerances or any other defects which may cause improper operation of the machinery and do not satisfy the mechanical operating criteria and have not received the approval for service from the Engineer. The Engineer must witness all tests and it shall be the duty of the Contractor to submit a detailed testing schedule in advance and to coordinate with the Engineer for the purpose of scheduling test dates. The Contractor shall provide all necessary personnel for carrying out the necessary tests, including complete direction of their duties and programming of the test process. This shall include his own personnel in addition to the systems vendor's field personnel and the testing company personnel. As a minimum, for the electrical testing and verification of the satisfactory operation of the installed machinery, the Contractor shall provide an operator for the operator's control console, and two field engineers or technical representatives of the manufacturer of the major electrical equipment. On the first day of performance acceptance testing, the Contractor shall have available 3 copies of the detailed test program, arranged with suitable spaces to record all results, instrument readings, designations to correlate with index markings to be noted on the charts during the tests, pertinent comments, etc. This program shall have been submitted to the Engineer and approval received before finalization of test date. Although the Contractor shall direct the testing, the right is reserved by the Engineer to call for certain notations to be made on the record copy of the test program as the tests proceed and to collaborate in the scope of interpretation of the program depending upon the results which develop. All test instruments or other test equipment required for all of the tests shall be provided by the Contractor. After completion of the performance acceptance tests, the Contractor shall submit records, adequately identified of all data recorded during the tests. The Engineer shall also have the right to request different and/or additional tests when there is any disagreement relative to any test result as having established proof of acceptability/conformance to the specification.

.2 Charts and electronic files shall be made for each test and each one uniquely identified for each test, cycle of test and movement direction of the span. The chart identifications shall coordinate with those as noted on the detailed test program. The Engineer may decide during testing that certain portions of the charts need not be included in the final sets to be processed and submitted by the Contractor. All other hard copy charts, to be submitted, shall be processed by the Contractor as follows:

.1 Cut and trim all of the charts and reproductions so that each identified portion is separate from other portions (for example: the span opening portion of the second cycle, from closed to fully open position, would be one identified portion).

.2 Fold flat wise to an overall length of 11" with the identifying chart number exposed. The identifying numbers shall contain three parts: one pertaining to the chart speed and instrument used; one part pertaining to the index system correlated to the test program; and one part to the direction of span movement.

.3 Make reproduction copy sets as required to accompany the report of tests. These shall be high quality reproductions comparable in quality to Xerox prints. Copies with perceptible loss of detail will not be acceptable.

.4 Arrange each set of charts sequentially according to the identifying numbers, separated into groups with each group corresponding to the instruments used.

.3 Following completion and acceptance of the performance tests, the Contractor shall furnish copies of a test report to the Department. Each copy shall be suitably bound and include the following information:

.1 Title page, table of contents, introduction, electrical test conclusions, test program, summary of results, test identification numbers and charts.

.2 The introduction shall include complete description of instruments used, current transformer ratios, and calculation of scale factors, available chart and recorder speeds used during the tests, dates tests were performed and any clarifying comments as appropriate to the full reporting of the tests.

.3 The test program will be a reproduction of the programs furnished by the Contractor when the tests were begun with notations as made during the tests including any recordings or chart portions not required to be included in the report.

.4 Summary of results shall describe the pertinent measured parameters and observable results for each test. Meaningful information shall be developed not requiring reference to the charts except for supplementary details. In other words, each test shall be described in narrative form giving recorded voltage, currents, power, speed changes and observable results pertaining to that test, including descriptions regarding acceleration, running and deceleration.

.5 The test identification numbers section of the report shall give the identifying number used, a list of the charts included in the report and a list of those charts which are not included.

.6 The charts portion of the report shall contain a pocket to enclose the reproduced charts, folded and identified as described herein.

.4 The original of the electronic data files and charts (complete, including those not reproduced in the report) shall be furnished to the Department.

The acceptance tests of the moving span shall be performed in conjunction with mechanical acceptance testing and shall include, but not be limited to:

.1 Normal load test: while recording the test data outlined herein open and close the span through two complete' cycles of operation for each of the duty modes of operation.

.6 Endurance Testing.

Prior to the bridge being placed into service and following performance acceptance testing, the Contractor shall perform a series of endurance tests on the complete bridge operating system. These tests shall be performed over an extended period and fully document the performance of each piece of machinery and electrical equipment including documenting failures and describing in a test report form all remedial actions taken to rectify failure conditions. Following any failure for any of the items indicated below, the Contractor shall repeat the endurance test on that item. The endurance testing of the individual sub systems and bridge operating system shall consist of the following:

.1 Fifteen (15) consecutive full drive and pull operating cycles of each span lock. Five minute duration shall be allowed between individual span lock operations.

.3 Carry out tests in presence of Departmental Representative.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in part 1 - QUALITY ASSURANCE.

.6 Verification requirements include:

.1 Materials and resources.

.2 Storage and collection of recyclables.

.3 Construction waste management.

.4 Resource reuse.

.5 Recycled content.

.6 Local / regional materials.

.7 Certified wood.

.8 Low-emitting materials.

3.9 SYSTEM STARTUP

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

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the St. Peters electrical work.

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

1.2 REFERENCES

.1 ANSI/NEMA WC70/ICEA S-95-658-2009 (14 AWG & larger) – Power Cables Rated 2,000 Volts or Less for the Distribution of Electrical Energy.

.2 ASTM B172-10 Standard Specification for Rope-Lay-Stranded Copper Conductors Having Bunch-Stranded Members, for Electrical Conductors.

.3 ASTM B174-10 Standard Specification for Bunch-Stranded Copper Conductors for Electrical Conductors.

.4 ICEA S-73-532/NEMA WC 57-2014 (22-16 AWG) - Standard for Control, Thermocouple Extension, and Instrumentation Cables.

.5 ICEA T-27-581/NEMA WC 53-2008 – Standard Test Methods for Extruded Dielectric Power, Control, Instrumentation, and Portable Cables for Test.

1.3 PRODUCT DATA

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 1000 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE or RWU90 XLPE, Jacketed or Non Jacketed.

.3 Copper conductors: size as indicated, with thermoplastic insulation type TWH rated at 600 V.

.4 Neutral supported cable: 1, 2 and 3 phase insulated conductors of Copper and one neutral conductor of Copper steel reinforced, size as indicated. Type: NS90 Insulation: Type NSF-2 flame retardant rated 600 V.

2.2 TECK 90 CABLE

.1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Conductors:

.1 Grounding conductor: copper as indicated.

.2 Circuit conductors: copper as indicated, size as indicated.

.3 Insulation:

.1 Cross-linked polyethylene XLPE.

.2 Rating: 1000 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: galvanized steel.

.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.

.7 Fastenings:

.1 One hole malleable iron straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.

.2 Channel type supports for two or more cables at 500 mm centers.

.3 Threaded rods: 6 mm diameter to support suspended channels.

.8 Connectors:

.1 Watertight approved for TECK cable.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from galvanized steel strip.

.4 Type: ACWU90 PVC flame retardant jacket over thermoplastic armour and compliant to applicable Building Code classification for this project wet locations.

.5 Connectors: anti short connectors.

2.4 CONTROL CABLES

.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: thermoplastic.

.2 Sheath : thermoplastic jacket, and armour of closely wound aluminum wire.

.2 Type: low energy 300 V control cable: stranded annealed copper conductors sized as indicated LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: PVC TW 40 degrees C polyethylene.

.2 Shielding: tape coated with paramagnetic material tape coated with diamagnetic material wire over each conductor pair group over conductors.

.3 Overall covering: PVC jackets interlocked armour of flat galvanized steel.

.3 Type: 600 V stranded annealed copper conductors, sizes as indicated:

.1 Insulation: PVC TW 40 degrees C, cross-linked polyethylene type x-link R90 (x-link) or RW90 (EP).

.2 Shielding: wire over each pair of conductors.

.3 Overall covering: thermoplastic jacket with sheath of interlocked armour and jacket over sheath of PVC.

2.5 NON-METALLIC SHEATHED CABLE

.1 Non-metallic sheathed copper cable type: NMD90XLPE, size as indicated.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Lay cable in cable wireways in accordance with Section 26 05 37 – Wireways and Auxiliary Gutters.

.2 Terminate cables in accordance with Section 26 05 22 – Wire and Box Connectors - (0-1000V).

.3 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.

.4 Conductor length for parallel feeders to be identical.

.5 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.6 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.7 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

.8 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable exposed, securely supported by straps and hangers.

3.5 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible on channels.

3.6 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit, cable troughs and underground ducts by direct burial.

.2 Ground control cable shield.

3.7 INSTALLATION OF NON-METALLIC SHEATHED CABLE

.1 Install cables.

.2 Install straps and box connectors to cables as required.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle Causeway electrical work.

1.2 REFERENCES

.1 CSA Group

.1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).

.3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Certificates: obtain inspection certificate of compliance covering high voltage stress from Departmental Representative and include it with as-built drawings and maintenance manuals.

.4 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.2 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

.3 Regional Materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for connectors and terminations for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect connectors and terminations from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management.

Part 2 Products

2.1 CONNECTORS AND TERMINATIONS

.1 Copper long barrel and short barrel compression connectors to CSA C22.2 No.65 as required sized for conductors.

.2 Contact aid for aluminum cables where applicable.

.3 2 way joint boxes in dry location type in accordance with Section 26 05 33 - Raceway and Boxes for Electrical Systems.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for connectors and terminations installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

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

3.2 INSTALLATION

.1 Install stress cones, terminations, and splices in accordance with manufacturer's instructions.

.2 Bond and ground as required to CSA C22.2No.41.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle Causeway electrical work.

1.2 REFERENCES

.1 CSA Group

- .1 CAN/CSA-C22.2 No.41-13-Grounding and Bonding Equipment
- .2 CAN/CSA-C22.2 No.04-04-Bonding Electrical Equipment (Protective Grounding)
- .3 CAN/CSA-C22.2 No.41-07 Grounding and Bonding Equipment

.2 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)

- .1 ANSI/IEEE 837-02, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

.3 CSA International

- .1 CSA Z32-09, Electrical Safety and Essential Electrical Systems in Health Care Facilities.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Sustainable Design Submittals:

- .1 Construction Waste Management:
  - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
  - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.
- .2 Recycled Content:
  - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.
- .3 Regional materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project

to furthest site of extraction or manufacture, and total cost of materials for project.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect grounding equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop a Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse of pallets, crates, padding, packaging materials as specified in the Construction Waste Management Planin accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 EQUIPMENT

.1 Clamps for grounding of conductor: size as indicated and as required to provide an electrically conductive path to ground.

.2 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, tinned, soft annealed, size as indicated and as required].

.3 Rod electrodes: copper clad steel 19 mm diameter by minimum 3 m long.

.4 Plate electrodes: Where indicated shall be galvanized steel, surface area 0.2 m^2 minimum 1.6 mm thick.

.5 Grounding and bonding conductors: bare stranded copper, tinned, soft annealed, size as indicated.

.6 Insulated grounding conductors: green, copper conductors, size as indicated.

.7 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.

.8 Non-corroding accessories necessary for grounding and bonding system, type, size, material as indicated, including but not necessarily limited to:

.1 Grounding and bonding bushings.

.2 Protective type clamps.

.3 Bolted type conductor connectors.

.4 Thermit welded type conductor connectors.

.5 Bonding jumpers, straps.

.6 Pressure wire connectors.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

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

3.2 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding and bonding system including, electrodes, conductors, connectors, accessories.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections, and connections to conductive water main, bridge structural steel, electrodes, using copper welding by thermit process and permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.

.5 Use mechanical connectors for grounding connections to equipment provided with lugs.

.6 Soldered joints not permitted.

.7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.8 Install separate ground conductor to outdoor lighting standards.

.9 Connect bridge, building structural steel and metal siding to ground by welding copper to steel.

.10 Make grounding connections in radial configuration only, with connections terminating at single grounding point or street side of water pipe. Avoid loop connections.

.11 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at the load end.

.12 Ground secondary service pedestals.

3.3 MAINTENANCE HOLES

.1 Install conveniently located grounding stud, electrode, size as indicated stranded copper conductor in each maintenance hole.

.2 Install ground rod in each maintenance hole so that top projects through bottom of maintenance hole. Provide with lug to which grounding connection can be made. Confirm ground resistance meets or exceeds Canadian Electrical Code minimum requirements.

3.4 ELECTRODES

.1 Make ground connections to continuously conductive underground water pipe on street side of water meter.

.2 Install water meter shunt.

.3 Install concrete encased electrodes in building foundation footings, with terminal connected to grounding network.

.4 Install rod, plate electrodes and make grounding connections as indicated for bridge electrical and storage facility and bridge pivot pier electrical and structural systems.

.5 Bond separate, multiple electrodes together.

.6 Use size 2/0 AWG copper conductors for connections to electrodes.

.7 Make special provision for installing electrodes that will give [acceptable] resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.5 SYSTEM AND CIRCUIT GROUNDING

.1 Install system and circuit grounding connections to the neutral of the secondary 575 V system.

3.6 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, frames of motors, motor control centres, starters, control panels, bridge and building steel work, distribution panels, outdoor lighting, cable raceways and the hydraulic power unit (HPU).

3.7 GROUNDING BUS

.1 Utilize the grounding bus in the MCC as the bridge main ground bus.

.2 Ground items of electrical equipment in electrical room to ground bus in the MCC with individual bare stranded copper connections size 2/0AWG.

3.8 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle Causeway electrical work.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.2 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

.3 Regional Materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect hangers and supports from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted, suspended and/or set in poured concrete walls and ceilings.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hangers and supports installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative and/or Consultant.

.2 Inform Departmental Representative and/or Consultant of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Secure equipment to hollow and solid masonry, tile and plaster surfaces with lead anchors and nylon shields.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring-loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

.1 One-hole malleable iron straps to secure surface conduits and cables 50 mm and smaller.

.2 Two-hole steel straps for conduits and cables larger than 50 mm.

.3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 3 m on centre spacing.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative and/or Consultant.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and/or recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal Requirements.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle Causeway electrical work.

1.2 REFERENCES

.1 CSA International

.1 CSA C22.2 No.40-M1989(R2009), Cutout, Junction and Pull Boxes.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.2 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

.3 Regional materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for raceway and boxes for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect raceway and boxes from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse of pallets, crates, padding, packaging materials as specified in the Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal Requirements.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Construction:

.1 The junction and pull boxes shall be NEMA 4X (Stainless steel Type 316) boxes for exposed areas

.2 The junction and pull boxes shall be NEMA 12 in all enclosed and weather protected areas.

.3 Provide drain holes in the boxes with protective drain fittings. Drain fittings shall be stainless steel with neoprene tube.

.4 Provide mesh filter at drain holes to prevent ingress of bugs.

.5 Provide anti-condensation felt on inside wall of junction boxes.

.6 Provide all boxes with mounting lugs and securely fasten to the structure with not less than four (4) stainless steel fasteners.

.7 Drill sheet metal enclosures to receive the conduit ends, to be secured with insulated hub connectors.

.8 Equip conduit ends projecting into all boxes and enclosures with insulated bushings.

.9 Do not drill any box or enclosure for more conduits than actually enter it.

.2 Fabricate framework for supporting boxes, switches, and other externally mounted electrical devices from structural stainless steel not less than 6 mm thick or if material of thickness less than 6 mm is used, obtain approval of the Departmental Representative.

.3 All mounting bolts, nuts, washers, and other hardware used for fastening boxes, disconnect switches, devices, conduit clamps, and similar devices shall be Type 316 stainless steel. Bolt heads and nuts shall be hexagonal, do not use bolts smaller than 10 mm in diameter except as may be necessary to fit the mounting holes in small devices, outlet boxes, and similar standard equipment.

.4 Provide isolation pads or washers where stainless steel fixtures make contact with dissimilar metals to prevent corrosion.

.5 All enclosures shall be provided with grounding terminals.

.6 Drilling on bridge structure is strictly prohibited without prior written permission from the Departmental Representative.

.7 For junction boxes with hinged covers located in open areas, including bridge structure, latches must be provided for pad-locking of the junction boxes.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for raceway and boxes installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of the Departmental Representative.

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

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

3.2 INSTALLATION

.1 Install junction and pull boxes in accessible locations.

.2 Mount boxes with top not higher than 2000 mm above finished floor except as indicated on the Contract Drawings.

.3 All boxes must be able to fit in the dimensioned spaces indicated on the Contract Drawings.

.4 Note that only main junction and pull boxes are indicated on the Contract Drawings. The Contractor shall install additional pull boxes in accordance with the requirements of CSA C22.1-12.

.5 Junction boxes in open areas shall not be easily accessible by the public (passers-by) but they should be accessible for maintenance, troubleshooting and clean-up work.

.6 Terminal strips shall be mounted in junction boxes to factory installed back panels.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal Requirements.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle Causeway electrical work.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-06, Canadian Electrical Code, Part 1, 20th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit samples for floor box in accordance with Section 01 33 00 - Submittal Procedures.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect raceway and boxes from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 347 V outlet boxes for 347 V switching devices.

.6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 One-piece electro-galvanized construction.

.2 Single and multi-gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.4 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.5 Extension and plaster rings for flush mounting devices in finished walls.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry single and multi-gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 FLOOR BOXES

.1 Concrete tight electro-galvanized sheet steel floor boxes with adjustable finishing rings to suit floor finish with brass faceplate. Device mounting plate to accommodate short or long ear duplex and single receptacles. Minimum depth: 73 mm for receptacles and communication outlets.

.2 Adjustable, watertight, concrete tight, cast floor boxes with openings drilled and tapped for 16, 21 and 27 mm conduit. Minimum size: 73 mm deep.

2.6 CONDUIT BOXES

.1 Cast FS and FD boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.7 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

.1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.

2.8 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

2.9 SERVICE FITTINGS

.1 'High tension' receptacle fitting made of 2 piece stainless steel, die-cast aluminum with brushed aluminum housing finish for 1 single and 1 duplex receptacles. Bottom plate with two knockouts for centered or offset installation. 12 x 102 mm extension piece as indicated.

.2 Pedestal type 'low tension' fitting made of 2 piece stainless steel with brushed aluminum housing finish to accommodate one amphenol jack connectors.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle Causeway electrical work.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
- .2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.
- .3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.
- .6 CSA C22.2 No. 211.3-96-1996, Reinforced Thermosetting Resin Conduit (RTRC) and Fittings Wiring Products.
- .7 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

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

- .1 Submit conduit, conduit fastenings and conduit fittings manufacturing data.

.3 Quality assurance submittals:

- .1 Test reports: submit certified test reports.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Instructions: submit manufacturer's installation instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse recycling] in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

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

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.4 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

.5 FRE conduit: to CSA C22.2 No. 211.3-96-1996.

.6 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.3.

2.2 CONDUIT FASTENINGS

.1 One hole malleable iron straps to secure surface conduits 50 mm and smaller.

.2 Two hole steel straps for conduits larger than 50 mm.

.3 Beam clamps to secure conduits to exposed steel work.

.4 Channel type supports for two or more conduits at 3 m on centre.

.5 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 200 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms in unfinished areas.

.3 Surface mount conduits except as indicated and described on the Contract Drawings.

.4 Use rigid hot dipped galvanized steel threaded conduit except where specified otherwise.

.5 Use epoxy coated conduit underground in corrosive areas, pivot pier vaulted area and bridge movable structure.

.6 Use rigid PVC conduit underground and in corrosive areas as specified.

.7 Use flexible metal conduit for connection to motors in dry areas, connection to recessed incandescent fixtures without prewired outlet boxes connection to surface or recessed fluorescent fixtures, work in movable metal partitions and where excessive vibration is anticipated between the conduit installation and connecting devices.

.8 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.9 Use explosion proof flexible connection for connection to explosion proof motors.

.10 Install conduit sealing fittings in hazardous areas.

.1 Fill with compound.

.11 Minimum conduit size for lighting and power circuits: 19 mm.

.12 Install rigid metal conduit from electrical room branch circuit panel to outlet boxes located in the electrical and storage building.

.13 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.14 Mechanically bend steel conduit over 19 mm diameter.

.15 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.16 Install fish cord in empty conduits.

.17 Run 2 - 25 mm spare conduits up to ceiling space and 2 - 25 mm spare conduits down to ceiling space from each flush panel.

.1 Terminate these conduits in 152 x 152 x 102 mm junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in surface type boxes.

.18 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.19 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building and bridge lines.

.2 Locate conduits behind infrared or gas fired heaters or any other heat-emitting device with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam, hydraulic or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

.1 Locate to suit reinforcing steel.

.1 Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.

.1 Use cold mastic between sleeve and conduit.

.5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.

.6 Encase conduits completely in concrete with minimum 25 mm concrete cover.

.7 Organize conduits in slab to minimize cross-overs.

3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

.1 Run conduits 25 mm and larger below slab and encase in 75 mm concrete envelope.

.1 Provide 50 mm of sand over concrete envelope below floor slab.

3.7 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle Causeway electrical work.

1.2 REFERENCES

.1 CSA International

.1 CSA C22.2 No.26-1952(R2009), Construction and Test of Wireways, Auxiliary Gutters and Associated Fittings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan Waste Reduction Workplan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.2 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

.3 Regional materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for wireways and auxiliary gutters for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wireways and auxiliary gutters from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal Requirements.

Part 2 Products

2.1 WIREWAYS

.1 Wireways and fittings: to CSA C22.2 No.26.

.2 Sheet steel with hinged bolted cover to give uninterrupted access.

.3 Finish: baked grey enamel in accordance with Section 26 05 00 - Common Work Results for Electrical.

.4 Elbows, tees, couplings and hanger fittings manufactured as accessories to wireway supplied.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wireways and auxiliary gutters installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative and/or Consultant.

.2 Inform Departmental Representative and/or Consultant] of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Install wireways and auxiliary gutters in accordance with manufacturer's written recommendations.

.2 Keep number of elbows, offsets, connections to minimum.

.3 Install supports, elbows, tees, connectors, fittings.

.4 Install barriers where required.

.5 Install gutter to full length of equipment.

.6 Ground metallic wireways and gutters as required.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and/or recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management Requirements.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle Causeway electrical work.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No. 100-04, Motors and Generators.

.2 CSA C22.2 No. 145-M1986(R2004), Motors and Generators for Use in Hazardous Locations.

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

.1 EEMAC M1-7-1992, Standard for Motors and Generators.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 47 15 - Sustainable Requirements: Construction and Section 02 81 01 - Hazardous Materials and include: product characteristics, performance criteria, physical size, horsepower, watt rating, limitations and finish.

.3 Shop drawings:

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

.2 Indicate dimensions, recommended installation procedure, wiring diagrams, sizes and location of mounting bolt holes and recommended support method.

.4 Quality Assurance Submittals:

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Manufacturer's Instructions: submit manufacturer's installation instructions.

.5 Closeout Submittals:

.1 Provide maintenance data for fractional horsepower motors for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for [reuse] [recycling] in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Collect, package and store expired motors for either recycling or rebuilding and return to recycler or rebuilder.

Part 2 Products

2.1 FRACTIONAL HORSEPOWER MOTOR

.1 Non-hazardous locations: to CSA C22.2 No. 100 EEMAC M1-7.

.2 Hazardous locations: to CSA C22.2 No. 145.

.3 Motor with inherent overheating protectors.

.4 Motors shall be rated as indicated on the Contract Drawings and other specification sections as applicable.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install wiring, flexible connections and grounding.

.2 Check rotation before coupling to driven equipment.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle Causeway electrical work.

1.2 REFERENCES

.1 CAN/CSA-Q9000-92 Quality Management Quality Assurance Standards for selection and use.

.2 MUTCDC - Manual of Uniform Traffic Control Devices for Canada.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for each type of the proposed limit switches and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store limit switches off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect limit switches from damages.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 GENERAL DESCRIPTION

.1 The contractor shall furnish all limit switches defined herein.

.2 The limit switches shall consist of lever arm and plunger type limit switches as herein specified and described on the Contract Drawings.

.3 All limit switches shall be manufactured in accordance with the requirements of NEMA A600 and be U.L. Listed, CSA certified and CEC marked.

2.2 LEVER ARM LIMIT SWITCHES

.1 The Contractor shall the limit switches indicated on the Contract Drawings, mounting hardware and all required accessories.

.2 The lever arm limit switches shall be of the standard box plug-in lever arm type, housed in a UL listed, NEMA type 6P enclosure. The switches shall be provided with 2 NO and 2 NC contacts be of the low differential spring return type with lever arm operators. The switches shall be provided with an adjustable length lever arm with hardened roller of oil impregnated sintered iron. The arm shall have a sufficient length for the defined application.

.3 The Contractor shall furnish formed galvanized steel supporting brackets and associated stainless steel hardware.

.4 The Contractor shall submit outline-dimensioned drawings of his proposed mounting details and specifications in the form of catalog cuts of proposed switch to be approved by the Departmental Representative.

2.3 PLUNGER TYPE LIMIT SWITCHES

.1 Span seated/Full Open limit switch shall be furnished as described herein and as indicated on the Contract Drawings. The switch shall be so arranged to trip when the swing span is fully seated in the fully closed as described on the Contract drawings.

.2 The span seated/full open limit switch shall be of the plunger operated type, spring return, snap action switches with four independent circuits.

.3 The switch circuits shall be rated at 10 Amps inductive and shall be suitable as inputs to the herein specified PLC.

.4 The switch shall be housed in a cast, weatherproof enclosure.

.5 Each switch shall operate with 51 mm movement of the operating rod, and the point of actuation shall be adjustable after installation. A spring buffer shall permit 51 mm of over travel of the operating rod.

.6 The switch tripping mechanism shall operate to open the switch contacts after a return movement of the operating rod of not more than 76 mm from the point that the contacts were closed.

.7 The operating rod for each switch shall be fabricated from stainless steel and the plunger shall have a bull-type operator at the end.

.8 The joint of the mechanism between the spring buffer and the plunger rod shall be covered with a watertight, neoprene bellows-type boot.

.9 The span seated limit switch shall be of B&B Roadway manufacture or Engineer approved equal.

.10 The Contractor shall submit outline drawings, dimensioned layout, switch contact configuration diagram and specification data sheet of the span seated limit switch to the Engineer for approval prior to procurement.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

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

3.2 INSTALLATION

.1 Install the limit switches in accordance with manufacturer’s recommendations and the approved shop and working drawings.

.2 Each limit switch shall be tested for correct operational functionality and repeatability.

3.3 FIELD QUALITY CONTROL

.1 Perform test in accordance with section 26 05 00.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the St. Peter's electrical work.

1.2 REFERENCES

.1 CSA International

.1 CSA C22.2 No.42-10, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA C22.2 No.42.1-00(R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.3 CSA C22.2 No.55-M1986(R2008), Special Use Switches.

.4 CSA C22.2 No.111-10, General-Use Snap Switches (Bi-national standard, with UL 20).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wiring devices from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal Requirements.

Part 2 Products

2.1 SWITCHES

.1 15 and 20 A, 120 V, single pole, double pole and three-way switches to: CSA C22.2 No.55 and CSA C22.2 No.111 as applicable.

.2 Manually-operated general purpose AC switches with following features:

.1 Terminal holes approved for No. 10 AWG wire.

.2 Silver alloy contacts.

.3 Urea or melamine moulding for parts subject to carbon tracking.

.4 Suitable for back and side wiring.

.5 Ivory toggle.

.3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.

.4 Switches of one manufacturer throughout project.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42 with following features:

.1 Ivory urea moulded housing.

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Eight back wired entrances, four side wiring screws.

.5 Triple wipe contacts and rivetted grounding contacts.

.2 Single receptacles CSA type 5-15 R, 125 V, 15 A, U ground with following features:

.1 Ivory urea moulded housing.

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Four back wired entrances, 2 side wiring screws.

.3 Other receptacles with ampacity and voltage as indicated.

.4 Receptacles of one manufacturer throughout project.

2.3 SPECIAL WIRING DEVICES

.1 Special wiring devices:

.1 Clock hanger outlets, 15 A, 125 V, 3 wire, grounding type, suitable for No. 10 AWG for installation in flush outlet box.

.2 Pilot lights as indicated, with neon type 0.04 W, 125 V lamp and red plastic jewel lens flush type.

2.4 COVER PLATES

.1 Cover plates for wiring devices to: CSA C22.2 No.42.1.

.2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.3 Stainless steel, vertically brushed, 1 mm thick cover plates, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box.

.4 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.5 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.

.6 Weatherproof spring-loaded [cast aluminum] cover plates complete with gaskets for single receptacles or switches.

2.5 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wiring devices installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative and/or Consultant.

.2 Inform Departmental Representative and/or Consultant of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height as indicated in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height as indicated in accordance with Section 26 05 00 - Common Work Results for Electrical.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Install GFI type receptacles as indicated.

.3 Cover plates:

.1 Install suitable common cover plates where wiring devices are grouped.

.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

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

3.4 PROTECTION

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

.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All section 26 specifications defined for the LaSalle causeway electrical work.

1.2 REFERENCES

.1 CSA Group

.1 CAN/CSA-C22.2 No.4-04(R2009), Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).

.2 CSA C22.2 No.39-13, Fuseholder Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for disconnect switches - non-fused and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.2 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

.3 Regional Materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect disconnect switches - non-fused from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal Requirements.

Part 2 Products

2.1 DISCONNECT SWITCHES

.1 Non-fusible, Horsepower rated disconnect switch in CSA enclosure NEMA 4X, to CAN/CSA-C22.2 No.4 size as indicated on the Contract Drawings.

.2 Provision for padlocking in on-off switch position by 3 locks.

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

.4 Quick-make, quick-break action.

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

2.2 DISCONNECT SWITCH WITH POWER RECEPTACLE

.1 The disconnect switch with the power receptacle shall be furnished and installed as a mobile generator hook-up as indicated on the Contract Drawings.

.2 The switch shall be NEMA type HD heavy-duty 3-pole, with visible blades; a quick make-and-break mechanism with reinforced, positive pressure type blade and jaw construction; pressure connectors are used for wire connectors. Additionally, where indicated on the contract drawings, auxiliary poles shall be provided.

.3 For maximum safety, the spring door receptacle at the bottom of the unit shall be mechanically interlocked with the switch operating mechanism. The switch shall be such that it cannot be closed until the plug is fully inserted and the plug cannot be withdrawn or inserted unless the switch is open; with the switch open, accidental plug withdrawal is prevented by the interlock mechanism; withdrawal can only be accomplished by activation of the interlock release lever located on the receptacle.

.4 Enclosures shall be compact and rectangular in shape with a gasketed, hinged door.

.5 Enclosure, handle and other exterior parts are corrosion-resistant.

.6 The switch enclosure covers shall be interlocked with the body and operating mechanism and shall be such that it cannot be opened when the plug is engaged and the switch is

closed ("ON"). When the switch is open, the switch cannot be put in a closed ("ON") position with the door open.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for disconnect switches - non-fused installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative and/or Consultant.

.2 Inform Departmental Representative and/or Consultant of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and/or recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal Requirements.

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Under the Mechanical Machinery section the Contractor shall furnish, install and place in operating condition span lock machinery for an existing bascule bridge. All work shall be performed as detailed on the Contract Plans and as detailed in these Specifications.

.2 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.

.3 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 Drawings 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 M14 of the Contract Drawings and as specified herein.

1.3 STANDARDS

.1 All new machinery items must meet the requirements of the National Standard of Canada CAN/CSA-S6-14 Canadian Highway Bridge Design Code, 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 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 to PWGSC. 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 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.

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 may proceed. The Contractor is solely responsible for converting dimensions from Imperial to metric units, or vice versa, as required.

1.8 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 New Pinon Alpha and Motor

.2 New Lever Arm Assembly and Bushings

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

1.9 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 that have been reviewed for conformance with the Plans and Specifications, stamped and signed by professional engineer registered or licensed in Ontario, Canada.

.3 Provide a detailed shop drawing submittal schedule to the Departmental Representative within 30 days of the "Notice to Proceed". Based on lead times required for procurement of raw materials and fabrication, provide milestone dates for approval of shop drawings to ensure that the completion date will be maintained.

.4 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.

.5 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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

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

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

.8 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

.9 Allow 30 days for the Departmental Representative's review of each submission.

.10 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.

.11 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.

.12 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.

.13 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 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.

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

.15 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.

.16 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.

.17 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.

.18 Submit electronic copies of manufacturer's 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.

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

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

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

.22 Delete information not applicable to project.

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

.24 If upon review by the Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, approved electronic documents 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.

1.10 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 and approval by the Departmental Representative.

.2 Upon approval 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 and approval 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 approval of completed shop inspection reports indicating parts are in conformance or approved non-conformance reports.

1.11 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 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.

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

1.12 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.

.3 It is intended that the field inspection reports will be submitted two times: To document preliminary alignment prior to tensioning bolts and to document final alignment after all fasteners are tightened as specified.

.4 Commissioning (Stage 1 - Contractor's Field Testing) may not begin until the final field inspection reports have been approved by the Departmental Representative.

1.13 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 approved 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).

1.14 MAINTENANCE AND LUBRICATION

.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 Schematics that show the all components of the machinery that require lubrication. Include also on the charts, the type and frequency of lubrication.

.4 Copies of all warranties on equipment supplied to the project. For each item of work defined in this specification, provided with a warranty.

.5 Copies of all approved machinery installation procedures.

.6 Copies of all assembly, erection and shop drawings. These drawings to be included "as built" in the final version of the manual.

.7 Steps for cursory inspection that should be carried out annually.

.8 Steps for semi-in-depth inspection that should be carried out every 3 years.

.9 Steps for in-depth inspection that should be carried out every 6 years.

.10 List of nearest local suppliers of all equipment parts.

.11 List of parts and supplied that are to be furnished as part of the Contract.

.12 Name, address, and telephone number of the local manufacturer's representative and of the service company for each piece of equipment so that pieces or spare parts can easily be obtained.

.2 Submit six preliminary copies 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 size, paper weight, paper reinforcement and protection including oil, moisture and wear resistant covers, and copy method.

.3 Preliminary copies will be reviewed and the changes made will be incorporated in to the final manual. Submit six final copies of the 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 an electronic copy of the final 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 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 Department Representative for approval.

.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 folded into manuals to page size. Reproduce diagrams and prints used in the manual to a size less than 280 mm by 432 mm. Include diagrams on white paper and vaccuum 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 Provide the Departmental Representative with a lubrication plan for approval. Develop with the plan from recommendations made by the machinery manufacturers and in accordance with the requirements of section 2.4, Lubrication.

.11 Furnish a minimum of one lubrication chart which shows all points requiring lubrication with type of lubricant to be used at each point and the frequency and the method of lubrication. Produce the lubrication chart on a 559 mm by 864 mm sheet. Submit the chart to the Departmental Representative for approval and mount the approved chart in a watertight frame. Mount the lubrication chart in the lock house near the hydraulic power unit.

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 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

.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 Plans, 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 Furnish the Departmental Representative with the number of unpriced copies of purchase orders as may be required for scheduling tests as outlined in this Specification.

.6 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 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 B1.13M, 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.

.2 Finished high-strength bolts shall meet the requirements of ASTM A449. 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.

.3 Turned bolts are called out by nominal thread diameter on the Contract Plans. The bodies of turned bolts shall be 63 microinch finish or finer, and as defined by CHBDC 13.7.22, unless noted otherwise on the Contract Plans. 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 Plans. 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.

.4 Hex socket head cap screws: ASTM A574M.

.5 Hex socket flat countersunk head cap screws: ASTM F835M.

.6 Stainless steel hex cap screws: ASTM F593 Grade 630

.7 Hex cap screws: ASTM A449

.8 Lock washers: ASME B18.21.1

.9 Brass hex socket flat countersunk head cap screws: ASTM F468M

.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 A563M 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 Tighten fasteners to provide a tension of 70% 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 approval by the Departmental Representative.

2.3 FORGINGS

.1 Forgings shall be reduced to size from a single bloom or ingot until perfect homogeneity is obtained. Blooms and ingots shall have a cross sectional area equal to at least three times the required size. Forgings shall be done at no less than red heat. Rounds for shafts and bars shall be true, straight and free from all injurious flaws such as piping, laps, seams or cracks. Forgings shall be subjected to ultrasonic examination in accordance with ASTM A388. Any indications using the straight beam method that cannot be readily explained by the geometry of the piece shall be cause for rejection. Any forgings that are rejected shall be replaced at no cost to the Department.

2.4 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 Plans, perform visual surface examinations of steel castings per ASTM A802, liquid-penetrant exams in accordance with ASTM E165, or magnetic particle exams in accordance with ASTM E709 in the manufacturer’s shop, for each casting.

.3 Unless otherwise indicated in the Contract Plans, perform visual surface examinations of bronze castings per MIL-STD-271F, or liquid-penetrant exams in accordance with ASTM E165 in the manufacturer’s shop, for each casting.

.4 Identify and remove unacceptable surface discontinuities in accordance with ASTM A802. Obtain approval from the Engineer before making any necessary major weld repairs (as defined in ASTM A781 S16 Weld Repair Charts). Perform radiographic examination of welds per ASTM E94. Any aberrant indications must be brought to the Engineer’s attention for review and may result in rejection of the weld repair.

2.5 LUBRICATION

.1 The size of grease lubricating fittings shall be standardized and shall be of the giant button head type, unless indicated otherwise on the Contract Plans or unless the locations of the fitting requires the use of a fitting that is smaller than the giant button head fitting. Under no circumstance shall the use of more than 2 different types of grease fittings be permitted. The minimum rated pressure of the fittings is 68,950 MPa [10,000 psi].

.2 Provide fittings with a steel check valve that will receive grease and close against backpressure.

.3 Locate fittings in a protected and conveniently accessible position for use. Connect the fittings to the points requiring lubrication by pipe extensions where necessary. All fittings and pipe material shall be stainless steel meeting ASTM A312M Type 316. Indicate piping necessary to provide access for lubrication on the shop drawings and list pipe components in the bill of materials.

.4 Furnish the Departmental Representative with copies of letters from the machinery manufacturers endorsing the lubricants that have been selected. Select lubricants for year round exposure at the bridge. All lubricants selected 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.

.5 Furnish grease for installation and testing of the machinery. Furnish an additional supply for future maintenance use to include a 1 year supply of lubricant. For the center bearing oil, provide 2 times the volume used to fill the bearing. Provide the lubricant in the original manufacturer's sealed container to prevent contamination.

.6 Protect all lubricants used during construction from contamination.

2.6 PAINT

.1 All machinery components 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 Use an epoxy mastic high build, aluminum filled primer for all machined surfaces that require paint but cannot be blasted cleaned). Provide surface preparation in accordance with paint manufacturer’s requirements. Provide intermediate and top coat of paint in accordance with paint requirements for structural steel.

.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. Submit color samples for approval.

.6 Include all painting instructions on the Shop Drawings.

2.7 GALVANIZING

.1 Galvanized required components per CAN/CSA G164-M92 (R003)

.2 Protect areas where the galvanized coating is removed during the machining process with a galvanized coating per ASTM A780/780M-09.

.3 Prepare and paint all galvanized surfaces which are to be painted in accordance with ASTM D6386-99 (2005).

2.8 SHAFTINGS AND PINS

.1 Provide rolled shafts and pins that meet the requirements of ASTM A675M-03(009) 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 Forged shafts and pins: meet the requirements of Forgings. 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 B46.1-2002 unless a finer finish is required.

2.9 JOURNAL BEARINGS AND BUSHINGS

.1 Produce bronze bushings of the materials indicated on the Contract Plans.

.2 Provide bronze bushings in journal bearings with grease grooves as indicated on the contract plans. Blend the edges of the grease grooves smoothly into the bearing surface. The entry hole from the grease fitting must intersect and lie completely within the grooves. Machine cut the grease grooves. Hand cutting of grease grooves is not acceptable.

2.10 SHIMS

.1 Produce shims required for leveling and alignment of machinery and equipment from brass or type 316 stainless steel.

.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 contract 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 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 approved 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.

2.11 NON-SHRINK GROUT

.1 Provide non-shrink grout for use under machinery supports.

.2 Minimum compressive strength: 103.4 MPa [15,000 psi] per ASTM C579-01(2006)

.3 Linear shrinkage: less than 0.0001 mm./mm

.4 Store and use grout in strict accordance with the manufacturer's recommendations.

2.12 WELDING

.1 Perform welding required for the work and weld inspection in accordance with the requirements of CSA W59 and CSA G40.21.

.2 Treat all machinery and weldments that support machinery as main members, all welds as joining primary components, unless otherwise specified in the Contract Documents.

.3 Do not perform field welding on these components unless specified in the Contract Documents.

.4 Open ended welds are not acceptable under any circumstances.

.5 Stress relieve welded machinery parts or supports by heat prior to final machining.

.6 Include welding and stress relieving procedures with the shop drawings for parts that require welding.

.1

.7 Acceptable products include Longwood Trapezoidal dock fenders, Size 10 cut to the lengths shown on the Plans.

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.

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 Contract Documents.

.4 Unless otherwise indicated in 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 approved 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 approval 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 that 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 Span Lock Assembly Testing – Operate the end support assembly through 10 extend/retract cycles. Verify that the end support moves smoothly without binding, vibration, excessive friction, or noise.

.2 Provide fourteen 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 approval 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 approval 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 and approved for installation, preparations by others where required have been satisfactorily completed and machinery installation procedure has been approved.

.2 Provide millwrights and supervising engineers with a minimum of two movable bridge jobs as previous experience in the design and installation of movable bridge machinery. The installation and adjustment of all machinery is to be led by millwrights with a minimum of ten years of experience 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 Prior to setting the final end support elevations to produce the required dead load reaction and roadway transition it is necessary to complete the balancing work and set the elevations of the end casters.

.3 Prior to final adjustment of the balance wheel clearances, set the final end support elevations.

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 plans or the specifications. Submit the manufacturers recommended alignment tolerances for a new installation as part of the installation procedure.

END OF SECTION