SUBMITTAL PROCEDURES

Part 1 General

1.1 RELATED REQUIREMENTS

.1 This Specification shall revise, amend, and supplement the requirements of CW1110.

1.2 REFERENCE STANDARDS

.1 City of Winnipeg General Conditions for Construction, Revision 2019-09-01.

.2 City of Winnipeg Specification CW1110.

1.3 ADMINISTRATIVE

.1 Submit to the Contract Administrator submittals required by individual Specification sections 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 reviewed by the Contract Administrator.

.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. If both Imperial and SI Metric units are shown, SI Metric equivalent shall be the primary unit with the Imperial shown in parentheses.

.5 Review submittals prior to submission to Contract Administrator. 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. Submittals not stamped, signed, dated, and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify the Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract stating reasons for deviations.

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

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

.9 Contractor's responsibility for deviations in submission from requirements of Contract documents is not relieved by the Contract Administrator’s review.

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

1.4 REQUESTS FOR INFORMATION

.1 In the event that the Contractor, or any Subcontractor involved in the Work, determines that some portion of the Drawings, Specifications, or other Contract Documents requires clarification or interpretation by the Contract Administrator, the Contractor shall submit a Request for Information (RFI) in writing to the Contract Administrator.

.2 Submission Procedure:

.1 Submit RFI’s to the Contract Administrator on the “Request for Information” form appended to this section. The Contract Administrator shall not respond to a RFI except as submitted on this form.

.2 Number RFI's consecutively in one sequence in order submitted, in a numbering system established by the Contract Administrator.

.3 Submit one distinct subject per RFI request. Do not combine unrelated items on one form.

.4 Where RFI form does not have sufficient space, attach additional sheets as required.

.5 Submit with RFI form all necessary supporting documentation.

.3 In the RFI, the Contractor shall clearly and concisely set forth:

.1 the issue for which clarification or interpretation is sought and why a response is needed from the Contract Administrator; and

.2 an interpretation or understanding of the requirement along with reasons why such an understanding was reached.

.4 The Contract Administrator will review all RFIs to determine whether they are valid RFIs. If it is determined that the document is not a valid RFI, it will be returned to the Contractor not having been reviewed with an explanation why it was deemed not valid.

.5 A RFI response shall be issued within 14 Calendar Days of receipt of the request from the Contractor unless the Contract Administrator determines that a longer time is necessary to provide an adequate response. When the RFI submission is received by the Contract Administrator before noon, the review period commences on that Calendar Day. When the RFI submission is received by the Contract Administrator after noon, the review period commences on the subsequent Calendar Day.

.6 If, at any time, the Contractor submits a large number of RFIs or the Contract Administrator considers the RFI to be of such complexity that the Contract Administrator cannot process the RFIs within 14 Calendar Days, the Contract Administrator shall confer with the Contractor within five (5) Calendar Days of receipt of such RFIs and the Contract Administrator and the Contractor will jointly prepare an estimate of the time necessary for processing same as well as an order of priority among the RFIs submitted. The Contractor shall accommodate such necessary time at no impact to the schedule and at no additional cost to the Contract.

.7 If the Contractor submits a RFI on an activity with 14 Calendar Days or less of available time to the impacted activity on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Contractor Administrator to respond to the request provided that the Contract Administrator responds within the 14 Calendar Days set forth above.

.8 A RFI response from the Contract Administrator will not change any requirement of the Contract. In the event the Contractor believes that the RFI response from the Contract Administrator will cause a change to the requirements of the Contract, the Contractor shall within 14 Calendar Days give written notice to the Contract Administrator stating that the Contractor believes the RFI response will result in a change in requirements to the Contract and the Contractor intends to submit a change request. Failure to give such written notice of 14 Calendar Days shall waive the Contractor's right to seek additional time or cost under the requirements of the Contract.

1.7 CLOSEOUT SUBMITTALS

.1 Refer to Section 01 78 00 – Closeout Submittals for closeout submittal requirements.

1.8 MISCELLANEOUS SUBMITTALS

.1 Prepare and submit submittals required by individual Specification sections.

.2 Copies: Submit one electronic copy to Contract Administrator. Method of electronic submission to be coordinated with Contract Administrator after execution of the Contract. Submit hard copies only where specifically required under individual Specification sections.

.3 Contract Administrator will review submittals for general conformance with design concept and intent, and general compliance with Contract.

.4 Contract Administrator's review does not relieve Contractor from compliance with requirements of Contract nor from errors in submittals or Contractor's design.

.5 Contractor is responsible for confirmation of dimensions at jobsite; fabrication processes; means, methods, techniques, sequences. and procedures of construction; coordination of work of all trades; and performance of Work in safe and satisfactory manner.

.6 At Contract Administrator's option, Contract Administrator's review comments and review stamp will be placed either directly on submitted copies of submittals or on separate submittal review comment form.

.7 Where work is to be designed by Contractor, comply with applicable codes and furnish submittals signed and sealed by professional engineer licensed in Province of Manitoba, as required by Specifications. If requested, calculations shall be submitted for review. Calculations shall also be signed and sealed by a professional engineer registered in the Province of Manitoba.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Request for Information (RFI)

RFI No. 0

For details and instructions on how to complete this document, click the [¶] icon under the Home tab to display the hidden text.

RFI Title: | **RFI No.:** 0

Date RFI initiated: | **Date Response Requested by:**

Date Response Issued:

Project Name:

Submitted To:

Contract Administrator (CA): | Consultant Ref. No.

Company/Dept.: | Tender No.

Requested By:		***For CA Use***	
Name:		City File No.:	
Title:		Project ID:	
Company:		Project Record Index No.:	
Email::		Purchase Order No.:	

Request/Question: (to be completed by Contractor)

Answer/Response: (to be completed by Contract Administrator)

Attachment(s):

Distribution (to be completed by Contract Administrator)

- Contract Administrator
- Contractor
- City Project Manager
- Other:

QUALITY CONTROL

Part 1 General

1.1 INSPECTION

.1 Allow the Contract Administrator access to the Work. If part of the Work is in preparation at locations other than the Site, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if the Work is designated for special tests, inspections, or approvals by the Contract Administrator or inspection authorities.

.3 If the 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 at no additional cost and have inspections or tests satisfactorily completed and make good such Work.

.4 The Contract Administrator will order part of the Work to be examined if the Work is suspected to be not in accordance with the Contract. If, upon examination, such work is found not in accordance with the Contract, correct such Work and pay cost of examination and correction. If such Work is found in accordance with the Contract, the City shall pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

.1 The Contract Administrator is to determine/approve the required inspection/testing. Independent inspection/testing agencies shall be engaged and coordinated by the Contractor for purpose of inspecting and/or testing portions of the Work. The Contract Administrator is to be copied on all inspection and/or testing results and correspondence from the inspection/testing agency. Additional tests required due to defective Work shall be paid by the Contractor at no additional cost to the Contract.

.2 The maximum allowed markup by the Contractor is 10% of the inspection/testing subcontractor costs. If additional inspection and/or tests are required due to defective Work by the Contractor, the additional costs will be borne by the Contractor.

.3 All equipment required for executing inspection and testing will be provided by the respective agencies.

.4 Employment of inspection/testing agencies does not relieve or relax the Contractor's responsibility to perform the Work in accordance with the Contract.

.5 If defects are revealed during inspection and/or testing, the appointed agency will request additional inspection and/or testing to ascertain the full degree of defect. Correct the defect and irregularities as advised by the Contract Administrator at no cost to the City. The Contractor shall be responsible for the costs of the subsequent testing and inspection of the corrected Work. The City shall deduct such costs from the Contract, amount of which will be determined by the Contract Administrator.

1.3 ACCESS TO WORK

.1 The City, the Contract Administrator, and other inspection authorities shall have access to the Work.

1.4 REJECTED WORK

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

.2 Make good other contractor's work damaged by such removals or replacement of defective Work.

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

1.5 REPORTS

.1 Submit draft inspection and test reports to the Contract Administrator, prior to inclusion with the operation and maintenance manuals and in accordance with Section 01 33 00 – Submittal Procedures

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

CLEANING

Part 1 General

1.1 PROJECT CLEANLINESS

.1 Maintain the Work in tidy condition, free from accumulation of waste products and debris, other than that caused by the City or other contractors.

.2 Remove waste materials from the Site at daily regularly scheduled times or dispose of as directed by the Contract Administrator. Do not burn waste materials on the Site.

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

.4 Provide on-site containers for collection of waste materials and debris. Asbestos Containing Material shall be kept separate from other waste material and debris.

.5 Dispose of waste materials and debris off site. Asbestos Containing Material shall be shipped off site to an approved landfill in a separate covered vehicle.

.6 Clean interior areas prior to start of finishing Work, and maintain areas free of dust and other contaminants during finishing operations.

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

.8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

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

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

1.2 FINAL CLEANING

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

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

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

.4 Remove waste products and debris other than that caused by the City or other contractors.

.5 Remove waste materials from the Site at regularly scheduled times or dispose of as directed by the Contract Administrator. Do not burn waste materials on the Site.

.6 Vacuum clean and dust building interiors.

.8 Clean roofs, downspouts, and drainage systems.

.9 Remove debris and surplus materials from crawlspace areas and other accessible concealed spaces.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

CLOSEOUT SUBMITTALS

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to Total Performance with the Contract Administrator to:

.1 Verify project requirements.

.2 Review warranty requirements.

.2 The Contract Administrator will establish communication procedures for:

.1 Notification of construction warranty defects.

.2 Determination of priorities for type of defects.

.3 Determination of reasonable response time.

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

1.2 OPERATION AND MAINTENANCE MANUALS

.1 General

.1 Provide operation and maintenance manuals in accordance with Section 01 33 00 – Submittal Procedures.

.2 An electronic draft copy of the operation and maintenance manuals shall be submitted (PDF version and searchable) prior to Substantial Performance of the Work for review and comments. Submission of individual data will not be accepted unless directed by the City. Make changes and incorporate the Contract Administrator's review comments as required and re- submit as directed by the Contract Administrator.

.3 After review and acceptance by the City, five (5) hard copies and one electronic (PDF) copy of the final operation and maintenance manuals shall be submitted. The final electronic copy shall be provided on a flash memory drive.

.4 Prepare operation and maintenance manuals using personnel experienced in maintenance and operation of described products.

.5 Operation and maintenance instructions and technical data to be sufficiently detailed with respect to design elements, construction features, component function, correct installation procedure, and maintenance requirements to permit effective start-up, operation, maintenance, repair, modification, extension, and expansion of any portion or feature of installation. Technical data to be in the form of approved Shop Drawings, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists.

.6 For the guidance of the City's operation and maintenance personnel, the Contractor shall prepare operation and maintenance manuals for the Work, describing in detail the construction of each part of the Work and the recommended procedure for operation, servicing, and maintenance.

.7 All instructions in these operation and maintenance manuals shall be in simple language to guide the City in the proper operation and maintenance of this installation.

.2 Format

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf, 8.5” by 11” with spine and face pockets.

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

.1 Identify contents of each binder on spine and face.

.4 Cover: identify each binder with title sheet labelled "Operation and Maintenance Instructions", and containing project name and date, facilities covered in the manual, City’s Contract number, the name and address of the Contractor, and the issue date.

.5 Arrange content by Division and 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 type written data.

.8 Drawings: provide with reinforced punched binder tab.

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

.3 Contents

.1 For each operation and maintenance manual volume, provide an overall title sheet that includes:

.1 The title "Operation and Maintenance Instructions";

.2 Project name and date;

.3 Facilities covered in the manual;

.4 City’s Contract number;

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

.6 Schedule of products and systems, indexed to content of volume;

.2 For each operation and maintenance manual volume, provide an overall list of contents which includes the contents for all the operation and maintenance manual volumes.

.3 In addition to operation and maintenance information required in the individual Specification sections, include:

.1 Brochures/catalogue excerpts of all components of the Work.

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

.3 Documentation of all test results.

.4 Complete set of equipment and assembly drawings.

.5 Installation, start-up, individual equipment operation and maintenance manuals.

.6 Shop Drawings and cutsheets of all equipment and materials.

.1 Do not utilize the cutsheet and Shop Drawing submittals that were sent to the Contract Administrator for review as these may contain inaccurate information and markups. Only provide cutsheets and Shop Drawings representing the final materials and equipment supplied, without any markups from the Contract Administrator.

.2 For generic cutsheets and Shop Drawings that list multiple model numbers or configurations, place a rectangle around the specific model that was supplied and cross out other models.

.7 Sections for the record Drawings and as-built Drawings of all installations. Drafted record Drawings and as-built Drawings of size 432x279 mm (11 x 17") will be inserted by the Contract Administrator, based on the as-built Drawings marked up by the Contractor.

.8 Names, addresses, and telephone numbers of all major Subcontractors and suppliers.

.9 Certificate of Inspection from the inspection authority.

.10 Testing and commissioning documentation.

.11 Warranty certificate, signed and dated.

.12 Written process narratives outlining the programming of the PLC systems for individual processes or systems.

.13 Final instrumentation set points including but not limited to:

.1 Units

.2 Scale

.3 Alarm points (low-low, low, high, high-high)

.4 4-20 mA settings

.14 Logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 – Quality Control.

.4 General catalog data for the operations and maintenance manual is unacceptable. If manufacturer's specification sheets are generalized in any way, they shall be clearly marked to show exactly which item has been supplied, and the project designation for that item (e.g., SF-Y601) is to be noted on manufacturer's specification sheet which includes all details for this unit, including complete model number, serial number, and construction and performance data.

.4 Equipment and Systems

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

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

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

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

.3 Include installed colour coded wiring diagrams.

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

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

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

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

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

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

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

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

.14 Additional requirements: as specified in individual Specification sections.

.5 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 if applicable.

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

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

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

1.3 AS-BUILT / RECORD DRAWINGS

.1 After award of Contract, the Contract Administrator will provide a complete set of Drawings for the purpose of maintaining project as-built and record Drawings. Accurately mark-up deviations from the Contract caused by the Site conditions and changes ordered by the Contract Administrator. Update daily.

.2 The Contractor shall keep one complete set of white prints at the Site during the Work, including all addenda, change orders, Site instructions, clarifications, and revisions for the purpose of the as-built and record Drawings. As the Work on-site proceeds, the Contractor shall clearly mark up the white prints in red pencil all the Work which

deviated from the original Contract. Identify Drawings as "Project Record Copy". Maintain in good condition and make available for inspection on-site by the Contract Administrator at all times.

1.4 WARRANTIES AND BONDS

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

.2 Submit warranty management plan, 30 days before planned pre-warranty meeting, to the Contract Administrator for approval.

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

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

.5 Submit warranty information, made available during construction phase, to the Contract Administrator for approval prior to each monthly pay estimate.

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

.1 Separate each warranty 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 Business Days after completion of applicable item of Work.

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

.5 Co-execute submittals when required.

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

.7 Except for items put into use with the City's permission, leave date of beginning of time of warranty until date of Total Performance is determined.

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

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

.2 Listing and status of delivery of certificates of warranty for warranty items, to include roofs, HVAC balancing, pumps, and commissioned systems. Provide list for each warranted equipment, item, feature of construction, or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

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

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

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

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

.10 Cross-Reference to specific pertinent operation and maintenance manuals.

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

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

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

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

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

.10 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Contract Administrator to proceed with action against the Contractor.

1.5 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by the Contract Administrator.

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

.3 Leave date of acceptance until project is accepted.

.4 Indicate following information on tag:

.1 Type of product/material.

.2 Model number.

.3 Serial number.

.4 Contract number.

.5 Warranty period.

.6 Inspector's signature.

.7 Construction Contractor.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 INTENT

.1 This specification is to supplement the health and safety requirements contained in the Tender Documents, and the City of Winnipeg's "General Conditions for Construction".

1.2 REFERENCE STANDARDS

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

.2 Province of Manitoba

.1 The Workers Compensation Act RSM 1987 – Updated 2020.

.3 General Conditions for Construction, City of Winnipeg, Revision 2020-01-31.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit copies of reports or directions issued by federal, provincial and territorial health and safety inspectors.

.3 Submit copies of incident and accident reports.

.4 Submit WHMIS SDS – Safety Data Sheets where indicated in individual sections.

.5 The Contract Administrator will review Contractor's Site-specific Safe Work Plan and provide comments to the Contractor within three (3) Business Days.

.6 The Contract Administrator's review of Contractor's final Safe Work Plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction health and safety.

1.4 SAFETY ASSESSMENT

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

1.5 MEETINGS

.1 Schedule and administer a health and safety meeting with the Contract Administrator and City personnel prior to commencement of the Work. Ensure that all people performing Work at Site are aware of the requirements of the general Site awareness orientation.

1.6 REGULATORY REQUIREMENTS

.1 Do Work in accordance with all applicable regulatory requirements.

1.7 GENERAL REQUIREMENTS

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

.2 The Contract Administrator and the City may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.8 RESPONSIBILITY

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

.2 Contractor will be responsible and assume the role of prime contractor as described in the Manitoba Workplace Safety and Health Act.

.3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with Site-specific Safe Work Plan.

1.9 COMPLIANCE REQUIREMENTS

.1 Comply with the Workers Compensation Act, Workplace Safety Regulation, Manitoba.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.10 UNFORESEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occurs during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province of Manitoba and advise Contract Administrator verbally and in writing.

.2 When unforeseen or peculiar safety-related factor, hazard, or condition occurs during performance of Work, advise the Health and Safety co-ordinator and follow procedures in accordance with Acts and Regulations of the Province of Manitoba and advise the Contract Administrator verbally and in writing.

1.11 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, a competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience.

.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 Contractor's Safe Work Plan.

.2 The Health and Safety Co-ordinator's contact information should be prominently displayed in the construction Site office.

1.12 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on Site in accordance with Acts and Regulations of the Province of Manitoba and in consultation with the Contract Administrator.

1.13 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by the Contract Administrator.

.2 Provide the Contract Administrator with written report of action taken to correct non-compliance of health and safety issues identified.

.3 The Contract Administrator may issue a stop Work order if non-compliance of health and safety regulations is not corrected.

1.14 POWDER ACTUATED DEVICES

.1 Use powder actuated devices only after receipt of written permission from the Contract Administrator.

1.15 WORK STOPPAGE

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

STRUCTURAL STEEL

Part 1 General

1.1 REFERENCES

.1 ASTM International Inc.

- .1 ASTM A36/A36M-19, Standard Specification for Carbon Structural Steel.
- .2 ASTM A193/A193M-20, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
- .3 ASTM A307-21, Standard Specification for Carbon Steel Bolts and Studs and Threaded Rod 60,000 PSI Tensile Strength.
- .4 ASTM F3125/F3125M, Standard Specification for High Strength Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-85.10-99, Protective Coatings for Metals.

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA)

- .1 Handbook of the Canadian Institute of Steel Construction.
- .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.

.4 Canadian Standards Association (CSA International)

- .1 CSA G40.20/G40.21-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-S16-14(R2019), Design of Steel Structures.
- .4 CAN/CSA-S136-16, North American Specifications for the Design of Cold Formed Steel Structural Members.
- .5 CSA W47.1-19, Certification of Companies for Fusion Welding of Steel.
- .6 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
- .7 CSA W55.3-08(R2018), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .8 CSA W59-18, Welded Steel Construction (Metal Arc Welding).

.5 Master Painters Institute

- .1 MPI-INT 5.1-08, Structural Steel and Metal Fabrications.
- .2 MPI-EXT 5.1-08, Structural Steel and Metal Fabrications.

.6 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International

- .1 NACE No. 3/SSPC SP-6-06, Commercial Blast Cleaning.

1.2 SUBMITTALS

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

.2 Shop Drawings:

.1 Provide Shop Drawings in accordance Section 01 33 00 – Submittal Procedures.

.3 Erection drawings:

.1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:

.1 Description of methods.

.2 Sequence of erection.

.3 Type of equipment used in erection.

.4 Temporary bracings.

.4 Fabrication Drawings:

.1 Submit for review and approval by the Contract Administrator fabrication drawings showing designed assemblies, components, and connections stamped and signed by qualified professional engineer registered or licensed in the Province of Manitoba.

.5 Source Quality Control Submittals:

.1 Submit copies of mill test reports 4 weeks prior to fabrication of structural steel.

.1 Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project.

.6 Fabricator Reports:

.1 Provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle materials in accordance with manufacturer’s recommendations.

.2 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.

Part 2 Products

2.1 MATERIALS

.1 Structural steel – W-Shapes: to CSA-G40.20/G40.21 Grade 350W.

.2 Structural steel – Rolled shapes and plates: to CSA-G40.20/G40.21 Grade 300W.

.3 Structural steel – HSS sections: to CSA-G40.20/G40.21 Grade 350W Class C.

.4 Standard Pipe: to ASTM A53.

.5 Cold Formed Steel: to CSA-S136.

.6 Anchor bolts: to ASTM A307.

.7 Bolts, nuts, and washers: to ASTM F3125/F3125M.

.8 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

2.2 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with approved Shop Drawings.

.2 Continuously seal members by continuous welds where indicated. Grind smooth.

Part 3 Execution

3.1 APPLICATION

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

3.2 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S16 and CAN/CSA-S136.

.2 Welding: in accordance with CSA W59.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.3 CERTIFIED STRUCTURAL INSPECTION OF PRIMARY CLARIFIERS NO. 1 & 2 BRIDGES

When the Primary Clarifier Nos. 1 & 2 Travelling Bridges are docked and washed for maintenance, the current state of the bridge structures shall be assessed by a third-party certified structural inspection and testing agency. The contractor shall provide the structural inspector with the existing engineering drawings and other supporting reference documents to complete the structural inspection of the bridge structures. The certified structural inspection shall be completed within 2 days after the clarifier is removed from service and the report submitted within 3 days of the inspection.

The scope of work includes the following:

.1 Visual inspection of Primary Clarifier Nos. 1 and 2 bridge structures including all structural members, welded and bolted connections, and welds for deterioration due to corrosion and fatigue.

.2 Non-Destructive Testing (NDT) of critical welded connections and suspected areas. A minimum of 6 NDT locations per clarifier bridge must be completed. Final NDT locations will be determined during the certified structural inspection and approved by the Contract Administrator.

.3 Provide detailed structural inspection report to the Contract Administrator. The assessment report shall include a description of the conditions observed, photo log and a list of any deficiencies recommended for repair.

.4 Outline tasks and intervals recommended for future inspections.

Inspectors for visual weld inspections shall be qualified in accordance with CSA W178.2 Level 3 and certified by the Canadian Welding Bureau. All existing welds and adjacent surfaces shall be 100% visually inspected in accordance with the requirements of CSA W59 or alternatively AWS D1.1. The NDT of critical joints shall be performed in accordance with the requirements of CSA W59 and AWS D1.1.

3.4 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Contract Administrator for direction before commencing fabrication.

3.5 MARKING

.1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.

.2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.6 ERECTION

.1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and in accordance with approved erection drawings.

.2 Field cutting or altering structural members: to approval of Contract Administrator.

.3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds, and burned or scratched surfaces at completion of erection.

.4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.7 FINISH

.1 The contractor must apply touch-up paint to all structural steel elements of Primary Clarifier Travelling Bridges 1 & 2 including the bolts and welds where the primer or main paint system is worn off. Follow the paint system and the requirements outlined in the standard paint specification as indicated in the contract documents or specified on the drawings.

3.8 QUALITY CONTROL

.1 All structural steel weld repairs and adjacent surface shall be 100% visually inspected in accordance with the requirements of CSA W59 or alternatively AWS D1.1 for cracks in the weld or adjacent surfaces. The cost for all corrective work shall be borne by the contractor.

.2 Provide safe access and working areas for testing on the Site, as required by testing agency and as authorized by Contract Administrator.

END OF SECTION

PAINT TOUCH-UPS

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-85.10-99, Protective Coatings for Metals.

.2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).

.1 Handbook of the Canadian Institute of Steel Construction.

.2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.

.3 Canadian Standards Association (CSA International)

.1 CSA W47.1-19, Certification of Companies for Fusion Welding of Steel.

.2 CSA W55.3-08(R2018), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.3 CSA W59-18, Welded Steel Construction (Metal Arc Welding).

.4 The Society for Protective Coatings (SSPC)

.1 SSPC SP-3, Power Tool Cleaning

1.2 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Product Requirements.

.2 Deliver paint materials in manufacturer's original, undamaged containers with identification labels intact.

1.3 IDENTIFICATION OF PAINT TOUCH-UPS ON PRIMARY CLARIFIERS 1 & 2

.1 Identification of areas of coating deteriorations requiring repairs on primary clarifier travelling bridges will be completed by the Contract Administrator once the bridges are removed from service and parked in the dry dock location.

.2 For the purposes of this Tender, the Contractor is to assume a total quantity of 2 square meters of paint touch-ups per bridge support steel (total of 4.0 square meters of paint touch up) with an average of 0.1 square meters per repair area. The quantity of touch ups shall be estimated based on in-service inspections completed once bridges are docked for maintenance.

.3 The Contractor shall not proceed with additional paint touch-ups outside of the marked areas without the prior written approval of the Contract Administrator.

.4 The guardrail swing gate around the tank shall be touched-up. The quantity of touch-ups is estimated as 0.2 square meters for this work.

.5 The Primary Clarifier Travelling Bridges 1 & 2 all deck guardrails shall be repainted. Refer to existing engineering drawings for travelling bridge guardrail lengths for estimating paint area.

Part 2 Products

2.1 MATERIALS

.1 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

2.2 FIELD PAINTING

.1 Paint for support steel: Bar Rust 235 Surface Tolerant Epoxy by International or approved equivalent in accordance with the Bid Opportunity Documents.

.1 Paint Colours

.1 Primary Clarifier Bridges 1 & 2 – Black

.2 Paint for guardrails:

.1 Paint Colours

.1 Primary Clarifier Bridges 1 & 2 Guardrail – Color to match existing guardrail.

.2 Guardrail around concrete tanks – Safety Yellow

Part 3 Execution

3.1 APPLICATION

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

3.2 GENERAL

.1 Welding: in accordance with CSA W59.

.2 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.3 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to the Contract Administrator for direction before commencing repair work.

3.4 PRIMARY TRAVELLING BRIDGES 1 & 2 WELD REPAIRS

.1 Following surface preparation and full corrosion removal of existing welded areas of the Primary Clarifier Bridges 1 & 2 support steel and bridge deck checked plates, notify the Contract Administrator if it is determined that welds may be compromised due to corrosion. Spot weld repairs will be carried out on an as-required basis as directed by the Contract Administrator. The Contractor is to assume a total quantity of 16 spot weld repairs for this bid opportunity.

3.5 FIELD QUALITY CONTROL

.1 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by the Contract Administrator or designate.

.2 Maintain one (1) 50mm x 50mm x 4mm carbon steel coupon with the specified surface preparation and field applied coating for each day of coating application. The back side of the coupon shall be labelled with the date and time the coating was applied. The coupon will be reserved by the Contract Administrator for testing purposes and for evaluation of coating cure.

3.6 FIELD PAINTING

.1 Clean corroded sections of members as indicated in the drawings by removing loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to SSPC-SP-3 – power tool cleaning.

.2 Feather existing coating edges towards the substrate prior to the touch up.

.3 Apply one coat of Bar Rust 235 or approved equivalent in accordance with the Bid Opportunity Documents to achieve minimum dry film thickness of 8 mils.

.4 Apply paint on dry surfaces and when surface and air temperatures are above 5 degrees Celsius.

.5 Maintain dry conditions and 5 degrees C minimum temperature until paint is thoroughly dry.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CSA W59.2-M1991 (R2013), Welded Aluminum Construction

.2 CSA W47.2-11 (R2015), Certification of Companies for Fusion Welding of Aluminum

.2 ASTM International

.1 ASTM B209M-07, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.

.2 ASTM B210M-05, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes Metric.

.3 ASTM B211M-03, Standard Specification for Aluminum and Aluminum Alloy Bar, Rod and Wire Metric.

.4 ASTM F593-02(2008), Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

.3 American Welding Society (AWS)

.1 AWS D1.2/D1.2M:2014 Structural Welding Code - Aluminum

.2 AWS - A5.10/A5.10M 1999(R2007), Specification for Bare Aluminum and Aluminum Alloy Welding Electrodes and Rods.

1.2 REFERENCE INSPECTION REPORTS AND DRAWINGS

.1 TestLabs

.1 “Final Report - Radiography (X-ray) Inspection of the Aluminum Alloy Primary Clarifier Bridge # 3 At the South End Sewage Treatment Plant (SEWPCC)” dated June 8, 2020.

.2 The report referenced in 1.2.1.1 indicated that all identified deficient welds (3 locations: Southeast, Northeast, and Northwest corners) are to be repaired. The report has been appended to this Bid Opportunity in Appendix I for Reference.

.2 Primary Clarifier No. 3 Truss Long Term Repair

.1 The truss bottom chord at southwest corner (i.e., previously repaired crack location) is to be repaired to extend the remaining useful life (RUL) of the bridge truss for an additional 25 years of service (Refer to the engineering drawing for truss long term repair details).

1.3 SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Submit Shop Drawings to include fabrication and erection documents consisting of connection and design details, shop details, erection diagrams, erection procedures, and material lists.

.2 Indicate cuts, copes, connections, holes, threaded fasteners, rivets, welds, and other items. Indicate welds using welding symbols as shown in Appendix A of CSA W59.2.

.3 Include description of methods, sequence of erection, and type of equipment to be used in erecting structural aluminum.

.4 Mill Test Reports

.1 Provide mill test reports as detailed in Item 1.4.1.

.5 Fabricator Affidavit

.1 Provide a fabricator affidavit as detailed in Item 1.4.2.

1.4 QUALITY ASSURANCE

.1 Submit copies of mill test reports showing chemical and physical properties and other details of aluminum to be incorporated into work, at least four weeks prior to fabrication of structural aluminum.

.2 Fabricator of structural aluminum to provide an affidavit stating that materials and products used in fabrication conform to applicable material and products standards called for by design Drawings and Specifications.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Store and protect structural aluminum from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Welding materials: to CSA W59.

.2 Aluminum and Aluminum-Alloy Extruded Bar, Rods, Wire, Shapes, and Tubes: to ASTM B221M, Alloy 6061-T651.

.3 Aluminum sheet or plate: to ASTM B209M, Alloy 6061-T651.

.4 Aluminum materials shall come with the following properties:

.1 Minimum Yield Strength = 240 MPa (35,000 psi)

.2 Minimum Tensile Strength = 290 MPa (42,000 psi)

2.2 FABRICATION

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

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

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

2.3 FINISHES

.1 Finish: Plain mill.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Contract Administrator

.2 Inform the Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with repair work only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Contract Administrator.

3.2 BRIDGE REPAIR WORKS

.1 Aluminum bridge repairs shall be made when the bridge is in the dry docked position and the sludge scrapper is supported from below and not adding load to the bridge.

.2 Do welding work in accordance with CSA W59.2 unless specified otherwise.

.3 Repair all deficient weld areas as outlined by TestLabs Radiography (X-ray) Inspection report noted in Section 1.2.1

.4 Companies to be certified under Division 1 or 2.1 of CSA W47.2 for fusion welding of aluminum, and CSA W55.3 for resistance welding of structural components.

.5 Provide temporary bridge support to ensure alignment is maintained. Any plans for temporary support works are to be submitted to the Contract Administrator for approval prior to installation.

.6 Erect any required metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.7 Weld field connection repairs as shown on the engineering drawing for truss long term repairs.

.8 Notify the Contract Administrator immediately following weld repair of the connections for coordination of weld inspections.

3.3 PRE REPAIR AND POST REPAIR SURVEY

.1 Prior to commencing bridge repair works, perform a survey to an accuracy of +/-0.5mm across both bottom chords of the bridge truss, recording measurements at every truss working point and midway points along the chord members (for a total of 21 measurements per chord). Points of measurement shall be marked for repeatability of the survey following weld repairs to the bridge.

.2 Repeat the survey indicated in 3.3.1 following completion of all weld repairs. The bridge repair work dimensional tolerances shall meet those prescribed in CSA standards or Crane Manufacturer's Association of America (CMAA)

3.4 FIELD QUALITY CONTROL

.1 Radiographic (or approved equivalent) inspections of all weld repairs shall be carried out in accordance with the requirements of CSA W59.2 or AWS D1.2 to confirm the weld quality and the final weld inspection report shall be submitted to the Contract Administrator for verification. The cost of all corrective work shall be borne by the contractor.

.2 Provide safe access and working areas for testing on Site, as required by testing agency and as directed by Contract Administrator.

3.5 PROTECTION

.1 Protect all existing equipment and components from damage during construction.

.2 Provide temporary support to the bridge to ensure alignment is maintained.

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

END OF SECTION

Part 1 General

.1 The purpose of this specification is to provide the general requirements for the mechanical scope of work to be completed as part of the Primary Clarifier Travelling Bridge (PCTB) refurbishment to be done on clarifier nos. 1 and 2 at the SEWPCC.

1.2 REFERENCE SPECIFICATIONS

.1 14 99 99A PCTB Drive Refurbishment

.2 14 99 99B PCTB Rail, Track, and Anchor Bolts

1.3 SUBMITTALS

.1 Completed Inspection and Test Plan (ITP) documents (Appendix B)

.2 CD-PM-TO-13: Form 100 – Certificate of Equipment Delivery (Appendix F)

.3 CD-PM-TO-14: Form 101 – Certificate of Readiness to Install (Appendix F)

.4 CD-PM-TO-15: Form 102 – Certificate of Satisfactory Installation (Appendix F)

.5 CD-PM-TO-16: Form 103 – Certificate of Equipment Satisfactory Performance (Appendix F)

.6 CD-PM-TO-17: Form 104 – Certificate of Satisfactory Process Performance (Appendix F)

.7 Material inspection and testing certificates for new components.

.8 Material packing lists and/or bills of lading.

Part 2 Products

2.1 GENERAL

.1 The City has pre-purchased materials from the Original Equipment Manufacturer (OEM), Walker-Process Equipment, Mike Fowler, Walker Repairs Sales, 630-264-5241, mfowler@walker-process.com. These materials are listed in Appendix G and must be used by the contractor in the refurbishment work.

.2 A list of materials that have not been pre-purchased but are to be replaced as part of the scope of work are also shown in the table in Appendix G. Procurement of the full set of materials (beyond the pre-purchased set) is the responsibility of the contractor.

2.2 SHIPPING, STORAGE, HANDLING, AND DISPOSAL

.1 The onsite laydown area outside the clarifier building that is to be used for the shutdown period is shown in Appendix C. Bring materials into the building using the large south facing loading doors at the west end of the building. Do not store materials outside the loading door.

.2 Access to the loading door must be authorized by the Bid Opportunity 976-2016 (Contract C4) contractor 24 hrs prior. Materials must be moved directly from the delivery vehicle inside the building.

.3 The overhead monorail at the west end of the building can be used to move materials inside the primary clarifier building. The Contractor shall provide their own hoist for this purpose.

.4 Ship and store materials in a location and manner that reflects the care and preservation requirements for those parts. Parts to be shipped fully secured and protected from rain/snow etc.

.5 Coordinate delivery of City supplied materials to the site with the OEM. Copy the Contract Administrator on all correspondence. Safe unloading and storage of the City supplied materials is the responsibility of the Contractor.

.6 Retain all packing slips/bills of lading and other shipping information provided upon delivery of City and Contractor supplied materials. Provide these to the Contract Administrator.

.7 The City has pre-purchased some mechanical replacement parts for PCTB No.2. These parts will be delivered to the SEWPCC site by the City. The City will require a minimum of 72 hrs prior notice for request for delivery of the components. Upon delivery, receive and unload the equipment for storage or installation.

.8 Coordinate delivery of Contractor supplied parts with the OEM to ensure readiness to receive and unload upon delivery. In order to separate delivery of long lead items, there may be more than one shipment needed. The contractor shall account for this in their bid.

.9 It is the contractor's responsibility to inspect the parts, prior to acceptance. Any damage or deficiencies identified during the inspection shall be noted at this time, and will be addressed by the OEM. Following this, the Contractor shall accept the equipment and assume risk and responsibility for it. Only deficiencies noted and documented in the foregoing manner will be deemed not the responsibility of the Contractor.

.10 A representative from the OEM, Contractor, and Contract Administrator will be physically in attendance at the time of delivery. When the full scope of parts has been delivered and inspected and photographed, the Contractor, OEM, and Contract Administrator shall fill out Form 100: "Certificate of Equipment Delivery" and provide it to the Contract Administrator. See Appendix F.

.11 The Contractor shall be responsible for the installation of the parts provided by the OEM. The installation shall be in accordance with OEM installation requirements and the Inspection and Test Plan documents contained in Appendix B.

Part 3 Execution

3.1 SAFETY

.1 Care will be required when working in the clarifier building when the clarifier is operating. If any project activity will enter the path of a PCTB in operation, coordination with plant operations staff is required to temporarily stop the unit.

.2 Only one clarifier may be shut-down for refurbishment in order to minimize the impact on the treatment plant capacity during the work. While one clarifier is drained and PCTB is locked out, the other adjacent clarifier will remain in operation with the PCTB in motion. Work on PCTB No.2 shall be performed first as it need to be repaired more urgently than No.1

.3 The contractor shall take all necessary precautions to follow health and safety regulations while refurbishing the PCTBs. This includes identifying and addressing any biological

hazards that may become apparent during the project, and ensuring that all workers wear appropriate PPE including fall restraint.

.4 The contractor shall provide their own gas monitors for use while working the clarifier room. The gas monitors shall be properly tested and calibrated in accordance with manufacturers specifications for detection of Hydrogen Sulfide gas (H2S) in accordance with applicable health and safety regulations.

.5 While working within 2m of the edge of the clarifier with no hand-rails or with the hand rails removed, workers must use fall restraint anchors, lanyards, and harnesses. Each clarifiers are fitted with existing fall restraint lifelines and anchors that run the length of the clarifier that may be used. The Contractor shall provide a Safe Work Plan to the Contract Administrator for approval that include fall restraint for working around the clarifier. Workers must have valid fall Working at Heights training certification provided by an authorized safety training agency.

3.2 MOBILIZATION/DEMOBILIZATION

.1 Mobilization and demobilization will be planned to occur before and after the clarifier shut down. Setting up equipment, tools, and accepting delivery of the materials will occur prior to the clarifier shut down to avoid using the available time for work that can be done while the clarifier is still running.

.2 Close coordination with SEWPCC plant staff is required in order to reduce potential delays in shutting down, or restarting the clarifiers. Access will be provided to SEWPCC staff to allow them to perform annual shut-down maintenance work.

3.3 DISASSEMBLY/DEMOLITION

.1 Disposal of waste steel and other demolition materials off site is the responsibility of the contractor.

.2 Disassembly of the travelling bridge drive assembly components shall be done such that the parts can be re-used if required. Use of force or application of heat that will result in damage to any component is not permitted without the approval of the Contract Administrator.

3.4 QUALITY CONTROL

.1 Complete all fields of the applicable ITP including the associated forms and checklists contained in Appendix B.

.2 All shop drawings provided by the Contractor shall conform to the requirements of the City of Winnipeg Water and Waste Department document (circa 1984) “Manual for the Production of Construction Shop Drawings”. The Manual can be located at this website. The link to the document name on that website is also listed.

.1 Website - https://winnipeg.ca/waterandwaste/dept/cad_gis.stm

.2 File Name- https://winnipeg.ca/waterandwaste/pdfs/dept/constructionManual.pdf

3.5 INSPECTION

.1 The services of a qualified representative from the OEM shall be included in the Bid, to be physically present onsite to monitor the quality of the Contractor’s work. Include an allowance of $45,000 for these OEM services. Provide an hourly rate proposal from the OEM along with summary qualifications of the representative proposed. Obtain approval from the Contract Administrator of this proposal before proceeding. Hourly costs and travel

disbursements will be reimbursed on the basis of hours spent, and disbursements incurred. Costs up to the limit will be paid. If the full allowance is not spent, the remaining amount will not be paid.

.2 The OEM will provide the services of a qualified representative to be physically present onsite to monitor the installation, start-up, commissioning, and performance testing of the new parts. The services to be performed by the OEM are as follows:

.1 The following City of Winnipeg standard forms must be signed by the Contractor and OEM and submitted to the Contract Administrator at the work step specified in the ITP:

.1 CD-PM-TO-13: Form 100 – Certificate of Equipment Delivery

.2 CD-PM-TO-14: Form 101 – Certificate of Readiness to Install

.3 CD-PM-TO-15: Form 102 – Certificate of Satisfactory Installation

Templates for the above forms can be found in Appendix F.

.2 Prior to mobilisation, the OEM shall provide to the Contractor detailed instructions and advice regarding the detailed requirements for the equipment installation including alignment tolerances, assembly best practices, and component fit types. The OEM and Contractor shall sign Form 101 to acknowledge that adequate instruction has been provided, and the Contractor is ready.

.3 A site visit inspection of the PCTBs shall be performed prior to mobilization by the OEM and Contractor together to identify any locations where the existing equipment may vary from the original design. The Contract Administrator shall be notified of any modifications observed at this time.

.4 Following the completion of the installation, the OEM shall inspect the installation of the equipment to verify that it has been installed in accordance with the manufacturer's requirements. The OEM, Contractor, and Contract Administrator shall sign Form 102. If any deficiencies in the installation exist at the time of inspection, these shall be noted on Form 102 by the OEM. The Contractor shall be responsible for the prompt correction of these deficiencies prior to the start-up of the equipment. See Appendix F.

.5 The OEM will be available for inspection of installation and supervision of start-up and commissioning as part of this Contract. These OEM services can only be accessed once approval from the Contract Administrator is received in writing. Services will be paid for based on agreed to and approved time and disbursement costs.

.3 The Contractor shall be responsible for coordinating the services provided by the OEM. The Contractor shall provide to the OEM and the Contract Administrator at least fourteen (14) days advance notice of when the OEM's services will be required.

3.6 COMMISSIONING

.1 The following City of Winnipeg standard forms must be signed by the Contractor and OEM and submitted to the Contract Administrator:

.1 CD-PM-TO-16: Form 103 – Certificate of Equipment Satisfactory Performance

.2 CD-PM-TO-17: Form 104 – Certificate of Satisfactory Process Performance

Templates for the above forms can be found in Appendix F. See Commissioning Plan document for further details.

.2 The OEM shall be physically present onsite to monitor the Contractor in starting-up and commissioning the equipment. Commissioning is to conform to the requirements of the Commissioning Plan included as Appendix E, and Divisions 14, and 26. Following a period of seven (7) consecutive days of operation of the equipment, the OEM, Contractor, and Contract Administrator shall sign Form 103 and Form 104.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 This specification provides scope and quality requirements for the mechanical refurbishment of PCTB Nos. 1 and 2 drive components. This specification does not include repair work for PCTB No.3. The intent of this specification is to describe the refurbishment work to be done to eliminate misalignment, replace worn, corroded, and/or damaged components, and improve the motion of the PCTB.

1.2 SCOPE

.1 The bridge collector drive assembly scope of work will involve the following components:

- .1 Bridge Drive System: Motor, motor coupling, gearbox, drive chain sprockets, drive chains, drive shaft sections, shaft bearings, shaft couplings, cog wheel axles, cog wheel axle bearings, and cog wheels.
- .2 Bridge Running Wheels Assembly: Running wheel axles, running wheel axle bearings, and running wheels.

1.3 REFERENCE DOCUMENTS

.1 Original Equipment Manufacturer (OEM) Drawings and Documents

- .1 Walker Process Equipment Operation and Maintenance Manual (see Appendix A)
- .2 Walker Process Equipment Travelling Bridge Collector Type “CB” assembly drawing set (included in Appendix A)
  - .1 3S33233-2 RAIL AND RACK SPLICE DETAILS
  - .2 3S33496-1 HELITHICKENER DRIVE ASSEMBLY
  - .3 4S33416-1 FOUNDATION LAYOUT COG BRIDGE
  - .4 4S33417-1 FOUNDATION LAYOUT COG BRIDGE
  - .5 4S33486-3 TYPICAL ASSEMBLY
  - .6 4S33487-1 TYPICAL ASSEMBLY
  - .7 4S33488-2 TYPICAL ASSEMBLY
  - .8 4S33489-2 TYPICAL ASSEMBLY
  - .9 4S33490-2 TYPICAL ASSEMBLY
  - .10 4S33491-2 TYPICAL ASSEMBLY
  - .11 4S33492-2 TYPICAL ASSEMBLY
  - .12 4S33497-0 HELITHICKENER ASSEMBLY

.2 Reference Standards

- .1 American Petroleum Institute (API)
  - .2 API RP 686 2nd Edition, December 1, 2009 Recommended Practice for Machinery Installation and Installation Design
- .3 American Society of Mechanical Engineers (ASME)

.1 ASME B29.1 Precision Power Transmission Roller Chains, Attachments, and Sprockets.

.2 ASME Y14.5-2009 Dimensioning and Tolerancing

.4 CSA Group

.1 CAN/CSA-B167-[16], Overhead cranes, gantry cranes, monorails, hoists, and jib cranes.

.5 City of Winnipeg Water and Waste Department

.1 WWD CAD/GIS Standards - 2016

.6 International Standards Organization (ISO)

.1 ISO 12488-1:2012 Cranes -- Tolerances for wheels and travel and traversing tracks -- Part 1: General.

1.4 SUBMITTALS

.1 Methodology Document

.1 Provide a detailed drive shaft, and wheel alignment methodology for review and approval by the Contract Administrator indicating the intended survey/alignment method, the make, model, and calibration of survey/measurement tools to be used.

.2 As-Found Documentation

.1 As-found electrical condition monitoring information including vibration data and motor amperage shall be recorded and reported to the Contract Administrator.

.3 As-Built Documentation

.1 As-built electrical condition monitoring information including vibration data and motor amperage shall be recorded and reported to the Contract Administrator.

.4 Other Documentation

.1 List of lubricants to be used, including make, type, and lubricated component
.2 Material certificates for new components
.3 Completed Inspection and Test Plan (ITP) documents
.4 Completed QC checklists
.5 Mid-repair drive system condition assessment
.6 Photographs of removed components
.7 Drive system refurbishment and alignment methodology
.8 Existing/Replaced component photo set
.9 Shop drawings of drive shaft sections
.10 Marked up copy of drawing 4S33487-2

Part 2 Products

2.1 MATERIALS

.1 Owner Supplied Materials

.1 The list of Owner supplied materials that relate to the PCTB drive system is provided in Appendix G with part numbers, descriptions, and quantities of each material ordered.

.2 Refer to Section 14 00 01 General - Mechanical for requirements regarding coordination and sign-off for receipt of parts. Upon delivery, inspect and photograph all materials. Report defects or deficiencies immediately upon acceptance of the components. Damage to the Owner supplied materials after acceptance will be the Contractor's responsibility. See CD-PM-TO-13/Form 100 – Certificate of Equipment Delivery in Appendix F.

.2 Contractor Supplied Materials

.1 The list of Contractor supplied materials that relate to the PCTB drive system is provided in Appendix G with descriptions and estimated quantities. The Contractor shall review and report deficiencies or discrepancies immediately.

.2 Procure and apply OEM recommended lubrication. Confirm lubricant types with Contract Administrator prior to application.

.3 All drive system bolts, nuts, washers, lock-washers, and other miscellaneous hardware not listed in Appendix G are to be provided by the Contractor.

Part 3 Execution

3.1 DISASSEMBLY/DEMOLITION

.1 All of the existing bridge collector drive assembly components to be replaced by parts listed in Appendix G are to be carefully removed, cleaned, inspected, photographed, marked/numbered, and stored in the event that they must be re-used. The parts will be marked or tagged using the OEM part numbers and location. The photographs will be stored in a file structure that uses part numbers and names. The file structure is to be provided to the Contract Administrator as part of the O&M Manual.

3.2 INSTALLATION

.1 The PCTB drive assembly and running wheel axles are to be refurbished to the requirements of the ITP and QC Checklists described in subsection 3.3 using the materials listed in subsection 2.1. Reference drawing 4S33490-2 using the methods described in ISO 12488-1:2012 and vendor documentation. Where conflicts exist, the ITP and QC Checklist shall govern. If further information is required, consult the Contract Administrator prior to starting work.

.2 When the PCTB is in dry-dock position, a detailed condition assessment of all drive components shall be completed. The inspection and inspection report should:

.1 Be performed by an experienced industrial mechanic or millwright that is qualified by CSA B167-08 as a crane inspector and who has 10 or more years' experience with clarifier bridges or similar equipment.

.2 Include drive and rail components that are to be replaced, and components that are to be left as-is.

.3 Be brief, and in point-form, but include results, photographs, causes of wear or misalignment, and recommendations.

.4 Be reported to the Contract Administrator within 24 hrs of completion.

.5 Be used as a basis to replace all components reported to be in poor condition that are not already included in the refurbishment scope.

.3 Provide a shop drawing for each shaft section showing misalignment, ovality, and runout of machined surfaces relative to the shaft centreline.

.1 The drawing provided must conform to the City drafting standards stipulated in Section 14 00 01 Mechanical – General and also ASME Y14.5-2009.

.2 In addition, provide a marked-up copy of drawing 4S33487-2 with field alignment measurements and shim pack sizes (See ITP line 4).

3.3 QUALITY CONTROL

.1 Complete all fields of the applicable ITP including the associated checklists. The drive system ITP can be found in Appendix B.

.2 Complete all Quality Control checklists as required by the ITP, see Appendix J for QC checklists.

.3 During alignment, other work that will cause vibration to the bridge collector may occur. If there is work being done by another contractor that will interfere with the alignment, the Contract Administrator will notify the Contractor.

3.4 COMMISSIONING

.1 Run test the bridge collector before the clarifier is put back into operation, the unit should travel at 8 ft/min if using the 900 rpm motor setting in accordance with OEM Manual section 13 (Appendix A).

.2 Mark or tag any part that was installed, aligned, and/or torqued during the work to confirm that each part has been installed, aligned, or torqued adequately. Carry out a follow up check on all equipment of the tags and marks to verify that no parts or pieces are incompletely installed (i.e. no loose bolts, etc.).

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 This specification provides scope and quality requirements for the mechanical refurbishment of PCTB Nos. 1 and 2 rail and rack. This specification does not include rail and rack repair work for PCTB No.3. The intent of this specification is to describe the refurbishment work to be done to eliminate misalignment, replace worn, corroded, and/or damaged components, and improve the motion of the PCTB.

1.2 SCOPE

.1 The bridge collector racks, and running rails scope of work includes removal and replacement of the following components:

.1 Anchor bolts, grout pads, base plates, and rail clips, splice plates for the ASCE 40 AS carbon steel rail and ½-inch mild steel rack and rack support angle (L3-1/2”x3”x1/2”) including bolts, nuts (hex and jam nuts), and washers (plain and lock washers). Refer to existing Walker Process Equipment Travelling Bridge Collector Type “CB” assembly drawings set for rail and rack anchor spacing and layout.

.2 Reuse the existing rail end stops.

1.3 REFERENCE DOCUMENTS

.1 Original Equipment Manufacturer (OEM) Drawings and Documents

.1 Walker Process Equipment Operation and Maintenance Manual (see Appendix A)

.2 Walker Process Equipment Travelling Bridge Collector Type “CB” assembly drawing set (included in Appendix A)

.1 3S33233-2 RAIL AND RACK SPLICE DETAILS
.2 3S33496-1 HELITHICKENER DRIVE ASSEMBLY
.3 4S33416-1 FOUNDATION LAYOUT COG BRIDGE
.4 4S33417-1 FOUNDATION LAYOUT COG BRIDGE
.5 4S33486-3 TYPICAL ASSEMBLY
.6 4S33487-1 TYPICAL ASSEMBLY
.7 4S33488-2 TYPICAL ASSEMBLY
.8 4S33489-2 TYPICAL ASSEMBLY
.9 4S33490-2 TYPICAL ASSEMBLY
.10 4S33491-2 TYPICAL ASSEMBLY
.11 4S33492-2 TYPICAL ASSEMBLY
.12 4S33497-0 HELITHICKENER ASSEMBLY

.2 Reference Standards

.3 Canadian Institute of Steel Construction (CISC)

.1 CISC Handbook of Steel Construction [11th Edition].

.2 CISC Crane Supporting Steel Structures: Design Guide 3rd Ed. (2017)

.4 CSA Group

.1 CAN/CSA-B167-16, Overhead cranes, gantry cranes, monorails, hoists, and jib cranes.

.5 City of Winnipeg Water and Waste Department

.1 WWD CAD/GIS Standards - 2016

.6 Crane Manufacturers Association of America (CMAA)

.1 CMAA 70-2015, Specification for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes.

1.4 SUBMITTALS

.1 Methodology Document

.1 Provide a detailed anchor bolt, rack, and rail alignment methodology document for review and approval by the Contract Administrator indicating the intended alignment method, the make, model, and calibration of survey/measurement tools to be used.

.2 As-Found Documentation

.1 Before beginning work on PCTB Nos. 1 and 2, provide a precision laser tracking service to measure the bridge and rail assembly and verify rail and rack alignment. A product datasheet and manufacturer's calibration certificate shall be provided to the Contract Administrator and a statement of the applicable measurement error shall be included with each dataset recorded and submitted to the Contract Administrator.

.2 Provide a shop drawing showing existing and proposed new anchor bolt locations as a baseline for a new drawing showing the as-built bolt locations. This shop drawing shall be stamped by a Professional Engineer registered in the Province of Manitoba and shall meet the requirements of Section 14 00 01 General - Mechanical. See Appendix K for a sample document.

.3 As-Built Documentation

.1 After completion of work on PCTB Nos. 1 and 2, provide a precision laser tracking service to measure the bridge and rail assembly and verify rail and rack alignment. If the calibration certificate for the unit used in para 1.4.1.1 no longer applies, a new calibration certificate shall be provided. The results collected shall be summarized and reported to the Contract Administrator and used to:

.1 Revise the shop drawing with as-built anchor bolt locations.

.2 Complete the applicable sections of the quality control forms described in subsection 3.3.

.4 Other Documentation

.1 Material certificates for new components

.2 Completed Inspection and Test Plan (ITP) documents

.3 Completed QC checklists

.4 Material packing lists and/or bills of lading

.5 Rail and rack installation and alignment methodology

.6 Rack, and subcomponents fabrication drawings

Part 2 Products

2.1 MATERIALS

.1 City Supplied Materials

.1 The list of City supplied materials that relate to the PCTB rails, and rack is provided in Appendix G with part numbers, descriptions, and quantities of each material ordered.

.2 Refer to Section 14 00 01 Mechanical - General for requirements regarding coordination and sign-off for receipt of parts. Upon delivery, inspect and photograph all materials. Report defects or deficiencies immediately upon acceptance of the components. Damage to the City supplied materials after acceptance will be the Contractor's responsibility. See material acceptance form contained in Appendix F.

.2 Contractor Supplied Materials

.1 The list of Contractor supplied materials that relate to the PCTB rails, and rack is provided in Appendix G with descriptions and estimated quantities. The Contractor shall review and report deficiencies or discrepancies immediately.

.2 Anchors bolts to be ¾" diameter 12" long stainless-steel grade 316 embed 8" into existing concrete using HILTI HIT HY200 epoxy system or approved equal. Install anchors as per manufacturer's recommendations.

.3 Grout type – Use SIKA M-Bed Standard.

.4 All rail and track bolts, nuts, washers, lock-washers, and other miscellaneous hardware not listed in Appendix G are to be provided by the Contractor.

Part 3 Execution

3.1 MOBILIZATION/DEMOBILIZATION

.1 Mobilization and demobilization will be planned to occur before and after the clarifier shut down. Setting up equipment, tools, and accepting delivery of the materials will occur prior to the clarifier shut down to avoid using the available time for work that can be done while the clarifier is still running.

3.2 DISASSEMBLY/DEMOLITION

.1 Remove existing steel rails and other debris from the site. Cut into smaller pieces as required. Disposal of waste steel and other demolition materials off site is the responsibility of the contractor.

.2 Existing grout pads are to be chipped a minimum of 1 inch and a maximum of 1.5 inches below the top of concrete.

3.3 INSTALLATION

.1 The Contractor shall make use of the Owner supplied parts first, in order to begin installation immediately when the shut-down window becomes available, and to avoid any delay resulting from late delivery of OEM supplied components.

.2 Anchor bolts, grout pads, sole plates, running rails, and racks are to be refurbished to the requirements of the ITP and QC Checklists described in subsection 3.4 using the materials listed in subsection 2.1. Additionally, the installation must meet the requirements of following existing engineering drawings and standards:

.1 3S33233-2 RAIL AND RACK SPLICE DETAILS (Appendix K)

.2 4S33416-1 FOUNDATION LAYOUT COG BRIDGE (Appendix K)

.3 4S33417-1 FOUNDATION LAYOUT COG BRIDGE (Appendix K)

.4 CISC Crane Supporting Steel Structures: Design Guide 3rd Ed. (2017)

.5 CMAA 70-2015.

Where conflicts exist, the ITP and QC Checklist shall govern. If further information is required, consult the Contract Administrator prior to starting work.

.3 Areas of damaged concrete from demo of original grout pads are to be patch repaired with cement repair mix. Provide concrete damage repair plan to the Contract administrator for review and approval prior to repairing damaged concrete work.

.4 Anchor bolts, rail, and rack are to be aligned and installed using the centerline of each clarifier as the reference. Refer to marked up drawing 4S33416-1 in Appendix K.

.5 Provide a detailed plan shop drawing for review by the Contract Administrator indicating the position and tolerance of all new anchor bolts and grout pads overlaid on the existing anchor bolt pattern (see subsections 1.4.2 and 1.4.3).

.1 The new anchor layout is to have the same typical anchor spacing as shown on the original layout drawing 4S33416-1 without any overlap with the original anchor locations.

.2 The drawing shall also include typical Sections/Details showing connections (splicing/anchoring) for rail and rack as well as minimum spacing requirements for new anchor bolts.

.3 Upon review by the Contract Administrator the shop drawing will be issued as final and include any required updates.

.4 The drawing provided must conform to the City drafting standards stipulated in Section 14 00 01 Mechanical - General.

.6 Anchor bolt installation shall be aligned from the longitudinal (east/west) and transverse (north/south) centrelines of each clarifier tank. Final anchor bolt alignment shall be considered a project Hold-Point whereby the contract must receive Contract Administrator approval prior to proceeding with installation. Refer to ITP in Appendix B for further information.

3.4 QUALITY CONTROL

.1 Complete all fields of the applicable ITP including the associated checklists. The Rail ITP can be found in Appendix B.

.2 Complete all Quality Control checklists as required by the ITP, see Appendix J for QC checklists.

3.5 COMMISSIONING

.1 See Commissioning Plan document in Appendix E for further details.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 This Section covers items common to Sections Division 26, ELECTRICAL.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-18, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

.2 CAN3-C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

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

.1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.

.3 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.

1.3 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.

1.4 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control 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.

1.5 SUBMITTALS

.1 Submit for review single line electrical diagrams and locate under plexiglass in electrical rooms.

.2 Shop drawings:

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

.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 copies of 600 x 600 mm minimum size drawings and product data to inspection authorities.

.6 If changes are required, notify Contract Administrator of these changes before they are made.

.3 Quality Control:

.1 Provide CSA certified equipment and material. Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special approval before delivery to site.

.2 Submit test results of installed electrical systems and instrumentation.

.3 Permits and fees: in accordance with General Conditions of contract.

.4 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.

.5 Submit certificate of acceptance from inspection authority upon completion of Work to Contract Administrator.

.4 Manufacturer's Field Reports: submit to Contract Administrator manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.6 QUALITY ASSURANCE

.1 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices as per the conditions of Provincial Act respecting manpower vocational training and qualification.

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

1.7 DELIVERY, STORAGE AND HANDLING

.1 Material Delivery Schedule: provide Contract Administrator with schedule within 2 weeks after award of Contract.

.2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

1.8 SYSTEM STARTUP

.1 Instruct Contract Administrator and 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.

1.9 OPERATING INSTRUCTIONS

.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.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

.1 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.

.2 Factory assemble control panels and component assemblies.

2.2 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 which are related to control systems specified in mechanical sections and as shown on mechanical drawings.

2.3 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of inspection authorities and Contract Administrator.

.2 Decal signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

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

2.5 EQUIPMENT IDENTIFICATION

.1 Identify electrical and controls equipment and instrumentation with nameplates and labels as follows:

.1 Nameplates: lamacoid 3 mm melamine, black face, white 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
Size 8	50 x 100 mm	2 lines	12 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates and labels to be approved by Contract Administrator prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate and label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved as directed by Contract Administrator. Eg. “P600”

.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.

2.6 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, 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.

.5 Identify each wire at termination points with unique wire tag, generally as shown on the drawings. Markers shall consist of machine printed sleeves.

2.7 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code 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

2.8 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 to EEMAC Y1-1.

.2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

2.9 SCOPE OF WORK

.1 The scope of the electrical work includes all items identified on the drawings and the specifications. The following list of major work items has been provided to provide a high level overview.

.2 Disconnect and remove all existing motor power wiring back to existing control panel. Existing conduits shall be reused. and extend conduit as required.

.3 Provide new power wiring for motors as identified on the electrical SLD drawings.

.4 Provide new lockable local disconnect switch for motors as shown on electrical drawings.

Part 3 Execution

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

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

3.3 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.

3.4 LOCATION OF OUTLETS

.1 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.3 Locate light switches on latch side of doors.

.1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

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

.1 Local switches: 1400 mm.

.2 Wall receptacles:

.1 General: 300 mm.

.2 Above top of continuous baseboard heater: 200 mm.

.3 Above top of counters or counter splash backs: 175 mm.

.4 In mechanical rooms: 1400 mm.

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

.4 Telephone and interphone outlets: 300 mm.

.5 Wall mounted telephone and interphone outlets: 1500 mm.

.6 Fire alarm stations: 1500 mm.

.7 Fire alarm bells: 2100 mm.

.8 Television outlets: 300 mm.

.9 Wall mounted speakers: 2100 mm.

.10 Clocks: 2100 mm.

.11 Door bell pushbuttons: 1500 mm.

3.6 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.7 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 - 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 Conduct following tests:

.1 Power distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.5 Systems: fire alarm system and communications.

.6 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.3 Carry out tests in presence of Contract Administrator.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project. 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 - 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.

3.8 CLEANING

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

.2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

END OF SECTION

WIRE AND BOX CONNECTORS 0-1000 V

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 01 – Common Works Results – For Electrical

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2 No.18-98, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.

.2 CSA C22.2 No.65-93(R1999), Wire Connectors.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused wiring materials from landfill to metal recycling facility as approved by Contract Administrator.

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Clamps or connectors for armoured cable as required to: CAN/CSA-C22.2 No.18.

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

.3 Install fixture type connectors and tighten. Replace insulating cap.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 01 – Common Works Results – For Electrical

.2 Section 26 05 20 – Wire and Box Connectors - 0 - 1000 V.

.3 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCES

.1 CSA C22.2 No .0.3-96, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No. 131-M89(R1994), Type TECK 90 Cable.

.3 City of Winnipeg

.1 Identification Standard – 510276-0000-40ER-0002.

.2 Tag Naming Standard – 612620-0014-40ER-0001.

1.3 SHOP DRAWING

.1 Include detail construction, dimension, capacities, weights of equipment or material.

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 chemically cross-linked thermosetting polyethylene material rated RW90.

2.2 1 KV TECK90 POWER CABLE

.1 Cable: to CAN/CSA-C22.2 No. 131.

.2 Conductors:

.1 Grounding conductor: copper.

.2 Circuit conductors: copper, size as indicated. (12 AWG minimum where not indicated)

.3 Insulation:

.1 Type: ethylene propylene rubber.

.2 Chemically cross-linked thermosetting polyethylene rated type RW90, 1000 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking aluminum.

.6 Overall covering: thermoplastic polyvinyl chloride material.

.7 Fastenings:

.1 One hole steel 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 300 mm centers.

.3 Threaded rods: 6 mm dia. to support suspended channels.

.8 Connectors:

.1 Watertight, explosion-proof approved for TECK cable.

2.3 600 V TECK90 CONTROL CABLE

.1 Cable: to CAN/CSA-C22.2 No. 131.

.2 Conductors:

.1 Grounding conductor: copper.

.2 Circuit conductors: copper, size as indicated. (14 AWG minimum where not indicated)

.3 Insulation:

.1 Type: ethylene propylene rubber.

.2 Chemically cross-linked thermosetting polyethylene rated type RW90, 600 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking aluminum.

.6 Overall covering: thermoplastic polyvinyl chloride material.

.7 Fastenings:

.1 One hole steel 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 300 mm centers.

.3 Threaded rods: 6 mm dia. to support suspended channels.

.8 Connectors:

.1 Watertight, explosion-proof approved for TECK cable.

2.4 TYPE RW90 CONDCUTOR

.1 In accordance with CSA C22.2 No.38

.2 Circuit conductors shall be concentric stranded soft copper, size as indicated (12 AWG minimum where not indicated).

.3 Insulation to be chemically cross-linked thermosetting polyethylene rated type RW90 XLPE, 600V

.4 Suitable for installation in temperatures down to -40 °C.

.5 90 °C conductor operating temperature.

2.5 WIRING IDENTIFICATION

.1 Provide wiring identification in accordance with Section 26 05 01 – Common Work Results – For Electrical

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 – Conduits, Conduit and Conduit Fittings.

3.2 INSTALLATION OF TECK CABLE 0 -1000 V

.1 Install cables.

.1 Group cables wherever possible on channels.

.2 Terminate cables in accordance with Section 26 05 20 – Wire and Box Connectors - 0 -1000 V.

3.3 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible.

.2 Terminate cables in accordance with Section 26 05 20 – Wire and Box Connectors - 0 -1000 V.

END OF SECTION

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 01 – Common Works Results – For Electrical

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling.

.4 Divert unused metal materials from landfill to metal recycling facility as approved by Contract Administrator.

.5 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted or suspended.

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors or 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 steel 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 dia threaded rods and spring clips.
- .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 1.5 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 Contract Administrator.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

SPLITTERS, JUNCTION, PULL BOXES AND CABINETS

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 01 – Common Works Results – For Electrical

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Include detail construction, dimension, capacities, weights of equipment or material.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling.

.3 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 SPLITTERS

.1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.

.3 At least three spare terminals on each set of lugs in splitters less than 400 A.

2.2 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

2.3 CABINETS

.1 Type E: sheet steel, hinged door and return flange overlapping sides, handle, lock and catch, for surface mounting.

.2 Type T: sheet steel cabinet, with hinged door, latch, lock, 2 keys, containing sheet steel backboard for surface mounting.

Part 3 Execution

3.1 SPLITTER INSTALLATION

.1 Install splitters and mount plumb, true and square to the building lines.

.2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor.

.3 Install terminal block as indicated in Type T cabinets.

.4 Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.

3.3 IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 01 - Common Work Results - Electrical.

.2 Install size 2 identification labels indicating system name, voltage and phase.

END OF SECTION

OUTLET BOXES, CONDUIT BOXES AND FITTINGS

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 01 – Common Works Results – For Electrical

1.2 REFERENCES

.1 CSA C22.1-2018, Canadian Electrical Code, Part 1.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling.

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 for special devices.

.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 SHEET STEEL OUTLET BOXES

.1 Electro-galvanized steel 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.

.2 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.3 102 mm square outlet boxes with 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 receptacles. Minimum depth: 28 mm for receptacles; 73 mm for communication equipment.

.2 Adjustable, watertight, concrete tight, cast floor boxes with openings drilled and tapped for 12 mm and 19 mm conduit. Minimum size: 73 mm deep.

2.6 CONDUIT BOXES

.1 Cast FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle.

2.7 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 32 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

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 and armoured cable connections. Reducing washers are not allowed.

END OF SECTION

CONDUITS, CONDUIT FASTENINGS AND CONDUIT FITTINGS

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 01 – Common Works Results – For Electrical

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CAN/CSA C22.2 No. 18-98, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.

.2 CSA C22.2 No. 45-M1981(R1992), Rigid Metal Conduit.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.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.

.4 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling.

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, aluminum threaded.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller. Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1.5 m oc.

.4 Threaded rods, 6 mm dia., to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

.2 Factory "ells" where 90° bends are required for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT. Set-screws are not acceptable.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection in all directions.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits in finished areas.

.3 Surface mount conduits except in mechanical and electrical service rooms and in unfinished areas.

.4 Use rigid aluminum threaded conduit except where specified otherwise.

.5 Use explosion proof flexible connection for connection to explosion proof motors.

.6 Install conduit sealing fittings in hazardous areas. Fill with compound.

.7 Minimum conduit size for lighting and power circuits: 19 mm.

.8 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.9 Mechanically bend steel conduit over 19 mm dia.

.10 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.11 Install fish cord in empty conduits.

.12 Run 2-25 mm spare conduits up to ceiling space and 2-25 mm spare conduits down to ceiling space from each flush panel. 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 box.

.13 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.

.14 Dry conduits out before installing wire.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended or 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 or hot water lines with minimum of 25 mm at crossovers.

.7 Provide stand-of conduit clamp / clip.

END OF SECTION

DISCONNECT SWITCHES - FUSED AND NON-FUSED

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for fused and non-fused disconnect switches.

1.2 RELATED SECTIONS

.1 Section 26 05 01 – Common Works Results – For Electrical

1.3 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CAN/CSA C22.2 No.4-M89 (R2000), Enclosed Switches.

.2 CSA C22.2 No.39-M89 (R2003), Fuseholder Assemblies.

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 Indicate:

.1 Mounting method and dimensions.

.2 Enclosure types.

Part 2 Products

2.1 DISCONNECT SWITCHES

.1 Fusible, non-fusible, horsepower rated disconnect switch in CSA Enclosure, to CAN/CSA C22.2 No.4, sized as per drawings.

.2 Type 4X enclosure, stainless steel or non-metallic.

.3 Provision for padlocking in off switch position by three locks.

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

.5 Fuses: size as indicated on drawings

.6 Fuseholders: to CSA C22.2 No.39 relocatable and suitable without adaptors, for type and size of fuse indicated.

.7 Quick-make, quick-break action.

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

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 01 - Common Work Results - Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

Part 3 Execution

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

END OF SECTION