THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 682-2018

SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER TRAVELLING BRIDGES - REFURBISHMENT

Note to Bidders: Please be aware of revisions to B15.4

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 South End Sewage Treatment Plant (SEWPCC) Primary Clarifier Travelling Bridges - Refurbishment

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, October 5, 2018.

B2.2 Bids determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.

B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. SITE INVESTIGATION

B3.1 Further to C3.1, the Contract Administrator or an authorized representative will conduct a Site Investigation of the primary clarifier area at the South End Sewage Treatment Plant (SEWPCC), located at 100 Ed Spencer Drive, Winnipeg, MB, on the following dates and times:
(a) September 25, 2018 at 1:30 pm; and
(b) September 26, 2018 at 9:00 am.

B3.1.1 The same information will be provided at both presentations of the Site Investigation.

B3.1.2 Bidders are requested to register for the Site Investigation by contacting the Contract Administrator identified in D4 before September 24, 2018 at 4:00PM.

B3.1.3 Bidders are requested to meet at the reception area of the SEWPCC.

B3.1.4 Bidders attending the Site Investigation outlined B3.1 are required to provide their own Personal Protective Equipment; at a minimum hard hat, CSA approved safety footwear, and safety glasses.

B3.2 Although attendance at the Site Investigations is not mandatory, the City strongly suggests that Bidders attend.

B3.3 The Bidder shall not be entitled to rely on any information or interpretation received at the site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.

B4.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.

B4.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator to all Bidders by issuing an addendum.

B4.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.

B4.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B4 unless that response or interpretation is provided by the Contract Administrator in writing.

B5. CONFIDENTIALITY

B5.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:

(a) was known to the Bidder before receipt hereof; or

(b) becomes publicly known other than through the Bidder; or

(c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

B5.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Bid Opportunity to the media or any member of the public without the prior written authorization of the Contract Administrator.

B5.3 Notwithstanding B5.1, all quotations, invoices and other pricing related information associated with the Standardized Goods and acquired by a Bidder or its Subcontractors through enquiries, investigation or any other means is confidential. Such information shall not be used or disclosed in any way, other than meeting the requirements of this Bid Opportunity.

B6. ADDENDA

B6.1 The Contract Administrator may, at any time prior to the Submission Deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.

B6.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.

B6.3 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/

B6.4 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B6.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 8 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B7. SUBSTITUTES

B7.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.

B7.2 Substitutes to the City's pre-qualified firms to act as the Systems Integrator, as identified in D9, and the City's Standardized Goods, as identified in E3, will not be accepted.

B7.3 Substitutions for non-Standardized Goods (not identified in E3) shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B7.4 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.

B7.5 The Bidder shall ensure that any and all requests for approval of a substitute:

(a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;

(b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;

(c) identify any anticipated cost or time savings that may be associated with the substitute;

(d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;

(e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.

B7.6 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.

B7.7 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.

B7.7.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.

B7.8 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.

B7.9 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B18.

B7.10 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B8. BID COMPONENTS

B8.1 The Bid shall consist of the following components:

(a) Form A: Bid;

(b) Form B: Prices;

(c) Bid Security

(i) Form G1: Bid Bond and Agreement to Bond, or
Form G2: Irrevocable Standby Letter of Credit and Undertaking, or
a certified cheque or draft;

B8.2 Further to B8.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B7.

B8.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely.

B8.4 The Bid Submission may be submitted by mail, courier or personal delivery, or by facsimile transmission.

B8.5 If the Bid Submission is submitted by mail, courier or personal delivery, it shall be enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address, and shall be submitted to:

The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg MB R3B 1J1

B8.5.1 Samples or other components of the Bid Submission which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder’s Bid Submission.

B8.6 If the Bid Submission is submitted by facsimile transmission, it shall be submitted to 204-949-1178.

B8.6.1 The Bidder is advised that the City cannot take responsibility for the availability of the facsimile machine at any time.

B8.7 Bidders are advised not to include any information/literature except as requested in accordance with B8.1.

B8.8 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B18.1(a).

B8.8.1 Bids submitted by internet electronic mail (e-mail) will not be accepted.

B9. BID

B9.1 The Bidder shall complete Form A: Bid, making all required entries.

B9.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:

(a) if the Bidder is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;

(b) if the Bidder is a partnership, the full name of the partnership shall be inserted;

(c) if the Bidder is a corporation, the full name of the corporation shall be inserted;

(d) if the Bidder is carrying on business under a name other than his/her own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

B9.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B9.2.

B9.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B9.4 Paragraph 11 of Form A: Bid shall be signed in accordance with the following requirements:

(a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;

(b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;

(c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;

(d) if the Bidder is carrying on business under a name other than his/her own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B9.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.

B9.4.2 All signatures shall be original.

B9.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B10. PRICES

B10.1 The Bidder shall state the lump sum price in Canadian funds for the Work on Form B: Prices.

B10.1.1 Notwithstanding C12.2.3(c), prices on Form B: Prices shall not include the Manitoba Retail Sales Tax (MRST, also known as PST), which shall be extra where applicable.

B10.2 Form B, Item 3: The Bidder shall enter the cost of the Standardized Goods to be supplied from Schneider Electric Canada Ltd. (Schneider) as part of the Standardized Control system and Motor Control Equipment agreement identified in E4. The cost shall be the base cost received from Schneider, without any mark-up or taxes applied.

B10.2.1 Any mark-up to the supply of Standarized Goods shall be deemed to be included in other applicable Form B lines.

B10.3 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B11. DISCLOSURE

B11.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.

B11.2 The Persons are:

(a) Ovivo Inc.

B11.3 Additional Material:

(a) Contract for Supply and Delivery of SEWPCC Primary Clarifier No. 3 Parts. Further details on the parts being supplied are outlined in Specification Section 14 43 19.

B12. CONFLICT OF INTEREST AND GOOD FAITH

B12.1 Bidders, by responding to this Bid Opportunity, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.

B12.2 Conflict of Interest means any situation or circumstance where a Bidder or employee of the Bidder proposed for the Work has:

(a) other commitments;

(b) relationships;

(c) financial interests; or

(d) involvement in ongoing litigation;

that could or would be seen to:

(i) exercise an improper influence over the objective, unbiased and impartial exercise of the independent judgment of the City with respect to the evaluation of Bids or award of the Contract; or

(ii) compromise, impair or be incompatible with the effective performance of a Bidder's obligations under the Contract;

(e) has contractual or other obligations to the City that could or would be seen to have been compromised or impaired as a result of its participation in the Bid Opportunity process or the Work; or

(f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the Bid Opportunity process) of strategic and/or material relevance to the Bid Opportunity process or to the Work that is not available to other bidders and that could or would be seen to give that Bidder an unfair competitive advantage.

B12.3 In connection with its Bid, each entity identified in B12.2 shall:

(a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Work;

(b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the Bid Opportunity process, promptly disclose a detailed description of the Conflict of Interest to the City in a written statement to the Contract Administrator; and

(c) provide the City with the proposed means to avoid or mitigate, to the greatest extent practicable, any perceived, potential or actual Conflict of Interest and shall submit any additional information to the City that the City considers necessary to properly assess the perceived, potential or actual Conflict of Interest.

B12.4 Without limiting B12.3, the City may, in its sole discretion, waive any and all perceived, potential or actual Conflicts of Interest. The City's waiver may be based upon such terms and conditions as the City, in its sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately avoided or mitigated, including requiring the Bidder to put into place such policies, procedures, measures and other safeguards as may be required by and be acceptable to the City, in its sole discretion, to avoid or mitigate the impact of such Conflict of Interest.

B12.5 Without limiting B12.3, and in addition to all contractual or other rights or rights at law or in equity or legislation that may be available to the City, the City may, in its sole discretion:

(a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of its employees proposed for the Work;

(b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in its sole discretion, determines cannot be avoided or mitigated;

(c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B12.4 to avoid or mitigate a Conflict of Interest; and

(d) disqualify a Bidder if the Bidder, or one of its employees proposed for the Work, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.

B12.6 The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in its sole discretion.

B13. QUALIFICATION

B13.1 The Bidder shall:

(a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and

(b) be financially capable of carrying out the terms of the Contract; and

(c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

B13.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

(a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/debar.stm

B13.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

(a) have successfully carried out work similar in nature, scope and value to the Work; and

(b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and

(c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);

B13.4 Further to B13.3(c), the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

(a) Written confirmation of a safety and health certification meeting SAFE Work Manitoba's SAFE Work Certified Standard (e.g., COR™ and SECOR™) or

(i) a copy of their valid Manitoba COR certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Certificate of Recognition (COR) Program administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or

(ii) a copy of their valid Manitoba SECOR™ certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Small Employer Certificate of Recognition Program (SECOR™) administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program or

(b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/.

B13.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B13.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B14. BID SECURITY

B14.1 The Bidder shall provide bid security in the form of:

(a) a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or

(b) an irrevocable standby letter of credit, in the amount of at least ten percent (10%) of the Total Bid Price, and undertaking issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or

(c) a certified cheque or draft payable to "The City of Winnipeg", in the amount of at least fifty percent (50%) of the Total Bid Price, drawn on a bank or other financial institution registered to conduct business in Manitoba.

B14.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B14.1.2 All signatures on bid securities shall be original.

B14.1.3 The Bidder shall sign the Bid Bond.

B14.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.

B14.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B14.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B14.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B14.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B14.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

B15. OPENING OF BIDS AND RELEASE OF INFORMATION

B15.1 Bids will not be opened publicly.

B15.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/bidopp.asp

B15.3 After award of Contract, the name(s) of the successful Bidder(s), their address(es) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/

B15.4 The Bidder is advised that any information contained in any Bid may be released if required by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law or by City policy or procedures (which may include access by members of City Council).

B15.4.1 To the extent permitted, the City shall treat as confidential information, those aspects of a Bid Submission identified by the Bidder as such in accordance with and by reference to Part 2, Section 17 or Section 18 or Section 26 of The Freedom of Information and Protection of Privacy Act (Manitoba), as amended.

B16. IRREVOCABLE BID

B16.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 9 of Form A: Bid.

B16.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work for the time period specified in Paragraph 9 of Form A: Bid.

B17. WITHDRAWAL OF BIDS

B17.1 A Bidder may withdraw his/her Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B17.1.1 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B17.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 11 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B17.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:

(a) retain the Bid until after the Submission Deadline has elapsed;

(b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 11 of Form A: Bid; and

(c) if the notice has been given by any one of the persons specified in B17.1.3(b), declare the Bid withdrawn.

B17.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B16.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law.

B18. EVALUATION OF BIDS

B18.1 Award of the Contract shall be based on the following bid evaluation criteria:

(a) compliance by the Bidder with the requirements of the Bid Opportunity or acceptable deviation there from (pass/fail);

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B13 (pass/fail);

(c) Total Bid Price;

(d) economic analysis of any approved alternative pursuant to B7.

B18.2 Further to B18.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.

B18.3 Further to B18.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is responsible and qualified.

B18.4 Further to B18.1(c), the Total Bid Price shall be the lump sum price shown on Form B: Prices.

B18.5 Further to B18.1 (c), the Award Authority may reject a Bid as being non-responsive if it exceeds the Pre-Tender Estimate as shown in D2.1.1.

B19. AWARD OF CONTRACT

B19.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B19.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.

B19.2.1 Without limiting the generality of B19.2, the City will have no obligation to award a Contract where:

(a) the prices exceed the available City funds for the Work;

(b) the prices are materially in excess of the prices received for similar work in the past;

(c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;

(d) only one Bid is received; or

(e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.

B19.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B18.

B19.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

B19.4 Notwithstanding C4, the City may issue a Purchase Order to the successful Bidder in lieu of the execution of a Contract.

B19.5 The Contract, as defined in C1.1, in its entirety shall be deemed to be incorporated in and to form a part of the Purchase Order notwithstanding that it is not necessarily attached to or accompany said Purchase Order.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

C0.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.

C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm

C0.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix "**C**" designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

D1.1 In addition to the *General Conditions for Construction*, these Supplemental Conditions are applicable to the Work of the Contract.

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of:

(a) Refurbish Primary Clarifier Travelling Bridge Collector No. 3 running rail, cog rail and related drive system components using materials prepurchased by the City from the original clarifier supplier's representative.

(b) Provide minor structural remediation to the aluminum structure of Primary Clarifier Travelling Bridge Collector No. 3.

(c) Provide paint touch-up to the festoon cable supports for Primary Clarifier Travelling Bridge Collector No. 1, 2 and 3, and for Primary Clarifier Nos.1 and 2 travelling bridge steel structures.

(d) Replace t Primary Clarifier Travelling Bridge Collector No. 1, 2 and 3 festoon power systems.

(e) Replace motor feeders from control panel to motors.

(f) Replace the Primary Clarifier Nos. 1, 2 and 3 travelling bridges control panels with new control panels with a local PLC and HMI.

(g) Replace all control wiring from field instruments to the new control panel.

(h) Provide new remote I/O panels for Primary Clarifier Nos. 1, 2 and 3 to interface to the existing DCS controls.

(i) Provide new wiring from remote I/O panels to festoon cable junction boxes to connect existing DCS control wiring.

(j) Provide new 120V power circuits from electrical panels in electrical room to the new control panels and remote I/O panels.

(k) Provide programming and commissioning of the new control systems PLC and HMI's.

(l) Provide Ethernet data cabling to interconnect the PLC and remote I/O panels. Note this includes both fibre optic and copper cabling.

D2.1.1 The City has determined the Pre-Tender Estimate to be $1,600,000.

D3. DEFINITIONS

D3.1 When used in this Bid Opportunity:

(a) "**ABB**" means the manufacturer ASEA Brown Boveri;

(b) "**Baseline Schedule**" means the time-scaled and precedence diagramming network construction schedule prepared by the Contractor. The Baseline Schedule is produced using the critical path method;

(c) "**Commissioning**" means the process of verifying that new equipment, and systems are installed, tested and capable of being operated and maintained to perform in conformance with the Drawings and Specifications. Commissioning includes, but is not limited to, satisfactory delivery, installation, training, testing, demonstration, performance verification, and document delivery for all equipment;

(d) "**Commissioning Team**" means a team led by the Contract Administrator, which is made up of members from the Contractor, Standardization Vendor, Systems Integrator, City, and Contract Administrator. The Commissioning Team will coordinate Commissioning activities through the Contract Administrator.

(e) "**CSA**" means the Canadian Standards Association international, formerly the Canadian standards association;

(f) "**Current Schedule**" means the Baseline Schedule that the Contractor has updated to reflect the actual progress of the Work;

(g) "**DCS**" means distributed control system, an existing ASEA Brown Boveri INFI90 control system;

(h) "**Demonstration Test**" means a test performed by the Commissioning Team, after any required Performance Tests, to demonstrate and confirm that the work meets the specified requirements. The Demonstration Test shall comprise of running the identified Work continuously for a minimum of 3-days at the specified operating conditions without interruption, or as otherwise specified. Upon successful completion of the Demonstration Test, Form 104 – Certificate of Process Satisfactory Demonstration shall be signed, and the City will take over operation of the identified Unit Process;

(i) "**EGM**" means Engineers Geoscientists Manitoba;

(j) "**Facility**" means the SEWPCC;

(k) "**Facility Area**" means parts of the Facility, including all of its Unit Processes;

(l) "**FAT**" means factory acceptance testing;

(m) **"Functional Test**" means a test or tests performed by the Contractor or Manufacturer's Representative in the presence of the Contract Administrator and the City to demonstrate that installed equipment meets the Manufacturer's installation, calibration, and adjustment requirements and other requirements as specified. Upon successful completion of the Functional Test, Form 102 – Certificate of Satisfactory Installation shall be signed;

(n) "**furnish or provide**" means supply and install.

(o) "**Local HMI**" means a local human machine interface, a subsystem of the PCS that provides the operator user interface;

(p) "**Intelligent**" means an automation component or system that communicates with the site control system and operates via instructions given and received over a communication medium of a protocol such as Ethernet, PROFIBUS, MODBUS or HART;

(q) "**I/O**" means input/output;

(r) "**Manufacturer**" means the person, partnership or corporation responsible for the manufacture and fabrication of Standardized Goods or the equipment supplied by the Contractor for the Work;

(s) "**Manufacturer's Representative**" means a trained serviceman empowered by the Manufacturer to provide installation, testing, training and commissioning assistance to the Contractor in his performance of those functions;

(t) "**PCS**" means process control system. The control system of the sewage treatment plant that provides monitoring and control of the sewage treatment process and ancillary systems, including HVAC and building services;

(u) "**Performance Test**" means a test performed by the Contractor or Manufacturer's Representative in the presence of the Contract Administrator and the City, after any required Functional Test, to demonstrate and confirm that equipment meets the performance requirements specified in individual Specification sections. Performance Tests shall be a minimum of 1-hour in duration, unless otherwise specified. Upon successful completion of the Performance Test, Form 103 – Certificate of Equipment Satisfactory Performance shall be signed;

(v) "**Performance Verification**" means a test performed by the Commissioning Team, after any required Demonstration Tests, to demonstrate and confirm that the identified Area and/or Unit Processes meet the specified performance requirements of the Work. The Performance Verification shall comprise of running the identified Unit Process between their specified minimum and maximum operating conditions over a 1-day period, or as otherwise specified, when flows and conditions allow. The Performance Verification may take place in conjunction with the Demonstration Test, if conditions and flows allow. Upon successful completion of the Performance Verification, Form 105 – Certificate of Process Satisfactory Performance shall be signed;

(w) "**PLC**" means programmable logic controller, a component of the PCS that performs monitoring and control of processes within the sewage treatment plant;

(x) "**Professional Engineer**" means an engineer registered in the Province of Manitoba;

(y) "**Project Commissioning Plan**" means a plan created by the Contract Administrator in collaboration with the Contractor detailing the commissioning processes, roles and responsibilities, commissioning specifications and objectives, procedures, verification and certification requirements and documentation and acceptance criteria relative to the Work;

(z) "**SAT**" means site acceptance testing;

(aa) "**SIFT**" means Systems Integration Functional Test;

(bb) "**Standardized Goods**" means the respective goods identified in D10 that have been standardized by the City;

(cc) "**Standardization Vendor**" means a contractor or supplier of Standardized Goods, as identified in D10;

(dd) "**SEWPCC**" means the South End Water Pollution Control Centre or the South End Sewage Treatment Plant;

(ee) "**Supply Contractor**" means the contractor retained by the City to supply City Supplied Equipment which shall be installed by the Contractor;

(ff) "**Systems Integrator**" means a Subcontractor performing the Work identified in E5;

(gg) "**Systems Integration Work**" means the specific Work identified in E5.

(hh) "**Unit Process**" means a portion of the Facility or Facility Area that performs a specific process function;

(ii) "**Vendor Supplied**" means a grouping of Manufacturer equipment to be supplied together so that they function as a Unit Process;

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is KGS Group, represented by:

Rudy Derksen, P. Eng.

Telephone No. B 204-478-3246
M 204-793-1862
Email Address rderksen@kgsgroup.com

D4.2 At the pre-construction meeting, the Contract Administrator will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D4.3 Bids Submissions must be submitted to the address in B8.

D5. CONTRACTOR'S SUPERVISOR

D5.1 At the pre-construction meeting, the Contractor shall identify his/her designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D5.2 At least two (2) business days prior to commencement of any work on the site, the Contractor shall provide the Contract Administrator with a phone number where the supervisor identified in D5.1 or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

D6. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

D6.1 The Contract, all deliverables produced or developed, and information provided to or acquired by the Contractor are the property of the City and shall not be appropriated for the Contractors own use, or for the use of any third party.

D6.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.

D6.3 The following shall be confidential and shall not be disclosed by the Contractor to the media or any member of the public without the prior written authorization of the Contract Administrator;

(a) information provided to the Contractor by the City or acquired by the Contractor during the course of the Work;

(b) the Contract, all deliverables produced or developed; and

(c) any statement of fact or opinion regarding any aspect of the Contract.

D6.4 A Contractor who violates any provision of D6 may be determined to be in breach of Contract.

D7. NOTICES

D7.1 Except as provided for in C23.2.2, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid.

D7.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D7.3, or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D4.1.

D7.3 Notwithstanding C21., all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following:

The City of Winnipeg
Attn: Chief Financial Officer
Office of the Chief Administrative Officer
Susan A. Thompson Building
2nd Floor, 510 Main Street
Winnipeg MB R3B 1B9

D7.4 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services

Facsimile No.: 204 947-9155

(a) Bids Submissions must not be submitted to the above facsimile number. Bids must be submitted in accordance with B8.

D8. COOPERATION WITH OTHERS

D8.1 The Contractor's attention is directed to the fact that other Contractors, the personnel of Utilities, and the staff of the City may be working within the Site. The activities of these agencies may coincide with the Contractor's execution of the Work, and it will be the Contractor's responsibility to cooperate to the fullest extent with other personnel working in the area, and such cooperation is an obligation of the Contractor under the terms of this Contract.

D8.2 The Contractor is advised that the following work is occurring at or in the vicinity of the project Site:

(a) South End Sewage Treatment Plant (SEWPCC) Upgrading / Expansion Project - Contract 4 – Site wide Mechanical, Electrical, Concrete, and Site Works (reference City of Winnipeg Bid Opportunity No. 976-2016).

STANDARDIZATION

D9. SYSTEMS INTEGRATOR

D9.1 The following firms have been pre-qualified to act as the Systems Integrator for this Contract:

(a) Eramosa Engineering Inc.;

(b) Schneider Electric Systems Canada Inc.; and

(c) True North Automation Inc.

D9.2 The contact information is as follows:

(a) Eramosa Engineering Inc.:

The City of Winnipeg Supplemental Conditions
Template Version: C220150806 - C Bldg
D. Nick Hallas
18 Royal Vista Link NW, Unit 208
Calgary, AB, T3R 0K4
Telephone: 403-208-7447
E-mail: nick.hallas@eramosa.com

(b) Schneider Electric Systems Canada Inc.:

Garth Eastman
4 Lake Road
Dollard des Ormeaux, QC, H9B 3H9
Telephone: 204-631-0670
E-mail: Garth.Eastman@Schneider-Electric.com

(c) True North Automation Inc.:

John Digness
7180 11 Street SE
Calgary, AB, T2H 2S9
Telephone: 403-984-2065
E-mail: John.Digness@truenorthautomation.com

D9.3 The Contractor shall engage and utilize one or more of the firms identified in D9.1 to perform the Systems Integration Work as identified in E5.

D9.4 The Systems Integrator shall be a Subcontractor of the Contractor.

D9.4.1 The City is not a party to any contract between a Contractor and the Systems Integrator.

D10. STANDARDIZED GOODS

D10.1 The following goods have been standardized by the City and will be supplied by the Contractor:

(a) Standardized Control System and Motor Control Equipment as per E4.

D11. CONTRACTUAL ARRANGEMENTS

D11.1 Each Standardization Vendor shall be a Subcontractor of the Contractor.

D11.2 The City's contract with each of the Standardization Vendors defines the prices and general terms of supply to the Contractor. Each Standardization Vendor is obligated to enter into a contract with the Contractor, based upon such prices and general terms of supply.

D11.2.1 The City is not a party to any contract between a Standardization Vendor and the Contractor, or any Subcontractor.

D11.3 In the event that a potential dispute arises between the Contractor and a Standardization Vendor, the Contract Administrator shall be notified.

D11.4 Further to D11.3, the Contractor and/or subcontractor(s) receiving confidential pricing from a Standardization Vendor may be required to further enter into separate confidentiality and nondisclosure agreements.

D12. PAYMENTS OF STANDARDIZATION VENDORS

D12.1 The Contractor is obligated to pay the Standardization Vendors in accordance with general terms of supply applicable to such Standardization Vendor.

D12.2 The Contractor's payment terms to the Standardization Vendor, in respect of Standardized Control System and Motor Control Equipment identified in E4, include the following:

D12.2.1 Except as indicated in D12.2.2, payment shall be in Canadian funds net thirty (30) Calendar Days after shipment.

D12.2.2 Payment for motor control equipment shall be in Canadian funds net thirty (30) Calendar Days and initiated based upon the following schedule:

(a) Upon approval of the Shop Drawings or forty (40) Calendar days after the last comprehensive submittal, in the event that a response is not made to the submittal: 25% of the total value.

(b) Upon delivery of the complete Motor Control Equipment along with all associated as-manufactured documentation: 60% of the total value; or

(c) In the event that the delivery is intentionally delayed, upon request by the Contractor, the following payment schedule would replace the 60% payment:

(i) Upon completion of the FAT and delivery of all as-manufactured documentation to the Contractor – 30% of the total value.

(ii) Forty (40) Calendar days after delivery of the as-manufactured documentation to the Contractor, or upon delivery, whichever comes sooner – 30% of the total value.

(d) Upon successful commissioning and delivery of documentation or six (6) months after delivery, whichever comes first: 15% of the total value.

SUBMISSIONS

D13. AUTHORITY TO CARRY ON BUSINESS

D13.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D14. SAFE WORK PLAN

D14.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D14.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/Safety/default.stm

D15. INSURANCE

D15.1 The Contractor shall provide and maintain the following insurance coverage:

(a) Wrap up liability insurance in the an amount of no less than five million dollars ($5,000,000) inclusive per occurrence and five million dollars ($5,000,000) general aggregate, covering bodily injury, personal injury, damage to the existing structure, products and completed operations, contractual liability and cross liability. Such policy will be written in the joint names of the Contractor, the City, Consultants and sub-contractors and include twenty-four (24) months completed operations after Total Performance.

(b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than $2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence;

(c) All risks course of construction insurance, including testing and commissioning, and equipment breakdown, insuring 100% of the full value of the work. Such policy shall be written in the joint names of the Contractor, the City and all sub-contractors and remain in place until at least ten (10) days after Substantial Completion, and if all testing and commissioning has not been completed at that time, the policy must extend until such time as all testing and commissioning has been completed.

D15.2 Deductibles shall be borne by the Contractor.

D15.3 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D15.4 The Contractor shall provide the Contract Administrator with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than seven (7) Calendar Days from notification of the award of Contract by Purchase Order.

D15.5 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D16. PERFORMANCE SECURITY

D16.1 The Contractor shall provide and maintain performance security until the expiration of the warranty period in the form of:

(a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; or

(b) an irrevocable standby letter of credit issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form attached to these Supplemental Conditions (Form H2: Irrevocable Standby Letter of Credit), in the amount of fifty percent (50%) of the Contract Price; or

(c) a certified cheque or draft payable to "The City of Winnipeg", drawn on a bank or other financial institution registered to conduct business in Manitoba, in the amount of fifty percent (50%) of the Contract Price.

D16.1.1 Where the performance security is in the form of a certified cheque or draft, it will be deposited by the City. The City will not pay any interest on certified cheques or drafts furnished as performance security.

D16.2 The Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of Purchase Order and prior to the commencement of any Work on the Site.

D16.3 If the bid security provided in his/her Bid was not a certified cheque or draft pursuant to B14.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D17. SUBCONTRACTOR LIST

D17.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than seven (7) Calendar Days from notification of the award of Contract.

D18. DETAILED WORK SCHEDULE

D18.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D18.2 The detailed work schedule shall consist of the following:

(a) a critical path method (C.P.M.) schedule for the Work; and

(b) a Gantt chart for the Work based on the C.P.M. schedule;

all acceptable to the Contract Administrator.

D18.3 Further to D18.2(a), the C.P.M. schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path:

(a) Mobilization

(b) Shop Drawing and Submittal Reviews

(c) Primary Clarifier 3

(i) Date when clarifier is shutdown and turned over to the Contractor to complete the Primary Clarifier 3 refurbishment work. The City estimates to have Primary Clarifier No. 3 isolated, dewatered, and cleaned by December 5, 2018.
(ii) Start and finish dates for electrical work.
(iii) Start and finish dates for control works.
(iv) Start and finish for mechanical refurbishment work.
(v) Start and finish for structural upgrade work.
(vi) Start and finish Commissioning.
(vii) Start and Finish Training.
(viii) Supply of Operations and Maintenance Manuals.
(ix) Start and Finish of Performance Verification.
(x) Date clarifier is returned back to City for use.

(d) Primary Clarifier 2
(i) Date when clarifier is shutdown and turned over to the Contractor to complete the Primary Clarifier No. 2 refurbishment work. The City estimates to have Primary Clarifier No. 2 isolated, dewatered, and cleaned by November 1, 2019.
(ii) Start and finish dates for electrical work.
(iii) Start and finish dates for control works.
(iv) Start and finish of painting upgrade work.
(v) Start and finish Commissioning.
(vi) Start and Finish Training.
(vii) Supply of Operations and Maintenance Manuals.
(viii) Start and Finish of Performance Verification.
(ix) Date clarifier is returned back to City for use.

(e) Primary Clarifier 1
(i) Date when clarifier is shutdown and turned over to the Contractor to complete The Primary Clarifier No. 1 refurbishment work. The City estimates to have Primary Clarifier No. 1 isolated, dewatered, and cleaned by December 2, 2019.
(ii) Start and finish dates for electrical work.
(iii) Start and finish dates for control works.
(iv) Start and finish of painting upgrade work.
(v) Start and finish Commissioning.
(vi) Start and Finish Training.
(vii) Supply of Operations and Maintenance Manuals.
(viii) Start and Finish of Performance Verification.
(ix) Date clarifier is returned back to City for use.

(f) Substantial Performance.

(g) Completion of Deficiencies.

(h) Total Performance.

D18.4 Further to D18.2(b), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the trade, task or milestone shall be on the vertical axis.

D18.5 The schedule shall indicate any planned non-working days such as a holiday shutdown between Christmas and New Year's Eve.

(a) No restricted working days exist at the SEWPCC. However the Contractor should be aware that City Operations staff will not be working at the SEWPCC between December 24, 2018 to December 26, 2018 inclusive.

D18.6 Update the Detailed Work Schedule to reflect actual progress on a regular basis. Update the schedule at least once every two (2) weeks and as requested by the Contract Administrator.

D18.7 The Contractor shall keep a copy of the Gantt chart schedule on-Site for tracking progress and updating on a daily basis.

D18.8 Following submission of the Detailed Work Schedule, but prior to the commencement of any Works, the Contractor shall attend a scheduling meeting with the Contract Administrator and the City. The Contract Administrator will advise the Contractor of the meeting time and location. The purpose of this meeting will be to review the Contractor's schedule and to address any scheduling concerns that may arise during review of the schedule. The Contractor shall not be permitted to commence any Works unless the Contract Administrator is satisfied with the Contractor's understanding of the scheduling requirements and is satisfied that the proposed schedule can reasonably be followed to complete the Works within the Project time constraints.

SCHEDULE OF WORK

D19. COMMENCEMENT

D19.1 The Contractor shall not commence any Work until he/she is in receipt of a Purchase Order from the Award Authority authorizing the commencement of the Work.

D19.2 The Contractor shall not commence any Work on the Site until:

(a) the Contract Administrator has confirmed receipt and approval of:

(i) evidence of authority to carry on business specified in D13;

(ii) evidence of the workers compensation coverage specified in C6.15;

(iii) the Safe Work Plan specified in D14;

(iv) evidence of the insurance specified in D15;

(v) the Performance Security specified in D16;

(vi) the Subcontractor List specified in D17; and

(vii) the Detailed Work Schedule and schedule review meeting specified in D18.

(viii) the completion and written acceptance by the City and the Contractor of the preconstruction photographic record specified in D21; and

(ix) the review and written acceptance by the Contractor of their obligation as stated in the Water and Waste Department Wastewater Services Division Environmental Preservation and Compliance Statement / Environmental Management Policy attached as Appendix H.

(b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D19.3 The Contractor shall not commence the Work on the Site before December 3, 2018.

D19.4 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the Purchase Order.

D19.5 The City intends to award this Contract by November 2, 2018.

D19.5.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D20. RESTRICTED WORK HOURS

D20.1 Work hours are restricted to 0730 hours and 1530 hours, five(5) days a week, Monday to Friday inclusive, excluding Statutory Holidays and/or Civic Holidays.

D21. DAMAGE TO EXISTING STRUCTURES AND PROPERTY

D21.1 The Contractor shall take special care to avoid damage to the existing SEWPCC structures and property during the course of Work.

D21.2 The Contractor is advised that, the Contract Administrator will, in the presence of the Contractor, develop a Pre-Construction Site Record. The Pre-Construction Site Record will be a record of the project Site conditions by means of photographs or other documentation or media. This record will be shared with the Contactor and the City, and will require signatures from the Contract Administrator, the City and the Contractor indicating acceptance of the preconstruction site conditions prior to commencing the Works.

D21.3 Any damage caused by the Contractor or his Subcontractors to any part of the SEWPCC, or to the adjacent structures or properties shall be promptly repaired by the Contractor at his own expense to the satisfaction of the Contract Administrator. Prior to Total Performance of the Project, the Contractor, the City and the Contract Administrator will review the Pre-Construction Site Record and ensure that the Site has been restored to its preconstruction state. Any remaining damage shall be repaired by the Contractor at his own expense to the satisfaction of the Contract Administrator.

D22. WORK BY OTHERS

D22.1 The Contractor is advised that while the laydown area for this Contract (as shown in Appendix C) is on the SEWPCC property, the at grade pathway between the laydown area and the loading door located at the southwest corner of the Primary Clarifier No. 3 building is currently in the care and control of NAC Constructors Ltd. under City of Winnipeg Bid Opportunity 976-2016.

D22.1.1 Access to this pathway by the Contractor shall require written approval by the Contract Administrator at least forty-eight (48) hours in advance of any work to be performed in this area.

D22.1.2 The Contractor and any Subcontractors shall attend a NAC Constructors Ltd. site safety orientation prior to undertaking any work in the area under Bid Opportunity 976-2016 control.

D23. CRITICAL STAGES

D23.1 The Contractor shall achieve the Critical Stages of the Work in accordance with the following requirements:

(a) Completion of all Refurbishment Work for Primary Clarifier No. 3 and ready to begin all Commissioning tasks for Primary Clarifier No. 3 by February 15, 2019;

(b) Completion of all Refurbishment Work for Primary Clarifier No. 3 and Completion of all Commissioning tasks for Primary Clarifier No. 3 by March 15, 2019;

(c) Completion of all Refurbishment Work for Primary Clarifier No. 2 and Completion of all Commissioning tasks for Primary Clarifier No. 2 by November 22, 2019;

(d) Completion of all Refurbishment Work for Primary Clarifier No. 1 and Completion of all Commissioning tasks for Primary Clarifier No. 1 by December 19, 2019

D23.2 The Critical Stages identified in D23.1 (b), (c), and (d) are the dates by which each respective primary clarifier has been fully Commissioned, accepted by and turned over to the City of Winnipeg.

D23.3 The above dates may be subject to change at the discretion of the Contract Administration if a portion(s) of the Work cannot be completed because of unseasonable weather or other conditions reasonably beyond the control of the City (e.g. an early Spring snow melt and the associated high wastewater levels and flows entering the SEWPCC for processing).

D24. SUBSTANTIAL PERFORMANCE

D24.1 The Contractor shall achieve Substantial Performance by December 19, 2019.

D24.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D24.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

D25. TOTAL PERFORMANCE

D25.1 The Contractor shall achieve Total Performance by January 31, 2020.

D25.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D25.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

D26. LIQUIDATED DAMAGES

D26.1 If the Contractor fails to achieve Critical Stages, Substantial Performance, or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:

(a) Completion of all Refurbishment Work for Primary Clarifier No. 3 and ready to begin all Commissioning tasks for Primary Clarifier No. 3 as specified in D23.1(a) – five(5) thousand dollars ($5,000);

(b) Completion of all Refurbishment Work for Primary Clarifier No. 3 and Completion of all Commissioning tasks for Primary Clarifier No. 3 as specified in D23.1(b) – five(5) hundred dollars ($500);

(c) Completion of all Refurbishment Work for Primary Clarifier No. 2 and Completion of all Commissioning tasks for Primary Clarifier No. 2 as specified in D23.1(c) – one(1) thousand dollars ($1,000);

(d) Completion of all Refurbishment Work and Commissioning tasks for Primary Clarifier No. 1 and Substantial Performance as specified in D23.1(d) – one(1) thousand dollars ($1,000); and

(e) Total Performance – five(5) hundred dollars ($500) per Working Day.

D26.2 The amount specified for liquidated damages in D26.1 are based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Critical Stages, Substantial Performance, or Total Performance by the days fixed herein for same.

D26.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

CONTROL OF WORK

D27. JOB MEETINGS

D27.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D27.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D28. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D28.1 Further to C6.24, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

D29. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D29.1 Further to B13.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B13.4.

D30. LAYOUT OF THE WORK

D30.1 The Contractor shall be responsible for the true and proper laying out of the Work and for the correctness of the location, levels, dimensions, and alignment of all aspects of the Work. He shall provide all required instruments and competent personnel for performing all layouts.

D30.2 The Contract Administrator shall be notified at least one (1) Working Day prior to any Work being commenced in order to have the option to check and review all elevations and layouts at his discretion.

D30.3 The Contractor shall carefully protect and preserve all benchmarks, pins, stakes, and other items of the basic data supplied by the Contract Administrator. Any such benchmarks, pins, or stakes removed or destroyed by the Contractor, without the consent of the Contract Administrator, shall be replaced by the Contract Administrator at the expense of the Contractor.

D30.4 The Contractor shall arrange and carry on his Work so as not to conflict with the collection of any data in anyway by the Contract Administrator. The Contractor shall adjust Work and/or remove any interference as directed by the Contract Administrator at the expense of the Contractor.

D31. REQUEST FOR INFORMATION AND NON-CONFORMANCE REPORTS

D31.1 For all Request for Information (RFI"s) and Non-Conformance Report (NCR"s) submissions, the Contractor shall assume a minimum of forty-eight (48)-hour response time will be required per submission.

D31.2 The Contractor shall not undertake work associated with these submissions until the Contract Administrator review is completed and responded to in writing.

MEASUREMENT AND PAYMENT

D32. INVOICES

D32.1 Further to C12, the Contractor may submit an invoice for each portion of Work performed in the previous month to:

The City of Winnipeg
Corporate Finance - Accounts Payable
4th Floor, Administration Building, 510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: 204-949-0864
Email: CityWpgAP@winnipeg.ca

D32.2 Invoices must clearly indicate, as a minimum:

(a) the City's purchase order number;

(b) date of delivery;

(c) delivery address;

(d) type and quantity of work performed;

(e) the amount payable with GST and MRST shown as separate amounts; and

(f) the Contractor's GST registration number.

D32.3 The City will bear no responsibility for delays in approval of invoices which are improperly submitted.

D32.4 Bid Submissions must not be submitted to the above facsimile number. Bids must be submitted in accordance with B8.

D33. PAYMENT SCHEDULE

D33.1 The City's payment to the Contractor, associated with Standardized Goods, will be in accordance with C12.

D34. PAYMENT

D34.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D35. WARRANTY

D35.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire one (1) year thereafter, except where longer warranty periods are specified in the respective Specification sections, unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

D35.1.1 For the purpose of Performance Security, the warranty period shall be one (1) year.

D35.2 Notwithstanding C13.2, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if a portion of the Work cannot be completed because of unseasonable weather or other conditions reasonably beyond the control of the Contractor but that portion does not prevent the balance of the Work from being put to its intended use.

D35.2.1 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

D35.3 Notwithstanding C13.2, if any law of Manitoba or of the jurisdiction in which the Work was manufactured requires, or if the manufacturer provides, a longer warranty period or a warranty which is more extensive in its nature, then the provisions of such law or manufacturer's warranty shall apply.

FORM H1: PERFORMANCE BOND
(See D16)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

_____ ,
(hereinafter called the "Surety"), are held and firmly bound unto **THE CITY OF WINNIPEG** (hereinafter called the "Obligee"), in the sum of

_____

_____ dollars ($_____.____)

of lawful money of Canada to be paid to the Obligee, or its successors or assigns, for the payment of which sum the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has entered into a written contract with the Obligee for

BID OPPORTUNITY NO. 682-2018
SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER TRAVELLING BRIDGES – REFURBISHMENT

which is by reference made part hereof and is hereinafter referred to as the “Contract”.

NOW THEREFORE the condition of the above obligation is such that if the Principal shall:

(a) carry out and perform the Contract and every part thereof in the manner and within the times set forth in the Contract and in accordance with the terms and conditions specified in the Contract;
(b) perform the Work in a good, proper, workmanlike manner;
(c) make all the payments whether to the Obligee or to others as therein provided;
(d) in every other respect comply with the conditions and perform the covenants contained in the Contract; and
(e) indemnify and save harmless the Obligee against and from all loss, costs, damages, claims, and demands of every description as set forth in the Contract, and from all penalties, assessments, claims, actions for loss, damages or compensation whether arising under "The Workers Compensation Act", or any other Act or otherwise arising out of or in any way connected with the performance or non-performance of the Contract or any part thereof during the term of the Contract and the warranty period provided for therein;

THEN THIS OBLIGATION SHALL BE VOID, but otherwise shall remain in full force and effect. The Surety shall not, however, be liable for a greater sum than the sum specified above.

AND IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable as Principal, and that nothing of any kind or matter whatsoever that will not discharge the Principal shall operate as a discharge or release of liability of the Surety, any law or usage relating to the liability of Sureties to the contrary notwithstanding.

IN WITNESS WHEREOF the Principal and Surety have signed and sealed this bond the

_____ day of _____ , 20____ .

SIGNED AND SEALED
in the presence of:

_____
(Witness as to Principal if no seal)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

By: _____ (Seal)
(Attorney-in-Fact)

FORM H2: IRREVOCABLE STANDBY LETTER OF CREDIT
(PERFORMANCE SECURITY)
(See D16)

_____
(Date)

The City of Winnipeg
Legal Services Department
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 682-2018
SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER TRAVELLING BRIDGES – REFURBISHMENT

Pursuant to the request of and for the account of our customer,

_____ ,
(Name of Contractor)

_____
(Address of Contractor)

WE HEREBY ESTABLISH in your favour our irrevocable Standby Letter of Credit for a sum not exceeding in the aggregate

_____

_____ Canadian dollars.

This Standby Letter of Credit may be drawn on by you at any time and from time to time upon written demand for payment made upon us by you. It is understood that we are obligated under this Standby Letter of Credit for the payment of monies only and we hereby agree that we shall honour your demand for payment without inquiring whether you have a right as between yourself and our customer to make such demand and without recognizing any claim of our customer or objection by the customer to payment by us.

The amount of this Standby Letter of Credit may be reduced from time to time only by amounts drawn upon it by you or by formal notice in writing given to us by you if you desire such reduction or are willing that it be made.

Partial drawings are permitted.

We engage with you that all demands for payment made within the terms and currency of this Standby Letter of Credit will be duly honoured if presented to us at:

_____
(Address)

and we confirm and hereby undertake to ensure that all demands for payment will be duly honoured by us.

All demands for payment shall specifically state that they are drawn under this Standby Letter of Credit.

Subject to the condition hereinafter set forth, this Standby Letter of Credit will expire on

_____ .
(Date)

It is a condition of this Standby Letter of Credit that it shall be deemed to be automatically extended from year to year without amendment from the present or any future expiry date, unless at least 30 days prior to the present or any future expiry date, we notify you in writing that we elect not to consider this Standby Letter of Credit to be renewable for any additional period.

This Standby Letter of Credit may not be revoked or amended without your prior written approval.

This credit is subject to the Uniform Customs and Practice for Documentary Credit (2007 Revision), International Chamber of Commerce Publication Number 600.

_____
(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

FORM J: SUBCONTRACTOR LIST

(See D17)

BID OPPORTUNITY NO. 682-2018
SOUTH END SEWAGE TREATMENT PLANT (SEWPCC) PRIMARY CLARIFIER TRAVELLING BRIDGES – REFURBISHMENT

Name	Address

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

E1.2 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.

E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/Spec/Default.stm

E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.

E1.2.3 Further to C2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.

E1.3 The following are applicable to the Work:

Specification No.	Specification Title
010001	City Supplied Equipment
051224	Paint Touch-ups
055001	Primary Clarifier #3 Aluminium Bridge Repairs
144319	Mechanical
253010	PLC Control Panel
260501	Common Work Result – For Electrical
260520	Wire and Box Connectors 0-1000 V
260521	Wires and Cables
260528	Grounding - Secondary
260529	Hangers and supports for Electrical Systems
260531	Splitters, Junction, Pull Boxes and Cabinets
260532	Outlet Boxes, Conduit Boxes and Fittings
260534	Conduits, Conduit Fastenings and Conduit Fittings
262716	Electrical Cabinets and Enclosures
262726	Wiring Devices
262814	Fuses – Low Voltage
262821	Moulded Case Circuit Breakers
262823	Disconnect Switches – Fused and Non-Fused
262903	Control Devices
262910	Motor Starters to 600 V
271005	Structured Cabling for Communications Systems
Appendix A	Dorr-Oliver (Ovivo) Clarifier Bridge O&M Manual & Related Drawings
Appendix B	Quality Control Check Lists
Appendix C	Site Plan for Laydown Area
Appendix D	Construction Plan
Appendix E	Commissioning Plan
Appendix F	Function Requirements Specifications
Appendix G	Primary Clarifier 3 Travelling Bridge - Structural Condition Assessment Report
Appendix H	Water and Waste Department Wastewater Services Division Environmental Preservation and Compliance Statement / Environmental Management Policy

Drawing No.	Sheet No.	Description
1-0102-SGAD-P002	001	Structural - Primary Clarifiers – General Arrangement Plan
1-0102-SSST-P001	001	Structural - Primary Clarifiers – Structural Steel Details
1-0102-682-2018-001	001	Automation - Primary Clarifiers Drawing List - Sheet 001
1-0102-682-2018-002	002	Automation - Primary Clarifiers Drawing List - Sheet 002
1-0102-ACBD-P003	004	Automation - Wiring Diagram - Primary Clarifiers - CP-P820-1 and CP-P820-2, RIO-P800-1 - Discrete Inputs
1-0102-ACBD-P004	001	Automation - Wiring Diagram - Primary Clarifiers - CP-P820-1 and CP-P820-2, RIO-P800-1 - Discrete Outputs
1-0102-ACBD-P004	002	Automation - Wiring Diagram - Primary Clarifiers - CP-P820-1 And CP-P820-2, RIO-P800-1 - Discrete Outputs
1-0102-ACBD-P010	002	Automation - Wiring Diagram - Primary Clarifiers - CP-P820-3 And CP-P820-4, RIO-P800-2 - Discrete Inputs
1-0102-ACBD-P010	005	Automation - Wiring Diagram - Primary Clarifiers - CP-P820-3 And CP-P820-4, RIO-P800-2 - Discrete Inputs
1-0102-ACBD-P010	006	Automation - Wiring Diagram - Primary Clarifiers - CP-P820-3 And CP-P820-4, RIO-P800-2 - Discrete Inputs
1-0102-ACBD-P011	001	Automation - Wiring Diagram - Primary Clarifiers - CP-P820-3 And CP-P820-4, RIO-P800-2 - Discrete Outputs
1-0102-ACBD-P011	002	Automation - Wiring Diagram - Primary Clarifiers - CP-P820-3 And CP-P820-4, RIO-P800-2 - Discrete Outputs
1-0102-ACBD-P301	001	Automation - Cabinet Layout - Primary Clarifiers - LCP-P301, Travelling Bridge PLC Cabinet - PLC-P301-1
1-0102-ACBD-P302	001	Automation - Power Distribution Schematic - Primary Clarifiers - LCP-P301-1, Travelling Bridge PLC Cabinet - PLC-301
1-0102-ACBD-P302	002	Automation - Power Distribution Schematic - Primary Clarifiers - LCP-P301-1, Travelling Bridge PLC Cabinet - PLC-301
1-0102-ACBD-P303	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P301, LCP-P301-1, PLC-P301 - Discrete Inputs
1-0102-ACBD-P304	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P301, LCP-P301-1, PLC-P301 - Discrete Outputs
1-0102-ACBD-P305	001	Automation - Cabinet Layout - Primary Clarifiers - LCP-P302-1, Travelling Bridge PLC Cabinet - PLC-P302
1-0102-ACBD-P306	001	Automation - Power Distribution Schematic - Primary Clarifiers - LCP-P302-1, Travelling Bridge PLC Cabinet - PLC-302
1-0102-ACBD-P306	002	Automation - Power Distribution Schematic - Primary Clarifiers - LCP-P302-1, Travelling Bridge PLC Cabinet - PLC-302
1-0102-ACBD-P307	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P302-1, PLC-P302 - Discrete Inputs
1-0102-ACBD-P308	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P302-1, PLC-P302 - Discrete Outputs
1-0102-ACBD-P309	001	Automation - Cabinet Layout - Primary Clarifiers - LCP-P311-1, Travelling Bridge PLC Cabinet - PLC-P311
1-0102-ACBD-P310	001	Automation - Power Distribution Schematic - Primary Clarifiers - LCP-P311-1,

Drawing No.	Sheet No.	Description
		Travelling Bridge PLC Cabinet - PLC-311
1-0102-ACBD-P310	002	Automation - Power Distribution Schematic - Primary Clarifiers - LCP-P311-1, Travelling Bridge PLC Cabinet - PLC-311
1-0102-ACBD-P311	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P311-1, PLC-P311 - Discrete Inputs
1-0102-ACBD-P312	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P311-1, PLC-P311 - Discrete Outputs
1-0102-ACBD-P313	001	Automation - Cabinet Layout - Primary Clarifiers - LCP-P301, Travelling Bridge PLC Cabinet - PLC-P301-1
1-0102-ACBD-P314	001	Automation - Power Distribution Schematic - Primary Clarifiers - LCP-P301-2, Travelling Bridge PLC Cabinet - RIO-301
1-0102-ACBD-P314	002	Automation - Power Distribution Schematic - Primary Clarifiers - LCP-P301-2, Travelling Bridge PLC Cabinet - RIO-301
1-0102-ACBD-P315	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P301-2, RIO-P301 - Discrete Inputs
1-0102-ACBD-P316	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P301-1, PLC-P301 - Discrete Outputs
1-0102-ACBD-P317	001	Automation - Cabinet Layout - Primary Clarifiers - LCP-P302-2, Travelling Bridge PLC Cabinet - RIO-P302
1-0102-ACBD-P318	001	Automation - Power Distribution Schematic - Primary Clarifiers - LCP-P302-2, Travelling Bridge PLC Cabinet - RIO-302
1-0102-ACBD-P318	002	Automation - Power Distribution Schematic - Primary Clarifiers - LCP-P302-2, Travelling Bridge PLC Cabinet - RIO-302
1-0102-ACBD-P319	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P302-2, RIO-P302 - Discrete Inputs
1-0102-ACBD-P320	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P302-2, RIO-P302 - Discrete Outputs
1-0102-ACBD-P321	001	Automation - Cabinet Layout - Primary Clarifiers - LCP-P311-2, Travelling Bridge PLC Cabinet - RIO-P311
1-0102-ACBD-P322	001	Automation - Power Distribution Schematic Primary Clarifiers - LCP-P311-2, Travelling Bridge PLC Cabinet - RIO-P311
1-0102-ACBD-P322	002	Automation - Power Distribution Schematic Primary Clarifiers - LCP-P311-2, Travelling Bridge PLC Cabinet - RIO-P311
1-0102-ACBD-P323	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P311-2, RIO-P311 - Discrete Inputs
1-0102-ACBD-P324	001	Automation - Wiring Diagram - Primary Clarifiers - LCP-P311-2, RIO-P311 - Discrete Outputs
1-0102-AILD-P304	001	Automation - Loop Diagram - RIO-P301 Inputs / RIO-P800-2 Outputs - Primary Clarifier 1 Travelling Bridge Interconnection
1-0102-AILD-P304	002	Automation - Loop Diagram - RIO-P301 Inputs / RIO-P800-2 Outputs - Primary Clarifier 1 Travelling Bridge Interconnection
1-0102-AILD-P305	001	Automation - Loop Diagram - RIO-P301 Outputs / RIO-P800-2 Inputs - Primary Clarifier 1 Travelling Bridge Interconnection
1-0102-AILD-P305	002	Automation - Loop Diagram - RIO-P301 Outputs / RIO-P800-2 Inputs -

Drawing No.	Sheet No.	Description
		Primary Clarifier 1 Travelling Bridge Interconnection
1-0102-AILD-P306	001	Automation - Loop Diagram - RIO-P302 Inputs / RIO-P800-2 Outputs - Primary Clarifier 2 Travelling Bridge Interconnection
1-0102-AILD-P306	002	Automation - Loop Diagram - RIO-P302 Inputs / RIO-P800-2 Outputs - Primary Clarifier 2 Travelling Bridge Interconnection
1-0102-AILD-P307	001	Automation - Loop Diagram - RIO-P302 Outputs / RIO-P800-2 Inputs - Primary Clarifier 2 Travelling Bridge Interconnection
1-0102-AILD-P307	002	Automation - Loop Diagram - RIO-P302 Outputs / RIO-P800-2 Inputs - Primary Clarifier 2 Travelling Bridge Interconnection
1-0102-AILD-P308	001	Automation - Loop Diagram - RIO-P311 Inputs / RIO-P800-1 Outputs - Primary Clarifier 3 Travelling Bridge Interconnection
1-0102-AILD-P308	002	Automation - Loop Diagram - RIO-P311 Inputs / RIO-P800-1 Outputs - Primary Clarifier 3 Travelling Bridge Interconnection
1-0102-AILD-P309	001	Automation - Loop Diagram - RIO-P311 Outputs / RIO-P800-1 Inputs - Primary Clarifier 3 Travelling Bridge Interconnection
1-0102-AILD-P309	002	Automation - Loop Diagram - RIO-P311 Outputs / RIO-P800-1 Inputs - Primary Clarifier 3 Travelling Bridge Interconnection
1-0102-ANET-P003	003	Automation - Network Diagram - Primary Clarifiers - Device Network
1-0102-ANET-P003	004	Automation - Network Diagram - Primary Clarifiers - Device Network
1-0102-ANET-P003	005	Automation - Network Diagram - Primary Clarifiers - Device Network
1-0102-ANET-P003	006	Automation - Network Diagram - Primary Clarifiers - Device Network
1-0102-ANET-P003	007	Automation - Network Diagram - Primary Clarifiers - Device Network
1-0102-ANET-P003	008	Automation - Network Diagram - Primary Clarifiers - Device Network
1-0102-EGAD-P003	001	Electrical - Power And Instrumentation - Main Floor Plan - Primary Clarifier 1 & 2 Elev 234.39M
1-0102-EGAD-P004	001	Electrical - Power And Instrumentation - Main Floor Plan - Primary Clarifier 3 Elev 234M
1-0102-EMCL-P301	001	Electrical - Motor Starter Schematic - TBC-P301 - Primary Clarifier 1 Travelling Bridge Collector
1-0102-EMCL-P301	002	Electrical - Motor Starter Schematic - TBC-P301 - Primary Clarifier 1 Travelling Bridge Collector
1-0102-EMCL-P302	001	Electrical - Motor Starter Schematic - TBC-P302 - Primary Clarifier 2 Travelling Bridge Collector
1-0102-EMCL-P302	002	Electrical - Motor Starter Schematic - TBC-P302 - Primary Clarifier 2 Travelling Bridge Collector
1-0102-EMCL-P303	001	Electrical - Motor Starter Schematic - CM-P303 - Primary Clarifier 1 Collector Mechanism
1-0102-EMCL-P303	002	Electrical - Motor Starter Schematic - CM-P303 - Primary Clarifier 1 Collector Mechanism
1-0102-EMCL-P304	001	Electrical - Motor Starter Schematic - CM-P304 - Primary Clarifier 2 Collector Mechanism
1-0102-EMCL-P304	002	Electrical - Motor Starter Schematic - CM-P304 - Primary Clarifier 2 Collector Mechanism

Drawing No.	Sheet No.	Description
1-0102-EMCL-P311	001	Electrical - Motor Starter Schematic - TBC-P311 - Primary Clarifier 3 Travelling Bridge Collector
1-0102-EMCL-P311	002	Electrical - Motor Starter Schematic - TBC-P311 - Primary Clarifier 3 Travelling Bridge Collector
1-0102-EMCL-P313	001	Electrical - Motor Starter Schematic - CM-P313 - Primary Clarifier 3 Collector Mechanism
1-0102-EMCL-P313	002	Electrical - Motor Starter Schematic - CM-P313 - Primary Clarifier 3 Collector Mechanism
1-0102-ESCH-P001	001	Sewpcc Upgrading/Expansion Project - Electrical - Primary Clarifiers - Panel Schedules
1-0102-ESLD-P001	001	Electrical - Single Line Diagram - Primary Clarifiers - MCC-P710
1-0102-ESLD-P002	001	Electrical - Single Line Diagram - Primary Clarifiers - MCC-P720 And Miscellaneous

E2. HAZARDOUS MATERIALS

E2.1 If asbestos or other hazardous materials are encountered during the Work of the Contract, the Contractor shall stop all work and notify the Contract Administrator immediately. Removal of hazardous materials shall be dealt with by the City and the Contractor shall await further instruction by the Contract Administrator.

CONTRACTOR SUPPLIED STANDARDIZED GOODS

E3. GENERAL REQUIREMENTS

E3.1 Comply with the general requirements of E3 for all Standardized Goods supplied by the Contractor.

E3.2 Comply with the following Standardization Goods requirements:

E3.2.1 Control System and Motor Control Equipment in accordance with E4.

E3.3 Contact the Contract Administrator regarding any potential uncertainty as to whether a good is covered under a standardization agreement.

E3.4 The Contractor may utilize a Standardization Vendor to provide other goods required under the Contract, in addition to Standardized Goods.

E3.5 The Contractor shall separately track all goods supplied under each standardization agreement.

E3.5.1 In the event that one or more Standardization Vendors are utilized to procure goods not covered under a standardization agreement, the Contractor shall ensure such goods are quoted, ordered, tracked and accounted in a separate manner.

E3.6 Pricing:

E3.6.1 The City has obtained discounted pricing for Standardized Goods. Each Standardization Vendor is obligated to sell Standardized Goods to all prospective Contractors at the discounted price, provided the goods are for the City of Winnipeg.

E3.6.2 The Standardization Vendors may at their option provide lump sum pricing for goods packages. The Standardization Vendor is not required to provide breakout pricing details to the Contractor.

E3.6.3 The Contractor and Subcontractors shall not utilize the City's agreements with the Standardization Vendors for any purpose other than City work.

E3.6.4 The City may audit the goods purchased from the Standardization Vendors under the standardization agreements and may identify to the Standardization Vendors any goods procured that are not associated with the Contract.

E3.7 The Contractor is responsible for ensuring that the Material supplied by the Standardization Vendors meets the requirement of the Contract. The Contractor shall review and confirm quotations supplied by the Standardization Vendors to ensure that all required Material is supplied.

E3.8 Without limiting or otherwise affecting any other term or condition of the Contract, including (non-exhaustive) D11.2.1:

E3.8.1 The supply of goods through a Standardization Vendor shall not relieve the Contractor of their obligations.

E3.8.2 Errors or omissions by a Standardization Vendor shall not be a cause for a Change in Work.

E3.8.3 Delays by a Standardization Vendor shall not be a cause for a Change in Work where the delay could have been avoided through reasonable planning, contingency allocation, or communication by the Contractor.

E3.9 Submittals

E3.9.1 Submittals shall be provided for Standardized Goods in accordance with the Specifications and typical industry practice. Submittals shall not be bypassed for Standardized Goods.

E4. STANDARDIZED CONTROL SYSTEM AND MOTOR CONTROL EQUIPMENT

E4.1 The City has standardized on a specific vendor for the supply and delivery of control system and motor control equipment. The Standardization Vendor was selected via RFP 756-2013 and was awarded to Schneider Electric Canada Inc. (Schneider).

(a) Refer to E4.7 for contact information.

(b) Copies of the tender documents are available from City of Winnipeg Material Management's website.

E4.2 Goods to be procured via this standardization agreement includes but is not limited to:

(a) Programmable Controllers (PLCs) including all associated components, hardware and software.

(b) Programmable Controller Programming Software.

(c) Touchscreen HMI systems such as Magellis HMIs.

(d) Touchscreen HMI Programming Software.

(e) Loose VFDs, motor starters, soft starters, and associated components.

(f) Industrial Ethernet Switches as per design. Note that some Ethernet switches may be specified to be from other vendors due to application requirements. Refer to drawings and specifications.

(g) Training sessions.

E4.3 For clarity, this standardization agreement does not include:

(a) Fused and un-fused disconnect switches not incorporated into a MCC or other motor starter;

(b) Control stations and pendants not incorporated into a MCC or other motor starter;

(c) Electrical Transformers not in a MCC or motor starter;

(d) System Integration Services (including programming and configuration);

(e) Control Panels to house PLCs;

(f) Instrumentation;

(g) Power supplies not integrated with the PLC / HMI systems; and

(h) Terminal blocks not integrated with the PLC / HMI systems

E4.4 The following model series shall be utilized unless otherwise indicated in the Specifications, Drawings or otherwise approved by the Contract Administrator:

(a) M580, and M340 PLCs;

(b) X80 PLC I/O;

(c) Unity Pro programming software;

(d) Vijeo Citect HMI systems;

(e) Local HMI – Magellis HMIGTO or HMIGTU series;

(f) Model 6 MCC – NEMA rated starters, Intelligent Ethernet (unless otherwise specified);

E4.5 Commissioning and start-up:

E4.5.1 Except as identified in E4.5.2, commissioning and start-up of all goods purchased under this standardization agreement shall be performed by the Contractor.

E4.5.2 Schneider shall provide MCC start-up services, but not commissioning services. Coordinate with Schneider as required to understand the limitations of Schneider's MCC start-up services and provide all remaining testing, commissioning and start-up services to provide a complete commissioning and start-up.

E4.6 Training

E4.6.1 Programmable Controller Local Training

(a) Overview

(i) Provide instruction to designated City personnel in the operation and maintenance of the Schneider programmable controller control system components and associated Schneider tools and equipment.

(ii) This training shall be provided by Schneider.

(iii) This training does not relieve the Contractor of other training requirements associated with the control system.

(b) Location

(i) The location of the training will be in the City of Winnipeg, in a facility provided by the City.

(ii) The room will be classroom style.

(c) Submittals

(i) Submit the names and qualifications of the proposed instructors.

(ii) Submit training proposal complete with hour by hour schedule including brief overview of content of each training segment a minimum of 30 Working Days prior to the anticipated date of beginning of training.

(d) Quality Assurance

(i) Provide competent instructors thoroughly familiar with all aspects of the programmable controller control system.

(ii) The Contract Administrator may reject instructors it deems to not be qualified.

(iii) In the event that the training provided is not satisfactory, reduction of payment may be applied.

(e) Duration

(i) The training shall be a minimum of one (1) day in duration.

(f) Materials

(i) Provide equipment, visual and audio aids, and materials.

(ii) Supply manual for each trainee, describing in detail the information included in each training program.

(g) Attendees

(i) The attendees are expected to include, but not be limited to: electrical and instrumentation maintenance personnel and programmable controller support specialists.

(h) Content

(i) Overview of the equipment.

(ii) Equipment maintenance training including:

- Installation
- Troubleshooting
- Preventative maintenance
- Replacement of modules
- Network communication troubleshooting and diagnostics
- Fieldbus troubleshooting and diagnostics
- Programmable controller redundancy strategies and operation
- Configuration of equipment parameters

(iii) Maintenance use of programmable controller programming software, including:

- Basic operation of the software
- Connecting to programmable controllers
- Download and upload of software configuration
- Diagnostics and troubleshooting
- Connecting to intelligent starters

(i) Number of Sessions:

(i) Provide a minimum of two (2) sessions.

E4.7 Primary contacts for all quotations and purchases from Schneider are:

E4.7.1 Goods to be procured directly from Schneider:

(a) Further to E4.2, goods to be procured via Schneider includes but is not limited to:

(i) PLC to Infi90 Termination Unit migration cables;

(ii) Process Simulator Software;

(iii) Historian Server and Client Software;

(iv) Version Management Software; and

(v) Training sessions.

(b) Primary Schneider contact:

Garth Eastman

21 Omands Creek Blvd
Winnipeg, MB, R2R 2V2
Telephone: 204-631-0670
E-mail: garth.eastman@schneider-electric.com

E4.7.2 Goods to be procured via Eecol Electric (Eecol), as Schneider's High Tech Automation Distributor (HTAD):

(a) Further to E4.2, goods to be procured via Eecol includes but is not limited to:

(i) Programmable Controllers (PLCs) including all associated components, hardware and software;

(ii) Programmable Controller Programming Software;

(iii) HMI System software;

(iv) Touchscreen HMI systems such as Magellis HMIs;

(v) Touchscreen HMI Programming Software;

(vi) Motor Control Centers including all components;

(vii) Loose VFDs, motor starters, soft starters, and associated components; and

(viii) Industrial Ethernet Switches as per design. Note that some Ethernet switches may be specified to be from other vendors due to application requirements. Refer to drawings and specifications.

(b) Primary Eecol contact:

Trevor Hambleton
1760 Wellington Avenue
Winnipeg, MB, R3H 0E9
Telephone: 204-774-2800
E-mail: hambletont@eecol.com

(c) All correspondence related to requests-for-quotations to Eecol for goods listed under E4.7.2(a) shall be copied to the primary Schneider contact listed under E4.7.1(b).

(d) For whatever reason, if Eecol is unable to receive or respond to request-for-quotations for goods listed under E4.7.2(a), request-for-quotations may be issued directly to the primary Schneider contact listed under E4.7.1(b).

E4.8 Quotations and orders:

E4.8.1 Reference the following in all quotation requests, quotations \ proposals, purchase orders, and invoices:

(a) This Bid Opportunity number; and

(b) A statement indicating:

E4.9 "This request / purchase order is subject to the Terms and Conditions of City of Winnipeg Request for Proposal RFP 756-2013."

E5. SYSTEMS INTEGRATION WORK

E5.1 The Systems Integration Work shall include the supply, installation, programming, testing, commissioning and decommissioning of both hardware and software aspects of a fully integrated process automation system.

E5.2 The Systems Integrator shall have sufficient capability and capacity both in the programming hardware they possess and the associated software licences to effectively develop the site automation systems.

E5.3 The Systems Integrator shall not be dependent upon the City to provide any programming hardware, software, or licences to complete the Work.

E5.4 At the point of final completion and sign off of the automation system, if items were provided by the City to assist the Systems Integrator, the Systems Integrator will turn over those items to the Contract Administrator within ninety (90) Calendar Days.

E5.5 The Systems Integrator shall be responsible for the following requirements:

E5.5.1 The Systems Integrator shall ensure the requirements of the City standards and guidelines are followed and implemented correctly. The standards and guidelines include, but are not limited to:

(a) WWD Historical Data Retention Standard;

(b) WWD Identification Standard;

(c) WWD Tag Naming Standard; and

(d) WWD HMI Layout and Animation Plan

E5.5.2 The Systems Integrator shall be responsible for developing the application software programming of the automation control systems.

E5.5.3 The Systems Integrator shall be responsible for programming, configuration, testing and commissioning of the following automation components:

(a) All automation Local HMIs;

(b) All automation intelligent motor controls;

(c) All automation PLC systems; and

(d) All automation communication systems and associated components for Ethernet.

E5.5.4 The Systems Integrator shall integrate the controls of both intelligent and non-intelligent MCCs and associated VFDs into the control system. The supply and/or installation of the MCCs may be via other Subcontractors.

E5.5.5 The Systems Integrator shall integrate all applicable automation panels into the control system. The supply and/or installation of the automation panels may be via other Subcontractors.

E5.5.6 The Systems Integrator shall integrate existing automation equipment into the PCS.

E5.5.7 The Systems Integrator shall integrate packaged third party automation systems into the PCS.

E5.5.8 The Systems Integrator shall provide all software and licences for a complete and operational control system.

E5.5.9 The Systems Integrator shall be responsible for conducting Factory Acceptance Testing (FAT) and SIFT (System Integration Functional Testing) for the automation control system to the satisfaction of the City and representatives of City in attendance. The Systems Integrator shall provide a facility for each FAT within the limits of the City of Winnipeg.

E5.5.10 The Systems Integrator shall be responsible for conducting Site Acceptance Testing (SAT) for the automation control system.

E5.5.11 The Systems Integrator shall develop a comprehensive software simulator for the PCS, to allow for complete off-line testing of each process. The simulator shall simulate the process and process equipment by providing automated responses for all control system inputs, based upon control system outputs. In addition, a user interface shall be provided to allow the user to easily override and force control system inputs to simulate various abnormal scenarios. The user interface shall be user-friendly and presented on a plant process area and system basis. An I/O watch window is not an acceptable user interface.

E5.5.12 The Systems Integrator shall be responsible for the migration of existing processes controlled from the existing ABB DCS automation system and other existing PLC based systems to the new PLC based automation system. The Systems Integrator shall take into consideration the complex nature of a sewage treatment plant running 24 hours a day serving the population of Winnipeg. Shut down of an existing system(s) may or may not be possible and the process may be required to remain live during the changeover of automation systems.

E5.5.13 The System Integrator shall be on-site to support commissioning of the process control and troubleshooting efforts.

E5.5.14 The Systems Integrator shall provide staff to service extended shutdowns and start-ups on a 24-hour working basis during critical windows of Work such as those of commissioning and performance test windows.

E5.5.15 The Systems Integrator shall provide a 24-hour support system, whereby a capable service technician experienced with the City's control systems being installed, is available on an emergency call basis.

E5.5.16 The Systems Integrator shall be responsible for producing the detailed Shop Drawings and any other drawings pertaining to the automation and control systems that forms a part of the scope of work of this project.

E5.5.17 The Systems Integrator shall be responsible for authentication (sealing) of all programming and other automation designs by a Professional Engineer registered with Engineers Geoscientists Manitoba (EGM).

E5.5.18 The Systems Integrator shall provide the specific portions of the operations and maintenance manuals detailing the automation system components, software, configuration, functionality, specific application software documentation, and commissioning records. However, the portions of the Area Manual(s) that describe the general process operation including, but not limited to, the PCS interaction, are not required to be within the System Integrator's scope.

E5.6 The Systems Integrator shall participate in the training provided by the Contractor to train City personnel.

E5.7 The training provided by the Systems Integrator shall be detailed and comprehensive and at minimum cover the following:

(a) City personnel should have an overview of the functionality of the Local HMI and PLC systems; and

(b) At the completion of the training, City personnel should have an in-depth understanding of the entire range of the automation and control system installed inclusive of the:

(i) Local HMIs

(ii) PLCs;

(iii) Intelligent motor control; and

(iv) Fibre Optic and Copper network installation;

E6. SHOP DRAWINGS

E6.1 Description

E6.1.1 This Specification provides instructions for the preparation and submission of shop drawings.

(a) The term „Shop Drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, including Site erection drawings which are to be provided by the Contractor to illustrate details of a portion of the Work; and,

(b) Submit specified Shop drawings to the Contract Administrator for review. All submissions must be in metric units. Where data is in imperial units, the correct metric equivalent shall also be shown on all submissions for Contract Administrator review

E6.2 Shop Drawings

E6.2.1 Original Drawings shall be prepared by Contractor, Subcontractor, supplier, distributor or manufacturer to illustrate appropriate portion of Work including fabrication, layout, setting or erection details as specified in appropriate sections.

E6.2.2 Shop Drawings for the following components shall bear the seal of a Professional Engineer registered in the Province of Manitoba and shall be signed and dated by the Engineer:

(a) Using a precision laser tracking service to measure the bridge and all rail components before and after installation, provide shop drawings in accordance with Mechanical Specifications Section 14 43 19, 1.1.1.18 and 19.

E6.2.3 Notwithstanding, and in addition to E6.2.2, Shop Drawings shall also be submitted for the following components:

(a) Position and tolerance of all new anchor bolts and grout pads overlaid on the existing anchor bolt pattern in accordance with Section 14 43 19.

(b) Shaft section showing misalignment or runout of the machined surfaces relative to the shaft centreline in accordance with Section 14 43 19.

(c) If applicable, modifications to permanent hand railing removed in accordance with Section 14 43 19.

(d) Supply of electrical and control materials in accordance with the following specification sections:

(i) 25 30 10
(ii) 26 05 01
(iii) 26 05 31
(iv) 26 27 16
(v) 26 27 26
(vi) 26 28 14
(vii) 26 29 03
(viii) 26 29 10
(ix) 27 10 05

(e) Supply of all electrical equipment as outlined in Supplemental Electrical Specifications Divisions 25, 26 and 27.

E6.3 Contractor"s Responsibilities

(a) Review Shop Drawings, product data and samples prior to submission and stamp and sign drawings indicating conformance to the Contract requirements.

(b) Verify:

(i) Field Measurements;
(ii) Field Construction Criteria; and,
(iii) Catalogue numbers and similar data.

(c) Coordinate each submission with requirements of Work and Contract Documents.

(d) Individual Shop Drawings will not be reviewed until all related drawings are available.

(e) Notify Contract Administrator, in writing at time of submission, of deviations from requirements of Contract Documents.

(f) Responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator"s review of submission, unless Contract Administrator gives written acceptance of specified deviations.

(g) Responsibility for errors and omissions in submission is not relieved by Contract

(h) Administrator"s review of submittals.

(i) Make any corrections required by the Contract Administrator and resubmit corrected copies of Shop Drawings. Direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the Contract Administrator on previous submission.

(j) After Contract Administrator"s review and return of copies, distribute copies to

(k) Subcontractors and others as appropriate.

(l) Maintain one (1) complete printed paper set of reviewed Shop Drawings, filed by Specification Section Number, at the Site of the Work for use and reference of the Contract Administrator and Subcontractors.

E6.4 Submission Requirements

(a) Schedule submissions at least fourteen (14) Calendar Days before dates reviewed submissions will be needed, and allow for a seven (7) Calendar Day period for review by the Contract Administrator of each individual submission and re-submission, unless noted otherwise in the Contract Documents.

(b) Submit PDF copies of Shop Drawings.

(c) Accompany submissions with transmittal/cover letter containing:
  (i) Date
  (ii) Project title and Bid Opportunity number
  (iii) Contractor"s name and address
  (iv) Number of each Shop Drawing, product data and sample submitted
  (v) Specification Section, Title, Number and Clause
  (vi) Drawing Number and Detail / Section Number
  (vii) Other pertinent data

(d) Submissions shall include:
  (i) Date and revision dates
  (ii) Project title and Bid Opportunity number
  (iii) Name of:
    (i) Contractor
    (ii) Subcontractor
    (iii) Supplier
    (iv) Manufacturer
    (v) Detailer (if applicable)
  (iv) Identification of product or material
  (v) Relation to adjacent structure or materials
  (vi) Field dimensions, clearly identified as such
  (vii) Specification section name, number and clause number or drawing number and detail / section number
  (viii) Applicable standards, such as CSA or CGSB numbers
  (ix) Contractor"s stamp, initialled or signed, certifying review of submission, verification of field measurements and compliance with Contract Documents

E6.5 Other Considerations

(a) Fabrication, erection, installation or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent shop drawings and resubmit.

(b) Material and equipment delivered to the Site of the Works will not be paid for at least until pertinent Shop Drawings have been submitted and reviewed.

(c) Incomplete Shop Drawing information will be considered as stipulated deductions for the purposes of progress payment certificates.

(d) No delay or cost claims will be allowed that arise because of delays in submissions, re-submissions and review of Shop Drawings.

E7. EXPEDITED SHOP DRAWINGS

E7.1 In order to expedite Shop Drawings with critical timeliness, the Lowest Responsive Bidder will be permitted, after receiving written approval from the Contract Administrator, to arrange for the preparation of Shop Drawings for the following items with critical timelines:

(a) All items requiring Shop Drawings listed in E6.

E7.2 If Award is made to the Lowest Responsive Bidder, then no specific payment for the preparation of Shop Drawings will be made.

E7.3 If no contract is awarded, then the City of Winnipeg will pay the requested Bidder up to a maximum of twenty thousand dollars ($20,000.00) for the complete set of requested submissions noted above. This amount will include submission of the shop drawing listed in E6.2.2 (a). Delivery of the Shop Drawings to the City and payment of the above amounts will constitute full and final consideration of each party to the other, and neither party will have any further liability to the other with respect to this Bid Opportunity.

CITY SUPPLIED EQUIPMENT

Part 1 General

.1 The City issued a Purchase Order for mechanical replacement parts for the clarifier 3 bridge.

.2 These parts were ordered from Ovivo (Local Representative Dan Landry – Mequipco). They will deliver them to the SEWPCC site. The contractor shall receive and unload the equipment for installation.

.3 The Contractor shall coordinate delivery of the Ovivo (Supplier) parts with the Supplier to ensure that he is ready to receive and unload the parts when they arrive. There may be more than one shipment.

.4 Prior to accepting any of the part, inspect them. A representative from each of the following groups will be in attendance at the time of delivery: the Supplier, Contractor, and Contract Administrator. A duly executed Form 100 – Certificate of Equipment Delivery shall be completed. Any minor or major damage or deficiencies identified during the inspection shall be noted and will be addressed by the Supplier. The Contractor shall accept the equipment and assume risk and responsibility for the equipment and fill out Form 100 - Certificate of Equipment Delivery, a copy of which is included at the end of this Section. Only deficiencies noted and documented in the foregoing manner will be deemed not the responsibility of the Contractor.

.5 The Contractor shall be responsible for the installation of the parts provided by the Supplier. The installation shall be in accordance with the manufacturers' installation requirements.

Part 2 Products

2.1 SUPERVISION OF INSTALLATION, START-UP, COMMISSIONING, AND FIELD TESTING

.1 For the parts supplied under the supply purchase order and this Contract, the Supplier will provide the services of a qualified representative to monitor the installation, start-up, commissioning, and performance testing of the new parts. The services to be performed by the Supplier are as follows:

.1 Prior to the Contractor beginning the installation, the Supplier shall provide to the Contractor instructions and advice regarding the detailed requirements for the equipment installation. The Supplier will be required to provide a Certificate of Readiness to Install, Form 101, a copy of which is included at the end of this Section. The Contractor shall be required to sign Form 101 to acknowledge that he has received adequate instruction.

.2 Following the completion of the installation, the Supplier shall inspect the installation of the equipment to verify that it has been installed in accordance with the manufacturer's requirements. The Supplier will be required to provide a Certificate of Satisfactory Installation, Form 102, a copy of which is included at the

end of this Section. If any deficiencies in the installation exist at the time of inspection, these shall be noted on Form 102 by the Supplier. The Contractor shall be responsible for the prompt correction of these deficiencies prior to the start-up of the equipment.

.3 The Supplier shall 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, 25, 26 and 27.

.4 Following a period of seven (7) consecutive days of operation of the equipment, the Supplier will be required to complete a Certificate of Equipment Satisfactory Performance, Form 103, a copy of which is included at the end of this Section. The Contractor shall sign the form.

.5 The parts Supplier will be available to provide site visits for inspection of installation and for supervision of start-up and commissioning as part of this Contract. These Supplier 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.

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

END OF SECTION

Form 100
CERTIFICATE OF EQUIPMENT DELIVERY

We certify that the equipment listed below has been delivered into the care and custody of the Installation Contractor. The equipment has been found to be in satisfactory condition. There is no visible evidence of exterior damage or defects.

Project:
Equipment Description:
Equipment Supply Bid Opp. No.:
Equipment Install Bid Opp. No.:
Equipment Tag No.:
Specification Reference:

(Authorized Representative of Supply Contractor)	Date
(Authorized Representative of Install Contractor)	Date
(Authorized Representative of Contract Administrator)	Date

Form 101
CERTIFICATE OF READINESS TO INSTALL

We have familiarized the installing contractor of the specific requirements related to the equipment listed below and am satisfied that the installing contractor understands the required installation procedures.

Project:
Equipment Description:
Equipment Supply Bid Opp. No.:
Equipment Install Bid Opp. No.:
Equipment Tag No.:
Specification Reference:

(Authorized Representative of Supply Contractor) Date

We certify that we have received satisfactory installation instructions from the equipment manufacturer/vendor.

(Authorized Representative of Install Contractor) Date

Form 102

CERTIFICATE OF SATISFACTORY INSTALLATION

We have completed our checks and inspection of the installation of our equipment as listed below and confirm that it is satisfactory and that any defects have been remedied except any as noted below.

Project:
Equipment Description:
Equipment Supply Bid Opp. No.:
Equipment Install Bid Opp. No.:
Equipment Tag No.:
Specification Reference:
Outstanding Defects:

(Authorized Representative of Supply Contractor)	Date
(Authorized Representative of Install Contractor)	Date
(Authorized Representative of Contractor Administrator)	Date

Form 103 - ELECTRICAL
CERTIFICATE OF EQUIPMENT SATISFACTORY PERFORMANCE

We certify that the equipment listed below has been continuously operated for a minimum of three (3) consecutive days and that the equipment operates satisfactorily and meets it's specified operating criteria. No defects in the equipment were found and as such are classified as "conforming".

Project:
Equipment Description:
Equipment Supply Bid Opp. No.:
Equipment Install Bid Opp. No.:
Equipment Tag No.:
Specification Reference:

(Authorized representative of Supply Contractor)	Date
(Authorized representative of Install Contractor)	Date
(Authorized representative of Contract Administrator)	Date

Form 103 - MECHANICAL

CERTIFICATE OF EQUIPMENT SATISFACTORY PERFORMANCE

We certify that the equipment listed below has been continuously operated for a minimum of three (3) consecutive days and that the equipment operates satisfactorily and meets it's specified operating criteria. No defects in the equipment were found and as such are classified as "conforming".

Project:
Equipment Description:
Equipment Supply Bid Opp. No.:
Equipment Install Bid Opp. No.:
Equipment Tag No.:
Specification Reference:

(Authorized representative of Supply Contractor)	Date
(Authorized representative of Install Contractor)	Date
(Authorized representative of Contract Administrator)	Date

Form 104 - ELECTRICAL

CERTIFICATE OF SATISFACTORY PROCESS PERFORMANCE

We certify that the process system listed below has been continuously operated and tested as per the Specifications using process fluid and that the equipment meets its Performance Testing and Operating Criteria. No defects in the process system were found and as such are classified as “conforming”.

Project:
Equipment Description:
Equipment Supply Bid Opp. No.:
Equipment Install Bid Opp. No.:
Equipment Tag No.:
Specification Reference:

(Authorized Representative of Supply Contractor)	Date
(Authorized Representative of Install Contractor)	Date
(Authorized Representative of Contract Administrator i.e. Commissioning Lead or Design Discipline Lead)	Date
(Authorized Representative of City)	Date

Form 104 – MECHANICAL
CERTIFICATE OF SATISFACTORY PROCESS PERFORMANCE

We certify that the process system listed below has been continuously operated and tested as per the Specifications using process fluid and that the equipment meets its Performance Testing and Operating Criteria. No defects in the process system were found and as such are classified as "conforming".

Project:
Equipment Description:
Equipment Supply Bid Opp. No.:
Equipment Install Bid Opp. No.:
Equipment Tag No.:
Specification Reference:

(Authorized Representative of Supply Contractor)	Date
(Authorized Representative of Install Contractor)	Date
(Authorized Representative of Contract Administrator i.e. Commissioning Lead or Design Discipline Lead)	Date
(Authorized Representative of City)	Date

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.

.3 Canadian Standards Association (CSA International)

.1 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.2 CSA W55.3-1965(R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.3 CSA W59-03, 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 Bid Opportunity, the Contractor is to assume a total quantity of 2 square meters of paint touch-ups per bridge (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 is estimated based on in-service inspections completed in May 2018.

.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.

Part 2 Products

2.1 MATERIALS

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

2.2 FIELD PAINTING

.1 Paint: Bar Rust 235 Surface Tolerant Epoxy by International or approved equivalent in accordance with B7 of the Bid Opportunity Documents.

.1 Paint Colours

.1 Festoon Running Beam – Safety Yellow

.2 Primary Clarifier Bridges 1 & 2 - Black

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 FESTOON HANGER WELD REPAIRS

.1 Following surface preparation and full corrosion removal of existing welded areas of the festoon running beam hangers, 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 10 hangers will require weld repairs.

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 B7 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

PRIMARY CLARIFIER #3 ALUMINUM BRIDGE REPAIRS

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

1.2 REFERENCE INSPECTION REPORT

.1 AJP Engineering Services

.1 "Structural Condition Assessment of Primary Clarifier Travelling Bridge Collector #3 at the South End Sewage Treatment Plant", Revision 0, dated January 17, 2018.

.2 The report referenced in 1.2.1.1 indicated thirteen (13) weld deficiencies requiring repair. The report has been appended to this Bid Opportunity in Appendix G for Reference.

1.3 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MATERIALS

.1 Welding materials: to CSA W59.

.2 Aluminum plate materials: 6061-T6 Tempered Aluminum 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.

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

.2 Repair all deficient weld areas as outlined by Canadian Quality Inspections as part of a weld inspection report annexed to the Structural Condition Assessment report noted in Section 1.2.1.

.3 Provide temporary bridge support if required. Any plans for temporary support works are to be submitted to the Contract Administrator for approval prior to installation.

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

.5 Weld field connection repairs.

.6 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.

3.4 PROTECTION

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

.2 Provide temporary support to the bridge if required.

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

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 SCOPE OF WORK

.1 Part A to Part E and relevant sections of Appendices A to G of these specifications shall apply.

.2 This specification provides the performance criteria for the mechanical refurbishment of the Primary Clarifier 3 Travelling Bridge.

.3 This specification applies to Primary Clarifier Travelling Bridge 3 only. It does not include clarifiers 1 and 2.

.4 There is concern over the number of travelling bridge components that are failing and the jerky movement of the bridge. The intent of this refurbishment work is to eliminate the shaky or jerky motion of the travelling bridge collector as much as possible.

.5 The City has issued a Purchase Order for materials from the Original Equipment Manufacturer - Ovivo. These materials are listed in Section 2.1 below. Refurbish the clarifier by removing the existing parts and installing the new materials.

.6 The bridge collector drive assembly scope of work will involve all of the following components with only those listed in Section 2.1 begin replaced.

.1 Bridge Drive System: Motor, controlled torque coupling, gearbox, drive sprockets, drive chain, driven sprocket, drive shaft sections, drive shaft bearings/pillow blocks, drive shaft couplings, cog wheel axles, cog wheel axle bearings/pillow blocks, and cog wheels.

.2 Bridge Running Wheels Assembly: Running wheel axles, running wheel axle bearings/pillow blocks, and running wheels.

.7 The bridge collector cog tracks, and running rail scope of work will involve all of the following components with those listed in Section 2.1 begin replaced. Also replaced will be cog and running rail anchor bolts, grout pads, bolts and hardware:

.1 Anchor bolts, grout pads, and sole plates for the ASCE 40AS rail and cog track including shims, neoprene pads and hardware.

.2 ASCE 40AS rail and 3/4in MS cog track including splice plates, cog track angles, bolts and hardware.

.8 Reuse the existing rail end stops.

.9 If necessary to complete the project work, remove the bridge collector sludge scraper assembly and place it at the bottom of the drained and cleaned clarifier while project work is being completed. This will provide work space at the west end of the building. See Appendix A plan of clarifier in the parked position.

.10 Bring materials into the building using the large south facing loading door at the west end of the clarifier 3 building. Do not store materials outside this loading door as this area belongs to another contract called C4 that is working in this area. Permission to drive to this loading door will be required from Contract C4

before entering this fenced area. Move materials directly from the delivery vehicle to inside the building. See also Appendix C.

.11 Note the U shaped monorail at the west end of the building can be used to move materials. Contractor shall provide his own hoist for this purpose.

.12 The south and north side safety rails at the ceiling level are available for use by the Contractor. The Contractor shall provide his own equipment to connect his harnesses to the safety rails.

.13 The contractor is free to install scaffolding inside the clarifier tank if required.

.14 The south side hand rail system can be removed if necessary to assist in completing project work. If this is done, provide a shop drawing indicating how the hand rail system will be replaced so that is of equal quality to the existing system.

.15 Care will be required when working in the clarifier 3 building when the clarifier is operating. If any Work will enter the path of the operating clarifier, coordination with Plant operations is required.

.16 Remove existing steel rails and other debris from the site. Cut into smaller pieces as required.

.17 Provide the services of a qualified representative from Ovivo, the City supplied material supplier, to monitor quality of the installation contractor's installation work. Include an allowance of $20,000 for these Ovivo services. Provide an hourly rate proposal from Ovivo 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 spend, 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.

.18 Before beginning work on clarifier 3, provide a precision laser tracking service to measure the bridge and all rail components before installation. Provide a shop drawing that can be used as a basis for showing all existing bolt locations, and as a baseline for a new drawing showing the new rail 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 3.4 below. See also Section 3.3 below for additional requirements regarding this drawing.

.19 When nearing completion of work on clarifier 3, provide a precision laser tracking service to measure the bridge and all final rail components. Provide a shop drawing showing all new 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 3.4 below. See also Section 3.3 below for additional requirements regarding this drawing.

.20 The data collected shall be used to complete the applicable sections of the quality control forms described in section 3.4 "Quality Control". A product datasheet and manufacturer's calibration certificate shall be provided to the Contract Administrator and a statement of the applicable measurement error included with each measurement recorded in the QC documentation. See also Section 3.3 for additional requirements regarding this drawing.

1.2 RELATED REQUIREMENTS

.1 Sections of the GL&V Operation and Maintenance Manual Vol.2 of 3, Contract 2 for Primary Clarifier Expansion (see Appendix A)

.2 Dorr-Oliver Canada Drawings (included in Appendix A)

- .1 L-32917 G.A. Primary Clarifier
- .2 L-32918 Cross Sections of Primary Clarifier
- .3 L-32983 Anchor Bolt and Rail Setting Plan
- .4 L-33033 Bridge Drive Arrangement and Erection
- .5 L-33152 Limit Switch Arrangement for Hoist Bridge No.3
- .6 L-33200 Lubrication Arrangement
- .7 L-33006 Chain Guard Assembly – Oil Tight
- .8 L-33105 Bridge Assembly – Primary Clarifier

.3 Chart 552 Recommended Lubricants for Dorr-Oliver-Long Ltd. Process and Mining Equipment (also included in Appendix A)

1.3 SHOP DRAWINGS

.1 Refer to requirements as listed in Specification Section E6.

1.4 REFERENCE STANDARDS

.1 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)

.2 CSA Group

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

.3 Crane Manufacturers Association of America (CMAA)

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

.4 City of Winnipeg Water and Waste Department

- .1 WWD CAD/GIS Standards - 2016

.5 International Standards Organization (ISO)

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

.6 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

.7 American Petroleum Institute (API)

.1 API RP 686 2nd Edition, December 1, 2009 Recommended Practice for Machinery Installation and Installation Design

Part 2 Products

2.1 MATERIALS AND HANDLING

.1 SHIPMENT, DELIVERY, STORAGE AND HANDLING

.1 The laydown area onsite to be used for the shutdown period is shown in Appendix C.

.2 Store materials in a location and manner that reflects the care and preservation requirements for those parts.

.3 Parts to be shipped fully secured and protected from rain/snow etc.

.2 CITY SUPPLIED MATERIALS

.1 The full list of City supplied materials that relate to the bridge collector drive system is provided in Table 1 with part numbers, descriptions, and quantities of each material ordered.

.2 The full list of City supplied materials that relate to the bridge collector rails and cog track is provided in Table 2 with part numbers, descriptions, and quantities of each material ordered

.3 Be responsible for safe unloading and storage of the City supplied materials described in sections 2.1.2.1 and 2.1.2.2. Coordinate delivery of the material to the site with Ovivo. Copy the Contract Administrator on all correspondence.

.4 Refer to Section 01 00 01 City Supplied Parts, for requirements regarding coordination and sign-off for receipt of parts, readiness to install, satisfactory installation, and satisfactory performance. Upon delivery, inspect the parts. Report defects or deficiencies immediately upon acceptance of the components. Damage of these City supplied parts after acceptance will be the Contractor's responsibility. See material acceptance requirements contained in Appendix B.

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

.3 CONTRACTOR SUPPLIED MATERIALS LIST

.1 The list of Contractor supplied materials that relate to the rails and drive system is provided in Table 3 with descriptions and quantities.

.2 Review the Contractor supplied materials list in Table 3 and report deficiencies or discrepancies immediately.

.3 Provide lubrication as per requirements described in Dorr-Oliver Canada drawing L-33200 Lubrication Arrangement and Chart 552 of the bridge collector O&M manual located in Appendix A.

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

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 Dispose of waste steel and other demolition materials off site.

.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.

.3 All of the existing bridge collector drive assembly components to be replaced by parts listed in Table 1 and the cog track pieces listed in Table 2 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 and provided to the Contract Administrator

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

3.3 INSTALLATION

.1 ANCHOR BOLTS AND RAIL

Anchor bolts, grout pads, sole plates, running rails, and cog tracks are to be installed to the requirements of the Inspection Test Plan (ITP) and Quality Control (QC) Checklists described in Section 3.3 using the materials listed in Section 2.1. Additionally, the installation must meet the requirements of:

.1 Drawing L-32918,

.2 Drawing L-32983,

.3 the requirements of CISC Crane Supporting Steel Structures: Design Guide 3rd Ed. (2017),

.4 and 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.

.1 Areas of damaged concrete from demo of original grout pads are to be patch repaired with cement repair mix.

.2 Anchor bolts, rail, and cog track are to be aligned and installed using the fixed starting point shown on drawing L-32983.

.3 Provide an anchor bolt, cog track, and rail alignment methodology document for review and approval by the Contract Administrator indicating the intended survey/alignment method, the make, model, and calibration of measurement tools to be used.

.4 Provide a detailed plan 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.

.1 The new layout will use the same typical anchor spacing as shown in the original layout in drawing L-32983 without any overlap on the original anchor locations.

.2 The drawing will also include typical Sections/Details showing connections (splicing/anchoring) for rail and cog track 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 must conform to the requirements of Section 3.4.4.

.5 Anchor bolt alignment shall be made from the longitudinal (east/west) and transverse (north/south) centrelines of the clarifier tank per the OEM installation requirements contained in the GL&V O&M Manual Erection Instructions section titled “Bolts” (see Appendix A).

.2 DRIVE SYSTEM

The bridge collector mechanism drive assembly and running wheel axles are to be installed to the requirements of the ITP and QC Checklists described in Section 3.4 using the materials listed in Section 2.1. Reference drawing L-33105 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.

.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 measurement tools to be used.

.2 Provide a shop drawing for each shaft section showing misalignment or runout of the machined surfaces relative to the shaft centreline. The drawings must conform to the requirements of Section 3.4.4.

.3 Provide a marked-up copy of drawing L-33033 with alignment measurements and shim pack sizes (See ITP line 4).

.4 The drive chain assembly is to be disassembled and re-assembled using the parts supplied.

3.4 QUALITY CONTROL

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

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

.3 Complete all City supplied checklists as required by the ITP, see Appendix B for QC checklists.

.4 All shop drawings supplied 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

.5 Shop drawings shall also conform to ASME Y14.5-2009.

.6 During alignment 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 be notified

3.5 COMMISSIONING

.1 Run test the bridge collector before the clarifier is put back into operation, the unit should travel at 1.8 m/min if using the 20 tooth sprocket in accordance with drawing L-32917.

.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).

.3 See Commissioning Plan document for further details.

END OF SECTION

Table 1 – Bridge Drive System – City Supplied Materials

OVIVO PART #	GL&V PART#	D.O. DWG #	NAME	QTY	UNIT
145898	052021AA	M26743 (REF)	Wheel Double Flanged D-I 24" #052021AA	2	EA
145899	052644AA	M26745 (REF)	Wheel Flat Run D-I 24" 052644AA C/W	2	EA
145900	050808B	M26812 (REF)	Wheel Cog Stl 24" Roller Type #050808B	2	EA
028019	028019	A35191 REV3	Block Pill SKF SNL22520/3-7/16 Floating	6	EA
027661	027661	A35327 REV3	Block Pill SKF SNL22520 FX	4	EA
028016	028016	A35190 REV3	Block Pill SNL22520/3-7/16 Held	2	EA
025396	025396	M24165 REV0	Axle Cog Wheel HSDF 3-7/16 x 2-10	2	EA
025395	025395	M24164 REV3	Axle Running Wheel Stl Bridge Collector	4	EA
050788A	050788A	A38115	FS203 Flex-Rigid Coupling flex hub reversed	2	EA
028016	028016	A35190	SNH22520 (3-7/16") SKF PB Bearing (held)	1	EA
028015	028015	A35189	SNH22520 (3-7/16") SKF PB Bearing (floating)	9	EA
050790	050790	A38117	120-2 14T Drive Sprocket set	1	EA
050794A	050794A	A-38121	120-2, 92 pitch length Drive Chain set	1	EA

Table 2 – Bridge Rail System – City Supplied Materials

OVIVO PART #	GL&V PART#	D.O. DWG #	NAME	QTY	UNIT
027902	027902	A23511 REV2	Gauge Cog Track Setting	1	EA
030075	030075	A32072 REV0	Bar Splice M-I 40# Rail	28	EA
050814A	050814A	A38148 REV0	Shim Plate Rail & Cog Track (HDG)	206	EA
050812A	050812A	A38146 REV0	Sleeper Plate (HDG)	206	EA
027907A	027907A	A35172 REV0	Cog Track Mounting Bracket (HDG)	206	EA
050815A	050815A	A-38149 REV0	Sleeper Plate - Rail Only (HDG)	18	EA
050817A	050817A	A38151	Shim Plate - Rail Only (HDG)	18	EA
001137A	001137A	A18545 REV0	Rail Clamps	448	EA
050813	050813	A38147	Pad Neoprene 6 x 14-3/4	206	EA
050816	050816	A38150	Pad Neoprene 6 x 8-5/8	18	EA
050810	050810	M26824	Rail Running 40# ASCE (Set) BR COLL C/O - Supply without bolt holes drilled, in uncut 40ft lengths	400	FT
767688	027905	M19075	Cog Track MS 3/4" - Supply without bolt holes drilled	400	FT

NOTES

1 RED = Additional or modified parts and sub-components not inlcuded in original PO

Table 3 – Contractor Supplied Materials

PART	NAME
Cog Rail Bolts	5/8in Dia.-18TPI x 2-1/4in Length 316SS ASTM F593 Partially Threaded
Nuts	5/8"-18 316 Stainless Steel Finished Hex Nut
Washers	5/8"/M16 316 Stainless Steel Heico Lock Bolt Securing Lock Washer
Cog Rail Bolts (option 2)	5/8" Shoulder x 3/4" Shoulder Length x 1/2"-13 18-8 Stainless Steel
Nuts (option 2)	5/8"-11 316 Stainless Steel Finished Hex Nut
Washers (option 2)	5/8"/M16 316 Stainless Steel Heico Lock Bolt Securing Lock Washer
Adhesive Anchor Bolts	5/8in Dia. x 8-1/2in Length Hilti HAS-R 316 SS with HY 200A adhesive
Anchor Bolt Nuts	5/8"-11 316 Stainless Steel Finished Hex Nut
Anchor Bolt Washers	5/8" x 1.750" OD Grade 316 Stainless Steel Large OD General Purpose
Splice Plate Bolts	3/4"-10 x 2" Grade 316 Stainless Steel Hex Cap Screw
Splice Plate Bolts (End Stops)	3/4"-10 x 3" Grade 316 Stainless Steel Hex Cap Screw
Splice Plate Nuts	3/4"-10 316 Stainless Steel Finished Hex Nut
Splice Plate Washers (both sides)	3/4" 316 Stainless Steel Small OD Flat Washer
Lubricant	GL&V O&M Manual

PLC CONTROL PANELS

Part 1 General

1.1 SUMMARY

.1 This specification shall define the electrical and mechanical components that make-up the PLC Control panels.

1.2 RELATED SECTIONS

.1 Section 26 05 01 - Common Work Results - Electrical.

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

.3 The City of Winnipeg Wastewater Treatment Facilities Automation Design Guide Document Code 612620-0012-40ER-0011 Revision 00

.4 The City of Winnipeg HMI Layout and Animation Plan Revision 01

.5 The City of Winnipeg Identification Standard Revision 02

.6 The City of Winnipeg Tag Naming Standard Document Code: 612620-0014-40ER-0001 Revision 00

1.3 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.14, Industrial Control Equipment.

.2 CSA C22.2 No.158, Terminal Blocks.

1.4 DESCRIPTION OF WORK INCLUDED

.1 Work of this Section consist of the supply and installation of a complete functional control and instrumentation system.

.2 The work includes, but is not limited to, the following:

.1 Programmable Logic Controller (PLC), Human Machine Interface (HMI) and other control.

.2 Control panel construction, operator devices and indications.

.3 Programming and process control configuration of the PLC and HMI and provision of program documentation.

.4 Coordination of controls to work with equipment in the Contract, equipment supplied by Owner, equipment supplied by others, equipment supplied by other trades or under other sections of the Contract.

.5 Training for plant operators as specified herein.

.6 A report generation and editor software package.

.7 Disconnect and remove existing Clarifier Bridge Control Panel.

.8 Disconnect and remove existing Clarifier Bridge instruments field wiring.

1.5 SHOP DRAWINGS

.1 Include:

.1 Outline sketch showing ratings, dimensions and weights

.2 User manual that shall include installation drawings and instructions, a functional description of the equipment with block diagrams, safety precautions, illustrations, step-by-step operating procedures and general maintenance guidelines.

1.6 WARRANTY

.1 The panel manufacturer shall warrant the PLC against defects in materials and workmanship for two (2) years.

1.7 QUALITY ASSURANCE

.1 All PLC panel equipment and components shall bear a CSA approval.

1.8 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Manual to include:

.1 Technical data:

.1 Approved shop drawings;

.2 Characteristic curves for automatic circuit breakers and protective devices;

.3 Project data;

.4 Technical description of components;

.5 Parts lists with names and addresses of suppliers.

1.9 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 metal and wiring 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 FABRICATION

.1 All materials and components making up the PLC panel shall be new, of current manufacture and shall not have been in prior service except during factory testing.

.2 Wiring

.1 Wiring practices, materials and coding shall be in accordance with the requirements of the Canadian Electical Code.

.2 All wiring shall be copper.

.1 All discrete control circuits shall have a minimum #14 wire gauge.

.2 All analog control circuits shall have a minimum #18 wire gauge.

2.2 CONTROL PANELS

.1 General

.1 The PLC panel enclosure shall be a two (2), three (3) – doors wall mount enclosure as indicated on the layout drawings.

.2 Enclosure shall have a Type 4X where there are corrosive conditions.

.3 Front access with hinged doors. Heavy gauge steel, dead front, lockable, with interior doors where installed outdoors.

.4 All operator interface devices shall be mounted on the doors.

.5 Design of the panel and devices contained therein shall provide a proper working interface with all other plant.

.6 All devices, terminal blocks, etc. shall be mounted on the backpan, mounting of equipment on the sides of panel is not acceptable.

.7 A complete set of wiring schematics and other devices shall be mounted inside the panel.

.8 Enclosures shall be by Hoffman Enclosures or approved equal.

.2 Main Control Panels

.1 Provide 20% spare room for installation of future relays, I/O, and equipment. Assemble such that it is possible to add min 30% additional optional modules or I/O modules of any type to PLCs.

2.3 24 VDC POWER SUPPLY

.1 Input voltage: 120 Vac at 60 Hz.

.2 Output voltage: 24 Vdc

.3 Each PLC panel contains two 24 Vdc power supplies connected together with diodes for a redundant 24 Vdc power supply.

.4 Capacity: 240 W minimum, sized to panel load plus 50% spare capacity for each 24 Vdc power supply.

.5 Output Characteristics:

.1 Voltage adjustment range: ±10 %

.2 Ripple: 2 % (peak-peak) maximum

.3 Temperature influence: 0.05 % / °C maximum with rated load and output voltage at an ambient temperature between 0 °C to 50 °C

.6 Overload protection: 105 % minimum of rated load current, with automatic reset.

.7 Ambient temperature operating range: 100 % load output, 0 °C to 50 °C.

.8 Ambient humidity operating range: 25 % to 85 % minimum

.9 Dielectric strength: 3000 Vac for 1 minute between all inputs and outputs.

.10 Undervoltage detection indicator.

.11 General alarm contact (Form C) rated 1 A at 24 Vdc.

2.4 PLC COMPONENTS

.1 The programmable controller shall be Schneider M580 PLC module. No alternatives or substitute will be accepted.

.2 Telefast wiring modules provided for discrete modules to provide individual channel isolation at desired voltages.

.3 PLC Processor:

.1 CPU shall be Modicon M580 PLC module.

.2 Input/Output modules

.3 Discrete 24 VDC Inputs - use for all 24 VDC device inputs. 32 points (four groups with eight points per group) per module.

.4 Discrete Outputs - isolated relay, 2 amp rating at 120 VAC or 30 VDC, 16 normally open points per module.

.4 The HMI touch screen panel shall support the following features:

.1 10.4” Touch Smart Display SVGA resolutions (800 x 600 pixels).

.2 Touchscreen resolution (800 x 600 pixels)

.3 Communications: Modbus\TCP protocol.

.4 Operating temperature range: 0 °C to 50 °C

.5 Enclosure: IP65, NEMA 4X

.6 Acceptable Product: Schneider Electric HMIDT542 c/w HMIG3U premium box.

2.5 ETHERNET SWITCH

.1 Ethernet switch shall be a managed with the following features:

.1 Support Modbus\TCP Industrial Ethernet protocol

.2 Support Turbo Ring, Turbo Chain, and RSTP/STP (IEEE 802.1w/D) for network redundancy.

.3 Contain a minimum of eight (8) 10/100/1000BaseT(X) ports plus four (4) 100/1000 Base SFP fiber optic port.

.4 Contain 1 relay outputs alarm contacts rated 1 A at 24 Vdc.

.5 Switch shall be DIN-Rail mountable.

.6 Switch shall be designed for industrial networks usage.

.7 Approved Product: Moxa EDS-G512-4GSFP Series switch

2.6 TERMINAL BLOCKS

.1 Terminal blocks shall comply with CSA C22.2 No. 158 – Terminal Blocks.

.2 Control voltage and discrete I/O, feed though type

.1 CSA rated 600 V, 36 A

.2 Conductor sizes: #26 through #10 AWG

.3 TS 35 DIN Rail mounting

.4 Moulding material: Thermoplastic

.5 Acceptable Product: Phoenix Contact 3046184

.3 Terminal, disconnect, fused

.1 CSA rated 300 V, 10 A

.2 Conductor sizes: #26 through #12 AWG

.3 TS 35 DIN Rail mouting

.4 5 x 20 mm fuse holder type, level type, hinged

.5 Disconnect to include blown fuse indicator.

.6 Moulding material: Thermoplastic

.7 Acceptable Product: Phoenix Contact 3046142

.4 Terminal 2-tier, disconnect, fused and feed through type

.1 CSA rated 300 V, 10 A

.2 Conductor sizes: #22 through #12 AWG

.3 TS 35 DIN Rail mouting

.4 5 x 20 mm fuse holder type, level type, hinged

.5 Disconnect to include blown fuse indicator.

.6 Moulding material: Thermoplastic

.7 Acceptable Product: Phoenix Contact 3044720, 3036806

.5 Terminal disconnect

.1 CSA rated 300 V, 10 A

.2 Conductor sizes: #26 through #12 AWG

.3 TS 35 DIN Rail mounting

.4 Test points

.5 Moulding material: Thermoplastic

.6 Product: Contact 3046139

.6 Control fuses

.1 Where fast acting is specified

.1 Current rating as shown

.2 Product: BUSS GMA

.2 Where time delay is specified

.1 Current rating as shown

.2 Product: BUSS GMD

.7 General

.1 Use partitions between voltages classes as required. Partition to conform with terminal type.

.2 Use end plates to complete strip assembly

.3 Apply end anchors to strip

.4 Use manufacturers markings tags to identify terminals

.5 Where more than one terminal strip is identified in a panel or enclosure, apply label carrier

.1 Acceptable Product: Phoenix Contact

2.7 PUSHBUTTONS

.1 Heavy industrial, operator recessed, flush, extended, mushroom type, as indicated. Colour as shown, with 1-NO and 1-NC EEMAC AC600 contacts, labels as indicated. Stop pushbuttons coloured red.

.2 30.5 mm NEMA type 4

.3 Acceptable Product: Allen Bradley 800T, Square D 9001 Series

2.8 SELECTOR SWITCHES

.1 Maintained, spring return, 2, 3 position as indicated, labelled as indicated, heavy industrial oil tight, standard operators, contact arrangement as indicated, EEMAC AC 600 contacts.

.2 30.5 mm NEMA type 4

.3 Acceptable Product: Square D 9001 Series or approved equal.

2.9 INDICATING LIGHTS

.1 Heavy duty oil tight, full voltage, LED type, lens colour as indicated, supply voltage 120 Vac or 24 Vdc as required, labels as indicated.

2.10 PLC AND HMI PROGRAMMING

.1 Provide all PLC programming services to program, test and commission the PLC panels to provide functionality as per the control narratives.

.2 Programming shall be completed in a timely fashion to facilitate checkout and commissioning of the system.

.3 Programmable Logic Controller (PLC) programming shall allow for system operation, alarms, and data exchange

.4 Provide all programming required to facilitate data transfers between the PLC's and Existing DCS.

.5 Programmer shall provide complete documentation of all PLC programming complete with comments or remarks on program execution or operation.

.6 Provide all HMI programming for the local HMI's. Allow for review and approval of all HMI screens by the City staff.

.7 All PLC and HMI programming shall be done to the following City of Winnipeg Standards:

.1 The City of Winnipeg Wastewater Treatment Facilities Automation Design Guide Document Code 612620-0012-40ER-0011 Revision 00

.2 The City of Winnipeg HMI Layout and Animation Plan Revision 01

.3 The City of Winnipeg Identification Standard Revision 02

.4 The City of Winnipeg Tag Naming Standard Document Code: 612620-0014-40ER-0001 Revision 00

.8 The PLC and HMI programming shall meet the following Functional Requirements Specifications:

.1 1-0102-AFRS-P002 - Clarifier No.1 Function Requirements Specification

.2 1-0102-AFRS-P003 - Clarifier No.2 Function Requirements Specification

.3 1-0102-AFRS-P004 - Clarifier No.3 Function Requirements Specification

.9 The PLC's shall be programmed utilizing Unity Pro XL and the final version of the programs shall be electronically turned over to the City which shall include the following:

.1 UnityPro Archived Application File in .STA file format.

.2 UnityPro Data Files in .DTX file format.

.10 The local HMI's shall be programmed utilizing Citect Vijeo and the final version of the program shall be electronically turned over to the City which shall include the following:

.1 Vijeo-Frame Archived File in .VDZ file format with the "Include Editor Project" options selected in the project properties to all the possibility to upload the application from the HMI at any time.

2.11 PROGRAMMING SOFTWARE

.1 Turn over to the City of Winnipeg all licenses required to program both the PLC's and HMI's.

2.12 SPARE PARTS

.1 Provide the following spare parts to be turned over to the city

.1 One spare I/O module for each I/O module type used.

.2 One spare PLC processor

.3 One spare power supply

.4 One spare telefast block for each type used.

.5 Twelve spare relays for each type used within telefast blocks.

.2 Complete set of spare parts to be supplied prior to commissioning.

Part 3 Execution

3.1 ASSEMBLY

.1 PLC panel shall be shop assembled by a CSA approved panel shop.

.2 Test each I/O point up to the point of field termination to ensure all wiring within PLC panel is correct before shipping panels to site.

.3 Provide panel shop drawings

3.2 INSTALLATION

.1 Install PLC panels as indicated on drawings.

.2 Connect instrumentation loops as per loop drawings.

.3 Provide DVD's with final as-built programming of all PLC's and HMI.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-06, 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: lamicoid 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 three existing Primary Clarifier Bridge Control Panel installed on each Bridge.

.3 Supply and install new PLC Control Panels for the three (3) Primary Clarifiers. New control panels shall be installed on the same location of existing panel.

.4 Supply and install new Remote I/O Control Panels for all three (3) Primary Clarifiers.

.5 Disconnect and remove Festoon cable system from termination box and all associated festoon trolleys for all three (3) Primary clarifiers.

.6 Supply and Install new Festoon cables systems including all associated trolleys and accessories for all three (3) Primary Clarifiers. Wire and connect to existing Festoon termination junction box.

.7 Supply and install new Festoon Fiber Optic cable (Fiber Flex) for all three (3) Primary Clarifiers. Wire and connect fiber optics to the new remote I/O control panel. Provide conduit for all fiber optics beyond the festoon system.

.8 Provide new 120V circuits complete with associated circuit breakers from existing panel board to the new remote I/O panel. Routing of cable shall be determined on site.

.9 Disconnect and remove all existing motor power wiring back to existing control panel. Existing conduits shall be reused. Provide new wiring when new control panel is installed. Adjust and extend conduit as required.

.10 Disconnect and remove all existing field instruments control wiring back to existing control panel. Existing conduits shall be reused. Provide new wiring when new control panel is installed. Adjust and extend conduit as required.

.11 Provide power and control wiring to all field devices as identified on the electrical loop drawings.

.12 Provide new PLC panels as detailed on the electrical drawings for each of the following areas:

.1 Primary Clarifiers PLC panel

.13 Provide all PLC programming, testing and commissioning services required.

.14 Provide al required temporary power and control wiring to facilitate the installation of new equipment.

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 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

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

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

.4 Locate light switches on latch side of doors.

.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.

.5 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - 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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

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

WIRES AND CABLES

Part 1 General

1.1 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

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

.4 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.

2.4 300 V INSTRUMENT CABLE

.1 Conductors: 16 AWG, 7 strand concentric lay, Class B tinned copper, twisted pairs/triads.

.2 Insulation: PVC TW75, 75 °C Wet, 105 °C Dry (-40 °C), 300 Volt.

.3 Twisted pairs/triads cabled with staggered lays.

.4 Shielding: Individual twisted pair(s)/triads Aluminum/mylar shield with ST drain wire, 100 % shield. Overall aluminum/mylar shield with ST drain wire. Individual drain wires one size smaller than conductor AWG. Overall drain wire the same AWG as conductors.

.5 Armour: interlocking aluminum.

.6 Overall covering: thermoplastic polyvinyl chloride material (90 °C, -40 °C).

.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. .

.8 Connectors:

.1 Watertight, explosion proof approved for armoured cable.

2.5 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.

2.6 FESTOON SYSTEMS

.1 PVC Flat Cable

.1 Flat PVC Festoon Cable #12/8C copper

.2 Manufacturer: Molex Part No. 130119-0002 or approved equivalent.

.2 Intermediate Car

.1 I-Beam festoon intermediate Car 638 S6, for 160MM I-Beam, Urethane Wheels

.2 Manufacturer: Molex Part No. 130123-0070 or approved equivalent.

.3 Lead Car

.1 I-Beam Festoon Lead Car 638 S6 Steel Wheels.

Manufacturer: Molex Part No. 130123-0136 or approved equivalent.

.4 Cable Connector

.1 Flat Festoon Cable Gland #12/8, Galarza Connector, PVC, PG-36-P

.2 Nylon Resin

.3 Steel – sealed ball bearing

.4 47.63MM knockout diameter

.5 Manufacturer: Molex Part No. 130121-0015 or approved equivalent.

.5 End Clamp

.1 Powder coating I-Beam Festoon steel End Clamp 638

.2 Manufacturer: Molex Part No. 130123-0059 or approved equivalent

2.7 WIRIG 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.

3.4 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit.

.2 Ground control cable shield.

3.5 INSTALLATION OF FESTOON SYSTEMS

.1 Install festoon system as per manufacturer instruction manual.

END OF SECTION

GROUNDING – SECONDARY

Part 1 General

1.1 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

.1 ANSI/IEEE 837-1989(R1996), Qualifying Permanent Connections Used in Substation Grounding.

.2 Canadian Standards Association, (CSA International)

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 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 EQUIPMENT

.1 Clamps for grounding of conductor: size as required.

.2 Grounding conductors: stranded copper, tinned, soft annealed, size as indicated.

.3 Insulated grounding conductors: green, type RW90.

.4 Ground bus: copper, size 2/0 AWG, complete with insulated supports, fastenings, connectors.

.5 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:

.1 Grounding and bonding bushings.
.2 Protective type clamps.
.3 Bolted type conductor connectors.
.4 Thermit welded type conductor connectors.
.5 Bonding jumpers, straps.
.6 Pressure wire connectors.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Use mechanical connectors for grounding connections to equipment provided with lugs.

.5 Soldered joints not permitted.

.6 Install bonding wire for flexible conduit, connected at one end to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.7 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

.8 Connect building structural steel and metal siding to ground by welding copper to steel.

.9 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

.10 Bond single conductor, metallic armoured cables to cabinet at supply end, and load end.

.11 Ground secondary service pedestals.

3.2 SYSTEM AND CIRCUIT GROUNDING

.1 Install system and circuit grounding connections to neutral of primary 600 V system and secondary 120 V system.

3.3 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting.

3.4 GROUNDING BUS

.1 Install copper grounding bus mounted on insulated supports on wall of electrical room.

.2 Ground items of electrical equipment in electrical room to ground bus with individual bare stranded copper connections size 2/0 AWG.

3.5 COMMUNICATION SYSTEMS

.1 Install grounding connections for telephone, sound, fire alarm, intercommunication systems as follows:

.1 Telephones: make telephone grounding system in accordance with telephone company's requirements.

.2 Sound, fire alarm, intercommunication systems as indicated.

3.6 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 01 - Common Work Results - Electrical.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Contract Administrator and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

1.2 REFERENCES

.1 CSA C22.1-2006, 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-glavanized 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.

2.8 SERVICE FITTINGS

.1 'High tension' receptacle fitting made of 2 piece die-cast aluminum with brushed aluminum housing finish for 1 duplex receptacles. Bottom plate with two knockouts for centered or offset installation. 12 x 102 mm extension piece as indicated.

.2 Pedestal type 'low tension' fitting made of 2 piece die-cast aluminum with brushed aluminum housing finish to accommodate two amphenol jack connectors.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit and armoured cable connections. Reducing washers are not allowed.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

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.

3.3 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.4 CONDUITS IN CAST-IN-PLACE CONCRETE

.1 Locate to suit reinforcing steel. Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed. Use cold mastic between sleeve and conduit.

.5 Do not place conduits is slabs in which slab thickness is less than 4 times conduit diameter.

.6 Encase conduits completely in concrete with minimum 25 mm concrete cover.

.7 Organize conduits in slab to minimize cross-overs.

3.5 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

.1 Run conduits 25 mm and larger below slab and encased in 75 mm concrete envelope. Provide 50 mm of sand over concrete envelope below floor slab.

3.6 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

END OF SECTION

ELECTRICAL CABINETS AND ENCLOSURES

Part 1 General

1.1 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Indicate detail construction, dimension, capacities, weights and electrical performance characteristics of equipment or material.

Part 2 Products

2.1 MATERIALS

.1 NEMA 4X rated enclosure for all locations except within electrical rooms and control rooms.

.2 NEMA 12 rated enclosures for devices within electrical rooms or control rooms.

.3 Door: minimum 1 m wide, hinged, minimum 3 point latching, with padlocking means.

.4 Door interlocks

Part 3 Execution

3.1 INSTALLATION

.1 Assemble enclosure in accordance with manufacturer's instructions and mount on concrete pad.

.2 Mount equipment in enclosure.

END OF SECTION

WIRING DEVICES

Part 1 General

1.1 SECTION INCLUDES

.1 Switches, receptacles, wiring devices, cover plates and their installation.

1.2 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No.42-99(R2002), General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CSA-C22.2 No.42.1-00, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.3 CSA-C22.2 No.55-M1986(July 2001), Special Use Switches.

.4 CSA-C22.2 No.111-00, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

Part 2 Products

2.1 SWITCHES

.1 15 A, 120 V, single pole, double pole, three-way, four-way industrial grade switches to: CSA-C22.2 No.55 and CSA-C22.2 No.111 as required.

.2 Manually-operated general purpose ac switches with following features:

.1 Terminal holes approved for No. 10 AWG wire.

.2 Silver cadmium oxide contacts.

.3 Fully enclosed with urea or melamine moulding for parts subject to carbon tracking.

.4 Suitable for back and side wiring.

.5 Brown toggle.

.3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.

.4 Switches of one manufacturer throughout project.

.5 Acceptable materials: Hubbell 1200 Series or equivalent.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA-C22.2 No.42 with following features:

- .1 [Ivory] [Brown] urea moulded housing.
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Break-off links for use as split receptacles.
- .4 Eight back wired entrances, four side wiring screws.
- .5 Triple wipe contacts and rivetted grounding contacts.

.2 Single receptacles CSA type 5-15 R, 125 V, 15 A, U ground with following features:

- .1 Brown urea moulded housing.
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Four back wired entrances, 2 side wiring screws.

.3 Other receptacles with ampacity and voltage as indicated.

.4 Receptacles of one manufacturer throughout project.

.5 Acceptable materials: Hubbell 5252 or equivalent.

2.3 COVER PLATES

.1 Stainless steel or pvc cover plates for wiring devices.

.2 Cover plates from one manufacturer throughout project.

.3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.4 Stainless steel, vertically brushed, 1 mm thick cover plates for wiring devices mounted in flush-mounted outlet box.

.5 Weatherproof double lift spring-loaded stainless steel or pvc cover plates, complete with gaskets for duplex receptacles as indicated on the drawings.

.6 Weatherproof spring-loaded stainless steel or pvc cover plates complete with gaskets for single receptacles or switches as indicated on the drawings.

Part 3 Execution

3.1 INSTALLATION

.1 Switches:

- .1 Install single throw switches with handle in "UP" position when switch closed.
- .2 Install switches in gang type outlet box when more than one switch is required in one location.
- .3 Mount toggle switches at height in accordance with Section 26 05 01 - Common Work Results - Electrical.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height in accordance with Section 26 05 01 - Common Work Results - Electrical.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Mount lighting fixture receptacles local to fixtures.

.3 Cover plates:

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

END OF SECTION

FUSES – LOW VOLTAGE

Part 1 General

1.1 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2No.248.12-94, Low Voltage Fuses Part 12: Class R (Bi-National Standard with, UL 248-12 (1st Edition).

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit fuse performance data characteristics for each fuse type and size. Performance data to include: average melting time-current characteristics.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

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

.2 Ensure emptied containers are sealed and stored safely for disposal away from children.

.3 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

1.5 DELIVERY AND STORAGE

.1 Ship fuses in original containers.

.2 Do not ship fuses installed in switchboard.

.3 Store fuses in original containers in moisture free location.

1.6 MAINTENANCE MATERIALS

.1 Three spare fuses of each type and size installed above 600 A.

.2 Six spare fuses of each type and size installed up to and including 600 A.

Part 2 Products

2.1 FUSES GENERAL

.1 Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.

.2 Fuses: product of one manufacturer for entire project.

2.2 FUSE TYPES

.1 Class L fuses (formerly HRC-L).

.1 Type L1, time delay, capable of carrying 500% of its rated current for 10 s minimum.

.2 Type L2, fast acting.

.2 Class J fuses (formerly HRCI- J).

.1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.

.2 Type J2, fast acting.

.3 Class R -R fuses (formerly HRCI- R). For UL Class RK1 fuses, peak let-through current and its= peak let-through values not to exceed limits of UL 198E-1982, table 10.2.

.1 Type R1, (UL Class RK1), time delay, capable of carrying 500% of its rated current for 10 s minimum, to meet UL Class RK1 maximum let-through limits.

.2 Type R2, time delay, capable of carrying 500% of its rated current for 10 s minimum.

.3 Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.

.4 Class -C fuses (formerly HRCII- C).

Part 3 Execution

3.1 INSTALLATION

.1 Install fuses in mounting devices immediately before energizing circuit.

.2 Ensure correct fuses fitted to physically matched mounting devices.

.1 Install Class R rejection clips for HRCI-R fuses.

.3 Ensure correct fuses fitted to assigned electrical circuit.

.4 Where UL Class RK1 fuses are specified, install warning label "Use only UL Class RK1 fuses for replacement" on equipment.

END OF SECTION

MOULDED CASE CIRCUIT BREAKERS

Part 1 General

1.1 SECTION INCLUDES

.1 Materials for moulded-case circuit breakers, circuit breakers, and ground-fault circuit-interrupters, fused circuit breakers, and accessory high-fault protectors.

1.2 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CSA-C22.2 No. 5-02, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).

1.4 SUBMITTALS

.1 Include time-current characteristic curves for breakers with ampacity of 600 A and over or with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage.

Part 2 Products

2.1 BREAKERS GENERAL

.1 Moulded-case circuit breakers, Circuit breakers, and Ground-fault circuit-interrupters, Fused circuit breakers, and Accessory high-fault protectors: to CSA C22.2 No. 5

.2 Bolt-on moulded case circuit breaker: quick-make, quick-break over center switching mechanism that is mechanically trip-free, for manual and automatic operation with temperature compensation for 40 degrees C ambient. Automatic tripping of the breaker shall be clearly indicated by the handler position. Contacts shall be non-welding silver alloy, and arc extinguishing shall be accomplished by means of DE-ION arc chutes.

.3 Common-trip breakers: with single handle for multi-pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.

.1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

.5 Circuit breakers with interchangeable trips as indicated.

.6 Circuit breakers to have minimum symmetrical rms interrupting capacity rating as indicated on the drawings.

.7 Circuit breakers identified as MCP will operate on the magnetic principle with a current sensing element in each pole.

.8 Circuit breakers 600 A through 2500 A frame shall be Cutler-Hammer type Westinghouse Series C with microprocessor-based RMS sensing trip units or approved equal.

.1 Each moulded case circuit breaker microprocessor-based tripping system shall consist of three current transformers, and a flux-transfer shunt trip. The trip unit shall use microprocessor-based technology to provide the adjustable time-current protection functions. True RMS sensing circuit protection shall be achieved by analysing the secondary current signals received from the circuit breaker current transformers and initiating trip signals to the circuit breaker trip actuators when predetermined trip levels and time delay settings are reached.

.2 Interchangeable rating plugs shall establish the continuous trip ratings of each circuit breaker. Rating plugs shall be fixed. Rating plugs shall be interlocked such that a breaker cannot be closed and latched with the rating plug removed.

.3 The microprocessor-based trip unit shall have thermal memory capabilities to prevent the breaker from being reset following an overload condition until after a preset time delay.

.4 When the adjustable instantaneous setting is omitted, the trip unit shall be provided with an instantaneous override. Internal ground fault protection adjustable pick-up ratings shall not exceed 1200 amperes.

.5 Breakers shall have built-in test points for testing the long time delay, instantaneous, and ground fault functions of the breaker by means of a 120 Volt operated test set. Provide one test set capable of testing all breakers 600 ampere frame and above.

.6 System coordination shall be provided by the following microprocessor-based time-current curve shaping adjustments:

.1 Adjustable long time pick-up and delay.

.2 Adjustable short time pick-up and delay.

.3 Adjustable instantaneous pick-up.

.7 Circuit Breakers shall be Cutler-Hammer type Westinghouse Series C circuit breakers, microprocessor-based RMS sensing trip units type Digitrip RMS 310 LSI or LSIG trip units or approved equal.

.8 Accessories:

.1 Provide shunt trips, bell alarms, and auxiliary switches as shown on the contract drawings.

.9 Enclosure:

.1 All enclosed circuit breakers shall have EEMAC 1 general purpose enclosures.

.2 All enclosed circuit breakers shall have metal nameplates, front cover mounted, that contain a permanent record of catalog number and maximum rating. Provide handle mechanisms that are padlockable in the “OFF” position.

2.2 THERMAL MAGNETIC BREAKERS

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

.2 Acceptable Product: Cutler-Hammer type Westinghouse Series C or approved equal.

2.3 MAGNETIC BREAKERS

.1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.

Part 3 Execution

3.1 FACTORY TESTING

.1 Standard factory tests shall be performed on the equipment under this section. All tests shall be in accordance with the latest version of CSA standard.

3.2 INSTALLATION

.1 Install circuit breakers as indicated on drawings per the manufacturer's recommendations.

3.3 FIELD SETTINGS

.1 The contractor shall perform field adjustments of the circuit breakers as required to place the equipment in final operating condition. The settings shall be in accordance with the drawings.

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

.3 Section 26 28 14 - Fuses - Low Voltage.

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 Provision for padlocking in off switch position by three locks.

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

.4 Fuses: size as indicated on drawings, in accordance with Section 26 28 14 - Fuses - Low Voltage.

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

.6 Quick-make, quick-break action.

.7 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

CONTROL DEVICES

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for industrial control devices including pushbutton stations, control and relay panels.

1.2 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.14-95(R2001), Industrial Control Equipment.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA ICS 1-2001, Industrial Control and Systems: General Requirements.

1.4 SHOP DRAWINGS

.1 Include schematic, wiring, interconnection diagrams.

1.5 QUALITY ASSURANCE

.1 Submit to Contract Administrator one copy of test results.

1.6 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 metal and wiring materials from landfill to metal recycling facility as approved by Contract Administrator.

Part 2 Products

2.1 AC CONTROL RELAYS

.1 Control Relays: to CSA C22.2 No.14 and NEMA ICS 1.

.2 Convertible contact type: contacts field convertible from NO to NC, electrically held, with poles to suit. Coil rating: 120 Vac. Contact rating: 120 Vac, 2 A minimum or 24 Vdc, 2 A minimum as required.

.3 Fixed contact plug-in type: general purpose with poles to suit. Coil rating: 120 V. Contact rating: 120 Vac, 2 A minimum or 24 Vdc, 2 A minimum as required.

2.2 DC CONTROL RELAYS

.1 Control Relays: to CSA C22.2 No.14 and NEMA ICS 1.

.2 Convertible contact type: contacts field convertible from NO to NC, electrically held, with poles to suit. Coil rating: 24 Vdc. Contact rating: 120 Vac, 2 A minimum or 24 Vdc, 2 A minimum as required.

.3 Fixed contact plug-in type: general purpose with poles to suit. Coil rating: 24 Vdc. Contact rating: 120 Vac, 2 A minimum or 24 Vdc, 2 A minimum as required.

2.3 RELAY ACCESSORIES

.1 Standard contact cartridges: normally-open - convertible to normally-closed in field.

2.4 SOLID STATE TIMING RELAYS

.1 Construction: AC operated electronic timing relay with solid-state timing circuit to operate output contact. Timing circuit and output contact completely encapsulated to protect against vibration, humidity and atmospheric contaminants.

.2 Operation: on-delay or off-delay.

.3 Supply voltage: 120 V, AC, 60 Hz.

.4 Temperature range: minus 20 degrees C to 60 degrees C.

.5 Output contact rating: maximum voltage 300 V AC or DC. Current: NEMA ICS 1.

.6 Timing ranges: minimum 1.0 s, maximum 5, 30 or 60 s.

2.5 OPERATOR CONTROL STATIONS

.1 Enclosure:

.1 In general CSA Type 4X, surface mounting.

.2 In clarifier electrical room with positive pressure CSA Type 1, surface mounting.

2.6 PUSHBUTTONS

.1 Heavy duty Oil tight. Operator extend type. Black, with 1-NO and 1-NC contacts rated at 2 A minimum, AC, labels as indicated. Stop pushbuttons coloured red, labelled as indicated.

2.7 SELECTOR SWITCHES

.1 Maintained, 2 or 3 position as required labelled as indicated heavy duty oil tight, operators standard, contact arrangement as indicated, rated 120 V, 2 A, AC minimum or 24 Vdc, 2 A minimum as required.

2.8 INDICATING LIGHTS

.1 Heavy duty Oil tight, full voltage, LED type, lens colour: as indicated, supply voltage: 120 V, lamp voltage: 120 V, labels as indicated.

2.9 CONTROL AND RELAY PANELS

.1 CSA Type 4x sheet steel enclosure with hinged padlockable access door, accommodating relays timers, labels, as indicated, factory installed and wired to identified terminals.

2.10 CONTROL CIRCUIT TRANSFORMERS

.1 Single phase, dry type.

.2 Primary: 600 V, 60 Hz ac.

.3 Secondary: 120 V, AC.

.4 VA Rating: as required by loads plus 20%.

.5 Secondary fuse rating: as required by loads

.6 Close voltage regulation as required by magnet coils and solenoid valves.

Part 3 Execution

3.1 INSTALLATION

.1 Install pushbutton stations, control and relay panels, control devices and interconnect.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 01 - Common Work Results - Electrical.

.2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at time and check out operation of section.

.3 Upon completion of sectional test, undertake group testing.

.4 Check out complete system for operational sequencing.

END OF SECTION

MOTOR STARTERS TO 600 V

Part 1 General

1.1 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

1.2 REFERENCES

.1 National Electrical Manufacturer's Association (NEMA)

.1 NEMA Standards Publication ICS 2-2000: Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Indicate:

.1 Mounting method and dimensions.
.2 Starter size and type.
.3 Layout of identified internal and front panel components.
.4 Enclosure types.
.5 Wiring diagram for each type of starter.
.6 Interconnection diagrams.

1.4 EXTRA MATERIALS

.1 Provide listed spare parts for each different size and type of starter:

.1 3 contacts, stationary.
.2 3 contacts, movable.
.3 1 contacts, auxiliary.
.4 1 control transformer.
.5 1 operating coil.
.6 2 fuses.
.7 10% indicating lamp bulbs used.

1.5 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.

Part 2 Products

2.1 MATERIALS

.1 Starters: to NEMA ICS 2-2000

2.2 FULL VOLTAGE REVERSING STARTERS

.1 Magnetic and combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:

.1 Contactor solenoid operated, rapid action type.

.2 Intelligent electronic motor overload protective relay complete with a Modbus/TCP communication interface to connect to the control system PLC.

.1 Acceptable Product: Schneider Electric Tesys T

.3 Wiring and schematic diagram inside starter enclosure in visible location.

.4 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.

.2 Combination type starters to include motor circuit interrupter.

.3 Accessories:

.1 Pushbuttons and selector switches: heavy duty oil tight labelled as indicated.

.2 Indicating lights: heavy duty oil tight type and color as indicated.

.3 1-N/O and 1-N/C spare auxiliary contacts unless otherwise indicated.

2.3 CONTROL TRANSFORMER

.1 Single phase, dry type, control transformer with primary voltage as indicated and 120 V secondary, complete with secondary fuse, installed in with starter as indicated.

.2 Size control transformer for control circuit load plus 20% spare capacity.

2.4 FINISHES

.1 Apply finishes to enclosure in accordance with Section 26 05 01 - Common Work Results - Electrical.

2.5 EQUIPMENT IDENTIFICATION

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

.2 Magnetic starter designation label, white plate, black letters, size 4 engraved as indicated.

Part 3 Execution

3.1 INSTALLATION

.1 Install starters, connect power and control as indicated.

.2 Ensure correct fuses and overload devices elements installed.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 01 - Common Work Results - Electrical and manufacturer's instructions.

.2 Operate switches, contactors to verify correct functioning.

.3 Perform starting and stopping sequences of contactors and relays.

.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

END OF SECTION

STRUCTURED CABLING FOR COMMUNICATIONS SYSTEMS

Part 1 General

1.1 RELATED SECTIONS

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

.2 Part A to E, and relevant sections of Appendices A to G of these specifications shall apply.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No. 214-02, Communications Cables (Bi-National standard with UL 444).

.2 CSA-C22.2 No. 232-M1988(R2004), Optical Fiber Cables.

.2 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)

.1 TIA/EIA-568-B.1-(2001), Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.

.2 TIA/EIA-568-B.2-(2001), Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.

.3 TIA/EIA-568-B.3-(2000), Optical Fiber Cabling Components Standard.

.4 TIA/EIA-606-A-(2002), Administration Standard for the Commercial Telecommunications Infrastructure.

.5 TIA TSB-140-2004, Telecommunications Systems Bulletin - Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.

.6 TIA-598-C-(2005), Optical Fiber Cable Color Coding.

1.3 DEFINITIONS

.1 Refer to TIA/EIA-598-C, Annex A for definitions of terms: optical-fiber interconnect, distribution, and breakout cables.

1.4 SYSTEM DESCRIPTION

.1 Structured telecommunications wiring system consist of unshielded-twisted-pair and optical fiber cables, terminations, connectors, cross-connection hardware and related equipment installed inside building for occupant's telecommunications systems, including voice (telephone), data, and image.

.2 Installed in physical star configuration with separate horizontal and backbone sub-systems.

.1 Horizontal cables link equipment to PLC Panels located in the same area.

.2 PLC Panels are linked to each other by backbone cables.

.3 DCS also linked to PLC Panels by backbone cables.

1.5 SUBMITTALS

.1 As-built Records and Drawings:

.1 Provide Microsoft Access database reflecting cable installation and cross-connections.

.2 Provide electronic drawings in AutoCAD 2000 format depicting all construction.

.3 Provide two (2) bound complete hard-copy sets of as-built records to the Contract Administrator.

.1 Provide and place one hard copy of as-built records for each telecommunications room in plan holder in each telecommunications room.

1.6 QUALITY ASSURANCE

.1 Health and Safety Requirements: do construction occupational health and safety.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal: separate waste materials for reuse and recycling.

Part 2 Products

2.1 FOUR-PAIR 100 Ω BALANCED TWISTED PAIR CABLE

.1 Armoured Four-pair, 100 ohm balanced unshielded-twisted-pair (UTP) cable, flame test classification FT4 to: CSA-C22.2 No. 214, Category 6 (Cat 6) to: TIA/EIA-568-B.2.

2.2 TERMINATION AND CROSS-CONNECTION HARDWARE FOR UTP

.1 Patch panel, Din rail mountable or wall mountable, 12 ports minimum:

.1 Each port equipped with factory installed "RJ-45" jacks, type T568A Category 6 to: TIA/EIA-568-B.2.

.2 Horizontal cable-management unit for every 12 ports.

2.3 UTP PATCH CORDS

.1 1 metres long, with factory-installed male plug at one end to mate with "RJ-45" jack and with factory-installed male plug at other end to mate with "RJ-45" jack Category 6, 4 pairs to: TIA/EIA-568-B.2.

2.4 OPTICAL-FIBER CABLE

.1 Armoured tray rated, OM3 multi-mode, 6 strands to: CSA-C22.2 No. 232 and TIA/EIA-568-B.3, flame test classification FT4, each end terminated with duplex LC connectors.

2.5 OPTICAL-FIBER FESTOON CABLE

.1 Festoon, OM3 multi-mode, 6 strands to: CSA-C22.2 No. 232 and TIA/EIA-568-B.3, flame test classification FT4, each end terminated with duplex LC connectors.

2.6 OPTICAL-FIBER PATCH PANEL

.1 Mounted on panel backboard, with lockable cover, capable of terminating 9 pairs (18 strands) of fiber, equipped with duplex LC compatible adapters.

2.7 OPTICAL-FIBER PATCH CORDS

.1 Cable, 2 strands, 1 metres long, each end equipped with duplex LC connectors. OM3 Multi-Mode to: TIA/EIA-568-B.3.

Part 3 Execution

3.1 INSTALLATION OF OPTICAL-FIBER CABLE TRUNKS

.1 Install optical-fiber backbones between the following locations:

.1 Utilities PLC Panel and Secondary Control Room Network Cabinet (Bailey DCS Interface)

.2 Utilities PLC Panel and Primary Clarifiers PLC Panel

.3 Utilities PLC Panel and Secondary Clarifiers PLC Panel

.4 Primary Clarifiers PLC Panel and Headworks PLC Panel

.2 Identify and label as indicated to: TIA/EIA-606-A.

3.2 INSTALLATION OF TERMINATION AND CROSS-CONNECT HARDWARE

.1 Install termination hardware in PLC panel as indicated and according to manufacturers' instructions. Identify and label as indicated to: TIA/EIA-606-A.

.2 Install consolidation points, as indicated according to manufacturer's instructions. Identify and label as indicated to: TIA/EIA-606-A.

3.3 INSTALLATION OF HORIZONTAL DISTRIBUTION CABLES

.1 Support horizontal cables at intervals not exceeding 1.5 metres.

.2 Install horizontal cables from PLC Panel to individual field equipment.

.1 Provide supplementary support channels in accordance to Section 26 05 29 – Hangers and Supports for Electrical Systems to support cables at intervals not exceeding 1.5 metres.

.2 Identify and label as indicated to: TIA/EIA-606-A.

.3 Terminate horizontal cables in PLC Panel and at individual equipment location.

.1 Identify and label as indicated to: TIA/EIA-606-A.

.4 Coil spare cables and store in ceiling space in zone.

.5 Harness slack cable in cabinets, racks, and wall-mounted termination and cross-connection hardware.

3.4 IMPLEMENT CROSS-CONNECTIONS

.1 Implement cross-connections using patch cords as specified.

3.5 FIELD QUALITY CONTROL

.1 Test horizontal UTP cables as specified below and correct deficiencies provide record of results as electronic record on DVD.

- .1 Perform tests for Permanent Link on installed cables, including spares:
  - .1 Category 6 using certified level III tester to: TIA/EIA-568-B.2.

.2 Test Optical-fiber strands for attenuation to: TIA/EIA-568-B.1 and correct deficiencies: provide record of results as electronic record on DVD.

- .1 Test horizontal links need at only one wavelength (850 nm or 1300 nm) and in one direction.
  - .1 Attenuation to be less than 2.0 dB, unless consolidation point is used.
  - .2 If consolidation point is used, attenuation test result to be less than 2.75 dB when testing between horizontal cross-connect and telecommunications outlet/connector.
- .2 Test backbone links in both directions. Backbone links:
  - .1 Test multi-mode fiber at both applicable wavelengths (850 nm and 1300 nm).
- .3 Maximum attenuation: Cable attenuation + Connector loss + Splice loss.
  - .1 Multi-mode-fiber attenuation coefficients:
    - .1 3.5 db/km @ 850 nm; and
    - .2 1.5 db km @ 1300 nm
  - .2 Maximum connector insertion loss: 0.75 db per pair and maximum splice insertion loss: 0.3 db.

.3 Perform additional Tier 2 tests using optical time domain reflectometer (OTDR) on backbone fiber pairs to: TSB-140.

- .1 Correct deficiencies.
- .2 Provide record of results as described in SUBMITTALS.

.4 Provide record of results as electronic record on DVD to: TIA/TSB-140.

END OF SECTION