THE CITY OF WINNIPEG

TENDER

TENDER NO. 806-2019

JESSIE WASTEWATER PUMPING STATION UPGRADES

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 JESSIE WASTEWATER PUMPING STATION UPGRADES

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, October 8, 2019.

B2.2 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 be available at the Jessie Wastewater Pumping Station, 417 Mulvey Avenue E. from 10:30 to 11:30 on September 26, 2019 to provide Bidders access to the Site.

B3.2 The Bidder is advised that the CSA approved Personal Protective Equipment (PPE) consisting of but not limited to safety boots, hard hat, fall arrest equipment also confined space training will be required.

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 D3.1.

B4.2 If the Bidder finds errors, discrepancies or omissions in the Tender, 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 Tender 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 Tender 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.

B4.6 Any enquiries concerning submitting through MERX should be addressed to:
MERX Customer Support
Phone: 1-800-964-6379
Email: merx@merx.com

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 Tender to the media or any member of the public without the prior written authorization of the Contract Administrator.

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 Tender, 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 MERX website at www.merx.com.

B6.4 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the MERX 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.

B6.6 Notwithstanding B4, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D3.

B7. SUBSTITUTES

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

B7.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B7.3 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.

B7.4 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.

B7.5 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.

B7.6 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.

B7.6.1 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.

B7.7 If the Contract Administrator approves a substitute as an "approved equal", any Bidder may use the approved equal in place of the specified item.

B7.8 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.

B7.9 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; and

(c) Form G1: Bid Bond and Agreement to Bond.

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 shall be submitted electronically through MERX at www.merx.com.

B8.4.1 Bids will **only** be accepted electronically through MERX.

B8.5 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B18.1(a).

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 and the corporate seal, if the corporation has one, should be affixed;

(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 entered below such signatures.

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 a price in Canadian funds for each item of the Work identified 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.

B10.1.2 Prices stated on Form B: Prices shall not include any costs which may be incurred by the Contractor with respect to any applicable funding agreement obligations as outlined in D24. Any such costs shall be determined in accordance with D24.

B10.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.

B10.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B10.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B10.5 The Bidder shall enter the Total Bid Price from Form B: Prices into the Total Bid Price field in MERX.

B10.5.1 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

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) Nothart Engineered Sales Ltd. – Supplying pumps and valves; pre-purchased by the City.

B12. CONFLICT OF INTEREST AND GOOD FAITH

B12.1 Bidders, by responding to this Tender, 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 Tender 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 Tender process) of strategic and/or material relevance to the Tender 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 Tender 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 https://winnipeg.ca/finance/findata/matmgt/listing/debar.pdf

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™) in the form of:

(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 A sample Bid Bond and Agreement to Bond are available on The City of Winnipeg, Corporate Finance, Materials Management Division website at https://www.winnipeg.ca/MatMgt/Templates/Sample_Bidsecurity/Sample_Bidsecurity.stm.

B14.2 The Bidder shall provide digital bid security in the form of 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).

B14.3 Bid security shall be submitted in an electronic or digital format meeting the following criteria:

(a) The version submitted by the Bidder must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures; all digital seals; with the surety company, or an approved verification service provider of the surety company.

(b) The version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.

(c) The verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.

(d) The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B14.3(a).

B14.4 Bonds failing the verification process will not be considered to be valid and the bid shall be determined to be non-responsive in accordance with B18.1(a).

B14.5 Bonds passing the verification process will be treated as original and authentic.

B14.5.1 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.

B14.6 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 formed with the successful Bidder and the contract securities are furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B14.7 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 Tender.

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 MERX website at www.merx.com.

B15.3 After award of Contract, the name(s) of the successful Bidder(s) and their Contract amount(s) will be available on the MERX website at www.merx.com.

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 until a Contract for the Work has been duly formed and the contract securities have been furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within 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 at any time prior to the Submission Deadline.

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 Tender, 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 qualified.

B18.4 Further to B18.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

B18.4.1 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

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 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 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D24 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.

B19.4 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B18.

B19.4.1 Following the award of contract, a bidder will be provided with information related to the evaluation of his/her Bid upon written requires to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

C0.1 The *General Conditions for Construction* (Revision 2019 09 01) 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 Tender 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 complete upgrade of all building and process equipment of the Jessie Wastewater Pumping Station.

D2.2 The major components of the Work are as follows:

(a) Mobilization and Demobilization

(b) By-Pass Manhole and Valve Assembly

(i) Installation of new by-pass manhole, piping, fittings and City supplied Valve Assembly.

(c) Flow Control and Temporary Wastewater Diversion and Disposal

(d) Structural

(i) Demolition of existing building superstructure

(ii) New superstructure;

(iii) Hatches modification;

(iv) Provision of motor room and pump room monorails for installing the City supplied motorized hoists;

(v) New building openings for HVAC systems;

(vi) New main floor opening for electrical, and

(vii) Miscellaneous structural improvements and reinforcement to existing building.

(e) Architectural

(i) New hatch covers and guardrails; and

(ii) Rehabilitation of substructure, drywall and ceiling including insulation.

(iii) Painting of substructure walls and ceiling.

(f) Process Mechanical

(i) Installation of City supplied pumps, motors and valves;

(ii) Replacement of all station process piping, fittings, valves along with new pumps and motors;

(iii) Replacement of all piping supports and bases;

(iv) Addition of flow meters; and

(v) Modifications and addition in the wet well level measurement system.

(g) Building Mechanical

(i) Replacement of HVAC system; and

(ii) Plumbing (water) upgrades.

(h) Electrical and Instrumentation

(i) Replacement of existing RTU panels;

(ii) New motor controls centre (MCC) and associated electrical work;

(iii) Replacement of electrical distribution system including wall receptacles, lighting, conduits and cabling; and

(i) For details, refer to Drawings and Technical Specifications.

D2.3 The following shall apply to the Services:

(a) City of Winnipeg Green Building Policy: New City-Owned Buildings and major additions;

http://clkapps.winnipeg.ca/DMIS/DocExt/ViewDoc.asp?DocumentTypeId=2&DocId=5989

(b) Universal Design Policy

http://clkapps.winnipeg.ca/DMIS/DocExt/ViewDoc.asp?DocumentTypeId=2&DocId=3604

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is Dillon Consulting Limited, represented by:

Blair Moore, P.Eng.
Associate

Telephone No. 204 453-2301 ext. 4013
Email Address bmoore@dillon.ca

D3.2 At the pre-construction meeting, Blair Moore will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D4. CONTRACTOR'S SUPERVISOR

D4.1 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. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

D5.1 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 Contractor's own use, or for the use of any third party.

D5.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.

D5.3 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.

D5.4 A Contractor who violates any provision of D5 may be determined to be in breach of Contract.

D6. NOTICES

D6.1 Except as provided for in C22.2.2, 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.

D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D6.3, D6.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D3.

D6.3 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

D6.4 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

D7. FURNISHING OF DOCUMENTS

D7.1 Upon award of the Contract, the Contractor will be provided with five (5) complete sets of the Tender. If the Contractor requires additional sets of the Tender, they will be supplied to him/her at cost.

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

D8.1 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.

D9. SAFE WORK PLAN

D9.1 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 Documents, if applicable.

D9.2 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

D9.3 Notwithstanding B13.4 at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D10. INSURANCE

D10.1 The Contractor shall provide and maintain the following insurance coverage:

(a) commercial general liability insurance, in the amount of at least two million dollars ($2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;

(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 in the amount of one hundred percent (100%) of the total Contract Price, written in the name of the Contractor and The City of Winnipeg, at all times during the performance of the Work and until the date of Total Performance.

D10.2 Deductibles shall be borne by the Contractor.

D10.3 The Contractor shall provide the City Solicitor 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 the date specified in C4.1 for the return of the executed Contract.

D10.4 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.

D11. CONTRACT SECURITY

D11.1 The Contractor shall provide and maintain the performance bond and the labour and material payment bond 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; and

(b) a labour and material payment bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H2: Labour and Material Payment Bond), in an amount equal to fifty percent (50%) of the Contract Price.

D11.2 The Contractor shall provide the City Solicitor with the required performance and labour and material payment bonds within seven (7) Calendar Days of notification of the award of the Contract by way of an award letter 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 Documents, if applicable.

D11.3 The Contractor shall, as soon as practicable after entering into a contract with a Subcontractor:

(a) give the Subcontractor written notice of the existence of the labour and material payment bond in D11.1(b); and

(b) post a notice of the bond and/or a copy of that bond in a conspicuous location at the Site of the Work.

D12. SUBCONTRACTOR LIST

D12.1 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 the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D13. DETAILED WORK SCHEDULE

D13.1 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 documents if applicable.

D13.2 The detailed work schedule shall consist of the following:

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

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

(c) a daily manpower schedule for the Work.

all acceptable to the Contract Administrator.

D13.3 Further to D13.2(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) Contract award;

(b) Mobilization;

(c) Temporary by-pass pumping operations;

(d) By-pass manhole and valve assembly;

(e) Station interior demolition, broken down by discipline;

(f) Process mechanical work;

(g) Mechanical HVAC work;

(h) Plumbing (water) work;

(i) Electrical work;

(j) Instrumentation work;

(k) Building renovations;

(l) Hoist device work;

(m) Equipment start-up;

(n) Commissioning;

(o) Substantial performance;

(p) Total Performance; and

(q) Submission of O&M Manuals and As-Built drawings.

D13.4 Further to D13.2(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 type of trade shall be on the vertical axis.

D13.5 Further to D13.2(c), the daily manpower schedule shall list the daily number of individuals on the Site for each trade.

SCHEDULE OF WORK

D14. COMMENCEMENT

D14.1 The Contractor shall not commence any Work until he/she is in receipt of an award letter from the Award Authority authorizing the commencement of the Work.

D14.2 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 D8;

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

(iii) the Safe Work Plan specified in D9;

(iv) evidence of the insurance specified in D10;

(v) the contract security specified in D11;

(vi) the Subcontractor list specified in D12; and

(vii) the detailed work schedule specified in D13.

(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.

D14.3 The Contractor shall not commence the Work on the Site before November 11, 2019.

D14.4 The City intends to award this Contract by November 8, 2019

D14.4.1 If the actual date of award is later than the intended date, the dates specified for Commencement, Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D15. CRITICAL STAGES

D15.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

(a) The 3 new pumping units and existing flood pumping units must be put into fully automated active service by March 1, 2020.

D16. SUBSTANTIAL PERFORMANCE

D16.1 The Contractor shall achieve Substantial Performance by May 1, 2020.

D16.2 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.

D16.3 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.

D17. TOTAL PERFORMANCE

D17.1 The Contractor shall achieve Total Performance by June 30, 2020.

D17.2 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.

D17.3 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.

D18. LIQUIDATED DAMAGES

D18.1 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) D15.1(a)– Two thousand dollars ($2,000);

(b) Substantial Performance – One thousand dollars ($1,000);

(c) Total Performance – Five hundred dollars ($500).

D18.2 The amounts specified for liquidated damages in D18.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

D18.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

CONTROL OF WORK

D19. JOB MEETINGS

D19.1 Regular bi-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.

D19.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D20. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D20.1 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).

D21. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D21.1 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.

MEASUREMENT AND PAYMENT

D22. PAYMENT

D22.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor’s banking institution.

D23. WARRANTY

D23.1 Warranty is as stated in C13.

THIRD PARTY AGREEMENTS

D24. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D24.1 In the event that funding for the Work of the Contract is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, the following terms and conditions shall apply, as required by the applicable funding agreements.

D24.2 Further to D24.1, in the event that the obligations in D24 apply, actual costs legitimately incurred by the Contractor as a direct result of these obligations (“Funding Costs”) shall be determined by the actual cost to the Contractor and not by the valuation method(s) outlined in

C7.4. In all other respects Funding Costs will be processed in accordance with Changes in Work under C7.

D24.3 For the purposes of D24:

(a) **"Government of Canada"** includes the authorized officials, auditors, and representatives of the Government of Canada; and

(b) **"Government of Manitoba"** includes the authorized officials, auditors, and representatives of the Government of Manitoba.

D24.4 Modified Insurance Requirements

D24.4.1 If not already required under the insurance requirements identified in D10, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars ($2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and its Ministers, officers, employees, and agents shall be added as additional insureds.

D24.4.2 If not already required under the insurance requirements identified in D10, the Contractor will be required to provide builders' risk insurance (including boiler and machinery insurance, as applicable) providing all risks coverage at full replacement cost, or such lower level of insurance that the City may identify on a case-by-case basis, such as an installation floater.

D24.4.3 The Contractor shall obtain and maintain third party liability insurance with minimum coverage of two million dollars ($2,000,000.00) per occurrence on all licensed vehicles operated at the Site. In the event that this requirement conflicts with another licensed vehicle insurance requirement in this Contract, then the requirement that provides the higher level of insurance shall apply.

D24.4.4 Further to D10.3, insurers shall provide satisfactory Certificates of Insurance to the Government of Manitoba prior to commencement of Work as written evidence of the insurance required. The Certificates of Insurance must provide for a minimum of thirty (30) days' prior written notice to the Government of Manitoba in case of insurance cancellation.

D24.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D24.5 Indemnification By Contractor

D24.5.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for Construction, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers, servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.

D24.6 Records Retention and Audits

D24.6.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.

D24.6.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for Construction, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total

Performance, all records, documents, and contracts referred to in D24.6.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.

D24.7 Other Obligations

D24.7.1 The Contractor consents to the City providing a copy of the Contract Documents to the Government of Manitoba and/or the Government of Canada upon request from either entity.

D24.7.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.

D24.7.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.

D24.7.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.

FORM H1: PERFORMANCE BOND
(See D11)

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

TENDER NO. 806-2019

JESSIE WASTEWATER PUMPING STATION UPGRADES

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: LABOUR AND MATERIAL PAYMENT BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
his/its heirs, executors, administrators, successors or assigns (hereinafter called the "Principal"), and

_____ ,
his/its heirs, executors, administrators, successors or assigns (hereinafter called the "Surety"), are held and firmly bound unto **THE CITY OF WINNIPEG** (hereinafter called the "Obligee"), for the use and benefit of claimants as herein below defined, in the amount of

_____

_____ dollars ($_____.____)

of lawful money of Canada, for the payment whereof we, the Principal and the Surety jointly and severally bind ourselves firmly by these presents.

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

TENDER NO. 806-2019

JESSIE WASTEWATER PUMPING STATION UPGRADES

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 promptly make payment to all claimants as hereinafter defined, for all labour, service and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void, otherwise it shall remain in full force and effect subject, however, to the following conditions:

(a) A claimant is defined as one having a direct contract with the Principal for labour, service and material, or any of them, used or reasonably required for use in the performance of the contract, labour, service and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment (but excluding rent of equipment where the rent pursuant to an agreement is to be applied towards the purchase price thereof) directly applicable to the Contract;

(b) The above-named Principal and Surety hereby jointly and severally agree with the Obligee that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant’s work, labour or service was done or performed, or materials were furnished by such claimant, may sue on this bond, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon;

(c) No suit or action shall be commenced hereunder by any claimant

    (i) unless claimant shall have given written notice to the Principal and the Surety above-named, within one hundred and twenty (120) days after such claimant did or performed the last of the work, labour or service, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work, labour or service was done or performed. Such notice shall be served by mailing the same by registered mail to the Principal, and Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the Province of Manitoba;

(ii) after the expiration of one (1) year following the date on which Principal ceased work on said Contract; including work performed under the guarantees provided in the Contract;

(iii) other than in a court of competent jurisdiction in the Province of Manitoba.

(d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.

(e) The Surety shall not be liable for a greater sum than the specified penalty of this bond.

The Principal and Surety hereby agree that The Guarantors' Liability Act (Manitoba) shall apply to this Bond.

IN TESTIMONY WHEREOF, the Principal has hereunto set its hand affixed its seal, and the Surety has caused these presents to be sealed and with its corporate seal duly attested by the authorized signature of its signing authority this

_____ 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 J: SUBCONTRACTOR LIST
(See D12)

JESSIE WASTEWATER PUMPING STATION UPGRADES

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 Tender shall govern over *The City of Winnipeg Standard Construction Specifications*.

E1.3 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B7. In every instance where a brand name or design specification is used, the City will also consider approved equals and/or approved alternatives in accordance with B7.

E1.4 The following are applicable to the Work:

Specification No.	Specification Title
Division 01 –	**General Requirements**
01 33 00	Submittal Procedures
01 45 00	Quality Control
01 51 00	Temporary Utilities
01 52 00	Construction Facilities
01 56 00	Temporary Barriers
01 61 00	Common Product Requirements
01 73 00	Execution
01 74 11	Cleaning
01 74 21	Construction/Demolition, Waste Management and Disposal
01 78 00	Closeout Submittals
01 79 00	Demonstration and Training
Division 02 –	**Existing Conditions**
02 21 19	Demolition
Division 04 –	**Concrete/Masonry**
04 20 00	Masonry
Division 05 –	**Metals**
05 12 23	Structural Steel for Buildings
05 31 00	Steel Decking
05 50 00	Metal Fabrication

26 05 32	Outlet Boxes, Conduit Boxes and Fittings
26 05 34	Conduits, Conduits Fastening and Conduits Fitting
26 05 36	Cable Trays for Electrical Systems
26 05 73	Coordination Short Circuit Arcflash Study
26 09 23	Metering and Switchboard Instruments
26 12 17	Dry Type Transformers up to 600V Primary
26 24 17	Panelboards Breaker Type
26 24 19	Motor Control Centres
26 27 26	Wire Devices
26 28 21	Molded Case Circuit Breakers
26 28 33	Disconnect Switches – Fused and Non-Fused
26 29 03	Control Devices
26 29 10	Motor Starters to 600 V
26 29 20	Variable Frequency Drives

Division 29 – Instrumentation and Control

29 05 00	Common Work – Instrumentation and Control
29 10 01	Enclosures
29 15 01	Instrumentation Cable
29 30 11	Miscellaneous Panel Devices
29 30 21	Power Supplies
29 40 01	Control and Operator Interface Requirements
29 40 11	RTU I-O Index
29 40 21	Instrumentation Index
29 40 51	Remote Terminal Units
29 50 01	Instrumentation Specifications Sheet

Division 31 – Earthwork

31 23 10	Excavating, Trenching and Backfilling

Division 40 – Process Piping

40 05 13	Process Piping
40 05 52	Process Valves

Division 43 – Process Pumping

43 21 13	Centrifugal Pumps

Drawing No.	Drawing Name/Title
00	Jessie Wastewater Pumping Station Upgrades Cover Sheet
C-01	Civil – Site Plan, By-Pass Connection Detail
A-01	Architectural – Demo, Roof Plan and Main Floor
A-02	Architectural – Demo Building Sections
A-03	Architectural – Proposed Roof Plan and Main Floor
A-04	Architectural – Proposed Access Level and Communitor Room
A-05	Architectural – Building Sections
A-06	Architectural – Building Elevations
A-07	Architectural – Sections and Details Typical
A-08	Architectural – Sections and Details
S-01	Structural – Notes
S-02	Structural – Temporary Shoring for Demolition
S-03	Structural – New Roof Plan and Details
S-04	Structural – New Foundation Wall and Main Floor Slab Plan
S-05	Structural – Structural Plans I
S-06	Structural – Structural Plans II

S-07 Structural – Structural Plans III
S-08 Structural – Structural Sections
S-09 Structural – Structural Sections and Details
S-10 Structural – Typical Sections and Details
P-01 Process – Demolition
P-02 Process – New Plans and Sections
P-03 Process – Process and Instrumentation Diagram
P-04 Process – Communitor Chamber Piping and Valve Upgrade
M-01 Mechanical – Demolition
M-02 Mechanical – New Plans and Section
M-03 Mechanical – Schedules and Details
E-01 Electrical – Single Line Diagram
E-02 Electrical – Finished Level and Access Level Floor Plan - Power
E-03 Electrical – Motor Room and Pump Room Floor Plan - Power
E-04 Electrical – Finished Level and Access Level Floor Plan - Lighting
E-05 Electrical – Motor Room and Pump Room Floor Plan - Lighting
E-06 Electrical – Finished Level and Motor Room Floor Plan - Instrumentation
E-07 Electrical – Pump Room Floor Plan - Instrumentation

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.

E3. MOBILIZATION AND DEMOBILIZATION

E3.1 Description

(a) This Specification covers all operations relating to the mobilization and demobilization of the Contractor to the Site, as specified herein.

(b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E3.2 Scope of Work

(a) The Work under this Specification shall include, but not be limited to:

(i) submission of Site Layout Plan;

(ii) mobilizing and demobilizing on-site Work facilities;

(iii) supplying, setting up, laying out, and removing site office facilities.

(iv) install, maintaining and removing any access roadway; and,

(v) traffic control and traffic management.

E3.3 References

(a) Mobilization and Demolition are in accordance with the most recent Standard Construction Specifications:

(i) CW 1120 – Existing Services, Utilities and Structures; and,

(ii) CW 1130 – Site Requirements.

E3.4 Submittals

(a) The Contractor shall submit the following to the Contract Administrator fourteen (14) Days prior to mobilization on-site, a plan highlighting the Site Layout Plan which includes; laydown area location(s), staging areas, office facility location, access road(s), temporary secure fencing limits, and gate locations for review and approval.

(b) Contractor shall refer to the drawings for Limits of Construction.

E3.5 Materials and Equipment

(a) All materials supplied under this Specification shall be of a type approved by the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.

(b) The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification. All materials shall be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

(c) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E3.6 Construction Methods

(a) Site Inspection

(i) Inspect the Site with the Contract Administrator to verify existing conditions prior to mobilizing on-site.

(ii) Inspect the Site with the Contract Administrator soon after demobilizing on-site, confirming Site has been restored to its original condition prior to initiation of Work.

(b) Layout of On-Site Work Facilities

(i) The Contractor shall mobilize all on-site Work and other temporary facilities.

(ii) Upon completion of construction activities, the Contractor shall remove all on-site Work and other temporary facilities.

(c) Cellular Telephone Communication

(i) The Contractor’s site supervisor is required to carry, at all times, a cellular telephone, with voicemail.

(d) Access Roadway

(i) The Contractor shall maintain any access roadway they install.

(ii) The access road shall be maintained on a regular basis to provide continual unrestricted site access, to the satisfaction of the Contract Administrator.

(iii) Upon completion of the Work, the area shall be restored to its original condition.

(e) Snow and Ice Removal

(i) If required, snow clearing shall be done by the Contractor on a regular basis.

(ii) If required, snow cover shall be cleared from the construction Site prior to commencement of the Work. The methodology to clear the snow shall be subject to the approval of the Contract Administrator.

(f) Restoration of Existing Facilities

(i) Upon completion of the Work and demobilization, the Contractor shall restore existing facilities to their original condition, including snow removal, to the approval of the Contract Administrator.

E3.7 Measurement and Payment

(a) Mobilization and demobilization will be paid for at the Contract Lump Sum Prices for "Mobilization and Demobilization" for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

(b) Mobilization and demobilization will be paid for at a percentage of the Contract Lump Sum Prices, as specified herein. These percentages shall be as follows:

(i)	when Contract Administrator is satisfied that construction has commenced.	30%
(ii)	during construction, percentage distributed equally on a monthly basis at the discretion of the Contract Administrator.	50%
(iii)	upon completion of the project.	20%

E4. WATERWAY BY-LAW

E4.1 The Contractor shall note that all Works within 107 metres (350 feet) of a riverbank are within the jurisdiction of the Waterway By-Law. The Contractor, if required, will apply and pay for any Waterway Permits for the project. The Contractor shall adhere to restrictions imposed on the permit.

E4.2 Under no circumstances will stockpiling of any material be permitted within 107 metres of a riverbank or dike.

E5. TEMPORARY USE OF CITY EQUIPMENT

E5.1 City facilities, systems and equipment shall not be used during construction without the Contract Administrator's written permission. The Contract Administrator reserves the right to withdraw said permission if, in his opinion, proper care and maintenance are not provided.

E6. WET WELL CLEANOUT

E6.1 Clean out the wet well, initially to inspect the overall condition of the wet wells and dividing wall, and throughout the duration of the project to maintain a clean wet well and prevent debris from entering the pumps upon initial start-up.

E6.2 Clean out shall be performed by mechanical or manual methods and shall remove grit, tallow and other buildup to the satisfaction of the Contract Administrator.

E6.3 The current level of accumulation in the Wet Well is not known. Higher levels of accumulation, above that anticipated by the Contractor, will not be eligible for additional payments.

E6.4 Schedule upstream work that may produce debris prior to wet well cleanout.

E6.5 All construction material and debris are to be removed from the wet well after completing the works and prior to station startup and commissioning.

E6.6 The Contractor shall be responsible to maintain a clean wet well during construction.

E6.7 Provide evidence of the Wet Well clean out in the form of photographs, or other suitable means, acceptable to the Contract Administrator.

E6.8 Costs for clean out of wet well shall be considered incidental to the Contract Work and no additional payment will be made beyond the amount indicated for Form B.

E6.9 Under no circumstances will the City pay for more than one clean out of the Wet Well. In the event that the areas are not clean at the end of the associated mechanical work, the Contractor is responsible for bearing the cost of re-cleaning.

E7. EXISTING PUMPING STATION OPERATION DURING CONSTRUCTION

E7.1 The facility related to the Work is critical to the transport of wastewater for the City of Winnipeg. Under no condition shall the station pumping be shut down without prior permission from the Contract Administrator.

E7.2 The Contractor is advised that the Pumping Station will be allowed to be taken out of operation only after the Contractor's schedule of activities to complete the Work is approved by the Contract Administrator. The Contractor shall plan his construction activities to allow for the minimum amount of disruption time to normal operating status of the station.

E7.3 The Contractor shall cooperate with and provide full access at all times for City personnel to carry out maintenance and operational duties.

(a) No additional payments will be made for providing access to City forces on the site or any potential affect City crews might have on the Contractor's work.

E8. TEMPORARY SHUTDOWN OF THE PUMPING STATION

E8.1 Temporary shutdown of the wastewater pumping station will be allowed for the following work activities.

(a) Construction of By-Pass Manhole and Valve Assembly.

(b) Removal of existing suction and discharge piping, valves and fittings inside the station.

(c) Supply and installation of new suction and discharge piping, valves and fittings inside the station.

(d) Switch-overs between station pumps and temporary bypass pumps.

E8.2 Sequence work such that a minimum amount of shut-down time at the Station is used for the above mentioned activities.

E8.3 All shutdowns must be reviewed and approved by the Contract Administrator prior to the shutdown. Prepare and submit shutdown plans to the Contract Administrator a minimum of forty-eight (48) hours prior to the proposed shutdown.

E8.4 Operation of all City-owned equipment (e.g. gate valves) will be by the City unless prior approval is given to the Contractor.

E8.5 The Contractor shall monitor the upstream system at all times to ensure the stored level of wastewater will not exceed the critical basement elevation. This elevation will be provided to the Contractor.

E8.6 Schedule work activities requiring shutdown of pumping operations to be done at night, if required by the Contract Administrator, when flow amounts are generally reduced, to maximize the amount of shutdown time available and reduce the risks associated with station shutdown.

E8.7 Schedule several work activities to be completed in the same shutdown where possible to minimize the number of station shutdowns and amount of temporary by-pass pumping required.

E8.8 The Contractor shall provide a duty operator to operate the temporary pumping for wastewater diversion twenty-four (24) hours a day at no extra cost.

E8.9 Temporary by-pass pumping, as described in E9, must be installed and operational at all times during construction and ready to be put into service if liquid level in the sewer system reaches the critical basement elevation shown on the drawings or as determined by the Contract Administrator.

E8.10 Water and Waste Department, Collection System personnel will be available to provide assistance to the Contractor for temporary shutdown of the pumping operations to facilitate completion of the Work.

E8.11 There will be no charge to temporarily shutdown the wastewater pumping station to facilitate completion of the Work.

E8.12 If an unreasonable number of station shutdowns are required to complete the Work due to the Contractor's method of operation, a fee of $300.00 per hour for Collection System personnel may be charged to the Contractor and deducted from future Progress Payments.

E8.13 The Contract Administrator reserves the right to cancel a planned station shutdown if in his opinion, flow conditions or the weather forecast would not allow for a shutdown of sufficient duration to complete the work activity. The Contractor shall reschedule the work activity to a more suitable time.

E8.14 Consecutive back-to-back station shutdowns will not be allowed until the sewer system has returned to normal.

E9. FLOW CONTROL: PERMANENT BYPASS MANHOLE AND TEMPORARY BY-PASS PUMPING

E9.1 Description

E9.1.1 This Section specifies the construction of a permanent By-Pass Manhole and Valve Assembly and the requirements for the temporary diversion of wastewater during construction and commissioning of the By-Pass Manhole and Valve Assembly and Pump Station. The wastewater being diverted is raw un-screened sewage.

E9.1.2 The expected minimum peak dry weather flow (PDWF) to the Pumping Station is 156 l/s (2,473 USGPM).

(a) Contractor to check and verify the critical basement elevation in the catchment area.

(b) Combined sewers can receive flow of an undetermined amount from watermain breaks, snow melt, rain and other unforeseen sources. The Contractor will be responsible to monitor the flow in the sewer and adjust or halt work activities accordingly due to unforeseen flow above the amount identified for PDWF.

E9.2 Materials

E9.2.1 Temporary By-Pass Pumping Equipment

(a) Non-clog, submersible pumping units, each sized to meet or exceed the required capacity. Complete with all required piping, fittings, floats, alarms, back-up generator, pump controls and related appurtenances suitable for temporary installation in a Municipal Gate Chamber upstream of the pumping station.

(b) Duty pump to provide 156 L/s at 22.6 m total head.

(c) Stand-by pump(s) to provide 156 L/s at 22.6 m total head.

(d) Pumps to operate in lead-lag configuration.

(e) Provide model and capacity curves to the Contract Administrator for approval.

(f) Power supply to be suitably sized for pumping equipment complete with all required controls. Fuel to be in lockable, tamperproof container, approved by Contract Administrator.

E9.2.2 Fittings and Appurtenances

(a) Fittings, couplings and appurtenances to be used for repairs to existing forcemains and sewers to be approved products for underground use in the City of Winnipeg.

(b) Acceptable Manufacturers

(i) Romac;

(ii) Approved equal in accordance with B7.

E9.2.3 Bedding and Backfill

(a) Bedding and initial backfill material to be sand in accordance with CW 2030.

(b) Backfill excavations in pavement areas to be Class 3 in accordance with Clause 3.8.3 of CW 2030. Backfill in excavations in boulevard areas to be Class 5 in accordance with Clause 3.8.3 of CW 2030.

E9.2.4 By-Pass Manhole and Valve Assembly

(a) A by-pass man hole assembly shall be installed immediately north of the Station on the existing underground bypass pipe to allow bypass pumping operations to take place when required. This manhole assembly shall be a pre-cast box section and shall include the installation of a gate valve on each of the forcemains upstream of both by-pass tees in the manhole.

(b) Two (2) 250 mm x 250 mm x 150 mm tee fittings with a 150 mm gate valve shall be installed on the dual forcemains as shown on the drawings, and is to be used for discharging wastewater flows during the by-pass pumping operations.

(c) The following items shall be procured and installed by the Contractor, and are shown on respective drawing.

(i) Two (2) 250 mm gate valves and Two (2) 150 mm gate valves. Gate valves are to be provided by City of Winnipeg.

(ii) Four (4) ductile iron spool pieces for connecting the gate valve and by-pass tee to the Polyethylene (PE) forcemain on the up and downstream ends using mechanical couplings.

(iii) Precast reinforced 2400 x 1800 mm concrete box section to City of Winnipeg SD-010.

E9.2.5 Pumps Controls

(a) Control system complete with float switches for automatic level control and manual start/stop ability.

(b) Temporarily connect existing RTU control panel to new pump controls to monitor a high level alarm and loss of utility power.

E9.2.6 Backup Power

(a) Provide portable generator to provide backup power in the event of a utility failure. Switching to generator and back to utility shall be a manual transfer switch.

E9.3 Construction Methods

E9.3.1 General

(a) Maintain level of sewage in existing sewers below the critical basement elevation shown on the Drawings at all times. The Contract Administrator will provide a mark at a convenient location for reference.

(b) Allowable shutdown times shown on the drawings are approximate and the Contractor must monitor the upstream system at all times to ensure the stored level of wastewater does not exceed the critical basement elevation.

(c) Provide a flow control plan to the Contract Administrator for review before construction starts.

(d) Diversion of wastewater flow directly or indirectly to the environment, Land Drainage Sewers or Storm Relief Sewers will not be allowed.

E9.3.2 By-Pass Manhole Construction

(a) The Contractor shall be responsible to obtain all necessary permits from the concerned offices/agencies in regards to the construction of the By-Pass Manhole and Valve Assembly. The Contractor will satisfy all permits and application requirements

including any testing (e.g. geotechnical, etc.) if required to obtain the permit at no extra cost.

(b) Survey and locate all existing services and limits of proposed manhole excavation relative to existing structures. The contractor shall provide all survey and layout work necessary to accurately layout and position the new construction. The Contract Administrator, at their sole discretion, may undertake a confirmatory survey of the Contractor's work if considered necessary.

(c) Design, supply and install shoring system necessary for opening the new excavation to the required depth and dimensions necessary to install the new manhole assembly.

(d) All excavations within 1.5 m of sewers to be soft dug, either hydro excavated or by hand, as necessary to avoid potentially damaging the existing sewers.

(e) Any service interruption shall conform to Section 1.4.

E9.3.3 Excavation Security Fence

(a) Further to Clause 3.1 of CW 1130, completely cover the excavation and provide a security fence to completely surround the excavation when unattended in accordance with the following:

(i) Security fence shall be chain link fence or approved equal, a minimum 1.80 meters high with metal support posts embedded far enough into the ground and spaced close enough together so the fence will not sag or collapse.

(ii) Attach fencing securely to posts.

(iii) Secure the gate or end of the fencing to a post with chain and a padlock.

(iv) Provide alternate security fence proposal to Contract Administrator for approval.

E9.3.4 Restoration

(a) Restore the disturbed area and surface during construction to match the existing surroundings as per the City requirements and applicable standards.

E9.3.5 Temporary Bypass Pumping

(a) Temporary by-pass pumping can be installed at the Municipal Gate Chamber during:

(i) Construction of By-Pass Manhole and Valve Assembly.

(ii) Pumping Station Upgrades.

(b) During Pump Station shut down for the By-Pass Manhole and Valve Assembly construction, wastewater will be hauled by sewage truck to a Wastewater Treatment Plant. The Contractor is responsible for all temporary pumping and hauling arrangements and costs.

(c) Once By-Pass Manhole and Valve Assembly is in operation, sewage can be pumped from the Municipal Gate Chamber to the by-pass tee during Pump Station shut down.

(d) Provide detailed information for pumping equipment to be used including pump capacity and dimensions, depth of submergence, pump controls and installation details to the Contract Administrator for review before construction starts.

(e) Power supply to be approved by the Contract Administrator before set-up. Locate the power supply where it will not adversely affect local residences. Location to be approved by the Contract Administrator before construction starts.

(f) Provide suitable traffic ramps approved by the Contract Administrator if the by-pass pumping discharge pipe and power supply cables are laid across vehicle or pedestrian traffic areas.

(g) Provide a check valve on the by-pass pumping discharge pipe to prevent cycling when the pumping station is activated.

(h) The Contractor is advised that the pumping station will remain in service while the work is being completed, except for planned temporary shutdowns as described in

Section 1.4. The Contractor shall cooperate and coordinate with the City to allow full access at all times for City staff to carry out maintenance and operational duties.

(i) If a temporary pump in use fails, it must be replaced immediately.

(j) The Contractor shall ensure temporary by-pass pumping equipment and materials will be properly insulated and heated, if required, to be protected from freezing and to maintain proper functioning during cold weather.

(k) Under no circumstances can any wastewater sewage be discharged to the river.

(l) Temporary by-pass pumping equipment and materials shall remain on-site until station construction is completed as described in these Specifications and to the satisfaction of the Contract Administrator.

(m) Under no circumstances shall wastewater levels in the sewer rise above the critical basement elevation.

E9.4 Measurement and Payment

E9.4.1 Flow control and temporary by- pass pumping will be measured on a lump sum basis at the Contract Unit Price for "Flow Control and Temporary Wastewater Diversion and Dispersal" as shown in Form B: Prices, installed in accordance with this specification, accepted and measured by the Contract Administrator.

E9.4.2 By-Pass Manhole and Valve Assembly construction will be measured on a lump sum basis at the Contract Unit Price for "By-Pass Manhole and Valve Assembly" as shown in Form B: Prices, installed in accordance with this specification, accepted and measured by the Contract Administrator.

E9.4.3 A maximum of 95% may be submitted for progress payments prior to the total completion of the associated services, including the provision of as-built drawing mark-ups and O&M manuals.

E10. WET WEATHER FLOWS IN EXISTING SEWER

E10.1 In the event the flow in the sewer system is expected to exceed the amount indicated for PDWF due to wet weather runoff, the Contract Administrator may suspend work activities that require temporary by-pass pumping and temporary shutdown of the wastewater pumping station. Suspension of these activities will continue until the high flow diminishes in the sewer system.

E10.2 In the opinion of the Contract Administrator, if suspension of work activities that require temporary by-pass pumping and temporary shutdown of the wastewater pumping station cause a delay in completion of the Work through no fault of the Contractor, the completion date of the Work will be adjusted accordingly.

E10.3 There shall be no claim for additional costs or time due to Station shut-downs from high wet weather flows.

E11. PRE-CAST CONCRETE RECTANGULAR BOX SECTION

E11.1 Description

(a) Notwithstanding and in addition to CW2130, this specification shall cover the supply and installation of Pre-Cast Rectangular Box Section as shown on the Drawings.

E11.2 Materials

(a) Notwithstanding CW2130 Clause 2.7 and City of Winnipeg Standard Detail SD-010, the supplied chamber shall be 2400 mm x 1800 mm Pre-cast Concrete Rectangular Box Section including the base and top.

E11.3 Construction Methods

(a) The Construction Methods shall be as per Clause 3.8 of CW2130.

E11.4 Measurement and Payment

(a) Pre-cast Rectangular Box Section installation including all accessories will be measured for payment on a unit basis for each catch basis and paid for at the Contract Unit Price for "Pre-cast Rectangular Box Section".

E12. REGULATORY APPROVALS AND PERMITS

E12.1 Description

(a) The Contractor shall be responsible to obtain all regulatory approvals and permits required to execute and complete the specified scope of work. It will include:

(i) Identification of the approvals and permits required, preparing and submitting applications, satisfying all requirements of the applications, performing any testing including geotechnical if required and payment of the fees at no extra cost.

E13. STRUCTURAL CONCRETE

E13.1 Description

(a) This Specification shall cover all operations relating to the preparation of Portland Cement structural concrete for, and all concreting operations related to, the construction of structural concrete works as specified herein and as shown on the Drawings.

(b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E13.2 Scope of Work

(a) The Work under this Specification shall include:

(i) Supplying and placing structural concrete for structural foundation wall

(ii) Supplying and placing structural concrete for structural slab

E13.3 Submittals

E13.3.1 General

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least fourteen (14) Days prior to the commencement of any scheduled Work on the Site, a proposed schedule, including methods and sequence of operations.

(b) The Contractor shall submit to the Contract Administrator for review and approval, at least fourteen (14) Days prior to the commencement of any Work on Site, the proposed materials to be used.

E13.3.2 Concrete Mix Design Requirements

(a) The Contractor shall submit a concrete mix design statement to the Contract Administrator for each of the concrete types specified herein that reflects the specified performance properties of the concrete. The mix design statement shall contain all the information as outlines on the concrete mix design statement as shown on the Manitoba Ready Mix Concrete Association website (www.mrmca.com). In addition, the mix design statement must indicate the expected method of placement (buggies, chute, or pump) methods are to be used, the method of placement must include a clear description of the pumping methods (line, vertical drop, length of hose, etc.).

(b) The Supplier shall submit directly, in confidence, to the City of Winnipeg, the concrete mix designs for each of the concrete types specified herein. The purpose of this confidential submission will be for record keeping purposes and may be used as information related to supplementary testing and investigation of suspected defective concrete. The City of Winnipeg will advise the Supplier if the in

information needs to be released to third parties. The concrete mix design shall contain a description of the constituents and proportions, and at the minimum the following:

(i) Cementitious content in kilograms per cubic metre or equivalent in accordance with B7, and type of cementitious materials;

(ii) Designated size, or sizes, of aggregates, and the gradation;

(iii) Aggregate source location(s);

(iv) Weights of aggregates in kilograms per cubic metre or equivalent in accordance with B7. Mass of aggregates is saturated surface dry basis;

(v) Maximum allowable water content in kilograms per cubic metre or equivalent in accordance with B7, and the water/cementitious ratio;

(vi) The limits for slump;

(vii) The limits for air content; and,

(viii) Quantity of other admixtures.

(c) The concrete mix design statements must be received by the Contract Administrator a minimum of fourteen (14) days prior to the scheduled commencement of concrete placement for each of the concrete types. The concrete mix designs must be received by the City of Winnipeg a minimum of five (5) Business Days prior to the scheduled commencement of concrete placement for each the concrete types.

(i) The mix design statement shall also include the expected slump measurement for each concrete type. The tolerances for acceptance of slump measurements in the field, by the Contract Administrator, shall be in accordance to CSA A23.1.

(ii) Any change in the constituent materials of any approved mix design shall require submission of a new concrete mix design statement, mix design, and mix design test data. If, during the progress of the Work, the concrete supplied is found to be unsatisfactory for any reason, including poor workability, the Contract Administrator may require the Contractor to make any necessary adjustments and associated resubmissions.

E13.3.3 Concrete Mix Design Test Data

(a) Concrete

(i) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty (20) Business Days prior to the scheduled commencement of concrete placement, test data showing that the concrete to be supplied will meet the performance criteria stated in this Specification for each concrete type.

(ii) All tests shall be based on the concrete samples taken from the point of discharge into the formwork. For example, at the concrete chute from the delivery truck if being placed by buggies, or at the end of the pump line should the Contractor choose to pump the concrete into the form. At the discretion of the Contract Administrator, if the Contractor can demonstrate a relationship between the plastic concrete properties at the point of discharge into the formwork and the end of the chute of the delivery truck, the Contract Administrator may accept test results at the end of the chute with the appropriate adjustments to the wet concrete performance requirements as being representative of what is in the formwork.

E13.3.4 Aggregates

(a) The Contractor shall furnish, in writing to the Contract Administrator for review and approval, at least twenty (20) Business Days prior to the scheduled commencement of concrete placement, the location of the sources where aggregate will be obtained in order that some may be inspected and tentatively accepted by the Contract Administrator. Changes in the source of aggregate supply during the course of the Contract shall not be permitted without notification in writing to and the expressed approval of the Contract Administrator.

(b) The Contractor shall submit to the Contract Administrator for review and approval recent test information on sieve analysis of fine and coarse aggregates in accordance with CSA Standard Test Method A23.2-2A.

(c) The Contractor shall submit to the Contract Administrator for review and approval recent test information on tests for organic impurities in fine aggregates for concrete, in accordance with CSA Standard Test Method A23.2-7A.

(d) The Contractor shall submit to the Contract Administrator for review and approval recent test information on relative density and absorption of coarse aggregate, in accordance with CSA Standard Test Methods A23.2-12A.

(e) The Contractor shall submit to the Contract Administrator for review and approval recent test information on petrographic examination of aggregates for concrete, in accordance with CSA Standard Test Methods A23.2-15A. The purpose of the petrographic analysis is to ensure the aggregates provided are of the highest quality for use in the production of concrete and will produce a durable overlay. An acceptable aggregate will have an excellent rating as judged by an experienced petrographer, with a (weighted) petrographic number typically in the range of 100 to 120.

(f) The Contractor shall submit to the Contract Administrator for review and approval recent test information on resistance to degradation of small-size, large-size coarse aggregates by abrasion and impact in the Los Angeles Machine, in accordance with CSA Standard Test Method A23.2-16A, and A23.2-17A, respectively.

(g) The Contractor shall submit to the Contract Administrator for review and approval recent test information on potential alkali reactivity of cement aggregate combinations (mortar bar method), in accordance with CSA Standard Test Method A23.2-27A.

E13.3.5 The Contractor shall submit to the Contract Administrator copies of all material quality control test results.

E13.3.6 Notification of Ready Mix Supplier

(a) The Contractor shall submit to the Contract Administrator the name and qualifications of the Ready Mix Concrete Supplier that he is proposing to use, at least twenty (20) Business Days prior to the scheduled commencement of concrete placement. The Contract Administrator will verify the acceptability of the Supplier and the concrete mix design requirements. Acceptance of the Supplier and the concrete mix design(s) by the Contract Administrator does not relieve or reduce the responsibility of the Contractor or Supplier from the requirements of this Specification.

E13.3.7 Temporary False Work, Formwork and Shoring Works

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty (20) Business Days prior to the scheduled commencement of concrete placement, detailed design calculations and shop drawings for any temporary Works, including falsework, formwork, and shoring, that are sealed, signed and dated by a Professional Engineer licensed to practice in the Province of Manitoba.

(b) Design Requirements

(i) All forms shall be of wood, metal or other materials as approved by the Contract Administrator.

(ii) The falsework, formwork, and shoring for these Works shall be designed by a Professional Engineer registered in the Province of Manitoba. Falsework shall be designed according to the requirements of CSA S269.1, “Falsework and formwork.” The shop drawings shall bear the Professional Engineer's seal. Shop drawings submitted without the seal of a Professional Engineer will be rejected. The submission of such shop drawings to the Contract Administrator shall in no way relieve the Contractor of full responsibility for the safety and structural integrity of the formwork and shoring.

(iii) The falsework, formwork, and shoring for these Works shall be designed to safely support all vertical and lateral loads until such loads can be supported by the concrete all in accordance with CSA Standard CAN/CSA S269.1. All proposed fastening methods to the existing deck superstructure must be submitted to the Contract Administrator for review and approval.

(iv) The loads and lateral pressures outlined in "Guide to formwork for concrete", (ACI 347) and wind loads as specified by the National Building Code shall be used for design. Additional design considerations concerning factors of safety for formwork elements and allowable settlements outlined in the above reference shall apply.

(v) As a minimum, the following spacing's shall apply for studding and walers:

- 20-mm plywood: studding 400 mm centre to centre (max.),
- walers 760 mm centre to centre (max.)

(vi) Forms shall be designed and constructed so that the completed Work will be within minus 3 mm or plus 6 mm of the dimensions shown on the Drawings.

(vii) Formwork shall be designed to provide chamber, where applicable, to maintain the specified tolerance to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete, due to construction loads.

(viii) Slots, recesses, chases, sleeves, inserts, bolts, hangers, and other items shall be accommodated in the design, in coordination and cooperation with the trade concerned. No openings in structural members are to be shown on the shop drawings without the prior written approval of the Contract Administrator.

(ix) Shores shall be designed with positive means of adjustment (jacks or wedges). All settlement shall be taken up before or during concreting as required.

(x) Mud sills of suitable size shall be designed beneath shores, to be bedded in sand or stone, where they would otherwise bear on soil. The soil below shores must be adequately prepared to avoid settlement during or after concreting. Shores must not be placed on frozen ground.

(xi) Shores shall be braced horizontally in two directions and diagonally in the same two vertical planes so that they can safely withstand all dead and moving loads to which they will be subjected.

(xii) All exposed edges shall be chamfered 20 mm unless otherwise noted on the Drawings.

(xiii) Formwork shall be designed to have sufficient strength and rigidity so that the resultant finished concrete conforms to the shapes, lines, and dimensions of the members shown on the Drawings.

(xiv) Forms shall be designed to be sufficiently tight to prevent leakage of grout or cement paste.

(c) Shop drawings shall show design loads, type, and number of equipment to be used for placing the concrete, method of construction, method of removal, type and grade of materials, and any further information that may be required by the Contract Administrator. The Contractor shall not proceed with any Work on Site until the shop drawings have been reviewed and approved in writing by the Contract Administrator. Falsework must be designed to carry all loads associated with construction of overhangs including deflection due to dead loads, placement of concrete, hoarding, construction live loads, and any other loads that may occur.

(d) For timber formwork and falsework, the shop drawings shall specify the type and grade of lumber and show the size and spacing of all members. The shop drawings shall also show the type, size and spacing of all ties or other hardware, and the type, size and spacing of all bracing.

E13.4 Materials

E13.4.1 General

(a) All materials supplied under this Specification shall be of a type approved by the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.

(b) The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification. All materials shall be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E13.4.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and workmanship like manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with CSA Standard CAN/CSA-A23.1.

E13.4.3 Concrete

(a) Concrete materials susceptible to frost damage shall be protected from freezing.

(b) Concrete shall have nominal compressive strengths (f'c) and meet the requirements for hardened concrete as specified in Table E13.1.

TABLE E13.1
REQUIREMENTS FOR HARDENED CONCRETE

Type of Concrete	Location	Nominal Compressive Strength [MPa]	Class of Exposure	Air Content Category	Max Aggregate Size
Type 1	Foundation wall	35 @ 28 Days	S-1	1	19 mm
Type 2	Structural slab	30 @28 Days	N	N/A	19 mm
Type 3	Apron	35 @28 Days	C-1	1	19 mm

E13.4.4 Aggregates

(a) General

(i) All aggregates shall be handled to prevent segregation and inclusion of any foreign substances, and to obtain uniformity of materials. The two sizes of coarse and fine aggregates, and aggregates secured from different sources, shall be piled in separate stockpiles. The site of the stockpiles shall be cleaned of all foreign materials and shall be reasonably level and firm or on a built up platform. If the aggregates are placed directly on the ground, material shall not be removed from the stockpile within 150 mm of the ground level. This material shall remain undisturbed to avoid contaminating the aggregate being used with the ground material.

(ii) The potential for deleterious alkali-aggregate reactivity shall be assessed in accordance with CSA A23.2-27A. Current (less than 18 months old) test data evaluating the potential alkali-silica reactivity of aggregates tested in accordance with CSA A23.2-14A or CSA A23.2-25A is required.

(iii) Petrographic analysis when performed shall be in accordance with MTO (Ministry of Transportation Ontario) Lab Test Method LS 609. The (weighted) petrographic number shall not exceed 130.

E13.4.5 Fine Aggregate

(a) Fine aggregate shall meet the grading requirements of CSA A23.1, Table 10, FA1, be graded uniformly and not more than 3% shall pass a 75 um sieve. Fine aggregate shall consist of sand, stone, screenings, other inert materials with similar characteristics or a combination thereof, having clean, hard, strong, durable, uncoated grains free from injurious amounts of dust, lumps, shale, alkali, organic matter, loam or other deleterious substances.

(b) Tests of the fine aggregate shall not exceed the limits for standard requirements prescribed in CSA A23.1, Table 12.

E13.4.6 Coarse Aggregate - Standard

(a) The maximum nominal size of coarse aggregate shall be 20 mm and meet the grading requirements of CSA A23.1, Table 11, Group I. Coarse aggregate shall be uniformly graded and not more than 2% shall pass a 75 um sieve. Coarse aggregate shall consist of crushed stone or gravel or a combination thereof, having hard, strong, durable particles free from elongation, dust, shale, earth, vegetable matter or other injurious substances. Coarse aggregate shall be clean and free from alkali, organic or other deleterious matter; shall have a minimum of two fractured faces; and shall have an absorption not exceeding 3%.

(b) The aggregate retained on the 5 mm sieve shall consist of clean, hard, tough, durable, angular particles with a rough surface texture, and shall be free from organic material, adherent coatings of clay, clay balls, an excess of thin particles or any other extraneous material.

(c) Course aggregate when tested for abrasion in accordance with ASTM C131 shall not have a loss greater than 30%.

(d) Tests of the coarse aggregate shall not exceed the limits for standard requirements prescribed in CSA A23.1, Table 12, for concrete exposed to freezing and thawing.

E13.4.7 Admixtures

(a) Air-entraining admixtures shall conform to the requirements of ASTM C260.

(b) Chemical admixtures shall conform to the requirements of ASTM C494 or C1017 for flowing concrete.

(c) All admixtures shall be compatible with all other constituents. The addition of calcium chloride, accelerators and air-reducing agents, will not be permitted, unless otherwise approved by the Contract Administrator.

E13.4.8 Cementitious Materials

(a) Cementitious materials shall conform to the requirements of CSA-A3000 and shall be free from lumps.

(b) Should the Contractor choose to include a silica fume admixture in the concrete mix design, the substitution of silica fume shall not exceed 8% by mass of cement.

(c) Should the Contractor choose to include fly ash in the concrete mix design, the fly ash shall be Class CI or F and the substitution shall not exceed 25% by mass of cement.

(d) Cementitious materials shall be stored in a suitable weather-tight building that shall protect these materials from dampness and other destructive agents. Cementitious materials that have been stored for a length of time resulting in the hardening, or the formation of lumps, shall not be used in the Work.

E13.4.9 Water

(a) Water to be used for all operations in the Specification, including mixing and curing of concrete or grout, surface texturing operations, and saturating the substrate shall conform to the requirements of CSA A23.1 and shall be free of oil, alkali, acidic, organic materials or deleterious substances. The Contractor shall not use water from shallow, stagnant or marshy sources.

E13.4.10 Formwork

(a) Formwork materials shall conform to CSA Standard A23.1, and American Concrete Institution Publication SP4, “Formwork for Concrete.”

(b) Form sheeting plywood to be covered with form liner or to be directly in contact with soil shall be exterior Douglas Fir, concrete form grade, conforming to CSA Standard O121, a minimum of 20 mm thick.

(c) Where form liner is not being used, form sheeting shall be Douglas Fir, overlay form liner type conforming to CSA Standard O121.

(d) Boards used for formwork shall be fully seasoned and free from defects such as knots, warps, cracks, etc., which may mark the concrete surface.

(e) No formwork accessories will be allowed to be left in place within 50 mm of the surface following form removal. Items to be left in place must be made from a non-rusting material or stainless steel; and they shall not stain, blemish, or spall the concrete surface for the life of the concrete.

(f) Forms for exposed surfaces that do not require a form liner may be either new plywood or steel as authorized by the Contract Administrator.

(g) Studding shall be spruce or pine and shall have such dimensions and spacing that they shall withstand without distortion all the forces to which the forms shall be subjected.

(h) Walers shall be spruce or pine, with minimum dimensions of 100 mm x 150 mm. Studding shall be spruce or pine, with minimum dimensions of 50 x 150.

(i) Stay-in-place formwork or falsework is not acceptable and shall not be used by the Contractor unless specifically shown on the Drawings.

E13.4.11 Form Coating

(a) Form coating shall be "Sternson C.R.A." by Sternson, "SCP Strip Ease" by Specialty Construction Products, or equivalent in accordance with B7 as accepted by the Contract Administrator.

E13.4.12 Permeable Formwork Liner

(a) Formwork liner shall be Texel Drainaform, or equivalent in accordance with B7 as accepted by the Contract Administrator. This formwork liner shall be used on all exposed formed surfaces, except soffit surfaces, or where a normal form finish is specified.

(b) Paper-lined forms shall be used on all soffit surfaces. The Contractor shall provide conclusive evidence that the paper-lined form proposed for use will not stain or otherwise blemish the hardened concrete surface.

E13.4.13 Curing Compound

(a) Curing compounds shall be liquid membrane-forming and conform to the requirements of ASTM Standard C309.

(b) Curing compound for approach slabs and slope paving shall be resin-based and white-pigmented.

(c) WR Meadows 1215 WHITE Pigmented Curing Compound is an approved product, or equivalent in accordance with B7 as accepted by the Contract Administrator.

E13.4.14 Curing Blankets

(a) Curing blankets for wet curing shall be 100 percent polyester, 3 mm thick, white in colour. An approved product is “Mirafi Geotextile P150”. Alternately, a 10 oz burlap, 5 mil polyethylene, curing blanket white in colour shall be used; “Curelap” manufactured by Midwest Canvas, together with a second layer of burlap, or equivalent in accordance with B7 as accepted by the Contract Administrator.

E13.4.15 Bonding Agents

(a) Latex Bonding Agent

(i) Latex bonding agent shall be Acryl-Stix, SikaCem 810, or equivalent in accordance with B7 as accepted by the Contract Administrator. Polyvinyl acetate-based latexes will not be permitted. Planicrete AC by MAPEI is approved for use as a latex bonding agent on concrete greater than 28 days in age, or equivalent in accordance with B7 as accepted by the Contract Administrator.

(b) Bonding Grout

(i) The grout for bonding the new deck slab concrete to the existing concrete deck slab concrete shall be mixed in an agitating hopper slurry pump and shall consist of the following constituents, by weight:

- 1 part water;
- 1 part latex bonding agent; and,
- 1½ parts Type GUSF Portland cement.

(ii) The consistency of the bonding grout shall be such that it can be brushed on the existing concrete surface in a thin, even coating that will not run or puddle in low spots.

E13.4.16 Epoxy Adhesive

(a) Epoxy adhesive for bonding concrete to steel shall be one of the following approved products: Sternson ST432 or ST433, Dural Duralbond, Capper Capbond E, Sikadur 32 Hi-bond, Concressive 1001 LPL, Meadows Rezi-Weld 1000, or equivalent in accordance with B7 as accepted by the Contract Administrator.

E13.4.17 Epoxy Grout

(a) Epoxy grout shall be one of the following approved products: Sternson Talygrout 100, Sika Sikadur 42, CPD Epoxy Grout by Specialty Construction Products, Meadows Rezi-Weld EG-96, or equivalent in accordance with B7 as accepted by the Contract Administrator.

E13.4.18 Cementitious Grout

(a) Cementitous grout shall be nonshrink and nonmetalic. Approved products are Sternson M-bed Standard, Specialty Construction Products CPD Non-Shrink Grout, Sika 212 Non-Shrink Grout, or equivalent in accordance with B7 as accepted by the Contract Administrator. The minimum compressive strength of the grout at 28 days shall be 40 MPa.

E13.4.19 Patching Mortar

(a) Patching mortar shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 1 part cement to 2 parts sand by damp loose volume. White Portland Cement shall be substituted for a part of the grey Portland Cement on exposed concrete in order to produce a colour matching the colour of the surrounding concrete, as determined by a trial patch. The quantity of mixing water shall be no more than necessary for handling or placing.

E13.4.20 Flexible Joint Sealant

(a) Flexible joint sealant for all horizontal, vertical, and sloping joints shall be guaranteed non-staining, grey polyurethane, accepted by the Contract Administrator and applied in strict accordance with the details shown on the Drawings and the Manufacturer's instructions including appropriate primers if recommended. Approved products are Vulkem 116 by Mameco, Sonolastic NP1 by Sonneborn, Sikaflex-1a by Sika, Bostik 915 by Bostik, or equivalent in accordance with B7 as accepted by the Contract Administrator,.

E13.4.21 Fibre Joint Filler

(a) Fibre joint filler shall be rot-proof and of the preformed, nonextruding, resilient type made with a bituminous fibre such as Flexcell and shall conform to the requirements of ASTM Standard D1751 or equivalent in accordance with B7 as accepted by the Contract Administrator.

E13.4.22 EMSEAL Precompressed Foam Joint Filler

(a) Expansion joint seal shall be EMSEAL BEJS or equivalent in accordance with B7 as approved by the Contract Administrator to ASTM C711 and ASTM G155.

(b) Sealant system shall be comprised of three components:

(i) Cellular polyurethane foam impregnated with hydrophobic 100% acrylic, water-based emulsion, factory coated with highway-grade, fuel resistant silicone;

(ii) Field-applied epoxy adhesive primer; and,

(iii) Field-injected silicone sealant bands.

(c) Impregnation agent to have proven non-migratory characteristics. Silicone coating to be highway-grade, low-modulus, fuel resistant silicone applied to the impregnated foam sealant at a width greater than maximum allowable joint extension and which when cured and compressed will form a bellows. Depth of seal as recommended by manufacturer. BEJS foam seal to be installed into manufacturer's standard field-applied epoxy adhesive. The BEJS SYSTEM is to be installed recessed from the surface such that when the field-applied injection band of silicone is installed between the substrates and the foam-and-silicone-bellows, the system will be ½" (12 mm) down from the substrate surface.

(d) Material shall be capable, as a dual seal, of movements of +50% to -50% (100% total) of nominal material size. Changes in plane and direction shall be executed using factory fabricated "Universal 90" transition assemblies. Transitions shall be warranted to be watertight at inside and outside corners through the full movement capabilities of the product.

(e) All substitute candidates to be certified in writing to be free in composition of any waxes or asphalts, wax compounds or asphalt compounds. All substitute candidates shall be certified in writing to be:

(i) Capable of withstanding 65°C for three (3) hours while compressed down to the minimum of movement capability dimension of the basis of design product (-50% of normal material size) without evidence of any bleeding of impregnation medium from the material; and,

(ii) That the same material after the heat stability test will self-expand to the maximum of movement capability dimension of the basis-of-design product (+50% of nominal material size) within twenty-four (24) hours at room temperature 20°C.

E13.4.23 Ethafoam Joint Filler

(a) Ethafoam joint filler shall be non-staining, polyethylene, closed-cell product for expansion and constraction and/or isolation joint application and shall be the type accepted by the Contract Administrator.

E13.4.24 Low Density Styrofoam

(a) Low density Styrofoam shall be the type accepted by the Contract Administrator.

E13.4.25 Backup Rod

(a) Backup rod shall be pre-formed compressible polyethylene, urethane, neoprene, or vinyl foam backer road, extruded into a closed cell form and oversized 30 to 50%.

E13.4.26 Dampproofing

(a) Dampproofing materials shall be applied to all buried concrete surfaces in contact with the soil to within 300 mm of Finished Ground Elevation, with the exception of those surfaces cast directly against the soil or in contact with prefabricated drainage composite. Dampproofing materials shall be mineral colloid emulsified asphalt complying with Canadian General Standards Board Specification CGSB No. 37. Acceptable product is Bakelite/Flintguard 710-11 Foundation Coating as manufactured by Bakor, Elsro Fibrated Foundation Coating, Insulmastic 7103 Fibered Waterproofing, or equivalent in accordance with B7 as accepted by the Contract Administrator.

(b) All damaged concrete, including tie holes to be filled with non-shrink grout prior to application of dampproofing.

(c) Primer for dampproofing shall be asphalt primer, penetrating type conforming to CGSB 37. Acceptable products are Bakor Penetrating 910-01 Asphalt Primer as

manufactured by Bakor Inc., Elsro Asphalt Primer No. 510, Insulmastic 7501 C/B Roof & Foundation Primer, or equivalent in accordance with B7 as accepted by the Contract Administrator.

E13.4.27 Miscellaneous Materials

(a) Miscellaneous materials shall be of the type specified on the Drawings or as accepted by the Contract Administrator.

E13.4.28 Benchmark Plugs

(a) Benchmark plugs shall be supplied by the City of Winnipeg. Installation by the Contractor shall be considered incidental to these Works. Installation locations shall be determined by the Contract Administrator.

E13.5 Equipment

E13.5.1 General

(a) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E13.5.2 Vibrators

(a) The Contractor shall have sufficient numbers of internal concrete vibrators and experienced operators on Site to properly consolidate all concrete in accordance with ACI 309. The type and size of vibrators shall be appropriate for the particular application, the size of the pour, and the amount of reinforcing and shall conform to standard construction procedures.

(b) The Contractor shall have standby vibrators available at all times during the pour.

E13.6 Construction Methods

E13.6.1 General

(a) It is intended that this Section cover all construction Work associated with Structural Concreting operations.

(b) Rate of application shall be the rate required to meet the requirements of ASTM C309 for the texture of concrete the curing compound is being applied to.

E13.6.2 Temporary False Work, Formwork, and Shoring

(a) Construction Requirements

(i) The Contractor shall construct falsework, formwork and shoring for the new deck slab concrete overhangs strictly in accordance with the accepted shop drawings.

(ii) All forms shall be of wood, metal or other materials as approved by the Contract Administrator. No formwork shall extend beneath the underside of the superstructure.

(iii) The falsework, formwork, and shoring for these Works shall be erected, and braced, as designed, and maintained to safely support all vertical and lateral loads until such loads can be supported by the concrete. All proposed fastening shall be as shown on the accepted shop drawings.

(iv) Forms shall be constructed and maintained so that the completed Work is within minus 3 mm or plus 6 mm of the dimensions shown on the Drawings.

(v) Formwork shall be cambered, where necessary to maintain the specified tolerance to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete, due to construction loads.

(vi) Slots, recesses, chases, sleeves, inserts, bolts, hangers, and other items shall be formed or set in coordination and cooperation with the trade concerned. No openings shall be made in structural members that are not shown on the shop drawings without the prior written approval of the Contract Administrator.

(vii) Shores shall be provided with positive means of adjustment (jacks or wedges). All settlement shall be taken up before or during concreting as required.

(viii) Mud sills of suitable size shall be provided beneath shores, bedded in sand or stone, where they would otherwise bear on soil. The soil below shores must be adequately prepared to avoid settlement during or after concreting. Shores must not be placed on frozen ground.

(ix) Shores shall be braced horizontally in two directions and diagonally in the same two vertical planes so that they can safely withstand all dead and moving loads to which they will be subjected.

(x) All exposed edges shall be chamfered 20 mm unless otherwise noted on the Drawings.

(xi) Formwork shall have sufficient strength and rigidity so that the resultant finished concrete conforms to the shapes, lines, and dimensions of the members shown on the Drawings.

(xii) Forms shall be constructed so as to be sufficiently tight to prevent leakage of grout or cement paste.

(b) Form panels shall be constructed so that the contact edges are kept flush and aligned.

(c) Forms for the concrete barriers shall be accordingly aligned to each other and to the geometry shown on the Drawings so as to provide a smooth, continuous barrier. Any misalignments in the barrier shall be cause for rejection and removal of same. No snap ties within the barriers shall be placed below 250 mm above the top of the upper lift elevation.

(d) Forms shall be clean before use. Plywood and other wood surfaces shall be sealed against absorption of moisture from the concrete by a field applied form coating or a factory applied liner as accepted by the Contract Administrator.

(e) Where prefabricated panels are used, care shall be taken to ensure that adjacent panels remain flush. Where metal forms are used, all bolts and rivets shall be counter sunk and well ground to provide a smooth, plane surface.

(f) Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be commercially manufactured types. The portion remaining within the concrete shall leave no metal within 50 mm of the surface when the concrete is exposed to view. Spreader cones on ties shall not exceed 30 mm in diameter. All fittings for metal ties shall be of such design that, upon their removal, the cavities which are left will be of the smallest possible size. Torch cutting of steel hangers and ties will not be permitted. Formwork hangers for exterior surfaces of decks and curbs shall be an acceptable break-back type with surface cone, or removable threaded type. Cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in matching colour of surrounding concrete.

(g) Formwork shall be constructed to permit easy dismantling and stripping and such that removal will not damage the concrete. Provision shall be made in the formwork for shores to remain undisturbed during stripping where required.

(h) It shall be permissible to use the forms over again where possible to a maximum of three uses, provided they are thoroughly cleaned and in good condition after being removed from the former portions of the Work. The Contract Administrator shall be the sole judge of their condition and his decision shall be final regarding the use of them again.

(i) Where required by the Contract Administrator, the Contractor shall cast test panels not using less than two panels of representative samples of the forms he proposes for reuse and shall strip them after forty-eight (48) hours for the Contract Administrator to judge the type of surface produced.

(j) All form lumber, studding, etc., becomes the property of the Contractor when the Work is finished, and it shall be removed from the concrete and the Site by the

Contractor after the concrete is set, incidental to the Work of this Specification, and the entire Site shall be left in a neat and clean condition.

E13.6.3 Concrete Construction Joints

(a) Concrete construction joints shall be located only where shown on the Drawings or as otherwise directed in writing by the Contract Administrator. Concrete construction joints shall be formed at right angles to the direction of the main reinforcing steel. All reinforcing steel shall be continuous across the joints.

(b) Forms shall be re-tightened and all reinforcing steel shall be thoroughly cleaned at the joint prior to concreting.

(c) After the forms are stripped off the construction joint, the entire face of the joint, including the reinforcing steel, shall be thoroughly cleaned down to sound concrete and the surface roughened.

(d) Refer to E13.6.11, “Preparation for Concreting Against Hardened Concrete”, for the requirements to prepare the hardened concrete at a construction joint for receiving new concrete.

E13.6.4 Concrete Control Joints

(a) Where control joints are shown between areas of floor slabs, they shall be formed by saw cutting to a depth and width shown on the drawings.

(b) Carry out saw cutting as soon as the surface can support the saw cutting equipment without damage to the surfaces to be cut.

(c) Complete saw cutting within 24 hours of placing concrete.

(d) Fill joints with sealant.

E13.6.5 Permeable Formwork Liner

(a) Permeable formwork liner shall be used on all exposed surfaces, except on soffit surfaces, or surfaces where a normal an architectural form finish is specified.

(b) The permeable formwork liner shall be used for only one (1) application.

(c) The supply, setup, application, and removal of permeable formwork liner shall be considered incidental to the placement of structural concrete, and no separate measurement or payment shall be made for this Work.

E13.6.6 Architectural Formwork Liner

(a) Architectural formwork liner shall be used at locations shown on the drawings.

(b) The architectural formwork liner shall be replaced after each use unless specifically allowed to be reused by the Manufacturer, as approved by the Contract Administrator.

(c) The supply, setup, installation, and removal of architectural formwork liner shall be considered incidental to the placement of structural concrete, and no separate measurement or payment shall be made for this Work.

E13.6.7 Control Joint Seals

(a) Formed control joints sealant for all horizontal, vertical and sloping joints shall be applied in strict accordance with the details shown on the Drawings and the Manufacturer’s instructions including appropriate primers if recommended.

(b) Form control joints shall be thoroughly cleaned before sealing.

E13.6.8 Benchmarks

(a) The Contractor shall install benchmark plugs supplied by the Contract Administrator at such locations on the structure as may be directed by the Contract Administrator.

E13.6.9 Supply of Structural Concrete

(a) All structural concrete shall be supplied from a plant certified by the Manitoba Ready Mix Concrete Association. The Contractor, upon request from the Contract Administrator, shall furnish proof of this certification.

(b) All mixing of concrete must meet the provisions of CSA A23.1, Clause 5.2, Production of Concrete.

(c) Time of Hauling

(i) The maximum time allowed for all types of concrete to be delivered to the Site of the Work, including the time required to discharge, shall not exceed 120 minutes after batching. Batching of all types of concrete is considered to occur when any of the mix ingredients are introduced into the mixer, regardless of whether or not the mixer is revolving. For concrete that includes silica fume and fly ash, this requirement is reduced to 90 minutes.

(ii) Each batch of concrete delivered to the Site shall be accompanied by a time slip issued at the batching plant, bearing the time of batching. In hot or cold weather, or under conditions contributing to quick stiffening of the concrete, a time less than 120 and/or 90 minutes may be specified by the Contract Administrator. The Contractor will be informed of this requirement twenty-four (24) hours prior to the scheduled placing of concrete.

(iii) To avoid the reduction of delivery and discharge time in hot weather, the Contractor will be allowed to substitute crushed ice for a portion of the mixing water provided the specified water/cementitious ratio is maintained. All of the ice shall be melted completely before discharging any of the concrete at the delivery point.

(iv) Unless otherwise noted in Table E13.1, “Requirements for Hardened Concrete”, no retarders shall be used.

(v) The concrete, when discharged from truck mixers or truck agitators, shall be of the consistency and workability required for the job without the use of additional mixing water. Additional water shall not be added to the concrete onsite.

(vi) A record of the actual proportions used for each concrete placement shall be kept by the Supplier and a copy of this record shall be submitted to the City upon request.

(d) Delivery of Concrete

(i) The Contractor shall satisfy himself that the Concrete Supplier has sufficient plant capacity and satisfactory transporting equipment to ensure continuous delivery at the rate required. The rate of delivery of concrete during concreting operations shall be such that the development of cold joints will not occur. The methods of delivering and handling the concrete shall facilitate placing with a minimum of rehandling, and without damage to the structure or the concrete.

E13.6.10 Concrete Placement Schedule

(a) The Contractor shall submit to the Contract Administrator the proposed concrete placement schedule for all concrete placements for review and approval. If, in the opinion of the Contract Administrator, the volume of the placement is deemed larger than can be placed with the facilities provided, the Contractor shall either:

(i) Limit the amount to be placed at any time (using adequate construction joints);

(ii) Augment his facilities and Plant in order to complete the proposed placement; and,

(iii) In the case of continuous placing, provide additional crews and have adequate lighting to provide for proper placing, finishing, curing and inspecting.

(b) The Contractor shall adhere strictly to the concrete placement schedule, as approved by the Contract Administrator.

E13.6.11 Preparation for Concreting Against Hardened Concrete

(a) All hardened concrete against which new concrete is to be placed shall be prepared in the following manner:

(i) Concrete shall be removed to sound concrete or to the limits as shown on the Drawings, whichever is greater. The resulting surface shall be roughened to remove latent cement and miscellaneous debris.

(ii) All existing surfaces and exposed reinforcing steel are to be sandblasted to reveal a clean substrate and kept clean until concrete placement. Sandblasting shall be followed by a high pressure water wash to remove all residues.

(iii) Surface shall be in saturated surface dry condition with no standing water.

(iv) Immediately prior to placing new concrete, bonding grout shall be thoroughly brushed onto the entire surface of the existing hardened concrete in a thin and even coating that will not run or puddle.

E13.6.12 Placing Structural Concrete

(a) The Contractor shall notify the Contract Administrator at least one (1) Working Day prior to concrete placement so that an adequate inspection may be made of formwork, shoring, reinforcement, deck joints, mechanical screed setup, movable hoarding, and related Works. No concrete pour shall be scheduled without the prior written approval of the Contract Administrator.

(b) The chart, Figure D1, Annex D of CSA Standard A23.1 shall be used to estimate surface moisture evaporation rates.

(c) Equipment for mixing or conveying concrete shall be thoroughly flushed with clean water before and after each pour. Water used for this purpose shall be discharged outside the forms. All equipment and processes are subject to acceptance by the Contract Administrator.

(d) Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent segregation and a marked change in consistency.

(e) Runways for concrete buggies and all pumping equipment shall be supported directly by the formwork and not on reinforcement.

(f) Before depositing any concrete, all debris shall be removed from the space to be occupied by the concrete, and any mortar splashed upon the reinforcement or forms shall be removed.

(g) Formwork liners shall be cooled immediately prior to placing concrete by spraying with cold water.

(h) Placing of concrete, once started, shall be continuous. No concrete shall be placed on concrete which has sufficiently hardened to cause the formation of seams or “cold joints” within the section. If placing must be interrupted, construction joints shall be located where shown on the Drawings or as accepted by the Contract Administrator.

(i) Concrete shall be placed as nearly as possible in its final position. Rakes or mechanical vibrators shall not be used to transport concrete.

(j) The maximum free drop of concrete into the forms shall not be greater than 1.5 m, otherwise rubber tubes or pouring ports spaced not more than 1.5 m vertically and 2.5 m horizontally shall be used. The Contractor shall obtain the Contract Administrator's acceptance, prior to pouring concrete, of all placing operations.

(k) All concrete, during and immediately after depositing, shall be consolidated by mechanical vibrators so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into the corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. Mechanical vibrators shall have a minimum frequency of 7000 revolutions per minute immersed.

(l) Vibrators shall be inserted systematically into the concrete at intervals such that the zones of influence of the vibrator overlap (generally 300 to 900 mm). Apply the vibrator at any point until the concrete is sufficiently compacted (5 to 15 seconds), but not long enough for segregation to occur. The vibrators shall be inserted

vertically and withdrawn out of the concrete slowly. Spare vibrators in good working condition shall be kept on the job Site during all placing operations.

(m) Concrete shall not be placed during rain or snow unless adequate protection is provided for formwork and concrete surfaces, to the satisfaction of the Contract Administrator.

E13.6.13 Finishing of Concrete Surfaces

(a) Finishing Operations for Unformed Surfaces

(i) The Contractor shall ensure that sufficient personnel are provided for the finishing of the slab surfaces. In the event that the depositing, vibrating, and screeding operations progress faster than the concrete finishing, the Contractor shall reduce the rate of concrete placement or cease the depositing of concrete until the exposed area of unfinished concrete has been satisfactorily minimized. The Contract Administrator's judgement in this matter shall be final and binding on the Contractor. All loads of concrete that exceed the 120 minute discharge time limit during the delay, while the finishing operations catch up, shall be rejected.

(b) Type 1 Finish – Exposed Formed Surfaces

(i) A permeable formwork liner finish shall be applied to all exposed formed surfaces including all exposed concrete surfaces not included in Type 2, Type 3, Type 4 finishes.

(ii) Exposed surfaces imply all surfaces exposed to view including surfaces to 300 mm below finish grade elevations.

(iii) All surfaces to receive a formwork liner finish shall be formed using an approved permeable formwork liner.

(iv) The surfaces shall be patched as specified in this Specification.

(c) Type 2 Finish – Unformed Surfaces

(i) All unformed concrete surfaces shall be finished as outlined hereinafter.

(ii) Screeding of all unformed concrete surfaces shall be performed by the sawing movement of a straightedge along wood or metal strips or form edges that have been accurately set at required elevations.

(iii) Screeding shall be done on all concrete surfaces as a first step in other finishing operations. Screeding shall be done immediately after the concrete has been vibrated.

(iv) After screeding, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared. Concrete surfaces after floating shall have a uniform, smooth, granular texture.

(d) Type 3 Finish - Surfaces Below Finished Grade

(i) All surfaces below 300 mm below finished grade except underside of footings shall be patched in accordance with the requirements of Sections E13.4.15, E13.4.16, and E13.6.16 of this Specification.

(ii) All surfaces below 300 mm below finish grade shall receive damp-proofing in accordance with E13.4.26 of this Specification.

(e) Working Base Concrete Finish

(i) During placing, concrete working base shall be vibrated, screeded and floated.

(ii) The supply, set up, operation, and finishing of working base concrete shall be considered incidental to the works of this specification, and no separate measurement or payment shall be made for this Work.

E13.6.14 General Curing Requirements

(a) Refer to E13.6.17 for cold weather curing requirements and E13.6.18 of this Specification for hot weather curing requirements.

(b) The use of curing compound shall not be allowed on concrete areas that are to receive additional concrete, dampproofing, a waterproofing membrane, or an asphalt overlay.

(c) Freshly finished concrete shall have either a curing compound applied, or shall be moist cured by immediately applying wet curing blankets to the exposed concrete surface immediately following finishing operations and continuously wetted for at least seven (7) consecutive days thereafter. Construction joints shall be cured by means of wet curing blankets only.

(d) Curing compound shall be applied at the rate required by the manufacturer's instruction for the accepted product.

(e) Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping, running water, vibration, and mechanical shock. No machinery shall travel in the vicinity of freshly placed concrete for a period of twenty-four (24) hours. Concrete shall be protected from freezing until at least twenty-four (24) hours after the end of the curing period.

(f) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3ºC in one hour or 20ºC in twenty-four (24) hours.

(g) Care shall be exercised to ensure that the polyester curing blanket is well drained and that it is placed as soon as the surface will support it without deformation. The Contractor shall ensure that water from the polyester curing blankets does not run into areas where concrete placement and finishing operations are underway. If this occurs, concrete placement shall stop until the problem is corrected satisfactory to the Contract Administrator.

(h) Formed surfaces shall receive, immediately after stripping and patching, the same curing as finished surfaces, with the exception of the Bridge deck overhang surfaces.

(i) For curing of barriers, formwork shall remain in place for six (6) consecutive days following concreting. The top surface of the concrete surface shall be moist cured during this timeframe.

E13.6.15 Form Removal

(a) The Contractor shall notify the Contract Administrator at least one (1) Working Day prior to form removal. The Contractor shall not commence any form removal operations without the prior written acceptance of the Contract Administrator.

(b) All forms shall remain in place and the concrete shall not be loaded for a minimum of seven (7) days after initial concrete placement, unless otherwise authorized by the Contract Administrator in writing.

(c) Notwithstanding the above, the minimum strength of in-place concrete prior to removal of vertical forms for deck extensions shall be 25 MPa, with the added provision that the member shall be of sufficient strength to safely carry its own weight, together with super-imposed construction loads.

(d) Field-cured test specimens representative of the cast-in-place concrete being stripped shall be tested as specified in this Specification to verify the concrete strength.

E13.6.16 Patching of Formed Surfaces

(a) The Contractor shall notify the Contract Administrator at least one (1) Working Day prior to removal of forms. Immediately after forms have been removed and before the Contractor commences any surface finishing or concrete patching operations, all newly exposed concrete surfaces shall be inspected by the Contract Administrator.

(b) Any repair or surface finishing started before this inspection may be rejected and required to be removed.

(c) Patching of formed surfaces shall take place within twenty-four (24) hours of formwork removal.

(d) All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purposes cut back 75 mm from the surface before patching.

(e) Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched, then applying bonding grout followed by patching mortar. Bonding grout shall be well brushed onto the area immediately prior to patching. When the bonding grout begins to lose the water sheen, the patching mortar shall be thoroughly trowelled into the repair area to fill all voids. It shall be struck off slightly higher than the adjacent concrete surface and left for one (1) hour before final finishing to facilitate initial shrinkage of the patching mortar. It shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification. The final colour shall match the surrounding concrete.

(f) Concrete shall be cast against forms which will produce plane surfaces with no bulges, indentations, or protuberances other than those shown on the Drawings. All objectionable fins, projections, offsets, streaks, or other surface imperfections on the concrete surface shall be removed by means acceptable to the Contract Administrator. Cement washes of any kind shall not be used.

(g) The arrangement of panel joints shall be kept to a minimum. Panels containing worn edges, patches, or other defects which will impair the texture of concrete surfaces shall not be used.

E13.6.17 Cold Weather Concreting

(a) The requirements of CSA Standard A23.1 shall be applied to all concreting operations during cold weather, i.e., if the mean daily temperature falls below 5°C during placing or curing.

E13.6.18 Hot Weather Concreting

(a) General

(i) The requirements of this section shall be applied during hot weather, i.e., air temperatures forecast to go higher than 27°C during placing.

(ii) Concrete at discharge shall be at as low a temperature as possible, preferably as low as 15°C, but not above 25°C. Concrete containing silica fume shall be between 10°C minimum and 18°C maximum at discharge. Aggregate stockpiles should be cooled by water sprays and sun shades.

(iii) The Contractor shall use cold water and/or ice in the mix to keep the temperature of the fresh concrete down, if required. Ice may be substituted for a portion of the mixing water; provided it has melted by the time mixing is completed.

(iv) Form and conveying equipment shall be kept as cool as possible before concreting by shading them from the sun, painting their surfaces white and/or the use of water sprays.

(v) Sun shades and wind breaks shall be used as required during placing and finishing.

(vi) Work shall be planned so that concrete can be placed as quickly as possible to avoid "cold joints".

(vii) The Contract Administrator's acceptance is necessary before the Contractor may use admixtures such as retardants to delay setting, or water reducing agents to maintain Workability and strength, and these must appear in the Mix Design Statement submitted to the Contract Administrator.

(viii) Hot weather curing shall follow immediately after the finishing operation.

(b) Hot-Weather Curing

(i) When the air temperature is at or above 25°C, curing shall be accomplished by fog misting and by using saturated absorptive fabric, in order to achieve cooling

by evaporation. Note that fog misting is mandatory for all deck slab and median slab pours at all temperatures.

(ii) Mass concrete shall be water cured for the basic curing period when the air temperature is at or above 20°C, in order to minimize the temperature rise of the concrete.

(c) Job Preparation

(i) When the air temperature is forecast to rise to 25°C or higher during the placing period, provisions shall be made by the Contractor for protection of the concrete in place from the effects of hot and/or drying weather conditions. Under severe drying conditions, the formwork, reinforcement, and concreting equipment shall be protected from the direct rays of the sun or cooled by mist fogging and evaporation, to the satisfaction of the Contract Administrator.

(d) Concrete Temperature

(i) The temperature of the concrete as placed shall be as low as practicable and in no case greater than the following temperatures, as shown in Table E13.2, "Acceptable Concrete Temperature", for the indicated size of the concrete section.

TABLE E13.2: ACCEPTABLE CONCRETE TEMPERATURES

THICKNESS OF SECTION	TEMPERATURE °C	
	MINIMUM	MAXIMUM
Less than: 1.0 m 1.2 m	 10 5	 27 25

E13.6.19 Cleanup

(a) The Contractor shall cleanup equipment and construction debris on at least a daily basis to the satisfaction of the Contract Administrator.

E13.7 Quality Assurance and Quality Control

E13.7.1 General

(a) The Contract Administrator shall be afforded full access for the inspection and control and assurance testing of concrete and constituent materials, both at the Site of Work and at any plant used for the production of concrete, to determine whether the concrete is being supplied in accordance with this Specification.

(b) The Contract Administrator reserves the right to reject concrete in the field that does not meet the Specifications.

(c) The Contractor shall provide, without charge, the samples of concrete and the constituent materials required for Quality Assurance tests and provide such assistance and use of tools and construction equipment as is required.

(d) Quality Assurance and control tests will be used to determine the acceptability of the concrete supplied by the Contractor.

(e) The Contractor will be required to undertake Quality Control tests, of all concrete supplied. All test results are to be copied to the Contract Administrator immediately after the tests have been performed.

E13.7.2 The frequency and number of concrete Quality Control tests shall be in accordance with the requirements of CSA Standard A23.1. Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract

Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work.

(b) The Contractor shall be wholly responsible for the control of all operations incidental thereto, notwithstanding any inspection or acceptance that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works, which are not in accordance with the requirements of this Specification.

(c) Quality Assurance testing shall be undertaken by the Contract Administrator. Quality Control testing shall be undertaken by the Contractor.

E13.7.3 Access

(a) The Contractor shall allow the Contract Administrator free access to all parts of the Work at all times. The Contractor shall supply samples to the Contract Administrator or his inspector for testing purposes as required. There will be no charge to the City for samples taken.

E13.7.4 Materials

(a) All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Quality Assurance Testing Laboratory designated by the Contract Administrator. There shall be no charge to the City of Winnipeg for any materials taken by the Contract Administrator for testing purposes.

(b) All materials shall conform to CSA Standard A23.1.

(c) All testing of materials shall conform to CSA Standard A23.2.

(d) All materials shall be submitted to the Contract Administrator for acceptance at least twenty (20) Business Days prior to its scheduled incorporation into any construction. If, in the opinion of the Contract Administrator, such materials, in whole or in part, do not conform to the Specifications detailed herein or are found to be defective in manufacture or have become damaged in transit, storage, or handling operations, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E13.7.5 Concrete Testing

(a) Slump tests shall be made in accordance with CSA Standard Test Method A23.2-5C, "Slump of Concrete". If the measured slump falls outside the limits in E13.3.2 of this Specification, a second test shall be made. In the event of a second failure, the Contract Administrator reserves the right to refuse the use of the batch of concrete represented.

(b) Air content determinations shall be made in accordance with CSA Standard Test Method A23.2-4C, "Air Content of Plastic Concrete by the Pressure Method". If the measured air content falls outside the limits in E13.4.3 of this Specification, a second test shall be made at any time within the specified discharge time limit for the mix. In the event of a second failure, the Contract Administrator reserves the right to reject the batch of concrete represented.

(c) The air-void system shall be proven satisfactory by data from tests performed in accordance with the test method of ASTM C457. The spacing factor, as determined on concrete cylinders moulded in accordance with CSA Standard Test Method A23.2-3C, shall be determined prior to the start of construction on cylinders of concrete made with the same materials, mix proportions, and mixing procedures as intended for the project. If deemed necessary by the Contract Administrator to further check the air-void system during construction, testing of cylinders may be from concrete as delivered to the job Site and will be carried out by the Contract Administrator. The concrete will be considered to have a satisfactory air-void system when the average of all tests shows a spacing factor not exceeding 230 microns with no single test greater than 260 microns.

(d) Rapid chloride permeability testing shall be performed in accordance with ASTM C 1202 and shall meet the requirements of each class of concrete.

(e) Samples of concrete for test specimens shall be taken in accordance with CSA Standard Test Method CSA-A23.2-1C, "Sampling Plastic Concrete".

(f) Test specimens shall be made and cured in accordance with CSA Standard Test Method A23.2-3C, "Making and Curing Concrete Compression and Flexure Test Specimens".

(g) Compressive strength tests at twenty-eight (28) days shall be the basis for acceptance of all concrete supplied by the Contractor. For each twenty-eight (28) day strength test, the strength of two companion standard-cured test specimens shall be determined in accordance with CSA Standard Test Method A23.2-9C, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the average of the strengths of the two specimens. A compressive strength test at seven (7) days shall be taken, the strength of which will be used only as a preliminary indication of the concrete strength, a strength test being the strength of a single standard cured specimen.

(h) Compressive strength tests on specimens cured under the same conditions as the concrete Works shall be made to check the strength of the in-place concrete so as to determine if the concrete has reached the minimum allowable working compressive strength as specified in Table E13.1 of this Specification and also to check the adequacy of curing and/or cold weather protection. At least two (2) field-cured test specimens shall be taken to verify strength of the in-place concrete. For each field-cured strength test, the strength of field-cured test specimens shall be determined in accordance with CSA Standard Test Method A23.2-9C, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the strength of the specimen.

E13.7.6 Corrective Action

(a) If the results of the tests indicate that the concrete is not of the specified quality, the Contract Administrator shall have the right to implement additional testing, as required, to further evaluate the concrete, at the Contractor's expense. The Contractor shall, at his own expense, correct such Work or replace such materials found to be defective under this Specification in an acceptable manner to the satisfaction of the Contract Administrator.

E13.8 Measurement and Payment

E13.8.1 Structural Concrete

(a) Supplying and placing structural concrete will not be measured. This Work shall be paid for at the Contract Lump Sum Price for the “Items of Work” listed here below, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

(b) Items of Work:

(i) Structural

(c) Supplying and installing all the listed materials, concrete design requirements, equipment, construction methods, and quality control measures associated with this Specification and Drawings shall be considered incidental to “Structural Concrete”, unless otherwise noted herein. No measurement or payment shall be made for this Work unless indicated otherwise.

E13.8.2 Concrete Heating and Hoarding

(a) Where conditions require heating and hoarding of concrete, this work shall be considered incidental to Structural Concrete and no separate measurement or payment will be made.

E13.8.3 Rigid Insulation

(a) Supplying and placing rigid insulation will be measured on a square meter basis and paid for at the Contract Unit Price for Rigid Insulation. The amount to be paid for will be the total area of rigid insulation installed in accordance with this Specification, Drawings, and accepted and measured by the Contract Administrator.

E14. SUPPLYING AND PLACING REINFORCING STEEL

E14.1 Description

(a) This Specification shall cover all operations relating to the supply, fabrication, delivery, and placement of black steel reinforcing, hot-dipped galvanized steel reinforcing and stainless steel reinforcing, and associated bar accessories, as specified herein and as shown on the Drawings.

(b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E14.2 Scope of Work

(a) The Work under this Specification shall involve supplying and placing all steel reinforcing, as shown on the Drawings.

E14.3 References

(a) All related Specifications and reference Standards are in accordance with the most current issue or latest revision:

(i) ASTM A955M – Standard Specification for Deformed and Plain Stainless-Steel Bars for Concrete Reinforcing;

(ii) ASTM A615M – Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement;

(iii) ASTM A143 – Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedures for Detecting Embrittlement.

(iv) ASTM A780/A780M – Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings;

(v) ASTM A767/A767M – Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement;

(vi) CAN/CSA A23.1/A23.2 – Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete;

(vii) CAN/CSA G30.18 – Billet Steel Bars for Concrete Reinforcement;

(viii) ACI 315 – Details and Detailing of Concrete Reinforcement;

(ix) ACI 315R – Guide to Presenting Reinforcing Steel Design Details; and,

(x) Reinforcing Steel Institute of Canada (RSIC), Manual of Standard Practice.

E14.4 Submittals

E14.4.1 General

(a) At least twenty-one (21) Days prior to the scheduled commencement of any fabrication, the qualifications of the Contractor and its Operators shall be submitted to the Contract Administrator for review and approval.

(b) The Contractor shall submit to the Contract Administrator for review and approval, at least fourteen (14) Days prior to commencement of any schedule Work on the Site, a proposed schedule, including methods and sequence of operations.

(c) The Contractor shall submit to the Contract Administrator for review, at least fourteen (14) Days prior to the commencement of any Work on Site a Certificate of Compliance from the Manufacturer stating that the stainless steel materials supplied

comply with the provisions of ASTM A955M and these Specifications, including corrosion resistance.

(d) Contractor shall submit all original mill certificates to the Contract Administrator prior to placement of reinforcing on site.

(e) Contractor to submit Quality Control Testing Program to the Contract Administrator.

(f) Contractor to submit Shop Drawings (including bar lists) in accordance with E3 and the latest edition of the Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada (RSIC).

E14.5 Materials

E14.5.1 General

(a) The Contractor shall be responsible for the supply, safe storage, and handling of all materials set forth in this Specification. All materials shall be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

(b) Bundles of reinforcing steel shall be identified by tags containing bar marks.

(c) The reinforcing steel shall not be placed directly on the ground. Sufficient timber pallets or blocking shall be placed under the reinforcing steel to keep them free from dirt and mud.

E14.5.2 Handling and Storage of Stainless Steel Reinforcing

(a) Stainless steel reinforcing shall be store separately from other reinforcing steel with the bar tags maintained and clearly visible until placing operations commence. Stacks of bundles of straight bars shall have adequate blocking to prevent contact between the layers of bundles.

(b) Chains for steel bands used for shipping shall not be in direct contact with stainless steel reinforcing. Wood or approved alternate should be used to protect the bars

(c) Nylon or polypropylene slings shall be used for moving stainless steel reinforcing.

(d) Keep carbon steel tools, chains, slings, etc. off stainless steel reinforcing.

E14.5.3 Reinforcing Steel

(a) Reinforcing steel shall be deemed to include all reinforcing bars, tie-bars, and dowels.

(b) All reinforcing steel shall conform to the requirements of CSA Standard CAN/CSA G30.18, Grade 400W, Billet-Steel Bars for Concrete Reinforcement.

(c) Stainless steel, as shown on the Drawings, shall be a high-manganese, low-nickel, nitrogen-strengthened austenitic stainless steel. Stainless steel reinforcing shall meet or exceed the minimum requirements of ASTM A955M, 300 Series, minimum Grade 420, of the Types listed below in Table E13.8.3.1, “Type of Stainless Steel Reinforcing”. Reinforcing deformations shall conform to the requirements of ASTM A615M. All hooks and bends shall be bent using pin diameters and dimension recommended by Reinforcing Steel Institute of Canada (RSIC), Manual of Standard Practice.

(d) If, in the opinion of the Contract Administrator, any reinforcing steel provided for the concrete Works exhibit flaws in manufacture or fabrication, such material shall be immediately removed from the Site and replaced with acceptable reinforcing steel. No additional costs will be applied to this Contract for the replacement of deficient reinforcing steel.

(e) All reinforcing steel shall be straight and free from paint, oil, millscale, and injurious defects. Rust, surface seams or surface irregularities will not be cause for rejection, provided that the minimum dimensions, cross-sectional area, and tensile properties of a hand wire-brushed specimen are not less than the requirements of CSA Standard CAN/CSA G30.18 and ASTM A955M.

TABLE E13.8.3.1 TYPE OF STAINLESS STEEL REINFORCING		
Common or Trade Name	**AISI Type**	**UNS Designation**
Type 316 LN	316 LN	S31653
Type 2205	Duplex 2205	S31803
Type 2304	EnduraMet 2304	S32304

E14.5.4 Galvanizing

(a) Shop Applied

(i) The galvanizing shall be shop applied and strictly in accordance with CSA Standard G164 and ASTM A767M latest addition to a retention equal to a Class II level (610 g/m2), except as otherwise specified herein.

(ii) Submit an original and three (3) copies of the coating applicator's notarized Certificate of Compliance that the hot-dip galvanized coating meets or exceeds the specified requirements.

(iii) Preclean reinforcing steel using acceptable methods to produce an acceptable surface for quality hot-dip galvanizing. If sulphuric acid or hydrochloric acid is used as a pickling bath for precleaning, care shall be exercised to minimize the immersion time. If signs of hydrogen embrittlement are present after pickling due to excessive immersion time, all reinforcing in that shipment will be rejected and shall be replaced at no additional cost to this Contract.

(iv) Handle all articles to be galvanized in such a manner as to avoid any mechanical damage and to minimize distortion.

(v) The surface finish shall be continuous, adherent, as smooth and evenly distributed as possible, and free from any defect detrimental to the stated end use of the coated article.

(vi) Coating adhesion shall withstand normal handling consistent with the nature and thickness of the coating and normal use of the article.

(vii) Sheared ends of bars shall be coated with a zinc-rich formulation before rusting occurs and before shipment to the job site.

(viii) Furthermore, all field welds, as well as cracking and other visible damage or deterioration of the hot-dip galvanizing as a result of handling or bending operations, or any other causes, shall be galvanize-coated with field applied galvanizing touch-up material as specified hereinafter.

(b) Field Applied

(i) All field applied galvanized coatings shall be applied in accordance with ASTM A780M.

(ii) Further to ASTM A780M, paints used for field applied galvanizing shall contain zinc dust above 92% in the dried film.

(iii) At least seven (7) days prior to any field applied galvanizing, the Contract shall submit the galvanizing product and application details to the Contract Administrator for review.

(iv) Spray applied field galvanizing will not be permitted. Where restrictions occur that brush applied field galvanizing is not possible, spray applied field galvanizing may be permitted if accepted in writing by the Contract Administrator prior to application.

(v) All field applied galvanized coatings shall be applied in accordance with the manufacturer's recommendations and as directed by the Contract Administrator.

(vi) The maximum area to be repaired in the field shall be 2,000 mm2. Any damaged article with a damaged area greater shall be rejected, removed, and replaced at the Contractor's expense.

E14.5.5 Bar Accessories

(a) Bar accessories shall be of types suitable for each type of reinforcing and a type acceptable to the Contract Administrator. They shall be made from a non-rusting material, and they shall not stain, blemish, or spall the concrete surface for the life of the concrete.

(b) Bar chairs, bolsters, and bar supports shall be cementitious material as acceptable to the Contract Administrator. Plastic, PVC or galvanized bar chairs may be permitted if accepted in writing by the Contract Administrator prior to installation.

(c) The use of pebbles, pieces of broken stone or brick, plastic, metal pipe, and wooden blocks, will not be permitted.

(d) Placing of bar supports shall be done to meet the required construction loads.

(e) Tie wire shall be the following:

(i) Black, soft-annealed 1.6 mm diameter wire or Nylon coated wire for black steel reinforcing;

(ii) Nylon coated wire or 1.6 mm galvanized coated wire for hot-dipped galvanized steel reinforcing; and,

(iii) Stainless steel, fully annealed 1.6 mm diameter wire, Type 316 or 316L for stainless steel reinforcing.

(f) Approved products are as supplied by Con Sys Inc., Box 341, Pinawa, Manitoba, Canada R0E 1L0 (204) 753-2404, or equivalent in accordance with B7 as accepted by the Contract Administrator.

(g) Bar accessories are not included in the Drawings and shall include bar chairs, spacers, clips, wire ties, wire (18 gauge minimum), or other similar devices and are to be acceptable to the Contract Administrator. The supplying and installation of bar accessories shall be deemed to be incidental to the supplying and placing of reinforcing steel.

E14.5.6 Mechanical Splices

(a) Mechanical splices shall be stainless steel, meeting the requirements of ASTM A955M, Type 316L, Type 2005, or Type 2304.

E14.6 Construction Methods

E14.6.1 Fabrication of Reinforcing Steel

(a) General

(i) Reinforcing steel shall be fabricated in accordance with CSA Standard CAN/CSA G30.18 to the lengths and shapes as shown on the Drawings.

(b) Black Steel Reinforcing

(i) Heating shall not be used as an aid in bending black steel reinforcing.

(ii) Hooks and bends should be smooth and not sharp.

(iii) Fabrication of the black steel reinforcing shall be straight and free of paint, oil, mill scale, and injurious defects.

(c) Galvanized Reinforcing Steel

(i) The reinforcing fabricator shall consult with the Contractor, Contract Administrator and hot-dip galvanizer regarding potential problems or potential handling problems prior or during the galvanizing process.

(ii) Remove all welding slag, splatter, antisplatter compounds, and burrs prior to delivery for galvanizing.

(iii) Avoid unsuitable marking paints. Consult with the galvanizer about removal of grease, oil, paint, and other deleterious material prior to fabrication.

(iv) Remove by blast cleaning or other methods surface contaminants and coatings which would not be removable by the normal chemical cleaning process in the galvanizing operation.

(v) Hooks or bends should be smooth and not sharp. Bars are to be bent prior to galvanizing. Minimum bend diameters shall be provided in accordance with ASTM A767 latest edition.

(vi) The reinforcing shall be a minimum of 10°C prior to bending and galvanizing operations, regardless of ambient temperatures in the plant. Where ambient temperatures fall below 10°C, bending and galvanizing in a facility that is not enclosed and temperature controlled will not be permitted.

(vii) The Contractor is responsible to ensure that accelerated strain-embrittlement does not occur during the manufacturing, bending practices and galvanizing of the reinforcing steel. The Contractor shall submit to the Contract Administrator the following;

- Reinforcing Supplier standards of practice for working of reinforcing steel. This shall include bending practices as per ASTM A767-latest addition and temperature requirements during fabrication (bending) of reinforcing. This is to be submitted with the Certificate of Compliance from the Manufacturer as specified in E14.4.1(c).
- Contractor is to carry out a Quality Control Testing Program following the requirements as per ASTM A143/A143M-latest addition. This will include but not limited to random bent bars to be tested after galvanizing, photos of items before and after testing, and a report submitted to the Contract Administrator for each trailer load received on site. Testing criteria shall be submitted for review and approval to the Contract Administrator at least ten (10) Business days prior to manufacturing of reinforcing.

(d) Stainless Steel Reinforcing

(i) Heating shall not be used as an aid in bending stainless steel reinforcing.

(ii) Hooks and bends should be smooth and not sharp.

(iii) Fabrication of the solid stainless steel reinforcing shall be such that the bar surfaces are not contaminated with deposits of iron and/or non-stainless steel or damage to the surface of the bars.

(iv) The stainless steel reinforcing shall be mechanically or chemically de-scaled prior to fabrication, leaving a totally passive stainless steel finish free of millscale, slag, or oxidation. Iron contamination shall be removed with picking paste or by wire brushing. Wire brush cleaning shall be done with stainless steel wire brushes only.

(v) All hand tools shall be stainless tools that have not been used on carbon steel.

E14.6.2 Placing of Reinforcing Steel

(a) Reinforcing steel shall be placed accurately in the positions shown on the Drawings and shall be retained in such positions by means of a sufficient number of bar accessories so that the bars shall not be moved out of alignment during or after the depositing of concrete. The Contract Administrator's decision in this matter shall be final.

(b) Reinforcing steel shall be free of all foreign material in order to ensure a positive bond between the concrete and steel. The Contractor shall also remove any dry concrete which has been deposited on the steel from previous pouring operations before additional concrete may be placed. Intersecting bars shall be tied positively at each intersection.

(c) Splices in reinforcing steel shall be made only where indicated on the Drawings. Prior acceptance by the Contract Administrator shall be obtained where other splices must be made. Welded splices will not be permitted.

(d) Place reinforcing bars to provide a clear space between the reinforcing bars as shown on the Drawings to accurately place preformed holes where necessary.

(e) Reinforcing steel shall not be straightened or rebent in a manner that will injure the metal or create excess damage to the galvanized coating. Bars with bends not shown on the Drawings shall not be used.

(f) Heating of reinforcing steel will not be permitted without prior acceptance by the Contract Administrator.

(g) A minimum of twenty-four (24) hours advance notice shall be given to the Contract Administrator prior to the pouring of any concrete to allow for inspection of the reinforcement.

(h) Following placement of galvanized-coated bars, all areas of damaged coating shall be repaired using approved touch-up coating material specified in Clause E14.5.4(b).

E14.7 Quality Control

E14.7.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or acceptance that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works which are not in accordance with the requirements of this Specification, regardless of any previous inspection or approval.

E14.7.2 Access

(a) The Contract Administrator shall be afforded full access for the inspection and control testing of reinforcing steel, both at the Site of Work and at any plant used for the fabrication of the reinforcing steel, to determine whether the reinforcing steel is being supplied in accordance with this Specification.

E14.7.3 Quality Testing

(a) Quality control testing may be used to determine the acceptability of the reinforcing steel supplied by the Contractor.

(b) The Contractor shall provide, without charge, the samples of reinforcing steel required for quality control tests and provide such assistance and use of tools and construction equipment as is required.

E14.8 Measurement and Payment

E14.8.1 Supplying and installing all the listed materials, construction methods, and quality control measures associated with this Specification and Drawings shall be considered incidental to “Structural”. No measurement or payment shall be made for this Work unless indicated otherwise.

E15. SUPPLY, FABRICATION, AND ERECTION OF MISCELLANEOUS METAL

E15.1 Description

(a) This specification shall cover all operations relating to the supply, fabrication, and erection of miscellaneous metal as shown or described on the Drawings and in this Specification.

(b) Miscellaneous metal includes, but is not limited to;

(i) Galvanized steel guardrail, stairsways, and stairway handrails, steel fabrications including the container guides, steel nosings, pole structures for security and facility lighting, anchor bolts, and anchor rods.

(ii) Quality control of materials and fabrication, including magnetic particle testing of welds.

(iii) Galvanizing of miscellaneous metal, and

(iv) Aluminum hatch covers and frames.

(c) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all other things necessary for and incidental to the satisfactory completion of all Work as hereinafter specified.

(d) Scope of Work

(i) Supply and install galvanized steel guardrails

(ii) Supply and install galvanized steel stairways

(iii) Supply and install galvanized hoist beams

(iv) Supply and install galvanized steel for repair works

(v) Repair of existing ladder

(vi) Supply and install aluminum hatch cover and frames

(vii) Supply and install of anchor bolts and anchor rods.

(viii) Supply and install of miscellaneous pre or post- installed mechanical or adhesive fasteners or anchors related to any of the above works.

E15.2 References and Related Specifications

(a) All related specifications shall be current issued or latest revision at the first date of tender advertisement.

E15.2.1 References

(a) CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steel

(b) CAN/CSA W48, Filler Metals and Allied Materials for Metal Arc Welding

(c) CSA W59, Welded Steel Construction (Metal Arc Welding)

(d) CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles

(e) CSA W47.1, Certification of Companies for Fusion Welding of Steel

(f) ASTM A36, Standard Specification for Carbon Structural Steel

(g) ASTM A53, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless

(h) ASTM A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

(i) ASTM A123, Standard Specification for Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products

(j) ASTM A240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

(k) ASTM A276, Standard Specification for Standard Specification for Stainless Steel Bars and Shapes

(l) ASTM A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

(m) ASTM A320, Standard Specification for Alloy Steel and Stainless Steel Bolting Materials for Low Temperature Service

(n) ASTM A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

(o) ASTM A484, Standard Specification for General Requirements for Stainless Steel Bars, Billets and Forgings

(p) ASTM A449, Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength General Use

(q) ASTM A1064/1064M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

(r) ASTM A500/A500M, Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

(s) ASTM A514/A514M, Standard Specification for High- Yield- Strength, Clenched and Tempered Alloy Steel Plate, Suitable for Welding

(t) ASTM A516/A516M, Standard Specification for Pressure Vessel Plates, Carbon Steel, For Moderate and Low Temperature Service

(u) ASTM A517/A517M, Standard Specification for Pressure Vessel Plates, Alloy Steel, High Strength, Quenched and Tempered

(v) ASTM A615, Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement

(w) ASTM A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

(x) ASTM F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

(y) ASTM B22/B22M, Standard Specification for Bronze Castings for Bridges and Turntables

(z) ASTM B29, Standard Specification for Refined Lead

(aa) ASTM B100, Standard Specification for Wrought Copper-Alloy Bearing and Expansion Plates and Sheets for Bridge and Other Structural Use

(bb) ANSI B46.1, Surface Texture (Surface Roughness, Waviness, and Lay)

(cc) AWS D1.5/D1.5M, Bridge Welding Code

(dd) AWS D1.1, Structural Welding Code – Steel

(ee) AWS D1.6/D1.6M, Structural Welding Code – Stainless Steel

E15.3 Submittals

(a) The Contractor shall submit the following to the Contract Administrator:

(i) Copies of Mill Test Certificates showing chemical analysis and physical tests of all miscellaneous metal prior to commencement of fabrication. Miscellaneous metal without this certification will be rejected.

(ii) Certification of chemical analysis and physical tests for all materials.

(iii) A complete set of Shop Drawings prior to commencement of fabrication. The Contractor shall indicate on the Shop Drawings all the necessary material specifications for the materials to be used and identify the components in accordance with the Drawings and Specifications. Applicable welding procedures, stamped as approved by the Canadian Welding Bureau, shall be attached to the Shop Drawings. In no case will the Contractor be relieved of responsibility for errors or omissions in the Shop Drawings.

(iv) Manufacturer's test reports of mechanical tests on high strength bolts, if requested by the Contract Administrator.

(v) All miscellaneous metals shop drawings shall be stamped by a professional engineer licensed in the Province of Manitoba.

E15.4 Materials

E15.4.1 General

(a) The Contractor shall mark all materials to identify its material specification and grade. This shall be done by suitable marking or by a recognized colour coding.

E15.4.2 Miscellaneous Metals

(a) Miscellaneous metals shall conform to the material grades specified on the Drawings, and meet the requirements and satisfy the testing procedures of CSA G40.21.

E15.4.3 Welded Steel Construction

(a) Welded steel construction (Metal Arc Welding) shall conform to the requirements and satisfy the testing procedures of CSA W59 and Welded Highway & Railway Bridges - AWS D1.1 of The American Welding Society & Addendum.

E15.4.4 Zinc

(a) Zinc for hot dipped, galvanized coatings shall conform to the requirements of ASTM A123.

E15.4.5 Steel Pipe for Handrail and Guardrail

(a) Steel pipe or tubing for handrail and guardrail shall be seamless pipe in accordance with ASTM A53 Type S, Grade A or B.

(b) Steel shall be hot-dip galvanized in accordance with this Specification.

E15.4.6 Stainless Steel

(a) Stainless steel bolts, nuts, washers, inserts, and the like as shown on the Drawings shall conform to the requirements of ASTM A320, Grade B8, Class 2.

(b) Stainless steel plates and perforated plates as shown on the Drawings shall be Type 316 or Type 316L, UNS S31600 or UNS S31603 and conform to the requirement for ASTM A240 and ASTM A666.

(c) Stainless steel shapes, such as angles, shall be Type 316 or Type 316L, UNS S31600 or UNS S31603 and conform to the requirements of ASTM A276

(d) Stainless steel pipe or tubing, not electrical conduit, shall be Type 316 or Type 316L, UNS S31600 or UNS S31603 and conform to the requirements of ASTM A312. Stainless steel pipe for guardrails or handrails shall be seamless.

E15.4.7 Post-installed fasteners

(a) Post-installed mechanical fasteners shall be Hilti Kwik Bolt TZ Wedge Anchor, Stainless Steel or equivalent in accordance with B7 as approved by the Contract Administrator unless shown otherwise on the contract drawings. The size and material shall be in accordance with the Drawings.

(b) Post-installed adhesive anchors shall be accomplished using Hilti Hit Hy 200, or equivalent in accordance with B7 as approved by the Contract Administrator. The size and material shall be in accordance with the Drawings.

(c) Installation of anchorages shall be carried out in accordance with the manufacturer's recommendations.

E15.4.8 Anchor Bolts

(a) Anchor bolts shall be manufactured in accordance with ASTM F1554 (grade 105). The size shall be in accordance with the Drawings.

E15.5 Construction Methods for Fabrication

E15.5.1 General

(a) The workmanship shall meet established practice in modern shops. Special emphasis shall be placed in prevention of cracks, notch-like flaws and bruises that may lower the structure's resistance to fatigue and brittle fracture.

(b) The punching of identification marks on members will not be allowed unless authorized in writing by the Contract Administrator.

(c) If damage occurs to the miscellaneous metal during fabrication, the Contract Administrator shall be notified immediately to facilitate the implementation of

remedial measures. Remedial repair measures are subject to the approval of the Contract Administrator.

(d) Dimensions and fabrication that control field matching of parts shall receive careful attention in order to avoid field adjustments.

(e) Field high-tensile bolted connections shall have all holes drilled or sub-punched and reamed using steel templates. Templates shall be located with utmost care as to position and angle and firmly bolted in place.

(f) Cutting shall be in accordance with AWS D1.1, D1.6 and CSA W59.

E15.5.2 Clean Material

(a) The material shall be clean, free from rust, mill scale, and other foreign matter before being worked in the shop. Material shall be cleaned by wheelabrating, sandblasting or other methods subject to the Contract Administrator's approval.

E15.5.3 Finish

(a) All portions of the Work shall be neatly finished. Shearing, cutting, chipping and machining shall be done neatly and accurately. Finished members shall be true to line and free from twists, bends, open joints, and sharp corners and edges.

E15.5.4 Bending

(a) When bending is necessary in order to meet the requirements of the design, it shall be done with care and by methods subject to the approval of the Contract Administrator. The bend line shall be at right angles to the direction of rolling. The internal radius of bend of load carrying sections shall not be less than twice the thickness of the bend section when bent cold, and if a smaller radius of bend is essential, the material shall be bent hot and later annealed. Before bending, the edges of the section in the region of the bend shall be smoothed and rounded to a radius of 2 mm.

E15.5.5 Holes

(a) General - Except where a specific method of holing materials is shown on the Drawings or required in the Special Provisions, all holes shall be either drilled or sub-punched and reamed with the exception of the holes and slots in the rectangular steel guardrail which may be punched. Poor matching holes will be cause for rejection.

(b) Punched Holes and Slots - For holes and slots punched full size, the diameter or size of the die shall not exceed that of the punch by more than 2 mm. All holes and slots which are punched shall have burrs and sharp edges removed. All holes shall be clean-cut without torn of ragged edges. The punching shall not distort the structural member. If required by the Contract Administrator, a sample of the punching operation shall be carried out to the satisfaction of the Contract Administrator prior to the start of fabrication.

(c) Drilled Holes - Drilling shall be done with twist drills or core drills, and all burrs and sharp edges shall be removed carefully. Care shall be taken to centre the drill accurately and to ensure that the hole is perpendicular to the member. Holes shall be clean-cut, without torn or ragged edges.

(d) Sub-Punched and Reamed Holes - All holes shall be sub-punched or sub-drilled to a diameter 5 mm smaller than the nominal hole diameter, and enlarged by reaming to the correct diameter. The diameter of the die shall not exceed the diameter of the punch by more than 2 mm. Holes shall be clean-cut without torn or ragged edges. Reamed holes shall be truly cylindrical and perpendicular to the member and all burrs shall be removed carefully. All reaming shall be done with twist reamers which shall be directed by mechanical means.

(e) Allowable Tolerance for Holes - All matching holes for bolts shall register with each other so that a gauge 2 mm less in diameter than the hole shall pass freely through the assembled members in a direction at right angles to such members. Finished

holes shall be not more than 2 mm in diameter larger than the diameter of the bolt passing through them unless otherwise specified by the Contract Administrator. The centre-to-centre distance between any two holes of a group of holes shall not vary by more than 1 mm from the dimensioned distance between such holes. Mispunched or misdrilled members shall not be corrected by welding.

E15.5.6 Welding

(a) Specifications

(i) Welding shall conform to the requirements of the Structural Welding Code - Steel of the American Welding Society AWS D1.1 and addendum and CSA W59 Welded Steel Construction. Welding of stainless steel shall conform to the requirement of the American Welding Society AWS D1.6.

(b) Welding Operator Qualification

(i) Welding operators shall be qualified in accordance with the requirements of C.W.B. at the time of fabrication for the processes that will be required as part of the Work.

(ii) Qualification shall have been issued within 2 years of commencement of fabrication. The reports of the results of the qualification tests shall bear the welding operator's name, the identification mark he will use and all pertinent data of the tests.

(iii) Evidence that the welding operators have been executing satisfactory welding in the required processes within the six (6) month period immediately prior to commencement of fabrication shall also be provided to the Contract Administrator.

(iv) The Contractor shall bear the whole cost and be fully responsible for the qualification of all welding operators.

(c) Welding Procedures, Specifications and Qualification

(i) Welding procedures that conform in all respects to the approved procedures of AWS D1.1, D1.6 and CSA W59 shall be deemed as pre-qualified and are exempt from tests or qualifications.

(ii) Welding procedures that do not conform to approved procedures in AWS D1.1, D1.6 and CSA W59 shall be qualified by tests carried out in accordance with AWS D1.1or D1.6.

(iii) The Contract Administrator may accept previous qualifications of the welding procedure.

(d) Welding Materials

(i) All electrodes for manual shielded metal arc welding shall conform to the low hydrogen classification requirements of the latest edition of the American Welding Society's Filler Metal Specification AWS A5.1/A5.1M or AWS A5.5/A5.5M and the CAN/CSA W48 Specification and be capable of producing weld metal having an impact strength of at least 27 J (Charpy V-Notch) at -18◦C.

(ii) All bare electrodes and flux used in combination for submerged arc welding, the electrode and gas shielding used in combination for gas metal-arc welding, or the electrode and shielding medium used in combination for flux cored arc welding of steels shall conform to the requirements in the latest edition of the American Welding Society AWS A5.17/A5.17M, A5.18/A5.18M or A5.20/A5.20M and CAN/CSA W48 and be capable of producing weld metal having a minimum impact strength of 27 J (Charpy V Notch) at -18◦C or shall be capable of producing low alloy weld metal having the mechanical properties listed in AWS D1.1.

(iii) Low alloy weld properties shall be determined from a multiple pass weld made in accordance with the requirements of the latest edition of the applicable Specification (AWS A5.17/A5.17M, A5.18/A5.18M, or A5.20/A5.20M) or the welding procedure specification.

(iv) Every user shall demonstrate that each combination of electrode and shielding medium will produce weld metal having the above mechanical properties until the applicable AWS Filler Metal Specification is issued. At that time, the AWS Filler Metal Specification will control. The test assembly for Grades E100XX and E110XX shall be made using CAN/CSA G40.21M 700Q or ASTM A514/A517 steel.

(v) The Contract Administrator may accept evidence of record of a combination that has been satisfactory tested in lieu of the test required, provided the same welding procedure is used.

(vi) Electrodes conforming to AWS A5.1 shall be purchased & delivered in hermetically sealed containers or shall be dried for at least two (2) hours between 230◦C and 260◦C before they are used. Electrodes conforming to AWS A5.5 shall be purchased & delivered in hermetically sealed containers or shall be dried 1 hour + 15 min. at a temperature of 425◦C + 15◦C before being used.

(vii) All electrodes for use in welding ASTM A514/A517 and CSA 700 Q. steel having a strength lower than that of the E100XX classification shall be dried for 1 hour + 15 min. at a temperature of 425◦C + 15◦C before being used. Electrodes shall be dried prior to use if the hermetically sealed container shows evidence of damage.

(viii) Immediately after removal from hermetically sealed containers or from drying ovens, electrodes shall be stored in ovens held at a temperature of at least 120◦C.

(ix) E70XX electrodes that are not used within four (4) hours, E80XX within 2 hours, E90XX within one (1) hour, and E100XX and E110XX within 0.5 hours after removal from hermetically sealed containers or removal from a drying or storage oven shall be re-dried before use.

(x) In humid atmospheres, these time limits will be reduced as directed by the Contract Administrator.

(xi) Electrodes that have been wet shall not be used. Electrodes shall be re-dried no more than once.

(xii) Flux used for submerged arc welding shall be non-hygroscopic, dry and free of contamination from dirt, mill-scale, or other foreign material. All flux shall be purchased in moisture-proof packages capable of being stored under normal conditions for at least six (6) months without such storage affecting its welding characteristics or weld properties. Flux from packages damaged in transit or handling shall be discarded or shall be dried before use at a minimum temperature of 120◦C for 1 hour. Flux shall be placed in the dispensing system immediately upon opening a package. If flux is used from an open package or an open hopper that has been inoperative for four (4) hours or more, the top 25 mm shall be discarded. Flux that has been wet shall not be used. Flux fused in welding shall not be reused.

(e) Preheat and Interpass Temperature

(i) The minimum preheat and interpass temperatures for welding miscellaneous metal shall conform to AWS D1.1, D1.6 and CSA W59.

(f) Welding Processes

(i) Welding processes which do not conform to the provisions of AWS D1.1, D1.6 or CSA W59 shall not be used without the written approval of the Contract Administrator.

(g) Distortion and Shrinkage Stresses

(i) Distortion and shrinkage stresses shall be kept to a minimum by the use of jigs and fixtures, utilizing heat distribution and a welding sequence. Areas contiguous to welding operations shall be preheated to a maximum temperature of 120ºC, if necessary in the estimation of the Contract Administrator to prevent distortion or weld cracking. The provisions of AWS

D1.1, D1.6 and CSA W59 shall be followed in the control of distortion and shrinkage stresses.

(h) Tack Welding

(i) All tack welds shall be a minimum of 10 mm in length and made with low hydrogen electrodes and shall not be incorporated in the final structure without specific written authorization by the Contract Administrator.

E15.5.7 Hot-Dip Galvanizing

(a) Galvanizing, when called for on the Drawings, for items other than fasteners shall be done in accordance with ASTM A123. All metal surfaces to be galvanized shall be cleaned thoroughly of rust, rust scale, mill scale, dirt, paint and other foreign material by commercial sand, grit or shop blasting or pickling prior to galvanizing. Heavy deposits of oil and grease shall be removed with solvents prior to blasting or pickling.

E15.5.8 Handling, Delivery and Storage of Materials

(a) Precautionary measures shall be taken to avoid damage to miscellaneous metal during handling, transit, stockpiling and erecting. Pinholes or other field connection holes shall not be used for lifting purposes. Special attention is directed to the shipping and storing of miscellaneous metal.

(b) Damaged parts shall not be installed in the structure and may be rejected at the discretion of the Contract Administrator.

(c) Materials that are not placed directly in the structure shall be stored above probable high water, on skids, platforms or in bins in a manner that will prevent distortion or the accumulation of water or dirt on the miscellaneous metal. The materials shall be kept separate and stored properly for ease of inspection, checking and handling and shall be drained and protected from corrosion.

E15.5.9 Erection

(a) Layout Before erection of miscellaneous metal, the Contractor shall satisfy himself that the installation locations are in accordance with the Drawings and specifications. All discrepancies discovered by the Contractor shall be brought immediately to the attention of the Contract Administrator.

(b) Workmanship

(i) The parts shall be assembled as shown on the Drawings and all match marks shall be observed. The material shall be handled carefully so that no parts will be bent, broken or otherwise damaged. Hammering which will injure or distort the member is not permitted.

(c) Misfits and Field Fitting

(i) Misfits of any part or parts to be erected under this Specification may be cause for rejection. No field fitting shall be undertaken by the Contractor until the cause for misfit of parts has been determined and the Contract Administrator, so informed, has given direct approval to accept the Contractor's proposed corrective measures. The Contract Administrator's decision as to the quantity of such work to be performed at the Contactor’s expense will be final and binding.

(d) Field Welding

(i) All field welding shall be electric arc welding, and shall be carried out in accordance with the Drawings, AWS D1.1 and CSA W59.

(e) Final Cleaning

(i) All metal surfaces shall be left free of dirt, dried concrete, debris or foreign matter to the satisfaction of the Contract Administrator.

E15.6 Quality Control / Quality Assurance

E15.6.1 Quality Control

(a) The Contractor shall be responsible for making a thorough inspection of materials to be supplied under this Work. All miscellaneous metal shall be free of surface imperfections, pipes, porosity, laps, laminations and other defects.

(b) Welding

(i) All welding may be subject to inspection by Non-Destructive Testing. This inspection shall be carried out in a manner approved of the Contract Administrator. The Contractor shall provide sufficient access and shop area to permit the performance of the tests. The Contractor shall give the Contract Administrator not less than 24 hours' notice of when work will be ready for testing and shall advise the Contract Administrator of the type and quantity of work that will be ready for testing.

(ii) All defects revealed shall be repaired by the Contractor at his own expense and to the approval of the Contract Administrator.

E15.6.2 Quality Assurance

(a) All materials will be subject to physical inspection by the Contract Administrator and will be subject to rejection during the course of the Work and for the length of time as specified in the General Conditions, if, in the opinion of the Contract Administrator, the materials involved do not meet the requirements of the Drawings and this Specification.

(b) All materials shall be subject to testing by the Contract Administrator and will be approved only if the requirements of the Drawings, standards and this Specification are met. The Contractor shall supply the specimens for testing in accordance with the requests of the Contract Administrator.

(c) The Contractor shall furnish facilities for the inspection of material and workmanship in the mill, shop and field, and the Contract Administrator shall be allowed free access to the necessary parts of the works.

E15.7 Measurement and Payment

E15.7.1 Miscellaneous Metal will be measured on a unit basis and paid for at the Contract Unit Price for "Items of Work" listed here below. The amount to be paid for will be the total number of units installed in accordance with this Specification, Drawings, and accepted and measured by the Contract Administrator.

E15.7.2 Items of Work:

(a) Structural