THE CITY OF WINNIPEG

TENDER

TENDER NO. 266-2019

2019 REGIONAL STREETS PROGRAM- ST. JAMES STREET, ELLICE AVENUE TO 150 METRES NORTH OF SARGENT AVENUE

TABLE OF CONTENTS

PART A - BID SUBMISSION

Form A: Bid 1
Form B: Prices 4
Form G1: Bid Bond and Agreement to Bond 17

PART B - BIDDING PROCEDURES

B1. Contract Title 1
B2. Submission Deadline 1
B3. Enquiries 1
B4. Confidentiality 1
B5. Addenda 1
B6. Substitutes 2
B7. Bid Components 3
B8. Bid 3
B9. Prices 4
B10. Disclosure 5
B11. Conflict of Interest and Good Faith 5
B12. Qualification 6
B13. Bid Security 7
B14. Opening of Bids and Release of Information 7
B15. Irrevocable Bid 8
B16. Withdrawal of Bids 8
B17. Evaluation of Bids 8
B18. Award of Contract 9

PART C - GENERAL CONDITIONS

C0. General Conditions 1

PART D - SUPPLEMENTAL CONDITIONS

General

D1. General Conditions 1
D2. Scope of Work 1
D3. Contract Administrator 2
D4. Contractor's Supervisor 2
D5. Ownership of Information, Confidentiality and Non Disclosure 2
D6. Notices 2
D7. Furnishing of Documents 3

Submissions

D8. Authority to Carry on Business 3
D9. Safe Work Plan 3
D10. Insurance 3
D11. Contract Security 4
D12. Subcontractor List 4
D13. Detailed Work Schedule 4

Schedule of Work

D14. Commencement 5
D15. Working Days 5
D16. Restricted Work Hours 6
D17. Work By Others 6
D18. Sequence of Work 6
D19. Critical Stages 6
D20. Substantial Performance 6
D21. Total Performance 7
D22. Liquidated Damages 7

D23. Scheduled Maintenance 7

Control of Work
D24. Job Meetings 7
D25. Prime Contractor – The Workplace Safety and Health Act (Manitoba) 8
D26. The Workplace Safety and Health Act (Manitoba) – Qualifications 8

Measurement and Payment
D27. Payment 8

Warranty
D28. Warranty 8

Third Party Agreements
D29. Funding and/or Contribution Agreement Obligations 8

Form H1: Performance Bond 11

Form H2: Labour and Material Payment Bond 13
Form J: Subcontractor List 15

PART E - SPECIFICATIONS

General
E1. Applicable Specifications and Drawings 1
E2. Geotechnical Reports 2
E3. Office Facilities 2
E4. Protection Of Existing Trees 3
E5. Traffic Control 3
E6. Traffic Management 4
E7. Pedestrian Safety 5
E8. Water Obtained From the City 5
E9. Surface Restorations 5
E10. Operating Constraints For Work In Close Proximity To Feedermains 5
E11. Outflow Restriction of Catch Basins 7
E12. Installation of Interlocking Paving Stones 8
E13. Concrete Works 9
E14. Supply and Install Watermain and Water Service Insulation 10
E15. Tree Removal 11
E16. Trees, Shrubs & Groundcover Plantings 12
E17. Landscape Maintenance 16
E18. Remove And Reinstall Fencing 18
E19. Subdrain Connections 18
E20. Line Painting in Parking Lots 18
E21. Piles 19
E22. Precast Concrete Lagging Panels 22
E23. Structural Concrete 26
E24. Supplying and Placing Reinforcing Steel 47
E25. Aluminum Pedestrian handRail 52

Appendix 'A' – Geotechnical Reports

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2019 Regional Streets Program- St. James Street, Ellice Avenue to 150 metres North of Sargent Avenue

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, June 7, 2019.

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

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

B3. ENQUIRIES

B3.1 All enquiries shall be directed to the Contract Administrator identified in D3.1.

B3.2 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.

B3.3 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.

B3.4 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.

B3.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B3 unless that response or interpretation is provided by the Contract Administrator in writing.

B4. CONFIDENTIALITY

B4.1 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.

B4.2 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.

B5. ADDENDA

B5.1 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.

B5.2 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.

B5.3 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/bidopp.asp

B5.4 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B5.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B5.6 Notwithstanding B3, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D3.

B6. SUBSTITUTES

B6.1 The Work is based on the Plant, Materials and methods specified in the Tender.

B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B6.3 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.

B6.4 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.

B6.5 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.

B6.6 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.

B6.6.1 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.

B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.

B6.8 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 B17.

B6.9 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.

B7. BID COMPONENTS

B7.1 The Bid shall consist of the following components:

(a) Form A: Bid;

(b) Form B: Prices, hard copy;

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

B7.2 Further to B7.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B6.

B7.3 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.

B7.4 The Bid shall be submitted enclosed and sealed in an envelope clearly marked with the Tender number and the Bidder's name and address.

B7.4.1 Samples or other components of the Bid which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Tender number, the Bidder's name and address, and an indication that the contents are part of the Bidder’s Bid.

B7.4.2 A hard copy of Form B: Prices must be submitted with the Bid. If there is any discrepancy between the Adobe PDF version of Form B: Prices and the Microsoft Excel version of Form B: Prices, the PDF version shall take precedence.

B7.5 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.

B7.6 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B17.1(a).

B7.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B7.8 Bids shall be submitted to:

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

B8. BID

B8.1 The Bidder shall complete Form A: Bid, making all required entries.

B8.2 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.

B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.

B8.3 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.

B8.4 Paragraph 13 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, shall 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.

B8.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.

B8.5 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.

B9. PRICES

B9.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B9.1.1 For the convenience of Bidders, and pursuant to B7.4.2 and B17.4.2, an electronic spreadsheet Form B: Prices in Microsoft Excel (.xls) format is available along with the Adobe PDF documents for this Tender on the Bid Opportunities page at the Materials Management Division website at http://www.winnipeg.ca/matmgt/

B9.2 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.

B9.3 Prices stated on forb 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 D29. Any such costs shall be determined in accordance with D29.

B9.4 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.

B9.5 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B10. DISCLOSURE

B10.1 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.

B10.2 The Persons are:

(a) N/A

B11. CONFLICT OF INTEREST AND GOOD FAITH

B11.1 Bidders, by responding to this Tender, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.

B11.2 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.

B11.3 In connection with its Bid, each entity identified in B11.2 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.

B11.4 Without limiting B11.3, 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.

B11.5 Without limiting B11.3, 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 B11.4 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.

B11.6 The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in its sole discretion.

B12. QUALIFICATION

B12.1 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.

B12.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

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

B12.3 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);

B12.4 Further to B12.3(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/.

B12.5 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.

B12.6 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.

B13. BID SECURITY

B13.1 The Bidder shall provide 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).

B13.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B13.1.2 All signatures on bid securities shall be original.

B13.1.3 The Bidder shall sign the Bid Bond.

B13.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.

B13.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the contract securities are furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B13.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Tender.

B14. OPENING OF BIDS AND RELEASE OF INFORMATION

B14.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Division, or in such other office as may be designated by the Manager of Materials.

B14.1.1 Bidders or their representatives may attend.

B14.1.2 Bids determined by the Manager of Materials, or his/her designate, to not include the bid security specified in B13 will not be read out.

B14.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/

B14.3 After award of Contract, the name(s) of the successful Bidder(s), their address(es) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/

B14.4 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).

B14.4.1 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.

B15. IRREVOCABLE BID

B15.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.

B15.2 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 executed 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 11 of Form A: Bid.

B16. WITHDRAWAL OF BIDS

B16.1 A Bidder may withdraw his/her Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B16.1.1 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B16.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 13 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B16.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:

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

(b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 13 of Form A: Bid; and

(c) if the notice has been given by any one of the persons specified in B16.1.3(b), declare the Bid withdrawn.

B16.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B15.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B17. EVALUATION OF BIDS

B17.1 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 therefrom (pass/fail);

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B12 (pass/fail);

(c) Total Bid Price;

(d) economic analysis of any approved alternative pursuant to B6.

B17.2 Further to B17.1(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.

B17.3 Further to B17.1(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.

B17.4 Further to B17.1(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.

B17.4.1 Further to B17.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

B17.4.2 The electronic Form B: Prices and the formulas imbedded in that spreadsheet are only provided for the convenience of Bidders. The City makes no representations or warranties as to the correctness of the imbedded formulas. It is the Bidder's responsibility to ensure the extensions of the unit prices and the sum of Total Bid Price performed as a function of the formulas within the electronic Form B: Prices are correct.

B18. AWARD OF CONTRACT

B18.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B18.2 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.

B18.2.1 Without limiting the generality of B18.2, 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.

B18.3 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 D29 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.

B18.4 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 B17.

B18.4.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

C0.1 The *General Conditions for Construction* (Revision 2019-01-15) are applicable to the Work of the Contract.

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

C0.2 A reference in the 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:

(a) Concrete Reconstruction
  (i) St. James Street from Ellice Avenue to Sargent Avenue.
  (ii) St. Matthews Avenue eastbound bike lane from Century Street to Kensington Street.
  (iii) Reconstruction of private approach on Sargent Avenue (1400 Sargent Avenue).

(b) Retaining Wall Construction
  (i) At The Brick, 1065 St. James Street.

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

(a) Concrete Reconstruction
  (i) Removal of existing pavement and sidewalk;
  (ii) Excavation;
  (iii) Installation of catch basins and sewer service pipe;
  (iv) Compaction of sub-grade;
  (v) Placement of separation geotextile fabric;
  (vi) Placement of sub-base and base course materials;
  (vii) Adjustment of existing manholes and appurtenances;
  (viii) Construction of 230 mm plain dowelled concrete pavement (utilizing slip form paving equipment wherever possible);
  (ix) Construction of 200 mm reinforced concrete approaches;
  (x) Construction of 180 mm integral barrier curb;
  (xi) Construction of safety median;
  (xii) Construction of 100 mm concrete sidewalk;
  (xiii) Construction of curbs and placement of asphalt in front of the retaining wall; and
  (xiv) Boulevard restoration.

(b) Retaining Wall Construction
  (i) Partial removal of existing sidewalk and excavation;
  (ii) Installation of piles;
  (iii) Fabrication, supply, and placement of precast lagging panels;
  (iv) Construction of reinforced cast-in-place concrete cap beam;
  (v) Placement of backfill;
  (vi) Reconstruction of reinforced cast-in-place concrete sidewalk; and
  (vii) Installation of aluminum pedestrian handrail.

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is Morrison Hershfield Ltd., represented by:

Wayne Jaworski, C.E.T.
Senior Project Manager

Telephone No. 204 977-8370
Email Address wjaworski@morrisonhershfield.com

D3.2 At the pre-construction meeting, Wayne Jaworski, C.E.T. will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D3.3 Bids Submissions must be submitted to the address in B7

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.

D4.2 At least two (2) business days prior to the commencement of any Work on the site, the Contractor shall provide the Contract Administrator with a phone number where the supervisor identified in D4.1 or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

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

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

D6.5 Bids Submissions must not be submitted to this facsimile number. Bids must be submitted in accordance with B7.

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.

D9.2 The Safe Work Plan shall 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

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, broad form property damage cover 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) an all risks Installation Floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.

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 the 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 letter of intent and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

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 or prior to a pre-construction meeting, or 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 the C4.1 for the return of the executed Contract.

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 the General Conditions for the return of the executed Contract.

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

(a) a Gantt chart for the Work

acceptable to the Contract Administrator.

D13.3 Further to D13.2(a), 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.

SCHEDULE OF WORK

D14. COMMENCEMENT

D14.1 The Contractor shall not commence any Work until he/she is in receipt of a letter of intent 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 twenty-four (24) hour emergency response phone number specified in D4.2.
  (iv) the Safe Work Plan specified in D9;
  (v) evidence of the insurance specified in D10;
  (vi) the contract security specified in D11;
  (vii) the subcontractor list specified in D12; and
  (viii) 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 July 29, 1019, and shall commence the Work on Site no later than August 2, 2019, as directed by the Contract Administrator and weather permitting.

D14.4 The City intends to award this Contract by July 12, 2019.

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

D15. WORKING DAYS

D15.1 Further to C1.1(ll);

D15.1.1 The definition of Working Day is amended to include Saturdays.

D15.1.2 The Contract Administrator will determine daily if a Working Day has elapsed and will record his/her assessment. On a weekly basis the Contract Administrator will provide the Contractor with a record of the Working Days assessed for the preceding week. The Contractor shall sign each report signifying that he/she agrees with the Contract Administrator's determination of the Working Days assessed for the report period.

D15.1.3 Work done to restore the Site to a condition suitable for Work, shall not be considered "work" as defined in the definition of a Working Day.

D15.1.4 When the Work includes two or more major types of Work that can be performed under different atmospheric conditions, the Contract Administrator shall consider all major types of Work in determining whether the Contractor was able to work in assessing Working Days.

D16. RESTRICTED WORK HOURS

D16.1 Further to clause 3.10 of CW 1130, the Contractor shall require written permission forty-eight (48) hours in advance from the Contract Administrator for any work to be performed between 2000 hours and 0700 hours, or on Sundays, Statutory Holidays and or Civic Holidays.

D17. WORK BY OTHERS

D17.1 Work by others on or near the Site will include but not necessarily be limited to:

(a) Traffic Signals- Removal, modification, and installation of new traffic signals plant;

(b) Manitoba Hydro – Removal and installation of street lighting and conduit installations;

(c) Manitoba Hydro, Gas Division – lowering and/ or rock wrapping of underground main and services as required;

(d) MTS and Shaw – relocations, protection and adjustments as required;

(e) Telus – installation of fibre on Sargent Avenue;

(f) City of Winnipeg Traffic Services - Erection and maintenance of temporary traffic control (see E5.), removal and installation of new traffic signage and line painting;

(g) City of Winnipeg Geomatics Branch – various work on survey infrastructure.

D18. SEQUENCE OF WORK

D18.1 Further to C6.1, the sequence of work shall be as follows:

D18.1.1 A recommended traffic staging plan has been included in E1.3.

D18.1.2 Placing the topsoil and finished grading of all boulevard and median areas shall be completed prior to commencing construction of the asphaltic concrete overlay, including the scratch course.

D19. CRITICAL STAGES

D19.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

(a) St. James Street Wall at the Brick shall be complete within twenty (20) consecutive Working Days of the commencement of the Work as specified in D14

D19.2 When the Contractor considers the Work associated with a critical stage to be completed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Completion. 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 re-inspected.

D19.3 The date on which the critical stage Work has been accepted by the Contract Administrator as being completed to the requirements of the Contract is the date on which completion of the critical stage has been achieved.

D20. SUBSTANTIAL PERFORMANCE

D20.1 The Contractor shall achieve Substantial Performance within fifty five (55) consecutive Working Days of the commencement of the Work as specified in D14.

D20.2 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 re-inspected.

D20.3 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.

D21. TOTAL PERFORMANCE

D21.1 The Contractor shall achieve Total Performance within sixty (60) consecutive Working Days of the commencement of the Work as specified in D14.

D21.2 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 re-inspected.

D21.3 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.

D22. LIQUIDATED DAMAGES

D22.1 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) Critical Stage D19.1(a) – one thousand dollars ($1,000);

(b) Substantial Performance – four thousand three hundred fifty dollars ($4,350);

(c) Total Performance – on thousand dollars ($1,000).

D22.2 The amounts specified for liquidated damages in D22.1 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.

D22.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D23. SCHEDULED MAINTENANCE

D23.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

(a) Sod maintenance as specified in CW 3510;

(b) Reflective crack maintenance as specified in CW3250;

(c) Two Year Landscaping maintenance as specified in E17.

D23.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

CONTROL OF WORK

D24. JOB MEETINGS

D24.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City

and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D24.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D25. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D25.1 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).

D26. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D26.1 Further to B12.4, 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 B12.4.

MEASUREMENT AND PAYMENT

D27. PAYMENT

D27.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D28. WARRANTY

D28.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

D28.2 Notwithstanding C13.2 or D28.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:

(a) a portion of the Work cannot be completed because of unseasonable weather or other conditions reasonably beyond the control of the Contractor but that portion does not prevent the balance of the Work from being put to its intended use.

D28.2.1 In such case the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

THIRD PARTY AGREEMENTS

D29. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D29.1 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.

D29.2 Further to D29.1, in the event that the obligations in D29 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.

D29.3 For the purposes of D29:

(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.

D29.4 Modified Insurance Requirements

D29.4.1 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.

D29.4.2 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.

D29.4.3 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.

D29.4.4 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.

D29.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D29.5 Indemnification By Contractor

D29.5.1 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.

D29.6 Records Retention and Audits

D29.6.1 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.

D29.6.2 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 D29.6.1 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.

D29.7 Other Obligations

D29.7.1 The Contractor consents to the City providing a copy of the Contract to the Government of Manitoba and/or the Government of Canada upon request from either entity.

D29.7.2 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.

D29.7.3 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.

D29.7.4 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. 266-2019

2019 Regional Streets Program- St. James Street, Ellice Avenue to 150 metres North of Sargent Avenue 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. 266-2019

2019 Regional Streets Program- St. James Street, Ellice Avenue to 150 metres North of Sargent Avenue

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)

2019 Regional Streets Program- St. James Street, Ellice Avenue to 150 metres North of Sargent Avenue

Portion of the Work	Name	Address
CONCRETE RECONSTRUCTION		
Supply of Materials		
Concrete		
Asphalt		
Base Course		
Sub-Base Material		
Sod		
Catchbasins		
Separation Fabric		
Frames & Covers		
Pipe		
Installation/Placement		
Concrete		
Asphalt		
Excavation		
Base Course		
Sub-Base Material		
Underground Works		
Sewer Televising		
Landscaping		

FORM J: SUBCONTRACTOR LIST
(See D12)

2019 Regional Streets Program- St. James Street, Ellice Avenue to 150 metres North of Sargent Avenue

Portion of the Work	Name	Address
RETAINING WALL CONSTRUCTION		
Supply of Materials		
Structural Concrete		
Plain Reinforcement		
Precast Concrete Lagging Panels		
Structural Steel		
Aluminum Pedestrian Handrail		
Granular Backfill		
Installation and Placement		
Piles		
Structural Concrete		
Plain Reinforcement		
Aluminum Pedestrian Handrail		
Backfill		
OTHERS		

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 B6. 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 B6.

E1.4 The following are applicable to the Work:

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
P-3508-01	Cover Sheet, Location Plan & Drawing List	A1
P-3508-02	Horizontal Geometry- St James Street- Sta 1+615 to Sta 1+890	A1
P-3508-03	Horizontal Geometry- St James Street- Sta 1+890 to Sta 2+155	A1
P-3508-04	Paving & Grading- St James Street- Sta 1+615 to Sta 1+750	A1
P-3508-05	Paving & Grading- St James Street- Sta 1+750 to Sta 1+890	A1
P-3508-06	Paving & Grading- St James Street- Sta 1+890 to Sta 2+020	A1
P-3508-07	Paving & Grading- St James Street- Sta 2+020 to Sta 2+155	A1
P-3508-08	Cross Sections- Various Stations	A1
P-3508-09	Details- Landscaping	A1
P-3508-10	Retaining Wall at the Brick, General Layout & Foundation Details	A1
P-3508-11	Retaining Wall at the Brick, Precast Panel Details	A1
P-3508-12	Retaining Wall at the Brick, Sidewalk & Cap Beam Details	A1
P-3508-13	Retaining Wall at the Brick, Pedestrian Railing Details	A1
P-3354-63	Horizontal Geometry- Century Street to Kensington Street	A1

P-3354-64	Paving and Grading- Century Street to Kensington Street	A1
P-3354-65	Cross Sections and Sections- Cross Section 'A' and Sidewalk Treatment Section	A1
Figure S-01	Staging- Stage 1-2 St. James Street	11" x 17"
Figure S-02	Staging- Stage 3-4 St. James Street	11" x 17"
Figure S-03	Staging- Stage 5 St. James Street	11" x 17"
SCD 517	Standard Detail for Tree Planting	8½" x 11"
SCF 519	Special Detail for Tree Planting in Restricted Sites	8½" x 11"

E1.5 following are applicable to the Work and provided for reference:

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
AA1	Partial Floor Plan and Misc. Details	A1
A-6	Building Sections & Wall Sections	A1
S-1	Foundation & Main Floor Framing Plan Sections	A1
88014-E1	Entrance Tower	A1
A-8	Sections Details	A1

E2. GEOTECHNICAL REPORTS

E2.1 Further to C3.1, the geotechnical reports are provided to aid the Contractor's evaluation of the pavement structure and/or existing soil conditions. The geotechnical reports are contained in Appendix 'A'.

E3. OFFICE FACILITIES

E3.1 The Contractor shall supply office facilities meeting the following requirements:

(a) The field office shall be for the exclusive use of the Contract Administrator.

(b) The building shall be conveniently located near the site of the Work.

(c) The building shall have a minimum floor area of 25 square metres, a height of 2.4 m with two windows for cross ventilation and a door entrance with a suitable lock.

(d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16-18^{o}C or 24-25^{o}C.

(e) The building shall be adequately lighted with florescent fixtures and have a minimum of three wall outlets].

(f) The building shall be furnished with one desk, one drafting table, table 3m X 1.2m, one stool, one four drawer legal size filing cabinet, and a minimum of 12 chairs.

(g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City.

(h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each site meeting. The Contract Administrator may request additional cleaning when he/she deems it necessary.

E3.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E3.3 The office facilities will be provided from the date of the commencement of the Work to the date of Total Performance.

E4. PROTECTION OF EXISTING TREES

E4.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within the limits of the construction area:

(a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.

(b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400mm wood planks, or suitably protected as approved by the Contract Administrator.

(c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.

(d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.

(e) Work on-site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.

E4.2 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the City Forester or his/her designate.

E4.3 No separate measurement or payment will be made for the protection of trees.

E4.4 Except as required in clause E4.1(c) and E4.1(e), Elm trees shall not be pruned at any time between April 1 and July 31.

E5. TRAFFIC CONTROL

E5.1 Further to clauses 3.6, 3.7 and 3.8 of CW 1130:

(a) Where directed by the Contract Administrator, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planing drop-offs to the satisfaction of the Contract Administrator. Payment shall be in accordance with CW3410.

(b) In accordance with the Manual of Temporary Traffic Control on City Streets (MTTC), the Contractor ("Construction Agency" in the manual) shall be responsible for placing, maintaining and removing the appropriate temporary traffic control devices as specified by the MTTC or by the Traffic Management Branch of the City of Winnipeg Public Works

Department. The Contractor shall bear all costs associated with the placement of temporary traffic control devices by their own forces or subcontractor.

E5.2 Notwithstanding E5.1, in accordance with the MTTC, the Contract Administrator shall make arrangements with the **Traffic Services Branch of the City of Winnipeg** to place, maintain, and remove all **regulatory signs** and traffic control devices authorized and/or required by the Traffic Management Branch in the following situations:

(a) Parking restrictions,

(b) Stopping restrictions,

(c) Turn restrictions,

(d) Diamond lane removal,

(e) Full or directional closures on a Regional Street,

(f) Traffic routed across a median,

(g) Full or directional closure of a non-regional street where there is a requirement for regulatory signs (turn restrictions, bus stop relocations, etc.) to implement the closure.

(h) Approved Designated Construction Zones with a temporary posted speed limit reduction. Traffic Services will be responsible for placing all of the advance signs and 'Construction Ends' (TC-4) signs. The Contractor is still responsible for all other temporary traffic control including but not limited to barricades, barrels and tall cones.

E5.2.1 An exception to E5.2 is the 'KEEP RIGHT/KEEP LEFT' sign (RB-25 / RB-25L) which shall be supplied, installed, and maintained by the Contractor at their own expense.

E5.2.2 Further to E5.2, where the Contract Administrator has determined that the services of the Traffic Services Branch are required, the City shall bear the costs associated with the placement of temporary traffic control devices by the Traffic Services Branch of the City of Winnipeg in connection with the works undertaken by the Contractor.

E5.2.3 Further to E5.2.2, the Contractor shall supply all required barricades and polyposts (traffic control devices) and the Traffic Services Branch of the City of Winnipeg will place and maintain them.

E6. TRAFFIC MANAGEMENT

E6.1 Further to clause 3.7 of CW 1130:

E6.1.1 Maintain a minimum of one lane of traffic in each direction on all streets within the Site at all times during construction;

E6.1.2 Left turns shall only be restricted as approved by the Contract Administrator. Wherever possible, additional lanes shall be provided for left turning vehicles.

E6.1.3 Intersecting street and private approach access shall be maintained at all times;

E6.1.4 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 72 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access; and

E6.1.5 Pedestrian, bus and ambulance/ emergency vehicle access must be maintained at all times.

E6.1.6 At the end of each construction season, the Contractor shall ensure that there will be no lane closures during the period when no Work is taking place.

E6.1.7 The Contractor shall refer to the traffic staging figures provided for more traffic management details.

E7. PEDESTRIAN SAFETY

E7.1 During the project a temporary snow fence shall be installed adjacent to existing and temporary sidewalks as necessary to prevent access to the construction area. The Contractor shall be responsible for maintaining the snow fence in a proper working condition. No measurement for payment shall be made for this work.

E8. WATER OBTAINED FROM THE CITY

E8.1 Further to clause 3.7 of CW 1120, the Contractor shall pay for all costs, including sewer charges, associated with obtaining water from the City in accordance with the Waterworks and Sewer By-laws.

E9. SURFACE RESTORATIONS

E9.1 Further to clause 3.3 of CW 1130, when Total Performance is not achieved in the year the Contract is commenced, the Contractor shall temporarily repair any Work commenced and not completed to the satisfaction of the Contract Administrator. The Contractor shall maintain the temporary repairs in a safe condition as determined by the Contract Administrator until permanent repairs are completed. The Contractor shall bear all costs associated with temporary repairs and their maintenance.

E10. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO FEEDERMAINS

E10.1 Description

E10.1.1 General

(a) This Section details operating constraints for all Work to be carried out in close proximity to the Sargent Feedermain. **Close proximity shall be deemed to be any construction activity within a 5 m offset from the centreline of the Feedermain.**

(b) The Sargent Feedermain is a critical component of the City of Winnipeg Regional Water Supply System and work in close proximity to the pipeline shall be undertaken with an abundance of caution. The pipe cannot be taken out of service to facilitate construction and inadvertent damage caused to the pipe would likely have catastrophic consequences.

(c) Work around the Feedermain shall be planned and implemented to minimize the time period that work is carried out in close proximity to the pipe and to ensure that the pipeline is not subjected to excessive construction related loads, including excessive vibrations and/or concentrated or asymmetrical lateral loads during backfill placement.

(d) The Sargent Feedermain is constructed of Pre-stressed Concrete Cylinder Pipe (Lined Core) conforming to AWWA Standard C301. AWWA C301 pipe has limited ability to withstand increased earth and live loading. Therefore, every precaution must be undertaken to ensure that applied loading during all phases of construction is within accepted loading parameters.

E10.1.2 Submittals

(a) Submit a Construction Method Statement with proposed construction plan including haul routes, excavation equipment locations, loading positioning and base construction sequencing, to the Contract Administrator for review seven (7) days prior to construction. Do not commence construction until the Construction Method Statement has been reviewed and accepted by the Contract Administrator.

E10.2 Construction Methods

E10.2.1 General

(a) The section of the Feedermain affected by construction crosses St. James Street in the westbound median lane of Sargent Avenue.

E10.2.2 Contractors carrying out reconstruction Work in close proximity to the Feedermain shall meet the following conditions and technical requirements: As per City of Winnipeg Specification CW 3110.

(a) Pre-work, Planning and General Execution

(i) No Work shall commence at the Site until the Construction Method Statement has been submitted and accepted, and the Feedermain location has been clearly delineated in the field.

(ii) The Contractor shall verify the Feedermain location and crown elevation by hydrovac methods prior to commencing excavation. Hydrovac methods shall be performed in the presence of the Contract Administrator.

(iii) Contact the City of Winnipeg WWD Department, Construction Services Coordinator (Duane Baker) two (2) weeks prior to construction.

(iv) Where Work is in close proximity to the Feedermain, utilize construction practices and procedures that do not impart excessive vibration loads on the Feedermain or that would cause settlement of the subgrade below the Feedermain.

(v) Crossing of the Feedermain is prohibited in the time period from removal of existing roadway structure until the completion of granular base construction. At all times prior to completion of final paving; reduce equipment speeds to levels that minimize the effects of impact loading to the pipe.

(vi) For construction Work activities either longitudinally or transverse to the alignment of the Feedermain, work only with equipment and in the manner stipulated in the accepted Construction Method Statement and the supplemental requirements noted herein.

(vii) The pipeline elevation datum relative to the proposed roadway shall be adequately verified. Deviations from the elevations noted herein shall be reported to Contract Administrator for review prior to construction of the subgrade.

(viii) Construction operations should be staged in such a manner as to limit multiple construction loads at one time, (e.g. offset crossings sufficiently from each other, rollers should remain a sufficient distance behind spreaders to limit loads. A reasonable offset distance is 3m between loads).

(ix) The Contractor and all Site supervisory personnel and equipment operators have to be formally briefed to ensure that they are fully cognizant of the associated restrictions, constraints, and risks associated with working adjacent to and over this pipeline. New personnel introduced after commencement of the project need to be formally orientated as to the significance and constraints associated with working over the Feedermain.

(b) Demolition and Excavation

(i) Use of pneumatic concrete breakers within 3 metres of the Feedermain is prohibited. Pavement shall be full depth saw-cut and carefully removed. Use of hand held jackhammers for pavement removal will be allowed. Use of machine mounted concrete breakers is prohibited.

(ii) Where there is less than 1.6 metres of earth cover over the Feedermain and further excavation is required either adjacent to or over the Feedermain, utilize only smooth edged excavation buckets, soft excavation or hand excavation techniques. Where there is less than 1 metre of cover over the Feedermain, carefully expose the Feedermain by hand excavation to delineate the location and depth of the main, and provide full time supervision of the excavation.

(iii) Where there is less than 2.5 m of earth cover over the Feedermain, offset backhoe or excavation equipment from Feedermain, a minimum of 3 m from Feedermain centerline, to carry out excavation.

(iv) Equipment should not be allowed to operate while positioned directly over the Feedermain. Loading of excavated material into trucks shall have the truck positioned on existing grade.

(c) Subgrade Construction

(i) Subgrade compaction shall be prohibited within 2 metres of the Feedermain. Subgrade compaction within 3 metres of the Feedermain shall be limited to non-vibratory methods only.

(ii) Subgrade, sub-base and base course construction shall be kept in a rut free condition at all times. Construction equipment is prohibited from crossing pipelines if the grade is insufficient to support the equipment without rutting.

(iii) Construction operations shall be staged to minimize the time period between excavation to subgrade and placement of granular sub-base materials. Should bare subgrade be left overnight, measures shall be implemented to protect the subgrade against inadvertent travel over it and to minimize the impact of wet weather.

(d) Sub-base and Base Course Construction

(i) Granular material, construction material, soil or other material shall not be stockpiled on the pipelines or within 5 metres of the pipe centerline.

(ii) Sub-base or base course materials shall not be dumped directly on pipelines but shall be stockpiled outside limits noted in these recommendations and shall be carefully bladed in-place.

(iii) Sub-base compaction within 3 metres of the centreline of the Feedermain shall be either carried out by static methods (without vibration) or with smaller equipment such as hand held plate packers or smaller roller equipment.

E10.3 Mandatory Orientation Meeting

E10.3.1 The Contractor shall ensure that all work crew members understand and observe the requirements of this Specification. Prior to commencement of on-site Work, the Contractor shall attend an orientation meeting with the Contract Administrator. Attendance is mandatory for all superintendents, foremen and heavy equipment operators. The purpose of the meeting is to make all workers fully cognizant of the limitations of altered loading on the Feedermain, the ramifications of inadvertent damage to the pipelines, the constraints associated with work in close proximity to the Feedermain and the specific details of the Construction Method Statement in instances where a Construction Method Statement is in effect.

E10.3.2 Employees of the Contractor or any sub-contractor that fail to attend the mandatory orientation or fail to comply with the conditions for working in close proximity to the Feedermain shall be promptly removed from the Site.

E10.4 Measurement and Payment

E10.4.1 No measurement or payment will be made for the works listed in this specification.

E11. OUTFLOW RESTRICTION OF CATCH BASINS

DESCRIPTION

E11.1 This Specification amends CW 2130. It covers the supply and installation of outflow restrictors on proposed catch basins.

MATERIALS

E11.2 The Contractor shall supply 250 mm injection moulded PVC plugs in accordance with CW 2130 with 100 mm drilled holes in the ends for use as flow restrictors where shown on the Drawings.

CONSTRUCTION METHODS

E11.3 Install outlet restrictors in sewer service pipes where shown on the Drawings.

E11.4 Install plug in accordance with CW 2130 and the manufacturer’s recommendations.

MEASUREMENT AND PAYMENT

E11.5 Supply and installation of outflow restrictors on proposed catch basins will not be measured separately. Payment shall be included in the price paid for "Catch Basin".

E12. INSTALLATION OF INTERLOCKING PAVING STONES

DESCRIPTION

E12.1 General

E12.1.1 This specification shall cover the installation of interlocking paving stones on concrete sidewalk and lean concrete base.

E12.1.2 Referenced Standard Construction Specifications

(a) CW 3325 – Portland Cement Concrete Sidewalk

(b) CW 3335 – Installation of Interlocking Paving Stones on a Lean Concrete Base

MATERIALS

E12.2 Interlocking Paving Stones

E12.2.1 Paving stones in median areas shall be Barkman Concrete Holland Stone Pavers (100 x 200). All pavers to be "Charcoal" in colour.

E12.2.2 Paving stones for sidewalk bands shall be Barkman Concrete Holland Stone Pavers (200 x 200). All pavers to be "Charcoal" in colour.

E12.2.3 Median areas shall be installed with Pattern #1 (45^{o} herringbone pattern) with Border #1.

E12.2.4 Paving stones shall conform to the requirements of CAN3-A231.2, Precast Concrete Pavers.

E12.2.5 Further to CAN3-A231.2.6.1.1, where concrete pavers are shipped for installation before the pavers are twenty-eight (28) days old, the average compressive strength of these pavers at the time of delivery to the work site shall be not less than 40 MPa.

E12.3 Other Materials

E12.3.1 Bedding sand shall be in accordance with CW 3335.

E12.3.2 Concrete sidewalk base to be in accordance with CW 3325.

CONSTRUCTION METHODS

E12.4 Installation of Paving Stones

E12.4.1 Sidewalk bands shall be installed on a 100 mm concrete sidewalk base which shall be constructed in accordance with CW 3325.

E12.4.2 Median areas shall be installed on lean concrete base in accordance with CW 3335.

E12.4.3 Install paving stones on concrete sidewalk with bedding sand in accordance with the Drawings and CW 3335.

MEASUREMENT OF PAYMENT

E12.5 Supply and Installation of Paving Stones

E12.5.1 Supply and installation of interlocking paving stones shall be measured on an area basis. The amount to be paid for shall be the total number of square metres of paving stones supplied and installed in accordance with this Specification and the Drawings and accepted by the Contract Administrator. Supply and Installation of Paving Stones shall be paid for at the Contract Unit Price for "Interlocking Paving Stones", which price shall be payment in full

for the supply of all materials and for performing all operations required to complete the work as specified.

E12.5.2 No measurement or payment will be made for bedding sand. Bedding sand shall be included in the price paid for "Interlocking Paving Stones".

E12.6 100 mm Concrete Sidewalk Base

E12.6.1 Supply and installation of 100 mm concrete sidewalk base shall be measured and paid for in accordance with CW 3325.

E12.7 Lean Concrete Base

E12.7.1 Supply and installation of lean concrete base shall be measured and paid for in accordance with CW 3335.

E13. CONCRETE WORKS

DESCRIPTION

E13.1 This Specification shall supplement and amend CW 3310-R17 – "Portland Cement Concrete Pavement Works".

CONSTRUCTION METHODS

E13.2 230 mm Plain-Dowelled Concrete

E13.2.1 The Contractor shall utilize slip-form paving methods wherever possible, as determined by the Contract Administrator.

E13.3 Concrete Barrier Curb

E13.3.1 The Contractor shall pour concrete barrier curb integrally with 230 mm plain-dowelled concrete pavement wherever possible, as determined by the Contract Administrator.

E13.4 Concrete Barrier Curb Dowelled on Asphalt Pavement

E13.4.1 Concrete Barrier curbs dowelled on asphalt pavement shall be constructed as shown on the Drawings and in accordance with CW 3310.

E13.4.2 The Contractor shall follow SD-205 except that vertical tie-bars (20M, 610 mm long) shall be placed through the existing asphalt pavement at 600 mm spacing.

E13.4.3 Asphalt pavement, if required, shall be placed after the curbs have been constructed.

E13.5 Monolithic Splash Strip Dowelled on Asphalt Pavement

E13.5.1 Monolithic concrete splash strip dowelled on asphalt pavement shall be constructed as shown on the Drawings and in accordance with CW 3310.

E13.5.2 The Contractor shall follow SD-223A except that vertical tie-bars (20M, 610 mm long) shall be placed through the existing asphalt pavement at 600 mm spacing.

E13.5.3 Asphalt pavement shall be placed after the splash strips have been constructed

MEASUREMENT AND PAYMENT

E13.6 Concrete Barrier Curb

E13.6.1 Measurement and payment for integral concrete barrier curb will be in accordance with CW 3310-R15.

E13.7 Concrete Barrier Curb Dowelled on Asphalt Pavement

E13.7.1 Concrete barrier curb dowelled on asphalt pavement will be measured on a length basis and paid for at the Contract Unit Price for "Construction of Barrier (180 mm ht, Dowelled on

Asphalt Pavement)" which shall be payment in full for performing all operations and supplying all materials described in this Specification.

E13.8 Monolithic Splash Strip Dowelled on Asphalt Pavement

E13.8.1 Monolithic splash strip dowelled on asphalt pavement will be measured on a length basis and paid for at the Contract Unit Price for "Construction of Monolithic Splash Strip (750mm width, Dowelled on Asphalt Pavement)" which shall be payment in full for performing all operations and supplying all materials described in this Specification.

E14. SUPPLY AND INSTALL WATERMAIN AND WATER SERVICE INSULATION

DESCRIPTION

E14.1 Notwithstanding 3.12 of CW 2110, this specification covers the supply and installation of insulation in roadway excavations over watermains and water services.

E14.2 Referenced Standard Construction Specifications

(a) CW 2030 – Excavation Bedding and Backfill

(b) CW 3110 – Sub –grade, Sub-base and Base Course Construction

E14.3 Referenced Standard Details

(a) SD-018 - Watermain and Water Service Insulation

MATERIALS

E14.4 Acceptable insulation is:

(a) Extruded Polystyrene rigid foam insulation – Type 4, 4" in thickness.

DOW - Roofmate or Highload 40

Owen's Corning - Foamular 350 or Foamular 400.

2" X 48" X 96", 2" X 24" X 96", 4" X 24" X 96"

E14.5 Sand Bedding :

(a) In accordance with CW 2030

CONSTRUCTION METHODS

E14.6 Prior to the installation of any sub-base material or geotextile material, locate all existing water services.

E14.7 Further to SD-018, where directed by the Contract Administrator, excavate the sub-grade to allow the top of the insulation to be installed flush with the surrounding sub-grade. Install the insulation on a level surface centered over the located watermain or water service for the full width of the roadway excavation. Install sand bedding if required to level the surface.

E14.8 Stockpile and dispose of excavated material in accordance with CW 3110.

E14.9 Thickness of insulation is 100 mm (4”). If using 50 mm (2”) panels 2 layers are required. Total width of insulation to be as directed by the Contract Administrator. Place sufficient full width panels to meet or exceed the specified width.

E14.10 Place insulation panels adjacent to each other over the specified area with no gaps between panels and less than 15mm of elevation difference along the adjoined edges. Where 2” thick panels are being used, offset the top layer to prevent the panel joints from aligning with the joints in the lower layer.

E14.11 Use full panels of insulation where possible. Where necessary cut insulation panels to obtain coverage to specified lengths. Insulation pieces shall be a minimum of dimension of 300 mm in width or length.

E14.12 Take appropriate measures to ensure panels are not displaced when installing geotextiles and during backfilling operations.

MEASUREMENT AND PAYMENT

E14.13 Watermain and Water Service Insulation shall be measured on an area basis and paid for at the Contract Unit Price per square metre of “Watermain and Water Service Insulation”. The area to be paid for shall be the total square meters of watermain and water service insulation supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

E14.14 Excavation of the roadway subgrade in accordance with E14.7 will not be measured for payment and will be included in the payment for “Watermain and Water Service Insulation”.

E15. TREE REMOVAL

E15.1 Description

E15.1.1 This Specification covers the removal of individual trees to facilitate the Work. The Work shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work.

E15.2 Construction Methods

E15.2.1 Tree Removal

(b) Before commencement of any work, the Contractor shall consult with the Contract Administrator as to which trees and/ or shrubs shall be removed. All other trees and shrubs shall be protected against damage from all construction activity in accordance with E4. Protection of Existing Trees.

(c) Trees to be removed are to be felled so as to land within the limits of the works. The Contractor shall take all precautions to prevent damage to traffic, structures, pole lines, adjacent property and to trees and shrubs designated to be saved, and he shall be liable for any damages occurring in the performance of this work.

(d) The Contractor shall cut down all trees and shrubs designated for removal and grub out all stumps and roots. The Contractor shall load and haul all trees, stumps, roots, logs, brush, rubbish and all other surface litter from the site and dispose of these materials at dumps located by the Contractor and approved by the Contract Administrator.

E15.3 Measurement and Payment

E15.3.1 Removal of trees will be measured on a unit basis and paid for at the Contract Unit Price for "Tree Removal" which price shall be payment in full for removing and disposing all tree materials and for completing all operations herein described and all other items incidental to the work included in this Specification.

E16. TREES, SHRUBS & GROUNDCOVER PLANTINGS

GENERAL

E16.1 Description

E16.1.1 Provide all labour, materials, methods, equipment and accessories for the supply and installation of trees, shrubs & groundcover plantings.

E16.2 References

E16.2.1 Agriculture and and Agri-Food Canada (AAFC)

(a) Plant Hardiness Zones in Canada-2000.

E16.2.2 Canadian Nursery Landscape Association (CNLA)

(a) Plant Canadian Standards for Nursery Stock-2001.

E16.2.3 Department of Justice Canada (JUS)

(a) Plant Canadian Environmental Protection Act (CEPA), 1999, c. 33.

(b) Transport of Dangerous Goods Act (TDGA), 1992, c.34.

E16.2.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

(a) Materials Safety Data Sheets (MSDS).

E16.3 Submittals

E16.3.1 Submit product data for:

(a) Fertilizer.

E16.4 Storage and Protection

E16.4.1 The Contractor shall be responsible for supplying and transporting trees to the appropriate placement locations.

E16.4.2 The Contractor shall coordinate the shipping of trees and excavation of tree pits to ensure no more than a maximum of a 24 hour time lapse has occurred between the plant material arriving on Site and the installation of that plant material.

E16.4.3 Trees shall be transported with care taken to prevent damage:

(a) Protect trees against abrasion, exposure and extreme temperature change during transit;

(b) Avoid binding of trees with rope or wire that would damage bark, break branches or destroy natural shape of tree;

(c) Point of contact with equipment shall be padded;

(d) Give full support to root ball of trees during lifting:

(i) Each balled specimen shall be handled with sufficient care, so that the root balls shall not be broken;

(ii) Broken root balls or root ball consisting of loose soil will not be accepted and shall be replaced;

(iii) Broken roots of deciduous stock shall be pruned back prior to planting.

E16.4.4 Trees with broken or damaged trunks or branches are not acceptable. Trees with damaged trunks, however caused, will be rejected. No exceptions shall be made in this respect.

E16.4.5 Keep roots moist and protected from sun and wind:

(a) Trees that cannot be planted immediately shall be well protected against damage and drying out; if necessary, trees shall be heeled-in in a shaded area and watered well.

MATERIALS

E16.5 Plant Material

E16.5.1 Type of root preparation, sizing, grading and quality: comply with Canadian Standards for Nursery Stock.

E16.5.2 Source of plant material: grown in Zone 3 only in accordance with Plant Hardiness Zones in Canada.

E16.5.3 Plant material must be planted in zone indicated as appropriate for its species.

E16.5.4 Plant material shall be free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

E16.5.5 Substitutions to plant material as indicated on planting plan are not permitted unless written approval has been obtained as to type, variety and size. Plant substitutions must be of similar species and of equal size as those originally specified.

E16.5.6 Refer to the Drawings for species, quantities, size and quality of plant materials.

E16.5.7 All nursery stock shall be measured when the branches are in their normal position. Height and spread dimensions specified refer to the main body of the plant and not from branch tip.

E16.5.8 Where trees are measured by caliper (cal.), reference is made to the diameter of the trunk measured 150 mm above ground as the tree stands in the nursery.

E16.5.9 All trees shall have one only, sturdy, reasonably straight and vertical trunk and a well-balanced crown with fully developed leader. All evergreens shall be symmetrically grown and branched from ground level up, and must be balled and burlapped.

E16.5.10 At least one plant of each variety supplied shall bear a tag showing both the botanical and common name of the plant.

E16.6 Water

E16.6.1 Water shall be supplied free of impurities that would hinder plant growth. The Contractor shall provide water, so that all costs to provide water for the watering operation and all associated costs shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.

E16.6.2 Further to clause 3.7 of CW 1120, the Contractor shall pay for all costs associated with obtaining water in accordance with the Waterworks By-law. Sewer charges will not be assessed for water obtained from a hydrant.

E16.7 Planting Soil

E16.7.1 The planting soil shall be topsoil that complies with CW 3540, Section 5.2.

(a) Further to CW 3540 Section 5.2, planting soil shall contain maximum ten percent (10%) organic matter (peat, rotted manure or composed material).

E16.7.2 At the discretion of the Contract Administrator, planting soil may be subject to tests for nitrate, phosphate, potassium, sulphate, pH, E.C. (salinity), and volume of organic matter, by a testing laboratory designated by the Contract Administrator.

E16.8 Truck Protection

E16.8.1 Upon completion of the planting operation, the Contractor shall install truck protection by slicing open a 100 mm diameter x 600 mm long section of plastic weeping tile material and placing it around the base of each tree trunk.

E16.8.2 Tree support stakes stall be T-rail iron stakes 40 x 40 x 5 x 1540 mm long, primed with 1 brush coat of zinc rick plant paint to CGSB 1-GP-191B. Stakes shall be uniform in style and colour.

E16.8.3 The guying straps shall be attached in accordance with the Drawings referenced in E1.3 and shall be of a material that is non-abrasive to the tree to prevent girdling injury:

(a) Hose-covered wire, flexible belting or any strong, soft wide strips of material is acceptable

E16.8.4 Where wire is used, ensure ends are twisted tight. Protruding ends are unacceptable.

E16.9 Mulch

E16.9.1 The Contractor shall supply much. Mulch shall:

(a) Be a clean bark or wood chip with minimal amount of leaves, branches, and other extraneous matter; and

(b) Not contain adhesives, wood preservatives or any other chemical contaminants, and

(c) Consist of chips not less than 15 mm nor larger than 75 mm in size and not more than 20 mm thick.

CONSTRUCTION METHODS

E16.10 Pre-Planting Preparation

E16.10.1 Obtain approval from Contract Administrator of finish grading, and planting soil installation prior to commencing Work in this section.

E16.10.2 Ensure plant material is acceptable to the Contract Administrator.

E16.10.3 Remove damaged roots and branches from plant material with sharp clean equipment treating wounds as necessary to maintain plant health.

E16.10.4 Apply anti-desiccant to deciduous trees in leaf in accordance with manufacturer's instructions.

E16.11 Planting Layout

E16.11.1 For individual trees:

(a) Tree locations will be staked by the Contract Administrator.

(b) Excavate tree pits to depths and widths indicated on the Drawings with a back hoe unless other methods are indicated or approved.

(c) Remove rocks, roots, debris and toxic material from the tree pit.

(d) Scarify sides of planting hole.

E16.11.2 Remove water which enters excavations or planting beds prior to planting. Notify Contract Administrator if water source is groundwater.

E16.12 Planting

E16.12.1 For jute burlap rootballs, cut away top one third of wrapping and wire basket without damaging rootball. Do not pull burlap or rope from under rootball.

E16.12.2 For container stock or rootballs in non-degradable wrapping, remove entire container or wrapping without damaging rootball. Loosen rootball to encourage bonding with planting medium and subgrade.

E16.12.3 Plant vertically in locations as indicated. Orient plant material to give best appearance in relation to structure, roads and walks.

E16.12.4 For trees and shrubs:

(a) Backfill soil in 150 mm (6”) lifts. Tamp each lift to eliminate air pockets. When two thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade.

(b) Form watering saucer as indicated on the Drawings.

E16.12.5 Water plant material thoroughly. Report persistent ponding in planting areas to the Contract Administrator immediately.

E16.12.6 After soil settlement has occurred, fill with soil to finish grade.

E16.12.7 Dispose of burlap, wire and container material off Site.

E16.13 Tree Supports

E16.13.1 Install tree supports taking care not to damage or puncture underground utilities.

E16.13.2 Use double stake tree support for deciduous trees:

(a) Place first stake on prevailing wind side of tree trunk.

(b) Drive stakes minimum 150mm into undisturbed soil beneath bottom of roots. Ensure stakes are secure, vertical and unsplit.

(c) Install tree tie 1500mm above grade.

E16.14 Pruning

E16.14.1 Undertake corrective pruning after planting to eliminate torn and broken branches. Do not damage lead branches or remove smaller twigs along main branches. Do not prune to compensate for root loss.

E16.15 Warranty of Nursery Stock

E16.15.1 For all plant material a warranty period of two (2) calendar years is required.

E16.15.2 During the warranty period, upon written notification from the Contract Administrator, the Contractor warrants to replace and replant any nursery stock found dead and/or in poor condition as soon as possible thereafter, without cost to The City. "Poor Condition" shall be interpreted as meaning nursery stock on which branches are dead or dying, or have not shown satisfactory growth in leaves. Exempted is nursery stock damaged by accidental causes or vandalism, which stock shall be replaced at the cost of The City.

E16.15.3 End-of-Warranty inspection will be conducted by Contract Administrator.

E16.15.4 Contact Administrator reserves the right to extend Contractor's warranty responsibilities for an additional one (1) year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

E16.16 Replacements

E16.16.1 During warranty period, remove from Site any plant material that has died or failed to grow satisfactorily as determined by the Contract Administrator.

E16.16.2 Extend warranty on replacement plant material for a period equal to the original warranty period.

E16.16.3 All required replacements shall be by plants of at least the same size and species as specified, and shall be supplied and planted in accordance with the original Drawings and Specifications.

E16.16.4 Should the replaced plant material not survive, the Contractor will be responsible to replace it a third time and guarantee it for a period equal to the original warranty period unless it is determined that unique Site conditions or inadequate maintenance causes the death of plants

E16.17 Maintenance

E16.17.1 Maintain plant material from date of planting to the end of the warranty period. Refer to Landscape Maintenance Specification.

E16.18 Measurement and Payment

E16.18.1 Supply and installation of trees will be measured on a unit basis and will be paid for at the Contract Unit Price per unit for the following items of work, measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification.

Items of Work:

(a) Discovery Elm

(b) Alpine Current Hedge

E16.18.2 Removal and Replacement of Mulch and Planting Beds will be measured on an area basis and will be paid for at the Contract Unit Price per square metre for "Removal and Replacement of Mulch and Planting Beds", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification

E16.18.3 All other items described in this Specification including, but not limited to, trunk protection, tree supports and mulch will not be measured and payment shall be included in the price paid for the Items of Work listed above.

E17. LANDSCAPE MAINTENANCE

E17.1 Description

E17.1.1 Provide all labour, materials, methods, equipment and accessories for the maintenance of trees following acceptance of the plant material to start warranty.

E17.1.2 In general, the Work shall include:

(a) Fertilizing

(b) Watering

(c) Weed Control

(d) Pest and Disease Control

(e) Winter Preparation

E17.1.3 Maintenance shall be performed on an as required basis.

E17.2 Maintenance and Warranty Period

E17.2.1 Maintenance shall occur between the date of installation and up to a period of two (2) years from date landscaped areas are accepted to start warranty. The warranty period for plant materials will be coincidental to the maintenance period.

E17.2.2 Thirty days after the planting installation has been completed, the Contract Administrator shall perform an inspection of the plant material to determine if the plant material is acceptable to start warranty.

E17.3 Materials and Equipment

E17.3.1 Materials shall conform to the requirements of related Specification sections.

E17.3.2 Provide all equipment to properly execute Work. Maintain such equipment in a workable, safe condition while in use during this project.

E17.3.3 Contract Administrator shall review equipment to be used to execute Work prior to execution.

E17.4 Method

E17.4.1 General

(a) Provide watering service within 24 hours, weeding services within 48 hours of the request by the Contract Administrator. Monitor the Site and advise the Contract Administrator of conditions that might void the Contractor's warranty responsibilities.

(b) The Contractor shall maintain a log noting times, dates, equipment used, and quantity of materials used and areas treated for each maintenance application. Forms shall be provided by Contract Administrator. Submit log to Contract Administrator upon request. Contractor shall notify Contract Administrator of the exact time Contractor proposes to commence each application.

(c) Schedule operations in accordance with growth, health, weather conditions, and use of Site.

(d) Perform each operation continuously and completely within a reasonable time period.

(e) Store equipment and materials off Site.

(f) Collect and dispose of debris or excess material on the day the maintenance is undertaken.

E17.4.2 Maintenance of Trees:

(a) Fertilizing: Apply fertilizer only at frequency, ratio and rates as recommended by manufacturer. Water immediately after fertilizing. Apply fertilizer no later than May 30th of each maintenance year.

(b) Watering: Apply water as required to supplement rainfall and to maintain optimum growing conditions. In general, water once a week to achieve rates as indicated. Allow soil to adequately dry between watering to prevent over saturation without creating water stress. Subject to the above-noted requirements, the Contractor must water at least once a week between May 1st and October 15th inclusive. A complete record is to be kept of each series of waterings for all planted trees noting location and date of watering. This record is to be given to the Contract Administrator when requested. Apply 40 litres of water per 25 mm calliper per application using a deep root feeder or low pressure open flow nozzle and hose. The water stream must not gouge the soil and mulch.

(c) Weed Control: Inspect and undertake weed control weekly during the first year of maintenance and monthly during the second year. By hand, remove all weeds with their roots from tree pits and tree beds and dispose of off Site. When weeding operation is complete, replace and rake displaced mulch to its original condition.

(d) Pests and Diseases: Obtain written approval of Contract Administrator prior to using any pesticide. Control pests and disease through pruning or application of pesticides. Use species specific pesticides where possible. Use only pesticides of low mammalian toxicity. Strictly follow manufacturer's written instructions.

(e) Pruning: The Contractor shall provide a person with a Manitoba Arborists Certificate for each work crew or Work Site. Prune as required to remove dead, broken or damaged limbs. Prune back to healthy growth while maintaining balanced crown shape. Employ clean sharp tools. Make cuts smooth and flush with outer edge of branch collar near the main stem or branch. Cuts must be smooth and sloping to prevent accumulation of water on cut. Do not leave little stumps ("horns") on trunks or main branches. Prune according to accepted horticultural practices as outline in "The Pruning Manual", Publication No. 1505-1977 by Agriculture Canada.

(f) Winter Preparation: Ensure adequate moisture in tree root zones prior to freeze-up.

E17.5 Measurement and Payment

E17.5.1 Landscape maintenance shall be paid for on a lump sum basis for the items of work listed below. Price shall be payment in full for supplying all material and performing all operations herein described and all other items incidental to the Work included in this Specification.

Items of Work:

(ii) Landscape Maintenance Year 1

(iii) Landscape Maintenance Year 2

E18. REMOVE AND REINSTALL FENCING

DESCRIPTION

E18.1.1 This Specification shall cover the removal and reinstallation of wood parking fence at 1038 St. James Street to accommodate the Work. The Work shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work.

CONSTRUCTION METHODS

E18.2 Remove and Reinstall Fencing

E18.2.1 Before commencement of any Work, the Contractor shall consult with the Contract Administrator to confirm the limits of removal shown on the Drawings.

E18.2.2 The Contractor shall store all fencing material and hardware in a safe location until it is required for reinstallation.

E18.2.3 Any damage to the existing fencing or hardware that has not been identified prior to removal will be repaired or replaced by the Contractor at his own expense.

E18.2.4 The Contractor shall reinstall the fencing at the locations shown on the Drawings and as indicated by the Contract Administrator to match the existing installation to the satisfaction of the Contract Administrator.

MEASUREMENT AND PAYMENT

E18.3 Remove and Reinstall Fencing

E18.3.1 Removal and reinstallation of existing fencing will be measured on a length basis and paid for at the Contract Unit Price for “Remove and Reinstall Fencing”. The number to be paid for will be the total number of metres removed, salvaged and reinstalled in accordance with this Specification, accepted and measured by the Contract Administrator.

E19. SUBDRAIN CONNECTIONS

E19.1 Connecting new subdrain pipe to existing subdrain pipe shall be constructed and paid for in accordance with CW 2130 “Connecting New Sewer Service to Existing Sewer Service” utilizing couplings in accordance with CW 3120 .

E19.2 Connecting new subdrain pipe to existing cathcbasins shall be constructed and paid for in accordance with CW 2130 “Connecting to Existing Catch Basin”.

E20. LINE PAINTING IN PARKING LOTS

DESCRIPTION

E20.1 General

E20.1.1 This Specification covers all operations relating to the supply and installation of line painting in asphalt parking lots, as noted on the Drawings.

E20.1.2 The Work to be done by the Contractor under this Specification shall include furnishing of all superintendence, overhead, labor, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

MATERIALS

E20.1.3 Line painting shall conform to City of Winnipeg specifications for line painting on asphalt surfaces.

(a) CGSBB1-GP-74 M, alkyd traffic paint

(b) CGSB 1-GP-12C, Yellow 505-308 for parking lot painting

SUBMITTALS

E20.2 Prior to construction the Contractor shall submit material data sheets for the proposed product to be supplied to the Contract Administrator.

CONSTRUCTION METHODS

E20.3 Surface Preparation

E20.3.1 Surface Preparation to be in accordance with the Manufacturer's instructions.

E20.3.2 Before commencement of any Work, the Contractor shall consult with the Contract Administrator to confirm the paint locations shown on the Drawings.

E20.3.3 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

E20.3.4 Paint lines to be of uniform colour and density with sharp edges.

E20.4 Paint Mixing

E20.4.1 Mix paint in accordance with Manufacturer's instructions.

E20.5 Installation of Paint Lines

E20.5.1 Install paint lines in accordance with Manufacturer's instructions.

MEASUREMENT AND PAYMENT

E20.6 Line Painting in Parking Lots

E20.6.1 Supply and installation of line painting in asphalt parking lots shall not be measured and will be paid for at the Contract Lump Sum Price for "Line Painting in Parking Lots", supplied and installed in accordance with this Specification and accepted and measured by the Contract Administrator.

E21. PILES

E21.1 Description

E21.1.1 This Specification covers the following items related to construction of concrete pile foundations:

(a) Drilling of the pile shafts.

(b) Use and installation of casing to prevent cave-ins.

(c) Supply and installation of reinforcement.

(d) Supply and installation of structural steel.

(e) Supply and placement of concrete.

(f) Disposal of water from piles shafts.

E21.2 Materials

E21.2.1 Structural steel (H-piles): HP 250x85 conforming to CSA Standard CAN/CSA G40.21, Grade 350W or ASTM A572 Grade 50. The top 1125 mm of the H-pile, including all structural steel attachments, shall be galvanized in accordance with ASTM A123 and CSA G164 to a minimum net retention of 610 g/m^2 after fabrication.

E21.2.2 Structural steel (angles): L152x106x16 conforming to CSA Standard CAN/CSA G40.21, Grade 350W or ASTM A572 Grade 50. All angles shall be galvanized in accordance with ASTM A123 and CSA G164 to a minimum net retention of 610 g/m^2 after fabrication.

E21.2.3 Concrete: Class F1 or S1, Type HS, HSb, or HSe cement, in accordance with E23.

E21.2.4 Reinforcement: Plain deformed steel bars conforming to CSA Standard CAN/CSA G30.18, Grade 400W, in accordance with E24.

E21.2.5 Elastomeric sheets: Fabricated of natural rubber or neoprene.

E21.2.6 Void Form: In accordance with E23.

E21.2.7 Miscellaneous Materials: Shall be of the type specified on the Drawings or approved by the Contract Administrator.

E21.3 Equipment

E21.3.1 All equipment shall be of a type accepted by the Contract Administrator and shall be kept in good working order.

E21.4 Construction Methods

E21.4.1 Drilling Pile Shafts

(a) Pile shaft construction shall not commence until the Contractor has obtained clearance from the appropriate utilities, including but not limited to Manitoba Hydro, MTS, and the City of Winnipeg Water and Waste.

(b) Pile shafts shall be placed in the positions shown on the Drawings and as directed by the Contract Administrator.

(c) Drill pile shafts to depths and dimensions shown on the Drawings unless otherwise directed by the Contract Administrator.

(d) The Contractor shall not be compensated for drilling larger diameter or deeper holes unless approved by the Contract Administrator.

(e) Care shall be taken to drill only to the depths indicated on the Drawings.

E21.4.2 Inspection of Shafts

(a) The Contractor shall provide a minimum of two (2) Business Day advance notice of intent to drill shafts to allow for inspection of shafts to occur during drilling activities.

(b) Shafts shall not be drilled until the Contract Administrator is onsite and available for inspection of the shafts.

(c) Concrete shall not be placed in the shaft until the shaft has been inspected and approved by the Contract Administrator.

(d) The Contractor shall have available suitable light for the inspection of each shaft throughout its entire length.

(e) Any improperly prepared shaft shall be corrected to the satisfaction of the Contract Administrator.

E21.4.3 Casing

(a) Cave-ins of the piles shafts and water ingress into the piles shall not be permitted and temporary casing shall be installed as required to prevent cave-ins and water inflows from water bearing soils.

(b) The Contractor shall be prepared to temporarily sleeve the full length of the shaft, if required.

(c) The Contractor shall not be compensated for drilling oversized shafts to accommodate installation of the casing.

(d) Casings shall remain in shafts until the concrete has been placed.

(e) Casings shall be removed by slow even lifting to prevent developing voids in plastic concrete.

(f) Casings shall be removed with due care and attention to prevent sloughing (necking) of the shaft walls and reductions in cross-sectional area of the pile.

E21.4.4 Placing Reinforcing

(a) Reinforcement shall be:

(i) Placed in accordance with the details shown on the Drawings.

(ii) Rigidly fastened together.

(iii) Lowered into the excavation before concrete is placed.

(b) Spacers shall be used to properly locate the reinforcing steel cage in the excavation.

E21.4.5 Structural Steel

(a) Inspect and remove all dirt, oil, or other foreign matter from steel prior to placing in caisson shaft.

E21.4.6 Location and Alignment of H-Piles

(a) H-piles shall be centred and plumb in pile shafts and held secure during the placement of concrete. Trim the H-piles if required.

(b) The H-piles shall be located to the positions shown on the Drawings. H-piles shall be installed not more than 50 mm off centre, measured at the final top elevation. Piles shall be plumb. The Contractor is responsible for determining a method to hold the pile plumb and to the correct location within the pile shaft.

E21.4.7 Placing Concrete

(a) Concrete shall be placed immediately after shaft approval by the Contract Administrator to avoid construction problems such as sloughing or caving and groundwater seepage.

(b) Concrete shall be placed to the elevations shown on the Drawings. The top surface of the pile shall be finished smooth with a hand float.

(c) The shaft shall be free of water prior to placing of concrete. Concrete shall not be placed in or through water unless authorized by the Contract Administrator.

(d) Concrete shall be placed in one continuous operation.

E21.4.8 Protection of Newly Placed Concrete

(a) Newly laid concrete threatened with damage by rain, snow, fog, or mist shall be protected with a tarpaulin or other approved means.

E21.4.9 Curing Concrete

(a) The top of the freshly finished concrete piles shall be covered and kept moist by means of wet polyester blankets immediately following finishing operations and shall be maintained at above 10ºC for at least seven (7) consecutive days thereafter.

(b) After the finishing is completed, the surface shall be promptly covered with a minimum of a single layer of clean, damp polyester blanket.

(c) Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping or running water, vibration, and mechanical shock. Concrete shall be protected from freezing until at least twenty-four hours after the end of the curing period.

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

E21.4.10 Void Form Placement

(a) Void form shall be placed above the concrete caisson to fill the gap between the top of concrete caisson and underside of lagging panel.

E21.5 Quality Control

E21.5.1 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 Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works that are not in accordance with the requirements of this Specification.

E21.5.2 The Contractor shall be responsible for making a thorough inspection of materials to be supplied under this Contract. All material shall be free of surface imperfections and other defects.

E21.6 Measurement and Payment

E21.6.1 Construction of piles shall be measured and paid for on a unit basis. The number paid for shall be the total number of piles constructed in accordance with this Specification as accepted by the Contract Administrator.

E21.6.2 Payment shall be at the Contract Unit Price for “Piles”, which shall be payment in full for all operations herein described including drilling shafts; removing and disposing of drill cuttings; supply and installation of steel, concrete, and reinforcement; supply and placement of void form and elastomeric strips; supply and installation of all other miscellaneous attachments to the primary pile components; and all other items incidental to the Work included in this Specification.

E22. PRECAST CONCRETE LAGGING PANELS

E22.1 Description

E22.1.1 This Specification shall cover the supply and installation of the precast concrete lagging panels and backfilling of the retaining wall, including:

(a) Demolition and removal of existing concrete sidewalk;

(b) Excavation to facilitate installation of precast concrete lagging panels.

(c) Supply and installation of the precast concrete lagging panels.

(d) Supply and placement of granular fill behind the shoring

(e) Supply and placement of the perforated pipe drain behind the shoring and catchbasin connection.

E22.2 Materials

E22.2.1 Concrete: Class C1, Type GU cement, in accordance with E23.

E22.2.2 Reinforcement: Plain deformed steel bars conforming to CSA Standard CAN/CSA G30.18, Grade 400W, in accordance with E24.

E22.2.3 Geotextile: As per CW3130.

E22.2.4 Granular Backfill: Free draining and in accordance with CW2030 Type 3 Material.

E22.2.5 Dampproofing: in accordance with E23.

E22.2.6 Sand: “Sand” in accordance with Table CW 2030.1, Specification CW 2030-R9.

E22.2.7 Drain pipe: 150 mm diameter PVC pipe, solid and perforated.

E22.2.8 Miscellaneous Materials: Shall be of the type specified on the Drawings or approved by the Contract Administrator.

E22.3 Construction Methods

E22.3.1 Fabrication of Precast Concrete Lagging Panels

(a) Placing Reinforcement:

(i) Reinforcement shall be:

- Placed in accordance with the details shown on the Drawings.
- Rigidly fastened together.
- Lowered into the excavation before concrete is placed.

(ii) Spacers shall be used to properly locate the reinforcing steel cage in the excavation.

(b) Concrete Finish

(i) Architectural formwork liner shall be used on the finished face as per E23.7.12.

(c) Placing Concrete

(i) Concrete shall be placed to the dimensions shown on the Drawings. Hand finished surfaces shall be finished smooth with a hand float.

(ii) The form shall be free of water prior to placing of concrete. Concrete shall not be placed in or through water unless authorized by the Contract Administrator.

(iii) Interruption in placing concrete shall not exceed 30 minutes.

(d) Protection of Newly Placed Concrete

(i) Newly cast concrete threatened with damage by rain, snow, fog, or mist shall be protected with a tarpaulin or other approved means.

(e) Curing Concrete

(i) Exposed surfaces of the concrete panels shall be covered and kept moist by means of wet polyester blankets immediately following finishing operations and shall be maintained at above 10ºC for at least seven (7) consecutive days thereafter.

(ii) After the finishing is completed, the exposed surface shall be promptly covered with a minimum of a single layer of clean, damp polyester blanket.

(iii) Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping or running water, vibration, and mechanical shock. Concrete shall be protected from freezing until at least twenty-four hours after the end of the curing period.

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

(f) Dampproofing

(i) Dampproofing shall be applied to the concrete lagging panels as per E23.

E22.3.2 Existing Sidewalk Removals and Excavation

(a) Existing sidewalk removals and excavation required for the placement of the panels shall be completed prior to panel placement.

(b) Sidewalk removals and excavations shall be kept to the minimum required for panel installation and shall not exceed the limits as shown on the Drawings. The Contractor shall excavate only material that is necessary for the expeditious construction of the structure or as set out by the Contract Administrator in the field.

(c) The information regarding the existing sidewalk has been obtained from the existing Drawings and the accuracy of this information is not guaranteed. The Contractor must verify all information prior to commencing Work.

(d) The Contractor shall be fully responsible for ensuring the Public Safety in all areas and will be held responsible for any loss or damage caused due to neglect by the Contractor or his employees.

(e) The Contractor shall provide barricades, railings, or warning signs, as necessary, at excavations, removals, and/or other construction to secure the safety of workmen and the Public. The safety precautions shall comply with all Provincial Statutes applicable

to the Work. The Contractor shall provide all other protective measures as may be required by any Law in force in Manitoba and the Canada Labour Code.

(f) The Contractor shall generally prevent any unspecified and undesirable movement or settlement of the existing building, damage to any existing buildings to remain, and damage to any services, paving, trees, landscaping and adjacent grades not specified for removal/disturbance.

(g) The Contractor shall design and provide any bracing, shoring or underpinning necessary to complete the work as required and shall have any designs for this Work sealed, signed and dated by a Professional Engineer licensed to practice in the Province of Manitoba. If the safety of the structure and/or existing services appears to be endangered during structural removal or excavation operations or if the Work is detrimentally impacting the environment, the Contractor shall cease operations and notify the Contract Administrator immediately. Additionally, if the Work is proceeding in a fashion unsatisfactory to the Contract Administrator for any reason, the Contractor will be notified and shall cease operations immediately. The design, fabrication, erection, and removal of all temporary works is considered incidental to the Work.

(h) In no case will the Contractor be permitted to use removal equipment, or other equipment or methods that may cause damage to any remaining structural components or to any new construction. In the event that any component is damaged, the Contractor shall repair such component at his own expense to the satisfaction of the Contract Administrator.

(i) The Contractor shall sawcut the existing sidewalk at the required removal limits the full depth of the sidewalk.

(j) Excavations shall be completed to the elevations required to construct the Works or to such other elevations as may be directed by the Contract Administrator in the field. Excavation sequence shall be done in a “top down” direction in order to maintain stability.

(k) All removed and excavated materials shall become the property of the Contractor. The Contractor shall promptly haul all removed and excavated materials indicated for disposal, off and away from the site. No storage of any materials on-site will be allowed without the written approval of the Contract Administrator. It shall be the Contractor’s responsibility to find suitable disposal areas away from the site. Under no circumstances shall demolition products find their outside the construction site limits. All materials shall be disposed of at an approved disposal facility by the Contractor. Any disposal fees shall be considered incidental to this Work. Wherever practical, the Contractor shall recycle disposed materials. The Contractor shall submit a list of locations of disposal/recycling for all removed materials to the Contract Administrator.

E22.3.3 Placement of Precast Concrete Lagging Panels

(a) Sidewalk removals and excavation required for the placement of the panels shall be completed prior to panel placement.

(b) Sand shall be placed to create a level bedding between the limits of the excavation and the underside of the concrete lagging panels.

(c) Concrete lagging panels shall be placed plumb, with the full height of finished face bearing directly against the elastomeric sheets.

(d) Concrete lagging panels shall be placed so that they bear on the support angles and are centred between the H-piles.

E22.3.4 Installation of Granular Backfill

(a) Granular backfill shall be a minimum of 0.3 m wide beyond the lagging panels.

(b) Granular backfill shall be placed in maximum 0.3 m lifts and hand tamped to the satisfaction of the Contract Administrator.

(c) Non-woven geotextile shall be placed between the granular fill, the sub-grade, and the surrounding fill.

(d) Sub-drains, consisting of perforated drain pipe, shall be installed as per the Drawings.

(e) Drainage pipe from sub-drain, consisting of drain pipe, shall be installed as per the Drawings.

(f) Sand shall be used to fill all gaps between the concrete lagging panels and the H-piles after granular backfilling operations are complete.

E22.4 Quality Control

E22.4.1 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 Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works that are not in accordance with the requirements of this Specification.

E22.4.2 The Contractor shall be responsible for making a thorough inspection of materials to be supplied under this Contract. All material shall be free of surface imperfections and other defects.

E22.5 Measurement and Payment

E22.5.1 Fabricate and Supply of Precast Concrete Lagging Panels

(a) Fabrication and supply of Precast Concrete Lagging Panels shall be measured and paid for on a unit basis. The number paid for shall be the total number of precast concrete lagging panels supplied in accordance with this Specification as accepted by the Contract Administrator.

(b) Payment shall be at the Contract Unit Price for each unit for “Fabricate and Supply of Precast Lagging Panels” for the “Items of Work” listed here below, which shall be payment in full for all operations herein described for the fabrication and supply of precast concrete lagging panels including supply, placement, and finishing of concrete; supplying and placing of reinforcing; furnishing of the panels to site; and all other items incidental to the Work included in this Specification.

E22.5.2 Install Precast Lagging Panels

(a) Install Precast Concrete Lagging Panels shall be measured and paid for on a unit basis. The number paid for shall be the total number of precast concrete lagging panels installed in accordance with this Specification as accepted by the Contract Administrator.

(b) Payment shall be at the Contract Unit Price for each unit for “Install Precast Lagging Panels” for the “Items of Work” listed here below, which shall be payment in full for all operations herein described for the installation of precast concrete lagging panels including placement of panels; dampproofing; sidewalk removals and excavation required for installation of precast panels; supply and installation of granular backfill including sand and installation of subdrains and drainage to the catchbasin, as described in the Drawings; installation of geotextile and backfill; supply and installation of all other miscellaneous attachments to the primary pile components; and all other items incidental to the Work included in this Specification.

E22.5.3 Items of Work

(a) Fabricate and Supply Precast Concrete Lagging Panels
  (i) Panel Mk. P1
  (ii) Panel Mk. P2
  (iii) Panel Mk. P3

(b) Install Precast Lagging Panels
  (i) Panel Mk. P1
  (ii) Panel Mk. P2

(iii) Panel Mk. P3

E23. STRUCTURAL CONCRETE

E23.1 Description

E23.1.1 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.

E23.1.2 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.

E23.2 Referenced Specifications and Drawings

E23.2.1 The latest edition and subsequent revisions of the following:

(a) ACI 309 – Guide for Consolidation of Concrete;

(b) ACI 347 – Guide to Formwork for Concrete;

(c) American Concrete Publication SP4 – Formwork for Concrete;

(d) ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings;

(e) ASTM C131 – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine;

(f) ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete;

(g) ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete;

(h) ASTM C457 – Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete;

(i) ASTM C494 – Standard Specification for Chemical Admixtures for Concrete;

(j) ASTM C1017 – Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete;

(k) ASTM C1202 – Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration;

(l) ASTM C1399 – Standard Test Method for Obtaining Average Residual-Strength of Fibre-Reinforced Concrete;

(m) ASTM C1609 – Standard Test Method for Flexural Performance of Fibre-Reinforced Concrete (Using Beam with Third Point Loading);

(n) ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types);

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

(p) CAN/CSA A3001 – Cementitious Materials for Use in Concrete;

(q) CAN/CSA G40.21 – General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel;

(r) CAN/CSA G164-M92 – Hot Dip Galvanizing of Irregularly Shaped Articles;

(s) CAN/CSA O121 – Douglas Fir Plywood;

(t) CAN/CSA-S6 – Canadian Highway Bridge Design Code;

(u) CAN/CSA S269.1 – False Work for Construction Purposes;

(v) CAN/CSA S269.3 – Concrete Formwork;

(w) ICRI Guideline No. 03732 – Selecting and Specifying Concrete Surface Preparation for Coatings, Sealers, and Polymer Overlays;

(x) Ministry of Transportation Ontario MTO Lab Test Method LS 609 – Petrographic Analysis of Coarse Aggregate;

(y) Ontario Provincial Standard Specification OPSS 1010 – Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material;

(z) SSPC-SP6/NACE No.3 Commercial Blast Cleaning.

E23.3 Scope of Work

E23.3.1 The Work under this Specification shall include:

(a) Supplying and placing structural concrete for the lagging panel retaining wall at 1065 St. James Street (The Brick), including:

(i) Foundation concrete for Piles;

(ii) Precast Concrete Lagging Panels;

(iii) Cast-in-Place Concrete Cap Beam; and

(iv) Cast-in-Place Concrete Sidewalk.

(b) Quality control tests of all concrete supplied.

E23.4 Submittals

E23.4.1 General

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Days prior to the commencement of any scheduled Work on the Site, a proposed schedule and materials for the Works.

E23.4.2 Concrete Mix Design Requirements

(a) The Contractor shall submit a concrete mix design statement for all concrete types expect the self compacting concrete 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 outlined 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) 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, except the self compacting concrete. 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 units, 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 units. Mass of aggregates is saturated surface dry basis;

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

(vi) The limits for slump;

(vii) The limits for air content;

(viii) Quantity of other admixtures;

(ix) Certification that all concrete constituents are compatible;

(x) Certification that the concrete mix(es) will meet the specified concrete performance criteria requirements.

(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 the most recent edition of CSA A23.1 Clause 4.3.2.3.2.

(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.

E23.4.3 Concrete Mix Design Test Data

(a) Concrete

(i) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) 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) The Contractor shall submit at a minimum, the test data to prove that the minimum compressive strength, air content, and slump of the concrete to be supplied meets or exceeds the performance criteria.

(iii) Testing for air void system shall be completed in accordance with E23.8.5.

(iv) 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 place.

E23.4.4 Aggregates for Concrete Other than Self Compacting Concrete

(a) The Contractor shall furnish, in writing to the Contract Administrator for review and approval, at least ten (10) 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 large-size coarse aggregate by abrasion and impact in the Los Angeles Machine, in accordance with CSA Standard Test Method A23.2-16A.

(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.

E23.4.5 The Contractor shall submit to the Contract Administrator copies of all material quality control test results.

E23.4.6 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 ten (10) 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.

E23.4.7 Temporary False Work, Formwork and Shoring Works

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) 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, “False Work for Construction Purposes.” 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 S269.3-M92. 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 Part 3, Section 102 of "Recommended Practice for Concrete Formwork", (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 Section 103 of the above reference shall apply.

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

- 20 mm plywood: studding 400 mm centre to centre maximum;
- Walers 760 mm centre to centre maximum.

(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 camber, 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 (2) directions and diagonally in the same two (2) 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.

E23.5 Materials

E23.5.1 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.

E23.5.2 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 the most recent edition of CSA Standard CAN/CSA-A23.1.

E23.5.3 Concrete

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

(b) For concrete other than self compacting concrete, concrete shall have nominal compressive strengths (f'c) and meet the requirements for hardened concrete as specified in the following Table.

(c) Concrete shall be Agilia Vertical, LaFarge North America, proprietary ready-mix concrete, or accepted equal, and meet the requirements for hardened concrete as specified in the following Table.

Requirements for Hardened Concrete

Type of Concrete	Location	Nominal Compressive Strength [MPa]	Class of Exposure	Air Content Category	Max Aggregate Size	Special Requirements	Slump-Flow
Type 1	Foundations	35 @ 28 Days	F-1, S-1	2	20 mm	Self Compacting	550 mm – 650 mm
Type 2	Lagging Panels, Cap Beam, and Sidewalk	35 @ 28 Days	C-1	1	20 mm	None	

E23.5.4 Aggregates for Concrete other than Self Compacting Concrete

(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 (2) 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 the most recent edition of CSA A23.2-27A. Current (less than eighteen (18) months old) test data evaluating the potential alkali-silica reactivity of aggregates tested in accordance with the most recent edition of 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.

E23.5.5 Fine Aggregate for Concrete other than Self Compacting Concrete

(i) Fine aggregate shall meet the grading requirements of the most recent edition of CSA A23.1, Table 10, FA1, be graded uniformly and not more than three percent (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.

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

E23.5.6 Coarse Aggregate – Standard – for Concrete other than Self Compacting Concrete

(a) The maximum nominal size of coarse aggregate shall be 20 mm and meet the grading requirements of CSA A23.1-04, Table 11, Group I. Coarse aggregate shall be uniformly graded and not more than two percent (2%) shall pass a 75 um sieve.

(b) 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 (2) fractured faces; and shall have an absorption not exceeding three percent (3%).

(c) 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.

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

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

E23.5.7 Admixtures for Concrete other than Self Compacting Concrete

(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.

E23.5.8 Cementitious Materials for Concrete other than Self Compacting Concrete

(a) Cementitious materials shall conform to the requirements of CSA-A3001 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 eight percent (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 thirty percent (30%) 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.

E23.5.9 Water for Concrete other than Self Compacting Concrete

(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 the most recent edition 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.

E23.5.10 Formwork

(a) Formwork materials shall conform to the most recent edition of CSA Standard A23.1, and American Concrete 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 O121-08, 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 O121-08. Approved Manufacturers are “Evans” and “C-Z.”

(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.

(f) Items to be left in place, i.e., within the structural concrete component, but not within the outer 50 mm, must be made from a non-rusting material or galvanized steel; and they shall not stain, blemish, or spall the concrete surface for the life of the concrete.

(g) Notwithstanding Clause E23.5.10(f), where the structural concrete component is reinforced with black steel reinforcing (refer to E24.5.3 for permissible components), the use of black steel formwork accessories will be permitted.

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

(i) 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.

(j) 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 mm x 150 mm.

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

E23.5.11 Form Coating

(a) Form coating shall be "Sternson C.R.A." by Sternson, "SCP Strip Ease" by Specialty Construction Products, or equal as accepted by the Contract Administrator, in accordance with B6.

E23.5.12 Permeable Formwork Liner

(a) Formwork liner shall be Texel Drainaform, Hydroform, or equal as accepted by the Contract Administrator, in accordance with B6. This formwork liner shall be used on all exposed substructure and superstructure formed surfaces, except soffit surfaces, precast panel front surfaces, or where a normal form finish is specified.

E23.5.13 Architectural Formwork Liner

(a) Architectural Formwork Liner shall provide a brick-like finish.

(b) Architectural Formwork Liner shall be Custom Rock Formliner pattern #12016, New Brick (keyed), or approved equal as accepted by the Contract Administrator, in accordance with B6.

E23.5.14 Curing Compound

(a) Curing compounds shall be liquid membrane-forming and conform to the requirements of ASTM Standard C309-98a.

(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 equal as accepted by the Contract Administrator, in accordance with B6.

E23.5.15 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 equal as accepted by the Contract Administrator, in accordance with B6.

E23.5.16 Bonding Agents

(a) Latex Bonding Agent

(i) Latex bonding agent shall be Acryl-Stix, SikaCem 810, or equal as accepted by the Contract Administrator, in accordance with B6. 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 twenty-eight (28) days in age.

E23.5.17 Epoxy Adhesive

(a) Epoxy adhesive for bonding concrete to steel shall be one (1) 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 equal as accepted by the Contract Administrator, in accordance with B6.

E23.5.18 Epoxy Grout

(a) Epoxy grout shall be one (1) of the following approved products: Sternson Talygrout 100, Sika Sikadur 42, CPD Epoxy Grout by Specialty Construction Products, Meadows Rezi-Weld EG-96, or equal as accepted by the Contract Administrator, in accordance with B6.

E23.5.19 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 equal as accepted by the Contract Administrator, in accordance with B7 Substitutes. The minimum compressive strength of the grout at 28 days shall be 40 MPa.

E23.5.20 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.

E23.5.21 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 equal as accepted by the Contract Administrator, in accordance with B6.

E23.5.22 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 D1751-99 or equal as accepted by the Contract Administrator, in accordance with B6.

E23.5.23 EMSEAL Precompressed Foam Joint Filler

(a) Expansion joint seal shall be EMSEAL BEJS or equivalent as approved by the Contract Administrator to ASTM C711 and ASTM G155-00A.

(b) Sealant system shall be comprised of three (3) components:

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

(ii) Field-applied epoxy adhesive primer;

(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 sixty-five degrees Celsius (65°C) for three (3) hours while compressed down to the minimum of movement capability dimension of the basis of design product (minus fifty percent (-50%) of normal material size) without evidence of any bleeding of impregnation medium from the material;

(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 (plus fifty percent (-50%) of nominal material size) within twenty-four (24) hours at room temperature twenty degrees Celsius (20°C).

E23.5.24 Extruded Polystyrene Foam

(a) Supply and install extruded polystyrene foam (also known as Styrofoam™) to the thicknesses and extents as shown on the Drawings. Extruded polystyrene foam shall be Styrofoam™ Brand Cladmate™ or equivalents as approved by the Contract Administrator in accordance with B6.

(b) Low density Styrofoam shall be the type accepted by the Contract Administrator, in accordance with B7 Substitutes.

(c) High density Styrofoam shall be expanded polystyrene with a minimum compressive stress of 207 kPa at ten percent (10%) deformation.

(d) Low density Styrofoam shall be the type accepted by the Contract Administrator, in accordance with B6.

E23.5.25 Stainless Steel Dowels and Expansion Sleeves for Cap Beam:

(a) Dowels shall conform to the requirements of ASTM A 955/A 955M Standard Specification for Deformed and Plain Stainless-Steel Bars for Concrete Reinforcement.

(b) Sleeves shall conform to the requirements of A213 seamless tube, A269 welded tube, A511 seamless mechanical tube or A554 ornamental tube, Type 304 or 316.

(c) The expansion assemblies shall be fabricated to the details shown on the Drawings.

E23.5.26 Dampproofing

(a) Dampproofing materials shall be applied to all buried concrete lagging panel surfaces in contact with the soil to within 100 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 No. 37.16-M89.

(b) Acceptable product is Bakelite/Flintguard 710-11 Foundation Coating as manufactured by Bakor, Elsro Fibrated Foundation Coating, Insulmastic 7103 Fibered

Waterproofing, or equal as accepted by the Contract Administrator, in accordance with B6.

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

(d) Primer for dampproofing shall be asphalt primer, penetrating type conforming to CGSB 37-GP-9Ma. 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 equal as accepted by the Contract Administrator, in accordance with B6.

E23.5.27 Void Form

(a) Void form stall be supplied by Void Form orientated, or equal as accepted by the Contract Administrator, in accordance with B6.

E23.5.28 Miscellaneous Materials

(a) Miscellaneous materials shall be of the type specified on the Drawings or as accepted by the Contract Administrator, in accordance with B6.

E23.6 Equipment

E23.6.1 General

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

E23.6.2 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.

E23.7 Construction Methods

E23.7.1 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 C309-98a for the texture of concrete the curing compound is being applied to.

E23.7.2 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.

(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 (2) directions and diagonally in the same two (2) 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 cap beam 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.

(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 (3) 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 (2) 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, ties 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.

E23.7.3 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 E23.7.10, ”Preparation for Concreting Against Hardened Concrete” for the requirements to prepare the hardened concrete at a construction joint for receiving new concrete.

E23.7.4 Cap Beam Joints

(a) For the joint sealing at all locations, the contractor shall submit shop drawings and his proposed installation procedures to the Contract Administrator for approval fourteen (14) days prior to installation.

(b) The installation of the fibre joint filler and the EMSEAL joint sealing shall be undertaken as shown on the drawings.

(c) EMSEAL joint seals shall not be field spliced except when specifically permitted by the Contract Administrator in writing.

(d) Furnish fibre joint filler for each joint in a single piece for the required depth and width for each joint, unless otherwise approved by the Contract Administrator. If permitted, multiple pieces shall be fastened together for a given joint by butting ends and securing in place by stapling or other positive fastening methods.

(e) The EMSEAL joint sealing at the barrier joints shall be installed as per the Manufacturer’s recommendations.

(f) All joint sealing of cap beams shall take place prior to the installation of the reconstructed sidewalk.

(g) The supply and installation of EMSEAL joint sealing and fibre joint fillers shall be considered incidental to the Work, and no additional measurement or payment shall be made for this Work.

E23.7.5 Sawcuts for Reconstructed Sidewalk

(a) The reconstructed sidewalk shall be sawcut as per City of Winnipeg SD-228A.

(b) Sawcuts shall be placed to align with sawcuts in existing sidewalk.

E23.7.6 Permeable Formwork Liner

(a) Permeable formwork liner shall be used on all exposed surfaces except for the precast concrete lagging panels.

(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.

E23.7.7 Architectural Formwork Liner

(a) Architectural formwork liner shall be used on the finished face of the concrete lagging panels.

(b) The architectural formwork liner shall provide a smooth, flat finish. All surfaces to receive an architectural formwork liner finish shall be formed using an approved architectural formwork.

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

E23.7.8 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 A23.1-04, 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 one hundred and twenty (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 ninety (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 one hundred and twenty (120) and/or ninety (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 E23.5.3, 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. If the slump of the concrete is less than that designated by the mix design statement, then water can be added on site provided the additional water meets the requirements of the most recent edition of CSA A23.1, 5.2.4.3.2. If additional water is to be added on site, it must be done under the guidance of the Suppliers' designated quality control person. The Supplier shall certify that the addition of water on site does not change the Mix Design for the concrete supplied. Any other water added to the concrete without such control will be grounds for rejection of the concrete by the Contract Administrator.

(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.

E23.7.9 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;

(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.

E23.7.10 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) 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.

E23.7.11 Placing Structural Concrete

(a) General

(i) 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, and related Works. No concrete pour shall be scheduled without the prior written approval of the Contract Administrator.

(b) Placing Structural Concrete

(i) 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.

(ii) 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.

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

(iv) 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.

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

(vi) 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.

(vii) When the Contractor chooses to pump the concrete, the operation of the pump shall produce a continuous flow of concrete without air pockets. The equipment shall be arranged such that vibration is not transmitted to freshly placed concrete that may damage the concrete. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a

manner that there will be no contamination of the concrete or separation of the ingredients.

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

(ix) 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.

(x) All concrete, with the exception of self compacting 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.

(xi) For concrete other than self compacting concrete, vibrators shall be inserted systematically into the concrete at intervals such that the zones of influence of the vibrator overlap (generally 300 mm 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.

(xii) 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.

E23.7.12 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 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 one hundred and twenty (120) minute discharge time limit during the delay, while the finishing operations catch up, shall be rejected.

(b) Type 1A Finish – Exposed Formed Surfaces Except Concrete Lagging Panels

(i) A permeable formwork liner finish shall be applied to all exposed formed surfaces including all exposed concrete surfaces not included in Type 1B and Type 3 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 1B Finish – Exposed Formed Surfaces for Concrete Lagging Panels

(i) An architectural formwork liner finish shall be applied to all exposed formed surfaces, including all exposed concrete surfaces not included in Type 1A and Type 3 finishes.

(ii) Exposed surfaces refer to the finished face of the concrete lagging panels.

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

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

(d) Type 3 Finish - Surfaces Below Finished Grade

(i) All surfaces below 100 mm below finished grade except underside and sides of foundations shall be patched in accordance with the requirements of Sections E23.5.16, E23.5.19, and E23.5.20 of this Specification.

(ii) All surfaces below 100 mm below finish grade shall receive dampproofing in accordance with E23.5.26 of this Specification.

E23.7.13 General Curing Requirements

(a) Refer to E23.7.16 for cold weather curing requirements and E23.7.17 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) Formed surfaces shall receive, immediately after stripping and patching, the curing compound coating.

(d) 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.

(e) Curing compound shall be applied at the rate required by ASTM P198 or at the rate specified by the Manufacturer for the accepted product. The compound must be applied uniformly and by roller. Spraying of the compound will not be permitted.

(f) 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.

(g) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3ºC in one (1) hour or 20ºC in twenty-four (24) hours.

(h) 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.

(i) Formed surfaces shall receive, immediately after stripping and patching, the same curing as finished surfaces.

E23.7.14 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. The top surface of the concrete surface shall be moist cured during this timeframe.

(c) Stripping of the forms shall not be permitted until a concrete strength of 28 MPa has been achieved.

(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.

E23.7.15 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.

E23.7.16 Cold Weather Concreting

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

E23.7.17 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 twenty-seven degrees Celsius (27°C) during placing.

(ii) Concrete at discharge shall be at as low a temperature as possible, preferably as low as fifteen degrees Celsius (15°C), but not above 25°C. Concrete containing silica fume shall be between ten degrees Celsius (10°C) minimum and eighteen degrees Celsius (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 twenty-five degrees Celsius (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 twenty degrees Celsius (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 twenty-five degrees Celsius (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.

E23.7.18 Cleanup

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

E23.8 Concrete Quality

E23.8.1 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.

E23.8.2 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.

E23.8.3 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 the most recent version of CSA Standard A23.1.

(c) All testing of materials shall conform to the most recent version of CSA Standard A23.2.

(d) All materials shall be submitted to the Contract Administrator for acceptance at least ten (10) 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.

E23.8.4 Quality Assurance and Quality Control

(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.

(f) The frequency and number of concrete Quality Control tests shall be in accordance with the requirements of the most recent version of CSA Standard A23.1. An outline of the quality tests is indicated below.

(g) Any and all Work performed by the Contractor for which the results of Quality Assurance testing, certified by the third-party testing company and as required by this Specification, cannot be produced by the Contractor may be rejected by the Contract Administrator.

E23.8.5 Concrete Testing

(a) Slump tests shall be made in accordance with the most recent version of CSA Standard Test Method A23.2-5C, "Slump of Concrete". If the measured slump falls outside the limits in E23.5.3 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 the most recent version of 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 E23.5.3 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 latest edition and all subsequent revisions of ASTM Standard Test Method C457 for all types of concrete. 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) Samples of concrete for test specimens shall be taken in accordance with the most recent version of CSA Standard Test Method CSA-A23.2-1C, "Sampling Plastic Concrete".

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

(f) 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 (2) companion standard-cured test specimens shall be determined in accordance with the most recent version of 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 (2) 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.

(g) 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 E23.5.3 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 the most recent version of CSA Standard Test Method A23.2-9C, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the strength of the specimen.

E23.8.6 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.

E23.9 Measurement and Payment

E23.9.1 Supply and Place Structural Concrete

(a) Cap Beam

(i) Supplying and placing structural concrete for the cap beam will not be measured. This Work shall be paid for at the Contract Lump Sum Price for the “Supply and Place Structural Concrete – Cap Beam”, 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.

(ii) 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 “Supply and Place Structural Concrete – Cap Beam”, unless otherwise noted herein. No measurement or payment shall be made for this Work unless indicated otherwise.

(b) Sidewalk

(i) Supplying and placing structural concrete for the sidewalk will be measured on a per square metre basis. This Work shall be paid for at the Contract Unit Price for the “Supply and Place Structural Concrete – Sidewalk”, 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.

(ii) 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 "Supply and Place Structural Concrete – Sidewalk", unless otherwise noted herein. No measurement or payment shall be made for this Work unless indicated otherwise.

(c) Supplying and placing structural concrete for the piles will be measured and paid for in accordance with E21.

(d) Supplying and placing structural concrete for the concrete lagging panels will be measured and paid for in accordance with E22.

E24. SUPPLYING AND PLACING REINFORCING STEEL

E24.1 Description

E24.1.1 This Specification shall cover all operations relating to the supply, fabrication, delivery, placement, and installation of Plain Steel Reinforcement and associated bar accessories, as specified herein and as shown on the Drawings.

E24.1.2 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.

E24.2 Scope of Work

E24.2.1 The Work under this Specification shall involve supplying and placing / installing all steel reinforcing, as shown on the Drawings for the following Works:

Scope of Work

Item		Type Of Steel Reinforcing
Retaining Wall at The Brick (1065 St. James Street)	Piles	Plain Steel
	Precast Lagging Panels	Plain Steel
	Cap Beam	Plain Steel
	Sidewalk	Plain Steel

E24.3 References

E24.3.1 All related Specifications and reference Standards are in accordance with the most current issue or latest revision:

(a) ASTM A1035– Standard Specifications for Deformed and Plain, Low-Carbon, Chromium, Steel Bars for Concrete Reinforcement;

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

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

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

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

(f) ACI 315R – Manual of Engineering and Placing Drawings for Reinforced Concrete Structures;

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

E24.4 Submittals

E24.4.1 General

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least seven (7) Days prior to the scheduled commencement of any fabrication, the qualifications of the Contractor and its Operators.

(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 all original mill certificates to the Contract Administrator prior to placement of reinforcing on site.

(d) The Contractor shall submit Shop Drawings (including bar lists) in accordance with section E4 and the latest edition of the Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada (RSIC).

(e) The Contractor shall submit a Quality Control Testing Program to the Contract Administrator in accordance with E42.7.

E24.5 Materials

E24.5.1 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.

E24.5.2 Reinforcing Steel

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

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

(c) 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.

(d) 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-M92 and ASTM A955M.

E24.5.3 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/or 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;

(f) Approved products are as supplied by Con Sys Inc., Box 341, Pinawa, Manitoba, Canada R0E 1L0 (204) 753-2404, or equal as accepted by the Contract Administrator in accordance with B6.

(g) Bar accessories are not included in the Drawings and shall include bar chairs, spacers, clips, wire ties, wire (16 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.

E24.5.4 Mechanical Splices

(a) Mechanical splices shall meet the requirements of the reinforcing steel manufacturer. The proposed mechanical splice shall be submitted to the Contract Administrator for acceptance.

E24.5.5 Bonding Agent/Grout

(a) Epoxy resin shall conform to the requirements of ASTM C881, Type I or Type IV, Grade 3 epoxy shall be used for bonding reinforcing steel into hardened concrete. An approved product is Hilti RE500 V3 or equal, as approved by the Contract Administrator in accordance with B6.

(b) An aggregate filler may be used in accordance with manufacturer's directions when the drilled hole is sized for the head of a stud rather than a shaft only.

E24.5.6 Epoxy Grout for Reinforcement Dowels in Sidewalk

(a) Epoxy grout shall be Hilti HIT-RE 100 or equivalent as approved by the Contract Administrator. The epoxy grout shall be suitable for horizontal, vertical, and/or overhead dowel grouting application, as required.

E24.6 Construction Methods

E24.6.1 Fabrication of Reinforcing Steel

(a) General

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

(b) Plain Steel Reinforcing

(i) Heating shall not be used as an aid in bending plain 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.

E24.6.2 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) The Contractor shall take care when placing reinforcement in the cap beam to ensure there are no conflicts with the Aluminum Pedestrian Rail Anchorage. The Contractor

shall determine appropriate means and methods to achieve the desired spacing of reinforcing while avoiding anchorage conflicts.

(c) 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.

(d) Splices in reinforcing steel shall be made only where required due to shipping length restrictions. Splices are subject to the written approval of the Contract Administrator. Welded splices shall not be permitted.

(e) Reinforcing steel shall be placed to provide a clear space between the reinforcing bars as shown on the Drawings to accurately place preformed holes where necessary.

(f) Reinforcing steel shall not be straightened or re-bent in a manner that shall injure the metal. Bars with bends not shown on the Drawings shall not be used.

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

(h) Reinforcing steel shall be placed within the tolerances specified in CAN/CSA A23.1.

(i) The Contractor shall supply and place all necessary support accessories to ensure proper placement of reinforcing steel. All reinforcement shall be accurately placed in the positions shown on the Drawings, and firmly tied and chaired before placing the concrete.

(j) Distances from the forms shall be maintained by means of stays, spacers, or other approved supports. Spacers and supports for holding reinforcing steel at the required location and ensuring the specified concrete cover over the reinforcing steel shall be as specified in E24.5.3, “Bar Accessories”

(k) Welding or tack welding is not permitted.

(l) Unless otherwise shown on the Drawings, the minimum distance between bars shall be 40 mm.

(m) Bars shall be tied at all intersections, except where spacing is less than 250 mm in each direction, when alternate intersections may be tied.

E24.6.3 Drilling and Grouting Reinforcement Dowels in Reconstructed Sidewalk

(a) The Contractor shall core or drill holes and place dowels at the locations and in accordance with the details shown on the Drawings. Holes for dowels shall be drilled or cored.

(b) The Contractor shall predetermine the locations of existing steel bars prior to drilling or coring. Dowel hole locations, as shown on the Drawings, shall be relocated as required to avoid conflicts with existing reinforcing steel bars, as approved by the Contract Administrator.

(c) Dowel hole diameters shall be in accordance with the recommendations of the epoxy adhesive grout manufacturer.

(d) All holes shall be thoroughly cleaned prior to the installation of grout and dowels.

(e) The epoxy adhesive grout shall be prepared, placed and cured in accordance with the recommendations of the epoxy adhesive grout manufacturer.

E24.6.4 Splicing

(a) Splices shall only be provided where required due to shipping length restrictions and are subject to the written approval of the Contract Administrator. Proposed splice locations shall be clearly indicated on the Shop Drawings.

(b) For lapped splices, the bars shall be placed in contact and wired together in such a manner as to maintain a clearance of not less than the required minimum clear

distance to other bars, and the required minimum distance to the surface of the concrete. In general, suitable lap lengths shall be supplied as detailed on the Drawings.

E24.7 Quality Control

E24.7.1 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.

(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) A minimum of one (1) Business Day advance notice shall be given to the Contract Administrator prior to the placing of any concrete to allow for inspection of the reinforcing steel.

(d) After all reinforcing steel has been placed, a final inspection shall be made prior to the placement of concrete to locate any damage or deficiencies. All visible damage or any deficiencies shall be repaired to the satisfaction of the Contract Administrator before concrete is placed.

E24.7.2 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.

E24.7.3 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.

E24.8 Measurement and Payment

E24.8.1 Supplying and Placing Reinforcing Steel

(a) Supplying and Placing Reinforcing Steel Bars shall be measured on a mass basis, as computed from the reviewed Shop Drawings.

(b) Supplying and Placing Reinforcing Steel Bars will be paid for at the Contract Unit Price per kilogram for the “Items of Work” listed here below, which price shall be payment in full for supplying all materials and for completing all operations herein described and all other items incidental to the work included in the Specification, accepted and measured by the Contract Administrator.

E24.8.2 Items of Work:

(a) Supply of Reinforcing Steel:
    (i) Plain Steel Reinforcing

(b) Placing Reinforcing Steel:
    (i) Plain Steel Reinforcing

E24.8.3 The measurement excludes the mass of bar accessories, which are incidental to the Works.

E24.8.4 Supplying and Installing all listed materials, construction methods, and quality control measures associated with this Specification and Drawings shall be considered incidental to "Supply of Reinforcing Steel" and "Placing Reinforcing Steel", unless otherwise noted herein. No measurement or payment shall be made for this Work unless indicated otherwise by the Contract Administrator.

E24.8.5 The supply and placing of reinforcing steel bars for piles shall be paid for under E21.

E24.8.6 The supply and placing of reinforcing steel bars for precast concrete lagging panels shall be paid for under E22.

E25. ALUMINUM PEDESTRIAN HANDRAIL

E25.1 Description

E25.1.1 This Specification shall cover all operations related to the design, fabrication, supply, and installation of the aluminum pedestrian railing, as herein specified and as shown on the Drawings.

E25.1.2 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 performance and completion of all work hereinafter specified.

E25.2 Scope of Work

E25.2.1 The Work under this Specification shall involve:

(a) Supplying and installing aluminum pedestrian handrail for the retaining wall at The Brick (1065 St. James Street);

(b) Supplying and installing all miscellaneous items and other items associated with the Work.

E25.3 Referenced Specifications and Drawings

E25.3.1 The latest edition and subsequent revisions of the following:

(a) ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate;

(b) ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes;

(c) ASTM B276 – Standard Specification for Stainless Steel Bars and Shapes;

(d) ASTM D1187 – Standard Specification for Asphalt-Base Emulsions for use as Protective Coatings and Metal;

(e) CAN/CSA W47.2 – Certification of Companies for Fusion Welding of Aluminum;

(f) CAN/CSA W59.2 – Welded Aluminum Construction;

(g) CAN/CSA S157 – Strength Design in Aluminum.

E25.4 Materials

E25.4.1 General

(a) All materials supplied under this Specification shall be of a type acceptable to 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.

E25.4.2 Pedestrian Railing

(a) Pedestrian railing shall be Echelon II Majestic Style, three rail standard bottom, 1.22 m (4 ft.) height, black colour, manufactured by Ameristar Fence, or approved equal.

E25.4.3 Railing Base Plates

(a) Railing base plates shall be fabricated from aluminum, in accordance with ASTM B221 Alloy 5083, ASTM B209 Allow 6061-T6, or Alloy 6531-T6, to the dimensions shown on the Drawings.

E25.4.4 Aluminum Shims

(a) Aluminum shims shall conform to ASTM Standard B221, Alloy 6061-T6, and shall be supplied as required to facilitate the installation of the rail posts as shown on the Drawings. Supply of shims will be considered incidental to the supply of aluminum pedestrian handrail.

E25.4.5 Railing Anchorage

(a) Anchor bolts shall be 13 mm diameter Hilti HAS-R 316 SS Threaded Anchor Rod Inserts, or approved equal.

(b) Epoxy adhesive shall be Hilti HIT-RE 500 V3, or approved equal.

E25.4.6 Aluminum Filler Alloys for Welded Construction

(a) Aluminum filler alloys for welded construction shall be one (1) of the following: ER4043, ER5183, ER5356, ER5554, ER5556, or ER5654.

E25.4.7 Miscellaneous Materials

(a) Miscellaneous materials shall be of the type specified on the Drawings or as accepted by the Contract Administrator, in accordance with B6.

E25.5 Submittals

E25.5.1 The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site, a proposed schedule, including methods and sequence of operations.

E25.5.2 The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the scheduled commencement of any fabrication, the proposed welding procedures and welding consumable certificates.

(a) The Contractor shall submit copies of the welding procedures which he intends to use, for examination and acceptance by the Contract Administrator.

(b) Such procedures shall be accompanied by documentary proof that they have been qualified previously by the Canadian Welding Bureau at the plant where the Work is to be carried out.

(c) The procedures shall include the following information: joint type, welding process, welding position, base metal specification, welding consumable specification and size, preheat requirements, amperage and voltage requirements, speed, polarity, and welding equipment, including a description of travel for automatic welding.

E25.6 Equipment

E25.6.1 All equipment shall be of a type acceptable to the Contract Administrator and shall be in good working order.

E25.7 Construction Methods

E25.7.1 Cutting

(a) Material 13 mm thick or less may be sheared, sawn, or cut with a router. Materials more than 13 mm thick shall be sawn or routed. Cut edges shall be true and smooth and free from excessive burrs or ragged breaks. Re-entrant cuts shall be avoided

whenever possible. If used, they shall be filleted by drilling prior to cutting. Flame cutting of aluminum alloys is not permitted.

E25.7.2 Welding

(a) Welded construction shall conform to the requirements of the latest edition and all subsequent revisions of CAN/CSA W59.2, Welded Aluminum Construction and W47.2, Certification of Companies for Fusion Welding of Aluminum.

(b) Welding will be done by qualified welders using the Metal Inert Gas (MIG) process. All areas to be welded should be thoroughly cleaned with a suitable solvent followed by wire brushing if surfaces are heavily oxidized. The size of fillet for equal leg fillet welds is defined as the leg length of the largest isosceles right angle triangle which can be inscribed within the fillet weld section. Welds must penetrate into the root corner. All butt welds should have full penetration to ensure maximum strength. Defective welds should be repaired by chipping out the defective area and rewelding. Particular care must be paid to the elimination of craters and cold starts.

(c) Welders and procedure should be qualified as agreed between the Contract Administrator and the Fabricator. The minimum requirements for mechanical test results of joints butt welded with Alcan 56S filler alloy shall be 259 MPa for Alcan D45S-H1 1A and 165 MPa for Alcan B51S-T4 alloy. In addition to the mechanical tests, soundness tests should be made as follows:

(i) Guided Bend Test: All bend tests should be fully guided through an angle of 1800. Root, face, and side bend tests in Alcan D54S parent alloy welded in Alcan 56S filler wire require a bend radius of 2T where T is the thickness of the material. For Alcan B51S parent alloy welded with 56S filler wire, a bend radius of 4T is required. Root bend and face bend specimens on material 10 mm thick and less should be 305 mm long and a minimum of 25 mm in width and cut from a plate having a minimum butt weld length of 450 mm. No test piece should be taken within 25 mm of the ends of the weld. Side bend tests should be carried out on material over 10 mm in thickness.

(ii) Specimens should be 10 mm in width. Longitudinal edges should be given in 2 mm radius. There should be no crack greater than 3 mm in length. If a crack starts from an edge, the specimen should be disregarded.

(iii) Fracture Test: The butt-welded joint shall have a notch not exceeding 2 mm in depth sawn on the four (4) sides of the weld bend and the weld broken. Inspection of the fracture should reveal no gas pockets or inclusions greater than 2 mm in diameter and the area lost due to scattered gas, porosity or voids should not exceed three percent (3%) of the area under inspection.

E25.7.3 Installation of Aluminum Pedestrian Handrail Anchorage

(a) The Contractor shall core or drill holes and place anchor bolts at the locations and in accordance with the details shown on the Drawings. Holes for dowels shall be drilled or cored, as per the epoxy grout Manufacturer's instructions.

(b) The Contractor shall take care to place reinforcement for cap beams to avoid anchor locations. Dowel hole locations, as shown on the Drawings, shall be not be relocated unless approved by the Contract Administrator.

(c) Dowel hole diameters shall be in accordance with the recommendations of the epoxy adhesive grout manufacturer.

(d) All holes shall be thoroughly cleaned prior to the installation of grout and dowels.

(e) The epoxy adhesive grout shall be prepared, placed and cured in accordance with the recommendations of the epoxy adhesive grout manufacturer.

E25.7.4 Installation of Aluminum Pedestrian Handrail

(a) The aluminum pedestrian handrail shall be brought on-site and accurately installed as shown on the Drawings.

(b) The rails shall be set true to the line and grade as shown on the Drawings or as required by the Contract Administrator.

(c) The material shall be carefully handled so that no parts will be bent, broken or otherwise damaged. Hammering that will injure or distort the member is not permitted. The Contractor shall report to the Contract Administrator any corrective measures.

(d) Except where shown on the Drawings, field welding shall not be permitted unless acceptable to the Contract Administrator. The rail posts shall be set on aluminum shims, as required, to achieve the correct elevation and grade. Additional aluminum shims shall be installed as required to achieve the correct elevation and grade. The bottom of the aluminum surface that is in contact with concrete shall be separated from the concrete surface with a neoprene pad.

E25.8 Quality Control

E25.8.1 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 Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspecting 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.

E25.8.2 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.

E25.8.3 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.

E25.8.4 Testing

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

E25.9 Measurement and Payment

E25.9.1 Aluminum Pedestrian Handrail

(a) Fabricating, supplying, and installing the aluminum pedestrian handrail rail shall be measured on a length basis and paid for at the Contract Unit Price per lineal metre for “Supply and Install Aluminum Pedestrian Handrail”, which price shall be paid 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, accepted and measured by the Contract Administrator.