



THE CITY OF WINNIPEG

TENDER

TENDER NO. 307-2022

**2022 REGIONAL STREET RENEWAL PROGRAM – UNIVERSITY CRESCENT
CONCRETE PAVEMENT RECONSTRUCTION & REHABILITATION**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

- B1.1 2022 Regional Street Renewal Program – University Crescent Concrete Pavement Reconstruction & Rehabilitation.

B2. SUBMISSION DEADLINE

- B2.1 The Submission Deadline is 12:00 noon Winnipeg time, June 10, 2022.
- B2.2 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. ENQUIRIES

- B3.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.
- 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.
- B3.6 Any enquiries concerning submitting through MERX should be addressed to:
MERX Customer Support
Phone: 1-800-964-6379
Email: merx@merx.com

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 MERX website at www.merx.com.
- B5.4 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the MERX website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B5.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid/Proposal. 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 D4.

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;
 - (c) Form G1: Bid Bond and Agreement to Bond.
- B7.2 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.
- B7.3 The Bid shall be submitted electronically through MERX at www.merx.com.
- B7.3.1 Bids will **only** be accepted electronically through MERX.
- B7.4 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).

B8. BID

- B8.1 The Bidder shall complete Form A: Bid/Proposal, making all required entries.
- B8.2 Paragraph 2 of Form A: Bid/Proposal 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/Proposal, 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/Proposal shall be signed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;
 - (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
 - (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;

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

B8.4.1 The name and official capacity of all individuals signing Form A: Bid/Proposal should be entered 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 Prices stated on Form B: Prices shall not include any costs which may be incurred by the Contractor with respect to any applicable funding agreement obligations as outlined in D32. Any such costs shall be determined in accordance with D32.

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 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.

B9.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B9.5 The Bidder shall enter the Total Bid Price from Form B: Prices into the Total Bid Price field in MERX.

B9.5.1 Bidders are advised that the calculation indicated in B17.4 will prevail over the Total Bid Price entered in MERX.

B9.6 Form B: Prices is organized into Parts: Part 1 of the Work and Part 2 of the Work. Bidders shall provide a total price for each Part and, on the summary sheet, a Total Bid Price consisting of the sum of prices for Part 1 and Part 2.

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 Further to C3.2, 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 <https://www.winnipeg.ca/matmgt/Templates/files/debar.pdf>

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);
- (d) have completed the Accessible Customer Service online training required by the Accessibility for Manitobans Act (AMA) (see B12.5 and D7).

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 Further to B12.3(d), the Bidder acknowledges they and all Subcontractors have obtained training required by the Accessibility for Manitobans Act (AMA) available at <http://www.accessibilitymb.ca/training.html> for anyone that may have any interaction with the public on behalf of the City of Winnipeg.

B12.6 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.

B12.7 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 include in its Bid Submission bid security in the form of a digital 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 Form G1: Bid Bond and Agreement to Bond, available on The City of Winnipeg, Corporate Finance, Materials Management Division website at <https://www.winnipeg.ca/MatMgt/templates/files/eBidsecurity.pdf>.

B13.2 Bid security shall be submitted in a digital format meeting the following criteria:

- (a) The version submitted by the Bidder must have valid digital signatures and seals;
- (b) The version submitted by the Bidder must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.
- (c) The version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.
- (d) The verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.
- (e) The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B13.2(a).

B13.3 Bonds failing the verification process will not be considered to be valid and the bid shall be determined to be non-responsive in accordance with B17.1(a).

B13.4 Bonds passing the verification process will be treated as original and authentic.

B13.4.1 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.

B13.5 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly formed with the successful Bidder and the contract securities are furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B13.6 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 not be opened publicly.

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 MERX website at www.merx.com.

B14.3 After award of Contract, the name(s) of the successful Bidder(s) and their Contract amount(s) will be available on the MERX website at www.merx.com.

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/Proposal.

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 formed and the contract securities have been furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B16. WITHDRAWAL OF BIDS

B16.1 A Bidder may withdraw his/her Bid without penalty prior to the Submission Deadline.

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.

B17.2.1 Any bid with an apparent imbalance between the unit prices in Part 1 and Part 2 may be determined to be non-responsive and rejected by the Award Authority in its sole discretion, acting reasonably.

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 may determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

B17.4.2 Bidders are advised that the calculation indicated in B17.4 will prevail over the Total Bid Price entered in MERX.

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 D32 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.
- B18.5 As noted in D3 and identified in Form B: Prices, the Work of Part 2 will be contingent upon Manitoba Hydro approving funding for the Work. If sufficient funding for Part 2 Work is not approved by Manitoba Hydro the City shall have the right to eliminate all or any portion of Part 2 Work in accordance with D2.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Construction* (Revision 2020-01-31) 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. FORM OF CONTRACT DOCUMENTS

D2.1 Notwithstanding C4.1(c) and C4.4, the Contract Documents will be provided to the Contractor electronically and there will be no requirement for execution and return to the City by the Contractor. Accordingly, the provisions under C4.4(a) and C4.4(b) are no longer applicable.

D3. SCOPE OF WORK

D3.1 The Work to be done under the Contract shall consist of two parts:

- (a) Part 1 – City Funded Work
- (b) Part 2 – Manitoba Hydro Funded Work

Part 1 – City Funded Work

D3.2 Part 1 – City Funded Work shall consist of:

- (a) Concrete Pavement Reconstruction
 - (i) University Crescent Northbound from Thatcher Drive to Pembina Highway
- (b) Pavement Rehabilitation
 - (i) University Crescent Southbound from Thatcher Drive to Pembina Highway
- (c) Traffic Signal Conduit and Base Installation and Associated Works
 - (i) University Crescent Pedestrian Corridor at Thatcher Drive
 - (ii) University Crescent Pedestrian Corridor at Wedgewood Drive
 - (iii) University Crescent and Pembina Highway Intersection
- (d) Water and Waste Work
 - (i) University Crescent from Thatcher Drive to Pembina Highway

Part 2 – Manitoba Hydro Funded Work

D3.3 Part 2 – Manitoba Hydro Funded Work shall consist of:

- (a) Street Lighting Installation and Associated Works
 - (i) University Crescent Northbound from Thatcher Drive to Pembina Highway

D3.4 The City currently has no approved funding in the Capital Budget for Part 2 of the Work, but is anticipating receiving notification about funding from Manitoba Hydro by late June 2022. Part 2 of the Work is contingent upon Manitoba Hydro approving sufficient funding.

D3.4.1 Further to C7.1, if notice of sufficient funding is not received, the City shall have the right to eliminate all or any portion of Part 2, and the Contract Price will be reduced accordingly.

D3.4.2 Further to C7.5, C7.5.1, and C7.6, a reduction in the Contract Price pursuant to D3.4.1 shall not be considered in calculating the aggregate reduction in the Contract Price for purposes of C7.5.

D3.4.3 If all or any portion of Part 2 is eliminated pursuant to D3.4.1, the time periods stipulated in D21 for Substantial Performance of the Work and in D22 for Total Performance of the Work will be reduced proportionally by the Contract Administrator acting reasonably.

D3.5 The major components of the Work are as follows:

- (a) Concrete Pavement Reconstruction
 - (i) Construction of temporary detour pavement
 - (ii) Removal of existing trees
 - (iii) Removal of existing catch basins and abandonment of existing leads
 - (iv) Installation of catch basins and sewer service pipe
 - (v) Relocation of hydrants
 - (vi) Removal and salvage of existing overhead sign support structure and signs
 - (vii) Removal and salvage of existing aluminum balanced barrier
 - (viii) Installation of new overhead sign support structure
 - (ix) Installation of bus stop flag foundations
 - (x) Removal of existing asphalt and concrete pavement
 - (xi) Excavation
 - (xii) Installation of subdrains
 - (xiii) Compaction of existing subgrade
 - (xiv) Placement of separation/filtration geotextile fabric and geogrid
 - (xv) Placement of sub-base and base course materials
 - (xvi) Construction of 250 mm plain-dowelled concrete pavement (main line)
 - (xvii) Construction of 200 mm reinforced concrete pavement (approaches)
 - (xviii) Construction of 180 mm barrier curb
 - (xix) Construction of 180 mm modified barrier curb
 - (xx) Construction of concrete medians and safety median
 - (xxi) Construction of sidewalk
 - (xxii) Construction of 75 mm Type IA asphalt multi-use pathway and bicycle lanes
 - (xxiii) Adjustment of existing manholes, water valves and curb stops
 - (xxiv) Placement of Type IA asphalt for tie-ins and approaches
 - (xxv) Boulevard grading
 - (xxvi) Sodding
- (b) Pavement Rehabilitation
 - (i) Construction of temporary detour pavement
 - (ii) Planing of existing asphalt overlay
 - (iii) Full depth concrete repairs of existing slabs and joints (200 mm reinforced concrete pavement)
 - (iv) Removal of existing catch basins and abandonment of existing leads
 - (v) Installation of catch basins and sewer service pipe
 - (vi) Adjustment of manholes, water valves and curb stops
 - (vii) Removal of existing barrier curb
 - (viii) Construction of barrier curb
 - (ix) Removal of existing monolithic curb and sidewalk
 - (x) Construction of monolithic curb and sidewalk with paving stone indicator surfaces
 - (xi) Placement of Type IA asphalt overlay (average thickness – 80 mm)
 - (xii) Placement of pavement repair fabric on main lanes at various locations
 - (xiii) Placement of Type IA asphalt for tie-ins and approaches
 - (xiv) Boulevard grading
 - (xv) Sodding
- (c) Traffic Signal Conduit and Base Installation and Associated Works
 - (i) Installation of conduit

- (ii) Installation of concrete bases
- (iii) Installation of service boxes
- (iv) Removal of concrete bases
- (v) Removal of service boxes
- (vi) Cutovers
- (d) Water and Waste Work
 - (i) Replacement of manhole risers
 - (ii) Insulation of water mains/services under northbound roadway
- (e) Street Lighting Installation and Associated Works
 - (i) Installation and removal of temporary overhead spans
 - (ii) Removal of existing street light poles and bases
 - (iii) Installation of new pre-cast concrete bases including luminaires and appurtenances along the east property line of University Crescent from Thatcher Drive to Pembina Highway
 - (iv) Installation of new street lighting cables in conduit (trenching and boring) and street light poles, including cable termination
 - (v) Installation of ground rods

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is AECOM Canada Ltd., represented by:

Ryan Cunningham, P.Eng.
Senior Transportation Engineer
Telephone No. (204) 928-8377
Email Address ryan.cunningham1@aecom.com

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

D5. CONTRACTOR'S SUPERVISOR

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

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

D6. NOTICES

D6.1 Except as provided for in C22.4, 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/Proposal.

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 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D4.

- D6.3 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services
Facsimile No.: 204-947-9155

D7. ACCESSIBLE CUSTOMER SERVICE REQUIREMENTS

- D7.1 The Accessibility for Manitobans Act (AMA) imposes obligations on The City of Winnipeg to provide accessible customer service to all persons in accordance with the Customer Service Standard Regulation ("CSSR") to ensure inclusive access and participation for all people who live, work or visit Winnipeg regardless of their abilities.
- D7.1.1 The Contractor agrees to comply with the accessible customer service obligations under the CSSR and further agrees that when providing the Goods or Services or otherwise acting on the City of Winnipeg's behalf, shall comply with all obligations under the AMA applicable to public sector bodies.
- D7.1.2 The accessible customer service obligations include, but are not limited to:
- (a) providing barrier-free access to goods and services;
 - (b) providing reasonable accommodations;
 - (c) reasonably accommodating assistive devices, support persons, and support animals;
 - (d) providing accessibility features e.g. ramps, wide aisles, accessible washrooms, power doors and elevators;
 - (e) inform the public when accessibility features are not available;
 - (f) providing a mechanism or process for receiving and responding to public feedback on the accessibility of all goods and services; and
 - (g) providing adequate training of staff and documentation of same.

D8. FURNISHING OF DOCUMENTS

- D8.1 Upon award of the Contract, the Contractor will be provided with 'issued for construction' Contract Documents electronically, including Drawings in PDF format only.

SUBMISSIONS

D9. AUTHORITY TO CARRY ON BUSINESS

- D9.1 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.

D10. SAFE WORK PLAN

- D10.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.
- D10.2 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>

- D10.3 Notwithstanding B12.4 at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D11. INSURANCE

- D11.1 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. Manitoba Hydro, Bell MTS, Telus, etc. to be added as additional insureds if required by written contract.
 - (b) 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.
 - (d) property insurance for all field offices and portable toilets used by the contractor directly or indirectly in the performance of the Work on the project that may be owned, rented, leased or borrowed.
- D11.2 All policies shall be taken out with insurers licensed to carry on business in the Province of Manitoba.
- D11.3 All subcontractors performing work on the project shall provide the contractor with evidence of insurances as outlined in D11.1(a) and D11.1(b) above and be registered with Workers Compensation Board of Manitoba and maintain insurance and workers compensation coverage throughout the performance of the work. The Contractor shall provide the contract administrator with evidence of the same prior to the commencement of any work.
- D11.4 Deductibles shall be borne by the Contractor.
- D11.5 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 Documents, as applicable.
- D11.6 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.

D12. CONTRACT SECURITY

- D12.1 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.

- D12.1.1 Where the contract security is a performance bond, it may be submitted in hard copy or digital format. If submitted in digital format the contract security must meet the following criteria:
- (a) the version submitted by the Contractor must have valid digital signatures and seals;
 - (b) the version submitted by the Contractor must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.
 - (c) the version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.
 - (d) the verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.
 - (e) the results of the verification must provide a clear, immediate and printable indication of pass or fail regarding D12.1(b).
- D12.1.2 Digital bonds failing the verification process will not be considered to be valid and may be determined to be an event of default in accordance with C18.1. If a digital bond fails the verification process, the Contractor may provide a replacement bond (in hard copy or digital format) within seven (7) Calendar Days of the City's request or within such greater period of time as the City in its discretion, exercised reasonably, allows.
- D12.1.3 Digital bonds passing the verification process will be treated as original and authentic.
- D12.2 The Contractor shall provide the City Solicitor with the required performance and labour and material payment bonds within seven (7) Calendar Days of notification of the award of the Contract by way of an award letter and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.
- D12.3 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 D12.1(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.

D13. SUBCONTRACTOR LIST

- D13.1 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 Documents, if applicable.

D14. DETAILED WORK SCHEDULE

- D14.1 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 Documents, as applicable.
- D14.2 If, prior to submitting the Detailed Work Schedule, the Contractor does not receive notification pursuant to D16.4 that all or some portion of Part 2 of the Work may be commenced, he/she

shall complete the Detailed Work Schedule for only Part 1 of the Work assuming that, if all of Part 2 is eliminated, the time periods stipulated in D21 for Substantial Performance of the Work and in D22 for Total Performance of the Work will be reduced by three (3) Working Days

- D14.3 If, after submitting the Detailed Work Schedule, the Contractor receives notification that all or any portion of Part 2 of the Work may be commenced, he/she shall submit a revised Detailed Work Schedule no later than two (2) Business Days from receipt of the notification.
- D14.4 The detailed work schedule shall consist of the following:
- (a) a Gantt chart for the Work acceptable to the Contract Administrator.
- D14.5 Further to D14.4(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.

D15. REQUIREMENTS FOR SITE ACCESSIBILITY PLAN

- D15.1 The Contractor shall provide the Contract Administrator with an Accessibility Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.
- D15.2 The Accessibility Plan shall demonstrate how the Contractor will accommodate the safe passage of pedestrians and cyclists in accordance with the Manual of Temporary Traffic Control, the Contract Drawings, Staging Plans, and Streets By-Law No. 1481/77 at all times for the duration of the Construction. Unless noted in the Contract, the Accessibility Plan must include a written plan for the following:
- (a) How the Contractor will maintain at least one crossing in each direction for each intersection (one north/south crosswalk and one east/west crosswalk).
 - (b) How the Contractor will maintain access to bus stops within the site.
 - (c) How the Contractor will maintain access to pedestrian corridors and half signals.
 - (d) How the Contractor will maintain cycling facilities.
 - (e) How the Contractor will maintain access to residents and businesses unless otherwise noted in the Contract.
 - (f) Any required detour signage at adjacent crossings to facilitate sidewalk or active transportation pathway closures.
- D15.3 The Accessibility Plan may also include figures, sketches, or drawings to demonstrate the proposed plan.
- D15.4 The Accessibility Plan shall include written details on how the Contractor intends to review, maintain, and document all items related to the Accessibility Plan on-site during Construction, including, but not limited to:
- (a) Signage
 - (b) Temporary Ramping
 - (c) Transit Stops
 - (d) Detour Signage
- D15.5 At minimum, the Contractor shall review the site conditions on a daily basis to ensure that all features related to the Accessibility Plan are in place. The site review is intended to correct deficiencies as a result of unforeseen events such as wind, traffic, or the general public. Deficiencies that are direct result of the Contractors actions must be corrected immediately.
- D15.6 Any changes to the Accessibility Plan must be approved by the Contract Administrator.

- D15.7 Upon request from the Contract Administrator, the Contractor shall provide records demonstrating that the site has been maintained.
- D15.8 Deficiencies as a direct result of actions by the Contractor that are not immediately corrected and/or failure to produce records that demonstrate that the site was maintained in compliance with the Accessibility Plan may result in a pay adjustment via the monthly Progress Payment. The rate of pay adjustment will be as per the following schedule:
- (a) First Offence – A warning will be issued and documented in the weekly or bi-weekly site meeting.
 - (b) Second Offence – A field instruction to immediately correct the site will be issued by the Contract Administrator.
 - (c) Third and subsequent Offences – A pay reduction will be issued in the amount of \$250.00 per instance and per day.

SCHEDULE OF WORK

D16. COMMENCEMENT

- D16.1 The Contractor shall not commence any Work until he/she is in receipt of an award letter from the Award Authority authorizing the commencement of the Work.
- D16.2 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 D9;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the twenty-four (24) hour emergency response phone number specified in D5.2.
 - (iv) the Safe Work Plan specified in D10;
 - (v) evidence of the insurance specified in D11;
 - (vi) the contract security specified in D12;
 - (vii) the subcontractor list specified in D13;
 - (viii) the detailed work schedule specified in D14;
 - (ix) the Requirements for Site Accessibility Plan specified in D15; and
 - (x) the direct deposit application form specified in D29.
 - (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.
- D16.3 The Contractor shall not commence the Work on the Site before July 4, 2022, and shall commence the Work on Site no later than July 11, 2022, as directed by the Contract Administrator and weather permitting.
- D16.4 The Contractor shall not commence Part 2 of the Work as described in D3 and identified in Form B: Prices, unless prior to July 4, 2022, he/she has received notification from the Contract Administrator that the City has received notice of sufficient funding from Manitoba Hydro.
- D16.5 The City intends to award this Contract by July 1, 2022.
- D16.5.1 If the actual date of award is later than the intended date, the dates specified for Substantial Performance and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D17. WORKING DAYS

D17.1 Further to C1.1(tt);

D17.1.1 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.

D17.1.2 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.

D17.1.3 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.

D18. RESTRICTED WORK HOURS

D18.1 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 Saturdays, Sundays, Statutory Holidays and or Civic Holidays.

D19. WORK BY OTHERS

D19.1 Further to C6.25, the Contractor's attention is directed to the fact that other Contractors, the personnel of Utilities and the staff of the City may be working within the project limit, approach roadway, adjacent roadways or right-of-way. The activities of these agencies may coincide with the Contractors execution of work and it will be the Contractor's responsibility to cooperate to the fullest extent with other personnel working in the area, and such cooperation is an obligation of the Contractor under the terms of Contract.

D19.2 Work by others on or near the Site will include but not necessarily be limited to:

- (a) Bell MTS – adjustment of service pits
- (b) Manitoba Hydro (Distribution)
 - (i) Relocation of anchor poles on the east side of University Crescent
 - (ii) Relocation of distribution lines crossing University Crescent from the south property line of 74 University Crescent to the west side of the roadway
 - (iii) Electrical supply and inspection of new street lighting hardware (to be installed by the Contractor) and the energizing of the new street light plant
- (c) Manitoba Hydro (Gas)
 - (i) lowering and/or rock wrapping of gas mains/services
 - (ii) safety watch for gas mains as required
- (d) Telus – adjustment of manholes
- (e) City of Winnipeg Geomatics Branch – various works on survey monuments
- (f) City of Winnipeg Traffic Services Branch – supply of signs as necessary and completion of line painting
- (g) City of Winnipeg Transit – Removal/installation of Transit shelters and removal/installation of bus stop flag signs
- (h) City of Winnipeg Traffic Signals Branch – Installation of traffic signal and pedestrian crossing poles and hookup of wiring
- (i) City of Winnipeg, Water and Waste Department – checking of main line water valves

D19.3 Further to D19.1 the Contractor shall cooperate and coordinate all activities with all parties performing required Work by Others. The Contractor must include and accommodate Work by Others identified in D19.2 or additional parties, in their construction schedule as per D14 and accommodate the necessary area on Site required for the Work by Others to complete the Work.

D20. SEQUENCE OF WORK

D20.1 Further to C6.1, the sequence of work shall be as follows:

D20.1.1 The Work shall be divided into two stages, which are identified on the Construction Staging plans listed in E1.4. Stages are further subdivided into major items of work.

D20.1.2 **Stage 1** – Construction of northbound lanes from Thatcher Drive to Pembina Highway

- (i) Remove existing pavement, curb and sidewalk
- (ii) Remove existing catch basins and abandon existing leads (Stage 1 underground works are to be completed prior to Stage 1 traffic control being in place)
- (iii) Install new catch basins and pipe and complete connections (Stage 1 underground works are to be completed prior to Stage 1 traffic control being in place)
- (iv) Complete street light works on the east side of University Crescent
- (v) Complete pedestrian corridor and traffic signal works
- (vi) Construct 250 mm plain-dowelled concrete pavement and 200 mm reinforced concrete pavement
- (vii) Construct curb and medians
- (viii) Construct 100 mm sidewalk
- (ix) Construct 75 mm Type IA asphalt multi-use pathway and bicycle lanes
- (x) Remove and salvage existing overhead sign structure and install new overhead sign structure
- (xi) Restore boulevards

D20.1.3 **Stage 2A** – Rehabilitation of southbound median lane from Thatcher Drive to Pembina Highway

- (i) Plane existing asphalt pavement
- (ii) Complete full depth repairs of existing slabs and joints
- (iii) Construct curb
- (iv) Placement of first lift of asphalt overlay
- (v) Restore boulevards

D20.1.4 **Stage 2B** – Rehabilitation of southbound gutter lane from Thatcher Drive to Pembina Highway

- (i) Plane existing asphalt pavement
- (ii) Remove existing catch basins and abandon existing leads
- (iii) Install new catch basins and pipe and complete connections
- (iv) Complete full depth repairs of existing slabs and joints
- (v) Construct curb
- (vi) Construct 100 mm sidewalk with paving stone indicator surfaces
- (vii) Placement of first lift of asphalt overlay
- (viii) Placement of top lift of asphalt overlay in Stage 2A and 2B work areas
- (ix) Restore boulevards

- D20.1.5 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.
- D20.1.6 Immediately following the completion of the asphaltic concrete works of Stage 2, the Contractor shall clean up the Site and remove all plant, surplus material, waste and debris, other than that left by the City or other Contractors.

D21. SUBSTANTIAL PERFORMANCE

- D21.1 The Contractor shall achieve Substantial Performance within seventy (70) consecutive Working Days of the commencement of the Work as specified in D16.
- D21.2 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.
- D21.3 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.

D22. TOTAL PERFORMANCE

- D22.1 The Contractor shall achieve Total Performance within seventy-five (75) consecutive Working Days of the commencement of the Work as specified in D16.
- D22.2 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.
- D22.3 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.

D23. LIQUIDATED DAMAGES

- D23.1 If the Contractor fails to achieve 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) Substantial Performance – Three Thousand dollars (\$3,000);
 - (b) Total Performance – One Thousand dollars (\$1,000).
- D23.2 The amounts specified for liquidated damages in D23.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve Substantial Performance or Total Performance by the days fixed herein for same.
- D23.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D24. COVID-19 SCHEDULE DELAYS

- D24.1 The City acknowledges that the schedule for this Contract may be impacted by the COVID-19 pandemic. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the health and safety of workers and the public, directives from health

authorities and various levels of government and in close consultation with the Contract Administrator.

- D24.2 If the Contractor is delayed in the performance of the Work by reason of the COVID-19 pandemic, the Work schedule may be adjusted by a period of time equal to the time lost due to such delay and costs related to such delay will be determined as identified herein.
- D24.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether COVID-19 will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to COVID-19, including but not limited to evidence related to availability of staff, availability of Material or work by others.
- D24.4 For any delay related to COVID-19 and identified after Work has commenced, the Contractor shall within seven (7) Calendar Days of becoming aware of the anticipated delay declare the additional delay and shall provide sufficient evidence as indicated in D24.3. Failure to provide this notice will result in no additional time delays being considered by the City.
- D24.5 The Work schedule, including the durations identified in D18 to D22 where applicable, will be adjusted to reflect delays accepted by the Contract Administrator. No additional payment will be made for adjustment of schedules except where seasonal work, not previously identified in the Contract, is carried over to the following construction season.
- D24.6 Where Work not previously identified is being carried over solely as a result of delays related to COVID-19, as confirmed by the Contract Administrator, the cost of temporary works to maintain the Work in a safe manner until Work recommences, will be considered by the Contract Administrator. Where the Work is carried over only partially due to COVID-19, a partial consideration of the cost of temporary works will be considered by the Contract Administrator.
- D24.7 Any time or cost implications as a result of COVID-19 and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

D25. SCHEDULED MAINTENANCE

- D25.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:
- (a) Reflective Crack Maintenance as specified in CW 3250-R7;
 - (b) Sod Maintenance as specified in CW 3510-R10.
- D25.2 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

D26. JOB MEETINGS

- D26.1 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.
- D26.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D27. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D27.1 Further to C6.26, 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).

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

D28.1 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

D29. PAYMENT

D29.1 Further to C12, the City shall make payments to the Contractor by direct deposit to the Contractor's banking institution, and by no other means. Payments will not be made until the Contractor has made satisfactory direct deposit arrangements with the City. Direct deposit application forms are at https://winnipeg.ca/finance/files/Direct_Deposit_Form.pdf.

WARRANTY

D30. WARRANTY

D30.1 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.

D30.2 Notwithstanding C13.2 or D30.1, 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.

D30.2.1 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.

DISPUTE RESOLUTION

D31. DISPUTE RESOLUTION

D31.1 The entire text of C21.4 is deleted, and amended to read: "Intentionally Deleted"

D31.2 The entire text of C21.5 is deleted, and amended to read:

- (a) If Legal Services has determined that the Disputed Matter may proceed in the Appeal Process, the Contractor must, within ten (10) Business Days of the date of the Legal Services Response Letter, submit his written Appeal Form, in the manner and format set out on the City's Materials Management Website, to the Chief Administrative Officer, and to the Contract Administrator. The Contractor may not raise any other disputes other than the Disputed Matter in his Appeal Form.

D31.3 Further to C21, prior to the Contract Administrator's issuance of a Final Determination, the following informal dispute resolution process shall be followed where the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator ("Dispute"):

- (a) In the event of a Dispute, attempts shall be made by the Contract Administrator and the Contractor's equivalent representative to resolve Disputes within the normal course of project dealings between the Contract Administrator and the Contractor's equivalent representative.
- (b) Disputes which in the reasonable opinion of the Contract Administrator or the Contractor's equivalent representative cannot be resolved within the normal course of project dealings as described above shall be referred to a without prejudice escalating negotiation process consisting of, at a minimum, the position levels as shown below and the equivalent Contractor representative levels:
 - (i) The Contract Administrator;
 - (ii) Supervisory level between the Contract Administrator and applicable Department Head;
 - (iii) Department Head.

- D31.3.1 Names and positions of Contractor representatives equivalent to the above City position levels shall be determined by the Contractor and communicated to the City at the pre-commencement or kick off meeting.
- D31.3.2 As these negotiations are not an adjudicative hearing, neither party may have legal counsel present during the negotiations.
- D31.3.3 Both the City and the Contractor agree to make all reasonable efforts to conduct the above escalating negotiation process within twenty (20) Business Days, unless both parties agree, in writing, to extend that period of time.
- D31.3.4 If the Dispute is not resolved to the City and Contractor's mutual satisfaction after discussions have occurred at the final escalated level as described above, or the time period set out in D31.3.3, as extended if applicable, has elapsed, the Contract Administrator will issue a Final Determination as defined in C1.1(v), at which point the parties will be governed by the Dispute Resolution process set out in C21.

THIRD PARTY AGREEMENTS

D32. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

- D32.1 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.
- D32.2 Further to D32.1, in the event that the obligations in D32 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.
- D32.3 For the purposes of D32:
 - (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.
- D32.4 Modified Insurance Requirements
 - D32.4.1 If not already required under the insurance requirements identified in D11, 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.

- D32.4.2 If not already required under the insurance requirements identified in D11, 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.
- D32.4.3 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.
- D32.4.4 Further to D11.5, 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.
- D32.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.
- D32.5 Indemnification By Contractor
- D32.5.1 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.
- D32.5.2 The Contractor agrees that in no event will Canada or Manitoba, their respective officers, servants, employees or agents be held liable for any damages in contract, tort (including negligence) or otherwise, for:
- (a) any injury to any person, including, but not limited to, death, economic loss or infringement of rights;
 - (b) any damage to or loss or destruction of property of any person; or
 - (c) any obligation of any person, including, but not limited to, any obligation arising from a loan, capital lease or other long term obligation;
- in relation to this Contract or the Work.
- D32.6 Records Retention and Audits
- D32.6.1 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.
- D32.6.2 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 D32.6.1 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.

D32.7 Other Obligations

- D32.7.1 The Contractor consents to the City providing a copy of the Contract Documents to the Government of Manitoba and/or the Government of Canada upon request from either entity.
- D32.7.2 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.
- D32.7.3 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.
- D32.7.4 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.
- D32.7.5 The Contractor represents and warrants that no current or former public servant or public office holder, to whom the Value and Ethics Code for the Public Sector, the Policy on Conflict of Interest and Post Employment, or the Conflict of Interest Act applies, shall derive direct benefit from this Contract, including any employment, payments, or gifts, unless the provision or receipt of such benefits is in compliance with such codes and the legislation.
- D32.7.6 The Contractor represents and warrants that no member of the House of Commons or of the Senate of Canada or of the Legislative Assembly of Manitoba is a shareholder, director or officer of the Contractor or of a Subcontractor, and that no such member is entitled to any benefits arising from this Contract or from a contract with the Contractor or a Subcontractor concerning the Work.

FORM H1: PERFORMANCE BOND
(See D12)

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. 307-2022

2022 Regional Street Renewal Program – University Crescent Concrete Pavement Reconstruction & Rehabilitation

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 D12)

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. 307-2022

2022 Regional Street Renewal Program – University Crescent Concrete Pavement Reconstruction & Rehabilitation

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 D13)

2022 Regional Street Renewal Program – University Crescent Concrete Pavement Reconstruction & Rehabilitation

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
<i>SURFACE WORKS:</i>		
Supply of Materials:		
Concrete		
Asphalt		
Base Course (limestone)		
Sub-Base (limestone)		
Separation Filtration Geotextile Fabric/Geogrid		
Sod		
Installation/Placement:		
Concrete		
Asphalt		
Base Course and Sub-Base		
Separation Filtration Geotextile Fabric/Geogrid		
Sod		
Joint Sealant		
<i>UNDERGROUND WORKS</i>		
Supply of Materials:		
Sewer Service Pipe		
Catch Basins		
Frames and Covers		
Installation/Placement:		
Sewer Service Pipe		
Catch Basins		
<i>STREET LIGHTING WORKS</i>		
Installation/Placement:		
Street Light Poles, Conduit, Bases, Cable and Appurtenances		

FORM J: SUBCONTRACTOR LIST
 (See D13)

2022 Regional Street Renewal Program – University Crescent Concrete Pavement Reconstruction & Rehabilitation

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
<i>TRAFFIC SIGNAL WORKS</i>		
Installation/Placement:		
Conduit, Bases, Service Boxes, Ground Rods, Cutovers		
<i>BUS STOP FLAG FOUNDATIONS</i>		
Installation/Placement:		
<i>OVERHEAD SIGN SUPPORT STRUCTURE</i>		
Supply of Materials:		
Installation/Placement:		

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:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>	<u>Drawing (Original) Sheet Size</u>
CT-00	Cover Sheet and Location Plan	A1
CT-01	Construction Staging and Traffic Management – Stage 1	A1
CT-02	Construction Staging and Traffic Management – Stage 2A	A1
CT-03	Construction Staging and Traffic Management – Stage 2B	A1
CT-04	Horizontal Geometry	A1
CT-05	Plan/Profile – Station 1+190 to Station 1+320	A1
CT-06	Plan/Profile – Station 1+320 to Station 1+450	A1
CT-07	Plan/Profile – Station 1+450 to Station 1+580	A1
CT-08	Plan/Profile – Station 1+580 to Station 1+705	A1
CT-09	Cross Sections and Details	A1
CS-01	S797 NB University Cr North of Wedgewood Dr – Overhead Sign Support Structure – Plan, Section and Details	A1
CS-02	S797 NB University Cr North of Wedgewood Dr – Overhead Sign Support Structure – Fabrication Details	A1
S-1508	Traffic Signals – Pembina Hwy. & University Cr.	A1
S-1524	Pedestrian Corridor – University Cr. & Wedgewood Dr.	A1
S-2166	Pedestrian Corridor – Thatcher Dr. & University Cr.	A1
SD-315.A	Signal Pole Base – Type PM	A1
SD-315.C	Signal Pole Base – Type POD	A1

- E1.5 Traffic Signals drawings (S-1508, S-1524 and S-2166) are provided for bidding purposes only. Sealed traffic signals drawings will be provided to the Contractor prior to commencement of construction.
- E1.6 Sealed street light drawings will be provided to the Contractor prior to the commencement of construction.

E2. MOBILIZATION AND DEMOBILIZATION PAYMENT

DESCRIPTION

- E2.1 This Specification shall cover all operations relating to the mobilization and demobilization of the Contractor to the project location(s).
- E2.2 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 Works as hereinafter specified.
- E2.3 The inclusion of a payment item for the Work under this Specification shall not release or reduce the responsibilities of the Contractor under any other specification in this Contract.

SCOPE OF WORK

- E2.4 Further to C12 of the General Conditions, where Mobilization and Demobilization is included as a bid item, it shall consist of the following, as applicable:
- (a) Mobilization shall include, but not be limited to:
 - (i) All activities and associated costs for transportation of the Contractor's personnel, equipment, and operating supplies to the site, and/or sites, and/or between sites;
 - (ii) Establishment of offices, buildings, other necessary general facilities and equipment parking/staging areas for the Contractor's operations at the site or sites;
 - (iii) Premiums paid for performance and payment bonds including coinsurance and reinsurance agreements as applicable;
 - (iv) General cleanup and housekeeping needed maintain a neat and orderly project site(s);
 - (v) Other job related items.
 - (b) Demobilization shall include, but not be limited to:
 - (i) All activities and costs for transportation of personnel, equipment, and supplies not used in the project from the site, and/or sites, and/or between sites;
 - (ii) Disassembly, removal, and site cleanup and restoration of offices, buildings, and other facilities assembled on the site and/or sites;
 - (iii) Repair of access roads, temporary haul roads, and equipment parking areas leaving the project site in the same or better condition than at the start of the project;
 - (iv) General cleanup and housekeeping needed to restore a neat and orderly project site.
- E2.5 Access to the site, equipment parking, and staging areas are limited to that shown on the drawings or as approved by the Contract Administrator.

MEASUREMENT AND PAYMENT

- E2.6 The lump-sum price for the Mobilization and Demobilization bid item shall not exceed five percent (5.00%) of the total bid price for the Contract.
- E2.6.1 Further to B9, B17, C12 and E2.6, should the lump sum price exceed 5% of the Total Bid Price the lump sum price will be reduced to 5% of the Total Bid Price, the Total Bid Price will be determined using the reduced lump sum price and payment will be based on the reduced lump sum price.
- E2.7 Payment for Mobilization:
- (a) 60% of the lump-sum price will be paid to the contractor for Mobilization on the first Progress Estimate for the Contract.
- E2.8 Payment for Demobilization:

- (a) The remaining 40% of the lump-sum price will be paid upon:
 - (i) Restoration of the site and/or sites to the satisfaction of the Contract Administrator;
 - (ii) Distribution of the Declaration of Total Performance.

E2.9 Pay Reduction for Accessibility Plan

- (a) The Demobilization payment will be reduced by the number of pay adjustments incurred in accordance with D15 and as determined by the Contract Administrator.

E2.10 Mobilization and Demobilization will be paid only once (to a maximum of 100%), regardless of the number of times the Contractor mobilizes to the site and/or sites.

E3. GEOTECHNICAL REPORT

E3.1 Further to C3.1, the geotechnical report is provided to aid the Contractor's evaluation of the pavement structure and/or existing soil conditions. The geotechnical report is contained in Appendix 'G'.

E4. OFFICE FACILITIES

E4.1 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 20 square metres, a height of 2.4m 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°C or 24-25°C.
- (e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three wall outlets.
- (f) The building shall be furnished with one desk, one drafting table, one table 3m x 1.2m, one stool, and a minimum of 8 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.

E4.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E4.3 The office facilities will be provided from the date of the commencement of the Work to the date of Total Performance.

E4.4 On a one time basis, where directed by the Contract Administrator, the Contractor shall relocate the office facilities to a location more convenient for the remaining Work.

E5. PROTECTION OF EXISTING TREES

E5.1 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.

E5.2 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.

E5.3 No separate measurement or payment will be made for the protection of trees.

E5.4 Except as required in clause E5.1(c) and E5.1(e), Elm trees shall not be pruned at any time between April 1 and July 31.

E6. TRAFFIC CONTROL

E6.1 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, the Contract Drawings, Staging Plans and Traffic Management Plans 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.
- (c) In addition, the Contractor shall be responsible for removing, placing and maintaining all regulatory signing including but not limited to:
 - (i) Parking restrictions;
 - (ii) Stopping restrictions;
 - (iii) Turn restrictions;
 - (iv) Diamond lane removal;
 - (v) Full or directional closures on a Regional Street;
 - (vi) Traffic routed across a median;
 - (vii) 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.
- (d) The Contractor shall remove and stockpile any regulatory signage not required during construction such as, but not limited to, parking restrictions, turn restrictions and loading restrictions.

E6.2 Further to E6.1(c) ,the Contractor shall make arrangement with the Traffic Services Branch to supply regulatory signs as required.

E6.3 Upon request from the Contract Administrator, the Contractor shall provide records demonstrating that the site has been maintained.

E6.4 Further to E6.1(c) and E6.1(d) the Contractor shall make arrangements with the Traffic Services Branch of the City of Winnipeg to reinstall the permanent regulatory signs after the Contract Work is complete. The Contractor shall make arrangements to drop off the stockpiled materials to Traffic Services at 495 Archibald Street.

E6.5 Any changes to the approved Traffic Management Plan must be submitted to the Contract Administrator a minimum of five (5) Working Days prior to the required change for approval.

E6.6 If the Contract Administrator determines that the Contractor is not performing Traffic Control in accordance with this specification, Traffic Services may be engaged to perform the Traffic Control. In this event the Contractor shall bear costs charged to the project by the Traffic Services Branch of the City of Winnipeg in connection with the required Works.

E7. TRAFFIC MANAGEMENT

E7.1 Further to clause 3.7 of CW 1130:

- (a) Single lane closures on intersecting and/or adjoining Regional Streets shall only be permitted during non-peak periods when required for construction activities when approved by the Traffic Management Branch. Storage/parking of materials, equipment or vehicles is not permitted on Regional Streets at any time unless approved by the Contract Administrator, in consultation with the Traffic Management Branch.

E7.1.1 The construction staging and traffic management drawings include details on traffic management, pedestrian access and signage placement for University Crescent and are identified in E1.4.

E7.1.2 Stage 1 underground Works (northbound pavement) are to be completed prior to Stage 1 traffic control being in place. During Stage 1 underground works, the Contractor shall maintain one lane in each direction on University Crescent from Thatcher Drive to Pembina Highway with the appropriate signage in place.

E7.1.3 During Stage 1, when pavement removal and excavation commences, the Contractor is permitted to fully close the east side of University Crescent to northbound traffic from Thatcher Drive to just south of Pembina Highway, however, access to Thatcher Drive or Wedgewood Drive must be maintained at all times. Two-way traffic shall operate in the west lanes of University Crescent.

E7.1.4 When Thatcher Drive is closed at the east side of University Crescent, the Contractor shall complete the following:

- (a) At the intersection of Thatcher Drive and Agassiz Drive, supply and place 'ROAD CLOSED NO EXIT' signage.
- (b) Supply and place informational sign for southbound cyclists on D'Arcy Drive at Glengarry Drive stating 'NO CYCLIST ACCESS TO UNIVERSITY CRESCENT VIA THATCHER DRIVE, DETOUR VIA GLENGARRY DRIVE'. Supply and place informational sign for northbound cyclists on University Crescent at Thatcher Drive stating 'NO CYCLIST ACCESS TO THATCHER DRIVE, DETOUR VIA WEDGEWOOD DRIVE'. Supply and place bike detour signage on D'Arcy Drive, Glengarry Drive, Agassiz Drive and Wedgewood Drive and University Crescent per the direction of the Contract Administrator.

E7.1.5 When Wedgewood Drive is closed at the east side of University Crescent, the Contractor shall complete the following:

- (a) At the intersection of Wedgewood Drive and Agassiz Drive, supply and place 'ROAD CLOSED NO EXIT' signage.

- E7.1.6 During Stage 1, the Contractor shall maintain the east side sidewalk for pedestrians until the new lanes are constructed and allow for pedestrian access.
- E7.1.7 During Stage 2A, the Contractor shall maintain southbound traffic in the southbound gutter lane and northbound traffic in the new northbound lanes.
- E7.1.8 During Stage 2B, the Contractor shall maintain southbound traffic in the southbound median lane and northbound traffic in the new northbound lanes. The west side sidewalk must remain accessible until all full depth concrete repairs have been completed in the southbound gutter lane. The Contractor shall maintain pedestrian access in the southbound gutter lane during the construction of the west side monolithic curb and sidewalk.
- E7.1.9 When the existing pedestrian corridor lights have been removed at Wedgewood Drive, the Contractor shall place temporary crosswalk signs until the new pedestrian corridor lights and corresponding signage are installed and operational. This crosswalk must be maintained at all times.
- E7.1.10 Existing Transit stop locations must be maintained and meet accessibility requirements at all times. The Contractor shall request bus stop portable signs from Traffic Services and place the signs as required.
- E7.1.11 When no work is being performed on site, non-essential lane closures will not be permitted.
- E7.1.12 Flag persons may be necessary to maintain the flow of traffic during certain work operations.
- E7.1.13 Private approach access shall be maintained at all times unless construction operations require temporary closure. The only exception is that private approach access is not required to be maintained to residences on the east side of University Crescent (#34 University Cr to #74 University Crescent) unless the Contract Administrator makes arrangements with a specific residence.
- E7.1.14 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he/she 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 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.
- E7.1.15 Ambulance/emergency vehicle access must be maintained at all times.

E8. REFUSE AND RECYCLING COLLECTION

- E8.1 While access to refuse and/or recycling collection vehicles is restricted, on collection day(s) the Contractor shall move all of the affected property owners refuse and/or recycling materials to a nearby common area, prior to an established time, in accordance with E8.2 to permit the normal collection vehicles to collect the materials. Immediately following recycling collection the Contractor shall return recycling receptacles to the addresses marked on the receptacles.

E8.2 Collection Schedule:

#30 University Crescent Apartment

Collection Day(s): **Varies**

Collection Time: **Varies**

Common Collection Area: **Private collection access must be maintained**

#34 University Crescent to #74 University Crescent (Private Residences)

Collection Day(s): **Wednesday**

Collection Time: **7:00 am**

Common Collection Area: **Relocate carts to common collection area as discussed with City of Winnipeg, Solid Waste**

West Side Commercial and Multi-Family Properties

Collection Day(s): **Varies**

Collection Time: **Varies**

For residential carts normally placed on the City sidewalk, provide access for carts to be picked up from the active southbound traffic lane in Stage 2A and 2B

Common Collection Area: **For full size bins or residential carts normally picked up on a property, provide access through private approaches, unless access from Pembina Highway is available**

E8.3 No measurement or payment will be made for the work associated with this specification.

E9. WATER OBTAINED FROM THE CITY

E9.1 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.

E10. SURFACE RESTORATIONS

E10.1 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.

E11. INFRASTRUCTURE SIGNS

E11.1 The Contractor shall obtain infrastructure signs from the Traffic Services Sign Shop at 421 Osborne Street. The Contractor shall mount each sign securely to a rigid backing material approved by the Contract Administrator. The Contractor shall fasten each sign to a suitable support and erect and maintain one sign at each street as directed by the Contract Administrator. When the Contract Administrator considers the Work on the street complete, the Contractor shall remove and dispose of the signs and supports. No measurement for payment will be made for performing all operations herein described and all other items incidental to the work described.

E12. SUPPLY AND INSTALLATION OF PAVEMENT REPAIR FABRIC

DESCRIPTION

E12.1 General

E12.1.1 This specification covers the supply and installation of pavement repair fabric.

E12.1.2 Referenced Standard Construction

(a) CW 3130 – Supply and Installation of Geotextile Fabrics.

MATERIALS

E12.2 Storage and Handling

E12.2.1 Store and handle material in accordance with Section 2 of CW 3130.

E12.3 Pavement Repair Fabric

E12.3.1 Pavement repair fabric will be a product included in Section 8 of the City of Winnipeg, Public Works – Approved Products for Surface Works.

CONSTRUCTION METHODS

E12.4 General

E12.4.1 Install pavement repair fabric at random locations as directed by the Contract Administrator.

E12.4.2 The extent of the placement limits and quantities required will be determined by the Contract Administrator and provided 48 hours prior to the placement of asphalt.

E12.4.3 Proceed with installation upon completion and acceptance of the asphalt levelling course.

E12.4.4 Install fabric in accordance with the manufacturer's specifications and recommendations.

E12.4.5 Only construction equipment required to place the final asphalt surface course will be allowed to travel on the exposed fabric.

E12.4.6 Replace damaged or improperly placed fabric.

E12.4.7 Ensure temperature of the asphalt material does not exceed the melting point of the fabric.

MEASUREMENT AND PAYMENT

E12.5 Pavement Repair Fabric

E12.5.1 The supply and installation of the pavement repair fabric will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Pavement Repair Fabric". The area to be paid for will be the total number of square metres of pavement repair fabric supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

E13. PORTLAND CEMENT CONCRETE SIDEWALK WITH BLOCK OUTS FOR INDICATOR SURFACES

DESCRIPTION

E13.1 This specification shall supplement CW 3325-R5 "Portland Cement Concrete Sidewalks".

CONSTRUCTION METHODS

E13.2 Add the following to section 9 :

E13.2.1 As shown on the drawings and as directed by the Contract Administrator, construct sidewalk with block outs and/or monolithic curb and sidewalk with block outs, to allow for the installation of indicator surfaces.

E13.2.2 Verify dimensions of paving stones (indicator surface) prior to construction of the block-outs. Gaps between paving stones and concrete pavement shall not exceed five (5) millimetres.

E13.2.3 Concrete curbs for monolithic curb and sidewalk with block outs shall be constructed in accordance with CW 3240.

MEASUREMENT AND PAYMENT

E13.3 Add the following to section 12 :

E13.3.1 Construction of concrete sidewalks with block outs for indicator surfaces will be measured on surface area basis. The surface area to be paid for shall be the number of square metres constructed in accordance with this specification and accepted by the Contract Administrator, as computed by measurements made by the Contract Administrator.

BASIS OF PAYMENT

E13.4 Add the following to section 13 :

E13.4.1 Construction of concrete sidewalks with block outs for indicator surfaces will be paid for at the Contract Unit Price per square meter for the "Items of Work" listed here below, measured as specified herein, 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.

E13.4.2 Items of Work:

- (a) 100 mm Sidewalk with Block Outs
- (b) 150 mm Sidewalk with Block Outs
- (c) Monolithic Curb and 100 mm Sidewalk with Block Outs*
- (d) Monolithic Curb and 150 mm Sidewalk with Block Outs*

* - reveal height and type

E13.4.3 Concrete thickness greater than the specified sidewalk thickness as a result of shaping the base material to accommodate the block outs is incidental to the listed Items of Work.

E13.4.4 Construction of 100 mm reveal height modified barrier curb on radii and 8-12 mm reveal height monolithic curb ramp is incidental to the construction of 'Monolithic Curb and 100 mm Sidewalk with Blockouts (100 mm reveal ht, dowelled)'.

E14. PAVING STONES FOR INDICATOR SURFACES

DESCRIPTION

E14.1 This specification shall supplement CW 3330-R5 "Installation of Interlocking Paving Stones"

MATERIALS

E14.2 Add the following to section 5:

E14.2.1 Paving Stones for paving band indicator surfaces shall be:

Barkman Concrete paving stones -
Charcoal Holland Paver (60mm X 210 mm X 210 mm)
<https://www.barkmanconcrete.com/>

CONSTRUCTION METHODS

E14.3 Add the following to section 9.2 "Preparation of Sub-grade, Sub-base and Sand-base":

E14.3.1 Preparation of Sand-Base for Paving Stones in Sidewalk Block Outs.

E14.3.2 Place a 15mm layer of bedding sand in the blocked out sidewalk areas. SPEC NOTE: the bedding sand and paver dimensions must be considered in the block out dimensions on the drawing.

- E14.3.3 The bedding sand shall be spread and levelled so that the paving stones when installed are 5 mm higher than the finished grade.
- E14.3.4 No more sand shall be spread than can be covered in with paving stone on the same day.
- E14.3.5 The bedding sand shall not be compacted or disturbed prior to laying the paving stones.
- E14.4 Add the following to section 9.3 "Installation of Paving Stones":
 - E14.4.1 For indicator surface paving stones, commence installation of paving stones against the long edge of the block out to obtain the straightest possible course of installation.

MEASUREMENT AND PAYMENT

- E14.5 Add the following to section 12:
- E14.6 Supply and Installation of Paving Stones for Indicator Surfaces
 - E14.6.1 Paving stones for indicator surfaces will be measured on surface area basis. The surface area to be paid for shall be the number of square metres constructed in accordance with this specification and accepted by the Contract Administrator, as computed by measurements made by the contract Administrator.

BASIS OF PAYMENT

- E14.7 Add the following to section 13:
 - E14.7.1 The supply and installation of paving stones for indicator surfaces will be paid for at the Contract Unit Price per square meter for "Paving Stone Indicator Surfaces, Charcoal Holland Paver (210 mm x 210 mm x 60 mm)", measured as specified herein, 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.
 - E14.7.2 Concrete thickness greater than the specified sidewalk thickness as a result of shaping the base material to accommodate the block outs is incidental to the listed Items of Work.

E15. SALVAGE OF TRANSIT BLUE PAVING STONES

- E15.1 The Contractor shall salvage existing Transit blue paving stones as directed by the Contract Administrator and deliver the paving stones to the Winnipeg Transit yard on pallets.

MEASUREMENT AND PAYMENT

- E15.2 Salvage of existing Transit blue paving stones shall be measured on an area basis and paid for at the Contract Unit Price per square metre of "Salvage of Existing Transit Blue Paving Stones". The area to be paid for shall be the total square meters of existing Transit blue paving stones salvaged in accordance with this specification, accepted and measured by the Contract Administrator.

E16. BUS STOP FLAG FOUNDATIONS

DESCRIPTION

- E16.1 The Work covered under this Item shall include all concreting operations related to construction of cast-in-place concrete foundations for bus stop flags and bus stop totems in accordance with this Specification and as shown on the Drawings. The Work covered under this item also includes the removal of the existing bus stop flag foundation in the vicinity of the proposed bus stop flag foundation.
- E16.2 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 Works as hereinafter specified.

MATERIALS

E16.3 General

- (a) The Contractor shall be responsible for the supply, safe storage, and handling of all Materials set forth in this Specification.

E16.4 Handling and Storage of Materials

- (a) All Materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator. Storage of Materials shall be in accordance with CSA Standard A23.1-04.

E16.5 Testing and Approval

- (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.
- (b) All Materials shall be approved by the Contract Administrator at least seven (7) days before any construction is undertaken. 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 Materials shall be rejected by the Contract Administrator and replaced by the Contractor at their own expense.

E16.6 Patching Mortar

- (a) The patching mortar shall be made of the same cementitious 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 one (1) part cement to two (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 and placing.

E16.7 Cement

- (a) Cement shall be Type HS or HSb, high-sulphate-resistant hydraulic cement, conforming to the requirements of CSA Standard A23.1-04

E16.8 Concrete

- (a) General
 - (i) Concrete repair material shall be compatible with the concrete substrate.
- (b) The Contractor shall be responsible for the design and performance of all concrete mixes supplied under this Specification. Either ready mix concrete or proprietary repair mortars, where applicable, may be used having the following minimum properties in accordance with CSA A23.1-04:
 - (i) Class of Exposure: S-1;
 - (ii) Compressive Strength at fifty-six (56) days = thirty-five (35) MPa;
 - (iii) Water/Cementing Materials Ratio = 0.4;
 - (iv) Air Content: Category 2 per Table 4 of CSA A23.1-04 (4-7%); and
 - (v) Cement – shall be as specified in E38.7. Mix design for ready mix concrete shall be submitted to Contract Administrator at least two weeks prior to concrete placing operations.
- (c) The workability of each concrete mix shall be consistent with the Contractor's placement operations. Self-compacting concrete may be used for the foundations.
- (d) Any proposed proprietary repair mortar shall be subject to the approval of the Contract Administrator and must meet or exceed the properties of the ready mix concrete.

- (e) The temperature of all types of concrete shall be between fifteen (15) degrees Celsius and twenty-five (25) degrees Celsius at discharge. Temperature requirements for concrete containing silica fume shall be between ten (10) degrees Celsius and eighteen (18) degrees Celsius at discharge unless otherwise approved by the Contract Administrator.
- (f) Concrete Materials susceptible to frost damage shall be protected from freezing.

E16.9 Aggregate

E16.9.1 The Contractor shall be responsible for testing the fine and coarse aggregates to establish conformance to these Specifications, and the results of these tests shall be provided to the Contract Administrator if requested. All aggregates shall comply with CSA A23.1.

(a) Coarse Aggregate:

- (i) The maximum nominal size of coarse aggregate shall be sized to suit the Contractor's mix design. Gradation shall be in accordance with CSA A23.1, Table 11, Group 1. The coarse aggregate shall satisfy the Standard Requirements specified in CSA A23.1, Table 12, "Concrete Exposed to Freezing and Thawing".
- (ii) 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; and shall have an absorption not exceeding 2.25%.
- (iii) The aggregate retained on the five (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, and excess of thin particles or any other extraneous material.
- (iv) Coarse aggregate when tested for abrasion in accordance with ASTM C131 shall not have a loss greater than thirty percent (30%).
- (v) Tests of the coarse aggregate shall not exceed the limits for standard for requirements prescribed in CSA A23.1, Table 12, for concrete exposed to freezing and thawing.

(b) Fine Aggregate

- (i) Fine aggregate shall meet the grading requirements of CSA A23.1, Table 10, Gradation FA1.
- (ii) 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.
- (iii) Tests of the fine aggregate shall not exceed the limits for standard requirements prescribed in CSA A23.1, Table 12.

E16.10 Cementing Materials

E16.10.1 Cementing Materials shall conform to the requirements of CSA A3001.

(a) Silica Fume:

- (i) Should the Contractor choose to include silica fume in the concrete mix design, it shall not exceed eight percent (8%) by mass of cement.

(b) Fly Ash:

- (i) Fly ash shall be Type C1 or Type F and shall not exceed twenty-five percent (25%) by mass of cement.

E16.10.2 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 formation of lumps shall not be used in the Work.

E16.11 Admixtures

- (a) Air entraining admixtures shall conform to the requirements of ASTM C260.
- (b) Chemical admixtures shall conform to the requirements of ASTM C494 or C1017 for flowing concrete.
- (c) All admixtures shall be compatible with all other constituents. The addition of calcium chloride, accelerators, and air-reducing agents will not be permitted, unless otherwise approved by the Contract Administrator.
- (d) Appropriate low range water reducing and/or superplasticizing admixtures shall be used in concrete containing silica fume. Approved retarders or set controlling admixtures may be used for concrete containing silica fume.
- (e) An aminocarboxylate based migrating corrosion inhibitor admixture shall be used in concrete that will be used as a repair material that will either be in contact with or adjacent to reinforcing steel in existing concrete. Proposed admixtures shall be subject to the approval of the Contract Administrator.

E16.12 Water

- (a) Water used for mixing concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances. It shall be equal to potable water in physical and chemical properties.

E16.13 Concrete Supply

- (a) Concrete shall be proportioned, mixed, and delivered in accordance with the requirements of CSA A23.1, except that the transporting of ready mixed concrete in non-agitating equipment will not be permitted unless prior written approval is received from the Contract Administrator.
- (b) Unless otherwise directed by the Contract Administrator, the discharge of ready mixed concrete shall be completed within one hundred twenty (120) minutes after the introduction of the mixing water to the cementing Materials and aggregates.
- (c) The Contractor shall maintain all equipment used for handling and transporting the concrete in a clean condition and proper working order.

E16.14 Reinforcing Steel

- (a) Reinforcing steel shall be deemed to include all reinforcing bars, tie-bars, and dowels.
- (b) All reinforcing steel shall conform to the requirements of CSA Standard G30.18, Grade 400 W, Billet-Steel Bars for Concrete Reinforcement. All reinforcing steel shall be new deformed billet steel bars. All bars, including ties, shall be hot-dip galvanized in accordance with CSA Standard G164 for a minimum net retention of six hundred (600) g/m². Reinforcing steel supply and installation will be incidental to construction of concrete foundation and no separate payment will be made.

E16.15 Anchor Bolts, Nuts, and Washers

- (a) Anchor bolts, nuts and washers shall be supplied by the Contract Administrator.

E16.16 Anchor Bolt Templates

- (a) Anchor bolt templates shall be supplied by the Contract Administrator.
- (b) Anchor bolt templates will be incidental to construction of new concrete foundation and no separate payment will be made.

E16.17 Fibre Joint Filler

- (a) Fibre joint filler shall be rot-proof and of the preformed, non-extruding, resilient-type, made with a bituminous fibre such as "Flexcell," and shall conform to the requirements of ASTM Standard D1751, or approved equal in accordance with B6.

E16.18 Anti-Graffiti Coating

- (a) Anti-graffiti coating shall be “Professional Water Sealant & Anti-Graffiti System” or approved equal in accordance with B6.

E16.19 Waterproofing Membrane

- (a) Waterproofing membrane shall be “Sonoshield HLM 5000 R” or approved equal in accordance with B6.

E16.20 Miscellaneous Materials

- (a) Miscellaneous Materials shall be of the type specified on the Drawings or approved by the Contract Administrator.

CONSTRUCTION METHODS

E16.21 Removal, Storage and Reinstallation of Existing Bus Stop Flag Signs

- (a) Winnipeg Transit will remove and store existing bus stop flag signs until the new bus stop flag foundations are installed.
- (b) Winnipeg Transit will reinstall existing bus stop flag signs on the new foundations.

E16.22 Removal of Existing Bus Stop Flag Foundations

- (a) The Contractor shall remove the existing bus stop flag foundation in the vicinity of the proposed bus stop flag foundation and if required, backfill with base course in 150 mm lifts to 100% standard proctor density.

E16.23 Location and Alignment of Foundations

- (a) Foundation construction shall not commence until the Contractor has obtained clearance from the appropriate Utility Authorities.
- (b) Foundations shall be placed in the positions shown on the Drawings and as directed by the Contract Administrator in the field.
- (c) The deviation of the axis of any finished foundation shall not differ by more than one percent (1%) from the vertical.

E16.24 Buried Utilities

- (a) The Contractor shall exercise extreme caution when constructing the foundations in the vicinity of existing buried utilities and buildings. The Drawings show the approximate locations of existing buried utilities. The Contractor shall be responsible for obtaining the exact location of the buried utilities from the appropriate Utility Authorities prior to installing the foundations.
- (b) The proposed locations of the foundations may be changed by the Contract Administrator if they interfere with the buried utilities.
- (c) The Contractor shall be responsible for all costs that may be incurred for repair/rectification of any damage caused to the existing buried utilities as a result of the Contractor's operations in constructing cast-in-place concrete foundations, as determined by the Contract Administrator.

E16.25 Excavation

- (a) The Contractor is responsible for determining the excavation method at each foundation location.
- (b) Excavations for foundations shall be made with equipment designed to remove a core of the diameter shown on the Drawings, or hydro-jet excavation to a depth to bypass and/or expose adjacent utilities.
- (c) Upon reaching the required elevation, the bottom of the excavation shall be cleaned as directed by the Contract Administrator in the field.
- (d) All excavated material from the foundations shall be promptly hauled away from the Site to an approved disposal area as located by the Contractor.

- (e) Upon completion of the cleaning out of the bottom to the satisfaction of the Contract Administrator, the reinforcement and anchor bolts shall be set in place and the concrete poured immediately. Under no circumstances shall a hole be left to stand open after boring has been complete.

E16.26 Sleeving

- (a) Timber or steel sleeving shall be used to temporarily line the bore to prevent bulging or caving of the walls and to protect men at Work in the bore.
- (b) The sleeving shall be designed by the Contractor and constructed to resist all forces that may tend to distort it.
- (c) The sleeving shall be withdrawn as the concrete is placed in the bore. The sleeving shall extend at least one (1) m below the top of the freshly deposited concrete at all times.
- (d) The clearance between the face of the bore hole and the sleeving shall not exceed seventy-five (75) mm.

E16.27 Inspection of Bores

- (a) Concrete shall not be placed in a bore until the bore has been inspected and approved by the Contract Administrator.
- (b) The Contractor shall have available suitable light for the inspection of each bore throughout its entire length.
- (c) All improperly set sleeving, bore, or bottom shall be corrected to the satisfaction of the Contract Administrator.

E16.28 Placing Reinforcing Steel

- (a) Reinforcement shall be:
 - (i) placed in accordance with the details shown on the Drawings;
 - (ii) rigidly fastened together; and
 - (iii) lowered into the bore intact before concrete is placed.
- (b) Spacers shall be utilized to properly locate the reinforcing steel cage in the bore.

E16.29 Placing Anchor Bolts

- (a) The anchor bolts shall be aligned with a steel template supplied by the Contract Administrator matching the bolt holes in the sign structure base plate. **Extreme care shall be used in this operation to ensure bolts are aligned properly.** Placement of anchor bolts without the steel template will not be permitted.
- (b) The threaded portion of the anchor bolts projecting above the top surface of foundation shall be coated with oil, before the concrete is poured, to minimize the fouling of threads splattered by concrete residue.

E16.30 Placing Metal Bases

- (a) Contractor to install metal bases as supplied by the Contract Administrator following curing of concrete foundations.
- (b) Metal bases are to be installed plumb, level, and flush to the concrete foundation. Contractor to use stainless steel washers to level bases as required.

E16.31 Forms

- (a) Forms for exposed surfaces that require an "ordinary surface finish" shall be made of good quality plywood, or an approved equivalent, or uniform thickness, with or without a form liner.
- (b) Architectural concrete form liner shall be as specified on the Plans or equivalent as approved by the Contract Administrator.

- (c) Permeable formwork liner shall be Drainoform, Zemdrail II, or equivalent as approved by the Contract Administrator.
- (d) Formwork Materials shall conform to CSA Standard CAN/CSA-A23.1, and American Concrete Publication SP: 4, "Formwork for Concrete".
- (e) No "stay-in-place" formwork or falsework is permitted.
- (f) 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-M1978, a minimum of twenty (20) mm thick.
- (g) Where form liner is not being used, form sheeting shall be Douglas Fir, overlay form liner type conforming to CSA Standard O121-M1978. Approved manufacturers are "Evans" and "C-Z".
- (h) Boards used for formwork shall be fully seasoned and free from defects such as knots, warps, cracks, etc., which may mark the concrete surface.
- (i) No formwork accessories will be allowed to be left in place within fifty (50) mm of the surface following form removal. Items to be left in place, 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.
- (j) Forms for exposed concrete surfaces that do not require a form liner may be either new plywood or steel as authorized by the Contract Administrator.
- (k) Studding shall be spruce or pine and shall have such dimensions and spacing that they shall withstand distortion from all the forces to which the forms will be subjected. Minimum dimensions shall be fifty (50) mm by one hundred fifty (150) mm.
- (l) Walers shall be spruce or pine, with minimum dimensions of one hundred (100) mm by one hundred fifty (150) mm.
- (m) All forms are incidental to these Works and must be removed by the Contractor once adequate strength and curing of the concrete has been achieved.
- (n) The forms shall be sufficiently rigid to prevent lateral or vertical distortions from the loading environment to which they shall be subjected. Forms shall be set to the design grades, lines, and dimensions, as shown on the Drawings.

E16.32 Placing Concrete

- (a) Care shall be taken to ensure that anchor bolts are vertically aligned and that anchor bolts and conduits are properly positioned prior to placement of concrete.
- (b) Concrete shall not have a free fall of more than two (2.0) m and shall be placed so that the aggregates will not separate or segregate. The slump of the concrete shall not exceed one hundred ten (110) mm. The concrete shall be vibrated throughout the entire length of the foundation.
- (c) Concrete shall be placed to the elevations as shown on the Drawings. The top surface of the foundation shall be finished smooth and even with a hand float.
- (d) 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.

E16.33 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.

E16.34 Construction Joints

- (a) Construction joints shall be located only where shown on the Drawings or as otherwise approved in writing by the Contract Administrator. Construction joints shall be at right angles to the direction of the main reinforcing steel. All reinforcing steel shall be continuous across the joints. Bevelled shear keys, as shown on the Drawings or approved by the Contract Administrator, shall be provided at all joints.

- (b) In lieu of shear keys, the Contractor may roughen the surface as follows. The surface shall be rough, with minimum amplitude of six (6) mm. Acceptable procedures to obtain this rough surface are as follows:
 - (i) by removing the mortar from between the larger aggregate particles with a water jet and soft brush when the concrete is in a semi-hardened state (green-cut); and
 - (ii) by first applying a chemical retarder to the surface and then removing the mortar from the larger aggregate particles with a water jet and brush.
- (c) The face of joints shall be cleaned of all laitance and dirt, after which the cementitious grout or an approved bonding agent shall be applied. Forms shall be retightened, and all reinforcing steel shall be thoroughly cleaned at the joint prior to concreting.

E16.35 Curing Concrete

- (a) The top of the freshly finished concrete foundations shall be covered and kept moist by means of wet polyester blankets immediately following finishing operations and shall be maintained at above ten (10) degrees Celsius 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 (24) hours after the end of the curing period.
- (d) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed three (3) degrees in one (1) hour or twenty (20) degrees in twenty-four (24) hours.

E16.36 Form Removal

- (a) Forms shall not be removed for a period of at least twenty-four (24) hours after the concrete has been placed. Removal of forms shall be done in a manner to avoid damage to, or spalling of, the concrete.
- (b) The minimum strength of concrete in place for safe removal of forms shall be twenty (20) MPa.
- (c) Field-cured test specimens, representative of the in-place concrete being stripped, will be tested to verify the concrete strength.

E16.37 Patching of Formed Surfaces

- (a) Immediately after forms around top of foundation have been removed, but before any repairing or surface finishing is started, the concrete surface shall be inspected by the Contract Administrator. Any repair of surface finishing started before this inspection may be rejected and required to be removed.
- (b) All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purposes cut back fifty (50) mm from the surface before patching.
- (c) Minor surface defects caused by honeycomb, air pockets greater than five (5) mm in diameter, and voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched and then applying patching mortar. A slurry grout consisting of water and cement shall be well-brushed onto the area to be patched. When the slurry grout begins to lose the water sheen, the patching mortar shall be applied. It shall be struck-off slightly higher than the surface and left for one (1) hour before final finishing to permit initial shrinkage of the patching mortar and it shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification, and the final colour shall match the surrounding concrete.

E16.38 Cold Weather Concreting

- (a) Protection of concrete shall be considered incidental to its placement. The temperature of the concrete shall be maintained at or above ten (10) degrees Celsius for a minimum of

three (3) days or till the concrete has reached a minimum compressive strength of twenty (20) MPa, by whatever means are necessary. Concrete damaged as a result of inadequate protection against weather conditions shall be removed and replaced by the Contractor at their own expense. Also, concrete allowed to freeze prior to the three (3) days will not be accepted for payment.

E16.39 Anti-Graffiti Coating

- (a) Anti-graffiti coating shall be applied to all raised planter walls shown on the Drawings or identified by the Contract Administrator
- (b) The anti-graffiti coating shall be applied according to manufactures Specifications.
- (c) Maintain anti-graffiti coating on all vertical concrete surfaces for a period of two (2) years.

E16.40 Waterproofing

- (a) Waterproofing membrane shall be applied to all new concrete raised planter interior walls and existing concrete columns within the planters which will come into contact with planting soil, as identified on the Drawings or by the Contract Administrator. The waterproofing membrane shall be roller applied according to manufactures Specifications.

E16.41 Quality Control

E16.41.1 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.

E16.41.2 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.

MEASUREMENT AND PAYMENT

E16.42 Bus Stop Flag Foundations

E16.42.1 Construction of bus stop flag foundations will be measured on a unit basis and will be paid for at the Contract Lump Sum Price per foundation for the "Items of Work" listed here below for concrete foundations constructed in accordance with this Specification and accepted by the Contract Administrator. Construction of bus stop flag foundations also includes removal of existing flag foundation, and backfill, if required.

- (a) Items of Work:
 - (i) Transit Bus Stop Flag Foundation

E17. PAVING STONES FOR BUS STOP FLAG SIGNS

DESCRIPTION

E17.1 This specification shall supplement CW 3330-R5 "Installation of Interlocking Paving Stones"

MATERIALS

E17.2 Add the following to section 5 :

E17.2.1 Paving stones for bus stop flag sign surfaces shall be:

Barkman Concrete paving stones -
Natural Holland Paver (210 mm X 210 mm X 60 mm and 105 mm X 210 mm X 60 mm)
<https://www.barkmanconcrete.com/>

CONSTRUCTION METHODS

- E17.3 Add the following to section 9.2 "Preparation of Sub-grade, Sub-base and Sand-base":
- E17.3.1 Preparation of Sand-Base for Paving Stones in Sidewalk Block Outs.
 - E17.3.2 Place a 15mm layer of bedding sand in the blocked out sidewalk areas. SPEC NOTE: the bedding sand and paver dimensions must be considered in the block out dimensions on the drawing.
 - E17.3.3 The bedding sand shall be spread and levelled so that the paving stones when installed are 5 mm higher than the finished grade.
 - E17.3.4 No more sand shall be spread than can be covered in with paving stone on the same day.
 - E17.3.5 The bedding sand shall not be compacted or disturbed prior to laying the paving stones.

MEASUREMENT AND PAYMENT

- E17.4 Add the following to section 12 :
- E17.5 Supply and Installation of Paving Stones for Bus Stop Flag Signs
- E17.5.1 Paving stones for bus stop flag signs will be measured on surface area basis. The surface area to be paid for shall be the number of square metres constructed in accordance with this specification and accepted by the Contract Administrator, as computed by measurements made by the contract Administrator.

BASIS OF PAYMENT

- E17.6 Add the following to section 13 :
- E17.6.1 The supply and installation of paving stones for bus stop flag signs will be paid for at the Contract Unit Price per square meter for "Paving Stone Indicator Surfaces, Natural Holland Paver (210 mm x 210 mm x 60 mm and 105 mm x 210 mm x 60 mm)", measured as specified herein, 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.
 - E17.6.2 Concrete thickness greater than the specified sidewalk thickness as a result of shaping the base material to accommodate the block outs is incidental to the listed Items of Work.

E18. SALVAGING OF OVERHEAD SIGN SUPPORT STRUCTURE AND ALUMINUM BALANCED BARRIER

DESCRIPTION

- E18.1 This Specification shall cover the removal, salvage, hauling and unloading of all overhead sign support structures (OHSS's), existing traffic signs and mounting brackets, and aluminum balanced barrier as noted on the Contract Drawings.
- E18.2 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.
- E18.3 The Work under this Specification shall include the following items, or as otherwise directed by the Contract Administrator:
 - E18.3.1 Removal/salvage of the existing OHSS along with aluminum balanced barrier and posts for the structure located in the east lanes of University Crescent between Wedgewood Drive and Pembina Highway.

- E18.3.2 Removal of the existing traffic signs and mounting brackets from the structure and delivery of the 'Pembina Hwy' sign and mounting brackets for both signs to the Traffic Services yard. The 'Bishop Grandin Blvd' sign shall remain in the care of the Contractor until it is installed on the new cantilever overhead sign support structure.
- E18.3.3 Temporary storage of the OHSS, existing traffic signs and aluminum balanced barrier components (if required) until such point they are hauled to the City of Winnipeg Bridge Yard.
- E18.3.4 Hauling/unloading of the existing OHSS and aluminum balanced barrier to the City of Winnipeg's yard.

SUBMITTALS

- E18.4 The Contractor shall submit the following to the Contract Administrator, in accordance with the Specification:
- E18.4.1 OHSS Removal Method Statement at least five (5) Calendar Days prior to any OHSS removal works identifying the means and methods to be utilized to remove the structure.

CONSTRUCTION METHODS

- E18.5 Removal
- E18.5.1 The Contractor shall exercise great care to not damage any portion of the OHSS, existing traffic signs and mounting brackets, and aluminum balanced barrier and posts being removed. The Contractor will be responsible for repairing any damage to the existing OHSS, traffic signs and mounting brackets, and aluminum balanced barrier and posts to the Contract Administrator's satisfaction caused as a result of the Contractor's removal/hauling/unloading operations.
- E18.5.2 The OHSS, existing traffic signs and mounting brackets, and aluminum balanced barrier and posts shall be lifted and secured with nylon ropes or other approved methods. Use of steel chains and steel hooks against hot-dip galvanized or powder coated surfaces will not be permitted. The structure components (shaft and arm, etc.) shall be placed on timber blocking and secured with nylon ropes during their transportation to the City of Winnipeg Yards.
- E18.6 Hauling and Unloading
- E18.6.1 The Contractor shall deliver all salvaged OHSS and aluminum balanced barrier components, including all miscellaneous bolts, washers, nuts, etc. to the City of Winnipeg's Bridge Yard at 960 Thomas Avenue. Access into the compound will be through Gate B1 and entry into the bridge yard will be through Gate B2.
- (a) The Contractor shall provide a minimum of twenty-four (24) hours' notice prior to delivery of the OHSS and aluminum balanced barrier components. The Contractor shall coordinate with:
- Mike Terleski, CET
Bridge Operations Technologist
Public Works
P: 204-986-5004
M: 204-794-8510
- (b) The Contractor shall be responsible for unloading of all OHSS and aluminum balanced barrier components at the City of Winnipeg Bridge Yard as directed by the City's representative, including the provision of all necessary labour, Materials and equipment to unload the components.
- E18.6.2 The Contractor shall deliver the salvaged 'Pembina Hwy' traffic sign and mounting brackets including all miscellaneous bolts, washers, nuts, etc. to the Traffic Services yard specified by the Contract Administrator.

- (a) The Contractor shall be responsible for unloading of all existing traffic sign components at the City of Winnipeg Traffic Services Yard as directed by the City's representative, including the provision of all necessary labour, Materials and equipment to unload the components.

MEASUREMENT AND PAYMENT

- E18.7 Removal/salvaging, hauling and unloading of the OHSS and existing traffic signs and components will be paid for at the Contract Lump Sum Prices for "Remove Existing Overhead Sign Support Structure". The payment will be considered full payment for supplying all Materials and for performing all operations herein described and all other items incidental to the Work.
- E18.8 Removal/salvaging, hauling and unloading of the aluminum balanced barrier and components will be paid for at the Contract Unit Prices for "Salvaging Existing Barrier Rail" and "Salvaging Existing Barrier Posts". The payment will be considered full payment for supplying all Materials and for performing all operations herein described and all other items incidental to the Work.

E19. CAST-IN-PLACE CONCRETE PILE FOUNDATIONS FOR STEEL OVERHEAD SIGN SUPPORT STRUCTURES

E19.1 Description

E19.1.1 General

- (a) The Work covered under this Item shall include all concreting operations related to construction of cast-in-place concrete pile foundations for new steel overhead sign support structures in accordance with this Specification and as shown on the Drawings.
- (b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E19.2 Materials

E19.2.1 General

- (a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification. All materials supplied under this Specification shall be subject to inspection and acceptance by the Contract Administrator.

E19.2.2 Handling and Storage of Materials

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

E19.2.3 Testing and Approval

- (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.
- (b) All materials shall be approved by the Contract Administrator at least seven (7) days before any construction is undertaken. 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 materials shall be rejected by the Contract Administrator and replaced by the Contractor at their own expense.

E19.2.4 Patching Mortar

- (a) The patching mortar shall be made of the same cementitious 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 one (1) part cement to two (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 and placing

E19.2.5 Cement

- (a) Cement shall be Type HS, HSe or HSb, high-sulphate-resistant hydraulic cement, conforming to the requirements of the latest CSA Standard A23.1.

E19.2.6 Concrete

(a) General

- (i) Concrete repair material shall be compatible with the concrete substrate.
- (b) The Contractor shall be responsible for the design and performance of all concrete mixes supplied under this Specification. Either ready mix concrete or proprietary repair mortars, where applicable, may be used having the following minimum properties in accordance with the latest CSA A23.1:
 - (i) Class of Exposure: S-1 and F-1;
 - (ii) Compressive Strength @ 56 days = 35 MPa;
 - (iii) Water / Cementing Materials Ratio = 0.4;
 - (iv) Air Content: Category 1 per Table 4 of CSA A23.1-14 (5-8%);
 - (v) Cement – shall be as specified in E18.2.5.
- (c) Mix design for ready mix concrete shall be submitted to Contract Administrator at least two (2) weeks prior to concrete placing operations.
- (d) The workability of each concrete mix shall be consistent with the Contractor's placement operations. Self-compacting concrete may be used for pile foundations
- (e) Any proposed proprietary repair mortar shall be subject to the approval of the Contract Administrator and must meet or exceed the properties of the ready mix concrete.
- (f) The temperature of all types of concrete shall be between fifteen degrees Celsius (15°C) and twenty-five degrees Celsius (25°C) at discharge. Temperature requirements for concrete containing silica fume shall be between ten degrees Celsius (10°C) and eighteen degrees Celsius (18°C) at discharge unless otherwise approved by the Contract Administrator
- (g) Concrete materials susceptible to frost damage shall be protected from freezing.

E19.2.7 Aggregate

- (a) The Contractor shall be responsible for testing the fine and coarse aggregates to establish conformance to these specifications, and the results of these tests shall be provided to the Contract Administrator if requested. All aggregates shall comply with the latest CSA A23.1.
- (b) Coarse Aggregate
 - (i) The maximum nominal size of coarse aggregate shall be sized to suit the Contractor's mix design. Gradation shall be in accordance with the latest CSA A23.1, Table 11, Group 1. The coarse aggregate shall satisfy the Standard Requirements specified in the latest CSA A23.1, Table 12, "Concrete Exposed to Freezing and Thawing".
 - (ii) 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; and shall have an absorption not exceeding two and a quarter percent (2.25%).

- (iii) 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, and excess of thin particles or any other extraneous material.
 - (iv) Coarse aggregate when tested for abrasion in accordance with the latest ASTM C131 shall not have a loss greater than thirty percent (30%).
 - (v) Tests of the coarse aggregate shall not exceed the limits for standard for requirements prescribed in the latest CSA A23.1, Table 12, for concrete exposed to freezing and thawing.
- (c) Fine Aggregate
- (i) Fine aggregate shall meet the grading requirements of the latest CSA A23.1, Table 10, Gradation FA1.
 - (ii) 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.
 - (iii) Tests of the fine aggregate shall not exceed the limits for standard requirements prescribed in the latest CSA A23.1, Table 12.

E19.2.8 Cementing Materials

- (a) Cementing materials shall conform to the requirements of the latest CSA A3001.

E19.2.9 Silica Fume

- (a) Should the Contractor choose to include silica fume in the concrete mix design, it shall not exceed eight percent (8%) by mass of cement.

E19.2.10 Fly Ash

- (a) Fly ash shall be Type C1 or Type F and shall not exceed twenty-five percent (25%) by mass of cement.

E19.2.11 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 formation of lumps shall not be used in the Work.

E19.2.12 Admixtures

- (a) Air entraining admixtures shall conform to the requirements of the latest ASTM C260.
- (b) Chemical admixtures shall conform to the requirements of the latest 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.
- (d) Appropriate low range water reducing and/or superplasticizing admixtures shall be used in concrete containing silica fume. Approved retarders or set controlling admixtures may be used for concrete containing silica fume.
- (e) An aminocarboxylate based migrating corrosion inhibitor admixture shall be used in concrete that will be used as a repair material that will either be in contact with or adjacent to reinforcing steel in existing concrete. Proposed admixtures shall be subject to the approval of the Contract Administrator.

E19.2.13 Water

- (a) Water used for mixing concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances. It shall be equal to potable water in physical and chemical properties.

E19.2.14 Concrete Supply

- (a) Concrete shall be proportioned, mixed, and delivered in accordance with the requirements of the latest CSA A23.1, except that the transporting of ready mixed concrete in non-agitating equipment will not be permitted unless prior written approval is received from the Contract Administrator.
- (b) Unless otherwise directed by the Contract Administrator, the discharge of ready mixed concrete shall be completed within (ninety) 90 minutes after the introduction of the mixing water to the cementing materials and aggregates.
- (c) The Contractor shall maintain all equipment used for handling and transporting the concrete in a clean condition and proper working order.

E19.2.15 Reinforcing Steel

- (a) Reinforcing steel shall be deemed to include all reinforcing bars, tie-bars, and dowels.
- (b) All reinforcing steel shall conform to the requirements of the latest CSA Standard G30.18, Grade 400 W, Billet-Steel Bars for Concrete Reinforcement. All reinforcing steel shall be new deformed billet steel bars. All bars, including ties, shall be hot-dip galvanized in accordance with the latest ASTM A767 for a minimum net retention of 610 g/m². Reinforcing steel supply and installation will be incidental to construction of concrete pile foundation and no separate payment will be made.

E19.2.16 Anchor Bolts, Nuts, and Washers

- (a) Anchor bolts, nuts, and washers shall be in accordance with the latest ASTM F1554 (Grade 55), and shall be hot-dip galvanized full length in accordance with the latest ASTM F2329 for a minimum net retention of 610 g/m², for the entire length of the anchor bolts. The top threaded portion of the anchor bolts shall be 300 mm long and the bottom threaded portion of the anchor bolts shall be 100 mm long. Anchor bolt supply and installation will be incidental to construction of concrete pile foundation and no separate payment will be made.

E19.2.17 Anchor Bolt Templates

- (a) Anchor bolt templates shall be the latest CSA G40.21 Grade 300W, minimum 10 mm thick, and will be incidental to construction of new concrete pile foundation and no separate payment will be made.

E19.2.18 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 D1751 or equal as accepted by the Contract Administrator, in accordance with B6.

E19.2.19 Precompressed Foam Joint Filler

- (a) Precompressed foam joint filler shall be "Emseal BEJS System", satisfying the requirements of ASTM C711 and G155, or equal as accepted by the Contract Administrator, in accordance with B6.
- (b) The sealant system shall be comprised of three components:
 - (i) Cellular polyurethane foam impregnated with hydrophobic 100% acrylic, waterbased emulsion, factory coated and highway-grade, fuel resistant silicone;
 - (ii) Field-applied epoxy adhesive primer; and
 - (iii) Field-injected silicone sealant bands
- (c) Impregnation agent shall have proven non-migratory characteristics. Silicone coating shall 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. The depth of seal shall be as recommended by the Manufacturer.
- (d) 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 1/2" (12mm) down from the substrate surface.

- (e) Material shall be capable, as a dual deal, of movements of +50% to -50% (100% total) of nominal material size. Changes in plan and direction shall be executed using factory fabricated transition assemblies. Transitions shall be watertight at the inside and outside corners through the full movement capabilities of the product.
- (f) All substitute candidates shall be free in composition of any waxes or asphalts, wax compounds or asphalt compounds. All substitute candidates shall be:
 - (i) Capable of withstanding 65oC for three (3) hours while compressed down to the minimum movement capability (-50% nominal material size) without evidence of any bleeding of impregnation medium from the materials; and
 - (ii) Capable of self-expanding to the maximum movement capability (+50% nominal material size) with twenty-four (24) hours at 20oC. E25.2.20 Miscellaneous Materials (a) Miscellaneous materials shall be of the type specified on the Drawings or approved by the Contract Administrator.

E19.3 Construction Methods

E19.3.1 Location and Alignment of Piles

- (a) Pile construction shall not commence until the Contractor has obtained clearance from the appropriate Utility Authorities including but not limited to Manitoba Hydro, Bell MTS and City of Winnipeg Water and Waste.
- (b) Piles shall be placed in the positions shown on the Drawings and as directed by the Contract Administrator in the field.
- (c) The deviation of the axis of any finished pile shall not differ by more than one percent (1%) from the vertical.

E19.3.2 Buried Utilities

- (a) The Contractor shall exercise extreme caution when constructing the pile foundations in the vicinity of existing buried utilities and buildings. The Drawings show the approximate locations of existing buried utilities. The Contractor shall be responsible for obtaining the exact location of the buried utilities from the appropriate Utility Authorities prior to installing the piles.
- (b) The proposed locations of the pile foundations may be changed by the Contract Administrator if they interfere with the buried utilities.
- (c) The Contractor shall be responsible for all costs that may be incurred for repair/rectification of any damage caused to the existing buried utilities as a result of the Contractor's operations in constructing cast-in-place concrete piles, as determined by the Contract Administrator.

E19.3.3 Excavation

- (a) Pile excavation shall be achieved by auguring (i.e. drilling) or hydro-jet excavation for the full depth of all piles unless noted otherwise on the Drawings.
- (b) It may be necessary to hydro-jet excavate utilities adjacent to a pile location to adequately ascertain the location or provide enough "slack" in conduits to move them slightly to avoid interference with the pile locations. The Contract Administrator may elect to alter the location of a pile if hydro-jet excavation shows that utilities cannot be avoided.
- (c) Upon reaching the required elevation, the bottom of the excavation shall be cleaned as directed by the Contract Administrator in the field.
- (d) All excavated material from the piles shall be promptly hauled away from the Site to an approved disposal area as located by the Contractor.
- (e) Upon completion of the cleaning out of the bottom to the satisfaction of the Contract Administrator, the reinforcement and anchor bolts shall be set in place and the

concrete poured immediately. Under no circumstances shall a hole be left to stand open after excavation has been completed.

- (f) If any hole is condemned because of caving, it shall be filled with lean-mix concrete and a new hole excavated as near as possible to the location shown on the Drawings. In locations where underground utilities have been exposed, the underground utilities shall be covered with clean sand to 300 mm minimum cover around the utility. Payment will not be made for condemned piles.

E19.3.4 Sleeving

- (a) Steel or corrugated metal pipe sleeving shall be used if required to temporarily line the excavation to prevent bulging or caving of the walls.
- (b) The sleeving shall be designed by the Contractor and constructed to resist all forces that may tend to distort it.
- (c) The sleeving shall be withdrawn as the concrete is placed in the excavation. The sleeving shall extend at least 1 m below the top of the freshly deposited concrete at all times.
- (d) The clearance between the face of the excavation and the sleeving shall not exceed 75 mm.
- (e) The sleeving may remain cast in place if required to protect nearby utilities at the direction of the Contract Administrator. The top of sleeving shall be 300 mm below the top of finished grade.

E19.3.5 Inspection of Excavations

- (a) Concrete shall not be placed in an excavation until the excavation has been inspected and approved by the Contract Administrator.
- (b) The Contractor shall have available suitable light for the inspection of each excavation throughout its entire length.
- (c) Any improperly set sleeving or improperly prepared excavation shall be corrected to the satisfaction of the Contract Administrator.

E19.3.6 Placing Reinforcing Steel

- (a) Reinforcement shall be:
 - (i) placed in accordance with the details shown on the Drawings;
 - (ii) rigidly fastened together;
 - (iii) lowered into the excavation intact before concrete is placed.
- (b) Spacers shall be utilized to properly locate the reinforcing steel cage in the excavation.

E19.3.7 Placing Anchor Bolts

- (a) The anchor bolts shall be aligned with the steel templates matching the bolt holes in the sign structure base plate. The setting templates shall be held in place by the top and bottom nuts of the anchor bolts. The anchor bolts shall be plumb. Extreme care shall be used in this operation. Placement of anchor bolts without the steel template will not be permitted.
- (b) The threaded portion of the anchor bolts projecting above the top surface of pile shall be coated with oil, before the concrete is poured, to minimize the fouling of threads splattered by concrete residue.

E19.3.8 Forms

- (a) For hydro-jet excavated piles, the top of the piles shall be formed with tubular forms (Sonotube) to a minimum depth of 1500 mm below final grade.
- (b) For bored piles the top of the piles shall be formed with tubular forms (Sonotube) to a minimum depth of 1000 mm below final grade.

- (c) In locations of caving, the tubular form (Sonotube) should extend a minimum of 500 mm below where the shaft becomes uniform. The minimum depth of the tubular forms (Sonotube) shall be as specified by E19.3.8(a) and E19.3.8(b).
- (d) The forms shall be sufficiently rigid to prevent lateral or vertical distortions from the loading environment to which they shall be subjected. Forms shall be set to the design grades, lines, and dimensions, as shown on the Drawings.

E19.3.9 Placing Concrete

- (a) Care shall be taken to ensure that anchor bolts are vertically aligned and that anchor bolts and conduits are properly positioned prior to placement of concrete.
- (b) Concrete shall not have a free fall of more than 2.0 m and shall be placed so that the aggregates will not separate or segregate. The slump of the concrete shall not exceed 110 mm. The concrete shall be vibrated throughout the entire length of the pile.
- (c) Concrete shall be placed to the elevations as shown on the Drawings. The top surface of the pile shall be finished smooth with a hand float and provided with a one percent (1%) slope for drainage away from the centreline of the pile.
- (d) 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. In the event that tremie concrete is allowed by the Contract Administrator, the concrete shall be placed as specified herein.
- (e) All concrete, during and immediately after deposition, shall be consolidated by mechanical vibrations 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 that may cause honeycombing, pitting, or planes of weakness.

E19.3.10 Tremie Concrete

- (a) The shaft of the pile shall be pumped clear of water so that the bottom can be cleaned. Pumping shall then be stopped and water shall be allowed to come into the excavation until a state of equilibrium is reached. Concrete shall then be placed by means of a tremie pipe. The tremie pipe shall have a suitable gate in the bottom to prevent water from entering the pipe. The bottom of the pipe shall be maintained below the surface of the freshly placed concrete. The pipe shall be capable of being raised or lowered quickly in order to control the flow of concrete.
- (b) Tremie concrete shall be poured up to a depth of 600 mm or as the Contract Administrator directs. Pumps shall then be lowered into the excavation and the excess water pumped out. The laitance that forms on top of the tremie shall then be removed and the remainder of the concrete shall be placed in the dry excavation

E19.3.11 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.

E19.3.12 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 ten degrees Celsius (10°C) 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 (24) hours after the end of the curing period.

- (d) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed three degrees Celsius (3° C) in one (1) hour or twenty degrees Celsius (20°C) in twenty-four (24) hours.

E19.3.13 Form Removal

- (a) Forms shall not be removed for a period of at least twenty-four (24) hours after the concrete has been placed. Removal of forms shall be done in a manner to avoid damage to, or spalling of, the concrete.
- (b) The minimum strength of concrete in place for safe removal of forms shall be 20 MPa.
- (c) Field-cured test specimens, representative of the in-place concrete being stripped, will be tested to verify the concrete strength.

E19.3.14 Patching of Formed Surfaces

- (a) Immediately after forms around top of pile have been removed, but before any repairing or surface finishing is started, the concrete surface shall be inspected by the Contract Administrator. Any repair of surface finishing started before this inspection may be rejected and required to be removed.
- (b) All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purposes cut back fifty (50) mm from the surface before patching.
- (c) Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, and voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched and then applying patching mortar. A slurry grout consisting of water and cement, shall be well brushed onto the area to be patched. When the slurry grout begins to lose the water sheen, the patching mortar shall be applied. It shall be struck-off slightly higher than the surface and left for one (1) hour before final finishing to permit initial shrinkage of the patching mortar and it shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification, and the final colour shall match the surrounding concrete.

E19.3.15 Cold Weather Concreting

- (a) Protection of concrete shall be considered incidental to its placement. The temperature of the concrete shall be maintained at or above ten degrees Celsius (10°C) for a minimum of three (3) days or till the concrete has reached a minimum compressive strength of 20 MPa, by whatever means are necessary. Concrete damaged as a result of inadequate protection against weather conditions shall be removed and replaced by the Contractor at their own expense. Also, concrete allowed to freeze prior to the three (3) days will not be accepted for payment.

E19.3.16 Removal and Restoration of Adjacent Surface Treatments

- (a) If the new pile being constructed is located in a concrete sidewalk/median slab, the existing slab shall be removed to the nearest existing joints. If the nearest existing joint is more than 600 mm beyond the perimeter of the pile, the Contractor shall remove a square section of the existing slab that is 300 mm beyond the pile perimeter. The surface of the slab shall be saw-cut to a depth of 50 mm around the perimeter of the square section. Care shall be taken to ensure that the saw-cut edge of the section is not chipped or broken during the removal of the concrete. Concrete slabs damaged beyond the specified limits shall be replaced at the Contractor's cost to the satisfaction of the Contract Administrator. After the pile has been constructed, the concrete sidewalk/median slab shall be restored flush with the adjacent surface level.
- (b) If the pile being constructed is located in grass boulevard/median, following pile construction disturbed areas shall be backfilled and restored with sod around the new pile as directed by the Contract Administrator.

- (c) If the pile being constructed is located in a paving stone surface, the paving stones shall be temporarily removed to the extent required for new pile construction and appropriately stored by the Contractor. Following pile construction, the Contractor shall cut as required and re-set the salvaged paving stones around the new pile flush with the adjacent surface level, as directed by the Contract Administrator.
- (d) The removal and restoration of surface treatments will be considered incidental to pile construction works at each Site and no separate payment will be made.

E19.4 Quality Control

- E19.4.1 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.
- E19.4.2 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.

E19.5 Measurement and Payment

E19.5.1 Construction of New Cast-in-Place Concrete Pile Foundations

- (a) Construction of new cast-in-place concrete pile foundations including supply and installation of anchor bolts complete with nuts, washers and steel templates will be measured on a unit basis and paid for at the Contract Unit Price for "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 this Specification, accepted and measured by the Contract Administrator.

Items of Work:

Cast-in-Place Concrete Pile Foundations:

- (i) 915 mm Diameter Pile;
- (b) Supplying and installing all the listed materials, concrete design requirements, equipment, construction methods, and quality control measures associated with this Specification and the Drawings shall be considered incidental to "Cast-in-Place Concrete Pile Foundations", unless otherwise noted herein. No measurement or payment shall be made for this Work unless indicated otherwise.

E20. SUPPLY AND INSTALLATION OF NEW STEEL OVERHEAD SIGN SUPPORT STRUCTURE

DESCRIPTION

- E20.1 The Work covered under this item shall include all operations related to the supply, fabrication, delivery, erection of new steel overhead sign support structures and installation of all sign panels onto the sign support structure.
- E20.2 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 the Work as hereinafter specified.

MATERIALS

- E20.3 General

- (a) The Contractor shall be responsible for the supply, safe storage, and handling of all materials set forth in this Specification. All materials supplied under this Specification shall be subject to inspection and acceptance by the Contract Administrator.
- (b) All materials used for fabrication of overhead sign support structures shall be new, previously unused material.

E20.4 Handling and Storage of Materials

- (a) All materials shall be handled in a careful and workmanship-like manner, to the satisfaction of the Contract Administrator.

E20.5 Structural Steel

- (a) Structural steel for all components of the overhead sign support structures shall be in accordance with CSA Standard G40.21 M, to the grades indicated on the Drawings. For purposes of hot-dip galvanizing, the silicon content in the steel shall be controlled within zero to three hundredths of a percent (0 to 0.03%) or fifteen hundredths to twenty-two hundredths of a percent (0.15 to 0.22%) for monotubular shafts and arms, and to less than three tenths of a percent (0.3%) for all other steel components.
- (b) The Contractor is advised that copies of mill test certificates showing the chemical and physical properties of all structural steel to be supplied under this Specification must be supplied to the Contract Administrator and be found acceptable prior to commencement of fabrication.
- (c) Steel shall not be acceptable unless the mill test certificate states the grade to be as indicated on the Drawings. Lower grade steel shall not be acceptable (despite favorable published mill test results). Items fabricated without steel certification shall be rejected.

E20.6 Flange Bolts, Nuts and Washers

- (a) Flange bolts, nuts, and washers shall be in accordance with ASTM F3125 Grade A325, Type 1, hot-dip galvanized in accordance with ASTM F2329.

E20.7 Mounting Bracket Fasteners (Bracket-to-Bracket)

- (a) Mounting bracket fasteners (connecting two (2) clamp brackets) shall be all-thread rod conforming to one (1) of the following:
 - (i) SAE Grade 2 hot dip galvanized;
 - (ii) ASTM A307 Grade B hot dip galvanized;
 - (iii) ASTM F1554 Grade 55 hot dip galvanized.
- (b) Hot-dip galvanizing shall be in accordance with ASTM F2329. Plated coatings will not be accepted.
- (c) Two (2) nuts, two (2) washers and one (1) lock washer (all hot dip galvanized) shall be provided for each segment of threaded rod.
- (d) The Contractor is permitted to field cut the threaded rod to suit the required length. If so, apply Zinga zinc rich galvanizing touch up paint to cut ends.

E20.8 Mounting Bracket Fasteners (Bracket to Panel)

- (a) Mounting bracket fasteners connecting the bracket to the aluminum backing bars of the sign panel shall be stainless steel all-thread hex bolts conforming to ASTM F593 Grade 304 or 316.
- (b) One (1) nut, one (1) washer, and one (1) lock washer shall be furnished with each bolt.

E20.9 Fasteners for Handhole Covers

- (a) Fasteners for handhole covers shall be in accordance with STM A276 Type 316 stainless steel.

E20.10 Hot-Dip Galvanizing

- (a) Hot-dip galvanizing of structural steel shall be in accordance with ASTM A123 for a minimum net retention of 610 g/m².

E20.11 Galvanizing Touch-up and Field-Applied Galvanizing

- (a) Only approved products listed below shall be used for field-applied galvanizing, to touch-up damaged hot-dip galvanizing on-site and to galvanize field welds.
- (b) Approved products for self-fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780-09(2015) for "Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings" are as follows:
 - (i) Galvalloy as manufactured by Metalloy Products Company, P.O. Box No. 3093, Terminal Annex, Los Angeles, California, available from Welder Supplies Limited, 150 McPhillips Street, Winnipeg;
 - (ii) Welco Gal-Viz Galvanizing Alloy, as manufactured by Thermocote Welco, Highway 161, York Road, Kings Mountain, North Carolina, available from Welder Supplies Limited, 150 McPhillips Street, Winnipeg.

E20.12 Cold Applied Galvanizing Compound

- (a) Approved cold-applied galvanizing compound is as follows:
 - (i) ZINGA, as manufactured by ZINGAMETALL, Ghent, Belgium, available from Pacific Evergreen Industries Ltd. Vancouver, BC, Ph. (604) 926-5564, and Centennial Mine & Industrial Supply, Saskatoon, Sask., Ph. (306) 975-1944.

E20.13 Rodent Screen

- (a) Rodent screens shall be ½" – 18F stainless steel (316L) expanded metal sheet or approved equal in accordance with B.7.

E20.14 Aluminum T-Bars

- (a) Aluminum T-Bars shall be in accordance with ASTM B221 6061-T6.

E20.15 Sign Plates and Panels for Overhead Sign Structures

- (a) The sign panel is to be reused from the existing sign structure ('165 East, Bishop Grandin Blvd' sign) and installed on the overhead sign structure in accordance with this specification.

E20.16 Welding Consumables

- (a) Welding consumables for all processes shall be certified by the manufacturer to be complying with the requirements of CSA Standard W59 and the following Specifications:
 - (i) manual shielded metal arc welding (SMAW): All electrodes shall be basic-type electrodes conforming to CSA W48, classification E480XX, or imperial equivalent;
 - (ii) gas metal arc welding (GMAW): All electrodes shall conform to CSA W48, classification ER480S-X, or imperial equivalent;
 - (iii) flux cored arc welding (FCAW): All electrodes shall conform to CSA W48, classification E480XT-X or imperial equivalent. Electrodes shall be controlled by hydrogen (CH) designation;
 - (iv) submerged arc welding (SAW): All electrodes shall conform to CSA W48, classification F480X-EXXX or imperial equivalent;
 - (v) shielding gas shall be welding grade carbon-dioxide with a guaranteed dew point of negative forty-six degrees Celsius (-46°C);
 - (vi) all electrodes, wires, and fluxes used shall be of a classification requiring a minimum impact of 27 joules at minus eighteen degrees Celsius (-18°C).
- (b) The proposed welding procedures and welding consumable certificates shall be submitted to the Contract Administrator for their approval at least two (2) Calendar Days prior to the scheduled commencement of any fabrication.

E20.17 Miscellaneous Materials

- (a) All equipment shall be of a type approved by the Contract Administrator and shall be kept in good working order.

EQUIPMENT

E20.18 All equipment shall be of a type approved by the Contract Administrator and shall be kept in good working order.

SUBMITTALS

E20.19 The Contractor shall submit the following to the Contract Administrator, in accordance with the Specification:

- E20.19.1 OHSS Installation Method Statement at least five (5) Calendar Days prior to any OHSS installation works identifying the means and methods to be utilized to install the structure.

CONSTRUCTION METHODS

E20.20 General Requirements

- (a) Holes in the base plate shall be sized as shown on the Drawings, and provisions made for field erection must be accurate within plus or minus 13 mm between supports, without affecting final installation and load capacity.
- (b) The base plate for the sign support structure shall be constructed to be fully compatible and mountable on the anchor bolts, provided in the foundations by the Contractor.
- (c) Sufficient reinforced handholes and wiring holes shall be provided for lighting of the sign as shown on the Drawings. All wiring holes shall have threaded couplings. All unused coupling holes shall be capped with a threaded galvanized plug.
- (d) The sign support structure shall be so fabricated that erection can be achieved by means of bolted connections.
- (e) The sign structure shall be provided with a "raised" structure identification number with a welding electrode in accordance with the details shown on the Drawings. The sign structure identification number shall be placed before hot-dip galvanizing.
- (f) Adequate venting and drainage holes shall be provided in enclosed sections for hot-dip galvanizing. The galvanizing facilities shall be consulted regarding the size and location of these holes.
- (g) Prior to fabrication, the dimensional limitations on the size and shape imposed by the galvanizing facilities shall be determined for hot-dip galvanizing the sign structures.

E20.21 Fabrication

- (a) All fabrication shall be carried out in accordance with this Specification and the Contract Drawings, as well as AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals - 2015 – 1st Edition, plus all subsequent revisions.
- (b) The punching of identification marks on the members will not be allowed, except for the structure identification number.
- (c) Any damage to members during fabrication shall be drawn to the attention of the Contract Administrator in order that the Contract Administrator may approve remedial measures.
- (d) Dimensions and fabrication details that control the field matching of parts shall receive very careful attention in order to avoid field adjustment.
- (e) All portions of the Work shall be neatly finished. Shearing, cutting, clipping, and machining shall be done neatly and accurately. Finished members shall be true to line, free from twists, bends, sharp corners, and edges.

- (f) Cut edges shall be true and smooth and free from excessive burrs or ragged breaks. Re-entrant cuts shall be avoided wherever possible. If used, they shall be filleted by drilling prior to cutting.
- (g) All holes shall be free of burrs and rough edges.

E20.22 Welding

- (a) Welding of steel structures shall be in accordance with CSA W59, "Welded Steel Construction".
- (b) All seams shall be continuously welded and free from any slag and splatter. Longitudinal welds shall be a minimum of sixty percent (60%) penetration, except those within 200 mm of baseplates, flanges, and circumferential welds, which shall be one hundred percent (100%) penetration. All circumferential groove welds shall be one hundred (100%) penetration, and where circumferential welds are used at a butt joint, an internal backup strip shall be provided.
- (c) Longitudinal seam welds in horizontal supports shall be located at the top of the horizontal members.
- (d) All welds shall be ground smooth and flush with the adjacent surface prior to hot-dip galvanizing.

E20.23 Surface Preparation and Cleaning

- (a) Surface preparation and cleaning of materials prior to hot-dip galvanizing shall be in accordance with ASTM A123 and SSPC Specification SP:6, "Commercial Blast Cleaning," unless otherwise specified herein. The Contractor shall ensure that all exterior and interior surfaces of vertical support members of sign structures are blast cleaned prior to pickling to achieve the minimum zinc coating mass of 610 g/m². All welding and provision of holes is to be completed prior to surface preparation and cleaning, except where shown on the Drawings.
- (b) The sandblasting and cleaning of sign structures shall be done in the shop.
- (c) After the structures have been sandblasted they shall be thoroughly cleaned of all sandblasting abrasive grit and debris, with special attention paid to areas of the structure where sand and debris collect, including but not limited to, behind the gusset plates, handholes and base plate.
- (d) After the sign structures have been sandblasted and cleaned, the Contract Administrator will carry out a visual inspection of the structures in the shop before they are shipped to the galvanizing plant.

E20.24 Hot-Dip Galvanizing

- (a) The hot-dip galvanizing plant shall be a Regular Member of the American Galvanizers Association, Inc.
- (b) All outside surfaces of the overhead sign support structures shall be hot-dip galvanized in accordance with ASTM A123 to a minimum net retention of 610 g/m².
- (c) Adequate venting and drainage holes shall be provided in enclosed sections for hot-dip galvanizing. The galvanizing facility shall be consulted regarding the size and location of these holes. Holes shall be provided by drilling not burning.
- (d) The galvanizing coating on outside surfaces of overhead sign support structures shall be generally smooth and free of blisters, lumpiness and runs. In particular, the outside surfaces of the bottom 2.5 m of the vertical support members shall have a smooth finish equal to the finish on hot-dipped galvanized handrails.
- (e) In addition to the provision of corrosion protection by the galvanized coating, the aesthetic appearance of the structure after hot-dip galvanizing will also be a criterion in the acceptance or rejection of the galvanized coating. The galvanized coating on the entire structure shall have a uniform "silver" colour and lustre. Galvanizing with parts of the structure having dull grey coating or streaks or mottled appearance will not be acceptable. If the galvanizing is rejected for aesthetic reasons, the Contractor shall rectify the

appearance by applying spray-on molten zinc metallizing with 85/15 zinc/aluminum alloy. The metallizing shall be carried out in the shop before the structure is installed.

- (f) Minor defects in the galvanizing coating shall be repaired as specified here below for "Field-Applied Touch-Up Galvanizing". The Contract Administrator shall be consulted before repairs are made.
- (g) Other defects and contaminants in the galvanizing coating, such as heavy dross protrusions, flux inclusions and ash inclusions shall be grounds for rejection of the galvanizing coating system.
- (h) The Contractor shall verify the thickness of galvanized coatings as part of their own quality control testing and make their results available to the Contract Administrator.
- (i) All threaded couplings shall be rethreaded after the sign structures have been hot-dip galvanized.
- (j) The sign structures shall be stored on timber blocking after hot-dip galvanizing.

E20.25 Delivery and Erection

- (a) The sign structures shall be lifted and secured with nylon ropes or other approved methods. Use of steel chains and steel hooks against hot-dip galvanized or powder coated surfaces will not be permitted. The structure components (shaft and arm etc.) shall be placed on timber blocking and secured with nylon ropes during their transportation to the Site.

E20.26 Attachment of Structure to Anchor Bolts

- (a) Each anchor bolt shall be provided with four (4) galvanized nuts: two (2) nuts at the bottom of the anchor bolt to secure the anchor bolt assembly template, one (1) nut below the base plate for levelling the structure, and one (1) nut above the base plate for anchoring the structure.
- (b) The anchor bolts shall have a minimum projection of 25 mm above the anchoring nuts.
- (c) The distance between the top of the concrete pile and the underside of the levelling nut shall not exceed one (1) anchor bolt diameter.
- (d) The threaded portions of the anchor bolts and nuts shall be treated with a wax based lubricant.
- (e) The Contractor shall plumb the shaft by adjusting the levelling and anchor nuts.
- (f) Levelling nuts and anchor nuts shall be tightened to a snug tight condition, defined as the full effort of an ironworker using an ordinary wrench, or a few impacts of an impact wrench.
- (g) The Contractor shall tighten the top anchoring nuts in an alternating "star" type pattern as follows:
 - (i) for anchor bolts less than or equal to 38 mm diameter: 1/3 of a turn (+20°, -0°) past a snug tight condition;
 - (ii) for anchor bolts greater than 38 mm diameter: 1/6 of a turn (+20°, -0°) past a snug tight condition.

E20.27 Structural Bolt Installation

- (a) Structural bolts for flange and splice connections shall be tightened in accordance with the turn-of-nut method as follows:
 - (i) alternately tighten all bolts to achieve a snug tight condition. The mating surfaces shall be in firm contact;
 - (ii) tighten all bolts in accordance with Table 1, below;
 - (iii) following tightening, check all bolts in the joint by hand using an ordinary wrench.

Table 1: Required Turns Past Snug Tight for Turn-of-Nut Method

Bolt Diameter <i>D</i> (inches)	Bolt Length up to $4D$		Bolt Length over $4D$ to $8D$		Bolt Length over $8D$ to $12D$	
	Length up to	Required Turns	Length Range	Required Turns	Length Range	Required Turns
1/2"	2"	$1/3 \pm 30^\circ$	2 to 4"	$1/2 \pm 30^\circ$	4 to 6"	$2/3 \pm 45^\circ$
5/8"	2.5"	$1/3 \pm 30^\circ$	2.5 to 5"	$1/2 \pm 30^\circ$	5 to 7.5"	$2/3 \pm 45^\circ$
3/4"	3"	$1/3 \pm 30^\circ$	3 to 6"	$1/2 \pm 30^\circ$	6 to 9"	$2/3 \pm 45^\circ$
7/8"	3.5"	$1/3 \pm 30^\circ$	3.5 to 7"	$1/2 \pm 30^\circ$	7 to 10.5"	$2/3 \pm 45^\circ$
1"	4"	$1/3 \pm 30^\circ$	4 to 8"	$1/2 \pm 30^\circ$	9 to 13.5"	$2/3 \pm 45^\circ$
1 1/8"	4.5"	$1/3 \pm 30^\circ$	4.5 to 9"	$1/2 \pm 30^\circ$	10 to 15"	$2/3 \pm 45^\circ$
1 1/4"	5"	$1/3 \pm 30^\circ$	5 to 10"	$1/2 \pm 30^\circ$	11 to 16.5"	$2/3 \pm 45^\circ$

E20.28 Installation of Sign Panels

- (a) The Contractor will be responsible for installation of the sign panel on the sign support structure.
- (b) The Contractor shall install the sign panel on the sign support structure immediately following erection of the support structures (same day). In no case will a sign support structure be allowed to be erected and left for a significant amount of time (greater than one (1) day) without having the sign panels installed.
- (c) Sign panels shall be installed such that the panels are level to ground after all support structure deflection has occurred.
- (d) Sign panels shall not be twisted or warped following installation.

E20.29 Rodent Screens

- (a) Rodent screens that will prevent vermin and debris from entering the gap between the bottom of the base plate and the top of the concrete foundation shall be installed in lieu of grout pads at all overhead sign structure bases.
- (b) The entire gap shall be covered with an expanded stainless steel metal screen, in accordance with E20.13, "Rodent Screen". The bottom edge of the expanded stainless steel screen shall be in full contact with the surface of the concrete foundation. The top edge of the expanded stainless steel screen shall not extend beyond the top surface of the structure base plate.
- (c) The rodent screen shall be made of one (1) continuous piece of expanded stainless steel with only one (1) overlapping splice where the ends come together and lap a minimum of 75 mm.
- (d) The rodent screen shall be attached to the vertical side of the structure baseplate with self-tapping stainless steel screws (#8-1/2" long) complete with stainless steel washers. Pilot holes shall first be drilled into the baseplate to facilitate screw installation. Screws shall be installed at 200 mm on center maximum and at least one screw shall be installed through the overlapping splice to clamp the two (2) layers of rodent screen together.
- (e) The two (2) overlapping layers of rodent screen shall also be clamped just above the concrete foundation with a stainless steel fastener assembly consisting of a machine screw (#8-5/8" long) complete with a nut, two (2) flat washers and a lock washer. The rodent screen shall be tightly clamped between the flat washers.

E20.30 Field-Applied Touch-up Galvanizing

- (a) Any areas of damaged galvanizing on the sign structures shall receive field-applied touch-up galvanizing.
- (b) Surfaces to receive touch-up galvanizing shall be cleaned using a wire brush, a light grinding action, or mild blasting to remove loose, scale, rust, paint, grease, dirt, or other contaminants.

- (c) For self-fluxing, low temperature, zinc based alloy rods, preheat the surface to three hundred and fifteen degrees Celsius (315°C) and wire brush the surface during preheating. Rub the cleaned preheated area with the repair stick to deposit an evenly distributed layer of zinc alloy. Spread the alloy with a wire brush, spatula, or similar tool. Field-applied galvanizing shall be blended into existing galvanizing of surrounding surfaces and shall be buffed and polished if required to match the surrounding surfaces. Care shall be taken to not overheat surfaces beyond four hundred degrees Celsius (400°C) and to not apply direct flame to the alloy rods.
- (d) For cold applied galvanizing compound, the approved product shall be applied by either a brush or roller. The compound shall be applied in three (3) coats, with each coat having a dry film thickness of 60 µm (2.36 mils). Each coat shall be left to dry for a minimum of one (1) hour before the application of the next coat.

QUALITY CONTROL

E20.31 General

- (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 Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection 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.
- (b) 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.

E20.32 Welding Qualifications

- (a) The Contractor shall produce evidence that the plant has recently been fully approved by the Canadian Welding Bureau (C.W.B.) to the requirements of CSA W47.1 Division 2.1 for welding of steel structures.
- (b) Approved welding procedures shall be submitted to the Contract Administrator prior to fabrication of any steel items.

E20.33 Testing

- (a) In addition to the Contractor's own quality control testing of all materials, welding procedures and steel fabrication including hot-dip galvanizing will be inspected and tested by the Contract Administrator to ascertain compliance with the Specifications and Drawings.
- (b) The Contract Administrator will hire a testing agency certified by the Canadian Welding Bureau to carry out shop fabrication inspection and testing before the overhead sign support structures are approved ready for installation of coating system. The inspector shall have access to all of the fabricator's normal quality control records for this Contract, specified herein. Inspection and testing will include:
 - (i) visual inspection of one hundred percent (100%) of welds;
 - (ii) ultrasonic testing of one hundred percent (100%) of full penetration sections of longitudinal seam welds and circumferential butt welds;
 - (iii) magnetic particle testing of a random ten percent (10%) of partial penetration sections of longitudinal seam welds;
 - (iv) ultrasonic testing of twenty-five percent (25%) of base plate and flange plate welds;
 - (v) inspection of hot-dip galvanizing and coating thickness.
- (c) Welds that are found by any of the inspection and testing methods to be inadequate and unsatisfactory shall be repaired in accordance with CSA W59 and then retested. The cost of the repairs and the cost of the retest shall be paid for by the Contractor.
- (d) No repair shall be made until agreed to by the Contract Administrator.

- (e) Defects in hot-dip galvanizing shall be rectified as directed by the Contract Administrator.

E20.34 Unacceptable Work

- (a) Any Work found to be unacceptable shall be corrected in accordance with CSA W59;
- (b) No repair shall be made until agreed to by the Contract Administrator.

MEASUREMENT AND PAYMENT

E20.35 Supply and Installation of New Steel Overhead Sign Support Structure

- (a) Supply and installation of new steel overhead sign support structure will be measured on a unit basis per new steel overhead sign support structure supplied and installed, and paid for at the Contract Unit Price for "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 this Specification, accepted and measured by the Contract Administrator.

Items of Work:

Supply and Installation of New Steel Overhead Sign Support Structure

- (b) The installation of sign panels shall be considered incidental to the work.

E21. CONSTRUCTION OF PRIVATE APPROACHES

- E21.1** Construction of 200 mm reinforced concrete private approaches shall include a 50mm blockout for asphalt where the multi-use pathway or bicycle lanes cross (east side of University Crescent).

MEASUREMENT AND PAYMENT

- E21.2** Construction of 200 mm reinforced concrete pavement with 50 mm blockout shall be measured on an area basis and paid for at the Contract Unit Price per square metre of "Construction of 200 mm Type 2 Concrete Pavement (Reinforced) with 50 mm Blockout" or "Construction of 200 mm Type 4 Concrete Pavement for Early Opening 72 Hour (Reinforced) with 50 mm Blockout". The area to be paid for shall be the total square meters of 200 mm reinforced concrete pavement with 50 mm blockout constructed in accordance with this specification, accepted and measured by the Contract Administrator.

E22. SUPPLY AND INSTALL WATERMAIN AND WATER SERVICE INSULATION

DESCRIPTION

- E22.1** Notwithstanding 3.12 of CW 2110, this specification covers the supply and installation of insulation in roadway excavations over watermains and water services.
- E22.2** Referenced Standard Construction Specifications
- (a) CW 2030 – Excavation Bedding and Backfill
 - (b) CW 3110 – Sub –grade, Sub-base and Base Course Construction
- E22.3** Referenced Standard Details
- (a) SD-018 - Watermain and Water Service Insulation

MATERIALS

- E22.4** 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"

E22.5 Sand Bedding:

- (a) In accordance with CW 2030

CONSTRUCTION METHODS

E22.6 Prior to the installation of any sub-base material or geotextile material, locate all existing water services. 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. Stockpile and dispose of excavated material in accordance with CW 3110.

E22.7 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.

E22.8 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.

E22.9 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.

E22.10 Take appropriate measures to ensure panels are not displaced when installing geotextiles and during backfilling operations.

MEASUREMENT AND PAYMENT

E22.11 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.

- (a) Excavation of the roadway subgrade in accordance with E22.6 will not be measured for payment and will be included in the payment for "Watermain and Water Service Insulation".

E23. MATERIALS FOR TRAFFIC SIGNAL INSTALLATIONS

E23.1 Further to CW 3620 2.11, Anchor Bolt Templates and Top Rings:

- (a) Master anchor bolt templates and Oversized D top rings are provided by the City and shall be used by the Contractor for all bases constructed under the provisions of this specification.
- (b) When using anchor bolt templates and top rings for pouring concrete they must both be oiled (inside and out) for ease of removal and cleaning. Following the removal of anchor bolt template and top ring, both must be cleaned immediately.
- (c) The templates shall be suitably cleaned by the Contractor at the end of the Contract and be returned to the City. The template shall be cleaned free of concrete residue and any other debris and returned to the City in a "like-new" condition.
- (d) In the event of loss or damage to materials supplied by the City, the cost of replacement materials shall be borne by the Contractor.
- (e) The Contractor shall contact the City of Winnipeg Stores Foreman to coordinate the pickup of the materials. Prior to pickup of the materials the Contractor will be required to obtain specific account information from the Traffic Signals Branch.

- (i) Public Works Stores
Attn: Stores Foreman
1277 Pacific Ave
Winnipeg, MB R3E 1G7
Phone: (204) 794-4333

E23.2 Further to CW 3620 2.10, City Supplied Materials:

- (a) If requested by the Contract Administrator, the Contractor shall submit in writing an account for all materials supplied by the City, showing in detail all materials drawn from the City's stores, quantities used at each work location, and materials on hand.
- (b) The City will issue the Contractor a "float" quantity of the above noted City-supplied materials, for the purpose of expediting the daily work progress.
- (c) The Contractor shall be obliged to requisition and withdraw those items which are City supplied material on the basis of the estimated quantity needed for a particular job.
- (d) The Contractor shall account for the quantities of materials drawn to the satisfaction of the City. Any overdraw of materials in excess of required quantities shall be credited or returned to the City. At the end of the Contract, all surplus materials shall be returned to the City.

E24. INSTALLATION OF TRAFFIC SIGNAL SERVICE BOXES (PRE-CAST)

DESCRIPTION

- E24.1 This specification covers the use and installation of a service box pre-cast (SD-322) 17" x 30" x 18" and 13" x 24" x 18".

MATERIALS

- E24.2 Materials shall be as per Section 2 of CW 3620.

CONSTRUCTION METHODS

- E24.3 Install pre-cast service box in grass boulevards/medians, and hard surfaced medians or as shown on the Drawings or as directed by the Contract Administrator.
- E24.4 Fill bottom of excavation with compacted limestone base course material to set precast service box to grade.
- E24.5 Install pre-cast service box on top of the compacted granular fill material to pavement, sidewalk or boulevard finish grade.
- E24.6 All conduits must be bundled into a group in the centre of the pre-cast service box. Install plastic plugs prior to back fill.
- E24.7 Backfill around pre-cast service box exterior. Back fill shall conform to requirements of SD-342.
- E24.8 Pre-cast service box shall meet the grade of the sidewalk or boulevard provided by the Contract Administrator.

MEASUREMENT AND PAYMENT

- E24.9 Installation of service boxes shall be measured on a unit basis and paid for at the Contract Unit Price per unit for "Items of Work" listed below. The number of units to be paid for shall be the total number of Service Boxes installed in accordance with this specification, accepted and measured by the Contract Administrator.

- (a) Service Box Pre-Cast (17" x 30")

E25. INSTALLATION OF EARLY OPEN CONCRETE TRAFFIC SIGNAL BASES

DESCRIPTION

E25.1 This specification shall cover the installation of early open concrete bases.

MATERIALS

E25.2 Supply concrete for bases in accordance with CW 2160, Table CW 2160.1 Design Requirements for Concrete Used for Underground Structures, for Type A Structures (monolithic sewers and reinforced structures).

E25.3 Further to E25.2, the supplied concrete shall achieve a minimum compressive strength of 22 MPa at 48 hours.

E25.4 City Supplied Materials shall be as per Section 2.10 of CW 3620 and E23.

CONSTRUCTION METHODS

E25.5 Construction methods for the installation of early open concrete bases shall be as per Section 3.7 or CW 3620.

MEASUREMENT AND PAYMENT

E25.6 Installation of Concrete Bases shall be measured on a unit basis and paid for at the Contract Unit Price per unit for "Items of Work" listed below. The number of units to be paid for shall be the total number of concrete bases installed in accordance with this specification, accepted and measured by the Contract Administrator.

(a) Signal Pole Base Early Open – Type G

(b) Signal Pole Base Early Open – Type OD

E25.7 Payment for the items of work in this Section includes the supply and installation of ready mix or mixed concrete on site.

E25.8 Payment for the items of work listed above includes the supply and installation of grounding rods (electrodes) installed with the concrete bases.

E25.9 Payment for the items of work listed above includes boring.

E25.10 Payment for the items of work listed above includes top ring forms.

E26. DOWELS AND TIE BARS

E26.1 Further to Section 9.2.3 of CW 3310, no measurement of payment will be made for dowels or tie bars that are drilled along a construction joint between new sections of concrete constructed as part of this Contract. Dowels or tie bars that are drilled into new concrete pavement will be considered incidental to the construction of the concrete pavement.

E27. REMOVAL OF EXISTING TREES

DESCRIPTION

E27.1 This specification covers the removal and disposal of existing trees.

CONSTRUCTION METHODS

E27.2 Trees shall be removed and disposed of by a pre-qualified subcontractor in accordance with the City's 'Guidelines for Maintaining City Owned Trees'. 'Guidelines for Maintaining City Owned Trees' and a list of pre-qualified contractors are located at:

https://winnipeg.ca/publicworks/parksOpenSpace/UrbanForestry/Homeowner_Tree_Maintenance_Guidelines.stm

E27.3 The Urban Forestry Branch has already approved the removal of trees from the median of University Crescent.

E27.4 The Contract Administrator will notify the Urban Forestry Branch when the trees have been removed.

MEASUREMENT AND PAYMENT

E27.5 Removal and disposal of existing trees will be paid for at the Contract Unit Price per metre for 'Removal of Existing Trees', measured as specified herein, which price shall be payment in full for performing all operations herein described in this specification.

E28. CONCRETE CONSTITUENT MATERIALS, MIX DESIGN REQUIREMENTS, AND HOT AND COLD WEATHER CONCRETING

DESCRIPTION

E28.1 General

E28.1.1 PORTLAND CEMENT CONCRETE PAVEMENT WORKS shall be in accordance with CW3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS, except as otherwise specified herein.

E28.1.2 This specification covers Portland cement concrete constituent materials and design requirements for the preparation of Portland Cement Concrete for all concreting operations relating to the construction of pavements, curbs, gutters, private approaches, bull-noses, median slabs, median, safety median and boulevard splash strips, sidewalk and other related concrete works.

E28.1.3 This specification also covers hot and cold weather concreting.

E28.1.4 Replace 2.0 Definitions of CW 3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS with 1.2 of this specification.

E28.1.5 Replace 5.3 Portland Cement Concrete Constituent Materials of CW 3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS with 2.0 MATERIALS of this specification.

E28.1.6 Replace 6.0 Design Requirements of CW 3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS with 3.0 DESIGN REQUIREMENTS of this specification.

E28.1.7 Replace 9.8. Weather Conditions of CW 3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS with 4.0 HOT AND COLD WEATHER CONCRETING of this specification.

E28.1.8 Replace 13.0 Basis of Payment of CW 3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS with 5.1 BASIS OF PAYMENT FOR CW 3310-R17 of this specification.

E28.1.9 Replace 13.0 Basis of Payment of CW 3230-R8, FULL-DEPTH PATCHING OF EXISTING PAVEMENT SLABS AND JOINTS with 5.2 BASIS OF PAYMENT FOR CW 3230-R8 of this specification

E28.1.10 Replace 13.0 Measurement and Payment for CW 3235-R9, RENEWAL OF EXISTING MISCELLANEOUS CONCRETE SLABS with 5.3 MEASUREMENT AND PAYMENT FOR CW 3235-R9 of this specification

E28.1.11 Replace 4.0 Measurement and Payment for CW 3240-R10, RENEWAL OF EXISTING CURBS with 5.4 MEASUREMENT AND PAYMENT FOR CW 3240-R10 of this specification

E28.1.12 Replace 13.0 Basis of Payment for CW 3325-R5, PORTLAND CEMENT CONCRETE SIDEWALK with 5.5 BASIS OF PAYMENT FOR CW 3325-R5 of this specification.

E28.1.13 This specification also replaces 2.0 Definitions, 5.3 Portland Cement Concrete Constituent Materials, 6.0 Design Requirements, 9.8. Weather Conditions, and 13.0 Basis of Payment of CW3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS where other specifications (e.g. CW3230-R8, CW3235-R9, CW3240-R10, CW3325-R5) reference CW3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS.

E28.1.14 All requirements and tests shall be in accordance with the latest edition of CSA A23.1-19/CSA A23.2-19, except as otherwise specified herein.

E28.2 Definitions

E28.2.1 Reinforced Concrete Pavement - A Portland Cement Concrete pavement with distributed steel reinforcement in the pavement slab and with deformed tie bars across longitudinal joints and smooth dowels across transverse contraction joints. Distributed steel reinforcement consists of smooth or deformed bars.

E28.2.2 Plain-Dowelled Pavement - A Portland Cement Concrete pavement with no reinforcing steel in the pavement slab and with deformed tie bars across longitudinal joints and smooth dowels across transverse contraction joints.

E28.2.3 Type 1 Concrete shall be used for expressways, major arterials, minor arterials, industrial/commercial collectors, residential major collectors, residential minor collectors, and industrial/commercial local pavements.

E28.2.4 Type 2 Concrete shall be used for residential roads and alleys, curb and gutter sections, curbs, commercial approaches, residential approaches, miscellaneous concrete slab and splash strips. Type 1 Concrete can be used instead of Type 2 Concrete.

E28.2.5 Type 3 is early opening concrete and shall be used for 24 hours early opening after placement.

E28.2.6 Type 4 is early opening concrete and shall be used for 72 hours early opening after placement.

E28.2.7 Type 5 Concrete shall be used for Sidewalks. Type 1 or Type 2 Concrete can be used instead of Type 5 Concrete.

E28.2.8 Type 6 Concrete is cold weather concreting and shall replace all other concrete types for all applications when cold weather exists, except Type 8.

E28.2.9 Type 7 is concrete for restoration of utility pavement cuts.

E28.2.10 Type 8 is concrete for temporary restoration.

E28.2.11 Coarseness Factor - A measure of the coarseness of the combined aggregate materials being incorporated into the concrete mix, defined as the percentage of all plus 2 500 sieve particles, which are also retained on the 10 000 sieve. Coarseness Factor = 100 (cumulative % retained on 10 000 Sieve divided by the cumulative % retained on 2 500 Sieve).

E28.2.12 Hot weather is defined as one or a combination of the ambient air temperature being at or above 27 °C, or when there is a probability of the temperature rising above 27 °C during the concrete placing period (as forecast by the nearest official meteorological office), or the evaporation rate that exceeds 0.75 kg/m² /h due to high concrete temperature (maximum temperature of 32 °C for fresh concrete), low relative humidity and high wind speed that tends to impair the quality of freshly mixed or hardened concrete by accelerating the rate of moisture loss and rate of cement hydration, or otherwise causing detrimental results.

E28.2.13 Cold weather is defined as a period when there is a probability of the ambient air temperature falling below 5 °C within 24 hours of placing or the average daily temperature for three consecutive days has fallen to, or is expected to fall, below 5°C as forecast by the nearest official meteorological office. The daily temperature is the mean temperature which is the average of the maximum and minimum temperature during the period from midnight to midnight.

E28.2.14 The protection period is the time required to prevent concrete from being affected by exposure to cold weather and to develop a minimum compressive strength of 24 MPa. Concrete compressive strength shall be determined by maturity meters and field cured cylinders. In no case shall the protection period be less than seven (7) days.

MATERIALS

E28.3 Concrete Constituent Materials

E28.4 Aggregates

E28.4.1 Aggregate shall consist of crushed stone or gravel or a combination of these materials conforming to the requirements of this Specification.

E28.4.2 Each of the fine- and coarse-fractions of the combined aggregate shall meet all the requirements of CSA A23.1, Table 10 (FA1) and Table 11, respectively and shall be handled and weighed separately to maintain uniformity. The supplier shall provide the City of Winnipeg, Research and Standards Engineer with test data in accordance with CSA A23.2-30A to demonstrate that the material will produce concrete of acceptable quality that meets all the relevant requirements of this Specification.

E28.4.3 The combined aggregate gradation and allowable deviations shall comply with the requirements in Table CW 3310.1.

TABLE CW 3310.1 – Combined Aggregate Gradation Limits and Allowable Deviations

Sieve Size	Percent of Total Dry Weight Passing Each Sieve	Allowable Deviation From The Job Mix Formula, % By Mass Passing Sieve
28 000	100%	--
20 000	90% - 100%	± 2%
14 000	75% - 95%	± 2%
10 000	60% - 75%	± 3%
5 000	35% - 50%	± 3%
2 500	27% - 35%	± 2%
1 250	20% - 30%	± 2%
630	10% - 20%	± 2%
315	5% - 10%	± 2%
160	1% - 4%	± 1%
80	0% - 2%	± 1%

E28.4.4 The fineness modulus of fine aggregate shall be not less than 2.3 nor more than 3.1.

E28.4.5 Aggregates shall conform to CSA-A23.1, Clauses 4.2.3.1 to 4.2.3.6. Each of the fine- and coarse-fractions shall comply with the physical requirements in Table CW 3310.2 and the test results shall be provided with the mix design submittal.

TABLE CW 3310.2 – Limits for Deleterious Substances and Physical Properties of Aggregates

Material	Parameter	Test Method	Maximum Limits	Frequency of Test
coarse aggregate	Clay lumps	CSA A23.2-3A	0.25%	2 years
	Low density granular material	CSA A23.2-4A	0.5%	2 years

	Material finer than 80 µm	CSA A23.2-5A	1.0%	1 year
	Relative density and absorption	CSA A23.2-12A	Note*	1 year
	Flat and elongated particles			
	- Flat particles	CSA A23.2-13B	25%	1 year
	- Elongated particles		40%	
	Petrographic examination** – PN	CSA A23.2-15A	125	1 year
	Unconfined freeze-thaw	CSA A23.2 24A	6%	Twice per season
	Alkali-silica reactivity	CSA A23.2-25A	0.15%	2 years
	Alkali-carbonate reactivity	CSA A23.2-26A	Note*	1 year
	Micro-Deval	CSA A23.2-29A	17%	Twice per season
fine aggregate	Clay lumps	CSA A23.2-3A	1%	2 years
	Low density granular material	CSA A23.2-4A	0.5%	2 years
	Material finer than 80 µm	CSA A23.2-5A	3.0%	1 year
	Organic impurities	CSA A23.2-7A	free from injurious amounts	2 years
	Petrographic examination**	CSA A23.2-15A	Note**	1 year
	Micro-Deval	CSA A23.2-23A	20%	1 year
	Alkali-silica reactivity	CSA A23.2-25A	0.15%	2 years

- *No acceptance/rejection values; however, the results shall be submitted.
- **Petrographic examinations shall be used to calculate the petrographic number (PN), to provide an appraisal of the physical-mechanical quality of coarse aggregate. Determination of PNs applies solely to coarse aggregates and should not be used for fine aggregates. The petrographic report for the fine aggregate shall include a comment on the suitability of the material for use in the production of concrete mix.
- The Coarseness Factor of the combined aggregate shall be between 45 and 65.
- Quarried limestone and dolomite shall not be acceptable as concrete aggregate materials.

E28.5 Hydraulic Cement

E28.5.1 Hydraulic Cement shall be either General Use (GU) or General Use Limestone (GUL) conforming to the requirements of the latest edition of CSA A3001. High-early-strength Portland cement (HE) may also be used for cold weather concreting only. Cement shall be kept in weather tight storage that will protect it from moisture and contamination, and in such a manner as to permit inspection, sampling and identification, where required, of each lot.

E28.6 Supplementary Cementing Materials

E28.6.1 Fly ash shall conform to the requirements of CSA A3001 Class F. Fly ash shall be added to concrete mixtures as a separate constituent material. The use of blended hydraulic cement is not permitted.

E28.7 Water

E28.7.1 Potable water, which is water suitable for human consumption, is permitted to be used as mixing water in concrete without testing. Non-potable water and combined water shall conform to ASTM C1602M, Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete. The concrete supplier shall maintain documentation on the characteristics of the mixing water in compliance with the requirements of Tables 1 and 2 in ASTM C1602M. Testing to verify compliance with the requirements in Table 1 shall be conducted on the Type 1 hand placement paving mix with fly ash. The testing frequency for mixing water shall be in accordance with Appendix X1 of ASTM C1602M. Information on the testing frequency of the concrete mixing water shall be included in the concrete suppliers' quality control program. The source(s) of concrete mixing water and test data indicating compliance with ASTM C1602M shall be provided with the Mix Design Statement submitted to the City of Winnipeg, Research and Standards Engineer.

E28.8 Admixtures

E28.8.1 Air-Entraining Admixture

- (a) The air-entraining admixture shall conform to the requirements of ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.

E28.8.2 Chemical Admixtures

- (a) Chemical admixtures shall conform to the requirements of ASTM C494, Standard Specification for Chemical Admixtures for Concrete. Chloride-based chemical admixtures will not be permitted under any circumstances.

E28.8.3 Cold-Weather Admixture Systems

- (a) Cold-weather admixture systems shall conform to the requirements of ASTM C1622, Standard Specification for Cold-Weather Admixture Systems.

DESIGN REQUIREMENTS

E28.9 Concrete Suppliers

E28.9.1 The City of Winnipeg, Research and Standards Engineer will maintain a list of approved concrete suppliers. To obtain approval, concrete suppliers must annually submit the following information to the Research and Standards Engineer prior to April 1st.

- (a) Concrete suppliers Approval Guidelines and Application is available at the City of Winnipeg, Corporate Finance, Material Management Division website at: <https://www.winnipeg.ca/matmgt/Spec/Default.stm>.
- (b) Names of suppliers and sources for all materials and admixtures.
- (c) Concrete mix designs with unique mix design codes signed and dated by person selecting the mix proportions.
- (d) Copy of valid Concrete Manitoba certificate for concrete batch plant.
- (e) Copies of valid scale calibration reports for the concrete batch plant.
- (f) Test data for aggregates (in accordance with clause 51.4).
- (g) The mill certificate for the cement and fly ash including chemical and physical composition and analysis, fly ash source and name of supplier.
- (h) Sieve analysis test reports for the individual aggregates and the combined aggregate gradations to be used in the concrete. The sieve analysis test reports shall be representative of the material to be used during concrete production.
- (i) Performance data from trial batches prior to construction to demonstrate the concrete mix will achieve the performance criteria in Table CW 3310.3.

TABLE CW 3310.3: Performance Criteria and Testing

	Time (day)	Type 1	Type 2	Type 3, and Type 6	Type 4	Type 5	Type 7**	Type 8
A minimum of one (1) set* of concrete compressive strength tests for the slipform paving mix with and without fly ash according to CSA A23.2-9C	@ 1	--	--	20 MPa	--	--	--	--
	@ 3	15 MPa	15 MPa	--	20 MPa	--	--	--
	@ 7	20 MPa	20 MPa	--	--	--	--	--
	@ 28	35 MPa	32 MPa	35 MPa	35 MPa	--	--	--
A minimum of two (2) sets* of concrete compressive strength tests for the hand placement paving mix with and without fly ash according to CSA A23.2-9C	@ 1	--	--	20 MPa	--	--	--	--
	@ 3	15 MPa	15 MPa	24 MPa	20 MPa	12 MPa	20 MPa	12 MPa
	@ 7	20 MPa	20 MPa	--	--	--	--	--
	@ 28	35 MPa	32 MPa	35 MPa	35 MPa	30 MPa	35 MPa	30 MPa
Air-void test according to ASTM C457	@ 28				See Note ***			
Rapid chloride penetrability test (RCPT) according to CSA A23.2-23C	@ 56				See Note ****			

*Each set contains at least three (3) cylinders at each specified date. The average of each set shall be equal to or greater than the specified strength, with no single result less than 85% of the specified strength.

** Type 7 is concrete for restoration of utility pavement cuts and shall be adjusted to meet the specified strength for other types based on the application and shall include set retarders or hydration stabilizers to extend the discharge time to 150 min.

***A minimum of one sample for air-void test at 28 days shall be performed for each cement for Type 1, Type 2, and Type 3 with fly ash, and Type 6. The air-void test shall meet the following requirements:

- Spacing factor shall not exceed 230 µm, with no single value greater than 260 µm; and,
- Air content shall be greater than or equal to 5.0% and less than 8.0%.

****A minimum of two samples for rapid chloride penetrability test shall be performed for Type 1, Type 2 and Type 3 for mixes with and without fly ash. For Type 1 and Type 3, the average penetrability shall be equal to or less than 1250 coulombs at 56 days based on the charge passed, with no single result greater than 1500 coulombs for mixes with and without fly ash. For Type 2, the average of chloride ion penetrability shall be equal to or less than 1500 coulombs at 56 days based on the charge passed, with no single result greater than 1750 coulombs.

- (j) Quality control program for all materials, including a proposed sampling and testing plan with minimum sampling and testing frequencies;
- (k) The laboratory(s) to be used and its credentials;
- (l) The quality control personnel and their qualifications; and,
- (m) Frequency of production equipment inspection, verification of calibration, and any certification of the production facility.

E28.10 The City of Winnipeg, Research and Standards Engineer will conduct inspections at least once a year during production. Samples of materials may be taken and tested.

E28.11 Testing for qualification or acceptance purposes shall be done in accordance with this Specification and the applicable test procedures and standard practices of CSA A23.2. There shall be no charge for any materials taken for testing purposes.

E28.12 Changes in the source of any concrete constituent materials will not be permitted without approval of the City of Winnipeg, Research and Standards Engineer. For new sources, all materials shall be tested.

E28.13 Once approved, all concrete shall be supplied in accordance with the approved Mix Design Statement. No changes in the concrete mix designs will be permitted without written permission from the City of Winnipeg, Research and Standards Engineer Concrete Properties.

E28.14 Concrete Suppliers

E28.14.1 The Mix Design Statements for all concrete types shall be submitted to the City of Winnipeg, Research and Standards Engineer for approval. The concrete mix shall be proportioned such as to yield concrete having the required workability, strength and durability in Table CW 3310.4.

TABLE CW 3310.4 – Concrete Properties

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8
Minimum Cementitious Content (kg/m ³)	360	340	360	360	320	400	340	300
Maximum Supplementary Cementing Materials – Fly Ash** (%) (see Note 2)	20%	20%	15%	20%	15%	0%	20%	20%
Maximum Water/Cementitious Ratio								
- Slip form paving	0.4	0.4	0.4	0.4	-	0.35	-	-
- Hand placement	0.42	0.42	0.42	0.42	0.42	0.36	0.42	0.45
Slump (mm)								
- Slip form paving	50 ± 20	50 ± 20	50 ± 20	50 ± 20	-	50 ± 20	-	-
- Hand placement	70 ± 20	70 ± 20	70 ± 20	70 ± 20	80 ± 20	70 ± 20	100 ± 20	100 ± 20
Nominal Maximum Aggregate Size (mm)	20	20	20	20	20	20	20	20
Air Content (%)	5-8	5-8	5-8	5-8	5-8	5-8	5-8	5-8
Minimum Compressive Strength (MPa)								
- @ 1 days	-	-	20	-	-	20	-	-
- @ 3 days	15	15	-	20	-	24	Note 1*	-
- @ 7 days	-	-	-	-	-	-	-	-
- @ 28 days	35	32	Note 1*	Note 1*	30	Note 1*	-	30
Maximum Rapid Chloride Penetrability Test*** (coulombs) @ 56 days. (see Note 3)	1500	1750	Note 1*	Note 1*	-	Note 1*	-	-

*The concrete shall meet Type 1 or Type 2 based on the application.

**The use of fly ash in concrete mix will be permitted. The Contractor will have the option to replace cement up to but not exceeding the above limits, by weight of total cementitious materials, depending on the concrete type. The use of fly ash will be permitted when the average daily temperature is 10°C and rising for the next five (5) consecutive days of placement as forecast by the nearest official meteorological office. The use of fly ash will not be permitted when the average daily temperature is below 10°C and the average daily temperature for more than five (5) consecutive days has fallen to, or is expected to fall, below 10°C within fourteen (14) days of placement as forecast by the nearest official meteorological office unless authorized in writing by the City of Winnipeg, Research and Standards Engineer.

***The concrete supplier shall develop and submit maturity relationships for Type 1 and Type 6 mixes.

***Rapid chloride penetrability test will be required where there is evidence of concrete damage as a result of inadequate curing and adverse weather conditions, including hot weather, wind, rain, sleet, snow and cold weather. The Contract Administrator shall be allowed access to all sampling locations and reserves the right to take samples for testing at any time.

E28.15 Plant Quality Control

E28.15.1 The concrete supplier shall provide quality control for the plant to ensure all materials meet the approved mix designs. This information shall be submitted bi-weekly and will be monitored by the City of Winnipeg, Research and Standards Engineer. Failure to submit the quality control results shall be cause for immediate suspension of the concrete supplier.

E28.15.2 A new mill certificate for cement and fly ash shall be provided monthly during production.

- E28.15.3 Check tests of any concrete constituent materials may be undertaken by a Testing Laboratory designated by the City of Winnipeg, Research and Standards Engineer. The concrete supplier shall be equipped with a suitable means or device for obtaining a representative sample of the cement and fly ash. The device shall enable the sample to be readily taken in proximity to the cement or fly ash weigh hopper and from a container or conveyor holding only cement or fly ash to prevent contamination. Any materials which fails to comply with the requirements of CSA A3001 will be rejected, notwithstanding any certificate of acceptance that may have been previously given. Materials that have been rejected must be removed immediately by the concrete supplier.

HOT AND COLD WEATHER CONCRETING

- E28.16 The Contractor shall be responsible for taking all necessary measures to protect freshly laid concrete from adverse weather conditions, including hot weather, wind, rain, sleet, snow and cold weather, except as otherwise specified herein.

E28.16.1 Hot weather concreting

- (a) When the ambient air temperature is at or above 27 °C, or when there is a probability of the temperature rising above 27 °C during the placing period (as forecast by the nearest official meteorological office), the Contractor shall provide protection for the concrete from the effects of hot and/or drying weather conditions.
- (b) When drying conditions are greater than or equal to 0.75 kg/m²/hr as estimated by use of Figure D1, Appendix D, Guidelines for Curing and Protection of CSA A23.1, the plastic concrete surface shall be protected from drying by application of an evaporation retardant. The evaporation retardant shall be applied according to the manufacturer's recommendations.

E28.16.2 Cold weather concreting

- (a) When there is a probability of the air temperature falling below 5 °C within 24 h of placing or the average daily temperature for more than three successive days is fallen to, or is expected to fall, below 5°C as forecast by the nearest official meteorological office, cold weather concreting requirements shall apply.
- (b) Concrete shall be placed on unfrozen base material, free of water, snow, and ice. Frozen base material will be identified by measuring the surface temperature using infrared thermometers or similar devices. If the surface temperature is less than or equal to 0°C, the base will be considered frozen. The Contractor shall use suitable heating methods to maintain the base temperature above 0°C. Salt shall not be used to thaw ice, snow, or frost.
- (c) Type 6 Concrete shall be used for cold weather concreting.
- (d) Where less than 30 cubic meters of concrete will be placed, the Contractor shall protect the concrete using a minimum of one layer of insulated tarp with R-value more than 5 for a minimum of seven (7) days after completion of placing operations unless otherwise specified by the Contract Administrator.
- (e) Where 30 cubic meters of concrete or more will be placed, a minimum of three maturity meters shall be used. One maturity meter shall be placed in the final 4 m of paving, and the two other maturity meters shall be placed at locations designated by the Contract Administrator. Each maturity meter shall be capable of recording the time and temperature at three depths, ½ inch below the surface, mid slab and ½ inch above the bottom of the pavement. Locations where the maturity meters are placed shall be protected in the same manner as the rest of the concrete.
- (f) The Contract Administrator shall provide all necessary wires and connectors for maturity meters. The Contractor shall be responsible for the placement, protection, and maintenance of all wires and connectors. No additional measurement or payment will be made for the placement, protection, and maintenance of all wires and connectors.
- (g) The Contractor shall maintain the internal concrete temperature above 10 °C during the protection period, a minimum of seven (7) days after completion of placing

operations, and until the concrete has developed a minimum compressive strength of 24 MPa. Temperature and concrete compressive strength shall be determined by maturity meters and field cured cylinders. A minimum of four (4) readings for temperature shall be collected in the first three (3) days and then two times daily thereafter.

- (h) The Contractor shall provide suitable protection methods to the Contract Administrator for approval such as insulation (blankets and boards), heating systems such as electric blankets and hydronic heating systems, unheated or heated enclosures, or a combination of the methods to maintain the internal concrete temperature above 10 °C. In no case shall the protection method be less than one layer of insulated tarp with R-value more than 5.
- (i) If the internal concrete temperature at any location in the concrete falls below 10 °C but not less than 5°C during the curing period, supplemental heat shall be introduced immediately.
- (j) If the internal concrete temperature at any location in the concrete falls below 5 °C during the curing period, cores shall be collected and tested at 28 days. The cores will be tested in accordance with ASTM C856, Standard Practice for Petrographic Examination of Hardened Concrete and CSA A23.2-14C, Obtaining and testing drilled cores for compressive strength testing. Concrete damaged by frost, as determined by the compressive strength test or Petrographic analysis, shall be removed and replaced at the Contractor's expense. All costs associated with coring, transmittal of cores, and petrographic examination and compressive testing shall be borne by the Contractor regardless of the outcome of the examination.
- (k) If the internal concrete temperature at any location in the concrete falls below 0 °C during the curing period, concrete shall be removed and replaced by the Contractor at his own expense.
- (l) The protection method shall not be completely removed until the concrete has cooled to the temperature differential given in CSA A23.2, Table 20. The Contractor shall provide suitable methods for gradual cooling to the Contract Administrator for approval such as loosening the forms while maintaining cover with plastic sheeting or insulation, gradual decrease in heating inside an enclosure, or turning off the heat and allowing the enclosure to slowly equilibrate to ambient temperature. If the concrete cracks due to a sudden temperature change, concrete shall be removed and replaced by the Contractor at his own expense.
- (m) Concrete damaged as a result of inadequate protection against weather conditions shall be removed and replaced by the Contractor at his own expense.
- (n) No additional measurement or payment will be made for cold weather concreting.

BASIS OF PAYMENT FOR CW 3310-R17

E28.17 Concrete Pavements, Median Slabs, Bullnoses and Safety Median

E28.17.1 Construction of concrete pavements, median slabs, bull-noses and safety median will be paid for at the Contract Unit Price per square metre for the "Items of Work" listed here below, measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this Specification. The unit price shall be reduced for deficiencies in pavement thickness as per Clause E28.19 of this Specification.

Items of Work:

- (i) "Construction of 250 mm Type (*) Concrete Pavement (**)(***)"
- (ii) "Construction of 230 mm Type (*) Concrete Pavement (**)(***)"
- (iii) "Construction of 200 mm Type (*) Concrete Pavement (**)(***)"
- (iv) "Construction of 150 mm Type (*) Concrete Pavement (**)(***)"
- (v) "Construction of Type (*) Concrete Median Slabs (****)"
- (vi) "Construction of Monolithic Type (*) Concrete Median Slabs (****)"

- (vii) "Construction of Type (*) Concrete Safety Medians (****)"
- (viii) "Construction of Monolithic Type (*) Concrete Curb and Sidewalk (****)"
- (ix) "Construction of Monolithic Type (*) Concrete Bull-noses"
- (x) *Specify the Concrete Type
 - **Specify either Reinforced or Plain-Dowelled
 - ***Specify Slip Form Paving if required
 - ****Specify referenced Standard Detail.

E28.18 Concrete Pavements for Early Opening

E28.18.1 Construction of concrete pavements for early opening will be paid for at the Contract Unit Price per square metre for the "Items of Work" listed here below, measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this Specification. The unit price shall be reduced for deficiencies in pavement thickness as per Clause E51.19 of this Specification.

Items of Work:

- (i) "Construction of 250 mm (Type *) Concrete Pavement For Early Opening (**)(****)"
- (ii) "Construction of 230 mm (Type *) Concrete Pavement For Early Opening (*)(**)(****)"
- (iii) "Construction of 200 mm (Type *) Concrete Pavement For Early Opening (*)(**)(****)"
- (iv) "Construction of 150 mm (Type *) Concrete Pavement For Early Opening (*)(**)(****)"
 - *Specify either Type 3 or Type 4
 - **Specify either Reinforced or Plain-Dowelled
 - ***Specify Slip Form Paving if required

E28.19 Pavement Thickness Tolerances

E28.19.1 At the option of the Contract Administrator, pavement thickness may be determined by coring pavement sections representing each day's pour and determining the pavement thickness by averaging the depth of the cores.

E28.19.2 Pavement found deficient in thickness by more than five (5%) percent shall be paid for at the reduced price. The reduced price = $P_R \times$ contract price;

P_R is in % and T_D is in %

Where: $P_R = 100 - [(T_D - 5) / 5] \times 25$

Where: T_D = thickness deficiency greater than or equal to 5%, up to 10%

E28.19.3 When the pavement thickness is deficient by more than ten (10%) percent and the judgement of the Contract Administrator is that the area of such deficiency should not be removed and replaced, payment will be fifty (50%) percent of Contract Unit Price.

E28.19.4 The cost of initial cores will not be paid for by the Contractor. Additional cores requested by the Contractor to determine the extent of areas deficient in thickness, shall be paid for by the Contractor.

E28.20 Concrete Curbs, Curb and Gutter, and Splash Strips

E28.20.1 Construction of concrete curbs, curb and gutter, and splash strips will be paid for at the Contract Unit Price per metre for the "Items of Work" listed here below, measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this Specification.

Items of Work:

- (i) "Construction of Type (*) Concrete Barrier Curb (**)"
- (ii) "Construction of Type (*) Concrete Modified Barrier Curb (**)"
- (iii) "Construction of Type (*) Concrete Curb and Gutter (**)"
- (iv) "Construction of Type (*) Concrete Mountable Curb (**)"
- (v) "Construction of Type (*) Concrete Lip Curb (**)"
- (vi) "Construction of Type (*) Concrete Curb Ramp (**)"
- (vii) "Construction of Type (*) Concrete Safety Curb (**)"
- (viii) "Construction of Type (*) Concrete Splash Strips (***)"

* Specify the Concrete Type

** Specify height, type and Referenced Standard Detail

***Specify height, monolithic or separate, type, width, and referenced Standard Detail

E28.20.2 No measurement or payment shall be made for supply or placement of bonding grout for concrete curbs.

E28.20.3 Drilled curb ramp tie bars are to be paid in accordance with CW 3230.

E28.21 Dowel Assemblies

E28.21.1 Supply and installation of dowel assemblies will be paid for at the Contract unit Price per metre for "Supply and Installation of Dowel Assemblies", measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this Specification.

E28.22 Drilled Tie Bars and Dowels

E28.22.1 Supply and installation shall be in accordance with Clause 9.2.3 of CW 3310-R17.

BASIS OF PAYMENT FOR CW 3230-R8

E28.23 Full Slab Replacement

E28.23.1 Replacement of complete slabs will be paid for at the Contract Unit Price per square metre for the "Items of Work" listed here below, measured as specified herein, 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.

Items of Work: Slab Replacement

- (i) 250mm Type (*) Concrete Pavement (**)
- (ii) 230mm Type (*) Concrete Pavement (**)
- (iii) 200mm Type (*) Concrete Pavement (**)
- (iv) 150mm Type (*) Concrete Pavement (**)

* Specify the Concrete Type

** Specify either Reinforced or Plain-Dowelled

E28.24 Full Depth Partial Slab Patches

E28.24.1 Full-depth partial slab patches will be paid for at the Contract Unit Price per square metre for "Items of Work", listed here below, measured as specified herein, 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.

Items of Work: Partial Slab Patches

- (i) 250mm Type (*) Concrete Pavement (**)
- (ii) 230mm Type (*) Concrete Pavement (**)
- (iii) 200mm Type (*) Concrete Pavement (**)

(iv) 150mm Type (*) Concrete Pavement (**)

* Specify the Concrete Type

** Specify class of patch

E28.25 Dowels in Drilled Holes

E28.25.1 Installation of dowels into hardened concrete will be paid for at the Contract Unit Price for "Drilled Dowels"*, measured as specified herein, 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.

*Specify diameter(s) of dowels

E28.26 Tie Bars in Drilled Holes

E28.26.1 Installation of tie bars into hardened concrete will be paid for at the Contract Unit Price for "Drilled Tie Bars"* measured as specified herein, 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.

*Specify size(s) of tie bars.

MEASUREMENT AND PAYMENT FOR CW 3235-R9

E28.27 Removal of Miscellaneous Concrete Slabs

E28.27.1 Removal of miscellaneous concrete slabs will be measured on an area basis and paid for at the Contract Unit Price per square metre for the "Items of Work" listed here below. The area to be paid for will be the total number of square metres of existing miscellaneous concrete slabs removed in accordance with this specification, accepted and measured by the Contract Administrator.

Items of Work: Miscellaneous Concrete Slab Removal

- (i) Median Slab
- (ii) Monolithic Median Slab
- (iii) Safety Median
- (iv) 100mm Sidewalk
- (v) 150mm Reinforced Sidewalk
- (vi) Bullnose
- (vii) Monolithic Curb and Sidewalk

E28.28 Installation of Miscellaneous Concrete Slabs

E28.28.1 Installation of miscellaneous concrete slabs will be measured on an area basis and paid for at the Contract Unit Price per square metre for the "Items of Work" listed here below. The area to be paid for will be the total number of square metres of miscellaneous concrete slabs installed in accordance with this specification, accepted and measured by the Contract Administrator.

Items of Work: Miscellaneous Concrete Slab Installation

- (i) Type (*) Concrete Median Slab**
- (ii) Type (*) Concrete Monolithic Median Slab**
- (iii) Type (*) Concrete Safety Median**
- (iv) Type (*) Concrete 100mm Sidewalk**
- (v) Type (*) Concrete 150mm Reinforced Sidewalk***

- (vi) Type (*) Concrete Bullnose**
- (vii) Type (*) Concrete Monolithic Curb and Sidewalk**

* Specify the Concrete Type
** referenced Standard Detail to be specified
*** renewal area to be specified

E28.28.2 All costs for installing sign support clamps and constructing isolations for boulevard and median appurtenances will be included in the payment for the "Items of Work" listed for miscellaneous concrete slab installation.

E28.28.3 All costs for excavation, sub-grade compaction, placement of sub-base, placement of leveling course and backfill materials, slabs installation and boulevard grading to the limits as identified in Section 3.2 of this specification will be included in the payment for the "Items of Work" listed for Installation of Miscellaneous Concrete Slabs.

E28.28.4 Additional base course over and above leveling course material will be paid in accordance with CW 3110.

E28.29 Miscellaneous Concrete Slab Renewal

E28.29.1 Miscellaneous concrete slab renewal will be measured on an area basis and paid for at the Contract Unit Price per square metre for the "Items of Work" listed here below. The area to be paid for will be the total number of square metres of existing miscellaneous concrete slabs removed and installed in accordance with this specification, accepted and measured by the Contract Administrator.

Items of Work: Miscellaneous Concrete Slab Renewal

- (i) Type (*) Concrete Median Slab**
- (ii) Type (*) Concrete Monolithic Median Slab**
- (iii) Type (*) Concrete Safety Median**
- (iv) Type (*) Concrete 100mm Sidewalk* (***)
- (v) Type (*) Concrete 150mm Reinforced Sidewalk (***)
- (vi) Type (*) Concrete Bullnose**
- (vii) Type (*) Concrete Monolithic Curb and Sidewalk**

* Specify the Concrete Type
** referenced Standard Details to be specified.
*** renewal area to be specified.

- a.) Less than 5 sq. m
- b.) 5 sq. m to 20 sq. m
- c.) Greater than 20 sq. m

E28.29.2 All costs for the slab removal, excavation, sub-grade compaction, placement of leveling course and backfill materials, slabs installation and boulevard grading to the limits as identified in Section 3.3 of this specification will be included in the payment for the "Items of Work" listed for Miscellaneous Concrete Slab Renewal.

E28.29.3 Additional base course over and above leveling course material will be paid in accordance with CW 3110.

E28.29.4 All costs for installing sign support clamps and constructing isolations for boulevard and median appurtenances will be included in the payment for the "Items of Work" listed for Miscellaneous Concrete Slab Renewal.

E28.30 Adjustment of Precast Concrete Sidewalk Blocks

E28.30.1 Adjustment of precast concrete sidewalk blocks will be measured on an area basis and paid at the Contract Unit Price per square metre for "Adjustment of Precast Sidewalk

Blocks". The area to be paid for will be the total number of square metres of precast concrete sidewalk blocks adjusted to grade in accordance with this specification, accepted and measured by the Contract Administrator.

E28.30.2 No measurement or payment will be made for any precast sidewalk blocks damaged or lost during replacement.

E28.31 Supply of Precast Concrete Sidewalk Blocks

E28.31.1 Supply of precast concrete sidewalk blocks will be measured on an area basis and paid at the Contract Unit Price per square metre for "Supply of Precast Sidewalk Blocks". The area to be paid for will be the total number of square metres of precast concrete sidewalk blocks supplied in accordance with this specification, accepted and measured by the Contract Administrator.

E28.32 Removal of Precast Concrete Sidewalk Blocks

E28.32.1 Removal of precast concrete sidewalk blocks will be measured on an area basis and paid at the Contract Unit Price per square metre for "Removal of Precast Sidewalk Blocks". The area to be paid for will be the total number of square metres of precast concrete sidewalk blocks removed in accordance with this specification, accepted and measured by the Contract Administrator.

MEASUREMENT AND PAYMENT FOR CW 3240-R10

E28.33 Concrete Curb Removal

E28.33.1 Concrete curb removal will be measured on a length basis and paid for at the Contract Unit Price per metre for the "Items of Work" listed here below. The length to be paid for will be the total number of metres of concrete curb removed in accordance with this specification, accepted and measured by the Contract Administrator.

Items of Work: Concrete Curb Removal

- (i) Barrier*
- (ii) Modified Barrier*
- (iii) Curb and Gutter
- (iv) Mountable Curb
- (v) Lip Curb
- (vi) Modified Lip Curb
- (vii) Curb Ramp
- (viii) Safety Curb
- (ix) Splash Strips**

* Integral or Separate to be specified.

** Monolithic or Separate.

E28.33.2 Removal of existing asphalt material immediately in front of the curb that is required for installation will be included in the payment for the "Items of Work" listed for Concrete Curb Removal when the asphalt overlay is not identified to be removed.

E28.34 Concrete Curb Installation

E28.34.1 Concrete curb installation will be measured on a length basis and paid for at the Contract Unit Price per metre for the "Items of Work" listed here below. The length to be paid for will be the total number of metres of concrete curb or splash strip installed in accordance with this specification, accepted and measured by the Contract Administrator.

Items of Work: Concrete Curb Installation

- (i) Type (*) Concrete Barrier**

- (ii) Type (*) Concrete Modified Barrier**
- (iii) Type (*) Concrete Curb and Gutter**
- (iv) Type (*) Concrete Mountable Curb**
- (v) Type (*) Concrete Lip Curb**
- (vi) Type (*) Concrete Modified Lip Curb**
- (vii) Type (*) Concrete Curb Ramp**
- (viii) Type (*) Concrete Safety Curb**
- (ix) Type (*) Concrete Splash Strips***

* Specify the Concrete Type

** reveal height, type and reference to Standard Detail to be specified.

*** reveal height, monolithic or separate, type, width and reference to Standard Detail to be specified.

E28.34.2 The placement and compaction of asphalt material immediately in front of the curb will be included in the payment for the "Items of Work" listed for Concrete Curb Installation when the asphalt overlay is not identified to be removed.

E28.34.3 No payment will be made for leveling course.

E28.34.4 Base course will be paid in accordance with CW 3110.

E28.34.5 Supply and placement of bonding grout for concrete curbs will not be measured for payment.

E28.35 Concrete Curb Renewal

E28.35.1 Concrete curb renewal will be measured on a length basis and paid for at the Contract Unit Price per metre for the "Items of Work" listed here below. The length to be paid for will be the total number of metres of concrete curb or splash strip removed and installed in accordance with this specification, accepted and measured by the Contract Administrator.

Items of Work: Concrete Curb Renewal

- (i) Type (*) Concrete Barrier** (***)
- (ii) Type (*) Concrete Modified Barrier**
- (iii) Type (*) Concrete Curb and Gutter** (***)
- (iv) Type (*) Concrete Mountable Curb**
- (v) Type (*) Concrete Lip Curb**
- (vi) Type (*) Concrete Modified Lip Curb**
- (vii) Type (*) Concrete Curb Ramp**
- (viii) Type (*) Concrete Safety Curb**
- (ix) Type (*) Concrete Splash Strips (***) (****)

* Specify the Concrete Type

* reveal height, type and referenced Standard Detail to be specified.

** renewed length to be specified.

- a.) Less than 3 m
- b.) 3 m to 30 m
- c.) Greater than 30 m

*** reveal height, monolithic or separate, type, width and reference to Standard Detail to be specified.

E28.35.2 All costs for removal, excavation, sub-grade compaction, leveling course and backfill materials, curb installation and boulevard grading to the limits as identified in Section 3.4 of

this specification will be included in the payment for the "Items of Work" listed for Concrete Curb Renewal.

- E28.35.3 Base course will be paid in accordance with CW 3110.
- E28.35.4 For installation lengths greater than 30 metres, the length will include breaks for approaches, isolations or fixed obstacles such as light standards or poles.
- E28.35.5 Curb ramp tie bars are to be paid in accordance with CW 3230.
- E28.35.6 Supply and placement of bonding grout for concrete curbs will not be measured for payment.

BASIS OF PAYMENT FOR CW 3325-R5

E28.36 Concrete Sidewalks

- E28.36.1 Construction of concrete sidewalks will be paid for at the Contract Unit Price per square metre for "100 mm Type (*) Concrete Sidewalk", measured as specified herein, 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.

E28.37 Leveling Course

- E28.37.1 No payment shall be made for leveling course.

E28.38 Excavation, Sub-grade Compaction, and Base Course

- E28.38.1 Excavation, sub-grade compaction, and additional base course shall be paid for in accordance with Specification CW 3110.

E29. INSTALLATION OF STREET LIGHTING AND ASSOCIATED WORKS

E29.1 DEFINITIONS

LIMITS OF APPROACH means the shortest distance that is permissible between live high voltage (>750 volts) conductors or apparatus and any part of a worker's body, material or tools being handled, or equipment operated.

MANITOBA HYDRO CENTRAL STORES means Manitoba Hydro's Waverley Service and Reclaim Centre - 1840 Chevrier Blvd - Winnipeg, Manitoba

OVERHEAD FEED means an electrical supply via an overhead conductor connected between streetlight standards. Typically strung between standards on a temporary basis.

OVERHEAD SOURCE means an electrical supply from Manitoba Hydro's system. (Typically, an overhead conductor from a wooden distribution pole or a DIP/RISER located on a wooden distribution pole.)

RECLAIM material means existing material that has been removed from Manitoba Hydro's system and to be returned to Manitoba Hydro.

SCRAP material means existing material that has been removed from Manitoba Hydro's system and to be recycled/disposed of by the Contractor.

SURPLUS material means new material that has been requisitioned by the Contractor and not incorporated into the work at the end of the Contract.

WORK CLEARANCE means an ELECTRICAL AND/OR NATURAL GAS FACILITIES LOCATE form (see SAMPLE ONLY included as Appendix D) issued by each of Manitoba Hydro's Customer Service Centre (CSC) affected to permit work to commence (Permit to work).

E29.2 DESCRIPTION

E29.2.1 The work shall consist of the supply of all supervision, labour, materials (except as indicated under MATERIAL SUPPLIED BY MANITOBA HYDRO below) insurance, tools, backfill and equipment (and their maintenance), transportation, fuel, oil, meals and lodging, mobilization and de-mobilization, and warranty of workmanship as required to install and remove temporary Overhead Feeds, remove existing street light poles as required, install new street light poles and associated underground cables/conduits, all in accordance with the requirements specified in the tender documents.

E29.3 WORK LOCATIONS

E29.3.1 The proposed street light installation and removals are included in Form B for the following project location:

- (a) Murray Park Road from Sturgeon Road to Moray Street

COORDINATION OF WORK

E29.3.2 The Contractor shall provide a minimum of ten (10) working days notice to Manitoba Hydro prior to the start of construction. The work shall be conducted and coordinated with Manitoba Hydro in a manner to ensure street lighting is maintained at all times for the duration of the work. The construction drawings provide the Proposed Sequence of Construction.

E29.3.3 The Contractor shall obtain Work Clearance from Manitoba Hydro's Customer Service Centre(s) (CSC) affected prior to the work commencing. No additional compensation shall be paid to the Contractor for delays obtaining Work Clearance for any reason.

E29.3.4 Manitoba Hydro's CSC will provide the Limits of Approach applicable to the Contractor on the Work Clearance form.

E29.4 ORIENTATION

E29.4.1 Prior to the commencement of the proposed work, the Contractor's crew foremen, electricians, and other key personnel shall attend one (1) day of orientation provided by Manitoba Hydro for various operations such as cable handling, cable splicing/termination, installation of street light poles, concrete bases, luminaires and various other construction standards and procedures. The Contractor will be responsible for all costs associated with personnel salaries, travel, sustenance and overheads, etc., during training.

E29.5 PRE-CONSTRUCTION MEETING

E29.5.1 Prior to the commencement of the work, the Contractor shall attend a pre-construction meeting with Manitoba Hydro. The agenda for this meeting shall include but not be limited to the following:

- (a) Reference the Contractor's Safe work Procedures;
- (b) Prime Contractor;
- (c) materials;
- (d) sequence of construction;
- (e) communication plan;
- (f) any training requirements & qualifications;
- (g) Drawing and Project review;
- (h) a review of the Contractor's proposed work schedule; and
- (i) any and all other topics of clarification that the Contractor and the Contract Administrator may wish to discuss.

E29.5.2 The Contractor's cost to attend this pre-construction meeting shall be incorporated into the unit prices for the work.

E29.6 QUALIFICATIONS AND CERTIFICATION

- E29.6.1 The Contractor's Crew Foreman, installers and other key Contractor's Personnel shall possess the necessary certification, licensing, training, experience and familiarity with safety rules, procedures and hazards relating to the work. Journeyman Power Line Technician (PLT), Journeyman Lineman, Journeyman Cableman or Journeyman Electricians shall be required to perform portions of this work.
- E29.6.2 Journeyman Power Line Technician (PLT), Journeyman Cableman and Journeyman Lineman are also required to possess a "Limited Specialized Trade Licence – 'M-P' Licence – Power Line" issued by the Province of Manitoba.
- E29.6.3 Office of the Fire Commissioner Bulletin OFC 18 – 002 dated May 23, 2018 regarding Electrician Licenses discusses the requirements for a "Limited Specialized Trade Licence – 'M-P' Licence – Power Line".

For more information contact:
Office of the Fire Commissioner
500-401 York Avenue
Winnipeg, Manitoba R3C 0P8
Tel. 204-945-3373
Fax 204-948-2089
Toll Free: 1-800-282-8069
firecomm@gov.mb.ca

- E29.6.4 Licensed Journeyman Electricians or Journeyman PLT or Journeyman Cableman or Journeyman Lineman ARE REQUIRED for all cable handling operations included but not limited to: disconnecting cables in the handhole, installation and removal of temporary overhead feeds, installation and connection of ground rods, streetlight cable splices, termination of streetlight cables in handholds and at luminaires. The Contractor shall employ sufficient qualified personnel on its crews to conform to the Electrician's Licensing Act. The Contractor shall be prepared to provide proof of licences to Manitoba Hydro upon request.
- E29.6.5 The Contractor shall assess the hazards associated with the work and have documented Safe work Procedures to perform the work. It is the Contractor's responsibility to train employees on these procedures. The Contractor shall be prepared to provide proof of training to Manitoba Hydro upon request.

E29.7 REFERENCED STANDARD CONSTRUCTION SPECIFICATIONS

- E29.7.1 In addition to these Specifications, the work to be performed by the Contractor relative to the installation and/or replacement of street lighting poles, concrete bases and associated cabling shall be in accordance with the following:
- (a) Manitoba Hydro 66kV and Below Standards;
 - (b) CSA C22.3 No. 7 (latest edition);
 - (c) Canadian Electrical Code (CEC) Part 1 (latest edition); and
 - (d) Any other applicable codes
 - (e) (collectively, the "Standards")
- E29.7.2 Revisions and updates to the Manitoba Hydro 66kV and Below Standards are issued periodically and the latest issued version of the Standard will apply. For the convenience of the Contractor for bidding purposes, excerpts of the Manitoba Hydro 66kV and Below Standards have been included as Appendix A.
- E29.7.3 In some cases, Municipal, Provincial or Federal laws or this Technical Specification may be more stringent than the CSA Standards. Whenever conflict exists, the Contractor shall comply with the most stringent requirements applicable at the place of the work.

E29.8 TOOLS, EQUIPMENT AND MATERIALS

E29.8.1 The Contractor shall be required to provide all tools and equipment required for performing the specified tasks. Equipment shall be in good operating condition, shall be properly maintained using original equipment manufacturer replacement parts and shall be provided with letters of testing/inspection from the manufacturer when requested. Where the equipment is provided as a kit with multiple parts and tools, the kit shall be complete with all parts required to perform the designed task. Contractor fabricated tools or equipment will not be accepted for use.

E29.8.2 The Contractor shall obtain the following specific Electrical Equipment including but not limited to:

- (a) Compression tool or tools and associated dies to perform compressions to a maximum size of 1/0 Al (MD-6 compression tools shall not be used).
- (b) Approved compression tools are:

Manufacture	Type	Model No.	Range
Burndy	In-line, battery	PATMD68-14V	350 Kcmil AL
Cembre	In-line, battery	B54Y (06V081E)	4/0 AWG AL
Burndy	Pistol, battery	BUR PAT60018V	350 Kcmil AL

E29.8.3 Dies shall be of the type shown in Standard CD210-21 and CD 210-24 only, must have identical markings, and compression tool die must match die number stamped on connector.

- (a) Modiewark Model #4444 or Fluke 1AC-II Volt Alert potential Indicator
- (b) Voltage meter – Fluke model #T3C
- (c) Insulated wire cutters – used for cutting cable ends square.

E29.8.4 Alternative equipment manufacturers may be considered upon request by the Contractor and shall be approved for use by Manitoba Hydro prior to use.

E29.8.5 Manitoba Hydro may reject any tools or equipment that do not appear to be in good condition or fail to successfully provide the required function.

E29.9 MATERIAL SUPPLIED BY MANITOBA HYDRO

E29.9.1 Manitoba Hydro shall supply all street light poles, concrete bases, breakaway bases, luminaires, street light arms, ground rods, compression sleeves, grommets, nuts, electrical cables, conduits, relays, cable guards, Gel-caps and all other materials noted in the Standards. The Contractor shall sign receipts indicating the location on which the materials are to be used. The material shall be picked up by the Contractor from the following locations:

E29.9.2 Manitoba Hydro Central Stores (contact personnel will be provided to the successful Contractor).

E29.9.3 Materials requested will be supplied to the Contractor by Manitoba Hydro upon presentation of Manitoba Hydro's Stores Material Order Form. The Contractor shall assume all responsibilities for the loading, unloading, transportation, proper handling, secure storage and working of the materials and shall make replacements at its own expense in case any material is damaged, stolen or lost due to improper handling, storage or poor workmanship.

E29.9.4 The Contractor shall, at the time of materials release, check and confirm the quantity of materials. Shortages, discrepancies, or damages to materials shall be immediately reported in writing to Manitoba Hydro.

E29.9.5 After commencing performance of the work, the Contractor shall continually monitor all material required for the timely completion of the work and shall report additional material requirements to Manitoba Hydro a minimum of 72 hours prior to materials being required to perform the work. No additional compensation shall be paid as a result of delays due to

material shortages where additional material requirements were not reported a minimum of 72 hours prior to being required for the work on an active project.

E29.10 MATERIAL SUPPLIED BY CONTRACTOR

E29.10.1 The Contractor shall be responsible to furnish gravel, sand, ¾" down limestone, ¼" down limestone, protective hose (i.e. typically 2" fire hose), duct seal and pit-run material for backfilling around street light poles and around cables as per the Standards. The cost of furnishing the above listed materials shall be incorporated into the unit prices for the work.

E29.11 SURPLUS, RECLAIM AND SCRAP MATERIAL

E29.11.1 Upon completion of the work, the Contractor shall, at its own expense, deliver to Manitoba Hydro Central Stores, all Surplus materials furnished by Manitoba Hydro and not used in the work, regardless of the location of said material at that time.

E29.11.2 In addition, the Contractor shall, at its own expense, deliver to Manitoba Hydro Central Stores all Reclaim materials from the work specifically HPS luminaires. Manitoba Hydro shall be responsible for the proper disposal of Reclaim HPS luminaires. The HPS bulb shall remain installed and unbroken in the Reclaim luminaire. The Contractor shall handle the Reclaim luminaires with care and shall avoid breaking the bulb or refractor.

E29.11.3 Manitoba Hydro's preference is to recycle as much Scrap Material as practicable. The Contractor is responsible to remove the Scrap Material, transport to the recycler or Manitoba Hydro approved disposal site, pay for any disposal fees and may retain any recycling value.

E29.12 DE-ENERGIZATION AND LOCKOUT

E29.12.1 **Manitoba Hydro** - Where a standard is supplied from an Overhead Source, Manitoba Hydro's staff shall be responsible to disconnect and isolate the street light standard or standards between the standard and Overhead Source. Some street light standards may be temporarily fed from an Overhead Source. This Overhead Source shall be disconnected and removed by Manitoba Hydro staff prior to commencing with the work. The streetlight circuits will not be Locked Out by Manitoba Hydro.

E29.12.2 **The Contractor** - The Contractor shall assess the hazards associated with the work and employ its own Safe Work Procedure for the work to be performed. The Contractor's Safe Work Procedure shall include provisions that the street light circuits will not be Locked Out by Manitoba Hydro. The Contractor's Safe Work Procedure shall achieve Lock Out or techniques equivalent to Lock Out.

E29.12.3 The Contractor shall complete a job planning form (an example is included as Appendix E) on a daily basis before any work commences and provide Manitoba Hydro with copies of the job plans if requested.

E29.13 TEMPORARY OVERHEAD FEEDS

E29.13.1 Manitoba Hydro in consultation with the Contractor will determine if temporary lighting will be provided by the existing street lights or from the new street lights.

E29.13.2 When using the existing poles for temporary lighting, Manitoba Hydro shall remove an Overhead Source in accordance with DE-ENERGIZATION AND LOCKOUT section above, prior to the Contractor installing a #4 duplex overhead conductor between the existing poles. The #4 duplex overhead conductor will normally be attached to the tenon of the davit arm near the luminaire with a pre-form grip. Older poles may require a spool insulator be attached to the pole using a pre-form grip to support the #4 duplex overhead conductor. A short length of 2C/#12 copper conductor is connected to the terminals of the luminaire brought out and connected to the #4 duplex overhead conductor. The final span to the Overhead Source shall be installed by Manitoba Hydro.

E29.13.3 When using the new poles for temporary lighting, the Contractor shall install the new bases, poles and #4 duplex overhead conductor. The #4 duplex overhead conductor will be attached to the tenon of the davit arm near the luminaire with a pre-form grip. A short

length of 2C/#12 copper conductor is connected to the terminals of the luminaire brought out and connected to the #4 duplex overhead conductor. The final span to the Overhead Source shall be installed by Manitoba Hydro.

E29.13.4 All material used to provide the temporary overhead feed shall be returned to Manitoba Hydro. Care shall be taken to coil and tag Reclaim conductor for reuse. If used, insulators shall be handled carefully to prevent breakage.

E29.14 SAFE EXCAVATION

E29.14.1 The work shall be performed in accordance with the requirements of Manitoba Hydro's Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B and Manitoba Workplace Safety and Health Regulation 217 latest revision.

E29.15 SAFE HANDLING

E29.15.1 The Contractor shall apply handling techniques in accordance with Manitoba Workplace Health and Safety Regulation 217 (latest revision).

E29.16 ELECTRIC CABLES AND CONDUITS

- (a) The Contractor shall use diligent care and proper equipment in handling of all cables, so as not to injure the jacket and avoid gouging, kinking, scratching or abrading the cables. If any material is damaged to any extent, the Contractor shall repair the damages at its own expense, in a manner approved by Manitoba Hydro or will be charged the full cost of the damaged items.
- (b) Cable reels shall not be dropped and must be handled and placed/stored in an upright position at all times and shall not be laid flat for any purpose or reason. Cable reels shall be adequately supported on hard surface to prevent the reel from sinking into the ground that can cause undue stress on the cables. Cable reels should be inspected for damages prior to use. If a cable reel is found to be defective, such defect shall be reported immediately to Manitoba Hydro.
- (c) The Contractor shall place all material and string the cables in such a manner as to cause the least interference with normal use of the land, street or roadway. All material shall be unloaded in a manner to preserve its condition, prevent loss and/or theft and permit easy access for Manitoba Hydro's inspection.
- (d) The Contractor shall provide Manitoba Hydro's inspector sufficient opportunity, in the sole discretion of Manitoba Hydro, to inspect the work.

E29.17 PRECAST CONCRETE BASES

E29.17.1 The Contractor shall handle, store, transport and unload the precast concrete bases in a manner to prevent damage to the threaded bolts and conduit casing.

E29.17.2 Precast Concrete Bases are extremely heavy. Approximate weight of pre-cast concrete bases are found in the Standards. The Contractor shall only use equipment rated for such weight.

E29.18 STREET LIGHT POLES AND ARMS

E29.18.1 The Contractor shall handle, store, transport, and provide proper load securement for the poles and arms in a manner to prevent damage.

E29.19 LUMINAIRES

E29.19.1 The Contractor shall handle, store, transport and unload the luminaires in their original packaging and in a manner to prevent damage.

E29.20 SMALL MATERIAL

E29.20.1 Photo electric cells, shorting caps, shims, nut covers and associated supplies shall be kept in a suitable warehouse provided by the Contractor at its own expense. Photo electric cells shall be transported and stored in such a manner as to prevent breakage.

E29.21 CARE OF MATERIALS

E29.21.1 The Contractor shall assume all responsibilities of all the materials and shall replace, at its own expense, any materials damaged, stolen or lost due to improper handling or poor workmanship.

E29.22 WIRE AND CABLE REEL STORAGE

E29.22.1 Cable reels shall be stored with the flanges upright and resting on a hard surface. At temporary storage sites where the soil may be soft, preservative-treated plywood sheets may be used to keep the flanges from sinking into the ground.

E29.22.2 If cable reels must be pancaked or stored on their side in vertical racks, do not lift the reel by the top flange. Spacers (two 2 X 4s placed wide side up) should be placed under the bottom flange and between the reels in order to create a space to insert the forks and lift the reels without damaging the cable.

E29.23 REEL HANDLING

E29.23.1 When off-loading reels from a truck, reels shall be lowered using a hydraulic gate, hoist or forklift truck. When a reel is rolled from one point to another, care must be taken to see that the reel does not straddle objects such as rocks, pipes, curbs or wooden blocks which could damage the cable or protective covering. A reel should always be rolled on hard surfaces to avoid sinkage and in the opposite direction to the cable wraps to ensure that the reel is rolled in such a direction as to tighten the cable on the reel.

E29.23.2 When using a hoist, install a mandrel through the reel arbour hole and attach a sling. Use a spreader bar approximately 6 inches longer than the overall reel width placed between the sling ends just above the reel flanges. This will prevent bending of the reel flanges and damage to the cable.

E29.23.3 If a forklift is used to move a reel, the reel is to be approached from the flange side. Position the forks such that the reel is lifted by both reel flanges. The lift forks shall not contact the cable.

E29.23.4 Returnable reels shall be returned promptly to Manitoba Hydro Central Stores and in no case later than three (3) days after the completion of the work unless otherwise mutually agreed between the Contractor and Manitoba Hydro.

E29.24 PRESSURIZED WATER/VACUUM EXCAVATION

E29.24.1 Pressurized water/vacuum excavation (PW/VE) shall be used to daylight all buried utilities and structures where excavation by other mechanical means would be expected to provide a physical risk to that utility or structure.

E29.24.2 The work shall be performed in accordance with the requirements of Manitoba Hydro's Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B.

E29.25 REMOVAL STREET LIGHT POLE FROM EXISTING BASE

E29.25.1 This shall include all work required to remove a street light pole from an existing base as set forth in this Technical Specification. The pole may be on an existing precast concrete base, steel power installed screw base or poured in place concrete base.

E29.25.2 The Contractor shall furnish all labour, supplies and materials (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary for the removal of the street light pole from the existing base. Care shall be taken to preserve the luminaire. The luminaire shall be reinstalled on the new street light pole or returned to Manitoba Hydro's stores as instructed by the Manitoba Hydro.

E29.25.3 The Contractor shall be responsible to transport all Surplus and Reclaim materials to Manitoba Hydro Central Stores and transport and dispose of all Scrap material as set forth in this Specification.

E29.26 REMOVAL OF BASE AND DIRECT BURIED STREET LIGHT POLE

- E29.26.1 This shall include all excavation, whether by auger, pressurized water/vacuum excavation, by hand, or by other methods which may be necessary to remove a base or direct buried street light pole. The base may be poured in place concrete, steel power installed or precast concrete.
- E29.26.2 The Contractor shall be responsible to transport all Surplus and Reclaim materials to Manitoba Hydro Central Stores and transport and dispose of all Scrap material as set forth in this Specification.
- E29.26.3 The Contractor is responsible to supply all backfill material as specified in the Standards and carry out all backfill, compacting and leveling of all excavations and voids for removed bases and direct buried street light poles so as to be ready for top soil and seed or sod or as directed by Manitoba Hydro.

E29.27 INSTALLATION OF FOUNDATION - CONCRETE BASE

- E29.27.1 This shall include all excavation, whether by auger, pressurized water/vacuum excavation, by hand, or by other methods which may be necessary to replace or install a concrete base as set forth in this Specification.
- E29.27.2 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary to install a new or replace a concrete base. Excavation for the precast concrete base shall be to a diameter and depth specified in Standard CD 300-6. All excess material is to be removed by the Contractor.
- E29.27.3 The concrete base shall be set on a bed of $\frac{3}{4}$ " down limestone. The concrete base backfill material shall be compacted in lifts no more than 150 mm. Backfill material shall be $\frac{3}{4}$ " down limestone. Compacting of backfill material shall be done using a hydraulic tamper. Alternative tamping methods shall be approved by Manitoba Hydro. Underground cables entering the concrete base shall be protected by a length of protective hose supplied by the Contractor and a layer of sand surrounding the cables to protect it from the limestone. The concrete base shall be installed level in all 4 directions. Final grade must be established prior to installing the concrete bases.
- E29.27.4 The completed backfill shall be at least equal in compaction to undisturbed soil, as required by the Municipal authorities or elsewhere in this Specification. The Contractor shall level all excavations.
- E29.27.5 Should settlement occur in the excavation and cause a depression in the surface, the Contractor shall repair the surface. Placing of additional backfill material due to settlement shall be at the Contractor's expense.
- E29.27.6 The concrete base shall be oriented in the proper direction to allow the easy entrance of the underground cables into the plastic pipe preinstalled in the concrete base. Care shall be taken to prevent damage to the insulation or jacket of the conductors. The cable shall be left long enough to extend one (1) metre beyond the top of the hand hole.

E29.28 BASE MOUNTED STREET LIGHT POLES

- E29.28.1 This shall include all work required to install the street light pole on the concrete base as set forth in this Specification.
- E29.28.2 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary for the installation of the pole (straight shaft or davit) on the concrete base.
- E29.28.3 Unless otherwise specified on the construction drawings, the Contractor shall orient the poles so that the hand hole is on the left side of the pole when viewed from the road. A worker should be able to see oncoming traffic when working in the hand hole.
- E29.28.4 The Contractor shall level the street light pole in all 4 directions. Leveling shims may be used.

- E29.28.5 Tightening of bolts shall be performed in a manner that brings the surfaces up evenly. All nuts shall be tightened and torqued in accordance with Standard CD 300-9. The Contractor shall install the nut covers included with the pole.
- E29.28.6 Unless otherwise specified, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.
- E29.28.7 Existing street light poles may have street signs attached. The Contractor shall remove the signs from the existing pole and temporarily reattach the signs to the new pole. The Contractor shall notify Manitoba Hydro of the location where the signs have been removed.

E29.29 LUMINAIRES AND ASSOCIATED WIRING

- E29.29.1 The Contractor shall furnish labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary to install the luminaire and associated wiring. Unless otherwise specified, the luminaire shall be installed with a tilt of zero (0) degrees. The Contractor shall install a length of 2 conductor No. 12 gauge (2C-12) wire from the terminals of the luminaire, through the arm (if applicable), down the pole to the hand hole. One (1) metre of 2C-12 wire shall be left at the hand hole. Impact equipment (air or electric) shall not be used to tighten luminaire mounting bolts. The Contractor shall be liable for damage due to over tightening.
- E29.29.2 The Contractor shall verify the luminaire voltage matches the source voltage as shown on the construction drawings. If luminaire voltage does not match the source voltage, the Contractor shall re-wire the luminaire in accordance with the wiring diagram provided.
NOTE: Not applicable for LED luminaires.
- E29.29.3 As specified on the construction drawings, the luminaire will require either a photo electric cell (PEC) or shorting cap installed. When installing the PEC the eye shall be oriented north. The Contractor shall also install the appropriate wattage bulb in the luminaire.
NOTE: Bulb installation not applicable for LED luminaires.

E29.30 BREAK AWAY BASES

- E29.30.1 Break away bases shall be installed in accordance with Standard CD 300-10. The height of the concrete base above grade shall not exceed 50mm. The surface of the concrete base shall be flat and level. A reaction plate shall be installed between the concrete base and the break-away base.
- E29.30.2 The Contractor shall torque the couplers in accordance with Standard CD 300-10. Impact tools shall not be used to tighten or torque couplers or nuts associated with a break away base.

E29.31 SPLICING/CONNECTING CABLES

- E29.31.1 The electric cable shall be spliced/terminated as per Standards CD 215-12, CD 215-13, CD 310-1, CD 310-4, CD 310-9 and CD 310-10 with the exception that the Contractor will use a GELCAP-SL-2/0 splice kit (See Appendix C). Termination in the hand hole may include the installation of an inline fuse holder.
- E29.31.2 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary to splice/terminate the street light conductor(s).

E29.32 EXCAVATION

- E29.32.1 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary for the completion and maintenance of grade and line of the street light cables and conduit including water control if found to be necessary. The trench shall be graded to conform to the street light cables and conduit so that the street light cables and conduit rest firmly on a smooth surface throughout its length. All stones or other objects which, in the opinion of Manitoba Hydro might damage the street light cable jacket and conduit shall be removed. Where the presence of rock or other condition prevent a satisfactory bed for the cables, 150 mm of

well-tamped, clean soil or ¼" down crushed limestone shall be placed in the bottom of the trench. In this case, the spoil bank from trenching operations shall not be allowed to fall into the trench or mix with the soil to be used in backfilling the trench. Loose debris or foreign matter and the spoil bank shall be placed so as not to hinder drainage, damage property, or obstruct traffic.

E29.32.2 Trenches shall be dug to such a depth that will provide a minimum cover of 600 mm from final grade in sodded areas and 1000 mm in roadways in accordance with Standard CD 305-1.

E29.33 LAYING CABLES

E29.33.1 Cables are to be lowered in the trench in an orderly fashion so as to maintain a consistent path and straight alignment. All cables shall be lowered in a continuous run (NO SPLICING) and in accordance with the construction drawings; and shall maintain the necessary separation, where required. All cables shall be of continuous runs and capped and sealed if they are not being installed in the pole at that time. Cables shall not be dragged over paved surfaces.

E29.33.2 Once a cable is cut its ends must be sealed immediately with an approved and appropriately sized, heat shrink or cold shrink sealing cap to prevent moisture ingress unless the cable is being installed in the pole at that time.

E29.33.3 During the removal of the cable, the reels shall be placed on jacks, stands or trailers with a bar through the arbour holes which will allow the reel to be turned easily, and the cable to be paid out. Cables can be paid out from the bottom or the top of the reel. Cable in coils shall be handled in a similar manner. This can be achieved by supporting the coil in a vertical plane and rotating it by hand as the cable is carefully uncoiled. The cable shall never be pulled over the flange of a reel, or pulled off the side of a coil, since this will introduce a twist in the cable.

E29.33.4 During installation, under no circumstance is the cable to be subjected to a bending radius tighter than that detailed in the Standards.

E29.33.5 Where specified in the Standards or on the construction drawings, the Contractor shall install the street light cable in a conduit.

E29.34 INSTALLING CONDUIT AND CABLE BY BORING (HORIZONTAL DIRECTIONAL DRILLING)

E29.34.1 The Contractor shall dig the approaches and openings necessary to install boring equipment, and the boring equipment used shall be of such a nature as to minimize the opening size required. The boring equipment shall produce a straight hole without unnecessary dips or bends. The bore hole shall be only slightly larger than the outside diameter of the conduits or cables to minimize possible settlement. Cables and conduits shall be pulled in with pulling eyes or using a kelly grip in a manner so as to guard against damage.

E29.34.2 During construction as the drill bit crosses each existing facility a lookout shall be assigned by the Contractor to visually confirm the drill bit is maintaining a minimum 300 mm clearance from the existing facility all in accordance with Manitoba Hydro Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B. Maximum pulling tensions on any streetlight cable shall be limited to 2.9 kN/0.65 kips.

E29.34.3 Drilling fluids and associated waste materials shall be disposed of in a manner that minimizes environmental effects.

E29.34.4 The Contractor shall properly compact the backfill material and will be responsible for placing additional material should settlement occur for the duration of the warranty period.

E29.35 BURIED UTILITY CROSSINGS

E29.35.1 All buried obstructions are not necessarily shown on the reference drawings and the locations of those indicated are approximate only.

- E29.35.2 The Contractor shall determine the location of all buried obstructions and shall notify the appropriate authorities and obtain all necessary permits prior to excavation, trenching and directional drilling near or across such obstructions. All buried obstructions where the new buried cable route crosses other utilities including but not limited to gas, water, sewer, telephone and electric lines shall be exposed as per each utilities guidelines by the Contractor, including the use of Pressurized Water/Vacuum Equipment (PW/VE) where necessary. Should any damage occur to such lines during the course of the work, the Contractor shall be responsible for the damage and the costs of repairs to buried obstructions caused by its operations and shall fully indemnify the City of Winnipeg and Manitoba Hydro from and against all claims arising out of such damage. Manitoba Hydro Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B shall be followed when crossing natural gas pipelines and electrical cables by the directional boring method.
- E29.35.3 The PW/VE technique, used to expose underground plant in certain conditions, must be performed in accordance with each utility's requirements, including but not limited to Manitoba Hydro, Manitoba Telecom Services, Shaw Cable, etc. PW/VE costs that the Contractor will incur during the work must be factored into the Contractor's bid prices. The Contractor shall not be entitled to extra compensation for the use of PW/VE on the work.
- E29.35.4 The Contractor shall be responsible to supply all backfill material and carry out all backfill, compacting and leveling of all excavations so as to be ready for topsoil and seed or sod or as directed by Manitoba Hydro.

E29.36 BENDING CABLES/CONDUITS AND INSTALLATION INTO STANDARDS

- E29.36.1 It is desired to reduce to a minimum the required number of bends and to lay the cables/conduits to conform to the contour of the ground and maintain a normal covering. This shall be accomplished by cutting the trench slightly deeper in approaches to road crossings and drainage ditches. It is intended that the Contractor shall eliminate unnecessary bending by operating the trenching machine at various depths rather than by finishing grading the trench by hand whenever practical.
- E29.36.2 Sharp bends of the cables/conduits shall be avoided at all times. All bends shall meet the requirements set out in this Specification. If excessive bending was exerted on any cable, the cable shall be replaced at the Contractor's cost. During installation, under no circumstance is the cable to be subjected to a bending radius tighter than that detailed in the Standards. At street light poles the Contractor shall install the ends of the cables into the plastic pipe preinstalled in the concrete base. Care shall be taken to prevent damage to the insulation or jacket of the conductors. Underground cables entering the concrete base shall be protected by a length of protective hose supplied by the Contractor and by a layer of sand surrounding the cables to protect it from the limestone. The cable shall be left long enough to extend one (1) metre beyond the hand hole. The street light cable in the trench shall be installed in conduit for mechanical protection and the ends sealed with duct seal supplied by the Contractor. Care shall be taken to prevent damaging the cable where it exits the conduit. The conduit shall only be installed into the concrete base if conduit sizes make it practicable.
- E29.36.3 Unless otherwise directed, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.

E29.37 BACKFILL

- E29.37.1 All backfilling material within 300 mm of the cables/conduits shall be clean, free of sod, vegetation, organic material, stones or other debris, and of a consistency as to not create significant voids or air spaces around the cables/conduits. Other backfilling material shall be free of stones greater than 150 mm on their maximum dimension. Where cinders or very acid soil are encountered or where gravel or incompressible fill is required by Municipal authorities, ¼" down crushed limestone shall be placed all around the cables for a depth of at least 300 mm. The completed backfill shall be at least equal in compaction to undisturbed soil or as directed by Manitoba Hydro. Backfill material is to be placed and

compacted in lifts not exceeding 300 mm. All excess material is to be removed by the Contractor.

- E29.37.2 Tamping or flushing methods must be used where necessary to give the required compaction. Where tamping is used, hand tampers shall be used to at least 300 mm above the cable before machine tamping may be used. The Contractor shall level all excavations so as to be ready for topsoil and seed or sod or as directed by the Manitoba Hydro. Should settlement occur in the excavation and cause a depression in the surface, the Contractor shall repair the surface to the satisfaction of the Manitoba Hydro at the Contractor's cost.
- E29.37.3 Excavations remaining where poles have been removed shall be backfilled with spoil, pit run gravel or ¾" down limestone and compacted in lifts of 150mm as directed by Manitoba Hydro. The top 300 mm of the excavation shall be backfilled with topsoil.
- E29.37.4 Excavations remaining where utility crossings have been exposed shall be backfilled with sand or clean spoil and compacted in lifts of 150mm. The top 300 mm of the excavation shall be backfilled with topsoil.
- E29.37.5 Backfill of all excavations shall be in accordance with City of Winnipeg Standard Construction Specification CW 2030 (latest revision), to the satisfaction of the authority having jurisdiction and Manitoba Hydro.

E29.38 DEFECTIVE WORK & WARRANTY

- E29.38.1 If any portion of the work fails to comply with the requirements of this Specification, fails within the Warranty period, or if the final tests prove or indicate the existence of any fault or defect in the work, or any part thereof, Manitoba Hydro may forthwith re-execute or make good the faulty or defective work or alter the same to make it comply with requirements of the Specification at the Contractor's expense. Manitoba Hydro shall give the Contractor notice together with particulars of such failure, fault or defect, Manitoba Hydro's cost to re-execute or make good the faulty or defective work and the Cost shall be deducted from the Contract.
- E29.38.2 At the completion of the work for each location, Manitoba Hydro shall prepare and issue a Network Commissioning Report, a sample of which is included as Appendix F, to the Contractor. The Network Commissioning Report shall be dated indicating the commencement of the Warranty period for the work performed at the location.

E29.39 AS-BUILT DRAWING

- E29.39.1 The Contractor shall provide an as-built drawing or mark-up drawing to Manitoba Hydro which accurately displays the "as-built" location of the buried street light cables, conduits and street light poles.

E29.40 MEASUREMENT AND PAYMENT

- E29.40.1 Removal of 25' to 35' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Removal of 25' to 35' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including removal of the pole, base, luminaire, appurtenances, use of pressurized water/vacuum excavation, transportation of Reclaim, Surplus and Scrap material, payment of associated disposal fees and all other items incidental to the work included in the Specification.
- E29.40.2 Removal of 45' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Removal of 45' street light pole and precast, poured in place concrete,

steel power installed base or direct buried including davit arm, luminaire and appurtenances". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including removal of the pole, base, luminaire, appurtenances, use of pressurized water/vacuum excavation, transportation of Reclaim, Surplus and Scrap material, payment of associated disposal fees and all other items incidental to the work included in the Specification.

- E29.40.3 Installation of Conduit and #4 AL C/N or 1/0 AL Triplex Streetlight Cable in Conduit by Open Trench Method
- (a) This pay item will be measured on a linear metre basis and paid for at the Contract Unit Price per linear metre for "Installation of Conduit and #4 AL C/N or 1/0 AL Triplex streetlight cable in Conduit by open trench method." The number of meters to be paid for at the Contract Unit Price shall be measured and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the conduit, pulling cable into the conduit, backfilling the trench, buried utility crossings, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E29.40.4 Installation of 50 mm Conduit by Boring Method complete with Cable Insertion (#4 AL C/N or 1/0 AL Triplex)
- (a) This pay item will be measured on a linear metre basis and paid for at the Contract Unit Price per linear metre for "Installation of 50 mm conduit or conduits by boring method complete with cable insertion (#4 AL C/N or 1/0 AL Triplex)." The number of meters to be paid for at the Contract Unit Price shall be measured and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of 50mm conduit or conduits by boring method, inserting the #4 AL C/N or 1/0 AL Triplex streetlight cable into the conduit(s), buried utility crossings, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E29.40.5 Installation of cable (#4 AL C/N or 1/0 AL Triplex) by boring method.
- (a) This pay item will be measured on a linear metre basis and paid for at the Contract Unit Price per linear metre for "Installation of cable(s) (#4 AL C/N or 1/0 AL Triplex) by boring method." The number of meters to be paid for at the Contract Unit Price shall be measured and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the cable or cables by boring method, buried utility crossings, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E29.40.6 Installation of 25'/35' Pole, Davit Arm and Precast Concrete Base Including Luminaire and Appurtenances
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of 25'/35' pole, davit arm and precast concrete base including luminaire and appurtenances." The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the pole, davit arm, base, luminaire, appurtenances, placing the cable(s) into the base, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E29.40.7 Installation of 45' Pole, Davit Arm and Precast Concrete Base Including Luminaire and Appurtenances
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of 45' pole, davit arm and precast concrete base including luminaire and appurtenances." The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the pole, davit arm, base, luminaire, appurtenances, placing the cable(s) into the base, use of

pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.

- E29.40.8 Installation of One (1) 10' Ground Rod at Every Third Street Light, at the End of a Street Light Circuit or Anywhere Else as Shown on the Design Drawings. Trench #4 Ground Wire up to 1 m From Rod Location to New Street Light and Connect (Hammerlock) to Top of Ground Rod
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of one (1) 10' ground rod at every third street light, at the end of a street light circuit or anywhere else as shown on the design drawings. Trench #4 ground wire up to 1 m from rod location to new street light and connect (hammerlock) to top of the ground rod." The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including install one (1) 10' ground rod, trench the #4 ground wire to the new streetlight pole, connect (hammerlock) ground wire to rod and all other items incidental to the work included in the Specification.
- E29.40.9 Installation of Lower 3 m of Cable Guard, Ground Lug, Cable Up Pole, and First 3 M Section of Ground Rod Per Standard CD 315-5
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Install/lower 3 m of Cable Guard, ground lug, cable up pole, and first 3 m section of ground rod per Standard CD 315-5". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installing the lower section of cable guard, ground lug, ground rod, coiling cable(s) up the pole and all other items incidental to the work included in the Specification.
- E29.40.10 Installation and Connection of Externally-Mounted Relay and PEC Per Standards CD 315-12 and CD 315-13
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation and connection of externally-mounted relay and PEC per Standards CD 315-12 and CD 315-13". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including mounting the relay, PEC, wiring as per the schematic and all other items incidental to the work included in the Specification.
- E29.40.11 Termination of 2/C #12 Copper Conductor to Street Light Cables Per Standard CD310-4, CD310-9 or CD310-10
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Terminate 2/C #12 copper conductor to street light cables per Standard CD310-4, CD310-9 or CD310-10". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including connection of the 2/C # 12 copper conductor to the #4 C/N or 1/0 Al Triplex cable(s) using a GELCAP-SL-2/0 splice kit and all other items incidental to the work included in the Specification.
- E29.40.12 Splicing #4 AL C/N or 2 Single Conductor Street Light Cables
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Splicing #4 Al C/N or 2 single conductor street light cables". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including splicing the #4 AL C/N or 2 single conductor cables in accordance with Standard CD 215-12 and CD 215-13 and all other items incidental to the work included in the Specification.
- E29.40.13 Splicing 1/0 AL Triplex Cable or 3 Single Conductor Street Light Cables

- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Splicing 1/0 AL triplex cable or 3 single conductor street light cables". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including splicing the 1/0 Al triplex cable or set of 3 single conductor cables in accordance with Standard CD 215-12 and CD 215-13 and all other items incidental to the work included in the Specification.
- E29.40.14 Installation of Break-Away Base and Reaction Plate on Base-Mounted Poles up to 35'
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of break-away base and reaction plate on base mounted poles up to 35'". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the reaction plate, break-away base and all other items incidental to the work included in the Specification.
- E29.40.15 Installation of Overhead Span of #4 Duplex Between New or Existing Streetlight Poles and Connect Luminaire to Provide Temporary Overhead Feed
- (a) This pay item will be measured on per span basis and paid for at the Contract Unit Price per span for "Installation of Overhead Span of #4 duplex Between New or Existing Streetlight Poles and Connect Luminaire to Provide Temporary Overhead Feed". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including attachment of the #4 duplex overhead conductor using a perform grip (c/w spool insulator(s) to davit arm if necessary), sagging conductor, connection of luminaire using 2C#12 copper conductor and all other items incidental to the work included in the Specification.
- E29.40.16 Removal of Overhead Span of #4 Duplex Between New or Existing Streetlight Poles to Remove Temporary Overhead Feed
- (a) This pay item will be measured on a per span basis and paid for at the Contract Unit Price per span for "Removal of Overhead Span of #4 duplex Between New or Existing Streetlight Poles to Remove Temporary Overhead Feed". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by the Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including removal of the #4 duplex overhead conductor, spool insulator(s) and all other items incidental to the work included in the Specification.
- E29.40.17 Expose Underground Cable Entrance of Existing Streetlight Pole and Install New Streetlight Cable(s).
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Expose Underground Cable Entrance of Existing Streetlight Pole and Install New Streetlight Cable(s)". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including excavation and exposure of the underground cable entrance by any means necessary including use of pressurized water/vacuum excavation, installation of the new streetlight cables(s), backfill, compaction and all other items incidental to the work included in the Specification.