



THE CITY OF WINNIPEG

TENDER

TENDER NO. 252-2021

**2019-2023 STAFFORD/TAYLOR/CORYDON PAVEMENT RENEWALS – TENDER 2
2022-2023**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2019-2023 Stafford/Taylor/Corydon Pavement Renewals – Tender 2 2022-2023

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, January 31, 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 D3.1.

B3.2 If the Bidder finds errors, discrepancies or omissions in the Tender, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.

B3.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Tender will be provided by the Contract Administrator to all Bidders by issuing an addendum.

B3.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Tender will be provided by the Contract Administrator only to the Bidder who made the enquiry.

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

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 D3.

B6. SUBSTITUTES

- B6.1 The Work is based on the Plant, Materials and methods specified in the Tender.
- B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.
- B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;
 - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
 - (c) identify any anticipated cost or time savings that may be associated with the substitute;
 - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;
 - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.
- B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.
- B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.
- B6.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.

- B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B17.
- B6.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B7. BID COMPONENTS

- B7.1 The Bid shall consist of the following components:
- (a) Form A: Bid;
 - (b) Form B: Prices;
 - (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.

B9.2 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.

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) Bayview Construction Ltd - Discussed contractor input for risks associated with constructability related to soil conditions and shallow utilities. Discussed feasibility to complete works within allowable windows.
- (b) Maple Leaf Construction - Discussed contractor input for risks associated with constructability related to soil conditions and shallow utilities. Discussed feasibility to complete works within allowable windows.

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).

B12.4 Further to B12.3(c), the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

- (a) Written confirmation of a safety and health certification meeting SAFE Work Manitoba's SAFE Work Certified Standard (e.g., COR™ and SECOR™) in the form of:
 - (i) a copy of their valid Manitoba COR certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Certificate of Recognition (COR) Program administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or
 - (ii) a copy of their valid Manitoba SECOR™ certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Small Employer Certificate of Recognition Program (SECOR™) administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or
- (b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>).

B12.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B12.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B13. BID SECURITY

B13.1 The Bidder shall 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.

B17.3 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 The Work of this Contract is contingent upon Council approval of sufficient funding in the 2022 Capital Budget. If the Capital Budget approved by Council does not include sufficient funding for the Work, the City will have no obligation to award a Contract.

B18.4 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B17.

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

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Construction* (Revision 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. SCOPE OF WORK

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

(a) 2022

(i) Stafford Street – Pavement Reconstruction

- ◆ Ebby Avenue to Scotland Avenue, southbound lanes
- ◆ Scotland Avenue to Corydon Avenue, all lanes

(ii) Harrow Street – Asphalt Path Construction

- ◆ Construct asphalt pathway and cycling facilities on Harrow Street from Taylor Avenue south to connect to the existing asphalt path at the Pembina Hwy Underpass at Jubilee Avenue

(b) 2023

(i) Stafford Street – Pavement Reconstruction

- ◆ Pembina Highway to Ebby Avenue, all lanes
- ◆ Ebby Avenue to Scotland Avenue, northbound lanes

(ii) Taylor Avenue – Pavement Reconstruction

- ◆ Harrow Street to Pembina Highway

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

(a) Pavement Reconstruction

- (i) Watermain Renewal
- (ii) Removal of existing pavement
- (iii) Removal of existing streetcar tracks and bedding
- (iv) Construction of temporary asphalt pavement
- (v) Excavation
- (vi) Installation of subdrains
- (vii) Installation of streetlights and associated infrastructure
- (viii) Installation of Traffic Signal underground conduit, bases and pits
- (ix) Demolition of existing OHSS base
- (x) Installation of new OHSS base and cantilever and new crash cushion
- (xi) Compaction of existing sub-grade
- (xii) Installation of catch basins and sewer service pipe
- (xiii) Installation of watermain and water service insulation
- (xiv) Relocation/Adjustment of fire hydrants
- (xv) Repairs to existing sewers and manholes
- (xvi) Completion of mainline sewer repairs
- (xvii) Placement of separation fabric
- (xviii) Placement of geogrid
- (xix) Placement of sub-base and base course materials
- (xx) Adjustment of existing Utility Manhole Frames

- (xxi) Adjustment of existing pavement appurtenances
- (xxii) Construction of 250mm reinforced, dowel jointed concrete pavements
- (xxiii) Construction of 200mm reinforced concrete pavements
- (xxiv) Construction of 180mm integral barrier curb
- (xxv) Construction of concrete median
- (xxvi) Construction of splash strip
- (xxvii) Construction of sidewalks with block-outs
- (xxviii) Construction of Asphalt Pathway
- (xxix) Installation of paving stones
- (xxx) Renewal of existing sidewalk
- (xxxii) Regrading of private walkways (paving stones, concrete, exposed aggregate concrete)
- (xxxiii) Installation of thickened, reinforced sidewalk for Transit stop flags
- (xxxiv) Installation and modification of existing timber fencing
- (xxxv) Completion of boulevard grading
- (xxxvi) Installation of topsoil and sod

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is:

Kevin Rae, P.Eng.
Senior Project Transportation Designer

Telephone No. 204 478-8933

Email Address kevin.rae@stantec.com

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

D4. CONTRACTOR'S SUPERVISOR

D4.1 At the pre-construction meeting, the Contractor shall identify his/her designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

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

D5. NOTICES

D5.1 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.

D5.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D5.3 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D3.

- D5.3 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

D6. FURNISHING OF DOCUMENTS

- D6.1 Upon award of the Contract, the Contractor will be provided with 'issued for construction' Contract Documents electronically, including Drawings in PDF format only.

D7. WORK PRACTICES ON ASBESTOS-CEMENT PIPE

- D7.1 Further C6.28(d), the Contractor's attention is directed to the possible health dangers associated with working with asbestos cement pipe and all work associated with the existing AC watermains shall conform to the following publications:
- (a) "Work Practices for Asbestos-Cement Pipe", AWWA No. M16, published by the American Water Works Association; and
 - (b) "Recommended Work Practices for AC Pipe", 1977, published by the AC Pipe Producers Association.
- D7.2 The Contractor shall state in the "job specific safe work plan" the proposed procedure for working on AC pipe. The Contractor shall also provide proof of asbestos handling training or certification.

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

- D8.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D9. SAFE WORK PLAN

- D9.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.
- D9.2 The Safe Work Plan 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>
- D9.3 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.

D10. INSURANCE

- D10.1 The Contractor shall provide the insurance coverage to remain in place at all times during the performance of the Work and throughout the warranty period unless otherwise stated below:
- (a) Commercial general liability insurance, in the amount of at least five million dollars (\$5,000,000.00) inclusive, with The City, Manitoba Hydro and Manitoba and its Ministers, officers, employees and agents added as additional insureds, with a cross-liability clause. Such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability, broad form property damage cover and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;
 - (b) 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.
 - (c) 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 \$5,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence.
 - (d) Property insurance for all equipment, tools, field office 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.
- D10.2 Deductibles shall be borne by the Contractor.
- D10.3 All Subcontractors performing Work on the Project shall provide the Contractor with evidence of insurance as outlined in D10.1 (a) and (c) above and be registered with Workers Compensation Board of Manitoba and maintain insurance and workers compensation coverage throughout the the performance of the Work, The Contractor shall provide the Contract Administrator with evidence of same prior to the commencement of any Work.
- D10.4 All policies shall be taken out with insurers duly licensed to carry on business in the Province of Manitoba.
- D10.5 The Contractor shall provide the City Solicitor with a certificate(s) of insurance for the City and Manitoba, in a form satisfactory to the City Solicitor and Manitoba, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4.1 for the return of the executed Contract.
- D10.6 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.

D11. CONTRACT SECURITY

- D11.1 The Contractor shall provide and maintain the performance bond and the labour and material payment bond until the expiration of the warranty period in the form of:
- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; and
 - (b) a labour and material payment bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H2: Labour and Material Payment Bond), in an amount equal to fifty percent (50%) of the Contract Price.
- D11.1.1 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 D11.1(b).

D11.1.2 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.

D11.1.3 Digital bonds passing the verification process will be treated as original and authentic.

D11.2 The Contractor shall provide the City Solicitor with the required performance and labour and material payment bonds within seven (7) Calendar Days of notification of the award of the Contract by way of an award letter and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

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

- (a) give the Subcontractor written notice of the existence of the labour and material payment bond in D11.1(b); and
- (b) post a notice of the bond and/or a copy of that bond in a conspicuous location at the Site of the Work.

D12. SUBCONTRACTOR LIST

D12.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at 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.

D13. EQUIPMENT LIST

D13.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment 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 The detailed work schedule shall consist of the following:
- (a) a critical path method (C.P.M.) schedule for the Work;
 - (b) a Gantt chart for the Work based on the C.P.M. schedule; and
 - (c) a daily manpower schedule for the Work
- all acceptable to the Contract Administrator.
- D14.3 Further to D14.2(a), the C.P.M. schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path:
- D14.4 Further to D14.2(b), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.
- D14.5 Further to D14.2(c), the daily manpower schedule shall list the daily number of individuals on the Site for each trade.

SCHEDULE OF WORK

D15. COMMENCEMENT

- D15.1 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.
- D15.2 The Contractor shall not commence any Work on the Site until:
- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D8;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the twenty-four (24) hour emergency response phone number specified in D4.2.
 - (iv) the Safe Work Plan specified in D9;
 - (v) evidence of the insurance specified in D10;
 - (vi) the contract security specified in D11;
 - (vii) the subcontractor list specified in D12;
 - (viii) the equipment list specified in D13;
 - (ix) the detailed work schedule specified in D14;
 - (x) the Pedestrian and Cyclist Accessibility Plan specified in **E2**
 - (xi) the direct deposit application form specified in D28
 - (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.
- D15.3 The Contractor shall not commence the Phase 1 Work on the Site before May 16, 2022. The Contractor shall not commence the Phase 2 Work on the Site before May 15, 2023.
- D15.4 The City intends to award this Contract by March 18, 2022.
- D15.4.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D16. RESTRICTED WORK HOURS

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

D17. WORK BY OTHERS

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

- (a) City of Winnipeg Traffic Services – Install traffic control for median crossovers and provide sign clamps;
- (b) City of Winnipeg Traffic Signals - Traffic signal loops may require decommissioning and reinstallation, bagging/unbagging of existing signal heads. Installation of Traffic Signals poles, davits, controllers and heads.
- (c) City of Winnipeg Transit – Transit will remove existing bus stop flags and shelters for reuse and provide signage for temporary Transit stops. The Contractor is expected to coordinate with Transit for the location of temporary stop locations and provide a safe and delineated area.
- (d) Manitoba Hydro – Will be completing vault roof repairs and pole relocations concurrently with the roadworks.
- (e) Manitoba Hydro Gas - Manitoba Hydro will evaluate the feasibility of lowering existing small diameter gas mains and gas services during roadway excavation. Manitoba Hydro may be required to rock wrap existing gas mains and/or services during roadway excavation. The Contractor will coordinate watches, adjustments and rock wrapping.
- (f) Manitoba Hydro Streetlights – Manitoba Hydro will activate and energizing the new streetlight plant. Manitoba Hydro will provide inspection of new street lighting hardware (to be installed by the Contractor).
- (g) BellMTS – BellMTS will be completing vault manhole casting adjustments concurrently with the roadworks.
- (h) Water and Waste Department – Multiple WWD projects have been completed prior to this tender and some are scheduled to be completed in 2022/23. Completed and expected works have been outlined below.

D17.2 Previous work by others:

- (a) Work completed in 2020
 - (i) The installation of a large diameter LDS on Taylor Avenue between Wilton Street and Pembina Highway was completed in 2020. As part of these works, new catch basins were installed and connected to the existing curb inlets in several locations. Because the new catch basins were not located at the existing low points they were covered with steel plates then buried as part of the pavement restorations. Under this contract the intention is to uncover the new catch basins, remove the temporary connections the old curb inlets and adjust the catch basins to the new design grades.
 - (ii) A new LDS line was installed on Stafford Street between Hector Avenue and Pembina Highway. This work also included the installation of new catch basin leads. The mainline connection and first sections of the catch basin leads were designed to connect to catch basins in the proposed catch basin locations but were then angled in the last sections of pipe to connect to the existing curb inlets. Under this contract new catch basins will be installed and the existing leads will be adjusted to connect to the new catch basins.
 - (iii) The watermain on Taylor Avenue between Pembina Highway and Wilton Street was renewed. Including fire hydrants and service connections. Hydrant adjustments/relocations will be completed as indicated in the Tender drawings.

- (b) Work completed in 2021
- (i) The 150 cast iron watermain on Stafford Street between Garwood Avenue and Corydon Avenue was renewed. The new alignment placed the watermain within 1.0m of the east back of curb and necessitates the installation of catch pits with offline catch basins.
 - (ii) A new FastNet fiber optic line installation was completed on Taylor Avenue. This line runs along the north property of Taylor Avenue up to west side of Harrow Street where it crosses and continues along the south side of Taylor Avenue. Due to the congestion of underground utilities just west of Stafford Street, this line runs in close proximity to the excavation limits proposed in this project.

D17.3 Future work by others:

- (a) WWD will be completing additional sewer upgrades in the vicinity of the works proposed in this contract in 2022/23. This will result in higher volumes of heavy trucking and equipment movement as well possible further traffic congestion in the general area.
- (i) LDS installations on Harrow Street south and just north of Taylor Avenue.
 - (ii) Residential sewer upgrades east of Stafford Street between Grant Avenue and Taylor Avenue. In particular at the Weatherdon and Carter Streets intersections.

D18. SEQUENCE OF WORK

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

D18.1.1 The Work shall be divided into Phase 1 (2022) and Phase 2 (2023) . Each Phase shall be subdivided into stages. Stages are further subdivided into major items of work.

D18.1.2 **Phase I (2022)**

- (a) **Stafford Street** – Ebby Avenue to Scotland Avenue (west side only) and Scotland Avenue to Corydon Avenue
- (i) Stage 1 – Underground Works
 - ◆ Complete the watermain renewal between Garwood Avenue and Lorette Avenue
 - ◆ Complete all Underground works and Sewer Repairs
 - ◆ Hydrant Relocations
 - ◆ Temporary Pavement Restorations in west gutter lane between Grant Avenue and Corydon Avenue
 - ◆ Complete all temporary Signal Works
 - (ii) Stage 2 – West Side Roadworks – Ebby Avenue to Grant Avenue
 - ◆ Pavement/sidewalk removals
 - ◆ Subdrain installation
 - ◆ Sub-Base and Base construction
 - ◆ Southbound Mainline and Tie-in paving
 - ◆ West Sidewalk construction
 - ◆ West side Streetlight removals/installations
 - ◆ Temporary Asphalt Paving in southbound median lane
 - ◆ Permanent Signal Works
 - ◆ Boulevard Grading and Sod
 - (iii) Stage 3 – West Side Roadworks – Scotland Avenue to Corydon Avenue
 - ◆ Pavement/sidewalk removals
 - ◆ Excavation and Streetcar Bedding removal
 - ◆ Detailed Excavation around Underground utilities
 - ◆ Subdrain installation

- ◆ Sub-Base and Base construction
 - ◆ Southbound Mainline and Tie-in paving
 - ◆ West Sidewalk construction
 - ◆ West side Streetlight removals/installations
 - ◆ Permanent Signal Works
 - ◆ Boulevard Grading and Sod
- (iv) Stage 4 – East Side Roadworks – Scotland Avenue to Corydon Avenue
- ◆ Pavement/sidewalk removals
 - ◆ Excavation and Streetcar Bedding removal
 - ◆ Detailed Excavation around Underground utilities
 - ◆ Subdrain installation
 - ◆ Sub-Base and Base construction
 - ◆ Northbound Mainline and Tie-in paving
 - ◆ East Sidewalk construction
 - ◆ East side Streetlight removals/installations
 - ◆ Permanent Signal Works
 - ◆ Boulevard Grading and Sod

(b) **Harrow Street – Asphalt Path and Cycling Facility**

- ◆ Remove temporary asphalt access ramps
- ◆ Remove existing trees
- ◆ Complete geometric modifications on the east side of Harrow Street north of Taylor Avenue
- ◆ Construct the asphalt path on the west side of Harrow Street south of Taylor
- ◆ Install Green Paint
- ◆ Complete boulevard grading and sod

D18.1.3

Phase II (2023)

- (a) **Stafford Street** – Pembina Highway to Ebby Avenue and Ebby Avenue to Scotland Avenue (east side only)
- (i) Stage 1 – Underground Works
- ◆ Complete the watermain renewal between Scotland Avenue and Carter Avenue
 - ◆ Complete all Underground works and Sewer Repairs
 - ◆ Hydrant Relocations
 - ◆ Temporary Pavement Restorations in east gutter lane between Pembina Highway to Hector Avenue
 - ◆ Complete all temporary Signal Works
- (ii) Stage 2 – West Side Roadworks - Pembina Highway to Ebby Avenue
- ◆ OHSS and crash cushion installation
 - ◆ Pavement/sidewalk removals
 - ◆ Subdrain installation
 - ◆ Sub-Base and Base construction
 - ◆ Southbound Mainline and Tie-in paving
 - ◆ West Sidewalk construction
 - ◆ West side Streetlight removals/installations

- ◆ Temporary Asphalt Paving in southbound median lane
- ◆ Permanent Signal Works
- ◆ Boulevard Grading and Sod
- (iii) **Stage 3** – East Side Roadworks - Pembina Highway to Scotland Avenue
 - ◆ Pavement/sidewalk removals
 - ◆ Subdrain installation
 - ◆ Sub-Base and Base construction
 - ◆ Northbound Mainline and Tie-in paving
 - ◆ East Sidewalk construction
 - ◆ East side Streetlight removals/installations
 - ◆ Permanent Signal Works
 - ◆ Boulevard Grading and Sod
- (b) **Taylor Avenue** – Harrow Street to Pembina Highway.
 - (i) **Stage 1** – South Side Underground and Roadworks
 - ◆ Complete all south side Underground works and Sewer Repairs
 - ◆ Complete Hydrant Relocations
 - ◆ Pavement/sidewalk removals
 - ◆ Excavation
 - ◆ Subdrain installation
 - ◆ Sub-Base and Base construction
 - ◆ Eastbound Mainline and Tie-in paving
 - ◆ South Sidewalk construction
 - ◆ South side Streetlight removals/installations
 - ◆ Complete temporary and permanent Signal Works
 - ◆ Boulevard Grading and Sod
 - (ii) **Stage 2** – Norths Side Underground and Roadworks
 - ◆ Complete all north side Underground works and Sewer Repairs
 - ◆ Complete Hydrant Relocations
 - ◆ Pavement/sidewalk removals
 - ◆ Excavation
 - ◆ Subdrain installation
 - ◆ Sub-Base and Base construction
 - ◆ Eastbound Mainline and Tie-in paving
 - ◆ South Sidewalk construction
 - ◆ South side Streetlight removals/installations
 - ◆ Complete permanent Signal Works
 - ◆ Boulevard Grading and Sod
 - ◆ Modification and installation of Timber Fencing

D18.2 Multiple locations included within an individual phase are expected to be constructed concurrently as required and according to the critical stages outlined below in D.19.

D19. CRITICAL STAGES

- D19.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:
- (a) Critical Stage 1 (2022) - Ten (10) Working Days from the commencement of Stafford Stage 1 Underground Works (2022)
 - (i) Completion of the watermain renewal between Garwood Avenue and Lorette Avenue
 - (b) Critical Stage 2 - October 14, 2022 – Completion of Phase 1 Specify the critical stages and the schedule required.
 - (c) Critical Stage 3 (2023) – Fifteen (15) Working Days from the commencement of Stafford Stage 1 Underground Works (2023)
 - (i) Completion of watermain renewal between Scotland Avenue and Carter Avenue
 - (d) Critical Stage 3A (2023) – Twenty Five (25) Working Days from the commencement of Stafford Stage 2 West Side Roadway Construction (2023)
 - (i) Complete east side pavement and sidewalk construction from the south side of Grant Avenue to the north side of Scotland Avenue (2022 construction limit) immediately upon commencement of Stafford Stage 2 Roadway Construction (2023). This will allow for full restoration of traffic on Stafford Street from Grant Avenue to Corydon Avenue as quickly as possible.
- D19.2 When the Contractor considers the Work associated with these Critical Stages to be completed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Completion. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.
- D19.3 The date on which the Work under each Critical Stage has been accepted by the Contract Administrator as being completed to the requirements of the Contract is the date on which completion of each Critical Stage has been achieved.

D20. SUBSTANTIAL PERFORMANCE

- D20.1 The Contractor shall achieve Substantial Performance by October 13, 2023.
- D20.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.
- D20.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

D21. TOTAL PERFORMANCE

- D21.1 The Contractor shall achieve Total Performance by October 20, 2023.
- D21.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.

D21.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

D22. LIQUIDATED DAMAGES

D22.1 If the Contractor fails to achieve Critical Stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Calendar Day for each and every Calendar Day following the days fixed herein for same during which such failure continues:

- (a) Critical Stage 1– Two Thousand dollars (\$2,000);
- (b) Critical Stage 2 – Five Thousand dollars (\$5,000);
- (c) Critical Stage 3 – Two Thousand dollars (\$2,000);
- (d) Critical Stage 3A – Two Thousand dollars (\$2,000)
- (e) Substantial Performance – Five Thousand dollars (\$5,000);
- (f) Total Performance – Two Thousand dollars (\$2,000).

D22.2 The amounts specified for liquidated damages in D22.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

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

D23. COVID-19 SCHEDULE DELAYS

D23.1 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.

D23.2 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.

D23.3 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.

D23.4 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 D23.3. Failure to provide this notice will result in no additional time delays being considered by the City.

D23.5 The Work schedule, including the durations identified in D16 to D21 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.

D23.6 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.

D23.7 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.

D24. SCHEDULED MAINTENANCE

D24.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

(a) Sodding as specified in the latest version of the City of Winnipeg Standard Construction Specification in CW 3510.

D24.2 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

D25. JOB MEETINGS

D25.1 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.

D25.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

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

D26.1 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).

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

D27.1 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

D28. PAYMENT

D28.1 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

D29. WARRANTY

- D29.1 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.
- D29.2 Notwithstanding C13.2 or D29.1, 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.
 - (b) Work under a specific Critical Stage has been completed.
- D29.2.1 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.
- D29.3 At least two (2) weeks prior to the expiration of the Warranty Period, or upon correction of all outstanding defects and deficiencies, whichever is later, the Contractor shall arrange, attend, and assist in the acceptance inspection of the Work. The Contract Administrator shall, on being satisfied that all outstanding defects and deficiencies in the Work have been corrected, issue a Certificate of Acceptance for the Work to be dated not earlier than two (2) years after the date of either the Certificate of Total Performance or two (2) years after the date of a Critical Stage, or the date that the Contractor corrects the final defects and deficiencies, whichever is the later, thereby terminating the Warranty Period. The Certificate of Acceptance will indicate acceptance of the due performance of the Contract.

THIRD PARTY AGREEMENTS

D30. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

- D30.1 Funding for the Work of the Contract is being provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada and accordingly, as required by the applicable funding agreements, the following terms and conditions shall apply.
- D30.2 For the purposes of D30:
- (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.
- D30.3 Indemnification By Contractor
- D30.3.1 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.
- D30.4 Records Retention and Audits

- D30.4.1 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.
- D30.4.2 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 D30.4.1 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.
- D30.5 Other Obligations
- D30.5.1 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.
- D30.5.2 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.
- D30.5.3 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.
- D30.5.4 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.
- D30.5.5 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.
- D30.5.6 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 D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____ ,
(hereinafter called the "Principal"), and

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

_____ dollars (\$_____)

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

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

TENDER NO. 252-2021

2019-2023 Stafford/Taylor/Corydon Pavement Renewals – Tender 2 2022-2023
which is by reference made part hereof and is hereinafter referred to as the "Contract".

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

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

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

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

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

_____ day of _____, 20____ .

SIGNED AND SEALED
in the presence of:

(Witness as to Principal if no seal)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

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

FORM H2: LABOUR AND MATERIAL PAYMENT BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

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

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

_____ dollars (\$_____)

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

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

TENDER NO. 252-2021

2019-2023 Stafford/Taylor/Corydon Pavement Renewals – Tender 2 2022-2023

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

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

- (a) A claimant is defined as one having a direct contract with the Principal for labour, service and material, or any of them, used or reasonably required for use in the performance of the contract, labour, service and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment (but excluding rent of equipment where the rent pursuant to an agreement is to be applied towards the purchase price thereof) directly applicable to the Contract;
- (b) The above-named Principal and Surety hereby jointly and severally agree with the Obligee that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work, labour or service was done or performed, or materials were furnished by such claimant, may sue on this bond, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon;
- (c) No suit or action shall be commenced hereunder by any claimant
 - (i) unless claimant shall have given written notice to the Principal and the Surety above-named, within one hundred and twenty (120) days after such claimant did or performed the last of the work, labour or service, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work, labour or service was done or performed. Such notice shall be served by mailing the same by registered mail to the Principal, and Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the Province of Manitoba;

- (ii) after the expiration of one (1) year following the date on which Principal ceased work on said Contract; including work performed under the guarantees provided in the Contract;
 - (iii) other than in a court of competent jurisdiction in the Province of Manitoba.
- (d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.
- (e) The Surety shall not be liable for a greater sum than the specified penalty of this bond.

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

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

_____ day of _____, 20____.

SIGNED AND SEALED
in the presence of:

(Witness as to Principal if no seal)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

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

FORM J: SUBCONTRACTOR LIST
(See D12)

2019-2023 Stafford/Taylor/Corydon Pavement Renewals – Tender 2 2022-2023

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
SURFACE WORKS		
<i>Supply of Materials</i>		
Base Course and Sub-Base Course		
Paving Stones		
Concrete		
Asphalt		
Topsoil/Sod		
<i>Installation/Construction</i>		
Excavation		
Base Works		
Concrete		
Asphalt		
Landscaping		
Streetlight Works		
Signals Works - Conduits, anchor bolts, concrete for bases		
UNDERGROUND WORKS		
<i>Supply of Materials</i>		
Precast Concrete Catchbasins, Catch Pits and Manhole Risers		
Sewer Pipe and Hydrants		
Frames/Covers		
<i>Installation/Construction</i>		
Watermain renewal		
Catch basins and Connections		
Sewer Televising		
Subdrains		
Sewer Repairs		
MISCELLANEOUS		
OHSS Crash Cushion		
OHSS Sign Plates		

FORM J: SUBCONTRACTOR LIST
(See D12)

2019-2023 Stafford/Taylor/Corydon Pavement Renewals – Tender 2 2022-2023

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
Tree Removal		
Fencing		

FORM K: EQUIPMENT
(See D13)

2019-2023 Stafford/Taylor/Corydon Pavement Renewals – Tender 2 2022-2023

<p>1. Category/type: Concrete Slip Form Paver</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>2. Category/type: Concrete Slip Form Paver</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>3. Category/type: Road Excavator</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>

FORM K: EQUIPMENT
(See D13)

2019-2023 Stafford/Taylor/Corydon Pavement Renewals – Tender 2 2022-2023

<p>4. Category/type: Road Excavator</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>5. Category/type: Motor Grader</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>6. Category/type: Crawler Tractor</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>

FORM K: EQUIPMENT
(See D13)

2019-2023 Stafford/Taylor/Corydon Pavement Renewals – Tender 2 2022-2023

7. Category/type: Padfoot Roller
Make/Model/Year: _____ Serial No.: _____
Registered owner: _____
Make/Model/Year: _____ Serial No.: _____
Registered owner: _____
Make/Model/Year: _____ Serial No.: _____
Registered owner: _____
8. Category/type: Steel Drum Roller
Make/Model/Year: _____ Serial No.: _____
Registered owner: _____
Make/Model/Year: _____ Serial No.: _____
Registered owner: _____
Make/Model/Year: _____ Serial No.: _____
Registered owner: _____

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>
P-3525-11	COVER PAGE DRAWING LIST AND SITE LOCATION MAP	A1
P-3525-12	TAYLOR AVENUE – HARROW ST. TO PEMBINA HWY – HORIZONTAL GEOMETRY	A1
P-3525-13	TAYLOR AVENUE – HARROW ST TO STA 5+495 - ROADWORKS	A1
P-3525-14	TAYLOR AVENUE – 5+495 TO 5+620 - ROADWORKS	A1
P-3525-15	TAYLOR AVENUE – 5+620 TO PEMBINA HWY – ROADWORKS	A1
P-3525-16	TAYLOR AVENUE – HARROW ST TO PEMBINA HWY – CONCRETE PAVEMENT JOINTS	A1
P-3525-17	TAYLOR AVENUE – UNDERGROUND INFRASTRUCTURE – HARROW ST TO STA 5+600	A1
P-3525-18	TAYLOR AVENUE – UNDERGROUND INFRASTRUCTURE – STA 5+600 TO PEMBINA HWY	A1
P-3525-19	TAYLOR AVENUE – HARROW ST TO PEMBINA HWY – 2023 CONSTRUCTION – STAGE 1	A1
P-3525-20	TAYLOR AVENUE – HARROW ST TO PEMBINA HWY – 2023 CONSTRUCTION – STAGE 2	A1
P-3526-1	STAFFORD STREET – PEMBINA HWY TO GRANT AVE – HORIZONTAL GEOMETRY	A1
P-3526-2	STAFFORD STREET – SCOTLAND AVE. TO GRANT AVE – HORIZONTAL GEOMETRY	A1
P-3526-3	STAFFORD STREET – PEMBINA HWY TO STA 3+090 – ROADWORKS	A1
P-3526-4	STAFFORD STREET – STA 3+090 TO STA 3+215 – ROADWORKS	A1
P-3526-5	STAFFORD STREET – STA 3+215 TO STA 3+340 – ROADWORKS	A1
P-3526-6	STAFFORD STREET – STA 3+340 TO 3+465 – ROADWORKS	A1

<u>Drawing No.</u>	<u>Drawing Name/Title</u>	<u>Drawing (Original) Sheet Size</u>
P-3526-7	STAFFORD STREET – STA 3+465 TO STA 3+590 – ROADWORKS	A1
P-3526-8	STAFFORD STREET – STA 3+590 TO STA 3+715 – ROADWORKS	A1
P-3526-9	STAFFORD STREET – STA 3+715 TO STA 3+820 – ROADWORKS	A1
P-3526-10	STAFFORD STREET – STA 3+820 TO STA 3+940 – ROADWORKS	A1
P-3526-11	STAFFORD STREET – STA 3+940 TO STA 4+065 – ROADWORKS	A1
P-3526-12	STAFFORD STREET – STA 4+065 TO STA 4+190 – ROADWORKS	A1
P-3526-13	STAFFORD STREET – STA 4+190 TO STA 4+290 – ROADWORKS	A1
P-3526-14	STAFFORD STREET – STA 4+290 TO STA 4+390 – ROADWORKS	A1
P-3526-15	STAFFORD STREET – STA 4+390 TO STA 4+470 – ROADWORKS	A1
P-3526-16	STAFFORD STREET AT TAYLOR AVE AND STAFFORD ST AT GRANT AVE. – INTERSECTION DETAILS	A1
P-3526-17	MISCELLANEOUS SECTIONS & DETAILS	A1
P-3526-18	MISCELLANEOUS SECTIONS & DETAILS	A1
P-3526-19	STAFFORD STREET – UNDERGROUND INFRASTRUCTURE – SEWER – PEMBINA HWY TO STA 3+275	A1
P-3526-20	STAFFORD STREET – UNDERGROUND INFRASTRUCTURE –SEWER – STA 3+275 TO STA 3+625	A1
P-3526-21	STAFFORD STREET – UNDERGROUND INFRASTRUCTURE –SEWER – STA 3+625 TO STA 3+925	A1
P-3526-22	STAFFORD STREET – UNDERGROUND INFRASTRUCTURE –SEWER – STA 3+925 TO STA 4+325	A1
P-3526-23	STAFFORD STREET – UNDERGROUND INFRASTRUCTURE –SEWER – STA 4+325 TO CORYDON AVE	A1
P-3526-24	STAFFORD STREET – UNDERGROUND INFRASTRUCTURE – WM RENEWAL – EBBY ST AT STAFFORD ST	A1
P-3526-25	STAFFORD STREET – UNDERGROUND INFRASTRUCTURE – WM RENEWAL –CARTER AVE TO STA 3+585	A1
P-3526-26	STAFFORD STREET – UNDERGROUND INFRASTRUCTURE – WM RENEWAL – STA 3+585 TO STA 3+710	A1
P-3526-27	STAFFORD STREET – UNDERGROUND INFRASTRUCTURE – WM RENEWAL – STA 3+710 TO STA 3+835	A1
P-3526-28	STAFFORD STREET – UNDERGROUND INFRASTRUCTURE – WM RENEWAL – STA 3+835 TO GARWOOD AVE	A1
S-796-2022-01	STAFFORD STREET – SB STAFFORD ST AT PEMBINA HWY – S_796 OVERHEAD SIGN LOCATION & DETAILS	A1
S-796-2002-02	STAFFORD STREET – SB STAFFORD ST AT PEMBINA HWY – S_796 OVERHEAD SIGN LOCATION & DETAILS	A1
S-796-2002-03	CRASH ATTENUATION DETAILS AND SECTION	A1

<u>Drawing No.</u>	<u>Drawing Name/Title</u>	<u>Drawing (Original) Sheet Size</u>
P-3526-29	STAFFORD STREET – PEMBINA HWY TO CORYDON AVE – 2022 CONSTRUCTION – UNDERGROUND – STAGE 1A, 1B, 1C	A1
P-3526-30	STAFFORD STREET – ROAD STAGING SECTIONS – 2022 CONSTRUCTION – STAGES 1, 2, 3 & 4	A1
P-3526-31	STAFFORD STREET – PEMBINA HWY TO CORYDON AVE – 2022 CONSTRUCTION – STAGE 2 & 3	A1
P-3526-32	STAFFORD STREET – MISCELLANEOUS DETAIL – 2022 CONSTRUCTION – STAGE 2 & 3	A1
P-3526-33	STAFFORD STREET – PEMBINA HWY TO CORYDON AVE – 2022 CONSTRUCTION – STAGE 4	A1
P-3526-34	STAFFORD STREET – MISCELLANEOUS DETAILS – 2022 CONSTRUCTION – STAGE 4	A1
P-3526-35	STAFFORD STREET – PEMBINA HWY TO GRANT AVE – 2023 CONSTRUCTION – UNDERGROUND STAGING	A1
P-3526-36	STAFFORD STREET – PEMBINA HWY TO GRANT AVE – 2023 CONSTRUCTION – STAGE 2	A1
P-3526-37	STAFFORD STREET – PEMBINA HWY TO GRANT AVE – 2023 CONSTRUCTION – STAGE 3	A1
P-3526-38	STAFFORD STREET – MISCELLANEOUS DETAILS – 2023 CONSTRUCTION – STAGE 3	A1
P-3526-39	STAFFORD STREET AND TAYLOR AVENUE INTERSECTION STAGING – 2023 CONSTRUCTION	A1
P-3525-21	HARROW STREET WEST – BIKE FACILITY – HORIZONTAL GEOMETRY AND GRADING	A1
SIGNALS DRAWINGS		
S-1741	PRELIMINARY – CORYDON & STAFFORD	A1
S-1375	PRELIMINARY – EBBY & STAFFORD	A1
S-1256	PRELIMINARY – GARWOOD & STAFFORD	A1
S-1442	PRELIMINARY – GRANT & STAFFORD	A1
S-1490	PRELIMINARY – PEMBINA & TAYLOR, WENTWORTH	A1
S-1246	PRELIMINARY – STAFFORD & TAYLOR	A1
S-1029	PRELIMINARY – STAFFORD & WARSAW	A1
STREETLIGHT DRAWINGS		
1-04707-DE-50000-STAFFORD	NEW ROADWAY LIGHTING - STAFFORD ST. BETWEEN CORYDON AVE. AND PEMBINA HWY.	A1

E2. SITE REQUIREMENTS FOR ACCESSIBILITY

- E2.1 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.
- E2.2 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.

E2.3 The Accessibility Plan may also include figures, sketches, or drawings to demonstrate the proposed plan.

E2.4 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

E2.5 At minimum, the Contractor shall review the site conditions on a daily basis to ensure the 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.

E2.6 Any changes to the Accessibility Plan must be submitted to the Contract Administrator a minimum of 5 Working Days prior to the required change for approval.

E2.7 Upon request from the Contract Administrator, the Contractor shall provide records demonstrating that the site has been maintained.

E2.8 Failure to produce records that demonstrate that the site was maintained in compliance with the Accessibility Plan or deficiencies as a direct result of actions by the Contractor that are not immediately corrected may result in a pay adjustment. 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 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, per day.

E3. MOBILIZATION AND DEMOBILIZATION PAYMENT

DESCRIPTION

E3.1 This Specification shall cover all operations relating to the mobilization and demobilization of the Contractor to the project location(s).

E3.2 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.

E3.3 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

E3.4 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 and/or sites;
 - (v) Development, and implementation of the Accessibility Site Plan as per E2.
 - (vi) 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.
 - (v) Monitoring, maintenance, and reporting of the Accessibility Site Plan as per E2.

E3.5 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

E3.6 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.

E3.6.1 Further to B9, B17, C12 and E3.6, 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.

E3.7 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.

E3.8 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.

E3.9 Pay Reduction for Accessibility Site Plan

- (a) The Demobilization payment will be reduced by the number of pay adjustments incurred in accordance with E2 and as determined by the Contract Administrator.

E3.10 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.

E4. GEOTECHNICAL REPORT

E4.1 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 'A'.

E5. OFFICE FACILITIES

E5.1 The Contractor shall supply office facilities meeting the following requirements:

- (a) The field office shall be for the exclusive use of the Contract Administrator.
- (b) The building shall be conveniently located near the site of the Work.
- (c) The building shall have a minimum floor area of 25 square metres, 2.4m with a window 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, table 3m x 1.2m 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.

E5.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E5.3 The office facilities will be provided from the date of the commencement of the Work to the date of Substantial Performance.

E5.4 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.

E5.5 Further to E5.3 the office facilities shall be removed from site within two weeks of completing Critical Stage 2 in 2022 and returned to site upon commencement of 2023 construction.

E6. PROTECTION OF EXISTING TREES

E6.1 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.

E6.2 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.

E6.3 No separate measurement or payment will be made for the protection of trees.

E6.4 Except as required in clause E6.1(c) and E6.1(e), Elm trees shall not be pruned at any time between April 1 and July 31.

E7. TRAFFIC CONTROL

E7.1 Further to clauses 3.6, 3.7 and 3.8 of CW 1130:

- (a) Where directed by the Contract Administrator, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planing drop-offs to the satisfaction of the Contract Administrator. Payment shall be in accordance with CW3410.
- (b) In accordance with the Manual of Temporary Traffic Control on City Streets (MTTC), the Contractor ("Construction Agency" in the manual) shall be responsible for placing, maintaining and removing the appropriate temporary traffic control devices as specified by the MTTC or by the Traffic Management Branch of the City of Winnipeg Public Works Department. The Contractor shall bear all costs associated with the placement of temporary traffic control devices by their own forces or subcontractor.

E7.2 Notwithstanding E7.1, in accordance with the MTTC, the Contract Administrator shall make arrangements with the **Traffic Services Branch of the City of Winnipeg** to place, maintain, and remove all **regulatory signs** and traffic control devices authorized and/or required by the Traffic Management Branch in the following situations:

- (a) Parking restrictions,
- (b) Stopping restrictions,
- (c) Turn restrictions,
- (d) Diamond lane removal,
- (e) Full or directional closures on a Regional Street,
- (f) Traffic routed across a median,
- (g) Full or directional closure of a non-regional street where there is a requirement for regulatory signs (turn restrictions, bus stop relocations, etc.) to implement the closure.
- (h) Approved Designated Construction Zones with a temporary posted speed limit reduction. Traffic Services will be responsible for placing all of the advance signs and 'Construction Ends' (TC-4) signs. The Contractor is still responsible for all other temporary traffic control including but not limited to barricades, barrels and tall cones.

E7.2.1 An exception to E7.2 is the 'KEEP RIGHT/KEEP LEFT' sign (RB-25 / RB-25L) which shall be supplied, installed, and maintained by the Contractor at their own expense.

E7.2.2 Further to E7.2, where the Contract Administrator has determined that the services of the Traffic Services Branch are required, the City shall bear the costs associated with the placement of temporary traffic control devices by the Traffic Services Branch of the City of Winnipeg in connection with the works undertaken by the Contractor.

E8. TRAFFIC MANAGEMENT

E8.1 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.

E8.2 When no work is being performed on site, non-essential lane closures will not be permitted.

E8.3 Further to specification E.2.

- (a) A safe pedestrian, vehicular and bicycle crossing is to be maintained at every other intersecting street and at Ebby Avenue, Garwood Avenue and Warsaw Avenue. These crossings may be closed temporarily as approved by the Contract Administrator to accommodate certain construction activities (ie. Excavation, Granular installation, Paving etc.) but must be reinstated as soon as reasonably possible.

E8.4 Pedestrian and vehicular access to residences and businesses must be maintained at all times.

- (a) 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.

E8.5 Flag persons may be necessary to maintain the flow of traffic during certain work operations

E8.6 Ambulance/emergency vehicle access must be maintained at all times.

E8.7 The Contractor must provide ten business days notice for any required Transit rerouting requirements to accommodated concrete paving operations to allow for sufficient planning time.

E8.8 The Contractor is to provide safe areas for temporary Transit stops as required. Some stops will be shifted to temporary locations or temporarily put out of service to accommodate construction. The Contractor shall provide five business days notice of any conflicts with temporary stops to construction operations to allow for sufficient planning time.

E8.9 Where left turn lanes exist, an additional lane to accommodate the left turn storage lane shall be maintained at all times.

E8.10 When access to side streets and public lanes are restricted, the Contractor shall supply and erect "Road Closed, No Exit" signage at the next closest access points to these streets and alleys.

E8.11 Any proposed modifications to the construction staging and/or traffic management plans outlined in the contract documents must be approved by the Contract Administrator.

E8.12 A single lane closure in the northbound dual left turn storage lanes on Pembina Highway shall be maintained at all times during both phases of construction, as applicable. The lane to be closed shall be coordinated with whichever northbound gutter lane of Stafford Street is being maintained at the time.

E8.13 **Phase 1 - Stafford Street (2022)**

- (a) Maintain a single northbound lane of traffic on Stafford Street between Taylor Avenue and Corydon Avenue.
- (b) Maintain southbound one-way traffic on Harrow Street between Taylor Avenue and Corydon Avenue

- (c) Side Streets and Alleys to remain open as construction allows during Stage 1 – Underground Works.
- (d) Every other side street is to remain open to pedestrians, vehicles and bicycles in Stages 2, 3 and 4.
- (e) Access to be maintained at Taylor Avenue, Ebby Avenue, Garwood Avenue, Grant Avenue, Warsaw Avenue and Corydon Avenue.
 - (i) At Ebby Avenue and Warsaw Avenue, short closures will be permitted to accommodate Excavation, rock installation and paving operations.
 - (ii) At Taylor Avenue, Grant Avenue and Corydon Avenue all northbound turning movements must be maintained at all times.
 - (iii) A dedicated northbound left turn lane must maintained at Corydon Avenue.
 - (iv) Eastbound left turns must be maintained at Taylor Avenue and Grant Avenue.
 - (v) A dedicated eastbound left turn lane must maintained at Grant Avenue.
 - (vi) The Pedestrian Corridor at Garwood is to be maintained at all times.
 - (vii) Two-way traffic on Stafford Street shall be reinstated south of Grant Avenue following the completion of Stage 3.

E8.14 Phase 2 - Stafford Street (2023)

- (a) Maintain a single northbound lane of traffic on Stafford Street between Pembina Highway and Grant Avenue.
- (b) Maintain southbound one-way traffic on Harrow Street between Taylor Avenue and Grant Avenue
- (c) Side Streets and Alleys to remain open as construction allows during Stage 1 – Underground Works.
- (d) Every other side street is to remain open to pedestrians, vehicles and bicycles in Stages 2 and 3.
- (e) The first alley north of Taylor Avenue on the East side shall be maintained at all times.
- (f) Access to be maintained at Taylor Avenue, Ebby Avenue and Grant Avenue
 - (i) At Ebby Avenue, short closures will be permitted to accommodate Excavation, rock installation and paving operations.
 - (ii) At Taylor Avenue and Grant Avenue all northbound turning movements must be maintained at all times.
 - (iii) A dedicated northbound left turn lane must maintained at Grant Avenue.
 - (iv) Eastbound left turns must be maintained at Taylor Avenue and Grant Avenue.
- (g) The Contractor shall provide 10 days notice of any proposed closure of the Bus Loop south of Taylor Avenue and shall be approved by the Contract Administrator.

E8.15 Phase 2 - Taylor Avenue (2023)

- (a) Utilize the existing crossover at Harrow Street.
- (b) Maintain a single lane in each direction on Taylor Avenue between Harrow Street and Stafford Street.
- (c) Maintain a minimum of a single eastbound lane of traffic on Taylor Avenue between Stafford Street and Pembina Highway. When possible, allow two lanes of traffic eastbound on Taylor Avenue between Stafford Street and Pembina Hwy.
- (d) Right turns from eastbound Taylor Avenue to southbound Pembina Highway are to be maintained at all times.
- (e) Eastbound left turn lanes to be maintained at Stafford Street.
- (f) At least a single access to Kesay Design Center is to be maintained at all times.

E9. REFUSE AND RECYCLING COLLECTION

E9.1 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 E9.2 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.

E9.2 Collection Schedule:

Stafford Street and Associated Side Streets

Collection Day(s): **Monday B**

Collection Time: **07:00 am**

Common Collection Area: **South Boulevard in front of residence**

E9.3 No measurement or payment will be made for the work associated with this specification.

E10. PEDESTRIAN SAFETY

E10.1 During the project a temporary snow fence shall be installed adjacent to open excavations and construction activities. The Contractor shall be responsible for maintaining the snow fence in a proper working condition. No measurement for payment shall be made for this work.

E11. WATER OBTAINED FROM THE CITY

E11.1 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.

E12. SURFACE RESTORATIONS

E12.1 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.

E13. INFRASTRUCTURE SIGNS

E13.1 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

E14. PORTLAND CEMENT CONCRETE SIDEWALK WITH BLOCK OUTS FOR INDICATOR SURFACES

DESCRIPTION

E14.1 This specification shall supplement CW 3325-R5 "Portland Cement Concrete Sidewalks".

CONSTRUCTION METHODS

E14.2 Add the following to section 9:

- E14.2.1 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.
- E14.2.2 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.
- E14.2.3 Concrete curbs for monolithic curb and sidewalk with block outs shall be constructed in accordance with CW 3240.
- E14.2.4 Adjacent to offline catchbasins located in the sidewalk and as indicated in the drawings, the sidewalk thickness shall increase to 150mm and reinforcing bar mats shall be added.

MEASUREMENT AND PAYMENT

E14.3 Add the following to section 12:

- E14.3.1 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.
- E14.3.2 No measurement and payment will be made for levelling course.

BASIS OF PAYMENT

E14.4 Add the following to section 13:

- E14.4.1 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.
- E14.4.2 Items of Work:
 - (a) 100 mm Type 5 Concrete Sidewalk with Block Outs
 - (b) 150 mm Type 5 Concrete Reinforced Sidewalk with Block Outs
- E14.4.3 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.

E15. PAVING STONES FOR INDICATOR SURFACES

DESCRIPTION

- E15.1 This specification shall supplement CW 3330-R5 "Installation of Interlocking Paving Stones"

MATERIALS

E15.2 Add the following to section 5 :

- E15.2.1 Paving Stones for indicator surfaces shall be :

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

Endicott Clay Paver(92mm X 57mm X 194mm)- Dark Ironspot

<https://endicott.com/>

Yankee Hill Brick (92mm X 57mm X 194mm)- Dark Ironspot
<http://yankeehillbrick.com/>

CONSTRUCTION METHODS

- E15.3 Add the following to section 9.2 "Preparation of Sub-grade, Sub-base and Sand-base" :
 - E15.3.1 Preparation of Sand-Base for Paving Stones in Sidewalk Block Outs.
 - E15.3.2 Place a 15mm layer of bedding sand in the blocked out sidewalk areas.
 - E15.3.3 The bedding sand shall be spread and levelled so that the paving stones when installed are 5 mm higher than the finished grade.
 - E15.3.4 No more sand shall be spread than can be covered in with paving stone on the same day.
 - E15.3.5 The bedding sand shall not be compacted or disturbed prior to laying the paving stones.
- E15.4 Add the following to section 9.3 "Installation of Paving Stones" :
 - E15.4.1 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

- E15.5 Add the following to section 12 :
- E15.6 Supply and Installation of Paving Stones for Indicator Surfaces
 - E15.6.1 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

- E15.7 Add the following to section 13 :
 - E15.7.1 The supply and installation of paving stones for indicator surfaces will be paid for at the Contract Unit Price per square meter for "Supply and Installation of Interlocking Paving Stones", 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.
 - E15.7.2 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.

E16. SUPPLY AND INSTALL WATERMAIN AND WATER SERVICE INSULATION

DESCRIPTION

- E16.1 Notwithstanding 3.12 of CW 2110, this specification covers the supply and installation of insulation in roadway excavations over watermains and water services.
- E16.2 Referenced Standard Construction Specifications
 - (a) CW 2030 – Excavation Bedding and Backfill
 - (b) CW 3110 – Sub –grade, Sub-base and Base Course Construction
- E16.3 Referenced Standard Details
 - (a) SD-018 - Watermain and Water Service Insulation

MATERIALS

E16.4 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"

E16.5 Sand Bedding :

- (a) In accordance with CW 2030

CONSTRUCTION METHODS

- E16.6 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.
- E16.7 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.
- E16.8 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.
- E16.9 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.
- E16.10 Take appropriate measures to ensure panels are not displaced when installing geotextiles and during backfilling operations.

MEASUREMENT AND PAYMENT

- E16.11 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 E16.6 will not be measured for payment and will be included in the payment for "Watermain and Water Service Insulation".

E17. CONCRETE PAVEMENT REINFORCING STEEL

DESCRIPTION

- E17.1 This specification covers the internal mid slab steel for 250mm thick reinforced concrete installed as per the Drawings.
- E17.2 The length and placement of tie bars and placement of Dowels have been modified to be different than City Specifications.
- E17.3 The placement and fabrication dimensions of bar mats have been modified to be different than City Specifications.

- E17.4 This section shall all be considered further to CW 3310.
- E17.5 This section does not apply to 200mm reinforced concrete. All 200mm reinforced concrete specifications shall apply to current City of Winnipeg Standard Construction Specifications.

MATERIALS

- E17.6 Further to CW 3310 – R17 Section 5.44
- E17.7 Tie Bars
- (a) 20M - 760mm long tie bars will be installed spaced at 500mm on-centre along longitudinal joints.
 - (b) The distance from transverse joints to the first tie bar has increased to a minimum of 450mm.
- E17.8 Dowels
- (a) The distance from longitudinal joints to the first dowel has increased to a minimum of 250mm.
- E17.9 Bar Mats
- (a) Steel diameter has increased to 15M for both longitudinal and transverse bars.
 - (b) On-center spacing has decreased on longitudinal bars to 400mm OC and on transverse bars to 430mm OC.
 - (c) Longitudinal and transverse bars are to be deformed.
 - (d) Allowable clear coverage from the end of any reinforcement to the edge of concrete has been increased to a minimum of 100mm on transverse joints and longitudinal joints.

CONSTRUCTION METHODS

- E17.10 Reinforcing steel is to be installed as per CW 3310 – R17.
- E17.11 The drawings represent minimum and maximum allowable tolerances for reinforcement and do not represent splicing of two bar mats which may be required for shipping and/or placement methods (ie Bar Mat A and Bar Mat B as per City Specifications).
- E17.12 The contractor may supply and install reinforcement using two bar mat method with a splice similar to that of the City Standard with approval of the Contract Administrator. If chosen, the Contractor should note this splicing mechanism may require additional bars which will not be considered for additional payment.

MEASUREMENT AND PAYMENT

- E17.13 Mid slab steel reinforcement as described above will be considered incidental to concrete pavements and no additional measurement and payment will be made for concrete reinforcement. Dowel assemblies and drilled tie-bars will be measured and paid as per City Specifications.

E18. TIE BARS FOR LONGITUDINAL JOINTS IN 250MM CONCRETE PAVEMENT

DESCRIPTION

- E18.1 Further to CW 3230 and CW 3310, this specification covers the Tie Bar requirements installed in 250mm concrete pavement on longitudinal joints

CONSTRUCTION METHODS

- E18.2 20M x 760mm Tie Bars shall be installed on Longitudinal joints as per CW 3310 and spaced at 0.500m OC intervals.

MEASUREMENT AND PAYMENT

- E18.3 No additional measurement and payment shall be made for 20M installed on longitudinal joints except where they could not have been wet set and are drilled into existing concrete in which case measurement and payment shall be in accordance with CW 3230.

E19. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO CRITICAL WATER INFRASTRUCTURE

DESCRIPTION

E19.1 General

- E19.1.1 This Section details operating constraints for all work to be carried out in close proximity to the City feeder mains and other critical water infrastructure. Close proximity shall be deemed to be any construction activity within a 5 m horizontal offset from the centreline of the feeder main/water main, within 5 m of valve chambers and other appurtenances, and any other infrastructure identified below.

- E19.2 The following shall be considered critical pipelines and water infrastructure for this project:

E19.2.1 400 AC Watermain crossing Stafford Street at Grant Avenue:

- (a) 400mm Asbestos Concrete Watermain.
- (b) The watermain runs east-west, approximately 1m south of the south curb of Grant Avenue as shown on the Drawings

E19.2.2 200 AC Watermain crossing Stafford Street at Jackson Avenue:

- (a) 200mm Asbestos Concrete Watermain.
- (b) The watermain runs east-west, approximately 1m south of the south curb of Jackson Avenue as shown on the Drawings

E19.2.3 150 AC Watermain crossing Stafford Street at Carter Avenue:

- (a) 150mm Asbestos Concrete Watermain.
- (b) The watermain runs east-west, approximately 1m south of the south curb of Carter Avenue as shown on the Drawings.

E19.3 General Considerations for Work in Close Proximity to Critical Water Infrastructure:

- E19.3.1 Feeder mains and large diameter water mains are a critical component of the City of Winnipeg Regional Water Supply System and work in close proximity to feeder mains shall be undertaken with an abundance of caution. Large diameter feeder main and water mains cannot typically be taken out of service for extended periods to facilitate construction and inadvertent damage caused to the pipe would likely have catastrophic consequences.
- E19.3.2 Work around critical water infrastructure shall be planned and implemented to minimize the time period that work is carried out in close proximity to the pipe and to ensure that the pipeline is not subjected to excessive construction related loads, including excessive vibrations and/or concentrated or asymmetrical lateral loads during backfill placement.
- E19.3.3 Large diameter pressure pipe generally has limited ability to withstand increased earth and live loading. Therefore, every precaution must be undertaken to ensure that applied loading during all phases of construction is within accepted loading parameters. PCCP typically fails in a non-ductile mode with the potential to cause extensive consequential damage to infrastructure if failure should occur. All large diameter feeder mains/water mains have the potential to cause extensive flooding.
- E19.3.4 Construction in close proximity to critical infrastructure shall not commence until both the equipment and construction method statements have been submitted, reviewed, and accepted by the Contract Administrator.

E19.4 Submittals

- E19.4.1 Submit proposed construction equipment specifications to the Contract Administrator for review a minimum of ten (10) Business Days prior to construction. The equipment submission shall include:
- (a) equipment operating and payload weights;
 - (b) equipment dimensions, including: wheel or track base, track length or axle spacing, track widths or wheel configurations; and,
 - (c) load distributions in the intended operating configuration.
- E19.4.2 Submit a construction method statement to the Contract Administrator a minimum of five (5) business days prior to construction. The construction method statement shall contain the following minimum information:
- (a) proposed construction plan including excavation locations, haul routes, excavation equipment locations, and loading positions;
 - (b) excavation plans, including shoring designs, for excavations occurring in close proximity to feeder mains (within 5 m horizontal of the pipe's centerline) where the excavation to be extended below the top of the feeder mains embedment zone (150 mm above the pipe);
 - (c) trenchless construction methodology for feeder main crossings, including: installation methods, means of grade control, means of confirming clear separation between the new LDS and existing feeder main; and
 - (d) any other pertinent information required to accurately describe the construction activities in close proximity to the feeder main and permit the Contract Administrator to review the proposed construction plans.
- E19.4.3 Incomplete or partial submissions will not be reviewed and will be returned to the Contractor for re-submission.
- E19.4.4 Allow five (5) Business Days for review by the Contract Administrator.

E19.5 Feeder Main Operational Limitations

- E19.5.1 Feeder main shutdowns are scheduled based on a number of factors including water demand, weather, reservoir operation, routine maintenance and repair work within the regional distribution system, and other factors. If feeder main shutdowns are required, the City shall endeavour to make requested time periods available to the Contractor to schedule his/her work requiring removal of the feeder main from service, without limiting the City's control over the operation of the feeder main to complete other work, maintain adequate water supply and storage of water and maintain the integrity of the infrastructure. The City shall reserve the right to cancel and/or delay these schedule dates at any time, due to any circumstances that could adversely affect the feeder main or water supply including, but not limited to, high water demand, abnormal weather, failures of related water system components and/or security concerns.
- E19.5.2 Scheduling Restrictions:
- (a) Temporary feeder main shutdowns are typically limited to off-peak demand seasons (September 15th to May 15th) and low demand hours including evenings or other low demand periods.
- E19.5.3 The Contractor shall provide Notice to the Contract Administrator in writing, a minimum of fifteen (15) Business Days prior to requiring the shutdown. The City will endeavour to schedule the shutdown as requested.

CONSTRUCTION METHODS

E19.6 Pre-Work, Planning and General Execution

- E19.6.1 No work shall commence in close proximity to feeder mains, chambers, and critical infrastructure until the equipment specifications and construction method statement have been submitted and accepted, and feeder main locations have been clearly delineated in the field. Work over feeder mains shall only be carried out with equipment that has been reviewed and quantified in terms of its loading implications on the pipe.
- E19.6.2 Contact the City of Winnipeg Water and Waste Department, Construction Services Coordinator prior to construction.
- E19.6.3 Locate feeder mains and water mains and confirm their position horizontally and vertically prior to undertaking work in close proximity to the identified feedermain. Note, exact locations to be identified in the field. Deviations from the elevations noted shall be reported to Contract Administrator for review prior to proceeding with work.
- E19.6.4 Visually delineate all critical infrastructure identified herein on Site by use of paint, staking/flagging, construction fencing, snow fencing, or other suitable methods
- E19.6.5 Only utilize construction practices and procedures that do not impart excessive vibratory loads on feeder mains and chambers or that would cause settlement of the subgrade below feeder mains and critical pipelines.
- E19.6.6 Where the existing road structure must be removed, crossing of critical infrastructure shall be prohibited from the time the existing roadway structure is removed until the completion of granular base construction. At all times prior to completion of final paving; reduce equipment speeds to levels that minimize the effects of impact loading to the critical infrastructure.
- E19.6.7 Only equipment and construction practices stipulated in the accepted construction method statement and the supplemental requirements noted herein may be utilized in close proximity to feeder mains, chambers, and other critical infrastructure identified herein.
- E19.6.8 Construction operations should be staged in such a manner as to limit multiple construction loads at one time, (e.g., offset crossings sufficiently from each other, rollers should remain a sufficient distance behind spreaders to limit loads. A reasonable offset distance is 3 m between loads).
- E19.6.9 Granular material, construction material, soil, and/or other material shall not be stockpiled on the pipelines or within 5 m of any feeder main, valve chamber, or other critical infrastructure identified herein.
- E19.6.10 The Contractor shall ensure that all crew members understand and observe the requirements of working near feeder mains, valve chambers, and critical infrastructure. Prior to commencement of on-Site work, the Contractor shall jointly conduct an orientation meeting with the Contract Administer, all superintendents, foreman, and heavy equipment operators to make all workers on the Site fully cognizant of the limitations of altered loading on, the ramifications of inadvertent damage to, and the constraints associated with work in close proximity to feeder mains and critical pipelines. New personnel introduced after commencement of the Project need to be formally orientated as outlined herein. It is recommended that restrictions associated with the crossing, consistent with the Contractor's submitted method statement be posted on Site and near the crossing.
- E19.7 Demolition, Excavation, and Shoring
- E19.7.1 Use of pneumatic concrete breakers within 3 m of a feeder main, valve chamber, or critical pipeline is prohibited. Pavement shall be full depth sawcut and carefully removed. Use of hand held jackhammers for pavement removal will be allowed.
- E19.7.2 Offset excavation equipment a minimum of 3 m from the centerline of critical pipelines when undertaking excavations where there is less than 2.4 m of earth cover over the pipeline.
- E19.7.3 Excavation:
- (a) Utilize only smooth edged excavation buckets, soft excavation, or hand excavation techniques where there is less than 1.5 m of earth cover over the pipeline.

- (b) Where there is less than 1.0 m of soil cover above the pipeline, provide full time supervision and complete the excavation utilizing hand excavation, soft excavation methods, or machine excavation. Where machine excavation is to be used the crown of the pipeline must be exposed (or suitable located) using hand or soft excavation methods a minimum of every 1.8 m.
- (c) Where there is less than 0.5 m of soil cover above the pipeline, provide full time supervision and complete the excavation utilizing hand excavation or soft excavation methods only.

E19.7.4 Equipment should not be allowed to operate while positioned directly over a feeder main or critical pipeline except where permitted herein, outlined in the reviewed and accepted construction method statement.

E19.7.5 Excavations within 3 m of the outside edge of a feeder main (hydrovac holes for confirming trenchless installations excluded) and which extend below the top of the feeder main shall utilize shoring methods that precludes the movement of native in-situ soils (i.e. a tight shoring system).

E19.8 Underground Construction and Trenchless Pipe Installation

E19.8.1 Install pipes to the grades shown on the Drawings. A minimum clear separation distance (outside to outside of pipe wall) of 1.0m shall be maintained between crossing pipes and the feeder main and cast iron watermain.

E19.8.2 The Contractor shall locate feeder mains and confirm their position horizontally and vertically prior to commencing with any trenchless pipe installations to ensure proper clearances are maintained. Under NO circumstances should blind coring proceed across feeder mains.

E19.8.3 The Contractor shall visually confirm the location and alignment of the drill rods or jacking pipe (horizontally and vertically) prior to proceeding with the trenchless installation beneath the feeder main. It is recommended that the new pipe alignment be confirmed within 2 m of the outside of the feeder main pipe but no closer than 0.5 m from the outside edge of the pipe.

E19.8.4 No trenchless methods involving soil displacement (plugs) shall be permitted in the vicinity of the Feedermain.

E19.8.5 Pressure grouting or approved alternative methods shall be used to fill voids caused by the installation or if the bored hole diameter is greater than the outside diameter of the pipe by more than 25 mm.

E19.8.6 Where excavation is required within the feeder main's embedment zone, the Contractor shall take steps to ensure the granular embedment material surrounding the feeder main remains stable during the work and the feeder main outside of the excavation is not undermined.

E19.9 Subgrade Construction

E19.9.1 Subgrade and backfill compaction within 3 metres (horizontal) of a critical pipeline or valve chamber shall be limited to non-vibratory methods only. Small walk behind vibratory packers will be permitted.

E19.9.2 Subgrade, sub-base and base course construction shall be kept in a rut free condition at all times. Construction equipment is prohibited from crossing pipelines if the grade is insufficient to support the equipment without rutting.

E19.9.3 Subgrade conditions should be inspected by personnel with competent geotechnical experience (e.g. ability to adequately visually classify soils and competency of subgrade, subbase, and base course materials). In the event of encountering unsuitable subgrade materials above the feedermain, proposed design revisions shall be submitted to this office for review to obtain approval from the Water and Waste Department relative to any change in conditions.

- E19.9.4 Fill material shall not be dumped directly on pipelines but shall be stockpiled outside the limits noted in these recommendations and shall be carefully bladed in-place
- E19.9.5 Only use compaction equipment approved by the contract administrator to compact fill materials above critical pipelines. Compaction of fill materials shall be completed using static methods only, no vibratory compaction will be allowed within the limits noted in these recommendations.
- E19.9.6 Construction operations shall be staged to minimize the time period between excavation to subgrade and placement of granular subbase materials. Should bare subgrade be left overnight, measures shall be implemented to protect the subgrade against inadvertent travel over it and to minimize the impact of wet weather.
- E19.10 Subbase and Base Course Construction
- E19.10.1 Subbase or base course materials shall not be dumped directly on pipelines but shall be stockpiled outside limits noted in these recommendations and shall be carefully bladed in-place.
- E19.10.2 Subbase compaction within 3 m horizontal of the centreline of a critical pipeline shall be either carried out by static methods (without vibration) or with smaller approved equipment such as hand held plate packers or smaller roller equipment.
- E19.11 Paving
- E19.11.1 When constructing asphalt pavements only non-vibratory compaction should be used within 3 m (horizontal) of the center of critical pipelines.

E20. WORKING IN CLOSE PROXIMITY TO GAS INFRASTRUCTURE

E20.1 DESCRIPTION

- E20.2 While working in close proximity to gas infrastructure, all procedures and precautions outlined in the Appendix 'F'- *Safe Excavation & Safety Watch Guideline* manual, as well as any supplemental direction from Manitoba Hydro contained in Appendix 'D', must be adhered to. Ensure that all locates and clearances are current and have been received and understood prior to construction.

MEASUREMENT AND PAYMENT

- E20.3 Hydro excavation to locate and verify gas infrastructure, as typically required by Manitoba Hydro, will be considered incidental to the Work.
- E20.4 Any costs associated performing Safety Watches will be considered incidental to the Work.

E21. WORKING IN CLOSE PROXIMITY TO HYDRO INFRASTRUCTURE

E21.1 DESCRIPTION

- E21.2 While working in close proximity to hydro infrastructure, all procedures and precautions outlined in the Appendix 'F'- *Safe Excavation & Safety Watch Guideline* manual, as well as any supplemental direction from Manitoba Hydro contained in Appendix 'D', must be adhered to. Ensure that all locates and clearances are current and have been received and understood prior to construction.

MEASUREMENT AND PAYMENT

- E21.3 Hydro excavation to locate and verify hydro infrastructure, as typically required by Manitoba Hydro, will be considered incidental to the Work.
- E21.4 Any costs associated performing Safety Watches will be considered incidental to the Work.

E22. WORKING IN PROXIMITY TO MANITOBA HYDRO OVERHEAD TRANSMISSION LINES

E22.1 DESCRIPTION

E22.2 Contractor is responsible to meet with Manitoba Hydro at the onset of the Taylor Avenue Works to verify the working restrictions, equipment and material storage, location of any site trailers and clearance requirements related to the transmission crossing on Taylor Avenue east of Harrow Street and the lines running longitudinally along the south property line of Taylor Avenue.

E22.3 The Contractor shall organize all safety watches that may be required.

E22.4 MEASUREMENT AND PAYMENT

E22.5 Manitoba Hydro safety watches and precautions required for working in proximity to Manitoba Hydro Overhead transmission lines shall not be measured or paid and will be considered incidental to the Work.

E23. EXISTING STREETCAR TRACK AND BEDDING REMOVAL

DESCRIPTION

E23.1 This specification covers the removal of existing street car track bedding excluding rails on Stafford Street between Corydon Avenue and Lorette Avenue.

E23.2 Site investigation during design provided no evidence of steel rails still present in the road. However steel rails still may be present.

E23.3 Refer to Appendix 'A' Geotechnical Report and Appendix 'L' Site Investigation Photos to see material profile of street car track bedding.

E23.4 The term Street Car Track Bedding shall include concrete bedding, wooden ties, and any other track bedding materials, for the street car tracks previously located down Corydon Avenue. The concrete bedding is estimated to be approximately 3.0 metres wide by 0.45 metres thick.

CONSTRUCTION METHODS

E23.5 Remove the existing concrete bedding, wooden ties and any other materials, by demolishing, loading, hauling, and disposing of the removed track bedding material.

E23.6 Ensure that Manitoba Hydro requirements for working in close proximity to Hydro and Gas infrastructure including transverse service connections are adhered to.

E23.6.1 When individual transvers gas services are within the 0.200m from the bottom of the streetcar tracks and bedding, additional efforts to remove the streetcar tracks and bedding will not be considered incidental.

E23.7 Dispose of the removed material as per CW 1130.

MEASUREMENT AND PAYMENT

E23.8 Removal of existing Street Car Track Bedding shall be measured on cubic meter basis and paid for at the Contract Unit Price for "Removal of Existing Street Car Track Bedding". The volume paid shall be the total number of cubic meters of existing street car track bedding removed as measured and accepted by the Contract Administrator.

E23.8.1 Removal of material below the concrete bedding required to achieve subgrade elevation will not be considered street car track bedding and shall be paid for as Excavation.

E23.8.2 Removal of the existing pavement on top of wooden ties and bedding will not be considered street car track bedding and shall be paid for as Pavement Removal.

E23.9 Removal of existing Street Car Track Rails shall be measured on lineal meter basis and paid for at the Contract Unit Price for "Removal of Existing Street Car Track Rails". The length paid shall be the total number of lineal meters of existing street car track rail removed as measured and accepted by the Contract Administrator.

E24. VALVE CLEANING

DESCRIPTION

E24.1 General

E24.1.1 This specification covers the cleaning of existing valves on site before the start of construction.

CONSTRUCTION METHODS

E24.2 Valve Cleaning

E24.2.1 Open valves to visually inspect the current condition.

E24.2.2 Use necessary equipment to clean dirt and debris from any valves that cannot be operated or where a valve box extension cannot be installed.

E24.2.3 Prepare a list of deficient items found and provide to the Contract Administrator.

MEASUREMENT AND PAYMENT

E24.3 Valve cleaning will be measured on a unit basis and paid for at the Contract Unit Price per item for "Valve Cleaning". The number to be paid for shall be the total number of valves cleaned in accordance with this Specification and accepted by the Contract Administrator.

E25. CATCH BASIN CLEANING

DESCRIPTION

E25.1 General

E25.1.1 This specification covers the cleaning of pre-existing catch basins not scheduled for replacement on Taylor Avenue.

E25.1.2 New catch basins were installed on Taylor Avenue in 2020 under the major sewer upgrade works in anticipation of the roadworks covered under this contract. As these catch basins are pre-existing and not scheduled for replacement they may require cleaning.

CONSTRUCTION METHODS

E25.2 Catch Basin Cleaning

E25.2.1 Prior to roadway construction, open Catch Basins to visually inspect the current condition.

E25.2.2 Use necessary equipment to remove dirt and debris as required.

MEASUREMENT AND PAYMENT

E25.3 Catch Basin cleaning will be measured on a unit basis and paid for at the Contract Unit Price per item for "Catch Basin Cleaning". The number to be paid for shall be the total number of catch basins cleaned in accordance with this Specification and accepted by the Contract Administrator.

E25.4 No payment shall be made for catch basin cleaning required after construction is complete.

E26. TREE REMOVAL

DESCRIPTION

E26.1 General

- E26.1.1 Further to CW 3010 and the City of Winnipeg "Tree Removal Guidelines", this specification shall cover the removal of trees as specified on the Drawings and as directed by the Contract Administrator.

CONSTRUCTION METHODS

- E26.2 Remove trees in accordance with CW 3010.

MEASUREMENT AND PAYMENT

- E26.3 Tree removal will be measured on a unit basis and will be paid for at the Contract Unit Price per unit for "Tree Removal," which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

E27. INSTALLATION OF STREETLIGHTS AND ASSOCIATED WORKS

E27.1 DEFINITIONS

- (a) **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.
- (b) **MANITOBA HYDRO CENTRAL STORES** means Manitoba Hydro's Waverley Service and Reclaim Centre - 1840 Chevrier Blvd - Winnipeg, Manitoba
- (c) **OVERHEAD FEED** means an electrical supply via an overhead conductor connected between streetlight standards. Typically strung between standards on a temporary basis.
- (d) **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.)
- (e) **RECLAIM** material means existing material that has been removed from Manitoba Hydro's system and to be returned to Manitoba Hydro.
- (f) **SCRAP** material means existing material that has been removed from Manitoba Hydro's system and to be recycled/disposed of by the Contractor.
- (g) **SURPLUS** material means new material that has been requisitioned by the Contractor and not incorporated into the work at the end of the Contract.
- (h) **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).

E27.2 DESCRIPTION

- E27.2.1 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.

E27.3 WORK LOCATIONS

E27.3.1 The proposed street light installation and removals are shown on construction drawings and are as follows:

- (a) Stafford Street – Corydon Ave. to Pembina Hwy.
- (b) Taylor Avenue – Harrow St. To Pembina Hwy.

E27.4 COORDINATION OF WORK

E27.4.1 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.

E27.4.2 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.

E27.4.3 Manitoba Hydro's CSC will provide the Limits of Approach applicable to the Contractor on the Work Clearance form.

E27.5 ORIENTATION

E27.5.1 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.

E27.6 PRE-CONSTRUCTION MEETING

E27.6.1 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.

E27.6.2 The Contractor's cost to attend this pre-construction meeting shall be incorporated into the unit prices for the work.

E27.7 QUALIFICATIONS AND CERTIFICATION

E27.7.1 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.

- E27.7.2 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.
- E27.7.3 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
- E27.7.4 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.
- E27.7.5 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.
- E27.8 REFERENCED STANDARD CONSTRUCTION SPECIFICATIONS
- E27.8.1 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")
- E27.8.2 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.
- E27.8.3 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.
- E27.9 TOOLS, EQUIPMENT AND MATERIALS
- E27.9.1 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.

E27.9.2 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

E27.9.3 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.

E27.9.4 Alternative equipment manufacturers may be considered upon request by the Contractor and shall be approved for use by Manitoba Hydro prior to use.

E27.9.5 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.

E27.10 MATERIAL SUPPLIED BY MANITOBA HYDRO

E27.10.1 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:

E27.10.2 Manitoba Hydro Central Stores (contact personnel will be provided to the successful contractor).

E27.10.3 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.

E27.10.4 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.

E27.10.5 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.

E27.11 MATERIAL SUPPLIED BY CONTRACTOR

E27.11.1 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.

E27.12 SURPLUS, RECLAIM AND SCRAP MATERIAL

E27.12.1 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.

E27.12.2 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.

E27.12.3 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.

E27.13 DE-ENERGIZATION AND LOCKOUT

E27.13.1 **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.

E27.13.2 **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.

E27.13.3 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.

E27.14 TEMPORARY OVERHEAD FEEDS

E27.14.1 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.

E27.14.2 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.

E27.14.3 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.

E27.14.4 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.

E27.15 SAFE EXCAVATION

E27.15.1 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 F and Manitoba Workplace Safety and Health Regulation 217 latest revision.

E27.16 SAFE HANDLING

E27.16.1 The Contractor shall apply handling techniques in accordance with Manitoba Workplace Health and Safety Regulation 217 (latest revision).

E27.17 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.

E27.18 PRECAST CONCRETE BASES

E27.18.1 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.

E27.18.2 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.

E27.19 STREET LIGHT POLES AND ARMS

E27.19.1 The Contractor shall handle, store, transport, and provide proper load securement for the poles and arms in a manner to prevent damage.

E27.20 LUMINAIRES

E27.20.1 The Contractor shall handle, store, transport and unload the luminaires in their original packaging and in a manner to prevent damage.

E27.21 SMALL MATERIAL

E27.21.1 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.

E27.22 CARE OF MATERIALS

E27.22.1 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.

E27.23 WIRE AND CABLE REEL STORAGE

E27.23.1 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.

E27.23.2 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.

E27.24 REEL HANDLING

E27.24.1 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.

E27.24.2 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.

E27.24.3 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.

E27.24.4 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.

E27.25 PRESSURIZED WATER/VACUUM EXCAVATION

E27.25.1 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.

E27.25.2 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.

E27.26 REMOVAL STREET LIGHT POLE FROM EXISTING BASE

E27.26.1 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.

E27.26.2 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.

E27.26.3 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.

E27.27 REMOVAL OF BASE AND DIRECT BURIED STREET LIGHT POLE

- E27.27.1 This shall include all excavation, whether by auger, pressurized water/vacuum excavation, by hand, or by other methods which may be necessary to remove a base or direct buried street light pole. The base may be poured in place concrete, steel power installed or precast concrete.
- E27.27.2 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.
- E27.27.3 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.

E27.28 INSTALLATION OF FOUNDATION - CONCRETE BASE

- E27.28.1 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.
- E27.28.2 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.
- E27.28.3 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.
- E27.28.4 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.
- E27.28.5 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.
- E27.28.6 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.

E27.29 BASE MOUNTED STREET LIGHT POLES

- E27.29.1 This shall include all work required to install the street light pole on the concrete base as set forth in this Specification.
- E27.29.2 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.
- E27.29.3 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.
- E27.29.4 The Contractor shall level the street light pole in all 4 directions. Leveling shims may be used.

- E27.29.5 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.
- E27.29.6 Unless otherwise specified, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.
- E27.29.7 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.

E27.30 LUMINAIRES AND ASSOCIATED WIRING

- E27.30.1 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.
- E27.30.2 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.
- E27.30.3 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.

E27.31 BREAK AWAY BASES

- E27.31.1 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.
- E27.31.2 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.

E27.32 SPLICING/CONNECTING CABLES

- E27.32.1 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.
- E27.32.2 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).

E27.33 EXCAVATION

- E27.33.1 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.

E27.33.2 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.

E27.34 LAYING CABLES

E27.34.1 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.

E27.34.2 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.

E27.34.3 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.

E27.34.4 During installation, under no circumstance is the cable to be subjected to a bending radius tighter than that detailed in the Standards.

E27.34.5 Where specified in the Standards or on the construction drawings, the Contractor shall install the street light cable in a conduit.

E27.35 INSTALLING CONDUIT AND CABLE BY BORING (HORIZONTAL DIRECTIONAL DRILLING)

E27.35.1 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.

E27.35.2 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.

E27.35.3 Drilling fluids and associated waste materials shall be disposed of in a manner that minimizes environmental effects.

E27.35.4 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.

E27.36 BURIED UTILITY CROSSINGS

E27.36.1 All buried obstructions are not necessarily shown on the reference drawings and the locations of those indicated are approximate only.

- E27.36.2 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.
- E27.36.3 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.
- E27.36.4 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.

E27.37 BENDING CABLES/CONDUITS AND INSTALLATION INTO STANDARDS

- E27.37.1 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.
- E27.37.2 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.
- E27.37.3 Unless otherwise directed, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.

E27.38 BACKFILL

- E27.38.1 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.

- E27.38.2 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.
- E27.38.3 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.
- E27.38.4 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.
- E27.38.5 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.

E27.39 DEFECTIVE WORK & WARRANTY

- E27.39.1 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.
- E27.39.2 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.

E27.40 AS-BUILT DRAWING

- E27.40.1 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.

E27.41 MEASUREMENT AND PAYMENT

- E27.41.1 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.
- E27.41.2 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.

- E27.41.3 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.
- E27.41.4 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.
- E27.41.5 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.
- E27.41.6 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.
- E27.41.7 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.

- E27.41.8 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.
- E27.41.9 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.
- E27.41.10 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.
- E27.41.11 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.
- E27.41.12 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.
- E27.41.13 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.
- E27.41.14 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.
- E27.41.15 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.
- E27.41.16 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.
- E27.41.17 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.

E28. VIDEO INSPECTION OF SEWERS

DESCRIPTION

- E28.1 This Specification amends CW 2130 and CW 2145. It covers the incidental video inspection of existing sewers following tying in new catch basin leads or the abandonment of existing catch basin leads

CONSTRUCTION METHODS

E28.2 Video inspection of existing sewers shall be done in accordance with CW 2130 and CW 2145.

MEASUREMENT AND PAYMENT

E28.3 Video inspection of existing sewers following tying in new catch basin leads or the abandonment of existing catch basin leads shall not be measured and shall be considered incidental to the Work.

E29. CONCRETE RETAINING CURBS AT BACK OF SIDEWALK

DESCRIPTION

E29.1 General

E29.1.1 Further to CW 3325 and CW 3310, this specification will cover the construction of concrete retaining curbs at the back of sidewalk.

E29.1.2 Referenced Standard Construction Specifications

(a) CW 3325 – Portland Cement Concrete Sidewalk

(b) CW 3310 – Portland Cement Concrete Pavement Works

MATERIALS

E29.2 Concrete mix design shall comply with CW 3310

E29.2.1 All other materials as per CW 3310.

CONSTRUCTION METHODS

E29.3 Construction as per Contract Drawings and as per CW 3310 and CW3325.

E29.4 Height, width and length of retaining curbs at the back of the sidewalk to be constructed as per the Drawings. All forming and reinforcing steel is incidental to the unit bid price Bid for this specification.

E29.5 Any thickened edges of sidewalk will be incidental to the unit bid price Bid for the concrete sidewalk.

E29.6 Retaining curb concrete shall have a smooth form finish.

E29.7 Curing compound is to be applied to all exposed surfaces, and promptly following stripping of forms.

E29.8 Sawcutting to be completed as soon as possible after the removal of formwork to avoid uncontrolled cracking.

E29.9 Bonding agent is to be applied to bearing surfaces prior to placement of retaining curbs and is incidental to the unit bid price.

E29.10 Free draining granular backfill will be placed behind the retaining curb up to 200mm below lip of curb shall be incidental to the unit bid price. Final surface such as boulevard grading or asphalt shall be paid for at the corresponding unit bid price.

MEASUREMENT AND PAYMENT

E29.11 Supply and Installation of concrete retaining curbs up to 200mm tall at the back of sidewalk will be measured on a per metre basis and paid for at the Contract Unit Price for "Construction of Retaining Curb (Up To 200 mm ht Separate)". The length to be paid for shall be the total number of linear metres formed and placed in accordance with this Specification and as measured and accepted by the Contract Administrator.

E30. TEMPORARY WOODEN TRANSIT STOP RAMPS

E30.1 DESCRIPTION

E30.2 This specification covers the production, supply and placement of temporary bus stop platforms. They are intended to be portable and moveable to accommodate construction activity through areas where Transit stops are located and passenger loading is temporarily required from a lane that is not adjacent to a curb or sidewalk on the right hand side of a Transit bus.

E30.3 These stops are intended to enable a wheelchair to navigate up a ramp to a platform that is high enough to accommodate the use of Transit low floor buses such that the wheelchair user can enter the bus directly from the top of the platform.

E30.4 These are not required at all locations where Transit stops currently exist. Some Transit stops will be relocated to locations where a curb and sidewalk are available, temporarily suspended, or relocated outside of the construction area.

E30.5 CONSTRUCTION METHODS

E30.6 The stops shall be constructed as determined by the Contractor with the following criteria;

- (a) A durable structure that can be moved by machines on site;
- (b) Timber based or better materials;
- (c) Surface for platform and ramp shall be either plywood or timber decking with zero gap at the time of install;
- (d) 5-7" in total height;
- (e) Include one ramp with 8-10% grade
- (f) All connections to be secured with screws.
- (g) Top of platform to be 2.0m by 2.0m minimum measure from outside edges of top of platform.
- (h) Platform to be plumb, Contractor to place shims or level course as required, and temporary affix to base, sub-base course, or existing pavement at two points.

E30.7 The stops shall be placed at locations approved by Transit and the Contract Administrator in consultation with the Contractor to accommodate construction staging.

E30.8 MEASUREMENT AND PAYMENT

E30.9 Temporary Wooden Transit Stop Ramps will be measured on a per unit basis and paid for at the Contract Unit Price for "Temporary Wooden Transit Stop Ramps". The units will be paid for each unit supplied and placed in accordance with this Specification and as measured and accepted by the Contract Administrator. Placing the stops and relocating will be incidental.

E31. GEOTEXTILE FABRIC AND GEOGRID

E31.1 Form B Unit Prices has separate line items for Class A Geogrid and for Separation/Filtration Fabric. This results in a two-stage operation for placement of these materials in the field. Alternatively, these materials may be placed as one operation using a Geotextile/Class A Geogrid Composite provided each material individually meets the required City Standard Specification for the respective material.

E32. CAST-IN-PLACE CONCRETE PILE FOUNDATIONS FOR STEEL OVERHEAD SIGN SUPPORT STRUCTURES

DESCRIPTION

E32.1 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.

MATERIALS

E32.2 General

E32.2.1 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.

E32.3 Handling and Storage of Materials

E32.3.1 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.

E32.4 Testing and Approval

E32.4.1 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.

E32.4.2 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.

E32.5 Patching Mortar

E32.5.1 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.

E32.6 Cement

E32.6.1 Cement shall be Type HS, HSe or HSb, high-sulphate-resistant hydraulic cement, conforming to the requirements of the latest CSA Standard A23.1.

E32.7 Concrete

E32.7.1 General

(a) Concrete repair material shall be compatible with the concrete substrate.

E32.7.2 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:

- (a) Class of Exposure: S-1 and F-1;
- (b) Compressive Strength @ 56 days = 35 MPa;

- (c) Water / Cementing Materials Ratio = 0.4;
- (d) Air Content: Category 1 per Table 4 of CSA A23.1-14 (5-8%);
- (e) Cement – shall be as specified in E32.6.

E32.7.3 Mix design for ready mix concrete shall be submitted to Contract Administrator at least two (2) weeks prior to concrete placing operations.

E32.7.4 The workability of each concrete mix shall be consistent with the Contractor's placement operations. Self-compacting concrete may be used for pile foundations.

E32.7.5 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.

E32.7.6 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.

E32.7.7 Concrete materials susceptible to frost damage shall be protected from freezing.

E32.8 Aggregate

E32.8.1 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 the latest CSA A23.1.

E32.8.2 Coarse Aggregate

- (a) 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".
- (b) Coarse aggregate shall consist of crushed stone or gravel or a combination thereof, having hard, strong, durable particles free from elongation, dust, shale, earth, vegetable matter or other injurious substances. Coarse aggregate shall be clean and free from alkali, organic or other deleterious matter; and shall have an absorption not exceeding two and a quarter percent (2.25%).
- (c) The aggregate retained on the 5 mm sieve shall consist of clean, hard, tough, durable, angular particles with a rough surface texture, and shall be free from organic material, adherent coatings of clay, clay balls, and excess of thin particles or any other extraneous material.
- (d) Coarse aggregate when tested for abrasion in accordance with the latest ASTM C131 shall not have a loss greater than thirty percent (30%).
- (e) Tests of the coarse aggregate shall not exceed the limits for standard for requirements prescribed in the latest CSA A23.1, Table 12, for concrete exposed to freezing and thawing.

E32.8.3 Fine Aggregate

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

E32.9 Cementing Materials

- E32.9.1 Cementing materials shall conform to the requirements of the latest CSA A3001.
- E32.10 Silica Fume
- E32.10.1 Should the Contractor choose to include silica fume in the concrete mix design, it shall not exceed eight percent (8%) by mass of cement.
- E32.11 Fly Ash
- E32.11.1 Fly ash shall be Type C1 or Type F and shall not exceed twenty-five percent (25%) by mass of cement.
- E32.12 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.
- E32.13 Admixtures
- E32.13.1 Air entraining admixtures shall conform to the requirements of the latest ASTM C260.
- E32.13.2 Chemical admixtures shall conform to the requirements of the latest ASTM C494 or C1017 for flowing concrete.
- E32.13.3 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.
- E32.13.4 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.
- E32.13.5 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.
- E32.14 Water
- E32.14.1 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.
- E32.15 Concrete Supply
- E32.15.1 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.
- E32.15.2 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.
- E32.15.3 The Contractor shall maintain all equipment used for handling and transporting the concrete in a clean condition and proper working order.
- E32.16 Reinforcing Steel
- E32.16.1 Reinforcing steel shall be deemed to include all reinforcing bars, tie-bars, and dowels.
- E32.16.2 All reinforcing steel shall conform to the requirements of the latest CSA Standard G30.18, Grade 400W, 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 the concrete pile foundation and no separate payment will be made.

E32.17 Anchor Bolts, Nuts, and Washers

E32.17.1 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 300mm to 560mm 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.

E32.18 Anchor Bolt Templates

E32.18.1 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.

E32.19 Fibre Joint Filler

E32.19.1 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.

E32.20 Precompressed Foam Joint Filler

E32.20.1 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.

E32.20.2 The sealant system shall be comprised of three components:

- (a) Cellular polyurethane foam impregnated with hydrophobic 100% acrylic, waterbased emulsion, factory coated and highway-grade, fuel resistant silicone;
- (b) Field-applied epoxy adhesive primer; and
- (c) Field-injected silicone sealant bands.

E32.20.3 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.

E32.20.4 BEJS foam seal to be installed into manufacturer's standard field-applied epoxy adhesive. The BEJS SYSTEM is to be installed recessed from the surface such that when the field-applied injection band of silicone is installed between the substrates and the foam-and-silicone-bellows, the system will be ½" (12mm) down from the substrate surface.

E32.20.5 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.

E32.20.6 All substitute candidates shall be free in composition of any waxes or asphalts, wax compounds or asphalt compounds. All substitute candidates shall be:

- (a) 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
- (b) Capable of self-expanding to the maximum movement capability (+50% nominal material size) with twenty-four (24) hours at 20 C.

E32.21 Miscellaneous Materials

- E32.21.1 Miscellaneous materials shall be of the type specified on the Drawings or approved by the Contract Administrator.

CONSTRUCTION METHODS

E32.22 Location and Alignment of Piles

- E32.22.1 Pile construction shall not commence until the Contractor has obtained clearance from the appropriate Utility Authorities including but not limited to Manitoba Hydro, MTS and City of Winnipeg Water and Waste.
- E32.22.2 Piles shall be placed in the positions shown on the Drawings and as directed by the Contract Administrator in the field.
- E32.22.3 The deviation of the axis of any finished pile shall not differ by more than one percent (1%) from the vertical.

E32.23 Buried Utilities

- E32.23.1 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.
- E32.23.2 The proposed locations of the pile foundations may be changed by the Contract Administrator if they interfere with the buried utilities.
- E32.23.3 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.

E32.24 Excavation

- E32.24.1 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.
- E32.24.2 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.
- E32.24.3 Upon reaching the required elevation, the bottom of the excavation shall be cleaned as directed by the Contract Administrator in the field.
- E32.24.4 All excavated material from the piles shall be promptly hauled away from the Site to an approved disposal area as located by the Contractor.
- E32.24.5 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.
- E32.24.6 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.

E32.25 Sleeving

- E32.25.1 Steel or corrugated metal pipe sleeving shall be used if required to temporarily line the excavation to prevent bulging or caving of the walls.
- E32.25.2 The sleeving shall be designed by the Contractor and constructed to resist all forces that may tend to distort it.
- E32.25.3 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.
- E32.25.4 The clearance between the face of the excavation and the sleeving shall not exceed 75 mm. 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.

E32.26 Inspection of Excavations

- E32.26.1 Concrete shall not be placed in an excavation until the excavation has been inspected and approved by the Contract Administrator.
- E32.26.2 The Contractor shall have available suitable light for the inspection of each excavation throughout its entire length.
- E32.26.3 Any improperly set sleeving or improperly prepared excavation shall be corrected to the satisfaction of the Contract Administrator.

E32.27 Placing Reinforcing Steel

- E32.27.1 Reinforcement shall be:
- (ii) placed in accordance with the details shown on the Drawings;
 - (iii) rigidly fastened together;
 - (iv) lowered into the excavation intact before concrete is placed.
- E32.27.2 Spacers shall be utilized to properly locate the reinforcing steel cage in the excavation.

E32.28 Placing Anchor Bolts

- E32.28.1 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.
- E32.28.2 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.

E32.29 Forms

- E32.29.1 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.
- E32.29.2 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.
- E32.29.3 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 on the drawings.
- E32.29.4 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.

E32.30 Placing Concrete

- E32.30.1 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.
- E32.30.2 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.
- E32.30.3 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.
- E32.30.4 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.
- E32.30.5 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.
- E32.31 Tremie Concrete
- E32.31.1 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.
- E32.31.2 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
- E32.32 Protection of Newly Placed Concrete
- E32.32.1 Newly laid concrete threatened with damage by rain, snow, fog, or mist shall be protected with a tarpaulin or other approved means.
- E32.33 Curing Concrete
- E32.33.1 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.
- E32.33.2 After the finishing is completed, the surface shall be promptly covered with a minimum of a single layer of clean, damp polyester blanket.
- E32.33.3 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.
- E32.33.4 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.
- E32.34 Form Removal
- E32.34.1 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.
- E32.34.2 The minimum strength of concrete in place for safe removal of forms shall be 20 MPa.

E32.34.3 Field-cured test specimens, representative of the in-place concrete being stripped, will be tested to verify the concrete strength.

E32.35 Patching of Formed Surfaces

E32.35.1 Immediately after forms around the 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.

E32.35.2 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.

E32.35.3 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.

E32.36 Cold Weather Concreting

E32.36.1 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 until 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.

E32.37 Removal and Restoration of Adjacent Surface Treatments

E32.37.1 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.

E32.37.2 If the pile being constructed is located in a 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.

E32.37.3 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.

E32.37.4 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.

QUALITY CONTROL

- E32.38 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.
- E32.39 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

- E32.40 Construction of New Cast-in-Place Concrete Pile Foundations
- E32.40.1 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.
- E32.40.2 **Items of Work:**
- (a) Construction of CIP Concrete Pile Foundation (S796 – 815 mm Diameter Pile)
- E32.40.3 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 "Construction of CIP Concrete Pile Foundation", unless otherwise noted herein. No measurement or payment shall be made for this Work unless indicated otherwise.

E33. SUPPLY AND INSTALLATION OF NEW STEEL OVERHEAD SIGN SUPPORT STRUCTURES

DESCRIPTION

- E33.1 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 structures.
- E33.2 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

- E33.3 General
- E33.3.1 The Contractor shall be responsible for the supply, safe storage, and handling of all materials set forth in this Specification.
- E33.3.2 All materials used for fabrication of overhead sign support structures shall be new, previously unused material.
- E33.4 Handling and Storage of Materials
- E33.4.1 All materials shall be handled in a careful and workmanship-like manner, to the satisfaction of the Contract Administrator.

E33.5 Structural Steel

E33.5.1 Structural steel for all components of the overhead sign support structures shall be in accordance with CSA Standard G40.21M, 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.

E33.5.2 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.

E33.5.3 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 favourable published mill test results). Items fabricated without steel certification shall be rejected.

E33.6 Flange Bolts, Nuts, and Washers

E33.6.1 Flange bolts, nuts, and washers shall be in accordance with ASTM F3125 Grade A325, Type 1, hot-dip galvanized in accordance with ASTM F2329.

E33.7 Mounting Bracket Fasteners (Bracket-to-Bracket)

E33.7.1 Mounting bracket fasteners (connecting two (2) clamp brackets) shall be all-thread rod conforming to one (1) of the following:

- (a) SAE Grade 2 hot dip galvanized;
- (b) ASTM A307 Grade B hot dip galvanized;
- (c) ASTM F1554 Grade 55 hot dip galvanized.

E33.7.2 Hot-dip galvanizing shall be in accordance with ASTM F2329. Plated coatings will not be accepted.

E33.7.3 Two (2) nuts, two (2) washers and one (1) lock washer (all hot dip galvanized) shall be provided for each segment of threaded rod.

E33.7.4 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.

E33.8 Mounting Bracket Fasteners (Bracket to Panel)

E33.8.1 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.

E33.8.2 One (1) nut, one (1) washer, and one (1) lock washer shall be furnished with each bolt.

E33.9 Fasteners for Handhole Covers

E33.9.1 Fasteners for handhole covers shall be in accordance with ASTM A276 Type 316 stainless steel.

E33.10 Hot-Dip Galvanizing

E33.10.1 Hot-dip galvanizing of structural steel shall be in accordance with ASTM A123 for a minimum net retention of 610 g/m².

E33.11 Galvanizing Touch-up and Field-Applied Galvanizing

E33.11.1 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.

- E33.11.2 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:
- (a) 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;
 - (b) 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.
- E33.12 Cold Applied Galvanizing Compound
- E33.12.1 Approved cold-applied galvanizing compound is as follows:
- (a) 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.
- E33.13 Rodent Screen
- E33.13.1 Rodent screens shall be ½" – 18F stainless steel (316L) expanded metal sheet or approved equal in accordance with B.6.
- E33.14 Aluminum T-Bars
- E33.14.1 Aluminum T-Bars shall be in accordance with ASTM B221 6061-T6.
- E33.15 Sign Plates and Panels for Overhead Sign Structures
- E33.15.1 For sign structure S796, sign plates are to be supplied by the Contractor in accordance with E34 and installed on the overhead sign structures in accordance with this specification.
- E33.16 Welding Consumables
- E33.16.1 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:
- (a) manual shielded metal arc welding (SMAW): All electrodes shall be basic-type electrodes conforming to CSA W48, classification E480XX, or imperial equivalent;
 - (b) gas metal arc welding (GMAW): All electrodes shall conform to CSA W48, classification ER480S-X, or imperial equivalent;
 - (c) 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;
 - (d) submerged arc welding (SAW): All electrodes shall conform to CSA W48, classification F480X-EXXX or imperial equivalent;
 - (e) shielding gas shall be welding grade carbon-dioxide with a guaranteed dew point of negative forty-six degrees Celsius (-46°C);
 - (f) 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).
- E33.16.2 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.
- E33.17 Miscellaneous Materials
- E33.17.1 Miscellaneous material incidental to this Work shall be as approved by the Contract Administrator.

EQUIPMENT

- E33.18 All equipment shall be of a type approved by the Contract Administrator and shall be kept in good working order.

CONSTRUCTION METHODS

E33.19 General Requirements

- E33.19.1 Holes in the base plates 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.
- E33.19.2 The base plates for the sign support structures shall be constructed to be fully compatible and mountable on the anchor bolts, provided in the foundations by the Contractor.
- E33.19.3 Sufficient reinforced handholes and wiring holes shall be provided for lighting of the signs as shown on the Drawings. All wiring holes shall have threaded couplings. All unused coupling holes shall be capped with a threaded galvanized plug.
- E33.19.4 The sign support structure shall be so fabricated that erection can be achieved by means of bolted connections.
- E33.19.5 Each 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.
- E33.19.6 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.
- E33.19.7 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.

E33.20 Fabrication

- E33.20.1 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, Luminaires, and Traffic Signals - 2015 – 1st Edition, plus all subsequent revisions.
- E33.20.2 The punching of identification marks on the members will not be allowed, except for the structure identification number.
- E33.20.3 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.
- E33.20.4 Dimensions and fabrication details that control the field matching of parts shall receive very careful attention in order to avoid field adjustment.
- E33.20.5 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.
- E33.20.6 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.
- E33.20.7 All holes shall be free of burrs and rough edges.

E33.21 Welding

- E33.21.1 Welding of steel structures shall be in accordance with CSA W59, "Welded Steel Construction".
- E33.21.2 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 percent (100%) penetration, and where circumferential welds are used at a butt joint, an internal backup strip shall be provided.

E33.21.3 Longitudinal seam welds in horizontal supports shall be located at the top of the horizontal members.

E33.21.4 All welds shall be ground smooth and flush with the adjacent surface prior to hot-dip galvanizing.

E33.22 Surface Preparation and Cleaning

E33.22.1 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.

E33.22.2 The sandblasting and cleaning of sign structures shall be done in the shop.

E33.22.3 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.

E33.22.4 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.

E33.23 Hot-Dip Galvanizing

E33.23.1 The hot-dip galvanizing plant shall be a Regular Member of the American Galvanizers Association, Inc.

E33.23.2 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.

E33.23.3 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.

E33.23.4 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.

E33.23.5 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.

E33.23.6 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.

E33.23.7 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.

E33.23.8 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.

E33.23.9 All threaded couplings shall be rethreaded after the sign structures have been hot-dip galvanized.

E33.23.10 The sign structures shall be stored on timber blocking after hot-dip galvanizing.

E33.24 Delivery and Erection

E33.24.1 The Contractor shall notify the Contract Administrator at least two (2) Working Days in advance of the anticipated delivery to the Site and erection of the overhead sign support structures.

E33.24.2 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 shall be placed on timber blocking and secured with nylon ropes during their transportation to the Site.

E33.24.3 Comply with project Traffic Management requirements during erection.

E33.25 Attachment of Structure to Anchor Bolts

E33.25.1 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.

E33.25.2 The anchor bolts shall have a minimum projection of 25 mm above the anchoring nuts.

E33.25.3 The distance between the top of the concrete pile and the underside of the levelling nut shall not exceed one (1) anchor bolt diameter.

E33.25.4 The threaded portions of the anchor bolts and nuts shall be treated with a wax based lubricant.

E33.25.5 The Contractor shall plumb the shaft by adjusting the levelling and anchor nuts.

E33.25.6 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.

E33.25.7 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.

E33.26 Structural Bolt Installation

E33.26.1 Structural bolts for flange and splice connections shall be tightened in accordance with the turn-of-nut method as follows:

- (a) alternately tighten all bolts to achieve a snug tight condition. The mating surfaces shall be in firm contact;
- (b) tighten all bolts in accordance with Table 1, below;
- (c) 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 4 <i>D</i>		Bolt Length over 4 <i>D</i> to 8 <i>D</i>		Bolt Length over 8 <i>D</i> to 12 <i>D</i>	
	Length up to	Required Turns	Length Range	Required Turns	Length Range	Required Turns
1/2"	2"	1/3 ± 30°	2 to 4"	1/2 ± 30°	4 to 6"	2/3 ± 45°

5/8"	2.5"	1/3 ± 30°	2.5 to 5"	1/2 ± 30°	5 to 7.5"	2/3 ± 45°
3/4"	3"	1/3 ± 30°	3 to 6"	1/2 ± 30°	6 to 9"	2/3 ± 45°
7/8"	3.5"	1/3 ± 30°	3.5 to 7"	1/2 ± 30°	7 to 10.5"	2/3 ± 45°
1"	4"	1/3 ± 30°	4 to 8"	1/2 ± 30°	9 to 13.5"	2/3 ± 45°
1 1/8"	4.5"	1/3 ± 30°	4.5 to 9"	1/2 ± 30°	10 to 15"	2/3 ± 45°
1 1/4"	5"	1/3 ± 30°	5 to 10"	1/2 ± 30°	11 to 16.5"	2/3 ± 45°

E33.27 Installation of Sign Panels

- E33.27.1 The Contractor will be responsible for installation of sign panels on the sign support structures.
- E33.27.2 The Contractor shall install the sign panels on the sign support structures 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.
- E33.27.3 Sign panels shall be installed such that the panels are level to ground after all support structure deflection has occurred. Sign panels shall not be twisted or warped following installation.

E33.28 Rodent Screens

- E33.28.1 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.
- E33.28.2 The entire gap shall be covered with an expanded stainless steel metal screen, in accordance with E33.13, "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.
- E33.28.3 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.
- E33.28.4 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.
- E33.28.5 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.

E33.29 Field-Applied Touch-up Galvanizing

- E33.29.1 Any areas of damaged galvanizing on the sign structures shall receive field-applied touch-up galvanizing.
- E33.29.2 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.
- E33.29.3 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.

- E33.29.4 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

E33.30 General

- E33.30.1 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 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.

- E33.30.2 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.

E33.31 Welding Qualifications

- E33.31.1 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.
- E33.31.2 Approved welding procedures shall be submitted to the Contract Administrator prior to fabrication of any steel items.

E33.32 Testing

- E33.32.1 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.
- E33.32.2 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 to be ready for installation of the 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:
- (a) visual inspection of one hundred percent (100%) of welds;
 - (b) ultrasonic testing of one hundred percent (100%) of full penetration sections of longitudinal seam welds and circumferential butt welds;
 - (c) magnetic particle testing of a random ten percent (10%) of partial penetration sections of longitudinal seam welds;
 - (d) ultrasonic testing of twenty-five percent (25%) of base plate and flange plate welds;
 - (e) inspection of hot-dip galvanizing and coating thickness.
- E33.32.3 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.
- E33.32.4 No repair shall be made until agreed to by the Contract Administrator.
- E33.32.5 Defects in hot-dip galvanizing shall be rectified as directed by the Contract Administrator.

E33.33 Unacceptable Work

- E33.33.1 Any Work found to be unacceptable shall be corrected in accordance with CSA W59;
- E33.33.2 No repair shall be made until agreed to by the Contract Administrator.

MEASUREMENT AND PAYMENT

E33.34 Supply and Installation of New Steel Overhead Sign Support Structures

E33.34.1 Supply and installation of new steel overhead sign support structures 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.

E33.34.2 **Items of Work:**

- (a) Supply and Installation of New OHSS (S796 – Stafford St. SB, North of Pembina Hwy.):

E33.34.3 The installation of sign plates on S796 shall be considered incidental to the work.

E34. SUPPLY OF REFLECTIVE GUIDE SIGN PANELS

DESCRIPTION

E34.1 General

E34.1.1 The work covered under this item shall include all operations related to the supply of reflective guide sign panels for overhead mounted guide sign applications.

E34.1.2 The Work to be done under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work hereinafter specified.

E34.2 Scope of Work

E34.2.1 Supply of guide signs shall include the following:

- (a) Supply of one (1) new guide sign Stafford Street south bound north of Pembina Hwy new overhead sign support structure S796.

E34.3 References

E34.3.1 ASTM B221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

E34.3.2 Manual of Uniform Traffic Control Devices for Canada (MUTCD)

E34.3.3 ASTM A193 Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications

E34.3.4 ASTM A193 Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications

E34.3.5 ASTM D4956 Standard Specification for Retro-reflective Sheeting for Traffic Control

E34.4 Graphical content to be supplied by the Contract Administrator

E34.4.1 Acting on behalf of the City of Winnipeg, the Contract Administrator will supply the Contractor with the following information within fourteen (14) calendar days of the request by the Contractor:

- (a) Electronic image file (PDF or JPEG) of the sign panel graphical content
- (b) Indication of character font, height, kern, line spacing, minimum edge distances, etc.
- (c) Indication of all colors for the sign panel content and background materials

- (d) Overall sign panel dimensions, with the sign panel height in increments of 305 mm.
- (e) Number and spacing of vertical backing bars ("T-bars").
- (f) All dimensions will be shown in metric units

E34.5 Submittals

E34.5.1 Shop Drawings for each sign panel to be supplied shall be submitted to the Contract Administrator by the Contractor at least fourteen (14) calendar days prior to the commencement of any sign panel fabrication work.

E34.5.2 Shop Drawings shall conform to the following

- (a) submitted in electronically generated PDF format
- (b) be of natural scale (1 horizontal to 1 vertical)
- (c) must be in full color. Scanned copies of printed materials will not be accepted.
- (d) Must be an accurate representation of the font, character size, spacing, edge distances, and other items displayed in the Drawings.
- (e) Show the spacing and edge distances of all vertical backing bars. For Contracts which include sign panel installation and/or installation of sign panels on new or existing structures, the location of the aluminum backing bars shown on the Shop Drawings shall take into consideration potential conflicts with the mounting configuration on the structure and shall be coordinated with respect to the shop drawings and/or as-built drawings of the sign panel support structure to which it will be mounted.
- (f) Must show at least one sign panel cross-section taken vertically through the sign panel showing the aluminum substrate extrusion shape, profile, and connecting hardware information.
- (g) All dimensions shall be shown in metric units
- (h) Must include a statement of sign panel mass, in kilograms.

E34.5.3 Sheeting Product Details

- (a) Submit the product data sheet and manufacturer's recommendations for installation of the selected sheeting material(s) to the Contract Administrator at least fourteen (14) Calendar Days prior to commencement of work.

E34.5.4 Connecting Hardware

- (a) Submit samples of the connecting hardware to the Contract Administrator at least fourteen (14) Calendar Days prior to commencement of work.

MATERIALS

E34.6 General

E34.6.1 All material shall be new, previously unused.

- (a) The re-use of sign panels after chemical stripping or sanding of the panel will not be accepted.

E34.6.2 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.

E34.7 Retro-reflective Sheeting

E34.7.1 Sign panel content shall be fabricated from reflective sign sheeting material meeting the same requirements specified herein for the retro-reflective sheeting and securely affixed to the face of the sign panel.

E34.7.2 The adhesive backing for the panel content shall be ASTM D4956 Class 1; the adhesive backing shall be pressure-sensitive and shall not require heat, solvent, or other preparation for adhesion to smooth, clean surfaces.

E34.8 Colours

E34.8.1 All colors used shall conform to ASTM D4956 and as indicated on the graphical content information to be supplied by the Contract Administrator, and in general conformance with the Manual of Uniform Traffic Control Devices for Canada (MUTCD) latest edition.

E34.8.2 Substrate

E34.8.1 Sign panel substrate shall consist of horizontally oriented and connected "channels" made from extruded aluminum alloy 6036-T6 conforming to Alcan die number 73247 or approved equal, with anodize treatment, each channel approximately 305 mm in exposed height.

E34.8.2 Aluminum shall conform to ASTM B221M Specification for Aluminum and Aluminum- Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.

E34.9 Panel Clips and Bolts

E34.9.1 Adjacent "channels" of substrate aluminum extrusions shall be connected with panel clips and bolts with geometry as shown on drawing TE-045H published by Manitoba Infrastructure and Transportation Traffic Engineering or approved equal.

E34.9.2 Clips shall conform to ASTM B221 alloy 6061-T6.

E34.9.3 Clip bolts shall be 3/8" diameter x 3/4" long stainless steel conforming to ASTM A193 or A320, Grade 304 minimum, complete with a stainless steel locknut.

E34.9.4 The head of the bolt shall be fabricated such that it slides into the substrate extrusion flanges while preventing rotation such that the nut can be tightened when connecting panel clips.

E34.9.5 An approved alternative to the method of connecting adjacent channels of substrate aluminum extrusions as described in E25.10.1 is the use of 3/8" diameter stainless steel bolts c/w stainless steel washer and stainless steel lock nut, installed through the webs of adjacent channels. The spacing of the fasteners should be the same as the spacing required for the panel clips and as required by this specification.

E34.10 Post Clips and Bolts

E34.10.1 Substrate aluminum "channels" shall be connected to vertical backing bars ("T-bars") using post clips and stainless steel bolts with geometry as shown on drawing TE-045i published by Manitoba Infrastructure and Transportation Traffic Engineering or approved equal.

E34.10.2 Post clips shall be fabricated from aluminum alloy 6356T.

E34.10.3 Post clip bolts shall be 3/8" diameter x 1-3/4" long rectangular head T-bolts, from stainless steel conforming to ASTM A193 or A320, Grade 304 minimum, complete with a stainless steel washer and stainless steel locknut.

E34.10.4 The rectangular head of the T-bolts shall be approximately 25 mm x 15 mm and fabricated such that it slides into the substrate extrusion flanges while preventing rotation such that the nut can be tightened when connecting post clips.

E34.10.5 An approved alternative to the method of connecting adjacent channels of substrate aluminum extrusions as described in E25.10.1 is the use of 3/8" diameter stainless steel bolts c/w stainless steel washer and stainless steel lock nut, installed through the webs of adjacent channels. The spacing of the fasteners should be the same as the spacing required for the panel clips as required by this specification.

E34.11 Vertical Backing Bars ("T-Bars")

E34.11.1 Vertical backing bars ("T-Bars") shall be of a type and grade as indicated on the Contract Drawings or as indicated elsewhere in the Contract Documents

- (a) If not indicated on the Contract Drawings or specified elsewhere in the Contract Documents, vertical aluminum backing bars ("T-Bars") shall be extruded aluminum T-sections conform to ASTM B221 Grade 6061-T6, and be 102 mm deep x 76 mm wide x 8 mm thick minimum.

E34.11.2 Vertical backing bars ("T-Bars") shall be supplied and installed on the back of the sign panel substrate in accordance with this specification.

E34.12 Sign Panel Mounting Brackets

E34.12.1 For Contracts including sign panel installation on sign support structures using mounting brackets, the specifications for support structure mounting brackets and associated hardware shall be specified elsewhere.

CONSTRUCTION METHODS

E34.13 General

E34.13.1 Sign panels shall be fabricated in a controlled indoor shop-like environment.

E34.14 Substrate Assembly

E34.14.1 Edges of all substrate material shall be de-burred to provide a smooth finished edge.

E34.14.2 All connecting hardware shall be firmly tightened and all surfaces firmly in contact, such that when connected the panel is rigidly and firmly fastened together into a single panel.

E34.14.3 Panel clips and bolts shall be installed as follows:

- (a) Connect adjacent aluminum substrate extrusions using panel clips, complete with 2 bolts per clip;
- (b) Horizontal spacing between connecting hardware sets shall be maximum 300 mm on centre, in a staggered fashion between rows of slots, except for the last slots at either end of the section or panel, at which locations a connecting hardware set shall be provided.
- (c) All nuts shall be tightened to a snug-tight condition, taking care not to over-tighten resulting in stripping of threads or failure of the lock nut.

E34.14.4 Contractor shall ensure that all connection hardware supplied and installed as specified herein are compatible and when connected result in a rigid sign panel assembly.

E34.15 Sheeting

E34.15.1 Sign panel sheeting material shall be correctly applied in accordance with the sheeting manufacturer's recommendations and industry accepted quality practices.

E34.15.2 Prepare the sign panel substrate in accordance with the retro-reflective sheeting manufacturer's specifications prior to adhesion of the sheeting.

E34.15.3 Retro-reflective sheeting shall be properly trimmed at either end of the panel so to be even with the end of the substrate.

E34.15.4 No more than one (1) material seam per length of panel will be permitted. Excessive patching with off-cut reflective material patched together will not be accepted.

E34.15.5 All material applied shall show no signs of wrinkles or improper adhesion to the viewed surface of the sign panel substrate.

E34.15.6 Reflective material applied shall be completely edge curled vertically down both sides of the full length of the sign panel and the material shall show no signs of wrinkles or excessive bubbling on either sides of the edges of the panel after sheeting application.

E34.15.7 Reflective material shall wrap over the vertical sides of the panel no more than 8 mm and should fit inside the groove edge provided in the aluminum extrusion, or terminated as otherwise recommended by the sheeting manufacturer.

E34.15.8 The presence of tears, holes, scrapes, compressed cells or patches will be grounds of rejection.

E34.15.9 Any joints must be sealed in accordance with the sheeting manufacturer's recommendations.

E34.16 Fabrication Tolerance

E34.16.1 Dimensions of the overall sign panel (height and width) shall be fabricated to within 1% of the specified dimension.

E34.16.2 Graphical content including character height, spacing, line spacing, and line weights shall not deviate from the specified dimension by more than 5%.

E34.16.3 If present, deviations within the above noted tolerances shall be uniform. In the sole judgement of the Contract Administrator, noticeable deviations in the fabrication tolerance between individual graphical elements, even if they are within the above specified limits, are grounds for sign panel rejection. For example, if the line weight of one particular letter on the sign panel was noticeably different than all other letters, the panel would be rejected.

E34.16.4 The flatness of the sign panel shall be measured using a 3 m long straight edge placed flush to the front face of the sign panel in any direction. The maximum single deviation from the straight edge shall be no greater than 15 mm. Multiple deviations (i.e. waviness) in the panel shall be cause for rejection even if deviations are less than 15 mm.

E34.16.5 Regardless of any measured deviation, no defect in the sign panel shall result in a reduction in the legibility of the sign, or the retro-reflective performance of the panel. The Contract Administrator shall be the sole judge as to whether a defect is present and if it requires repair or replacement of the sign panel.

E34.17 Manufacturer's Identification

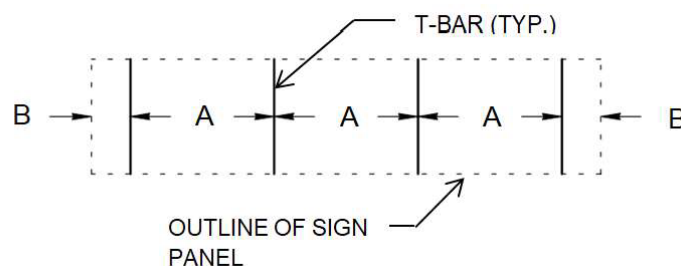
E34.17.1 All signs shall be clearly and permanently labeled using durable weather resistant material or engraving with an identification coding. The coding shall appear in characters 6-10 mm high on the lower right back of the sign and shall be imparted in such a manner that the front face of the sign is not damaged. The manufacturer shall include the following information on the label:

- (a) Manufacturer's name
- (b) Month and year of manufacture, in MM-YYYY format.
- (c) Brand of sign sheeting material

E34.18 Connecting Vertical Backing Bars ("T-Bars")

E34.18.1 Vertical backing bars ("T-bars") shall be installed on the back of the sign panel substrate square to the sign panel, extend the full height of the sign panel, and in accordance with the spacing shown on the Contract Drawings.

E34.18.2 Where no Contract Drawings are applicable, or if the spacing is not indicated, vertical backing bars shall be installed on that back of the sign panel substrate as indicated in the following table, or as directed by the Contract Administrator:



Typical Sign Width	Number of Vertical Backing Bars	Dimension A [# spaces] x [mm]	Dimension B [mm]
7320 mm (24 ft)	6	5 x 1220	610
6710 mm (22 ft)	5	4 x 1425	505
6100 mm (20 ft)	5	4 x 1225	600
5490 mm (18 ft)	4	3 x 1430	600
4880 mm (16 ft)	4	3 x 1220	610
4270 mm (14 ft)	4	3 x 1200	335
3660 mm (12 ft)	3	2 x 1400	430
3050 mm (10 ft)	3	2 x 1200	325
2440 mm (8 ft)	2	1 x 1000	720

- E34.18.3 No holes shall be drilled in the backing bars at the time of fabrication. If required, holes in the backing bars shall only be field drilled at the time of final installation on the support structure to ensure a level and planar sign panel when mounted to the support structure.
- E34.18.4 A post clip and bolt shall be provided to connect each side of each vertical backing bar ("T-bar") to the flanges of the aluminum substrate extrusion. The maximum spacing of the post clips and bolts shall be 305 mm and they shall be provided on alternating sides of the vertical backing bar.
- (a) In addition, the top and bottom of the vertical backing bar shall be fitted with a post clip and bolt on both sides of the backing bar.
- E34.18.5 All nuts shall be tightened to a snug-tight condition, taking care not to over-tighten resulting in stripping of threads or failure of the lock nuts or washers.
- E34.19 Packaging and Delivery
- E34.19.1 Contractor shall package each preassembled sign panel individually prior to delivery. Packaging shall protect the sign panel from damage to the sheeting or aluminum components and hardware.
- E34.19.2 Contractor shall be responsible for safe handling, lifting, hauling, transporting and offloading of sign panels.
- E34.19.3 Sign panels shall be protected from damaging effects including scratches, warping, and denting which may be caused during handling.
- E34.19.4 For Contracts that do not include installation of the sign panel and are for supply and delivery only, the Contractor shall offload the sign panels at the stated delivery location, and place the sign panel(s) in a location directed by the Contract Administrator or designate.
- E34.20 Delivery Location
- E34.20.1 For Contracts that do not include sign panel installation, sign panels shall be delivered to:
- (a) N/A

- E34.20.2 For Contracts that include sign panel installation, sign panels shall be delivered to the work site under the care of the Contractor. Sign panels shall be appropriately protected and stored on site or in a suitable location until final installation occurs.
- E34.20.3 Damaged sign panels shall be repaired or replaced to the satisfaction of the Contract Administrator at no additional cost to the City of Winnipeg.
- E34.21 Quality Assurance and Quality Control
- E34.21.1 All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator or by the Quality Assurance Testing Laboratory designated by the Contract Administrator.
- E34.21.2 The Contractor shall be wholly responsible for the control of all operations incidental thereto, notwithstanding any inspection or acceptance that may have been previously given.
- E34.21.3 The Contract Administrator reserves the right to reject any materials or work which are not in accordance with the requirements of this specification.
- E34.21.4 Quality Control shall be undertaken by the Contractor. Quality Assurance testing shall be undertaken by the Contract Administrator.
- E34.21.5 The Contract Administrator shall be afforded full access for the inspection and control and assurance testing of sign panel constituent materials, both at the work site and at the location of sign panel fabrication. There shall be no charge to the City of Winnipeg for any materials taken by the Contract Administrator for testing purposes.
- E34.22 Field Performance Requirements
- E34.22.1 Reflective sheeting, processed and applied according to the sheeting manufacturer's recommendations (or as specified in this specification when there is an exception to the manufacturer's recommendations), shall perform satisfactorily for the number of years required under Warranty as stated in this Specification.
- E34.22.2 The sheeting (including all sign panel content) shall be considered unsatisfactory if it has deteriorated due to natural causes (precluding unnatural causes such as vehicle impact or vandalism), to the extent that the sign is ineffective for its intended purpose, when viewed from a moving vehicle under normal day and night driving conditions or shows any of the following defects:
- (a) Cracks discernible with the unaided eye from the driver's position while in an outside lane at a distance of 15 meters (50 feet) or greater from the sign
 - (b) Peeling in excess of 6.4 millimeters (1/4 inch)
 - (c) Shrinkage in excess of 3.2 millimeters (1/8 inch) total per 1.2 meters (48 inches) of sheeting width
 - (d) Fading or loss of color to the extent that color fails to meet the requirements in ASTM D4956.
 - (e) Loss of reflectivity to a level below 20% of the minimum values specified in ASTM D4956 or in this specification for new sheeting when measured at the angles specified for each type.
- E34.23 Warranty
- E34.23.1 Before final acceptance of the sign panel(s) by the Contract Administrator, the sign panel Supplier shall provide the Contract Administrator with a written warranty stating that they will perform satisfactorily in the field for a period of twelve (12) years from the issuance of the Certificate of Total Performance. The Supplier shall state that they have reviewed the fabrication and installation procedures and find them in accordance with their recommendations.
- (a) The Supplier shall warranty the replacement of the entire sign panel, including removal of the existing panel and installation of replacement panel in the field, at no

cost to the City of Winnipeg or the Contractor, in the event that the sign panel(s) do not meet the field performance requirements specified in E34.23 for a period of seven (7) years from the issuance of the Certificate of Total Performance.

- (b) The Supplier shall warranty the replacement of the sheeting material only, including panel removal and reinstallation in the field, at no cost to the City of Winnipeg or the Contractor, in the event that the sign panel(s) do not meet the field performance requirements specified in E34.23 during the period of eight (8) to twelve (12) years from the issuance of the Certificate of Total Performance.

MEASUREMENT AND PAYMENT

E34.24 Supply of Sign Panels

E34.24.1 Supply of Sign Panels will be measured on a unit basis and paid for at the Contract Unit Price per sign for the following "Items of Work", which 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.

E34.24.2 **Items of Work:**

- (a) Supply And Installation of Reflective Guide Sign Panels (4.644 m x 2.440 m)

E35. REMOVAL OF EXISTING DRAINAGE CONNECTION PIPE

DESCRIPTION

- E35.1 This specification covers the removal of temporary connection pipes on Taylor Avenue.
- E35.2 Temporary connection pipes were installed on Taylor Avenue between existing curb inlets and new catch basins as part of major sewer upgrades completed in 2020. These catch basins were installed at the locations of future roadway low points which are represented in these Contract Drawings.

CONSTRUCTION METHODS

- E35.3 Prior to any work involving the pre-existing catch basins, the catch basins shall be visually inspected to determine if catch basin cleaning will be required. Any pre-construction catch basin cleaning shall be covered under the related specification.
- E35.4 Existing drainage connection pipes are to be removed as per the Contract Drawings.
- E35.5 Connection pipes are to be carefully removed as to not disturb or damage the catch basins.
- E35.6 The catch basins are to be patched and grouted to seal the hole left from the removed drainage pipe connection.

MEASUREMENT AND PAYMENT

- E35.7 Removal of existing drainage connection pipe shall be measured on a per meter basis and paid for at the Contract Unit Price for "Removal of Existing Drainage Connection Pipe". The length paid will be for the total number of linear meters of existing drainage connection pipe removed in accordance with this specification and as measured and accepted by the Contract Administrator.
- E35.8 No measurement or payment shall be made for the patching of existing catch basins following the removal of the drainage connection pipe and shall be considered incidental to the work.

E36. TIMBER FENCING

DESCRIPTION

- E36.1 This specification covers the removal, installation and modification of Timber Fencing.
- E36.2 The timber fence surrounding the parking lot of #693 Taylor Avenue will require modification under this contract.

MATERIALS AND CONSTRUCTION METHODS

- E36.3 Existing Timber fencing shall be removed carefully to minimize damage to surrounding parking lot pavement. Parking lot pavement damaged due to careless removal of fencing shall be repaired at the Contractor's expense.
- E36.4 New materials supplied shall match the existing fencing material.
- E36.5 Post holes shall be augured a minimum of 100mm larger in diameter than the timber poles to be installed to a minimum depth of 1.2m. Granular limestone shall be placed at the bottom of the augered hole and around the post to a depth of 100mm below finished grade. The granular limestone shall be placed in 300mm lifts and compacted by watering and tamping.
- E36.6 Fence boards shall be secured using the same method as the existing fence.
- E36.7 The area surrounding the new post shall be restored with asphalt.

MEASUREMENT AND PAYMENT

- E36.8 Removal of existing timber fencing shall be measured on a per meter basis and paid for at the Contract Unit Price for "Removal of Timber Fence". The length to be paid will be for the total number of linear meters of timber fencing removed in accordance with this specification and as measured and accepted by the Contract Administrator.
- E36.9 Supply Installation of timber fencing shall be measured on a per meter basis and paid for at the Contract Unit Price for "Supply and Installation of Timber Fence". The length to be paid will be for the total number of linear meters of timber fencing supplied and installed in accordance with this specification and as measured and accepted by the Contract Administrator. No additional payment shall be made for intermediate and/or terminated fence posts installed regardless of length of timber fence installed.

E37. DETAILED ROADWAY EXCAVATION AND COMPACTION

DESCRIPTION

- E37.1 This specification should be considered supplemental to the latest revisions of the City of Winnipeg Standard Construction Specifications CW3170 and CW3110.
- E37.2 This specification covers the detailed excavation and compaction required to maintain subgrade drainage in areas adjacent to existing Manitoba Hydro and BellMTS utility duct lines on Stafford Street between Grant Avenue and Corydon Avenue as described in the drawings.
- E37.3 In the event that this specification conflicts with any requirements and/or working restrictions set forth by Manitoba Hydro or BellMTS, Manitoba Hydro and/or BellMTS requirements and working restrictions shall take precedence.

CONSTRUCTION METHODS

- E37.4 The Contractor shall excavate the roadway as per the drawings, following all Manitoba Hydro and BellMTS requirements and working restrictions.

E37.5 Compaction of subbase and base course material over existing MTS duct lines shall be limited to non-vibratory methods, static rolling only shall be allowed in the vicinity of these duct lines.

E37.6 Granular material shall be placed and compacted in accordance with the latest revision of CW 3110.

MEASUREMENT AND PAYMENT

E37.7 No additional measurement and payment shall be made for detailed roadway excavation outlined in this specification or for any special compaction requirements that may be required.

E38. TRANSIT STOP FLAG BASES

DESCRIPTION

E38.1 Further to City of Winnipeg specification CW 3620-R9, this specification covers the supply and installation of thickened, reinforced sidewalk for Transit Stop Flag installation.

MATERIALS AND CONSTRUCTION METHODS

E38.2 Thickened, reinforced sidewalk for Transit Stop Flags is to be installed as per the Contract Drawings.

E38.3 The sidewalk panels where the Flag is to be installed is to be constructed at 300mm thick and reinforced with typical reinforcing bar mats.

E38.4 The thickened sidewalk should extend a minimum of 225 mm in all four directions from the centreline of the base (to create a 450mm x 450mm x 300mm sidewalk) and then taper from 300mm to 100mm thick. The full 300mm thickened portion must be large enough to accommodate the anchor bolts.

E38.5 Sidewalk reinforcement should extend the entire thickened sidewalk area up to where the sidewalk returns to the typical 100mm thickness.

E38.6 Anchor bolts are to be set wet set according to the template provided.

E38.7 Anchor bolts and template shall be supplied by Winnipeg Transit, the Contract Administrator will provide the contact information and location where these items can be obtained.

E38.8 Above ground materials (i.e. transit stop pole and flag) shall be supplied and installed by Others.

MEASUREMENT AND PAYMENT

E38.9 Supply and Installation of Transit Stop Flag Reinforced Sidewalk will be measured and paid for at the Contract Unit Price for "Transit Stop Flag Reinforced Sidewalk". The units will be paid for each unit base installed and placed in accordance with this Specification and as measured and accepted by the Contract Administrator.

E39. PROVISIONAL ITEMS

E39.1 The Provisional Items listed in the Schedule of Prices are part of the Contract.

E39.2 The Contractor shall not perform Work included in the Provisional Items without prior authorization from the Contract Administrator. All Work included in the Provisional Items will be carried out within the construction areas shown on the drawings.

E39.3 Notwithstanding C:7, the City reserves the right to diminish all or any portion of the items of Work listed in the Provisional Items and no claim shall be made for damages on grounds of loss of anticipated profit or for any other reason.

E40. WATER SERVICE INTERRUPTIONS TO BUSINESSES, SCHOOLS AND APARTMENT BUILDINGS

- E40.1 Further to CW 1120 clause 3.6, the Contractor shall be required to work evenings, nights and weekends where required to minimize water service interruptions on this project.
- E40.2 The Contractor shall work closely with the Contract Administrator and the City to coordinate service connections and tie-ins to minimize the disruption of water service to all properties in the area.
- E40.3 Contractor shall be required to submit a work plan to the Contract Administrator seven (7) calendar days prior to any construction activities to illustrate how the work will be performed to minimize or eliminate water shut downs for this project. The plan will be reviewed by Contract Administrator and revised by the Contractor as required.
- E40.4 No additional payment shall be made for measures taken to minimize water service disruptions.

E41. CONNECTING TO EXISTING WATER SERVICES

- E41.1 This specification shall amend clause 4.22 of CW 2110.
- E41.2 Connecting to existing lead water services will be measured and paid for in accordance with Clause 4.13 of CW 2110, "Connecting Existing Copper Water Services to New Watermain" for each connection made, regardless of the material of the existing water service being connected to. Connecting to existing lead water services will not be included in the installation of a curb stop.

E42. GREEN BIKE LANE TREATMENT

DESCRIPTION

- E42.1 General
 - E42.1.1 This specification covers the supply and installation of Green Methyl Methacrylate Area (MMA) Bike Lane Treatment.
 - E42.1.2 Drawings and Manuals
 - Contract Drawings;
 - Appendix B – CycleGrip MMAX Specification – Methyl Methacrylate Bike Lane Treatment;
 - Appendix C - Application Instructions – MMAX Area Markings

MATERIAL

- E42.2 CycleGrip® MMAX kit – includes CycleGrip® MMAX Resin (**green**), CycleGrip® MMAX Aggregate and Catalyst
- E42.3 Source
 - E42.3.1 ENNIS-FLINT

Available from:

ENNIS-FLINT

Attention: Deryk Upton
Ph: 604-315-8765
Email: dupton@ennisflint.com
Web: www.ennisflint.com

CONSTRUCTION METHODS

E42.4 Preparation and Installation

E42.4.1 Surface is to be prepared in accordance with the Manufacturer's instructions.

E42.4.2 Treatment is to be installed in accordance with the Manufacturer's instructions.

MEASUREMENT AND PAYMENT

E42.5 Supply and installation of MMA bike lane treatment will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Supply and Install Green Paint". The area to be paid for will be the total number of square metres of MMA bike lane treatment supplied and installed in accordance with this specification, as accepted and measured by the Contract Administrator.

E42.6 Surface preparation for MMA markings shall be included in the cost for "Supply and Installation Green Paint" and no separate measurement and payment will be made.

E43. HYDRO EXCAVATION FOR 69 KV HIGH VOLTAGE LINE

E43.1 DESCRIPTION

E43.2 General

E43.2.1 This specification covers the removal of earthen material immediately adjacent to underground utilities infrastructure by means of high-pressure water spray, and the recovery of evacuated material by vacuum type means or equivalent method as approved by the Contract Administrator

E43.2.2 Further to E21 this item is related specifically to excavation of the roadbed directly over the 69Kv high voltage line crossing Stafford Street south of Grant Avenue.

MATERIALS

E43.3 Equipment

E43.3.1 Hydro Excavation unit shall be capable of maintaining a minimum working pressure of 10,000 psi, at a rate of 10 to 12 gallons per minute. Unit should be adjustable, so as to provide adequate pressure to remove earthen material identified by the Contract Administrator.

E43.3.2 Spray head shall be equipped with a rotating nozzle, in order to provide a wider path of cut.

CONSTRUCTION METHODS

E43.4 Hydro-Removal of Earthen Material

E43.4.1 Earthen material adjacent to utility entity shall be sprayed with high pressure water 3.0 m longitudinally in each direction from the centreline of the high voltage line for the width and depth of the roadway excavation, so as to remove all such material identified by the Contract Administrator.

E43.5 Recovery of Excavated Material

E43.5.1 The recovery of excavated material shall be done using a vacuum type method, or other type of method approved by the Contract Administrator.

- E43.5.2 The recovery of material shall follow immediately behind the excavation, to avoid excavated areas from filling with excavated material.
- E43.5.3 The use of mechanical sweepers will not be allowed.
- E43.5.4 Dispose of material in accordance with Section 3.4 of CW-1130.
- E43.6 Backfill of Hydro Excavated Hole
- E43.6.1 The Contractor shall be responsible for the backfill of the hydro excavated hole upon the completion of the Work described herein, to the approval of the Contract Administrator.

MEASUREMENT AND PAYMENT

- E43.7 Hydro Excavation for 69Kv High Voltage Line
- E43.8 Hydro Excavation of earthen material will be measured on an hourly basis and paid for at the Contract Unit Price per hour for "Hydro Excavation for 69 kV High Voltage Line". The hours to be paid for will be the total number of hours of Hydro Excavation in accordance with this Specification, accepted and measured by the Contract Administrator.

E44. SPLICING CONDUIT

E44.1 DESCRIPTION

E44.2 General

- E44.2.1 Further to CW 3620 3.11.12, joining of conduit will not be allowed except:
- E44.2.2 Where joining of conduit is required for convenience of road construction sequencing with a maximum of one (1) joint per conduit.

MATERIALS

E44.3 Couplers

- E44.3.1 Joining of conduit shall use an approved oversize coupler to connect nominal size 1.5" or 2" LDPE pipe, IPEX Series 75, installation to follow manufacture's recommendations.
- E44.3.2 Approved Products:
- (a) Plasson Universal Slip Repair Coupler 60-64, Product Code: 176100060064 for use with nominal 2" LDPE.
 - (b) Plasson Universal Slip Repair Coupler 48-51, Product Code: 176100048051 for use with nominal 1.5" LDPE.

CONSTRUCTION METHODS

E44.4 Splicing Conduit

- E44.4.1 Splicing of conduit with coupling pipe and gear clamps shall not be allowed.

MEASUREMENT AND PAYMENT

- E44.5 Splicing of conduit shall be included in the unit price bid for Installation of Conduit and no further measurement for payment shall be made.

E45. MISCELLANEOUS REMOVALS

E45.1 DESCRIPTION

E45.2 General

- E45.2.1 This Specification shall cover the miscellaneous removals listed below.

CONSTRUCTION METHODS

E45.3 Removal and Salvage Existing Crash Attenuation Unit

- E45.3.1 The Contractor shall remove the existing crash attenuation unit shown on the Drawings.
- E45.3.2 The Crash Attenuation Unit and all hardware shall be delivered to the City of Winnipeg East Yard at 960 Thomas Avenue (Gate B2), contact Mike Terleski. City equipment at the yard for unloading is a skid-steer with forks, so if other equipment is required the contractor shall supply that equipment. The contractor shall provide at least one days' notice prior to delivery.
- E45.3.3 Any damage done to the Crash Attenuation Unit by the Contractor or parts/hardware that are missing shall be rectified/replaced at the Contractor's expense

E45.4 Removal and Salvage Existing Overhead Sign Support Structure

- E45.4.1 The Existing Overhead Sign Support Structure shall be disassembled, and all components and hardware shall be delivered to the City of Winnipeg East Yard at 960 Thomas Avenue (Gate B2). City equipment at the yard for unloading is a skid-steer with forks, so if other equipment is required the contractor shall supply that equipment. The contractor shall provide at least one days' notice prior to delivery.
- E45.4.2 The Contractor shall carefully remove and salvage all existing signage from the sign structure and securely store and reinstall applicable signs on the new sign structure. Sign clamps for reinstallation on the new sign structure will be supplied by the City of Winnipeg Traffic Services.
- E45.4.3 Included in the cost of removal and salvage of the existing Overhead Sign Support structure shall be the demolition of the existing sign support structure pile foundation to a minimum of 0.9m below finished grade.
- E45.4.4 Any damage done to the Existing Overhead Sign Support Structure by the Contractor or parts/hardware that are missing shall be rectified/replaced at the Contractor's expense.

E45.5 Removal, Salvage and Reinstallation of Existing Roadside Signage

- E45.5.1 The Contractor shall carefully remove and salvage all existing roadside signage and posts on Stafford Street within project limits and securely store for later reinstallation. Sign clamps for reinstallation in sidewalks or on bands for reinstallation on new street light standards will be supplied by the City of Winnipeg Traffic Services.
- E45.5.2 Any damage done to the Existing Roadside Signage by the Contractor or parts/hardware that are missing shall be rectified/replaced at the Contractor's expense.

MEASUREMENT AND PAYMENT

E45.6 Removal and Salvage of Existing Crash Attenuation Unit

- E45.6.1 Removal and salvage existing crash attenuation unit will be measured on a unit basis and paid for at the Contract Unit Price for "Removal and Salvage of Existing Crash Attenuation Unit". Removal and Salvage of Existing Crash Attenuation Units will be paid for on a Lump Sum basis for the all units removed, salvaged, delivered and unloaded in accordance with this Specification, accepted and measured by the Contract Administrator.

E45.7 Removal and Salvage Existing Overhead Sign Support Structure

- E45.7.1 Removal and salvage existing Overhead Sign Support Structure will be measured on a unit basis and paid for at the Contract Unit Price for "Removal and Salvage Existing OHSS and Demolition of Pile". Removal and Salvage Existing OHSS and Demolition of Pile will be paid for on a Lump Sum basis for the all structures removed, demolished, salvaged, delivered and unloaded in accordance with this Specification, accepted and measured by the Contract Administrator.

E45.8 Removal, Salvage and Reinstallation of Existing Roadside Signage

E45.8.1 Remove, salvage and reinstallation of existing roadside will be considered incidental to the work and no further measurement or payment shall be made.

E46. SUPPLY AND INSTALLATION OF CRASH ATTENUATION BARRIERS

E46.1 DESCRIPTION

E46.2 General

E46.2.1 The Work covered under this Specification shall include all operations related to the supply, fabrication, delivery and installation of the Crash Attenuation Barriers and associated materials in accordance with AASHTO MASH or NCHRP Report 350.

E46.2.2 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. All materials supplied under this Specification shall be subject to inspection and acceptance by the Contract Administrator.

E46.2.3 Site specific requirements for the installation of Crash Attenuation Barriers will be in accordance with the Drawings. General supply, loading, hauling, unloading, storing and installing is as per Manufacturer's recommended procedures.

E46.2.4 The Contractor shall provide manufacturer's product data sheet and shop drawings prior to supply and installation. The shop drawings will be subject to acceptance by the Contract administrator.

MATERIALS

E46.3 Crash Attenuation Barriers

E46.3.1 Materials shall be supplied in accordance with the manufacturer's product manual and in accordance with AASHTO MASH or NCHRP Report 350 Test Level 2.

E46.3.2 The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this specification.

(a) The following products will be supplied by the Contractor:

(b) (a) Quadguard II Test Level 2 and associated hardware by Trinity Highway Products.

(c) The Contractor may request an approved equal for the item listed in E47.2.3 in accordance with B6.

(d) Steel posts shall be W150x14. Steel posts and hardware shall conform to CAN/CSA Standard G40.21 Grade 350W or ASTM Standard A36 and shall be hot dip galvanized after fabrication conforming to ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

(e) Neoprene spacer blocks shall be King Blocks by Trinity Highway Products or approved equal in accordance with B6.

(f) Appurtenances including but not limited to Quadbeam panels and associated hardware shall be supplied in accordance with NCHRP Report 350.

(g) Concrete and reinforcing steel shall be supplied in accordance with the Drawings and CW 3310-R17.

(h) Granular levelling materials shall be Base Course in accordance with CW 3110-R21.

CONSTRUCTION METHODS

E46.4 Handling and Storage of Materials

- E46.4.1 All materials shall be handled in a careful and workmanlike manner and the sections and ends shall be stored on blocks or built-up platforms.
- E46.4.2 Bolts and malleable washers shall be stored separately in suitable bins for inspection, checking and handling.
- E46.5 Site Inspection
- E46.5.1 Prior to commencing installation at a location, the Contractor shall verify that it can be installed in strict accordance with the Drawings. This shall include contacting all utilities and other owners of underground facilities in order to ensure that the proposed location of the posts is not in conflict with existing or proposed utilities and installations.
- E46.5.2 Should there be a conflict between a proposed location and any facility the Contract Administrator shall be notified immediately.
- E46.6 The Crash Attenuation Barriers shall be installed in accordance with the manufacturer's installation manual.
- E46.6.1 Refer to 'Appendix K' - T Quadguard II Assembly Manual.
- E46.7 Related items, including concrete foundations and backups, reinforcing steel, Quadbeam panels, post installation, neoprene spacer blocks, connection hardware, excavation, granular levelling materials and compaction are to be installed as shown on the Drawings or as per the manufacturer's recommendations.

MEASUREMENT AND PAYMENT

- E46.8 Supply and Installation of Crash Attenuation Barriers
- E46.8.1 Supply and Installation of Quadguard II Crash Attenuation Barrier, including all product materials, concrete foundations, reinforcing steel, Quadbeam panels, steel posts, neoprene spacer blocks, connection hardware, excavation, granular levelling materials and compaction will be measured for payment on a lump sum basis and paid for at the Contract Unit Price for "Supply and Installation of Crash Attenuation Barriers".

E47. JOINT SEALING

DESCRIPTION

- E47.1 Further to 9.7 of CW 3310 – R17 Portland Cement Concrete Pavement Works, joints and the pavement surface shall be cleaned of all residue left by the sawing operations. This cleaning shall be completed using a vacuum system sufficient to remove all residue and as approved by the Contract Administrator. Use of water jetting and compressed air will not be permitted.

MEASUREMENT AND PAYMENT

- E47.2 No additional measurement or payment will be made for joint cleaning or sealing of portland concrete pavements.

E48. PATH RUMBLE STRIP

DESCRIPTION

- E48.1 General
- E48.1.1 This specification shall cover the requirements for the construction of a rumble strip on the asphalt pathway on Harrow Street.
- E48.1.2 The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all as hereinafter specified.

CONSTRUCTION METHODS

- E48.2 Construction of the Path Rumble Strip shall be completed after the completion of the asphalt path, by way of grinding into the new asphalt.

MEASUREMENT AND PAYMENTS

- E48.3 Path Rumble Strip will be measured on a length basis and paid for at the Contract Unit Price per metre for "Rumble Strip". The length to be paid for will be the total number of metres of rumble strip installed on the path in accordance with this specification, as accepted and measured by the Contract Administrator.

E49. WORKING IN CLOSE PROXIMITY TO A FEEDERMAIN

- E49.1 Prior to any construction, exploratory excavations at the existing 400 mm Feedermain on Grant Avenue, in accordance with E50, are to be completed so as to confirm depth and location of the feedermain, for any location where works are to be completed within close proximity to the existing feedermain.
- E49.2 Close proximity will include any excavation within five (5) metres of the existing feedermain location shown on the drawings.
- E49.3 Granular material, construction material, soil or other material, shall not be stockpiled on the feedermain or within five (5) metres of centerline of the feedermain.
- E49.4 Stage construction such that the feedermain is not subjected to significant asymmetrical loading at any time.
- E49.5 Where work is in close proximity to the feedermain, utilize construction practices and procedures that do not impart excessive vibration loads on the feedermain or that would cause the settlement of the subgrade below the feedermain.
- E49.6 Concrete demolition and removal within five (5) metres horizontally of the feedermain shall be completed by saw cutting and removal, or use of hand held jack hammers. Use of machine mounted concrete breakers within five (5) metres of a feedermain shall not be permitted.

E50. EXPLORATORY EXCAVATIONS AT FEEDERMAIN

- E50.1 Concrete demolition and removal to be in accordance with E49.6
- E50.2 Excavations deeper than one (1) metre shall be done using vacuum excavation methods to minimize the potential for any damage to the feedermain. The purpose of exploratory excavations at feedermain is to determine the excavation method to be used to install new watermain infrastructure within close proximity, as defined in E49.2, to the existing feedermain. Depending on the depth of the excavation required to install the works in relation to the existing feedermain, the following excavation methods shall be implemented:
- (a) Where the excavation elevation is higher than one (1) metre above the crown elevation of the feedermain pipe, excavations by normal methods with a backhoe/excavator will be permitted.
 - (b) Where part of the excavation elevation is located within one (1) metre of the crown elevation of the feedermain pipe, excavation using a backhoe/excavator will be permitted to a depth of one (1) metre above the crown of the feedermain. Excavation below this depth must be by soft digging / vacuum excavation methods only.
 - (c) Where part of the excavation elevation is located below the crown elevation of the feedermain pipe but higher than the invert elevation of the feedermain pipe, a higher standard of care is required to minimize the impact on the feedermain. Excavation using a backhoe/excavator will be permitted to a depth of one (1) metre above the crown of the feedermain. Excavation below this depth must be by soft digging /

vacuum excavation methods only. Shoring and bracing may be required to minimize the loss of soil or bedding material from around the feedermain.

- (d) Where part of the excavation elevation is located below the invert elevation of the feedermain pipe, a very high standard of care is required to minimize the impact on the feedermain pipe. The excavation must be completed as described in E50.2c, however, engineered shoring must be installed in the excavation shaft to minimize disruption to the feedermain. Engineered Shoring must comply with E51.

- E50.3 Backfill for excavations within close proximity to the feedermain to be done in accordance with CW 2030, using Class 2 backfill. Flood tamping is not permitted in a zone within 2.5 m (horizontal offset) from the edge of the feedermain pipe. Granular backfill shall be placed and mechanically compacted in maximum 300 mm thick lifts. Mechanical compaction equipment is limited to walk behind vibratory compactors only. Compaction using a backhoe / excavator bucket is not permitted due to the potential for over-compaction and vibration.
- E50.4 Exploratory excavations of the feedermain for excavations in close proximity shall be measured on a unit basis per exploratory excavation required and paid for at the Contract Unit Price of "Exploratory Excavation at Feedermain" in Form B of the Bid Submission.
- E50.5 Any additional costs associated with excavation in close proximity to a feedermain, backfilling, or restoration shall be incidental to the cost of the watermain renewal and will be included in the Contract Unit Price bid for "Watermain Renewal" in Form B of the Bid Submission.

E51. ENGINEERED SHORING

- E51.1 The type, strength and amount of shoring and bracing shall be such as the nature of the ground and site conditions may require to protect the feedermain from loss of bedding material below the pipe springline.
- E51.2 All material used for shoring construction shall be in a like-new condition, and shoring and bracing shall be so spaced and dimensioned as to prevent caving, loss of ground, surface settlement, or squeezing of the soil beyond the neat lines of the excavation. Shoring material shall be free from defects that might impair its strength or suitability for the Work.
- E51.3 Prepare design calculations as required to facilitate review of the submission for conformance with the Contract Documents.
- E51.4 Submit Shop Drawings and design calculations for the shoring/excavation system designed and sealed by a Professional Engineer registered and licensed to practice in the Province of Manitoba, and experienced in the structural design of shoring systems. The designer of the shoring system shall inspect the system during construction and certify, in writing to the Contract Administrator, that construction is in conformance with the approved design.
- E51.5 Shoring and bracing shall be removed in stages while backfilling the excavation.
- E51.6 All work associated with the design and provision of engineered shoring to protect the feedermain shall be measured on a unit basis per excavation requiring engineered shoring and bracing, and paid for at the Contract Unit Price of "Engineered Shoring" in Form B of the Bid Submission. Requirement for engineered shoring will be determined by the Contract Administrator based on the findings of the "Exploratory Excavations at Feedermain" completed by the Contractor in accordance with E50.

E52. CROSSING THE FEEDERMAIN

- E52.1 All watermains and water services crossing the feedermain must maintain a minimum clearance of 0.5 metres between the top of the feedermain and the bottom of the watermain or water service pipe, or a minimum clearance of 1.0 metres between the bottom of the feedermain and the top of the watermain or water service pipe, or as stated by the Contract Administrator.

E52.2 A shaft must be excavated in accordance with E50, four (4) metres from the centreline of the feedermain to confirm the alignment and elevation of the drilling rod before it crosses the feedermain. This confirmation must be witnessed by a City of Winnipeg Water and Waste representative designated by the Contract Administrator.

E53. EXPLORATORY EXCAVATION ON EBBY AVENUE

E53.1 The purpose of exploratory excavation on Ebbby Avenue is to confirm the existing watermain material prior to construction. It is unknown if the existing watermain shown to be renewed on Ebbby Avenue on drawing U-201 is asbestos cement or cast iron. Existing pipe is to be exposed prior to construction such that the material type can be confirmed. If the existing pipe in service is confirmed to be asbestos cement, then all watermain renewal works identified on U-201 are to be removed from the Contract in accordance with E40. If the existing pipe in service is confirmed to be cast iron, then all watermain renewal works identified on U-201 are to be completed as shown.

E53.2 Exploratory excavation of the existing watermain on Ebbby Avenue shall be measured on a lump sum basis and paid for at the Contract Unit Price of "Exploratory Excavation on Ebbby Ave" in Form B of the Bid Submission.

E54. MATERIAL SUPPLIED BY THE CITY

E54.1 Further to CW3620 2.10.1:

- (a) Master anchor bolt templates shall be provided by The Contractor.
- (b) Twine shall be provided by The Contractor.

E54.1.2 Further to CW3620 2.10, City Supplied Materials:

- (a) All City supplied materials provided by the City of Winnipeg will be picked up by the Contractor.
- (b) 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.
- (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. The Contractor must pre-order materials from the City prior to pick up, only material required for work being completed in the immediate future will be provided as approved by the Contract Administrator.
- (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.

E55. SERVICE BOX PRE-CAST

E55.1 Description

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

E55.2 Materials

- (a) Materials shall be as per section 2 of CW 3620.

E55.3 Construction Method

- (a) 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.

- (b) Fill bottom of excavation with compacted limestone base course material to set precast service box to grade.
- (c) Install Pre-Cast Service Box on top of the compacted granular fill material to pavement, sidewalk or boulevard finish grade.
- (d) All conduits must be bundled into a group in the centre of the Pre-Cast Service Box. Install plastic plugs prior to back fill.
- (e) Backfill around Pre-Cast Service Box exterior. Back fill shall conform to requirements of SD-342.
- (f) Pre-Cast Service box shall meet the grade of the sidewalk or boulevard given provided by Contract Administrator.

E56. INSTALLATION OF EARLY OPEN CONCRETE BASES

E56.1 Description

- (a) This specification shall cover the installation of Early Open Concrete Bases.

E56.2 Materials

- (a) 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).
- (b) Further to E56.2(a), the supplied concrete shall achieve a minimum compressive strength of 22 MPa at 48 hours.

E56.3 Construction Methods

- (a) Construction Methods for the installation of Early Open Concrete Bases shall be as per Section 3.7 of CW 3620.

E57. INSTALLATION OF PRE-CAST TYPE PM BASES

E57.1 Pre-cast Type PM concrete bases shall be supplied by The Contractor including anchor bolts.

E57.2 Fabrication and installation shall be in accordance with SD-315.A.

E58. ANCHOR BOLT PROJECTIONS FOR CONCRETE BASES

E58.1 Further to Section 3.7 of CW 3620 Concrete Bases Type A, Type G, Type OD and Type J Bases shall have an anchor bolt projection as specified below:

- (a) The following bolt projections shall override what has been specified on SD-310, SD-313 and SD-314.

Concrete Base Type	Anchor Bolt Projection (mm)	Tolerance (mm)
Type A	76.0	(71.0 – 76.0)
Type G	89.0	(84.0 – 89.0)
Type OD	50.8	(45.8 – 50.8)
Type J	150.0	(145.0 – 150.0)

E59. ADJUSTMENT OF UTILITY MANHOLE FRAMES

DESCRIPTION

E59.1 General

- E59.1.1 This specification covers the adjustment of utility manhole frames which works include but are not limited to; picking up the materials, removing the existing frame, making any required changes to the structure to accommodate new frame installation, reinstalling the existing frame or installing a new frame/cover, installing supplied lifter rings and constructing any required temporary asphalt ramps.
- E59.1.2 Utility manhole frames to be adjusted include but are not limited to Manitoba Hydro and BellMTS.
- E59.1.3 Pavement removal and replacement will be in accordance with Specifications CW 3100 and CW 3230. Pavement isolations surrounding utility manhole frames must be reinforced with 15m bars for isolation in the roadway and 10m bars for isolations in sidewalk.
- E59.1.4 The Contractor is to provide a minimum 48 hour notice to the utility and the Contract Administrator prior to undertaking any of the proposed works on the utility manholes.
- E59.1.5 The Contractor to make arrangements through the utility for watch personnel to be present during construction of the required works to the utility manholes.
- E59.1.6 Referenced Standard Construction Specifications
- (a) (a) CW 3110 – Sub-Grade, Sub-Base and Base Course Construction;
 - (b) (b) CW 3230 – Full-Depth Patching of Existing Slabs and Joints.

MATERIALS

E59.2 Manhole Frames, Covers and Riser Rings

- E59.2.1 Utility manhole frames and covers shall be provided by the utility. The Contractor shall arrange to pick up materials from the particular utility storage yard.

CONSTRUCTION METHODS

E59.3 Removal of Existing Pavement

- E59.3.1 Remove complete concrete slab surrounding utility manhole in accordance with Specification CW 3110.
- E59.3.2 Removal procedures to be done in a manor not to damage utility manhole structure.

E59.4 Removal of Manhole Frame and Cover

- E59.4.1 Remove the required concrete embedding the frame and remove the frame and cover. Utility Watch personnel to approve construction method prior to proceeding. The Contractor is to provide opportunity for the utility to collect the old frame and cover if applicable, otherwise the old frame and covers are to be disposed of off-site as directed by the Contract Administrator.

E59.5 Installation of New Frame and Cover

- E59.5.1 Install new or existing frame and cover as specified herein and or on the drawings, if applicable. Existing frames identified as being in good condition are to be reused.
- E59.5.2 The Contractor shall set the frame and cover to the proposed grade utilizing shims and a form inside the manhole frame to prevent concrete from spilling into the interior of the manhole and produce a neat finished surface inside the frame. The Contractor shall then pour concrete around the outside of the frame to secure it to the manhole.

E59.6 Installation of Lifter Rings

- E59.6.1 Install new lifter rings as specified herein and or on the drawings, if applicable.

- E59.6.2 The Contractor shall check prior to installation to ensure that the riser ring will fit into the existing frame, if existing frame does not accommodate the proposed riser ring, then a new frame and cover will be installed.
- E59.6.3 The Contractor shall remove the existing cover, clean the existing frame, install required riser ring and reinstall the cover.
- E59.7 Construct temporary asphalt ramp
- E59.7.1 Where required for re-opening lane to traffic, construct temporary asphalt ramp to the grades as noted on the drawings and as directed by the Contract Administrator.

MEASUREMENT AND PAYMENT

- E59.8 Removal and Installation of Utility Frame and Cover
- E59.8.1 Removal and Installation of Utility Frame and Covers will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Removal and Installation of Utility Manhole Frame and Cover". The number of units to be paid for will be the total number of manhole frames and covers installed in accordance with this specification, accepted and measured by the Contract Administrator.
- E59.9 Concrete Pavement removal and replacement will be measured and paid for in accordance with Specification CW 3230.

E60. CONCRETE CONSTITUENT MATERIALS, MIX DESIGN REQUIREMENTS, AND HOT AND COLD WEATHER CURING

DESCRIPTION

- E60.1 General
- E60.1.1 PORTLAND CEMENT CONCRETE PAVEMENT WORKS shall be in accordance with CW3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS, except as otherwise specified herein.
- E60.1.2 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.
- E60.1.3 This specification also covers hot and cold weather concreting.
- E60.1.4 Replace 2.0 Definitions of CW 3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS with 1.2 of this specification.
- E60.1.5 Replace 5.3 Portland Cement Concrete Constituent Materials of CW 3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS with 2.0 MATERIALS of this specification.
- E60.1.6 Replace 6.0 Design Requirements of CW 3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS with 3.0 DESIGN REQUIREMENTS of this specification.
- E60.1.7 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.
- E60.1.8 Replace 13.0 Basis of Payment of CW 3310-R17, PORTLAND CEMENT CONCRETE PAVEMENT WORKS with 5.0 BASIS OF PAYMENT of this specification.
- E60.1.9 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 W3310-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.

- E60.1.10 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.
- E60.2 Definitions
- E60.2.1 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.
- E60.2.2 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.
- E60.2.3 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.
- E60.2.4 Type 2 Concrete shall be used for residential roads and alleys, curb and gutter sections, curbs, commercial approaches, residential approaches, and splash strips. Type 1 Concrete can be used instead of Type 2 Concrete.
- E60.2.5 Type 3 is early opening concrete and shall be used for 24 hours early opening after placement.
- E60.2.6 Type 4 is early opening concrete and shall be used for 72 hours early opening after placement.
- E60.2.7 Type 5 Concrete shall be used for Sidewalks. Type 1 or Type 2 Concrete can be used instead of Type 5 Concrete.
- E60.2.8 Type 6 Concrete is cold weather concreting and shall replace all other concrete types for all applications when cold weather exists, except Type 8.
- E60.2.9 Type 7 is concrete for restoration of utility pavement cuts.
- E60.2.10 Type 8 is concrete for temporary restoration.
- E60.2.11 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 = $100 \times (\text{cumulative \% retained on 10 000 Sieve} / \text{cumulative \% retained on 2 500 Sieve})$.
- E60.2.12 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.
- E60.2.13 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.
- E60.2.14 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

E60.3 Concrete Constituent Materials

E60.3.1 Aggregates

- (a) Aggregate shall consist of crushed stone or gravel or a combination of these materials conforming to the requirements of this Specification.
- (b) 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.
- (c) The combined aggregate gradation and allowable deviations shall comply with the requirements in Table CW 3310.1.

Table CW 3310.1 – Combined Aggregate Gradation

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%

- (b) The fineness modulus of fine aggregate shall be not less than 2.3 nor more than 3.1.
- (c) 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

E60.4 Hydraulic Cement

E60.4.1 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.

E60.5 Supplementary Cementing Materials

E60.5.1 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.

E60.6 Water

E60.6.1 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.

E60.7 Admixtures

E60.7.1 Air-Entraining Admixtures

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

E60.7.2 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.

E60.7.3 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

E60.8 Concrete Suppliers

E60.8.1 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 2.1.1)
- (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.

E60.8.2

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.

E60.8.3 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.

E60.8.4 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.

E60.8.5 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

E60.9 Concrete Properties

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	0.4 0.42	0.4 0.42	0.4 0.42	0.4 0.42	- 0.4 2	0.35 0.36	- 0	- 0.45
Slump (mm)	50 ± 20 70 ± 20	50 ± 20 70 ± 20	50 ± 20 70 ± 20	50 ± 20 70 ± 20	- 80 ± 20	50 ± 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 5	- 1 5	20 -	- 2 0	- -	20 24	Note 1*	- -
- @ 1 days	-	-	-	-	-	-	-	-
- @ 3 days	-	-	Note 1*	Note 1*	3	-	-	-
- @ 7 days	3	3	1*	1*	0	Note 1*	30	30
- @ 28 days	5	2	2	1*	0	1*	1*	1*
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.

E60.10 Plant Quality Control

- E60.10.1 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.
- E60.10.2 A new mill certificate for cement and fly ash shall be provided monthly during production
- E60.10.3 Check tests of any concrete constituent materials may be undertaken by a Testing Laboratory designated by the City of Winnipeg, Research and Standards Engineer. 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 has been rejected must be removed immediately by the Concrete Supplier.

Hot and Cold Weather Concreting

- E60.11 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.
- E60.11.1 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.
- E60.11.2 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

E60.12 Basis of Payment For CW 3310-R17

E60.12.1 Concrete Pavements, Median Slabs, Bull Noses and Safety Medians

- (a) 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 5.3 of this Specification.

Items of Work:

- (i) "Construction of 250 mm Type 1 Concrete Pavement (Plain Dowelled), Slip Form Paving"
- (ii) "Construction of 250 mm Type 1 Concrete Pavement (Dowel Jointed, Reinforced), Slip Form Paving"
- (iii) "Construction of 250 mm Type 1 Concrete Pavement (Plain Dowelled)"
- (iv) "Construction of 250 mm Type 1 Concrete Pavement (Dowel Jointed, Reinforced)"
- (v) "Construction of 200 mm Type 1 Concrete Pavement (Reinforced)"
- (vi) "Construction of Type 1 Concrete Median Slabs"
- (vii) "Construction of Type 1 Concrete Safety Medians"
- (viii) "Construction of Monolithic Type 1 Concrete Bull-noses"

E60.12.2 Concrete Pavements for Early Opening

- (a) 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 prices shall be reduced for deficiencies in pavement thickness as per Clause 5.3 of this Specification.

Items of Work:

- (i) "Construction of 250 mm Type 3 Concrete Pavement for Early Opening 24 Hour (Dowel Jointed, Reinforced)"
- (ii) "Construction of 250 mm Type 4 Concrete Pavement for Early Opening 72 Hour (Dowel Jointed, Reinforced)"
- (iii) "Construction of 250 mm Type 4 Concrete Pavement for Early Opening 72 Hour (Plain-Dowelled)"
- (iv) "Construction of 200 mm Type 3 Concrete Pavement for Early Opening 24 Hour (Reinforced)"
- (v) "Construction of 200 mm Type 4 Concrete Pavement for Early Opening 72 Hour (Reinforced)"

E60.12.3 Pavement Thickness Tolerances

- (a) 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.
- (b) Pavement found deficient in thickness by more than five (5%) percent shall be paid for at the reduced price. The reduced price = PR x contract price;

PR is in % and TD is in %

$$\text{Where: } PR = 100 - [(TD - 5) / 5] \times 25$$

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

- (c) 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.
- (d) 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.

E60.12.4 Concrete Curbs, Curb and Gutter, and Splash Strips

- (a) 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 Barrier (180mm ht, Type 1, Integral)"
- (ii) "Construction of Modified Barrier (180mm ht Type 1, Integral)"
- (iii) "Construction of Lip Curb (75mm, Type 1, Integral)"
- (iv) "Construction of Curb Ramp (8-12mm ht, Type 1, Integral)"
- (v) "Construction of Splash Strip (180mm ht, Monolithic Barrier Curb, 750mm width, Type 1)"

- (b) No measurement or payment shall be made for supply or placement of bonding grout for concrete curbs.
- (c) Drilled curb ramp tie bars are to be paid in accordance with CW 3230.

E60.12.5 Dowel Assemblies

- (a) 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.

E60.12.6 Drilled Tie Bars and Dowels

- (a) Supply and installation shall be in accordance with clause 9.2.3 of CW 3310-R17.

MEASUREMENT AND PAYMENT

E60.13 Measurement and Payment for CW 3235-R9

E60.13.1 Removal of Miscellaneous Concrete Slabs

- (a) 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

E60.13.2 Installation of Miscellaneous Concrete Slabs

- (a) 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) Construction of Type 1 Concrete Median Slab
 - (ii) Construction of Type 1 Concrete Safety Median
 - (iii) Construction of Monolithic Type 1 Concrete Bullnose
- (b) 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.
- (c) 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.
- (d) Additional base course over and above leveling course material will be paid in accordance with CW 3110.

E60.13.3 Miscellaneous Concrete Slab Renewal

- (a) 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 5 Concrete 100mm Sidewalk

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.

- (b) Additional base course over and above leveling course material will be paid in accordance with CW 3110.
- (c) 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.

E60.14 Measurement and Payment for CW3240-R10

E60.14.1 Concrete Curb Removal

- (a) 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 Separate

(ii) Curb Ramp

- (b) 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.

E60.14.2 Concrete Curb Installation

- (a) 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) "Construction of Barrier (180mm ht, Type 1, Integral)"
 - (ii) "Construction of Modified Barrier (180mm ht Type 1, Integral)"
 - (iii) "Construction of Lip Curb (75mm, Type 1, Integral)"
 - (iv) "Construction of Curb Ramp (8-12mm ht, Type 1, Integral)"
 - (v) "Construction of Splash Strip (180mm ht, Monolithic Barrier Curb, 750mm width, Type 1)"
- (b) 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.
- (c) No payment will be made for leveling course.
- (d) Base course will be paid in accordance with CW 3110.
- (e) Supply and placement of bonding grout for concrete curbs will not be measured for payment.

E60.14.3 Concrete Curb Renewal

- (a) 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) Concrete Barrier (150mm reveal ht, Type 1, Dowelled)
- (b) 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.
- (c) Base course will be paid in accordance with CW 3110.
- (d) For installation lengths greater than 30 metres, the length will include breaks for approaches, isolations or fixed obstacles such as light standards or poles.
- (e) Curb ramp tie bars are to be paid in accordance with CW 3230.
- (f) Supply and placement of bonding grout for concrete curbs will not be measured for payment.

APPENDIX 'A'

GEOTECHNICAL REPORT

APPENDIX 'B'

CycleGrip MMAX Specification for Methyl Methacrylate Bike Lane Treatment

APPENDIX 'C'

Application Instructions for MMAX Area Markings

APPENDIX 'D'

Manitoba Hydro Gas Infrastructure Operating Constraints

APPENDIX 'E'

Manitoba Hydro Electrical Standards

APPENDIX 'F'

Manitoba Hydro Safe Excavation & Safety Watch Guidelines

APPENDIX 'G'

Manitoba Hydro gel Cap Kit Detail

APPENDIX 'H'

Manitoba Hydro Electric/Gas Facilities Locate Form

APPENDIX 'I'

Manitoba Hydro Sample Job Plan

APPENDIX 'J'

Manitoba Hydro Network Commissioning Report

APPENDIX 'K'

QuadGuard II Manuals

APPENDIX 'L'

Site Investigation Photos