THE CITY OF WINNIPEG

TENDER

TENDER NO. 291-2024

2024 BRIDGE MAINTENANCE – MAIN STREET AND NORWOOD BRIDGES

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2024 Bridge Maintenance – Main Street and Norwood Bridges

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, June 6, 2024.

B2.2 The Contract Administrator or the Manager of Purchasing may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. SITE INVESTIGATION

B3.1 Further to C3.1, the Bidder may view the Site without making an appointment.

B3.2 The Bidder/Proponent is responsible for inspecting the Site, the nature of the Work to be done and all conditions that might affect their Bid/Proposal or their performance of the Work, and shall assume all risk for conditions existing or arising in the course of the Work which have been or could have been determined through such inspection.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D6.1.

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

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

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

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

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

B5. CONFIDENTIALITY

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

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

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

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

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

B6. ADDENDA

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

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

B6.3 Addenda will be available on the MERX website at www.merx.com.

B6.4 The Bidder is responsible for ensuring that they have received all addenda and is advised to check the MERX website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B6.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid/Proposal. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B6.6 Notwithstanding B4, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D6.

B7. SUBSTITUTES

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

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

B7.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.

B7.4 The Bidder shall ensure that any and all requests for approval of a substitute:

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

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

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

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

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

B7.5 The Contract Administrator, after assessing the request for approval of a substitute, may in their sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.

B7.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.

B7.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons they wish to inform.

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

B7.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base their Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B18.

B7.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B8. BID COMPONENTS

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

(a) Form A: Bid/Proposal;

(b) Form B: Prices;

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

B8.2 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.

B8.3 The Bid shall be submitted electronically through MERX at www.merx.com.

B8.3.1 Bids will **only** be accepted electronically through MERX.

B8.4 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B18.1(a).

B9. BID

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

B9.2 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 their own name, their 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 their own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

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

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

B9.4 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 their 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 their duly authorized officer or officers;

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

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

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

B10. PRICES

B10.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B10.1.1 Prices stated on Form B: Prices shall not include any costs which may be incurred by the Contractor with respect to any applicable funding agreement obligations as outlined in D31. Any such costs shall be determined in accordance with D31.

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

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

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

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

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

B11. DISCLOSURE

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

B11.2 The Persons are:

(a) N/A

B12. CONFLICT OF INTEREST AND GOOD FAITH

B12.1 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.

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

(a) other commitments;

(b) relationships;

(c) financial interests; or

(d) involvement in ongoing litigation;

that could or would be seen to:

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

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

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

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

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

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

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

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

B12.4 Without limiting B12.3, the City may, in their 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 their 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 their sole discretion, to avoid or mitigate the impact of such Conflict of Interest.

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

(a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of their 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 their sole discretion, determines cannot be avoided or mitigated;

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

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

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

B13. QUALIFICATION

B13.1 The Bidder shall:

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

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

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

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

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

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

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

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

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

(d) have completed the Accessible Customer Service online training required by the Accessibility for Manitobans Act (AMA) (see B13.5 and D8)

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

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

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

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

(b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information

Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at http://www.winnipeg.ca/matmgt/.

B13.5 Further to B13.3(d), the Bidder acknowledges they and all Subcontractors have obtained training required by the Accessibility for Manitobans Act (AMA) available at Accessibility Training for anyone that may have any interaction with the public on behalf of the City of Winnipeg.

B13.6 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B13.7 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B14. BID SECURITY

B14.1 The Bidder shall include in their 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, Purchasing Division website at https://www.winnipeg.ca/MatMgt/templates/files/Bidsecurity.pdf.

B14.2 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 B14.2(a).

B14.3 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 B18.1(a).

B14.4 Bonds passing the verification process will be treated as original and authentic.

B14.4.1 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.

B14.5 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.

B14.6 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.

B15. OPENING OF BIDS AND RELEASE OF INFORMATION

B15.1 Bids will not be opened publicly.

B15.2 Following the Submission Deadline, the names of the Bidders and their Total Bid Prices (unevaluated and pending review and verification of conformance with requirements) will be available on the MERX website at www.merx.com.

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

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

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

B16. IRREVOCABLE BID

B16.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B16.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly formed and the contract securities have been furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B17. WITHDRAWAL OF BIDS

B17.1 A Bidder may withdraw their Bid without penalty at any time prior to the Submission Deadline.

B18. EVALUATION OF BIDS

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

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

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

(c) Total Bid Price;

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

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

B18.3 Further to B18.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in their Bid or in other information required to be submitted, that they are qualified.

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

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

B18.4.2 Further to B18.1(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.

B19. AWARD OF CONTRACT

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

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

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

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

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

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

(d) only one Bid is received; or

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

B19.3 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D31 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.

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

B19.4.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of their 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, Purchasing Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm

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

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. FORM OF CONTRACT DOCUMENTS

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

D3. SCOPE OF WORK

D3.1 The Work to be done under the Contract shall consist of concrete girder spandrel wall repairs, partial depth replacement of the structural approach slabs and expansion joint blockouts, concrete repairs on the barriers, asphalt removal and replacement overlay of the Norwood Southbound Bridge over the Red River (B103-SB). Approach roadway repairs and joint replacement North and South of Norwood Southbound Bridge over the Red River (B103-SB) and Norwood Northbound Bridge over the Red River (B103-NB). Paver removal and relevelling at all four corners of the Norwood Bridges (B103-NB & B103-SB), and Southeast corner of the Main Street Southbound Bridge over the Assiniboine River (B104-SB). Salvage of existing guardrails and removal of pavement and crash attenuator; and installation of new pavement and crash attenuator North of Norwood Northbound Bridge over the Red River (B103-NB).

D3.2 The major components of the Work are as follows:

(a) Partial depth concrete removals on the structural approach slabs, expansion joint blockouts, and concrete header;

(b) Girder spandrel wall concrete repairs;

(c) Place new High Performance Concrete (HPC) on the structural approach slabs and expansion joint blockouts;

(d) Planter and Barrier concrete repairs;

(e) Full depth asphalt and transverse wick drain removal, with full depth asphalt paving;

(f) Asphalt mill and fill;

(g) Approach roadway slab joint replacements and slab repair;

(h) Relevelling of paver stones;

(i) Construct new crash attenuator concrete support slab;

(j) Removal and installation of new crash attenuator (by others).

D3.3 The following shall apply to the Work:

(a) Universal Design Policy

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

D4. SITE INVESTIGATION DUE DILIGENCE AND RISK

D4.1 Notwithstanding C3.1, the Contractor acknowledges that the site investigation reports and other site information included in this Tender have been provided to it and may be relied upon by the Contractor to the extent that the Contractor uses Good Industry Practice in interpreting such report(s) and site information and carries out the Work in accordance with Good Industry

Practice based upon such report(s) and the information contained in them and such other site information. In the event that a site condition related to:

(a) the location of any utility which can be determined from the records or other information available at the offices of any public authority or person, including a municipal corporation and any board or commission thereof, having jurisdiction or control over the utility;

(b) the Site conditions, including but not limited to subsurface hazardous materials or other concealed physical conditions;

(c) the location, nature, quality or quantity of the materials to be removed or to be employed in the performance of the Work;

(d) the nature, quality or quantity of the Plant needed to perform the Work;

(e) all matters concerning access to the Site, power supplies, location of existing services, utilities or materials necessary for the completion of the Work; and

(f) all other matters which could in any way affect the performance of the Work;

that could not have been “properly inferable”, “readily apparent” and readily discoverable” using Good Industry Practice by the Contractor, results in additional Work which is a direct result of this newly discovered site condition, such additional Work will be considered by the City under Changes in Work.

D5. DEFINITIONS

D5.1 When used in this Tender:

(a) “**Supply Chain Disruption”** means an inability by the Contractor to obtain goods or ser vices from third parties necessary to perform the Work of the Contract within the schedule specified therein, despite the Contractor making all reasonable commercial efforts to procure same. Contractors are advised that increased costs do not, in and of themselves, amount to a Supply Chain Disruption.

D6. CONTRACT ADMINISTRATOR

D6.1 The Contract Administrator is Morrison Hershfield Ltd. now Stantec Consulting Ltd., represented by:

Bill Ebenspanger, P.Eng.
Senior Bridge Engineer

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

D6.2 At the pre-construction meeting, Bill Ebenspanger will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D7. CONTRACTOR'S SUPERVISOR

D7.1 At the pre-construction meeting, the Contractor shall identify their designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D7.2 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 D7.1 or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

D8. ACCESSIBLE CUSTOMER SERVICE REQUIREMENTS

D8.1 The Accessibility for Manitobans Act (AMA) imposes obligations on The City of Winnipeg to provide accessible customer service to all persons in accordance with the Customer Service Standard Regulation ("CSSR") to ensure inclusive access and participation for all people who live, work or visit Winnipeg regardless of their abilities.

D8.1.1 The Contractor agrees to comply with the accessible customer service obligations under the CSSR and further agrees that when providing the Goods or Services or otherwise acting on the City of Winnipeg's behalf, shall comply with all obligations under the AMA applicable to public sector bodies.

D8.1.2 The accessible customer service obligations include, but are not limited to:

(a) providing barrier-free access to goods and services;

(b) providing reasonable accommodations;

(c) reasonably accommodating assistive devices, support persons, and support animals;

(d) providing accessibility features e.g. ramps, wide aisles, accessible washrooms, power doors and elevators;

(e) inform the public when accessibility features are not available;

(f) providing a mechanism or process for receiving and responding to public feedback on the accessibility of all goods and services; and

(g) providing adequate training of staff and documentation of same.

D9. UNFAIR LABOUR PRACTICES

D9.1 Further to C3.2, the Contractor declares that in bidding for the Work and in entering into this Contract, the Contractor and any proposed Subcontractor(s) conduct their respective business in accordance with established international codes embodied in United Nations Universal Declaration of Human Rights (UDHR) https://www.un.org/en/about-us/universal-declaration-of-human-rights International Labour Organization (ILO) https://www.ilo.org/global/lang--en/index.htm conventions as ratified by Canada.

D9.2 The City of Winnipeg is committed and requires its Contractors and their Subcontractors, to be committed to upholding and promoting international human and labour rights, including fundamental principles and rights at work covered by ILO eight (8) fundamental conventions and the United Nations Universal Declaration of Human Rights which includes child and forced labour.

D9.3 Upon request from the Contract Administrator, the Contractor shall provide disclosure of the sources (by company and country) of the raw materials used in the Work and a description of the manufacturing environment or processes (labour unions, minimum wages, safety, etc.).

D9.4 Failure to provide the evidence required under D9.3, may be determined to be an event of default in accordance with C18.

D9.5 In the event that the City, in its sole discretion, determines the Contractor to have violated the requirements of this section, it will be considered a fundamental breach of the Contract and the Contractor shall pay to the City a sum specified by the Contract Administrator in writing ("Unfair Labour Practice Penalty"). Such a violation shall also be considered an Event of Default, and shall entitle the City to pursue all other remedies it is entitled to in connection with same pursuant to the Contract.

D9.5.1 The Unfair Labour Practice Penalty shall be such a sum as determined appropriate by the City, having due regard to the gravity of the Contractor's violation of the above requirements, any cost of obtaining replacement goods/ services or rectification of the breach, and the impact upon the City's reputation in the eyes of the public as a result of same.

D9.5.2 The Contractor shall pay the Unfair Labour Practice Penalty to the City within thirty (30) Calendar Days of receiving a demand for same in accordance with D9.5. The City may also hold back the amount of the Unfair Labour Practice Penalty from payment for any amount it owes the Contractor.

D9.5.3 The obligations and rights conveyed by this clause survive the expiry or termination of this Contract, and may be exercised by the City following the performance of the Work, should the City determine, that a violation by the Contractor of the above clauses has occurred following same. In no instance shall the Unfair Labour Practice Penalty exceed the total of twice the Contract value.

D10. FURNISHING OF DOCUMENTS

D10.1 Upon award of the Contract, the Contractor will be provided with 'issued for construction' Contract Documents electronically, including Drawings in PDF formal only.

SUBMISSIONS

D11. AUTHORITY TO CARRY ON BUSINESS

D11.1 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.

D12. SAFE WORK PLAN

D12.1 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.

D12.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at http://www.winnipeg.ca/matmgt/Safety/default.stm

D12.3 Notwithstanding B13.4 at any time during the term of the Contract, the City may, at their 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.

D13. INSURANCE

D13.1 The Contractor shall provide and maintain the following insurance coverage:

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

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

(c) an all risks Installation Floater carrying adequate limits to cover all supplies and/or materials intended to enter into and form part of any installation.

(d) Property insurance for all field offices, portable toilets, machinery and equipment.

(e) Contractor's pollution liability insurance (CPL) in the minimum amount of one million dollar ($1,000,000) per occurrence and two million dollars ($2,000,000) annual aggregate insuring against claims covering third party injury and property damage claims and including clean-up costs and transported cargo as a result of pollution conditions arising suddenly or gradually from the Contractor operations and completed operations. Such policy to name the City as an additional insured and remain in place throughout the warranty period.

D13.2 Deductibles shall be borne by the Contractor.

D13.3 All policies shall be taken out with insurers licensed to carry on business in the Province of Manitoba.

D13.4 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, as applicable.

D13.5 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D14. CONTRACT SECURITY

D14.1 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.

D14.1.1 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 D14.1(b).

D14.1.2 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 their discretion, exercised reasonably, allows.

D14.1.3 Digital bonds passing the verification process will be treated as original and authentic.

D14.2 The Contractor shall provide the Contract Administrator identified in D6 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.

D14.3 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 D14.1(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.

D15. SUBCONTRACTOR LIST

D15.1 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 General Conditions for the return of the executed Contract Documents, if applicable.

D16. EQUIPMENT LIST

D16.1 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.

D17. REQUIREMENTS FOR SITE ACCESSIBILITY PLAN

D17.1 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.

D17.2 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.

D17.3 The Accessibility Plan may also include figures, sketches, or drawings to demonstrate the proposed plan.

D17.4 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

D17.5 At minimum, the Contractor shall review the site conditions on a daily basis to ensure that all features related to the Accessibility Plan are in place. The site review is intended to correct deficiencies as a result of unforeseen events such as wind, traffic, or the general public. Deficiencies that are direct result of the Contractors actions must be corrected immediately.

D17.6 Any changes to the Accessibility Plan must be approved by the Contract Administrator.

D17.7 Upon request from the Contract Administrator, the Contractor shall provide records demonstrating that the site has been maintained.

D17.8 Deficiencies as a direct result of actions by the Contractor that are not immediately corrected and/or failure to produce records that demonstrate that the site was maintained in compliance with the Accessibility Plan may result in a pay adjustment via the monthly Progress Payment. The rate of pay adjustment will be as per the following schedule:

(a) First Offence – A warning will be issued and documented in the weekly or bi-weekly site meeting.

(b) Second Offence – A field instruction to immediately correct the site will be issued by the Contract Administrator.

(c) Third and subsequent Offences – A pay reduction will be issued in the amount of $250.00 per instance and per day.

SCHEDULE OF WORK

D18. DETAILED WORK SCHEDULE

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

D18.2 The detailed work schedule shall consist of a “baseline schedule” component showing the planned start and completion dates for all activities/tasks. In addition, the detailed work schedule shall consist of an “update schedule” component showing the Contractor’s updated planned or actual start, progress and completion dates for each activity/task as construction proceeds in order to compare Contractor’s planned baseline schedule versus actual execution of the Work.

D18.3 The Contractor’s planned baseline detailed work schedule will be reviewed by Contract Administrator as a Submittal for conformance to the Project intent and general conformance to the requirements of the Contract.

D18.4 The Contractor shall not change the baseline portion of the detailed work schedule, once it has been reviewed without issue by the Contract Administrator, without prior consent or until requested by the Contract Administrator.

D18.5 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;

(c) capacity to show simultaneously the planned baseline schedule as well as the update schedule for each activity/task;

(d) all acceptable to the Contract Administrator.

D18.6 Further to D18.5(a), the C.P.M. schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path:

(a) Date of Commencement of the Work;

(b) Mobilization to Site;

(c) Substantial Performance;

(d) Total Performance;

(e) Demobilization from Site.

D18.7 Further to D18.5(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.

D18.8 Without changing the baseline portion of the detailed work schedule, at least once per month or within two (2) Working Days upon request from the Contract Administrator, Contractor shall accurately update the "update schedule".

D18.9 Contractor shall provide sub-schedules to define critical portions of the Work upon reasonable request from the Contract Administrator.

D19. COMMENCEMENT

D19.1 The Contractor shall not commence any Work until they are in receipt of an award letter from the Award Authority authorizing the commencement of the Work.

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

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

(i) evidence of authority to carry on business specified in D11;

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

(iii) the Safe Work Plan specified in D12;

(iv) evidence of the insurance specified in D13;

(v) the contract security specified in D14;

(vi) the Subcontractor list specified in D15;

(vii) the Requirements for Site Accessibility Plan specified in D17;

(viii) the detailed work schedule specified in D18;

(ix) the direct deposit application form specified in D27; and

(x) the Pedestrian and Traffic control plan specified in E4.

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

D19.3 The Contractor shall not commence the Work on the Site before July 2, 2024.

D19.4 The City intends to award this Contract by June 27, 2024.

(a) If the actual date of award is later than the intended date, the dates specified for commencement, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended date of award and actual date of award.

D20. SUBSTANTIAL PERFORMANCE

D20.1 The Contractor shall achieve Substantial Performance by September 6, 2024.

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 reinspected.

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 September 20, 2024.

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 reinspected.

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, Substantial Performance or Total Performance in accordance w ith 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) Substantial Performance - two thousand dollars ($2,000.00);

(b) Total Performance - one thousand dollars ($1,000.00).

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, 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. SUPPLY CHAIN DISRUPTION SCHEDULE DELAYS

D23.1 The City acknowledges that the schedule for this Contract may be impacted by the Supply Chain Disruption. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the delivery requirements and schedule identified in the Contract in close consultation with the Contract Administrator.

D23.2 If the Contractor is delayed in the performance of the Work by reason of the Supply Chain Disruption, 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 a Supply Chain Disruption will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to a Supply Chain Disruption,

including but not limited to ordering of Material or Goods, production and/or manufacturing schedules or availability of staff as appropriate.

D23.4 For any delay related to Supply Chain Disruption 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 D18 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 Supply Chain Disruption, 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 Supply Chain Disruption, 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 Supply Chain Disruption and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

CONTROL OF WORK

D24. JOB MEETINGS

D24.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D24.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever they deem it necessary.

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

D25.1 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).

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

D26.1 Further to B13.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at their sole discretion and acting reasonably, require updated proof of compliance, as set out in B13.4.

MEASUREMENT AND PAYMENT

D27. PAYMENT

D27.1 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

D28. WARRANTY

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

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

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

(b) the Work is considered to be completed to a Total Performance level for one of the structures prior to the Work being considered completed to a Total Performance level on the second structure.

D28.3 In either case of D28.2(a) and/or D28.2(b), the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

DISPUTE RESOLUTION

D29. DISPUTE RESOLUTION

D29.1 If the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator, the Contractor shall act in accordance with the Contract Administrator's opinion, determination, or decision unless and until same is modified by the process followed by the parties pursuant to D29.

D29.2 The entire text of C21.4 is deleted, and amended to read: "Intentionally Deleted"

D29.3 The entire text of C21.5 is deleted, and amended to read:

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

D29.4 Further to C21, prior to the Contract Administrator's issuance of a Final Determination, the following informal dispute resolution process shall be followed where the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator ("Dispute"):

(a) In the event of a Dispute, attempts shall be made by the Contract Administrator and the Contractor's equivalent representative to resolve Disputes within the normal course of project dealings between the Contract Administrator and the Contractor's equivalent representative.

(b) Disputes which in the reasonable opinion of the Contract Administrator or the Contractor's equivalent representative cannot be resolved within the normal course of project dealings as described above shall be referred to a without prejudice escalating negotiation process consisting of, at a minimum, the position levels as shown below and the equivalent Contractor representative levels:

(i) The Contract Administrator;

(ii) Supervisory level between the Contract Administrator and applicable Department Head;

(iii) Department Head.

D29.4.1 Names and positions of Contractor representatives equivalent to the above City position levels shall be determined by the Contractor and communicated to the City at the pre-commencement or kick off meeting.

D29.4.2 As these negotiations are not an adjudicative hearing, neither party may have legal counsel present during the negotiations.

D29.4.3 Both the City and the Contractor agree to make all reasonable efforts to conduct the above escalating negotiation process within twenty (20) Business Days, unless both parties agree, in writing, to extend that period of time.

D29.4.1 If the Dispute is not resolved to the City and Contractor's mutual satisfaction after discussions have occurred at the final escalated level as described above, or the time period set out in D29.4.3, as extended if applicable, has elapsed, the Contract Administrator will issue a Final Determination as defined in C1.1(v), at which point the parties will be governed by the Dispute Resolution process set out in C21.

INDEMNITY

D30. INDEMNITY

D30.1 Indemnity shall be as stated in C17.

D30.2 Notwithstanding C17.1, the Contractor shall save harmless and indemnify the City in the amount of twice the Contract Price or five million dollars ($5,000,000), whichever is greater, against all costs, damages or expenses arising from actions, claims, demands and proceedings, by whomsoever brought, made or taken as a result of negligent acts or negligent omissions of the Contractor, their Subcontractors, employees or agents in the performance or purported performance of the Work, and more particularly from:

(a) accidental injury to or death of any person whether retained by or in the employ of the contractor or not, arising directly or indirectly by reason of the performance of the Work, or by reason of any trespass on or damage to property;

(b) damage to any property owned in whole or in part by the City, or which the City by duty or custom is obliged, directly or indirectly, in any way or to any degree, to construct, repair or maintain;

(c) damage to, or trespass or encroachment upon, property owned by persons other than the City;

(d) any claim for lien or trust claim served upon the City pursuant to The Builders' Liens Act;

(e) failure to pay a Workers Compensation assessment, or Federal or Provincial taxes;

(f) unauthorized use of any design, device, material or process covered by letters patent, copyright, trademark or trade name in connection with the Work;

(g) inaccuracies in any information provided to the City by the Contractor.

D30.3 Further to C17, The City shall save harmless and indemnify the Contractor in the amount of twice the Contract Price or five million dollars ($5,000,000), whichever is greater, against all costs, damages or expenses arising from actions, claims, demands and proceedings, by whomsoever brought, made or taken as a result of negligent acts or negligent omissions of the City, their employees or agents in the performance of its obligation under the Contract.

THIRD PARTY AGREEMENTS

D31. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D31.1 In the event that funding for the Work of the Contract is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, the following terms and conditions shall apply, as required by the applicable funding agreements.

D31.2 Further to D31.1, in the event that the obligations in D31 apply, actual costs legitimately incurred by the Contractor as a direct result of these obligations ("Funding Costs") shall be determined by the actual cost to the Contractor and not by the valuation method(s) outlined in C7.4. In all other respects Funding Costs will be processed in accordance with Changes in Work under C7.

D31.3 For the purposes of D31:

(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.

D31.4 Modified Insurance Requirements

D31.4.1 If not already required under the insurance requirements identified in D13, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars ($2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and their Ministers, officers, employees, and agents shall be added as additional insureds.

D31.4.2 If not already required under the insurance requirements identified in D13, the Contractor will be required to provide builders' risk insurance (including boiler and machinery insurance, as applicable) providing all risks coverage at full replacement cost, or such lower level of insurance that the City may identify on a case-by-case basis, such as an installation floater.

D31.4.3 The Contractor shall obtain and maintain third party liability insurance with minimum coverage of two million dollars ($2,000,000.00) per occurrence on all licensed vehicles operated at the Site. In the event that this requirement conflicts with another licensed vehicle insurance requirement in this Contract, then the requirement that provides the higher level of insurance shall apply.

D31.4.4 Further to D13.3, insurers shall provide satisfactory Certificates of Insurance to the Government of Manitoba prior to commencement of Work as written evidence of the insurance required. The Certificates of Insurance must provide for a minimum of thirty (30) days' prior written notice to the Government of Manitoba in case of insurance cancellation.

D31.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D31.5 Indemnification By Contractor

D31.5.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for Construction, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers, servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.

D31.5.2 The Contractor agrees that in no event will Canada or Manitoba, their respective officers, servants, employees or agents be held liable for any damages in contract, tort (including negligence) or otherwise, for:

(a) any injury to any person, including, but not limited to, death, economic loss or infringement of rights;

(b) any damage to or loss or destruction of property of any person; or

(c) any obligation of any person, including, but not limited to, any obligation arising from a loan, capital lease or other long term obligation in relation to this Contract or the Work;

D31.6 Records Retention and Audits

D31.6.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.

D31.6.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for Construction, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total Performance, all records, documents, and contracts referred to in D31.6.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.

D31.7 Other Obligations

D31.7.1 The Contractor consents to the City providing a copy of the Contract Documents to the Government of Manitoba and/or the Government of Canada upon request from either entity.

D31.7.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.

D31.7.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.

D31.7.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.

D31.7.5 The Contractor represents and warrants that no current or former public servant or public office holder, to whom the Value and Ethics Code for the Public Sector, the Policy on Conflict of Interest and Post Employment, or the Conflict of Interest Act applies, shall derive direct benefit from this Contract, including any employment, payments, or gifts, unless the provision or receipt of such benefits is in compliance with such codes and the legislation.

D31.7.6 The Contractor represents and warrants that no member of the House of Commons or of the Senate of Canada or of the Legislative Assembly of Manitoba is a shareholder, director or officer of the Contractor or of a Subcontractor, and that no such member is entitled to any benefits arising from this Contract or from a contract with the Contractor or a Subcontractor concerning the Work.

FORM H1: PERFORMANCE BOND
(See D14)

KNOW EVERYONE 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. 291-2024

2024 Bridge Maintenance – Main Street and Norwood Bridges

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 D14)

KNOW EVERYONE 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. 291-2024

2024 Bridge Maintenance – Main Street and Norwood Bridges

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

(ii) 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;

(iii) 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;

(iv) 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 D15)

2024 BRIDGE MAINTENANCE – MAIN STREET AND NORWOOD BRIDGES

Name	Address

FORM K: EQUIPMENT
(See D16)

2024 Bridge Maintenance – Main Street and Norwood Bridges

1. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

2. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

3. Category/type:

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 their 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, Purchasing Division website at http://www.winnipeg.ca/matmgt/Spec/Default.stm

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

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

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

E1.4 The following are applicable to the Work:

Drawing No.	Drawing Name/Title
B103-24-01 / B-104-24-01	Cover Sheet
B103-24-02 / B-104-24-02	General Notes
B103-24-03 / B-104-24-03	General Arrangement and Scope of Work
B103-24-04	Norwood Bridge Northbound Exterior Delamination Map
B103-24-05	Norwood Bridge Southbound Exterior Delamination Map
B103-24-06	Norwood Bridge Northbound Girder Concrete Repair Details
B103-24-07	Norwood Bridge Southbound Girder Concrete Repair Details
B103-24-08	Norwood Bridge Northbound Structural Approach Slab, Asphalt, Planter, and Barrier Repairs
B103-24-09	Norwood Bridge Northbound Structural Approach Slab and Asphalt Repair Details
B103-24-10	Norwood Bridge Northbound Planter and Barrier Repair Details
B103-24-11 / B-104-24-04	Road Slab Joint Repair Locations
B103-24-12 / B-104-24-05	Road Slab Joint Repair Details
B103-24-13 / B-104-24-06	Road Slab and Median Curb Modification
B103-24-14 / B-104-24-07	Paving Stone Re-Grading Locations and Details
B103-24-15 / B-104-24-08	Traffic Signing and Staging – Stage 1 St. Mary's Road / Main Street (1 of 3)
B103-24-16 / B-104-24-09	Traffic Signing and Staging – Stage 1 Main Street / Stradbrook Ave (2 of 3)

Drawing No.	Drawing Name/Title
B103-24-17 / B-104-24-10	Traffic Signing and Staging – Stage 1 Main Street (3 of 3)
B103-24-18 / B-104-24-11	Traffic Signing and Staging – Stage 2 St. Mary's Road / Main Street (1 of 3)
B103-24-19 / B-104-24-12	Traffic Signing and Staging – Stage 2 Main Street / Stradbrook Ave (2 of 3)
B103-24-20 / B-104-24-13	Traffic Signing and Staging – Stage 2 Main Street (3 of 3)
B103-24-21 / B-104-24-14	Traffic Signing and Staging – Stage 3 St. Mary's Road / Main Street (1 of 3)
B103-24-22 / B-104-24-15	Traffic Signing and Staging – Stage 3 Main Street / Stradbrook Ave (2 of 3)
B103-24-23 / B-104-24-16	Traffic Signing and Staging – Stage 3 Main Street (3 of 3)

E2. OFFICE FACILITIES

E2.1 The Contractor shall supply office facilities for shared use with the Contract Administrator meeting the following requirements:

E2.1.1 The building shall be conveniently located near the site of the Work.

E2.1.2 The building shall have sufficient floor space for holding weekly project meetings with required attendees and include a window and a door entrance with a suitable lock.

E2.1.3 The building shall be suitable for all weather use and shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between 18°C to 25°C.

E2.1.4 The building shall be adequately lighted and have a minimum of three wall outlets.

E2.1.5 The building shall be furnished with one desk for use by the Contract Administrator, one chair with back support for use by the Contract Administrator, and a minimum number of chairs for all weekly meeting attendees.

E2.1.6 The office shall be equipped with reliable internet access, supplied and paid for by the Contractor, either provided by Ethernet cable (hard line) or wireless internet service. Any wireless internet access shall be secured by an access password and by conventional WPA2 256-bit encryption to prevent unauthorized access. If wireless internet access is not provided, then a minimum of two Ethernet connections shall be provided.

E2.1.7 The field office shall be equipped with a water cooler and be supplied so as never to run out of water. They shall be equipped with one (1) fridge, one (1) microwave, one electric tea kettle (1), and one (1) coffee maker.

E2.1.8 A portable toilet shall be located near the field office building. The toilet shall have a locking door.

E2.1.9 The field office building and the portable toilet shall be cleaned on a weekly basis and immediately prior to each site meeting. The Contract Administrator may request additional cleaning if deemed necessary.

E2.1.10 A minimum of two parking stalls shall be made available for use by the Contract Administrator immediately adjacent to the site office.

E2.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E2.3 The office facilities shall be provided from the date of commencement of the Work to the date of Total Performance.

E2.4 Equipment

E2.4.1 General

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

E3. MOBILIZATION AND DEMOBILIZATION PAYMENT

E3.1 Description

E3.1.1 This Specification shall govern mobilization and demobilization of the Contractor to and from the Site, as specified herein.

E3.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as herein specified.

E3.2 Scope of Work

E3.2.1 The Work under this Specification shall include but not be limited to:

(a) the submission of a Safe Work Plan, Site Accessibility Plan, Detailed Work Schedule, Site Layout Plan; and

(b) mobilizing and demobilizing on site work facilities; and

(c) installing, maintaining, and removing any access roadway.

(d) Supplying, setting up, layout out, and removing site office facilities as detailed in E2.

(e) Supplying and installing secure fencing/gates for portions of the laydown areas the Contractor wishes to secure and around the site.

(f) Traffic and Pedestrian Control (E4); and

(g) Restoring all existing facilities

E3.3 References

E3.3.1 The latest edition and subsequent revisions of the following:

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

(b) CW 1130 – Site Requirements

(c) Specification E2 Office Facilities.

(d) Specification E4 Traffic and Pedestrian Control.

E3.4 Submittals

E3.4.1 The Contractor shall submit the following to the Contract Administrator seven (7) Calendar Days prior to mobilization on Site:

(a) A Safe Work Plan for review and approval.

(b) A Site Accessibility Plan as detailed in D17 for review and approval.

(c) A Detailed Work Schedule as detailed in D18 for review and approval.

(d) A Site Layout Plan which includes: laydown area location(s), staging areas, office facility location, access road(s), temporary secure fencing limits, and gate locations for review and approval.

E3.5 Materials and Equipment

E3.5.1 All materials supplied under this Specification shall be of a type approved by the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.

E3.5.2 The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification. All materials shall be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E3.5.3 All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E3.6 Construction Methods

E3.6.1 Site Inspection

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

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

E3.6.2 Layout of On-Site Work Facilities

(a) The Contractor shall mobilize all on Site Work and other temporary facilities.

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

E3.6.3 Cellular Telephone Communication

(a) The Contractor's site supervisor is required to carry, at all times, a cellular telephone, with voice mail.

E3.6.4 Site Security

(a) The Contractor has discretion on what areas of the site they wish to secure. This may include the Contractor's lay down area, material storage areas, and/or access roads. These areas may be fenced and gated for security and to discourage pedestrian entrance to construction areas and to control any potential hazard to the public, particularly children. The Contractor shall not fence off areas where public traffic or pedestrians need to travel, such as open roadway lanes or sidewalks/bike paths.

E3.6.5 Access Roadway

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

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

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

E3.6.6 Restoration of Existing Facilities

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

E3.7 Quality Control and Assurance

E3.7.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work.

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

E3.7.2 Access

(a) The Contractor shall allow the Contract Administrator free access to all parts of the Work at all times. The Contractor shall supply samples to the Contract Administrator

or his inspector for testing purposes as required. There will be no charge to the City for samples taken.

E3.8 Measurement and Payment

E3.8.1 Mobilization and Demobilization

(a) Mobilization and demobilization will not be measured and will be paid for at a percentage of the Contract Lump Sum Price for "Mobilization and Demobilization", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator. Payment will be made on the following schedule:

(i) 30% payment of the Mobilization and Demobilization lump sum price will be paid once the Contract Administrator is satisfied that construction has commenced at the Site.

(ii) 60% payment of the Mobilization and Demobilization lump sum price will be paid on a percentage distributed equally on a monthly basis at the discretion of the Contract Administrator.

(iii) 10% of the Mobilization and Demobilization lump sum price will be paid upon completion of the project.

E4. TRAFFIC AND PEDESTRIAN CONTROL

E4.1 Description

E4.1.1 This Specification covers all items relating to traffic and pedestrian control for completion of the Works which includes, but is not limited to, placing, maintaining, and removing all regulatory sign and traffic control devices required for the duration of the Works.

E4.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E4.2 Scope of Work

E4.2.1 The Work under this Specification shall be completed in accordance with the Manual of Temporary Traffic Control on City Streets (MTTC) and shall include but not be limited to:

(a) Implementation of all necessary traffic and pedestrian control measures as specified herein, on the Drawings, and generally as required to complete the Work.

(b) Coordination with and receipt of approvals from relevant City of Winnipeg Departments as required prior to implementation of any pedestrian and traffic control measures.

E4.3 References

E4.3.1 The latest edition and subsequent revisions of the following:

(a) City of Winnipeg – Manual of Temporary Traffic Control on City Streets (MTTC);

(b) CW 1130 – Site Requirements; and

(c) E6 – Winnipeg Transit Coordination.

E4.4 Construction Methods

E4.4.1 Pedestrian and Cyclist Controls

(a) All sidewalks shall remain open at all times unless otherwise approved by the Contract Administrator.

(b) During construction operations that require the closure of the west sidewalk, the Contractor shall erect signage and direct pedestrians to the east sidewalk in accordance with the MTTC.

(c) During construction operations that require the closure of the east sidewalk, the Contractor shall erect signage and direct pedestrians to the west sidewalk in accordance with the MTTC.

(d) During construction operations that require the closure of the east bike path, the Contractor shall erect signage and direct cyclists to dismount and use the east sidewalk in accordance with the MTTC.

E4.4.2 Lane Closures

(a) A minimum of two (2) 3.5 m lanes shall be maintained for southbound traffic throughout construction on the Norwood Bridge.

(b) A minimum of two (2) 3.5 m lanes shall be maintained for northbound traffic throughout construction on both the Norwood Bridge.

(c) A minimum of one (1) 3.5 m lane shall be maintained for westbound traffic on Stradbrook Avenue throughout construction.

E4.4.3 Further to CW 1130 and in accordance with the latest edition of the MTTC, the Contractor shall:

(a) Submit a *Regional Street Lane Closure Request* form at least seven (7) Calendar Days prior to beginning Work on Site and prior to switching over to any other stage of lane closures;

(b) Implement traffic and pedestrian control measures required for all stages of Work.

(c) Modify and/or maintain Winnipeg Transit services in accordance with E6 – Winnipeg Transit Coordination;

(d) Supply, erect, and maintain all applicable traffic control devices (including, but not limited to, designated construction zones, warning signs, barricades, barrels, tall cones and chevrons) as specified by the MTTC, the Traffic Management Branch, the Contract Administrator and/or the Permit issued by the City;

(e) Supply, remove, place and maintain all regulatory signing (including, but not limited to; parking restrictions, stopping restrictions, turn restrictions, diamond lane removal, full or directional closures on a Regional Street, traffic routed across a median, and 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;

(f) Remove and stockpile any regulatory signage not required during construction;

(g) Ensure intersecting street and private approach access is maintained at all times. Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, the Contractor 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 twenty-four (24) hours notification to the affected residence or business and the Contract Administrator prior to disruption of access;

(h) Mark barricades supplied by the Contractor with the name and the telephone number(s) at which the Contractor can be reached twenty-four (24) hours per day, seven (7) days per week;

(i) Provide safety for the workers;

(j) Provide safety and convenience for motorists, cyclists and pedestrians;

(k) Ensure all temporary traffic control devices are removed or hidden from view when no longer appropriate;

(l) Contact the Traffic Management Branch to report any changes to the location, limits or duration of any lane closures;

(m) Notify the Traffic Management Branch of the reopening of any lane closures; and

(n) Provide and maintain flagmen in accordance with the MTTC.

E4.4.4 The Contractor shall take all other safety measures necessary to cope with any peculiar or unusual circumstances that have not been set out in the MTTC and shall, at all times, ensure that maximum protection is afforded to the road-user and that their operations in no way interfere with the safe operation of traffic, cyclists or pedestrians.

E4.4.5 Improper signing will be sufficient reason for the Contract Administrator to order the Works to cease on Site.

E4.4.6 During the hours when the Contractor is not working, equipment and stockpiled materials shall be left in such a location so as not to interfere with or present a hazard to motorists, cyclists or pedestrians.

E4.4.7 Emergency vehicle access must be maintained at all times.

E4.4.8 If the Contractor determines that they are unable to meet the traffic management requirements described herein for any location, they may apply in writing to the Contract Administrator to determine an alternate schedule or closure.

E4.5 Submittals

E4.5.1 The Contractor shall submit detailed traffic management plans for review a minimum of seven (7) Calendar Days prior to implementing the lane closure(s) or performing any Work on Site.

E4.5.2 The detailed traffic management plans shall be prepared in accordance with the MTTC.

E4.5.3 At a minimum, the detailed traffic management plans shall:

(a) Show a plan view of the area for each stage of construction or traffic control set-up;

(b) Show all applicable signage and traffic management devices to be used;

(c) Provide all relevant dimensions and geometric layout of devices such as sign spacing, taper lengths, cone spacing, etc.;

(d) Indicate the general sequence of device installation;

(e) Indicate the date and time of implementation of the devices;

(f) Indicate the expected date and time of the removal of the devices;

(g) Confirm the work zones created by the closures are adequate for the construction operations required for the Work;

(h) Indicate how all affected Winnipeg Transit routes and bus stops will be dealt with for Contractor Administrator and Winnipeg Transit review in accordance with E6 – Winnipeg Transit Coordination; and

(i) Include all other information as deemed necessary by the Contract Administrator, and/or other agencies reviewing the submitted traffic management plans.

E4.6 If the Contract Administrator determines that the Contractor is not performing Traffic Control in accordance with this specification, Traffic Services Branch may be engaged to perform the Traffic Control. In this event the Contractor shall bear the costs associated charged to the project by the Traffic Services Branch of the City of Winnipeg in connection with the required Works undertaken by the Contractor.

E4.7 Measurement and Payment

E4.7.1 Traffic and pedestrian control will not be measured and will be paid for at a percentage of the Contract Lump Sum Price for “Traffic and Pedestrian Control”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator. Payment will be made on the following schedule:

(a) 30% payment of the Traffic and Pedestrian Control lump sum price will be paid once the Contract Administrator is satisfied that construction has commenced at the Site.

(b) 60% payment of the Traffic and Pedestrian Control lump sum price will be paid on a percentage distributed equally on a monthly basis at the discretion of the Contract Administrator.

(c) 10% of the Traffic and Pedestrian Control lump sum price will be paid upon completion of the project.

E5. LAYDOWN AREA

E5.1 Description

E5.1.1 This Specification covers items relating to the laydown area for use by the Contractor, as specified herein.

E5.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E5.2 Scope of Work

E5.2.1 The Work under this Specification shall include but not be limited to:

(a) The submission of a site layout plan as specified in E3.4.

(b) Supply, installation, and removal of all Office Facility requirements as specified in E2.

E5.3 References

E5.3.1 E2 – Office Facilities

E5.3.2 E3 – Mobilization and Demobilization Payment

E5.4 Construction Methods

E5.4.1 The Contractor shall be responsible for ensuring the laydown area(s) are kept clean and organized.

E5.4.2 Equipment storage may be permitted in the closed lanes.

E5.4.3 The Contractor shall also be responsible to ensure the laydown area(s) do not interfere with road users, pedestrians, or cyclists and that road users, pedestrians, and cyclists are sufficiently protected from objects in the laydown area(s) that may pose a hazard. Placement of large, fixed objects adjacent to live lanes of traffic pose a hazard to users. Should the Contractor desire to use these areas for laydown the Contractor shall submit a plan for adequately protecting the roadside hazard. The plan is to be sealed by an Engineer registered to practice in the Province of Manitoba.

E5.5 Measurement and Payment

E5.5.1 The laydown area(s) shall be considered incidental to the Work and no separate measurement or payment will be made.

E6. WINNIPEG TRANSIT COORDINATION

E6.1 Description

E6.1.1 This Specification covers items related to the coordination of construction activities, including lane closures and traffic management, with Winnipeg Transit, as specified herein.

E6.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all

things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E6.2 References

E6.2.1 E4 – Traffic and Pedestrian Control.

E6.3 Construction Methods

E6.3.1 The Contractor shall be responsible for coordinating with Winnipeg Transit to ensure that temporary bus stop(s) are implemented and that Diamond Lane signage is adjusted as required as per the drawings and as per the submitted and approved Site Accessibility Plan. Temporary bus stops shall be implemented for all bus stops impacted by the construction Works.

E6.3.2 Overhead diamond lane signage and temporary diamond lane signage shall be provided as per the Drawings and as required by Winnipeg Transit.

E6.4 Submittals

E6.4.1 The Contractor shall clearly identify how Winnipeg Transit services are affected and accommodated in the submission of the detailed traffic management plan outlined in E4 – Traffic and Pedestrian Control.

E6.5 Measurement and Payment

E6.5.1 Winnipeg Transit Coordination shall be considered incidental to “Traffic and Pedestrian Control” and no separate payment will be paid for the Work.

E7. PROTECTION OF EXISTING TREES

E7.1 In accordance with E5 – Laydown Area, the Contractor is advised that for any laydown area us ed that any existing trees within the area shall be protected from any facilities, equipment, and/or materials. The protection of the trees shall be as specified herein.

E7.2 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing trees within the limits of the construction and laydown area:

E7.2.1 The Contractor shall not stockpile materials and soil or park vehicles and equipment within 2 m of trees.

E7.2.2 Trees identified to be at risk by the Contract Administrator are to be strapped with 25 mm x 100 mm x 2,400 mm wood planks, or suitably protected as approved by the Contract Administrator.

E7.2.3 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, re-fueled; 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.

E7.2.4 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.

E7.3 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 their designate.

E7.4 Elm trees shall not be pruned at any time between April 1 and July 31.

E7.5 Measurement and Payment

E7.5.1 The protection of existing trees shall be considered incidental to the Work and no separate measurement or payment will be made.

E8. PROTECTION OF EXISTING UTILITIES

E8.1 In accordance with and further to CW 1120, the Contractor shall protect and maintain all existing utilities that may be affected by the Work. The Contractor shall identify and locate utilities and select appropriate construction methods to complete the work while avoiding harm to any utilities.

E8.2 References

E8.2.1 The latest edition and subsequent revisions of the following:

(a) CW 1120 – Existing Services, Utilities and Structures

E8.3 Measurement and Payment

E8.3.1 The protection of existing utilities shall be considered incidental to the Work and no separate measurement or payment will be made.

E9. WATER OBTAINED FROM THE CITY

E9.1 Further to Clause 3.7 of CW 1120, the Contractor shall pay for all costs, including sewer charges, associated with obtaining water from the City in accordance with the Waterworks and Sewer By-laws.

E9.2 References

E9.2.1 The latest edition and subsequent revisions of the following:

(a) CW 1120 – Existing Services, Utilities and Structures.

E10. CONCRETE REMOVAL

E10.1 Description

E10.1.1 This Specification shall cover all operations relating to the removal and disposal of existing concrete, as specified herein and as shown on the Drawings. This Specification shall cover concrete removal Works, including all necessary staging, demolition, removal, salvaging, transporting, unloading, stockpiling, and disposal of applicable materials.

E10.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E10.2 Scope of Work

E10.2.1 The Work under this Specification shall generally include the following items, to the limits as shown on the Drawings or as otherwise directed by the Contract Administrator.

(a) Concrete removal to depths as shown on the Drawings at the structural approach slabs at both the north and south ends of the northbound Norwood bridge;

(b) Concrete removal to a depth as indicated on the Drawings for subsequent construction of shear keys as shown on the Drawings;

(c) Concrete removal to depths as shown on the Drawings at the concrete header at the north end of the northbound Norwood bridge;

(d) Concrete removal to depths as shown on the Drawings at the expansion joint blockouts at both the north and south ends of the northbound Norwood bridge;

(e) Concrete removals as indicated on the Drawings at the location of the proposed roadway joint repairs past the north and south ends of the Norwood bridges;

(f) Concrete removals as shown on the Drawings necessary for required delamination and concrete deterioration repairs on the deck, approach slabs, barriers, and planter; and

(g) Concrete removal shall include removal of reinforcing steel as shown on the Drawings.

E10.2.2 Removing concrete with appropriate equipment satisfactory to the Contract Administrator. No demolition products shall find their way into the watercourse. No demolition products shall find their way onto the sidewalk or roadway lanes which are open to traffic. Limits of demolition shall be saw-cut to provide a clean edge at the extent of demolition. Repair any over demolition and damaged reinforcing steel to the satisfaction of the Contract Administrator, at no additional cost.

E10.2.3 All concrete removal materials not identified for salvage shall revert to the Contractor for off-site disposal.

E10.2.4 It shall be the Contractor's responsibility to provide all necessary work details and plans, and all work required to develop and implement these plans shall be considered incidental to the Work.

E10.3 References

E10.3.1 The latest edition and subsequent revisions of the following:

(a) ICRI No. 310.2 – Selecting and Specifying Concrete Surface Preparation for Coatings, Sealers and Polymer Overlays.

E10.4 Submittals

E10.4.1 The Contractor shall submit to the Contract Administrator for review and approval, at least five (5) Business Days prior to the commencement of any Work on Site, a detailed plan and schedule, clearly illustrating the method and sequence by which the Contractor proposes to perform the concrete removals, including a description of the measures that will be implemented to meet any applicable environmental requirements. The demolition procedure shall include a description of the following:

(a) Type and capacity of equipment;

(b) Sequence of operations; and

(c) Design of demolition products protection of traffic lanes.

E10.5 Materials

E10.5.1 All materials supplied under this Specification shall be of a type approved by the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.

E10.5.2 The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification. All materials shall be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E10.6 Equipment

E10.6.1 All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E10.6.2 The use of explosives is prohibited.

E10.7 Sequence of Structural Removals

E10.7.1 Sequencing of all structural removals shall take place as shown on the Drawings unless otherwise approved to in writing by the Contract Administrator.

E10.8 Demolition Barriers

E10.8.1 The Contractor shall provide all necessary temporary barriers to protect open traffic lanes and the general public from the products of the demolition process. The barriers shall not impede the concrete removals process or associated inspection of all Works by the Contract Administrator.

E10.9 Construction Methods

E10.9.1 General

(a) Concrete removals shall be deemed to include all the items of work as listed under Clause E10.2 of this Specification and to the limits as shown on the Contract Drawings or otherwise directed by the Contract Administrator.

(b) The Contractor shall prevent damage and destructive vibrations to: existing structures to remain, services, expansion joints, and adjacent roadways. If safety measures are not followed, or if existing structures to remain and/or services appear to be endangered, the Contractor shall cease operations and notify the Contract Administrator immediately.

(c) The Contractor is advised that the measured concrete cover from the top surface of the concrete approach and roadway slabs to the top of the top layer of reinforcing steel is variable.

(d) All removed material shall become the responsibility of the Contractor except as otherwise indicated herein.

(e) The Contractor shall promptly haul all removed materials indicated for disposal, off and away from the site. No storage of any materials on Site will be allowed without written approval of the Contract Administrator. It shall be the Contractor's responsibility to find suitable disposal areas away from the Site.

(f) The Contractor shall take all necessary precautions to ensure that materials do not fall onto any neighbouring roadways or sidewalks during removal operations.

(g) The Contractor shall visit the Site to become familiar with the existing conditions and scope of work prior to bid submission. No allowance for extras will be made for any concrete removals, not foreseen by the Contractor, required to complete the scope of Work.

(h) The details and dimensions of the existing structures shown on the Drawings are for assisting the Contractor in establishing methods and limits of removal and for determining the cost of the Work. Available Drawings for the existing bridge structure and modifications are available for viewing with the Contract Administrator. No guarantee for the accuracy of the information is given. No allowance for extras will be given for information on the Drawings that does not represent existing conditions.

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

(j) The Contractor shall provide all necessary access to facilitate concrete removals and subsequent inspection of all the Works by the Contract Administrator.

(k) The Contractor shall be fully responsible for ensuring the public safety in all areas, and will be held responsible for any loss or damage caused due to neglect by the Contractor or their employees.

(l) The Contractor shall only use methods of concrete removal that will not damage the existing structure to remain or new structures. Limits of demolition shall be straight and saw-cut to provide a clean edge at the extent of demolition.

(m) The structural approach slabs are to have final surface scarification by high pressure water jet before application of new concrete.

(n) Following the initial removal of concrete, the Contract Administrator will conduct a delamination survey to determine if any additional concrete removal will be required.

These areas will be clearly marked out by the Contact Administrator for the Contractor's completion of delamination repairs.

(o) In the case that reinforcing is exposed during the concrete removal operations the following shall be adhered to:

(i) Any reinforcing steel that is severed shall be replaced, with appropriate lap lengths, by the Contractor to the satisfaction of the Contract Administrator at no additional cost to the City.

(ii) Reinforcing steel shall be electrically connected and galvanic anodes installed in accordance to E20.

(p) The Contractor shall only use methods of concrete removal that will not damage the existing reinforcing steel or new structures. The Contractor shall ensure that the remaining portions of the existing bridge elements are not damaged during the removal operations.

E10.9.2 Removal of Structural Approach Slab Concrete

(a) Removal of structural approach slab concrete shall be the removal of concrete in the areas shown on the Drawings to a minimum depth as shown on the Drawings as measured from the top of the existing concrete surface. Removal shall extend until sound concrete surface is reached as accepted by the Contract Administrator.

(b) All of the existing reinforcing steel is to remain in place. The Contractor shall ensure that the reinforcing steel is not damaged.

E10.9.3 Removal of Shear Key Concrete

(a) Removal of concrete at proposed shear keys shall take place in areas shown on the Drawings to a nominal depth as shown on the Drawings as measured from the top of the existing concrete surface transitioning to the new HPC header.

(b) All of the existing reinforcing steel is to remain in place. The Contractor shall ensure that the reinforcing steel is not damaged.

E10.9.4 Removal of Header and Expansion Joint Blockout Concrete

(a) Removal of header and expansion joint blockout concrete shall be the removal of concrete in the areas shown on the Drawings to a minimum depth as shown on the Drawings as measured from the top of the existing concrete surface. Removal shall extend until sound concrete surface is reached to the satisfactory of the Contract administrator.

(b) All of the existing reinforcing steel is to remain in place. The Contractor shall ensure that the reinforcing steel is not damaged.

E10.9.5 Removal of Barrier and Planter Concrete

(a) Removal of concrete at barriers and planters shall take place in areas the area shown and to the dimensions shown on the Drawings.

(b) All of the exposed reinforcing steel is to be removed and replaced as per the Drawings.

E10.9.6 Removal of Roadway Slab Concrete

(a) Saw-cut perimeter the length of slab to be repaired to the dimensions specified on the Drawings. Mechanically remove unsound concrete to the limits indicated on the Drawings or to the depth of unsound concrete, whichever is greater. The existing concrete in the repair area shall be removed to a minimum of 25 mm behind the existing reinforcing.

E10.9.7 Removal of Delaminated Concrete

(a) Type 1

(i) Sawcut perimeter of repair area to 25mm deep.

(ii) Concrete shall be removed to a nominal depth of 50 mm.

(iii) Sound concrete is reached and no reinforcement it exposed.

(b) Type 2

(i) Sawcut perimeter of repair area to 25mm deep.

(ii) Concrete shall be removed to a nominal depth of 50 mm.

(iii) Sound concrete is reached and reinforcement it exposed up to middle of exposed bars.

(iv) Local pockets shall be chipped to provide 50mm of cover for placement of anodes.

(v) Exposed reinforcing steel should be cleaned to remove all residual rust and concrete residue to the satisfaction of the Contract Administrator.

(c) Type 3

(i) Sawcut perimeter of repair area to 25mm deep.

(ii) Concrete shall be removed to a nominal depth of 50 mm.

(iii) If sound concrete is not reached or if bars are exposed past the middle of exposed bars, extend removals to a nominal depth of 100 mm.

(iv) Concrete shall be removed from around and behind all rebar in the area to be repaired accordance with good concrete repair practice such as ACRA guideline HB84-2006. Section 6. Rebar shall be exposed to 25 mm below the lower bars. Exposed reinforcing steel should be cleaned to remove all residual rust and concrete residue to the satisfaction of the Contract Administrator.

E10.9.8 Surface Preparation Works

(a) The final surface preparation of the Structural Approach Slabs, Expansion Joint Blockouts, Roadway Slabs, Planters, Delamination, and Headers at locations of concrete or asphalt overlay shall be conducted by water jet unless otherwise approved by the Contract Administrator. The resulting surface shall achieve the required grades, while being roughened to the following requirements:

(i) Concrete shall be removed by water jet to a medium scarification profile in accordance with the ICRI Guideline No.310.2 CSP 6.

(b) The Contractor shall take all necessary precautions to ensure that no sound concrete located below the required depth of removal is damaged or removed. Any damage caused to sound concrete or reinforcing steel beyond the required limit of removal or excessive removal of concrete beyond the required depth of removal by the Contractor during any demolition procedure will be repaired by the Contractor at the Contractor's own expense to the satisfaction of the Contract Administrator.

(c) Where applicable, any "shadowing" of the reinforcing steel by concrete not removed by the concrete removals shall be removed by the Contractor through other approved means to expose the reinforcement. The existing concrete shall then be removed to a minimum of 25 mm beneath the existing reinforcement.

(d) Upon completion of the concrete removals of each section, the Contractor shall remove all cuttings, slurry containing the products of the removal method, and all other debris from the resulting concrete surface so as to produce a thoroughly clean surface. Cleaning of each section shall be done before debris and water are allowed to dry on the deck surface and prior to the placement of any cathodic protection (if applicable).

(e) All exposed reinforcing steel which is left unsupported by the concrete removal process shall be adequately supported and protected from all equipment. All reinforcing steel damaged or dislodged by these operations, as deemed by the Contract Administrator, shall be replaced with new reinforcing of the same size at the expense of the Contractor.

E10.10 Quality Control

E10.10.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work.

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

E10.10.2 Access

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

E10.11 Measurement and Payment

E10.11.1 Removal of the existing expansion joint blockout and headers will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Expansion Joint Blockout and Header Concrete Removals”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E10.11.2 Removal of the existing structural approach slab concrete and shear keys will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Structural Approach Slab Concrete Removals”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E10.11.3 Removal of the existing barrier concrete will be measured on an area basis and paid for at the Contract Unit Price per vertical square metre for “Barrier Concrete Removals”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E10.11.4 Removal of the existing planter concrete wall will be measured on an area basis and paid for at the Contract Unit Price per vertical square metre for “Planter Concrete Removals”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E10.11.5 Removal of the existing roadway slab concrete will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Roadway Slab Concrete Removals”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

(a) Removal of barrier curbs and safety shape curbs within the limits of the roadway slab repairs shall be considered incidental to “Roadway Slab Concrete Removals”, and no separate measurement or payment will be made for this Work.

E10.11.6 Removal of the existing Type 1 delaminated concrete will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Type 1 Delaminated Concrete Removals”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E10.11.7 Removal of the existing Type 2 delaminated concrete will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Type 2 Delaminated Concrete Removals”, which price shall be payment in full for supplying all materials and for

performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E10.11.8 Removal of the existing Type 3 delaminated concrete will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Type 3 Delaminated Concrete Removals", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E11. STRUCTURAL CONCRETE

E11.1 Description

E11.1.1 This Specification shall cover all operations relating to the preparation of Portland Cement structural concrete for, and all concreting operations related to, the construction of structural concrete works as specified herein and as shown on the Drawings, except for the girder spandrel walls.

E11.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E11.2 Referenced Specifications and Drawings

E11.2.1 The latest edition and subsequent revisions of the following:

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

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

(c) ASTM B418 – Standard Specification for Cast and Wrought Galvanic Zinc Anodes;

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

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

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

(g) ASTM C881- Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete;

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

(i) ASTM C1059 – Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete;

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

(k) ASTM C1876 – Standard Test Method for Bulk Electrical Resistivity or Bulk Conductivity of Concrete;

(l) CSA A23.1 – Concrete Materials and Methods of Concrete Construction;

(m) CSA-A3001 – Cementitious Materials for Use in Concrete; and

(n) CSA O121 – Douglas Fir Plywood.

E11.3 Scope of Work

E11.3.1 Supplying and placing concrete topping for structural approach slabs;

E11.3.2 Supplying and placing concrete topping for headers;

E11.3.3 Supplying and placing concrete for planter repairs;

E11.3.4 Supplying and placing concrete for roadway slab repairs; and

E11.3.5 Supplying and placing concrete for typical delamination repairs.

E11.4 Submittals

E11.4.1 General

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

(b) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any Work on Site, the proposed materials to be used.

E11.4.2 Concrete Mix Design Requirements

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

(b) The Supplier shall submit directly, in confidence, to the City of Winnipeg, the concrete mix designs for each of the concrete types specified herein. The purpose of this confidential submission will be for record keeping purposes only. The concrete mix design shall contain a description of the constituents and proportions, and at the minimum the following:

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

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

(iii) Aggregate source location(s);

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

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

(vi) The limits for slump;

(vii) The limits for air content; and

(viii) Quantity of other admixtures.

(c) The concrete mix design statements must be received by the Contract Administrator a minimum of ten (10) Business Days prior to the scheduled commencement of concrete placement for each of the concrete types. The concrete mix designs must be received by the City of Winnipeg a minimum of five (5) Business Days prior to the scheduled commencement of concrete placement for each of the concrete types.

(d) The mix design statement shall also include the expected slump measurement for each concrete type. The tolerances for acceptance of slump measurements in the field, by the Contract Administrator, shall be in accordance to CSA A23.1-19 Clause 4.3.2.3.2.

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

E11.4.3 Concrete Mix Design Test Data

(a) Concrete

(i) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the scheduled commencement of concrete placement, test data showing that the concrete to be supplied will meet the performance criteria stated in this Specification for each concrete type.

(ii) The Contractor shall submit at a minimum, the test data to prove that the minimum compressive strength, flexural strength for Fibre Reinforced Concrete (FRC) only, air content and slump of the concrete to be supplied meets or exceeds the performance criteria. In addition, test data shall be submitted to support requirements for fibre dispersion in accordance with the Canadian Highway Bridge Design Code (CHBDC) CAN/CSA-S6-19, Section 16, Fibre Reinforced Structures, Clause 16.6. Testing for post-cracking residual strength index (Ri) of FRC shall be conducted at the Contractor's expense as follows: one set of five (5) concrete beam specimens, 100 mm x 100 mm x 350 mm long, shall be tested at seven (7) Calendar Days in accordance with the latest addition of ASTM C1609. The initial cracking load of the concrete (Pp) and the post-cracking residual strength (Pcr), which shall be taken as the average of loads corresponding to deflection values of 0.5 mm, 0.75mm, 1.0mm, and 1.25 mm, shall be tabulated for each of the specimens. The Ri for each specimen, which shall be taken as the ratio of Pcr over Pp, shall be tabulated. Tests conducted in accordance with ASTM C1609 will be considered invalid if the initial crack in the specimen has occurred after 0.2 mm deflection. The Ri shall be taken as the average of the Ri values from a minimum of five (5) valid specimens. The Contractor shall submit a report as specified in ASTM C1609, including a summary of the results of all post-cracking residual strength index tests and all load deflection curves.

(iii) All tests shall be based on the concrete samples taken from the point of discharge into the formwork. For example, at the concrete chute from the delivery truck if being placed by buggies, or at the end of the pump line should the Contractor choose to pump the concrete into place.

(iv) Samples of concrete for test specimens shall be taken in accordance with CSA Standard Test Method CSA-A23.2-1C-19, "Sampling Plastic Concrete".

(b) Aggregates

(i) The Contractor shall furnish, in writing to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the scheduled commencement of concrete placement, the location of the sources where aggregate will be obtained in order that some may be inspected and tentatively accepted by the Contract Administrator. Changes in the source of aggregate supply during the course of the Contract shall not be permitted without notification in writing to and the expressed approval of the Contract Administrator.

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

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

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

(v) The Contractor shall submit to the Contract Administrator for review and approval recent test information on petrographic examination of aggregates for concrete, in accordance with CSA Standard Test Methods A23.2-15A. The purpose of the petrographic analysis is to ensure the aggregates provided are

of the highest quality for use in the production of concrete and will produce a durable overlay. An acceptable aggregate will have an excellent rating as Judged by an experienced petrographer, with a (weighted) petrographic number typically in the range of one hundred (100) to one hundred and twenty (120).The Contractor shall submit to the Contract Administrator for review and approval recent test information on resistance to degradation of large-size coarse aggregate by abrasion and impact in the Los Angeles Machine, in accordance with CSA Standard Test Method A23.2-16A.

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

(c) The Contractor shall submit to the Contract Administrator copies of all material quality control test results.

E11.4.4 Notification of Ready Mix Supplier

(a) The Contractor shall submit to the Contract Administrator the name and qualifications of the Ready Mix Concrete Supplier that he is proposing to use, at least ten (10) Business Days prior to the scheduled commencement of concrete placement. The Contract Administrator will verify the acceptability of the Supplier and the concrete mix design requirements. Acceptance of the Supplier and the concrete mix design(s) by the Contract Administrator does not relieve or reduce the responsibility of the Contractor or Supplier from the requirements of this Specification.

E11.4.5 Concrete Pour Sequence and Schedule

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to scheduled commencement of concrete placement, the proposed concrete placement schedule for all concrete placements of this Specification.

E11.5 Materials

E11.5.1 General

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

E11.5.2 Testing and Approval

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

(b) All materials shall be approved by the Contract Administrator at least seven (7) days before any construction is undertaken. If, in the opinion of the Contract Administrator, such materials in whole or in part, do not conform to the Specifications detailed herein or are found to be defective in manufacture or have become damaged in transit, storage, or handling operations, then such materials shall be rejected by the Contract Administrator and replaced by the Contractor at their own expense.

E11.5.3 Adhesive Agent

(a) Adhesive agent for bonding steel reinforcing or dowels to concrete shall conform to the requirements of ASTM C881, Type V, Grade 3, Class A, B and C, except linear shrinkage. An acceptable product would be Hilti Hit-RE 500 V3, or equivalent.

E11.5.4 Concrete Strength and Workability

(a) Structural Concrete

(i) Proportioning of fine aggregate, coarse aggregate, cement, water, and air-entraining agent shall be such as to yield concrete having the required strength and workability, as follows:

Concrete Type	Location	Exposure Class	Nominal Compressive Strength	Maximum Aggregate Size	Air Content Category	Special Requirements
1	Structural Approach Slabs, Bridge Deck Shear Keys, Delamination Repairs, and Headers	C-XL	50 MPa @ 56 days	10 mm	1	Synthetic Fibres Ri = 0.15
2	Roadway Slabs, Barrier, Planter, and Crash Attenuator Slab	C-1	35 MPa @ 28 days	20 mm	1	Synthetic Fibres Ri = 0.15

E11.5.5 Concrete Aggregate

(a) Fine Aggregate

(i) Fine aggregate shall consist of sand having clean, hard, strong, durable, uncoated grains; free from injurious amounts of dust, soft or flaking particles, shale, alkali, organic matter, load or other deleterious substance.

(ii) Fine aggregate shall be well-graded throughout and shall conform to the following gradation requirements:

Sieve Size	Percent of Total Dry Weight Passing Each Sieve
10 mm	100%
5 mm	95 – 100%
2.5 mm	80 – 100%
1.25 mm	50 – 90%
630 µm	25 – 65%
315 µm	10 – 35%
160 µm	2 – 10%
80 µm	0 – 3%

(b) Coarse Aggregate

(i) Coarse aggregate shall be clean and free from alkali, organic, or other deleterious matter, shall have an absorption not exceeding three percent (3%), and shall conform to the following gradation requirements per Type 1 or Type 2 requirements:

Sieve Size	Percent of Total Dry Weight Passing Each Sieve (20 mm Aggregate)	Percent of Total Dry Weight Passing Each Sieve (10 mm Aggregate)
28 mm	100%	–
20 mm	85 – 100%	–
14 mm	60 – 90%	100%
10 mm	25 – 60%	85 – 100%

5 mm	0 – 10%	10 – 30%
2.5 mm	0 – 5%	0 – 10%
1.25 mm	–	0 – 5%

E11.5.6 Cementitious Materials

(a) Cementitious materials shall conform to the requirements of CSA-A3001 and shall be free from lumps.

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

(c) Should the Contractor choose to include fly ash in the concrete mix design, the fly ash shall be Class CI or F and the substitution shall not exceed thirty percent (30%) by mass of cement.

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

E11.5.7 Water

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

E11.5.8 Admixtures

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

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

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

E11.5.9 Synthetic Fibres

(a) The synthetic fibres shall consist of one hundred percent (100%) virgin polypropylene as accepted by the Contract Administrator. The dosage shall be designed by the Contractor to meet the requirements for post-cracking residual strength index (Ri) and fibre dispersion in accordance to the CHBDC CSA-S6-19, Fibre-Reinforced Structures, Clause 16.6. Notwithstanding CHBDC Section 16, Clause 16.6, testing for post-cracking residual strength index (Ri) of concrete shall be completed in accordance with E11.4.3(a).

E11.5.10 Bonding Agents

(a) Latex Bonding Agent

(i) Latex bonding agents to bond new concrete to existing concrete shall conform to the requirements of ASTM C1059, Type II. Polyvinyl acetate-based latexes will not be permitted. An acceptable product would be SikaCem 810, or equivalent. An acceptable product for concrete greater than twenty-eight (28) days in age would be Planicrete AC by MAPEI, or equivalent.

(b) Epoxy Bonding Agent

(i) Epoxy bonding agents to bond new concrete to existing concrete shall be SikaTop Armatec-110 EpoCem, or equivalent as approved by the Contract Administrator, in accordance with B7.

E11.5.11 Bonding Grout

(a) For latex bonding grouts, the grout for bonding the new concrete to the existing concrete shall be mixed in accordance with manufacturer's specifications.

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

E11.5.12 Curing Compound

(a) Curing compounds shall be liquid membrane-forming and conform to the requirements of ASTM C309. Curing compounds shall be resin-based and white-pigmented. An acceptable product would be WR Meadows 1215 WHITE Pigmented Curing Compound, or other equivalent product as approved by the Contract Administrator, in accordance with B7 Substitutes.

E11.5.13 Curing Blankets

(a) Curing blankets for wet curing shall be one hundred percent (100%) polyester, 3 mm thick and white in colour. Alternately, a ten (10) ounces burlap, five (5) mil polyethylene, curing blanket white in colour shall be used. An acceptable product would be Curelap together with a second layer of burlap, or other equivalent product as approved by the Contract Administrator, in accordance with B7 Substitutes.

E11.5.14 Patching Mortar

(a) Patching mortar shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 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 or placing.

E11.5.15 Reinforcing Steel

(a) Reinforcing steel shall conform to the requirements of ASTM A1035 CS Grade 100 Low-Carbon Chromium Steel. An acceptable product would be ChromX 9100, or other equivalent product as approved by the Contract Administrator, in accordance with B7.

E11.5.16 Bar Accessories

(a) Bar accessories shall be of a type approved by the Contract Administrator. They shall be made from a non-rusting material, and shall not stain, blemish, or spall the concreted surface for the life of the concrete.

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

E11.5.17 Formwork

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

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

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

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

(e) No formwork accessories will be allowed to be left in place within 50 mm of the surface following form removal. Items to be left in place beyond 50 mm must be made

from a non-rusting material and shall not stain, blemish, or spall the concrete surface for the life of the concrete.

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

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

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

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

E11.5.18 Form Coating

(a) Form coating shall not stain the surface of the concrete.

E11.5.19 Permeable Formwork Liner

(a) Permeable formwork liner shall be a draining synthetic lining finished with two (2) different surfaces. The side in contact with the concrete shall be smooth and perform as a filter to prevent the leaching of fine cement particles when the formwork is in place. The other side shall be fibrous and act as a draining element to help evacuate the water and the excess air at the surface. An acceptable product would be Texel Drainaform. This formwork liner shall be used on all barrier repair types and transition barrier repairs.

E11.6 Equipment

E11.6.1 General

(a) All equipment shall be of a type accepted by the Contract Administrator. The equipment shall be kept in good working order, kept free from hardened concrete or foreign materials, and shall be cleaned at frequent intervals.

E11.6.2 Vibrators

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

(b) The Contractor shall use rubber coated vibrators for consolidating concrete containing epoxy-coated reinforcing steel.

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

E11.6.3 Supply of Structural Concrete

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

(b) All mixing of concrete must meet the provisions of CSA A23.1-19, Clause 5.2, Production of Concrete.

(c) Time of Hauling

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

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

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

(iv) Unless otherwise noted, no retarders shall be used.

(v) The concrete, when discharged from truck mixers or truck agitators, shall be of the consistency and workability required for the job without the use of additional mixing water.

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

(d) Delivery of Concrete

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

(e) Concrete Placement Schedule

(i) The Contractor shall submit to the Contract Administrator the proposed concrete placement schedule for all concrete placements for review and approval.

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

E11.6.4 Preparation for Concreting Against Hardened Concrete

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

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

(ii) All existing surfaces and exposed reinforcing steel are to be sandblasted to reveal a clean substrate and kept clean until concrete placement. Surface preparation type shall be to ICRI Guideline No. 310.2 CSP 6 (Medium Scarification). Sand-blasting or shot-blasting shall be followed by a high pressure water wash to remove all residues.

(iii) Immediately after the blasting is complete and before sign of flash rusting appears on the steel surface, all exposed bars are to be recoated with an approved epoxy coating.

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

E11.6.5 Placing Structural Concrete

(a) General

(i) The Contractor shall notify the Contract Administrator at least one (1) Working Day prior to concrete placement so that an adequate inspection may be made of formwork, shoring, reinforcement, deck joints, and related Works. No

concrete pour shall be scheduled without the prior written approval of the Contract Administrator.

(b) Placing Structural Concrete

(i) Placement of deck concrete shall not be permitted when the surface moisture evaporation exceeds 0.75 kg/m2/h. Fog misting is mandatory regardless of drying conditions. The Contractor shall use fog misting operations as accepted by the Contract Administrator.

(ii) The nomograph, Figure D1, Annex D of CSA Standard A23.1-19 shall be used to estimate surface moisture evaporation rates.

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

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

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

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

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

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

(ix) Concrete shall be placed as nearly as possible in its final position. Rakes or mechanical vibrators shall not be used to transport concrete. The maximum free drop of concrete into the forms shall not be greater than 1.5 m, otherwise rubber tubes or pouring ports spaced not more than 1.5 m vertically and 2.5 m horizontally shall be used. The Contractor shall obtain the Contract Administrator's acceptance, prior to pouring concrete, of all placing operations.

(x) All concrete, during and immediately after depositing, shall be consolidated by mechanical vibrators so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into the corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting or planes of weakness. Mechanical vibrators shall have a minimum frequency of seven thousand (7,000) revolutions per minute immersed.

(xi) Vibrators shall be inserted systematically into the concrete at intervals such that the zones of influence of the vibrator overlap (generally 300 to 900 mm). Apply the vibrator at any point until the concrete is sufficiently compacted (five (5) to fifteen (15) seconds), but not long enough for segregation to occur. The vibrators shall be inserted vertically and withdrawn out of the concrete slowly. Spare vibrators in good working condition shall be kept on the job site during all placing operations.

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

(xiii) Before any concrete is placed for the header and approach slabs, the Contractor shall demonstrate to the satisfaction of the Contract Administrator before each pour that all necessary adjustments have been made to provide the required slab thickness. This demonstration may be carried out by means of an attachment securely fastened to the finisher's strike-off machine and moving

the machine and the strike-off across the deck over the reinforcing steel with a minimum 3 mm clearance between the steel and attachment.

E11.6.6 Finishing of Concrete Surfaces

(a) Finishing Operations for Unformed Surfaces

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

(b) Type 1 Finish – Unformed Surfaces

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

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

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

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

(v) For riding surfaces, after final floating, the slab surface shall receive coarse transverse scored texture by drawing a steel tined broom uniformly across the slab surface, to the satisfaction of the Contract Administrator.

E11.7 Construction Methods

E11.7.1 Debris Containment

(a) The Contractor shall ensure that all debris including, but not limited to: concrete debris, concrete cutting fluids, formwork debris, and repair materials do not enter the waterway in any way including by the bridge or adjacent roadway drainage system.

E11.7.2 Construction Joints

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

(b) In lieu of forming shear keys at construction joints, the Contractor may roughen the surface as follows. The surface shall be rough, with minimum amplitude of 6 mm. Acceptable procedures to obtain this rough surface are as follows:

(i) By removing the mortar between the larger aggregate particles with a water jet and soft brush when the concrete is in a semi-hardened state (green-cut); and,

(ii) By first applying a chemical retarder to the surface and then removing mortar from the larger aggregate particles with a water jet and soft brush.

(c) The face of joints shall be cleaned of all laitance and dirt, after which the cementicious grout or an approved bonding agent shall be applied. Forms shall be retightened, and all reinforcing steel shall be thoroughly cleaned at the joint prior to concreting.

E11.7.3 General Curing

(a) Hot weather curing shall be in accordance with CSA A23.1, refer to (f) for hot weather curing requirements.

(b) Unformed concrete surfaces shall be covered and kept moist by means of wet polyester blankets for seven (7) consecutive days immediately following finishing operations or otherwise approved by the Contract Administrator and shall be maintained at above 10ºC for at least seven (7) consecutive days. Construction joints shall only be covered and kept saturated by means of wet polyester curing blankets for the curing period.

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

(d) 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.

(e) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3°C in any one hour period or 20ºC in any twenty-four (24) hour period.

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

E11.7.4 Form Removal

(a) All forms for concrete repairs shall remain in place for a minimum of three (3) days. The Contract Administrator must be notified at least twenty-four (24) hours prior to any form removal. The Contractor must receive approval from the Contract Administrator prior to beginning Work.

(b) The minimum strength of concrete and mortar in place for safe removal of soffit forms for horizontal or inclined members, as well as vertical forms shall be 20 MPa, with the added provisions that the member shall be of sufficient strength to carry safely its own weight, together with superimposed construction loads.

(c) Field-cured test specimens, representative of the in-place concrete being stripped, may be tested to verify the concrete strength.

E11.7.5 Patching of Formed Surfaces

(a) Immediately after forms have been removed, but before any repairing or surface finishing is started, the concrete surface shall be inspected by the Contract Administrator. Any repair or surface finishing started before this inspection may be rejected and required to be removed.

(b) All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purposes cut back fifty 50 mm from the surface before patching.

(c) Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, and voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched and then applying patching mortar. A slurry grout consisting of water and cement shall be thoroughly 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 adjacent 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.

(d) All objectionable fins, projections, offsets, streaks, or other surface imperfections shall be removed by approved means to the Contract Administrator's satisfaction. Cement washes of any kind shall not be used.

(e) Concrete shall be cast against forms that will produce plane surfaces with no bulges, indentations, or protuberances other than those shown on the Drawings. The arrangement of panel joints shall be kept to a minimum. Panels containing worn edges, patches, or other defects that will impair the texture of concrete surfaces shall not be used. All fins on the concrete surfaces shall be removed.

E11.7.6 Hot Weather Concreting

(a) General

(i) The requirements of this section shall be applied during hot weather; i.e., air temperatures above 25ºC during placing.

(ii) Concrete shall be placed at as low a temperature as possible, preferably below 15ºC, but not above 22ºC. Aggregate stockpiles may be cooled by watersprays and sunshades.

(iii) Ice may be substituted for a portion of the mixing water; providing it has melted by the time mixing is completed.

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

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

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

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

(viii) Curing shall follow immediately after the finishing operations.

(b) Hot-Weather Curing

(i) When the air temperature is at or above 25ºC, curing shall be accomplished by water spray or by using saturated absorptive fabric, in order to achieve cooling by evaporation.

(c) Job Preparation

(i) When the air temperature is at or above 25ºC, or when there is a probability of it rising to 25ºC during the placing period, facilities shall be provided for protection of the concrete in place from the effects of hot and/or drying weather conditions. Under severe drying conditions, as defined in CSA A23.1 the formwork, reinforcement, and concreting equipment shall be protected from the direct rays of the sun or cooled by fogging and evaporation.

(d) Concrete Temperature

(i) The temperature of the concrete as placed shall be as low as practicable and in no case greater than that shown below for the indicated size of the concrete section.

Thickness of Section (m)	**Temperatures, °C**	
	Minimum	Maximum
Less than 0.3	10	27
0.3 to 1.0	10	27
1.0 to 2.0	5	25

E11.7.7 Cleanup

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

E11.8 Measurement and Payment

E11.8.1 Bridge Structural Concrete

(a) Supplying and placing Concrete Type 1 for structural approach slabs, expansion joint blockouts, and concrete headers will be measured on a volume basis and paid for at the Contract Unit Price per cubic meter for "Supply and Place High Performance Concrete", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

(b) Supplying and placing Concrete Type 1 for typical delamination repairs will be measured and paid for as specified under section E14.

(c) Supplying and placing Concrete Type 2 for roadway slabs will be measured and paid for as specified under section E14.

(d) Supplying and placing Type 2 Concrete for barrier repairs, will be measured and paid for as specified under section E14.

(e) Supplying and placing Type 2 Concrete for planter repairs, will be measured and paid for as specified under section E14.

(f) Supplying and placing Type 2 Concrete for crash attenuator slabs, will be measured and paid for as specified under section E19.

E12. GIRDER CONCRETE REMOVALS

E12.1 Description

E12.1.1 This Specification shall cover all operations relating to the removal and disposal of concrete as specified herein and as shown on the Drawings. This Specification shall cover concrete removal Works, including all necessary staging, demolition, removal, salvaging, transporting, unloading, stockpiling, dismantlement, and disposal of applicable materials.

E12.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E12.2 Scope of Work

E12.2.1 The Work under this Specification shall include the removal and disposal of existing girder concrete to the limits as shown on the Drawings or as otherwise directed by the Contract Administrator.

E12.2.2 Provision of access platforms and work platforms.

E12.2.3 Removing concrete with appropriate equipment satisfactory to the Contract Administrator.

E12.2.4 Providing saw cuts where necessary to limit the extent of demolition.

E12.2.5 Repairing any over demolition and reinforcing damage to the satisfaction of the Contract Administrator.

E12.2.6 All concrete removal materials shall revert to the Contractor for off-site disposal.

E12.3 Submittals

E12.3.1 The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site, a proposed schedule, including methods and sequence of operations.

E12.4 Materials

E12.4.1 General

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

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

E12.5 Equipment

E12.5.1 General

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

E12.5.2 Demolition Access

(a) The Contractor shall provide all necessary access/work platforms to facilitate removals and associated inspections of all Works by the Contract Administrator.

(b) Access is to take place from the median lane on the bridge decks by means of an access platform. Access platforms are to be designed and sealed by an Engineer registered to practice in the Province of Manitoba.

(c) Any proposal to drill into the existing bridge structure to secure any platforms must be submitted in writing to the Contract Administrator for review and acceptance prior to proceeding with any Work.

E12.6 Construction Methods

E12.6.1 General

(a) Concrete shall be removed to the limits shown on the Drawings. Any unsound concrete detected beyond the removal extents depicted in the Drawings shall be reported to the Contract Administrator immediately. Removals beyond the limits shown on the Drawings shall only proceed as directed by and in the presence of the Contract Administrator. The Contractor shall field verify removal limits with sounding prior to demolition.

(b) The Contractor shall prevent movement, settlement, or damage of existing structures to remain, services, paving, trees, landscaping and adjacent grades. If the safety of the structure and/or existing structures or services appears to be endangered during structural removal operations, the Contractor shall cease operations and notify the Contract Administrator immediately.

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

(d) If any existing roadway is to be closed to traffic in no case shall the Contractor commence any construction operations until such time as all the signs, barricades, and flashers have been erected to the satisfaction of the Contract Administrator.

(e) Remove concrete and other removal items with appropriate equipment satisfactory to the Contract Administrator. Jackhammers heavier than nominal 14 kg class and chipping hammers heavier than nominal 7 kg class shall not be used. The Contractor shall take all necessary precautions to ensure that material does not fall into the water or onto sidewalks or pathways during removal operations.

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

(g) The Contractor shall only use methods of concrete removal that will not damage the existing structure to remain or new structures.

(h) Provide sawcuts where necessary to limit the extent of demolition.

(i) Repair any over demolition and reinforcing steel damage to the satisfaction of the Contract Administrator.

E12.6.2 Details of Existing Structure

(a) The applicable details and structure dimensions of the existing structures are shown on the Drawings for information only in establishing the methods and limits of Work.

(b) The accuracy of this information is not guaranteed and the Contractor must verify all information before commencing Work.

E12.6.3 Waste Handling and Disposal of Removed Materials

(a) Wherever practical, the Contractor shall recycle disposed materials.

(b) The Contractor shall promptly haul all removed materials indicated for disposal, off and away from the site. No storage of any materials on-site will be allowed without written approval from the Contract Administrator. It shall be the Contractor's responsibility to find suitable disposal areas away from the site.

E12.7 Quality Control

E12.7.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work.

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

E12.7.2 Access

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

E12.1 Measurement and Payment

E12.1.1 Girder Concrete Removals

(a) No separate measurement or payment shall be made for this Work. This Item of Work shall be included in the " Girder Concrete Repairs" Contract Unit Price as per Specification E13, Clause E13.6, which price shall be paid in full for supply of all materials and performing all operations herein described and all other items incidental to the Work.

E13. GIRDER CONCRETE REPAIRS

E13.1 Description

E13.1.1 The Work covered under this item shall include all operations relating to the construction of concrete repairs, as herein specified and shown on the Drawings. The specific locations and extents of repairs will be marked out by the Contract Administrator. Additional locations may be required as directed by the Contract Administrator.

E13.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E13.2 Scope of Work

(a) Construction of girder concrete repairs as shown on the Drawings, including the following Work:
  (i) Work Platforms
  (ii) Concrete Removals
  (iii) Concrete Repairs

(b) Quality Control and Quality Assurance testing, including retention of a third-party testing company, acceptable to the Contract Administrator, retained and paid for by the Contractor. Quality Control testing shall be undertaken by the Contractor.

E13.3 Materials

E13.3.1 General

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

E13.3.2 Handling and Storage of Materials

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

E13.3.3 Testing and Approval

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

(b) All materials shall be approved by the Contract Administrator at least seven (7) days before any construction is undertaken. If, in the opinion of the Contract Administrator, such materials in whole or in part, do not conform to the Specifications detailed herein or are found to be defective in manufacture or have become damaged in transit, storage, or handling operations, then such materials shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E13.3.4 Bonding Agents

(a) Latex Bonding Agent
  (i) Latex bonding agent shall be SikaCem 810, or equal as approved by the Contract Administrator.

(b) Bonding Grout
  (i) Grout for bonding new concrete to existing concrete, if used, may consist of the following constituents by weight:
    - 1 part water;
    - 1 part latex bonding agent; and
    - 1 ½ parts Type GUSF Portland Cement
  (ii) The consistency of the bonding grout shall be such that it can be brushed on the existing concrete surface in a thin, even coating that will not run or puddle in low spots.

E13.3.5 Curing Compound

(a) If permitted for use, curing compound shall be liquid membrane-forming and conform to the requirements of ASTM Standard C309 and the proposed standard ASTM P198. Rate of application shall be 1.5 times the rate required to meet the requirements of ASTM P198 for the texture of concrete to which the curing compound is being applied.

(b) Curing compounds shall be resin-based and white-pigmented.

E13.3.6 Patching Mortar for Minor Surface Defects

(a) The use of patching mortar shall be limited to patching minor new surface defects as directed by the Contract Administrator. Patching Mortar is not to be used for general concrete repairs.

(b) 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 1 part cement to 2 parts sand by damp loose volume. White Portland Cement shall be substituted for a part of the grey Portland Cement on exposed concrete in order to produce a colour matching the colour of the surrounding concrete, as determined by a trial patch. The quantity of mixing water shall be no more than necessary for handling and placing.

E13.3.7 Formwork

(a) Formwork materials shall conform to CSA Standard CAN/CSA-A23.1, and American Concrete Publication SP:4, “Formwork for Concrete”.

(b) No “stay-in-place” formwork or falsework is permitted.

(c) Form sheeting plywood to be covered with form liner or to be directly in contact with soil shall be exterior Douglas Fir, concrete form grade, conforming to CSA Standard O121-M1978, a minimum of 20 mm thick.

(d) Where form liner is not being used, form sheeting shall be Douglas Dir, overlay form liner type conforming to CSA Standard O121-M1978. Approved manufacturers are “Evans” and “C-Z”.

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

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

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

(h) Studding shall be spruce or pine and shall have such dimensions and spacing that they shall withstand distortion from all the forces to which the forms will be subjected. Minimum dimensions shall be 50 mm x 150 mm.

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

(j) All forms are incidental to these Works and must be removed by the Contractor once adequate strength and curing of the concrete has been achieved.

E13.3.8 Stainless Steel Welded Wire Mesh

(a) All stainless steel welded wire mesh shall conform to the requirements of AISI 304. If, in the opinion of the Contract Administrator, any mesh provided for the concrete works exhibits flaws in manufacture or fabrication, such material shall be immediately removed from the Site and replaced with acceptable mesh.

E13.3.9 Adhesive Anchors

(a) Anchors shall be of a type approved by the Contract Administrator. They shall be made from stainless steel and shall not stain, blemish, or spall the concreted surface for the life of the concrete.

(b) Anchor accessories shall include wire ties, wire (18 gauge minimum), or other similar devices that may be approved by the Contract Administrator.

(c) Adhesive shall be epoxy two-part injectable, acceptable product is Hilti RE500, or as accepted by the Contract Administrator.

E13.3.10 Patching Grout

(a) Concrete repair material shall be compatible with the concrete substrate and the Contractor's method of placement. The Contractor shall use MasterEmaco S440MC low shrink high early strength concrete grout or equivalent, subject to the approval of the Contract Administrator.

(b) Repair mortars must also meet the following special requirement to ensure compatible behaviour with the corrosion control system:

28-day moist cured electrical resistivity less than 50,000 ohm-cm

(c) The workability of the repair mortar shall be consistent with the Contractor's placement operations.

(d) Any proposed proprietary repair mortar shall be subject to the approval of the Contract Administrator.

E13.3.11 Miscellaneous Materials

(a) The Contractor shall supply all materials, as approved by the Contract Administrator, to ensure the satisfactory completion of the concrete works.

E13.4 Equipment

E13.4.1 General

(a) All equipment shall be of a type accepted by the Contract Administrator. The equipment shall be in good working order, kept free from hardened concrete or foreign materials, and shall be cleaned at frequent intervals.

(b) The Contractor shall have sufficient standby equipment available on short notice at all times.

E13.4.2 Miscellaneous Equipment

(a) The Contractor shall provide all miscellaneous equipment as required to properly and thoroughly execute and complete all operations related to the supply and placement of concrete.

E13.5 Construction Methods

E13.5.1 General

(a) The Contractor shall form and use pressure grout application methods for all types of concrete repairs as shown on the Drawings. Other methods shall be subject to the approval of the Contract Administrator.

E13.5.2 Preparation for Concreting Against Hardened Concrete

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

(i) Following the completion of concrete removals, all surfaces at the cold joint interface including concrete and exposed reinforcing steel are to be sandblasted to the requirements of SSPC-SP6/NACE No. 3 Commercial Blast Cleaning to reveal a clean substrate and kept clean until concrete placement. Sandblasting shall be followed by a high pressure water wash to remove all residues.

E13.5.3 Formwork and Shoring

(a) Formwork shall be designed, erected, braced, and maintained to safely support all vertical and lateral loads until such loads can be supported by the concrete.

(b) As a maximum, the following spacings shall apply, for studding and whaling:

(i) 20 mm plywood: studding – 450 mm centre to centre

(ii) Walers – 760 mm centre to centre

(c) Forms shall be clean before use. Plywood and other wood surfaces shall be sealed against adsorption of moisture from the concrete by a field-applied form coating or a factory-applied liner.

(d) Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be a commercially manufactured type. The portion remaining within the concrete shall leave no metal within 50 mm of the surface when the concrete is exposed to view. Spreader cones on ties shall not exceed 25 mm in diameter.

(e) All exposed edges shall be chamfered 25 mm unless otherwise noted on the Drawings.

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

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

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

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

(j) The loads and lateral pressures outlined in Part 3, Section 102 of “Recommended Practice for Concrete Formwork” (ACI 347) and wind loads as specified by the National Building Code shall be used for design. Additional design considerations concerning factors of safety for formwork elements and allowable settlements outlined in Section 103 of the above reference shall apply.

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

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

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

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

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

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

(q) All form lumber, studding, etc. becomes the property of the Contractor when the Work is finished, and it shall be removed from the concrete and the Site by the Contractor after the concrete is set, free of extra charge, and the entire Site left in a neat and clean condition.

E13.5.4 Bonding New Concrete to Existing Concrete

(a) The Contractor is responsible to create a bond between the new mortar/grout and the existing substrates. This may be done by either the application of a suitable bonding agent or grout or by using a self-bonding mortar or concrete. The Contract Administrator will check all repaired areas for bond using a hammer “sounding” method after form removal. Place mortar or concrete by trowelling, pumping, or into forms ensuring that all entrapped air is removed.

(b) Should a bonding grout be used, it shall be applied immediately before concrete placement. It shall be thoroughly brushed onto the existing hardened concrete surface in a thin and even coating that will not puddle.

E13.5.5 General Curing

(a) The use of curing compound will not be allowed on concrete areas that are to receive additional concrete or waterproofing.

(b) Unformed concrete surfaces shall be covered and kept moist by means of wet polyester blankets for seven (7) consecutive days immediately following finishing operations or otherwise approved by the Contract Administrator and shall be maintained at above 10^{o}C for at least seven (7) consecutive days thereafter. Construction joints shall only be covered and kept saturated by means of wet polyester curing blankets for the curing period.

(c) If permitted for use, curing compounds shall be applied at the rate of not less than 4 m^2/L. The compound must be applied uniformly and by roller. Spraying of the compound will not be permitted.

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

(e) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3^{o} in any one hour period or 20^{o} in any twenty-four hour period.

(f) Formed surfaces shall receive, immediately after stripping and patching, the same application of curing compound as finished surfaces.

(g) After completing the finishing of unformed surfaces, where curing compound is not permitted, the surfaces shall be promptly covered with a minimum of a single layer of clean, damp polyester curing blanket and 6 mil polyethylene.

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

E13.5.6 Form Removal

(a) All forms shall remain in place for a minimum of seven (7) days. The Contract Administrator must be notified at least 24 hours prior to any form removal. The Contractor must receive approval from the Contract Administrator prior to beginning Work.

(b) Field-cured test specimens, representative of the in-place concrete being stripped, may be tested to verify the concrete strength

E13.5.7 Patching of Formed Surfaces

(a) Immediately after forms have been removed, but before any repairing or surface finishing is started, the concrete surface shall be inspected by the Contract Administrator. Any repair or surface finishing started before this inspection may be rejected and required to be removed.

(b) All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purposes cut back fifty (50) mm from the surface before patching.

(c) Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, and voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched and then applying patching mortar. A slurry grout consisting of water and cement shall be thoroughly 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 adjacent surface and left for one 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.

(d) All objectionable fins, projections, offsets, streaks, or other surface imperfections shall be removed by approved means to the Contract Administrator's satisfaction. Cement washes of any kind shall not be used.

(e) Concrete shall be cast against forms that will produce plane surfaces with no bulges, indentations, or protuberances other than those shown on the Drawings. The arrangement of panel joints shall be kept to a minimum. Panels containing worn edges, patches, or other defects that will impair the texture of concrete surfaces shall not be used. All fins on the concrete surfaces shall be removed.

E13.5.8 Cold Weather Concreting

(a) The requirements of CSA Standard A23.1-19 shall be applied to all concreting operations during cold weather.

(b) Protection of concrete shall be considered incidental to its placement. 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 completion for the curing period will not be accepted for payment.

E13.5.9 Clean Up

(a) The Contractor shall maintain the Sites of Work in a tidy condition and free from the accumulation of waste and debris to the satisfaction of the Contract Administrator.

E13.6 Measurement and Payment

E13.6.1 Girder Concrete repairs will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Girder Concrete Repairs", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E14. CONCRETE REPAIRS

E14.1 Description

E14.1.1 This Specification shall cover all concrete repairs to the planters, barriers, roadway slabs, and typical delamination, as required.

E14.1.2 The Work to be done under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E14.2 References

E14.2.1 E11 – Structural Concrete.

E14.3 Scope of Work

E14.3.1 The Work under this Specification shall involve the preparation and repair of concrete and reinforcing steel for:

(a) Supplying and placing structural concrete for precast planters;

(b) Supplying and placing structural concrete for cast-in-place barriers:

(c) Supply and placing structural concrete for roadway slab repairs; and

(d) Supplying and placing structural concrete for typical delamination repairs.

E14.4 Materials

E14.4.1 General

(a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in the Specification. All materials shall be new and within the recommended shelf-life, as approved by the Contract Administrator.

E14.4.2 Testing and Approval

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

(b) All materials shall be accepted by the Contract Administrator at least five (5) 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 material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E14.4.3 Material for Concrete Repair

(a) Structural Concrete

(i) The Contractor shall be responsible for supplying Concrete as per Specification E11 – Structural Concrete.

(b) Embedded Galvanic Anodes

(i) Zinc anodes shall be Galvashield XPT-Type, see E19, available from Vector Corrosion Technologies, or equal as accepted by the Contract Administrator, in Accordance with B7. Embedded galvanic anodes shall be pre- manufactured 60g of zinc in compliance with ASTM B6 Special High Grade cast around a pair of steel tie wires in compliance with bright annealed ASTM A82 and encased in a highly alkaline cementitious shell with a pH of 14 or greater. The cementitious shell shall contain no added sulphate nor shall it contain chloride, bromide or other constituents that are corrosive to reinforcing steel. Anode units shall be supplied with integral unspliced wires with loop ties for tying to the reinforcing steel. Should the Contractor choose to use Concrete Type 1 with anodes, the Contractor shall demonstrate that the saturated bulk resistivity tested per ASTM C1876 – 19 meets the requirements of the anode supplier and the results shall be submitted and accepted by the Contract Administrator before placing concrete.

E14.4.4 Formwork

(a) Formwork and form removal shall be as per section E11.

E14.4.5 Curing

(a) All cementitious patches shall be wet cured for seven (7) Calendar Days unless otherwise approved by the Contract Administrator as per E11.7.3.

E14.4.6 Quality Control

(a) All workmanship and materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator, including all operations from the selection and production of materials through to final acceptance of the specified Work. The Contractor shall be wholly responsible for the control of all operations incidental hereto notwithstanding any inspection or acceptance 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.

E14.5 Equipment

E14.5.1 All equipment shall be of a type approved by the Contract Administrator and shall be kept in good working order.

E14.6 Construction Methods

E14.6.1 General

(a) The Contractor shall ensure that existing concrete to remain is not damaged.

(b) The Contractor shall ensure materials and existing bridge components to remain, such as railing, internal railing hardware, and reinforcing, shall not be damaged.

(c) Repair or replacement of existing reinforcement, splicing and doweling in replacement reinforcement, and repair or replacement of planter reinforcing bars are incidental to the barrier repair work.

(d) All existing concrete surfaces and exposed reinforcing steel to be surface prepared in accordance with section E11, specifically E11.6.4.

E14.6.2 Debris and Cleanup

(a) The Contractor shall be required to pick up and remove from the Site all debris created by the repair procedures to the satisfaction of the Contract Administrator.

E14.6.3 Preparation

(a) All corroded steel shall be sand blasted to remove all corrosion signs.

(b) Install embedded galvanic anodes in accordance with the drawings and E19.

E14.6.4 Barrier Repairs

(a) Removals in accordance with E10.9.5.

(b) Clean reinforcing steel to remove rust and contaminants.

(c) Install reinforcing steel bars into predrilled holes and place reinforcing steel bars to splice onto damaged bars as follows:

(i) Drill holes into barrier concrete of the diameters and depths shown on the Drawings. Drill bits shall have a diameter as per manufacturers requirements for installation of the reinforcing steel bars;

(ii) Holes shall be located to the correct depth and alignment as indicated on the Drawings;

(iii) Drilling equipment shall be operated so as to ensure that no damage to the concrete results from such drilling operation. Coring of holes is not permitted. In the event that existing reinforcing steel bars are hit during the drilling operations, that hole shall be abandoned and a new hole shall be drilled nearby to the correct depth. All abandoned holes shall be filled with non-shrink grout or approved adhesive agent;

(iv) Holes for reinforcing steel bars shall be blown clean with compressed air. An approved adhesive agent such as Hilti HIT-RE 500-V3 or equivalent as approved by the Contract Administrator shall be placed in the back of the drilling hole. The reinforcing bars shall be worked back into the holes for complete coverage around the portion of the bar that extends into the hole, such that adhesive agent is squeezed from the hole. The adhesive agent shall be suitable for horizontal, vertical or overhead doweling application as required and shall be carried out per the Manufacturer’s recommendations;

(v) Install reinforcing steel bars as shown on the Drawings; and

(vi) Once all reinforcing steel is in position, it shall be inspected and approved by the Contract Administrator before any new concrete is placed. Otherwise, the concrete may be rejected by the Contract Administrator and shall be removed by the Contractor at his/her own expense.

(d) Install galvanic anodes according to E19 and as per manufacturer’s recommendations and as shown on the Drawings.

(e) Clean existing concrete surfaces that will be in contact with the repair mortar to remove all deleterious substances.

(f) The Contractor is responsible to create a bond between the new mortar and the existing substrates. The Contract Administrator will check all repaired areas for bond using a hammer “sounding” method after form removal.

(g) Apply bonding grout or epoxy bonding agent to all existing concrete surfaces that will be in contact with the repair concrete.

(h) Cure in accordance with E11.7.3

E14.6.5 Precast Planter Repairs

(a) Removals in accordance with E10.9.5.

(b) Install reinforcing steel bars into predrilled holes and place reinforcing steel bars as follows:

(i) Drill holes into planter concrete of the diameters and depths shown on the Drawings. Drill bits shall have a diameter as per manufacturers requirements for installation of the reinforcing steel bars;

(ii) Holes shall be located to the correct depth and alignment as indicated on the Drawings;

(iii) Drilling equipment shall be operated so as to ensure that no damage to the concrete results from such drilling operation. Coring of holes is not permitted. In the event that existing reinforcing steel bars are hit during the drilling operations, that hole shall be abandoned and a new hole shall be drilled nearby to the correct depth. All abandoned holes shall be filled with non-shrink grout or approved adhesive agent;

(iv) Holes for reinforcing steel bars shall be blown clean with compressed air. An approved adhesive agent such as Hilti HIT-RE 500-V3 or equivalent as approved by the Contract Administrator shall be placed in the back of the drilling hole. The reinforcing bars shall be worked back into the holes for complete coverage around the portion of the bar that extends into the hole, such that adhesive agent is squeezed from the hole. The adhesive agent shall be suitable for horizontal, vertical or overhead doweling application as required and shall be carried out per the Manufacturer’s recommendations;

(v) Install reinforcing steel bars as shown on the Drawings; and

(vi) Once all reinforcing steel is in position, it shall be inspected and approved by the Contract Administrator before any new concrete is placed. Otherwise, the concrete may be rejected by the Contract Administrator and shall be removed by the Contractor at his/her own expense.

(c) Install galvanic anodes according to E19 and as per manufacturer’s recommendations and as shown on the Drawings.

(d) Clean existing concrete surfaces that will be in contact with the repair mortar to remove all deleterious substances.

(e) The Contractor is responsible to create a bond between the new mortar and the existing substrates. The Contract Administrator will check all repaired areas for bond using a hammer “sounding” method after form removal.

(f) Apply bonding grout or epoxy bonding agent to all existing concrete surfaces that will be in contact with the repair concrete.

(g) Cure in accordance with E11.7.3.

E14.6.6 Roadway Slab Repairs

(a) Removals in accordance with E10.9.6.

(b) Where reinforcing steel is encountered, clean reinforcing steel to remove rust and contaminants.

(c) Install galvanic anodes as per manufacturer’s recommendations and as shown on the Drawings.

(d) Clean existing concrete surfaces that will be in contact with the repair mortar to remove all deleterious substances.

(e) The Contractor is responsible to create a bond between the new mortar and the existing substrates. The Contract Administrator will check all repaired areas for bond using a hammer “sounding” method after form removal.

(f) Apply bonding grout or epoxy bonding agent to all existing concrete surfaces that will be in contact with the repair mortar.

(g) Cure in accordance with E11.7.3.

(h) Reconstruction of barrier curbs and safety shape curbs within the limits of the roadway slab repairs shall be considered incidental to “Roadway Slab Repairs”, and no separate measurement or payment will be made for this Work.

E14.6.7 Form Removal

(a) All forms shall remain in place for a minimum of three (3) Calendar Days with wet cure continued for four (4) Calendar Days for a total of seven (7) Calendar Days of wet curing from the time of concrete placement. The Contract Administrator must be notified at least twenty-four (24) hours prior to any form removal. The Contractor must receive approval from the Contract Administrator prior to beginning Work.

E14.6.8 Typical Delamination Repairs

(a) Removals in accordance with E10.9.7.

(b) If reinforcement is exposed, install zinc anodes, wired to the reinforcing steel, in accordance with the Manufacturer’s instructions, around the perimeter of the patch area at a spacing of 350 mm in locations as approved by the Contract Administrator.

(c) The anode units and repair material should be installed immediately following preparation and cleaning of the steel reinforcement. Securely fasten the anode units from the side or beneath the exposed rebar as close as practical to the surrounding concrete (preferably within 100 mm) while ensuring that enough space remains to fully encapsulate the unit in the repair.

(d) The minimum cover of the repair material over the galvanic anodes shall be 20 mm.

(e) Anode-to-steel continuity and steel-to-steel continuity within the patch should be verified with an appropriate meter; discontinuous steel should be tied to continuous bars using steel tie wire and re-tested. A value between 0 and 1 ohm should be achieved.

(f) The Contractor is responsible to create a bond between the new mortar/concrete and the existing substrates.

(g) Repair areas shall be filled with Structural Concrete as per specification E11 – Structural Concrete.

(h) The Contract Administrator shall inspect all repaired areas for bond using a hammer “sounding” method following cure.

(i) Cure in accordance with E11.7.3.

E14.7 Measurement and Payment

E14.7.1 General

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

E14.7.2 Barrier Repairs

(a) The Barrier Repairs will be measured on an area basis and paid for at the Contract Unit Price per vertical square meter for “Barrier Repairs”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E14.7.3 Precast Planter Repairs

(a) The Precast Planter Repairs will be measured on an area basis and paid for at the Contract Unit Price per vertical square meter for “Precast Planter Repairs”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E14.7.4 Roadway Slab Repairs

(a) The Roadway Slab Repairs will be measured on an area basis and paid for at the Contract Unit Price per square meter for “Roadway Slab Repairs”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E14.7.5 Typical Delamination Repairs

(a) The Type 1 delamination repairs on the bridge deck and structural approach slabs will be measured on an area basis and paid for at the Contract Unit Price per square meter for “Type 1 Typical Delamination Repairs”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

(b) The Type 2 delamination repairs on the bridge deck and structural approach slabs will be measured on an area basis and paid for at the Contract Unit Price per square meter for “Type 2 Typical Delamination Repairs”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

(c) Type 3 The delamination repairs on the bridge deck and structural approach slabs will be measured on an area basis and paid for at the Contract Unit Price per square meter for “Type 3 Typical Delamination Repairs”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E15. REMOVAL OF ASPHALT

E15.1 Description

E15.1.1 This Specification shall cover all operations relating to the supply of labour, equipment, tools and material necessary to remove the existing asphalt to the depths and at the locations noted in the Drawings and as specified herein.

E15.2 References

E15.2.1 The latest edition and subsequent revisions of the following:

(a) CW 3450-R6 – Planing of Pavement

E15.3 Scope of Work

E15.3.1 Further to CW 3450-R6, the Contractor shall remove the asphalt to near the top of the existing waterproofing membrane and shall not damage the membrane at the locations noted on the Drawings.

E15.3.2 Further to CW 3450-R6, the Contractor shall remove the top 50 mm of the existing asphalt at the mill and fill locations noted on the Drawings.

E15.3.3 Transverse wick drains adjacent to concrete blockouts shall be fully removed and disposed of. Longitudinal wick drains to remain.

E15.3.4 Any damages to the waterproofing membrane shall be repaired by the Contractor to the satisfaction of the Contract Administrator. The City is not responsible for the cost of any waterproofing membrane repair.

E15.4 Measurement and Payment

E15.4.1 Measurement and payment for asphalt removals shall be accordance with Section 4.1 of CW 3450-R6.

E16. CONSTRUCTION OF ASPHALTIC CONCRETE PAVEMENTS

E16.1 Description

E16.1.1 This Specification shall cover all construction of asphaltic concrete pavements as required.

E16.1.2 The Work to be done under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E16.2 References

E16.2.1 The latest edition and subsequent revisions of the following:

(a) ASTM E-950 – Standard Test Method for Measuring the Longitudinal Profile of Traveled Surface with an Accelerometer-Established Inertial Profiling Reference.

(b) Special Provision – Asphalt Pavement Works

E16.3 Scope of Work

E16.3.1 Further to Appendix A, Special Provision – Asphalt Pavement Works, the Contractor shall apply separate layers of nominal 50 mm and 65 mm of asphalt in accordance with the joint pattern specified herein except as noted in the Drawings.

E16.3.2 Both layers shall be MS1 mix.

E16.4 Testing

E16.4.1 Testing of asphaltic concrete pavement shall be carried out per the Special Provision – Asphalt Pavement Works.

E16.4.2 Notwithstanding E16.4.1, sampling of asphalt by means of coring is not permitted for determining the density of in place asphalt.

E16.5 General

E16.5.1 Remove surplus material from surface of previously laid strip.

E16.5.2 Do not deposit on surface of freshly laid strip.

E16.5.3 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated on the Drawings.

E16.5.4 Only static rolling will be allowed on the bridge. Contractor is responsible for the level of the rolling effort to ensure densities are meeting the Special Provisions – Asphalt Pavement Works. Contractor to carry out intermittent density testing as required.

E16.5.5 The bottom lift should be given an adequate time to cool as to provide a firm surface for the rolling of the top lift.

E16.6 Transverse Joints

E16.6.1 Offset transverse joint in succeeding lifts by at least 600 mm.

E16.6.2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.

E16.6.3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

E16.7 Longitudinal Joints

E16.7.1 Offset longitudinal joints in succeeding lifts by at least 150 mm.

E16.7.2 If adjacent lanes of traffic are closed simultaneously, asphalt shall be placed with no longitudinal joint between the lanes.

E16.7.3 No longitudinal joint shall be permitted between two adjacent traffic lanes when both lanes of traffic are closed simultaneously, unless otherwise approved by the Contract Administrator.

E16.7.4 Cold joint is defined as joint where asphalt mix is placed, compacted, and left to cool below 100°C prior to paving of adjacent lane.

E16.7.5 If cold joint cannot be avoided, cut back by saw-cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane. Saw-cut shall not damage waterproofing membrane.

E16.7.6 Overlap previously laid strip with spreader by 25 to 50 mm.

E16.7.7 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.

E16.7.8 Roll longitudinal joints directly behind paving operation.

E16.7.9 When rolling with static rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

E16.8 Warranty Period

E16.8.1 Asphalt Warranty Defect Repairs During Warranty Period

(a) Contractor to carry out necessary asphalt pavement repairs at the end of the two-year warranty period following asphalt placement as directed by the Contract Administrator.

(b) Asphalt repairs may require milling of the asphalt lift and placement of new asphalt to correct the defect to the satisfaction of the Contract Administrator. Localized asphalt patching shall not be considered to be an acceptable form of repair.

(c) All necessary traffic control, material, labor, and equipment to complete the warranty asphalt pavement repairs shall be considered incidental to the work.

(d) All materials failing to meet the Specification requirements within the two year warranty period shall be replaced by the Contractor.

(e) Failure of the asphalt wearing surface within the two year warranty period shall include:

(i) Rutting or vertical depression of the asphalt more than 5 mm in any area when measured with a 3 m long straight edge.

(ii) Any potholes or areas of loss of bond, regardless of dimension or depth.

(iii) Opening of longitudinal joints more than 10 mm wide.

(iv) Rippling or vertical protrusion of the asphalt more than 5 mm in any area when measured with a 3 m long straight edge.

(v) Raveling that has progressed to shallow disintegration of the pavement with an open texture appearance.

(vi) Flushing, or the migration of asphalt upwards, that has progressed to distinctive colouring of the pavement surface with excess asphalt free on the pavement surface.

(f) The Contract Administrator shall inspect the asphalt surface in the presence of the Contractor. The Contractor shall arrange for and pay for any required traffic control to conduct the inspection. The Contract Administrator shall provide instructions to the Contractor for the areas of asphalt to be repaired based on this inspection. The direction provided by the Contractor Administrator shall be considered final.

(g) The Contractor shall provide asphalt repair methodologies for review and final approval by the Contract Administrator. The Contractor Administrator's decision on acceptance or rejection of the repair method(s) shall be considered final.

E16.9 Measurement and Payment

E16.9.1 The Construction of Asphaltic Concrete Pavements will be measured by weight and paid for at the Contract Unit Price per tonne for "Construction of Asphalt Concrete Overlay", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E16.9.2 The completion of Asphalt Warranty Defect Repairs During Warranty Period shall be considered incidental to the Work and no separate payment shall be made.

E17. VERIFICATION OF WEIGHTS

E17.1 All material which is paid for on a weight basis shall be weighed on a scale certified by Consumer and Corporate Affairs, Canada.

E17.2 All weight tickets shall have the gross weight and the time and date of weighing printed by an approved electro/mechanical printer coupled to the scale.

E17.3 The tare weight and net weight may either be hand written or machine printed. All weights, scales and procedures shall be subject to inspection and verification by the Contract Administrator. Such inspection and verification may include, but shall not be limited to:

E17.3.1 Checking Contractor's scales for Consumer and Corporate Affairs certification seals;

E17.3.2 Observing weighing procedures;

E17.3.3 Random checking of either gross or tare weights by having such trucks or truck/trailer(s) combinations as the Contract Administrator shall select weighed at the nearest available certified scale; and

E17.3.4 Checking tare weights shown on delivery tickets against a current tare.

E17.4 No charge shall be made to the City for any delays or loss of production caused by such inspection and verification.

E17.5 The Contractor shall ensure that each truck or truck/trailer(s) combination delivering material which is paid for on a weight basis carries a tare not more than one (1) month old.

E17.6 The tare shall be obtained by weighing the truck or truck/trailer(s) combination on a certified scale and shall show:

E17.6.1 Upon which scale the truck or truck/trailer(s) combination was weighed;

E17.6.2 The mechanically printed tare weight;

E17.6.3 The license number(s) of the truck and trailer(s); and

E17.6.4 The time and date of weighing.

E17.7 Measurement and Payment

E17.7.1 No separate measurement or payment will be made for performing all operations herein described and all other items incidental to the Work described.

E17.7.2 Verification of Weights will not be measured and is considered incidental to Construction of Asphaltic Concrete Pavements.

E18. JOINT RENEWALS

E18.1 Description

E18.1.1 This Specification covers all items related to the supply and installation of the roadway slab joint renewals, as applicable.

E18.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E18.2 Scope of Work

E18.2.1 The Scope of Work under this Specification shall involve:

(a) Replacing deteriorated roadway seals.

E18.3 Referenced Specifications and Drawings

E18.3.1 The latest edition and subsequent revisions of the following:

(a) ASTM C711 – Standard Test Method for Low-Temperature Flexibility and Tenacity of One-Part, Elastomeric, Solvent-Release Type Sealants; and,

(b) ASTM G155 – Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

E18.4 Materials

E18.4.1 General

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

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

E18.4.2 Precompressed Foam Joint Filler

(a) Joint seal shall be precompressed foam joint filler and conform to the requirements of ASTM C711 and ASTM G155. An acceptable product would be EMSEAL BEJS Sticks, or equivalent as approved by the Contract Administrator.

(b) The seal width shall be as indicated on the Drawings.

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

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

(ii) Field-applied epoxy adhesive primer; and

(iii) Field-injected silicone sealant bands.

(d) Impregnation agent to have proven non-migratory characteristics. Silicone coating to be highway-grade, low-modulus, fuel resistant silicone applied to the impregnated foam sealant at a width greater than maximum allowable joint extension and which when cured and compressed will form a bellows. Depth of seal as recommended by

manufacturer. Bridge expansion joint system (BEJS) stick to be installed into manufacturer's standard field-applied epoxy adhesive.

(e) Material shall be capable, as a dual seal, of movements of plus fifty percent (+50%) to minus fifty percent (-50%) (one hundred percent (100%) total) of nominal material size. Changes in plane and direction shall be executed in accordance with manufacturer recommendations. Transitions shall be warranted to be watertight at inside and outside corners through the full movement capabilities of the product.

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

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

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

E18.4.3 Low Density Polyethylene Foam

(a) Low density polyethylene foam shall be supplied and installed to the thicknesses and extents shown on the Drawings. The maximum density of polyethylene foam shall be 30 kg•m^3. An acceptable product would be Ethafoam^{TM} 180, or equivalent as approved by the Contract Administrator.

E18.5 Construction Methods

E18.5.1 Removals and Cutting

(a) Remove the existing joint seals where replacement is indicated on the Drawings.

(b) Saw-cut the roadway slabs and as shown on the Drawings.

(c) Clean all concrete surfaces as required by the seal manufacturer's installation instructions.

E18.5.2 Foam Installation

(a) Install the low density polyethylene foam in accordance with the manufacturer's recommendations.

E18.5.3 Seal Installation

(a) Install the precompressed foam joint filler in accordance with the manufacturer's recommendations.

E18.6 Measurement and Payment

E18.6.1 Joint Renewals will be measured on a lineal basis and will be paid for at the Contract Unit Price per linear meter for "Joint Renewals", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E19. CRASH ATTENUATOR SLAB RENEWAL

E19.1 Description

E19.1.1 This Specification covers all items related to the renewal of the crash attenuator slabs as indicated in the Drawings.

E19.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all

things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E19.2 Referenced Specifications and Drawings

E19.2.1 The latest edition and subsequent revisions of the following:

(a) CW 3230 – Full-Depth Patching of Existing Pavement Slabs and Joints.

(b) E11 – Structural Concrete.

(c) ASTM D4216 – Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) and Related PCV and Chlorinated Poly(Vinyl Chloride) (CPVC) Building Products Compounds.

E19.3 Scope of Work

E19.3.1 Coordinate with the City of Winnipeg for timing for the City to remove the existing barrier system (GREAT unit) and for the City to remove from site.

E19.3.2 Disassemble and salvage existing aluminum balance barrier to extents required to complete proposed work.

E19.3.3 Demolition of existing crash cushion support slab and median and reinstate with new concrete road slabs. New slab to be placed flush with adjacent pavements with installed tie-bars to adjacent pavements per standard City of Winnipeg details.

E19.3.4 Reinstate transverse pavement expansion joints as noted, including reinstating portion of joints in curbs.

E19.3.5 Pour new crash cushion support slab flush with adjacent pavements, including anchor block, and monolithically with a 75 mm rounded bullnose curb and median. Rounded “mountable” bullnose curb to be similar to City of Winnipeg SD-202A. Rounded bullnose curb to transition back to existing curb.

E19.3.6 Anchor block dimensions to be in accordance with Quadguard M10 with tension strut backup drawing QGMTSCVR-U by Valtir.

E19.3.7 City of Winnipeg to supply and install new Quadguard M10.

E19.3.8 Restore pavers/banding on median behind Quadguard M10.

E19.3.9 Existing aluminum balanced barrier to be modified and shortened to suit new crash cushion location. Relocation of aluminum balanced barrier post to be within 300 mm of new crash cushion location.

E19.3.10 Reassemble aluminum balanced barrier and install salvaged post(s).

E19.4 Materials

E19.4.1 General

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

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

E19.4.2 Dowels and Tie Bars

(a) The dowels and tie bars shall be as specified in CW 3230.

E19.4.3 Bar Accessories

(a) Bar accessories shall be of a type approved by the Contract Administrator. They shall be made from a non-rusting material, and shall not stain, blemish or spall the concreted surface for the life of the concrete.

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

E19.4.4 Extruded Polystyrene Foam

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

E19.4.5 Granular Material Compaction

(a) Compact areas of suitable sub-grade material, the full width of the excavation, to a minimum of 95% Standard Proctor Maximum Dry Density.

E19.4.6 Crash Attenuator Slab Concrete

(a) The crash attenuator slab concrete shall be Concrete Type 2 as per E11.

E19.4.7 Flexcell (Fibre Joint Filler)

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

E19.5 Construction Methods

E19.5.1 The construction and curing methods shall be as specified in CW 3230.

E19.6 Measurement and Payment

E19.6.1 Crash Attenuator Slab Renewal

(a) The Crash Attenuator Slab Renewal will be measured on an area basis and paid for at the Contract Unit Price per square meter for “Crash Attenuator Slab Renewal”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

(b) The anchor block shall be considered incidental to the Work and no separate measurement or payment will be made.

E20. DISCRETE GALVANIC PROTECTION SYSTEM

E20.1 Description

E20.1.1 The Work under this section consists of designing, supplying, installing and energizing a zinc-based galvanic corrosion control system consisting primarily of embedded zinc anodes, including required electrical connections, materials, testing and ensuring continuity of the reinforcing steel to all elements as outlined in the Drawings.

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

E20.2 References

E20.2.1 The latest edition and subsequent revisions of the following:

(a) ACI/ICRI 1999 Concrete Repair Manual

(b) ACI Guideline No. 222 – Corrosion of Metals in Concrete

(c) ACI 562-13 Code Requirements for Evaluation, Repair and Rehabilitation of Concrete Buildings

(d) ACI Repair Application Procedure (RAP) Bulletin 8 – Installation of Embedded Galvanic Anodes (2010)

(e) ICRI Guideline 310.1R-2008 Guide for Surface Preparation for the Repair of Deteriorated Concrete resulting from Reinforcing Steel Corrosion

(f) ASTM B418-12 – Standard Specification for Cast and Wrought Galvanic Zinc Anodes

E20.3 Submittals

E20.3.1 Shop drawings showing typical galvanic corrosion control system installation details, such as distributed anode installation locations, type and location of anode standoff spacers, reinforcing connections shall be prepared by the Contractor and submitted for approval prior to any field installations. The shop drawings shall clearly illustrate the layout of the anodes, in both elevation and section views.

E20.4 Materials

E20.4.1 Embedded Galvanic Anodes

(a) Discrete galvanic units shall be alkali-activated zinc meant to be embedded into concrete repairs and for corrosion prevention only. Nominal dimensions shall be 125 mm x 25 mm x 25 mm or as approved. The anodes shall be pre-manufactured with a nominal 60 grams of zinc in compliance with ASTM B418 Type II cast around a pair of uncoated, non-galvanized steel tie wires and encased in a highly alkaline cementitious shell with a pH of 14 or greater.

(b) The galvanic anodes shall be alkali-activated and shall contain no intentionally added chloride, bromide or other constituents that are corrosive to reinforcing steel as per ACT 562-13. Anode units shall be supplied with integral unspliced wires for directly tying to the reinforcing steel. Embedded galvanic anodes shall be Galvashield® XPT available from Vector Corrosion Technologies (www.vector-corrosion.com) USA (813) 830-7566, Canada (204) 489-9611 or approved equal.

(c) Application for approved equals shall be requested in writing two weeks before submission of project bids. Application for galvanic anode approved equals shall include verification of the following information:

(i) The zinc anode is alkali-activated with an alkaline cementitious shell with a pH of 14 or greater.

(ii) The galvanic anode shall contain no intentionally added constituents corrosive to reinforcing steel, e.g. chloride, bromide, etc.

(iii) The anode manufacturer shall provide documented test results from field installations showing that the anodes have achieved a minimum of 10 years in service.

(iv) The galvanic anode shall have been used in a minimum of ten projects of similar size and application.

(v) The galvanic anode units shall be supplied with solid zinc core (ASTM B418) cast around uncoated, non-galvanized, non-spliced steel tie wires for wrapping around the reinforcing steel and twisting to provide a durable steel to steel connection between the tie wire and the reinforcing steel.

(vi) The anode manufacturer shall provide third party product evaluation, such as from Concrete Innovations Appraisal Service, BBA, etc.

E20.4.2 Repair Materials

(a) Repair mortars, concrete, and bonding agents shall be portland cement-based materials with suitable electrical resistivity less than 50,000 ohm-cm. Non-conductive repair materials such as epoxy, urethane, or magnesium phosphate shall not be permitted. Repair materials with significant polymer modification and/or silica fume content may have high resistivity. Insulating materials such as epoxy bonding agents shall not be used unless otherwise called for in the design.

E20.4.3 Storage

(a) Deliver, store, and handle all materials in accordance with manufacturer's instructions. Anode units shall be stored in dry conditions in the original unopened containers in a manner to avoid exposure to extremes of temperature and humidity.

E20.5 Construction Methods

E20.5.1 General

(a) The galvanic corrosion protection shall consist of the anodes as indicated on the Drawings. The anode units are connected to the reinforcing steel and encased in a concrete with a minimum of 50 mm of clear concrete cover over the anode units.

E20.5.2 Manufacturer Corrosion Technician

(a) The Contractor will enlist and pay for a technical representative employed by the galvanic anode manufacturer to provide training and on-site technical assistance during the initial installation of the galvanic anodes. The technical representative shall be a NACE-qualified corrosion technician (Cathodic Protection Technician–CP2 or higher).

(b) The qualified corrosion technician shall have verifiable experience in the installation and testing of embedded galvanic protection systems for reinforced concrete structures.

(c) The Contractor shall coordinate its work with the designated corrosion technician to allow for site support during project startup and initial anode installation. The corrosion technician shall provide Contractor training and support for development of application procedures, verification of electrical continuity, and project documentation.

E20.5.3 Cleaning and Repair of Reinforcing Steel

(a) Clean exposed reinforcing steel of rust, mortar, epoxy coating, etc. to provide sufficient electrical connection and mechanical bond.

(b) If significant reduction in the cross section of the reinforcing steel has occurred, replace or install supplemental reinforcement as directed by the Contract Administrator.

(c) Secure loose reinforcing steel by tying tightly to other bars with steel tie wire.

(d) Verify electrical continuity of all reinforcing steel, including supplemental steel, as per Section E20.5.4(f).

E20.5.4 Galvanic Anode Installation

(a) Install anode units and repair material immediately following preparation and cleaning of the steel reinforcement.

(b) Anode spacing shall be such to provide full protection for the entire patch perimeter. Anode spacing is dependent on the reinforcing steel density. Maximum anode spacing shall be as per the manufacturer's guidelines to provide a 20 year service life.

(c) Place the galvanic anodes as close as possible to the patch edge while still providing sufficient clearance between anodes and substrate to allow the repair material to fully encase the anode with a minimum concrete or mortar cover over the anode of 50mm. If necessary, increase the size of the repair cavity to accommodate the anodes.

(i) Place the anode such that the preformed BarFit™ groove fits along a single bar or at the intersection between two bars and secure to each clean bar.

(ii) If less than 25 mm of concrete cover is expected, place anode beneath the bar and secure to clean reinforcing steel.

(d) The tie wires shall be wrapped around the cleaned reinforcing steel at least one full turn in opposite directions and then twisted tight to create a secure electrical connection and allow no anode movement during concrete placement.

(e) Repair materials with resistivity greater than 50,000 ohm-cm are not to be used.

(f) Electrical Continuity

(i) Confirm electrical connection between anode tie wire and reinforcing steel by measuring DC resistance (ohm Ω) or DC potential (mV) with a multi-meter.

(ii) Electrical connection is acceptable if the DC resistance measured with the multi-meter is 1 Ω or less or the DC potential is 1 mV or less.

(iii) Confirm electrical continuity of the exposed reinforcing steel within the repair area. If necessary, electrical continuity shall be established by tying discontinuous steel to continuous steel using steel tie wire.

(iv) Electrical continuity between test areas is acceptable if the DC resistance measured with multi-meter is 1 Ω or less or the potential is 1 mV or less.

E20.5.5 Concrete or Mortar Replacement

(a) If the repair procedures require the concrete surface to be saturated with water, do not damage the anode nor allow the anode units to be soaked for greater than 20 minutes.

(b) Complete the repair with the repair material, taking care not to damage, loosen or leave voids around the anode

E20.6 Measurement and Payment

E20.6.1 Discrete Galvanic Anode System

(a) The supply and installation of Discrete Galvanic Protection System as shown on the Drawings will be measured on a Unit Basis. This work shall be paid for at the Contract Unit Price Per Unit for “Discrete Galvanic Anode System”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E21. REGRADING OF EXISTING PAVING STONES

E21.1 Description

E21.1.1 This Specification shall cover all operations relating to regrading of existing 200mm by 200mm natural paving stones running bond pattern.

E21.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E21.1.3 This specification shall supplement CW 3330-R5 “Installation of Interlocking Paving Stones”.

E21.2 References

E21.2.1 The latest edition and subsequent revisions of the following:

(a) CW 3330-R5 “Installation of Interlocking Paving Stones”.

E21.3 Equipment

E21.3.1 General

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

E21.4 Construction Methods

E21.4.1 Paving stones shall be regraded in accordance to section 9.4 “Regrading Existing Interlocking Paving Stone Installations”

E21.4.2 Add the following to section 9.2 “Preparation of Sub-grade, Sub-base and Sand-base” of CW 3330-R5:

(a) No more sand shall be spread than can be covered in with paving stone on the same day.

(b) The bedding sand shall not be compacted or disturbed prior to laying the paving stones.

E21.4.3 Revise section 9.4 “Regrading Existing Interlocking Paving Stone Installations” CW 3330-R5 to read:

(a) As directed by the Contract Administrator, the Contractor shall regrade existing interlocking paving stone installations.

(b) The Contractor shall carefully remove and clean existing paving stones from areas determined by the Contract Administrator. The crushed limestone sub-base and bedding sand layer shall be prepared in accordance with Clause 9.2 of this Specification.

(c) The Contractor shall re-install existing paving stones to elevations determined by the Contract Administrator or in accordance with Clause 9.3 of this Specification. Supply and replacement of paving stones damaged by the Contractor shall be incidental to the cost of regrading the existing paving stones. Replacement paving stones shall be of similar colour and dimensions as the existing paving stones, and shall tie into adjoining interlocking paving stones without cutting of replaced interlocking paving stones.

E21.5 Measurement and Payment

E21.5.1 Regrading of Existing Paving Stones will be measured and paid for in accordance to CW 3330-R5.

E22. CONCRETE CRACK INJECTION

E22.1 Description

E22.1.1 This Specification shall cover all operations relating to the epoxy injection of concrete cracks located on the structural approach slab concrete surfaces as shown on the Drawings and as directed by the Contract Administrator.

E22.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tolls, supplies, and all tings necessary for and incidental to the satisfactory performance, and completion of all Works as herein specified.

E22.2 References

E22.2.1 All related Specifications and reference Standards are in accordance with the most current issue or latest revision.

E22.3 Scope of Work

E22.3.1 The Work under this Specification shall include surface preparation and epoxy injection of concrete cracks located on the structural approach slab surface, as shown on the Drawings and as identified by the Contract Administrator.

E22.4 Submittals

E22.4.1 Four copies of the crack repair work plan shall be submitted to the Contract Administrator at least 3 weeks prior to the commencement of the work.

E22.4.2 The crack repair work plan shall bear the seal and signature of an Engineer and include at least the following information.

E22.4.3 A description of the method of repair, including the following minimum information:

(a) Basis of selection.

(b) Proposed effective pressure.

(c) Surface finishing.

(d) Location and size of injection ports.

(e) Surface treatment of the concrete prior to surface sealing.

(f) Method of storing and handling grouts, cleaning solvents, and waste materials.

E22.4.4 A list of the materials to be used for crack preparation and repair, including the following minimum information:

(a) Material specifications.

(b) Product data sheets with test data.

(c) Material safety data sheets.

(d) Pot life of the components to be used based on a sample size of 200 ml at 5°C and 20°C.

E22.4.5 A certificate from the material supplier shall be submitted stating the material is suitable for the intended use in this Contract.

E22.4.6 A list of the equipment and accessories to be used including the following minimum information:

(a) The operating pressure of each component.

(b) The type of injection port and means of closure.

E22.5 Materials

E22.5.1 Epoxy Resin

(a) Material used for crack injection shall be epoxy resins for passive cracks.

(b) Epoxy grout shall prevent the penetration of water and shall have sufficient flowability to fill the crack at least 80% of the depth of the crack using the proposed equipment and method of repair at the ambient and substrate temperatures existing at the time of grouting.

(c) Epoxy resin shall be moisture insensitive and 100% solids.

E22.5.2 Equipment

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

E22.5.3 Gauges

(a) In addition to the calibrated gauges required for use with the pumps and with the injection hose, additional gauges shall be available on site to replace those that malfunction.

(b) Certificates of calibration, from an organization accredited by the Standards Council of Canada shall be supplied for each gauge certifying that the gauges are capable of measuring the pressure within a tolerance of ± 5 kPa.

E22.5.4 Pumps

(a) Equipment used for pressure injection shall be suitable for the intended use and compatible with the grout.

(b) Pumps shall be positive displacement type and shall be capable of delivering a minimum of two litres of grout per minute.

(c) Pumps shall be capable of developing a maximum regulated operating pressure at least equal to twice the effective pressure.

(d) Pumps shall be equipped with a calibrated gauge and shall be capable of accurately maintaining an effective operating pressure of 50 kPa or less.

(e) Plural component pumps shall be used when multicomponent solution grouts are used.

(f) Hand cartridge pumps shall not be used unless the volume of crack repair is less than one litre of resin for 100 m^2 of gross repair area.

E22.5.5 Static In-Line Mixers

(a) Static in-line mixers shall produce a homogeneous grout and shall be sized to accommodate the minimum and maximum anticipated flow rates.

(b) Static mixers shall have the manufacturer's plate attached showing the following mixer information:

(i) Size.

(ii) Type.

(iii) Maximum operating pressure.

E22.5.6 Agitating Mixer

(a) Agitating mixers shall have a power driven paddle mixing head and produce a homogeneous component. The speed of the mixers shall be variable to a maximum of 500 rpm.

E22.5.7 Injection Hoses

(a) Injection hoses shall have a rated working pressure equal to or greater than the maximum pump operating pressure and shall be equipped with a calibrated gauge at the injection port end.

E22.5.8 Injection Ports

(a) Injection ports shall be removable or non-metallic insert type units. The pressure capacity of the injection ports shall be at least equal to the maximum operating pressure of the pump. All injection ports shall be equipped with a shut-off valve or other mechanical means of closure under pressure.

(b) Surface mounted injection ports shall not be used.

E22.5.9 Air Compressor

(a) Compressed air shall be free from oil and water when tested according to ASTM D 4285.

E22.5.10 Drills

(a) Drilling of the injection holes shall be performed using a rotary percussion or rotary diamond type drill.

(b) Percussion drilling equipment shall not be used for drilling holes greater than 26 mm diameter and holes within 150 mm of any edge of concrete.

(c) Only holes 26 mm or less in diameter shall be drilled within 50 mm of any free edge of concrete.

E22.5.11 Concrete Router

(a) Hand-held grinding wheel or a multi-bladed cut-off saw equipped with abrasive or diamond blades.

(b) Multi-bladed floor saw cutting equipment equipped with diamond blades.

E22.6 Construction Methods

E22.6.1 General

(a) Installation of all accessories and material shall be according to the manufacturer's recommendations and as specified in the submitted work plan.

(b) Work shall only proceed when the temperature of the concrete is 5 °C or greater.

(c) Prior to commencement of the work, the cracks requiring repair, as identified by the Contract Administrator, shall be numbered, physically marked as to their extent, and measured in the presence of the Contract Administrator.

(d) This information shall be recorded and a copy submitted to the Contract Administrator.

E22.6.2 Crack Injection

(a) Drilling for Injection Ports

(i) Injection holes shall be drilled, on each side of the crack, at a 45° angle to the surface of the concrete. The holes shall be located such that they intersect the crack section at approximately the midpoint and they shall extend through the crack section. The holes shall be sized to accommodate the injection ports. The spacing of the holes shall not exceed the depth of the crack or 200 mm, and the holes shall be alternated from one side of the crack to the other.

(ii) Prior to installation of the injection ports each hole shall be individually cleaned of all deleterious material by an air-water blast to completely remove all drill cuttings from the hole.

(iii) Injection ports shall be inserted into the holes and sealed. The inserted end of the injection port shall not extend beyond the point at which the drilled hole intersects the crack.

(b) Cleaning and Flushing

(i) After the injection ports have been inserted, cracks shall be flushed with an air-water mixture or an alternating water and air flush to remove all deleterious material prior to the injection of grout. The flushing material shall be injected through the injection port and continued until it exudes from the adjacent injection port and the crack is thoroughly cleaned. This flushing shall proceed from one end of the crack to the other.

(ii) A final flush shall be made with air only to remove all of the free water.

(c) Surface Preparation and Sealing

(i) Surface opening of the cracks shall be sealed prior to injection.

(ii) The surface of the concrete shall be mechanically cleaned for a distance of 25 mm each side of the crack sections to prepare a clean substrate for bonding of the surface sealing compound. The surface preparation and sealing shall be as recommended by the manufacturer of the surface sealing material.

(iii) The surface sealing material shall completely confine the injection grout to the crack section with only the injection ports providing access. The surface sealing material shall withstand the maximum injection pressure without developing leakage along the crack section.

(iv) Surface sealing of passive cracks shall not commence until at least one hour after the final air flush.

E22.6.3 Injection of Epoxy

(a) Injection of epoxy shall proceed from the injection port at the lowest elevation of the crack and continue upwards along the crack on an injection port to injection port basis without interruption to the other end of the crack. The injection nozzle shall not be moved to the adjacent injection port until epoxy is showing at the next higher adjacent injection port or refusal criteria is developed.

(b) While under pressure, each injection port shall be sealed immediately after completion of injection at that injection port.

(c) When a maximum operating pressure greater than 3 MPa is required to inject the epoxy, the injection operation shall cease until the Contractor determines why this operating pressure is required.

E22.6.4 Monitoring

(a) The volume of grout used within each five metres of crack length shall be recorded. The pump gauge pressure shall be recorded every 10 minutes. The volume of grout and pump pressure shall be related to the crack location.

(b) The records shall indicate crack location and number, injection port spacing and confirmation of grout showing or refusal. A copy of the recorded information shall be submitted to the Contract Administrator at the end of each Day.

E22.6.5 Effective Pressure

(a) When calculating the effective pressure, the head losses shall be determined prior to commencement of injection.

(b) Head losses shall be determined in the presence of the Contract Administrator by performing a pressure flow test, through the equipment, for each equipment configuration used.

E22.6.6 Ratio Test

(a) Plural component injection equipment proportioning shall be verified in the presence of the Contract Administrator by measuring the volume output of material in the pressure lines at least once for each two hours of operation.

(b) When deviation from the manufacturer's specified proportioning ratio exceeds 5%, immediate adjustment or replacement of the equipment is required.

E22.6.7 Pot Life Determination

(a) Prior to commencing the grouting operation, a sample shall be taken from the material containers on site and manually proportioned to the specified component ratio in the presence of the Contract Administrator. The total sample size shall be 200 ml, and the same size container shall be used for each sample taken.

(b) The temperature of the material at the time of mixing and the pot life of the mixed material shall be recorded.

(c) The proportions of materials and pot life shall conform to those specified in the original submissions.

(d) An additional sample shall be taken from the end of the injection hose and a further pot life determination performed.

(e) During grouting material samples shall be taken on a frequency of at least one per hour of operation and the pot life recorded.

(f) Deviation from the proportions and pot life specified shall result in immediate discontinuance of use of the material.

(g) All records shall be submitted to the Contract Administrator at the end of each working day.

E22.6.8 Surface Finishing

(a) Surface finishing shall not proceed until the curing period, as specified by the material supplier, has elapsed. Surface finishing shall consist of removal of the injection ports and the surface sealant flush with the original concrete surface. Core holes and holes left after the removal of injection ports shall be filled with a cement-based non-shrink grout after the surface sealant has been removed.

(b) Where the crack is not completely filled to the injection surface, the crack shall be filled with a compatible material acceptable to the Contract Administrator. The material shall be applied according to the manufacturer's recommendations.

E22.7 Quality Control and Assurance

E22.7.1 Quality Control

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

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

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

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

E22.7.2 Quality Assurance

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

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

(c) The Contractor shall furnish facilities for the inspection of material and workmanship in the mill, shop and field, and the Contract Administrator shall be allowed free access to the necessary parts of the Works. The Contractor shall supply samples to the Contract Administrator or his inspector for testing purposes as required. There will be no charge to the City for samples taken.

E22.8 Measurement and Payment

(a) Concrete crack injection will me measured on a length basis and paid for at the Contract Unit Price per lineal metre for "Concrete Crack Injection", which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. Included in this Specification, accepted and measured by the Contract Administrator.

APPENDIX A – SPECIAL PROVISION (ASPHALT PAVEMENT WORKS)

TABLE OF CONTENTS

1. DESCRIPTION

1.1 General

1.1.1 This specification covers the requirements for the materials, equipment, and processes for proportioning and mixing hot mix asphalt (HMA) including warm mix asphalt (WMA), recycled mixes, and mixes for miscellaneous work in accordance with the Marshall and Superpave methods.

1.1.2 This Specification covers the preparation of hot/warm-mixed, hot/warm-laid, asphalt paving mixes for, and all placing operations relating to, the construction of asphalt pavements, overlays and other related pavement works.

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

1.2 Definitions

1.2.1 Hot Mix Asphalt (HMA) means hot mixed, hot laid asphalt. The terms are used interchangeably. HMA may include recycled or specialty mixes.

1.2.2 Warm Mix Asphalt (WMA) means warm mixed, warm laid asphalt produced using technologies that allow for the mixing, handling, and compaction of the asphalt concrete mixture at a temperature typically lower than conventional hot mix asphalt.

1.2.3 Lift means the compacted thickness of asphalt material laid in a single application.

1.2.4 Base Course means the layer of material between the sub-base and the pavement wearing surface.

1.2.5 SP1 means dense-graded asphalt mix using Superpave mix design for surface course. SP1 is intended for the reconstruction and asphalt overlay of expressways, major arterials, and minor arterials, reconstruction of industrial/commercial collectors and associated approaches as well as the paving of bridge decks.

1.2.6 SP2 means dense-graded asphalt mix using Superpave mix design for intermediate and bottom lifts. SP2 is intended for the reconstruction of high traffic volume streets, including expressways, major arterials, minor arterials, industrial/commercial collectors and associated approaches as well as the paving of bridge decks.

1.2.7 MS1 means dense-graded asphalt mix using Marshall mix design for surface course. MS1 is intended for the reconstruction and asphalt overlay of intermediate and low volume streets including residential major or minor collectors, residential local, public lanes, asphalt pathways and associated approaches.

1.2.8 MS2 means dense-graded asphalt mix using Marshall mix design for intermediate and bottom lifts. MS2 is intended for intermediate and low volume streets including residential major or minor collectors, residential local, public lanes, asphalt pathways and associated approaches.

1.2.9 Reclaimed asphalt pavement (RAP) means the processed HMA or WMA material that is recovered by partial or full depth removal.

1.2.10 Deleterious Material means soft or friable material that would decay or disintegrate from weathering including ironstone, porcelain, vegetation, organic material, wood, glass, alkali, plastic, metal, reinforcing steel, building rubble, brick, shale, mica, coal, clay lumps, and loam or other deleterious substances.

1.2.11 Job-Mix Formula (JMF) means the percentage passing on each designated sieve of the total mass of aggregate and the amount of asphalt cement as a percentage by mass of the mixture that are based on specified mix design procedures, and when mixed results in a paving mixture in accordance with this specification.

1.2.12 Mix Design means the design of the proportions of aggregates, asphalt cement, and additives that when uniformly mixed results in an acceptable asphalt mix in accordance with the specified method.

1.2.13 Performance Graded Asphalt Cement (PGAC) means an asphalt binder that is asphalt-based cement produced from petroleum residue, either with or without the addition of non-particulate modifiers, in accordance with AASHTO M320.

1.2.14 Superpave means the method for specifying material components and asphalt mix design using the Superpave Gyratory Compactor (SGC).

1.2.15 Joint means a vertical contact between a new asphalt pavement course and any existing asphalt pavement or any rigid object that exists at the time the HMA is laid.

1.2.16 Prime Coat means application of emulsified asphalt cement on a Base Course granular surface.

1.2.17 Tack Coat means application of emulsified asphalt cement on existing asphalt or portland cement concrete pavement prior to overlay, or between layers of new bituminous pavement.

1.2.18 Prime/Tack Coat Cure means the moment when water separates enough from the emulsified asphalt to show a color change from brown to black.

1.2.19 Segregation means a condition of the pavement characterized by areas with comparatively coarser texture than that of the surrounding pavement.

1.2.20 Lot means a specific quantity of material, approximately 150 tonnes or less, from a single source and produced by the same process within a single operational day. Actual size of Lot may vary based on scaled quantities delivered to the road.

2. MATERIALS

2.1 Handling and Storage of Materials

2.1.1 All asphalt constituent materials shall be stored in a manner that will prevent contamination or deterioration. Access to the storage facilities shall be provided for inspection by the Contract Administrator.

2.1.2 All fabricated and incidental materials, such as anti-stripping, prime coat, tack coat, etc., shall be stored in accordance with the manufacturer's instructions.

2.1.3 The Contract Administrator shall approve all materials before any construction is undertaken. If, in the opinion of the Contract Administrator, such materials, in whole or in part, do not conform to this Specification or are found to be defective in manufacture or have become damaged in transit, storage or handling operations, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense. There shall be no charge to the City for any materials taken for testing purposes.

2.2 Aggregate

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

2.2.1.1 Each of the fine- and coarse-fractions of the combined aggregate shall meet all the requirements of this Specification 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 demonstrating that the material will produce asphalt mixes of acceptable quality that meet all the requirements of this Specification.

2.2.1.2 Aggregates shall be hard and durable fragments with a maximum of 2% deleterious materials in both coarse and fine aggregates in accordance with ASTM Standard C142, Standard Test Method for Clay Lumps and Friable Particles in Aggregate and ASTM C123/C123M - Standard Test Method for Lightweight Particles in Aggregate by Washing as well as visual inspection of aggregates to identify deleterious materials.

2.2.1.3 The combined aggregate gradation and physical properties shall comply with the requirements in Table CW 3410.1.

TABLE CW 3410.1 - Combined Aggregate Gradation and Physical Properties Limits

	Test Method	SP1	SP2	MS 1	MS 2
Sieve Size, mm		Percent of Total Dry Weight Passing Each Sieve			
19.0 16.0 12.5	ASTMC 136 or ASTM D5444	-- 100% 90% - 100%	100% 90% - 100% 70% - 90%	-- 100% 90% - 100%	100% 90% - 100% 75% - 95%

9.5 4.75 2.36 1.18 0.60 0.15 0.075	(Note 1)	75% - 90% 48% - 70% 28% - 58% 19% - 40% 13% - 30% 4% - 15% 2% - 8%	60% - 80% 40% - 62% 23% - 50% 15% - 35% 10% - 22% 4% - 14% 2% - 8%	75% - 90% 48% - 70% 28% - 58% 19% - 40% 13% - 30% 4% - 15% 2% - 8%	70% - 90% 55% - 70% 35% - 55% 28% - 46% 17% - 32% 4% - 12% 3% - 10%
Fine Aggregate Angularity, %min (Note 2)	ASTM C1252 – Method A	40%	45%	40%	40%
Clay Content (Sand Equivalency), %min	ASTM D2419	45%	45%	45%	40%
Crush Count, %min (Fractured Faces) (Note 3)	ASTM D5821	95%	80% (2 Fractured Faces)	80% (2 Fractured Faces)	80% (2 Fractured Faces)
Flat and Elongated Particles, % Max	ASTM D4791	6%	10%	--	--
Absorption, %max (Note 3)	ASTM C127	2%	2%	2%	2%
Abrasion, %max (Note 3)	ASTM C131	35%	35%	35%	40%
Micro-Deval, %max (Note 3)	ASTM D6928	15%	15%	15%	17%
Soundness (Note 4)	ASTM C88	Note 3	Note 3	Note 3	--
Lightweight Particles Content, %max (Note 4)	ASTM C123	3%	5%	3%	5%

- Note 1: ASTM C136 shall be used for determining the particle size distribution of fine and coarse virgin aggregates while ASTM D5444 shall be used for determining the particle size distribution of extracted aggregates from bituminous mixtures.
- Note 2: Test criteria shall apply for fine aggregates passing 4.75mm sieve. Test results shall be based on combined aggregates prior to the addition of RAP.
- Note 3: Test criteria shall apply for coarse aggregates retained on 4.75 mm sieve.
- Note 4: Soundness - Coarse aggregate when subjected to five cycles of the soundness test shall have a weighted loss of not more than twelve (12) percent when sodium sulphate is used or not more than eighteen (18) percent when magnesium sulphate is used in accordance with ASTM Standard C88, Test for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
- Note 5: The lightweight particle content is the percentage of lightweight particles by weight of all particles retained on 4.75mm sieve.

2.2.1.4 Quarried limestone and dolomite shall not be acceptable as asphalt aggregate materials for SP1 and MS1 surface lifts.

2.3 Asphalt Cement

2.3.1 Asphalt cement shall be performance graded asphalt cement in accordance with AASHTO M 320 unless otherwise specified in the Contract Documents.

2.3.1.1 Use only those materials listed as Approved Products for Surface Works. The Approved Products are available in Adobe Acrobat (.pdf) format at the City of Winnipeg, Corporate Finance, Material Management Internet site at: https://legacy.winnipeg.ca/matmgt/spec/default.stm

2.3.2 The PGAC shall be homogeneous, free of water and any contamination, and shall not foam when heated to the temperatures specified by the manufacturer for the safe handling and use of the product. It shall be shipped, used, and always handled in accordance with the manufacturer's specifications.

2.3.3 All PGAC shall be in accordance with AASHTO M 320 when tested using the methods designated in AASHTO R29, Test Procedure for Grading an Unknown Asphalt Binder and continuous grading temperatures and reported continuous grading temperatures rounded to the nearest 0.1 °C.

2.3.4 Grades shall be tested at a temperature of 58 °C to determine the average percent recovery at 3.2 kPa ($R_{3.2}$) in accordance with the requirements of AASHTO T350 Multiple Stress Creep Recovery (MSCR) Test using a Dynamic Shear Rheometer. The minimum MSCR Elastic Recovery shall be 25%.

2.3.5 The PGAC performance grading test result requirements shall be

- Equal to or above XX* and equal to or below -YY*; or
- ≤ 0.5 °C below XX and ≤ 0.5 °C above -YY

Where *XX is the specified high temperature performance grade and design maximum pavement temperature and -YY is the specified low temperature performance grade and design minimum pavement temperature.

2.3.6 The PGAC shall comply with the performance grading requirements in Table CW 3410.2.

Table CW 3410.2: Categories for PGAC

Asphalt Type		Specified Standard Grade*
Top lift	SP1	PG 64-34P
	MS1	PG 58-34P

Other lifts	SP2	PG 58-34P
	MS2	PG 58-34P

2.4 Mineral Filler

2.4.1 Mineral filler, when required, shall consist of finely divided mineral matter such as rock dust, slag dust, hydrated lime, hydraulic cement, fly ash, loess or other suitable mineral matter, and shall conform to the requirements of ASTM Standard D242, Standard Specification for Mineral Filler for Bituminous Paving Mixtures. Mineral filler shall be free from organic matter and shall be non-plastic when tested in accordance with ASTM D2974 Standard Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils

2.5 Incidental Materials

2.5.1 Prime Coat

2.5.1.1 Prime coat shall consist of an emulsified asphalt. Method of application shall conform to the manufacturer's recommendations.

2.5.1.2 Use only those materials listed as Approved Products for Surface Works. The Approved Products are available in Adobe Acrobat (.pdf) format at the City of Winnipeg, Corporate Finance, Material Management Internet site at:
https://legacy.winnipeg.ca/matmgt/spec/default.stm

2.5.2 Tack Coat

2.5.2.1 Tack coat shall consist of emulsified asphalt. Method of application shall conform to the manufacturer's recommendations.

2.5.2.2 Use only those materials listed as Approved Products for Surface Works. The Approved Products are available in Adobe Acrobat (.pdf) format at the City of Winnipeg, Corporate Finance, Material Management Internet site at:
https://legacy.winnipeg.ca/matmgt/spec/default.stm

2.5.3 Reclaimed Asphalt Pavement (RAP)

2.5.3.1 Reclaimed asphalt pavement shall consist of sound durable particles produced by crushing and screening.

2.5.3.2 RAP is not permitted in SP1 where used as a surface course. Up to 10% by mass of RAP is permitted where SP1 is used in lifts other than surface course.

2.5.3.3 Up to 10% by mass of RAP is permitted in MS1 where used as a surface course.

2.5.3.4 Up to 15% by mass of RAP is permitted in MS1, MS2, and SP2 where used in lifts other than surface course.

2.5.3.5 RAP shall be blended during production of the asphalt and the mix produced shall consist of a uniform blend of all materials.

2.5.3.6 All physical requirements and combined aggregate gradation limits shall meet the requirements of Table CW 3410.1.

2.5.4 Recycled Asphalt Shingles (RAS)

2.5.4.1 RAS shall be blended during production of the asphalt and the mix produced shall consist of a uniform blend of all materials.

2.5.4.2 RAS shall consist of sound durable particles produced from recovered organic asphalt, shingles, asphalt caps and asphalt rolled roofing. Fiberglass shingles are not permitted.

2.5.4.3 RAS material can be incorporated to a maximum 3% by weight of the total mix into MS1, MS2, and SP2 where used in lifts other than surface course.

2.5.4.4 RAS particles shall be a maximum size of 10mm and shall otherwise meet the gradation requirements in Table CW 3410.1.

2.5.4.5 RAS shall be free of chemical contaminants. Deleterious substances shall be a maximum of 3% of RAS by weight. Deleterious substances include fiberglass shingles, metal, glass, rubber, nails, soil, brick, tars and asbestos.

3. DESIGN REQUIREMENTS FOR ASPHALT PAVING MIX

3.1 Testing Laboratories

3.1.1 The City of Winnipeg, Research and Standards Engineer will maintain a list of approved Testing Laboratories. To obtain approval, Testing Laboratories must submit the following information to the Research and Standards Engineer annually prior to April 1st:

3.1.1.1 Valid Category "B" Asphalt laboratory certification or higher by Canadian Council of Independent Laboratories (CCIL);

3.1.1.2 A complete list of the certified testing; and,

3.1.1.3 List of the field personnel and their qualifications.

3.2 Asphalt Suppliers

3.2.1 Asphalt suppliers must submit the following information to the Research and Standards Engineer three weeks prior to paving:

3.2.1.1 Asphalt suppliers Approval Guidelines and Application is available at the City of Winnipeg, Corporate Finance, Material Management Division website at;

https://legacy.winnipeg.ca/matmgt/spec/default.stm

3.2.1.2 Names of suppliers and sources for all materials and admixtures;

3.2.1.3 Asphalt mix designs. The mix design shall be completed by an approved laboratory with CCIL Type "A or B" certification based on the asphalt type;

3.2.1.4 Copies of valid scale calibration reports for the asphalt batch plant;

3.2.1.5 Test data for aggregates (in accordance with Clause 2.2);

3.2.1.6 Sieve analysis test reports for the individual aggregates and the combined aggregate gradations to be used in the asphalt. The sieve analysis test reports shall be representative of the material to be used during asphalt production;

3.2.1.7 Test data for asphalt cement (in accordance with Clause 2.3) and the following items shall be submitted:

3.2.1.7.1 The PGAC supplier and location that the product shall be supplied from;

3.2.1.7.2 All documentation from the PGAC supplier confirming the grade of PGAC;

3.2.1.7.3 Applicable mixing and compaction temperatures for the product;

3.2.1.7.4 The minimum temperature of the mix immediately after spreading as recommended by the PGAC supplier; and,

3.2.1.7.5 Documentation of construction, storage, and handling requirements, including the material safety data sheet, recompaction temperature, and mix discharge temperature.

3.2.1.8 Performance data from trial batches prior to construction to demonstrate the asphalt mix will achieve the performance criteria in Table CW 3410.4 and Table CW 3410.5. Three (3) separate sets of test results from a trial batch will be required for approval of the corrected mix design statement;

3.2.1.9 Quality control program for all materials, including a proposed sampling and testing plan in accordance with Clause 3.4;

3.2.1.10 The supplier shall hold a valid development license issued in accordance with the Manitoba Environment Act for the operation of the Bituminous Mix plant. The plant shall be located and operated in accordance with the terms and conditions of the license; and,

3.2.1.11 The supplier shall control dust at the plant site in accordance with health, safety and environmental requirements.

3.2.2 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.

3.2.3 Testing for qualification or acceptance purposes shall be done in accordance with this Specification and applicable test procedures and standard practices. There shall be no charge for any materials taken for testing purposes.

3.2.4 Changes in the source of any asphalt 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.

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

3.2.6 Any change in the constituent materials of the asphalt shall require a new asphalt mix design.

3.2.7 No asphalt supply or placement shall proceed until the asphalt cement submittal, mix design and Job Mix Formula are approved.

3.3 Asphalt Mix Design and Job Mix Formula

3.3.1 The Mix Design Statements for all asphalt types shall be submitted to the City of Winnipeg, Research and Standards Engineer for approval. The mix shall be proportioned to produce asphalt in accordance with the requirements of Table CW 3410.3 or Table CW 3410.4.

Table CW 3410.3: Marshall Mix Requirements

Mix Properties	**MS1**	**MS2**
Asphalt Cement, % total sample weight	5.5% to 6.5%	5.0% to 6.0%
Voids in Mineral Aggregate, %min	14%	13%
Voids Filled with Asphalt (%)	67% to 75%	67% to 75%
Air Voids	3.0% to 5.0%	3.0% to 5.0%
Marshall Stability, kN at 60°C	8 min.	8 min.
Flow Index, units of 250 µm	8.0 to 14.0	8.0 to 16.0

Note: The mix shall be designed using 75 blows per side of the test specimen with manual compaction hammer or a mechanical equivalent device.

Table CW 3410.4: Superpave Mix Requirements

Mix Properties			SP1	SP2
% of Theoretical Maximum		Mix Gyratory Compaction Requirements		

Specific Gravity	$N_{initial}$	8	≤ 89.0	≤ 90.5
	N_{design}	100	96.0	96.0
	N_{max}	160	≤ 98.0	≤ 98.0
Voids in Mineral Aggregate, %min			14	13
Voids Filled with Asphalt, %			67 – 75	65 – 75
Dust to Binder Ratio			0.6 – 1.2	0.6 – 1.2
Minimum Tensile Strength Ratio (TSR), % (AASHTO T283)*			80%	70%

* If the specified TSR is not met, an approved anti-stripping additive shall be incorporated into the mix at a rate recommended by the anti-strip manufacturer and approved by the City of Winnipeg, Research and Standards Engineer.

3.3.2 If, during the progress of the work, the mix design is found to be unsatisfactory for any reason or the quality assurance tests show deviation between the results and Mix Design Statement exceeding those identified in Table CW 3410.5, the asphalt supplier shall revise the mix design(s) and submit the proposed changes to the City of Winnipeg, Research and Standards Engineer for approval. The changes shall not exceed any of the limits specified in Table CW 3410.5 and shall meet the requirements specified in Tables CW 3410.1, CW 3410.2, CW 3410.3 and CW 3410.4 of this Specification; otherwise a new mix design shall be submitted.

Table CW 3410.5: Maximum Deviation and Adjustments for JMF

Mix Properties	Maximum Deviation Between the QA results and Mix Design Statement, %	Maximum JMF Adjustment, %
Asphalt Cement, % total sample weight	± 0.2	± 0.3
RAP	3%	5%
Passing 16.0 mm, 12.5 mm, 9.5 mm sieves	4.0%	5.0%
Passing 4.75 mm, 2.36 mm, 1.18 mm, 0.425 mm, 0.18 sieves	2.0%	3.0%
Passing 0.075 mm sieve	1.0%	1.0%

3.3.3 The mix design shall be valid for a maximum of twelve (12) months from when the mix design was developed. To extend use of the mix design beyond the initial twelve (12) months, a minimum of one test of each property listed in Section 3 shall be submitted to the City of Winnipeg, Research and Standards Engineer for approval. A full mix design shall be submitted every three years.

3.4 Plant Quality Control

3.4.1 The asphalt supplier shall be responsible for quality control of the plant to ensure all materials meet the approved mix designs. This information shall be submitted monthly 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 asphalt supplier.

3.4.2 Quality Control testing shall be conducted by a laboratory certified in accordance with the requirements of Clause 3.1 and approved by the City of Winnipeg, Research and Standards Engineer.

3.4.3 The quality control program shall include all testing in accordance with Sections 2 and 3 of this Specification. A minimum of one test for aggregate gradation and asphalt materials shall be provided monthly during production.

3.4.4 Testing of any asphalt constituent materials may be undertaken by a testing laboratory designated by the City of Winnipeg, Research and Standards Engineer. The asphalt supplier shall be equipped with suitable means or a device for obtaining a representative sample of the asphalt cement. Any material which fails to comply with the requirements of this specification will be rejected. Material that has been rejected must be removed immediately by the asphalt supplier.

4. SUPPLY OF MATERIALS

4.1 General

4.1.1 All asphalt suppliers shall be approved by the City of Winnipeg, Research and Standards Engineer. A list of approved asphalt suppliers is available at the City of Winnipeg, Corporate Finance, Material Management Division website at: https://legacy.winnipeg.ca/matmgt/spec/default.stm

4.1.2 Unless otherwise specified, only use of stationary asphalt mixing plants will be permitted.

4.2 Aggregate

4.2.1 The different sizes of aggregate used shall be kept separate and adequate provision shall be made to keep them from becoming mixed or otherwise contaminated.

4.2.2 Where blending of materials from one or more sources and/or sizes, each material shall be placed in separate stockpiles.

4.2.3 Separate aggregate feeds capable of delivering a uniform flow of material to the dryer shall be provided for each separate stockpile of aggregate, RAP, supplementary material and VMA additive used to produce the asphalt mix.

4.2.4 The aggregates shall be dried at a minimum temperature of 135°C before mixing with the asphalt.

4.3 Asphalt Cement

4.3.1 The asphalt cement shall be heated in a storage tank to a temperature that falls within the mixing temperature range recommended by the asphalt cement manufacturer. The mixing temperature shall be based on the temperature-viscosity curve for the asphalt cement and shall be sufficient to produce a uniform and homogeneous mixture in which all particles of

the aggregate are thoroughly and uniformly coated. All information related to the asphalt cement shall be made available to the Contract Administrator upon request.

4.3.2 The asphalt cement shall be heated at the plant to a maximum temperature of 160°C before mixing with the aggregates. In no case shall the temperature of the asphalt and aggregates differ by more than 15°C when placed in the mixing drum.

4.4 Transportation of Asphalt Paving Mix

4.4.1 The mixture shall be transported from the plant to the site in trucks with metal bottoms previously cleaned of all foreign materials. If required, truck boxes shall be lightly coated with a uniform application of a non-petroleum-based asphalt release agent. The release agent shall conform to the Manufacturer's specifications and approved by the Contract Administrator. Excess lubricants shall be removed before trucks are loaded with asphalt. Release agents that adversely affect the quality or performance of the asphalt mix shall not be used.

4.4.2 The trucks shall be suitably insulated, as required. Each vehicle shall be equipped with a tarpaulin or other suitable covering material of sufficient size to overhang the truck box on three sides when the vehicle is fully loaded. Such tarpaulins shall be on the truck at all times and shall be used to cover the mixture completely as directed by the Contract Administrator.

5. EQUIPMENT

5.1 General

5.1.1 All equipment shall be of a type approved by the Contract Administrator. The equipment shall be in good working condition for the duration of the Contract.

5.2 Prime/Tack Coat Distributors

5.2.1 For main lane paving, prime/tack coat shall be applied using self-propelled or tow-along pressure distributors capable of applying the product at the specified rate and in a continuous and uniform manner both longitudinally and transversely for the full lane width.

5.2.2 The distributors shall be equipped with a volume metering system of sufficient sensitivity to measure the quantity of tack/prime coat. The metering system shall be calibrated annually and all the certifications shall be made available to the Contract Administrator upon request. The distributors shall contain a thermometer for measuring the temperature of the tank contents.

5.2.3 All nozzles shall be set in the spray bar such that the nozzle slots make an angle between 15° to 30° with the longitudinal axis of the spray bar. Clogged nozzles shall be removed and cleaned with solvent before being used.

5.2.4 The use of a hand-held pressure applicator is acceptable only for prime/tack coating of small or irregularly shaped areas such as cuts, approaches, etc.

5.3 Mechanical Pavers

5.3.1 Asphalt pavers shall be self-propelled and capable of laying a consistent lift which is true to the specified geometrics, cross-section and alignment. Pavers shall be equipped with hoppers and distributing screws capable of placing the hot mix evenly in front of the screeds.

5.3.2 Asphalt pavers shall be equipped with automatic longitudinal and transverse grade and slope controls which are capable of being operated from either side of the paver. The longitudinal grade control shall be readily adjustable for lift thickness in small increments without the necessity of stopping the paver.

5.3.3 The use of any paver that is experiencing difficulty in achieving a consistent and smooth lift in conformance with this Specification shall be discontinued until the Contractor demonstrates suitable corrective measures.

5.4 Rollers

5.4.1 A rolling pattern shall be established and submitted by the Contractor to the Contract Administrator for approval before paving. The Contract Administrator shall approve any deviation from the rolling pattern during construction.

5.4.2 The Contract Administrator shall be provided with the mass of the rollers and may require they be weighed.

5.4.3 Rollers shall be classified into categories in accordance with Table CW 3410.6.

Table CW 3410.6: Roller Classifications

Type	Description	Classification	Minimum Mass, tonnes
Class S	Self-propelled steel-drum roller	S1	7
		S2	9
Class R	Self-propelled pneumatic-tired rollers Or Self-propelled combination roller	R1	8
		R2	15
Class V	Self-propelled vibratory roller	V1	4
		V2	5.2
		V3	5.8

5.4.4 Rollers shall be equipped with an automatic device that prevents the drum from vibrating unless the roller is moving and shall automatically halt vibration before coming to a stop. Frequency of vibration shall not be less than 2200 per minute. Vibration should not be used

where there is potential to damage services and structures, or cause nuisance complaints as directed by the Contract Administrator.

6. CONSTRUCTION METHODS

6.1 General

6.1.1 All construction methods shall conform to this Specification, except as otherwise approved by the Contract Administrator.

6.2 Preparation of Base Course for Asphalt Pavement

6.2.1 General

6.2.1.1 Placing of the asphalt mixture shall not commence until the construction of the sub-grade, sub-base and Base Course has been completed in accordance with the requirements of Specification CW 3110, and the installation of pavement and boulevard structures and appurtenances has been completed to the satisfaction of the Contract Administrator.

6.2.1.2 Where Base Course has raveled, the loose material shall be removed or recompacted to a uniform surface.

6.2.2 Prime Coat

6.2.2.1 Application of prime coat shall consist of flushing the final accepted Base Course layer with diluted emulsified asphalt. Use an equal volume of water to dilute the emulsified asphalt unless otherwise specified by the Contract Administrator. Surfaces to be prime coated shall be free of standing water and contamination, such as mud, loose aggregate, or debris.

6.2.2.2 The application rate of undiluted prime shall be between 0.5 to 1.0 L/m^2 and shall be approved by the Contract Administrator.

6.2.2.3 Prime coat shall be placed with sufficient time to cure prior to paving. Asphalt mix shall not be placed on prime coated areas until the prime coat is cured for a minimum of eight (8) hours or until prime coat cannot be tracked by foot traffic and tires. Paving and construction equipment shall not be permitted onto the prime coat until it has broken and set. Traffic shall not be permitted on the prime coat.

6.2.2.4 Prime coat shall be visually uniform. Prime coat shall be reapplied to areas of insufficient or non-uniform coverage. A hand spray can be used to apply prime coat to areas missed or inaccessible by the distributor. When prime coating is performed using hand spray, the visual appearance of such areas shall be consistent with the adjacent areas.

6.2.2.5 Prime coat shall not be applied when the weather is foggy or rainy or when the ambient temperature is less than 0°C. If the ambient temperature is less than 0°C as forecast

by the nearest official meteorological office, the product used for prime coat shall be approved by the Contract Administrator.

6.2.2.6 Before applying the prime coat, the surface shall be flushed with water to create optimal conditions for adhesion, absorption control, and overall effectiveness of the prime coat and shall be approved by the Contract Administrator.

6.2.2.7 After curing, if any excess primer remains on the surface, the Contractor shall apply an approved sand where necessary to blot up the excess prime. The sand cover, where used, shall consist of clean, granular, mineral material approved by the Contract Administrator, all of which shall pass a 4.75 mm sieve. Only sufficient sand shall be spread to blot up excess prime and such areas shall be broomed to remove the excess sand prior to paving.

6.2.2.8 Prime coat shall be inspected and approved by the Contract Administrator before any asphalt is placed. Otherwise the asphalt shall be rejected by the Contract Administrator and shall be removed by the Contractor at his own expense.

6.2.2.9 When traffic flow must be maintained, prime coat shall be applied to one direction of the roadway at a time. No prime coat shall be applied to the other direction of the roadway until the first direction has cured to accommodate vehicular traffic.

6.3 Preparation of Asphalt or Portland Cement Concrete Pavement for Asphalt Overlay

6.3.1 Asphalt Surface Pavement

6.3.1.1 A layer of the existing asphalt surface course shall be removed to such depth as is specified on the Drawings or as directed by the Contract Administrator. This work will be done and paid for in accordance with Specification CW 3450.

6.3.1.2 If the entire existing asphalt overlay is removed to the existing portland cement concrete pavement, the preparation of the existing Portland cement concrete pavement for asphalt overlay shall be in accordance with Section 6.4 of this Specification.

6.3.1.3 If the surface remaining after the removal of the specified layer of asphalt surface course is asphalt, the Contractor shall proceed to fill any remaining holes and depressions with asphalt paving mixture and compact these areas with a steel wheel roller before paving. The asphalt surface upon which the asphalt overlay is to be placed shall be approved by the Contract Administrator prior to placing asphalt.

6.3.1.4 At the locations designated on the Drawings and at any other locations designated by the Contract Administrator, the Contractor shall adjust existing structures and appurtenances, reconstruct sections of curb, seal all cracks and do other repair works as required. The adjustment of existing structures and appurtenances shall be done and paid for in accordance with Specification CW 3210, and the curb renewal, crack sealing and other repair works shall be done and paid for in accordance with Specifications CW 3230, CW 3240, and CW 3250.

6.3.2 **Portland Cement Concrete Pavement Surface**

6.3.2.1 At the locations designated on the Drawings and at any other locations designated by the Contract Administrator, the Contractor shall adjust existing structures and appurtenances, reconstruct sections of concrete pavement, reconstruct sections of curb, seal all joints and cracks and do other repair works as required. The adjustment of existing structures and appurtenances shall be done and paid for in accordance with Specification CW 3210, and the pavement reconstruction, curb renewal, joint and crack sealing and other repair works shall be done and paid for in accordance with Specifications CW 3230, CW 3240, and CW 3250.

6.3.3 Tack Coat

6.3.3.1 Application of tack coat shall consist of flushing the final accepted surface with undiluted emulsified asphalt. Surfaces to be tack coated shall be free of standing water and contamination, such as mud, loose aggregate, or debris.

6.3.3.2 Tack coat shall be required between layers of asphalt material and the application rate shall be in accordance with Table CW 3410.7, unless otherwise specified by the Contract Administrator.

Table CW 3410.7: Application Rate for Tack Coat

Surface Type	Application Rate, L/m^2	Max Allowable Tolerance, L/m^2
New Asphaltic pavement	0.25	0.03
Old Asphaltic pavement, Portland Cement Concrete, Milled Surface	0.35	0.05

6.3.3.3 Tack coat shall be placed with sufficient time to cure prior to paving. Asphalt mix shall not be placed on tack coated areas until the tack coat is cured for a minimum of three (3) hours or until tack coat cannot be tracked by foot traffic and tires. If trackless tack is used, the curing time can be reduced in accordance with the manufacturer's specifications unless otherwise specified by the Contract Administrator. Paving and construction equipment shall not be permitted onto the tack coat until it has cured and set. Traffic shall not be permitted on the tack coat.

6.3.3.4 Tack coat shall be visually uniform. Areas of insufficient or non-uniform tack coat coverage shall be re-sprayed. Hand spray can be used to apply tack material to areas missed or inaccessible by the distributor including curb areas attached to the asphalt. When tack coating is performed using hand spray, the visual appearance of such areas shall be consistent with the adjacent areas of machine applied material.

6.3.3.5 Tack coat shall not be applied when the weather is foggy or rainy or when the ambient temperature is less than 5°C. If the ambient temperature is less than 5°C as forecast by the nearest official meteorological office, the product used for tack coat shall be approved by the Contract Administrator.

6.3.3.6 Tack coat shall be inspected and approved by the Contract Administrator before any asphalt is placed. Otherwise the asphalt shall be rejected by the Contract Administrator and shall be removed by the Contractor at his own expense.

6.4 Placing Asphalt Paving Mixture

6.4.1 General

6.4.1.1 The Contract Administrator shall approve the surface upon which new asphalt is to be placed before paving operations may begin.

6.4.1.2 The mixture shall be delivered to the job and placed at a temperature that allows for proper compaction, taking into consideration the weather conditions, the temperature of the surface on which the mixture is to be placed, and the thickness of the lift. In no case shall the asphalt mixture be placed at a temperature lower than the values specified in Table CW 3410.8.

Table CW 3410.8: Limits for Asphalt Mixes Temperatures

Asphalt Type	Temperature for Asphalt before Placing, °C		Minimum Temperature During Rolling, °C
	Minimum	Maximum	
HMA	125	160	90
WMA	115	155	80

6.4.1.3 Unless otherwise permitted by the Contract Administrator, the mixture shall be spread by means of a mechanical self-powered paver capable of spreading the mixture true to the line, grade and crown required.

6.4.1.4 Pavers shall be equipped with hoppers and distributing screws of the reversing type to place the mixture evenly in front of adjustable screeds. The mixture shall be dumped in the centre of the hoppers and care exercised to avoid overloading and slopping over of the mixture upon the base.

6.4.1.5 When laying the mixture, pavers shall operate so as to provide as continuous an operation as possible at a speed of between three meters and six meters per minute. They shall be equipped with a quick and efficient steering device and shall have forward and reverse travelling speeds of not less than 25 meters per minute.

6.4.1.6 Pavers shall be capable of spreading the mixture, without segregation, in thicknesses as specified on the Drawings or approved by the Contract Administrator. Placement widths shall vary from a minimum of 1.5 meters to a maximum of 4.5 meters unless approved by the Contract Administrator. They shall be equipped with blending or joint levelling devices for smoothing and adjusting all longitudinal joints between strips or courses of the same thickness. Pavers shall be equipped with screeds.

6.4.1.7 The term screed includes any strike-off device operated at workable temperature without tearing, shoving or gouging the finished surface.

6.4.1.8 The minimum and maximum thickness of a compacted lift for reconstruction shall be in accordance with Table CW 3410.9, unless otherwise specified by the Contract Administrator.

Table CW 3410.9: Lift Thicknesses

Mix Type	Thickness, mm	
	Minimum	Maximum
MS1	35	55
MS2	50	75
SP1	35	55
SP2	50	75

6.4.1.9 No construction traffic shall travel on the finished surface until the surface has cooled to a temperature of 60°C or less.

6.4.2 Main Line Paving

6.4.2.1 Main line paving shall include the placement of bottom and top lifts for asphalt pavements and overlays utilizing mechanical pavers with automatic grade control for:

6.4.2.1.1 All through and parallel turning lanes greater than 15.0 meters in length;

6.4.2.1.2 Other lanes greater than 15.0 metres in length; and,

6.4.2.1.3 Intersections through which the main line continues.

6.4.2.2 Main line paving with mechanical pavers shall utilize automatic grade control, except for:

6.4.2.2.1 Intersections through which the main line continues and where traffic must be maintained; and,

6.4.2.2.2 The side of the paver adjacent active traffic.

6.4.2.3 Hand placement shall be minimized. Hand placed asphalt shall be spread and compacted to match the finished grade to the satisfaction of the Contract Administrator.

6.4.3 Tie-Ins and Approaches

6.4.3.1 Tie-Ins and approaches shall include the placement of leveling and surface courses for pavements and overlays for all areas other than main line paving lanes. This includes intersecting side streets to the main road under construction except as noted in Section 6.4.2 of this specification, intersection turnouts, right turn cut-offs, median openings, and private approaches. Tie-ins include miscellaneous asphalt for temporary ramping, sidewalk in-fill and isolations.

6.4.3.2 Tie-Ins and approaches shall utilize mechanical pavers where possible with or without automatic grade control, or hand methods as approved by the Contract Administrator.

6.4.3.3 Hand placement shall be minimized. Hand placed asphalt materials shall be spread and compacted to match the finished grade to the satisfaction of the Contract Administrator.

6.4.4 Weather Limitations

6.4.4.1 Asphalt shall be laid upon a surface which is dry, clean and free from standing water, and only when weather conditions are suitable in accordance with Table CW 3410.10.

Table CW 3410.10: Minimum Placement Temperature for Asphalt

Asphalt Type	Location	Lift Thickness, mm	Temperature*, C°	
			Wind Speed, km/hr > 10	Wind Speed, km/hr ≤ 10
HMA	Top Lift	< 50	10°C	6°C
		≥ 50	8°C	6°C
	Other than top lift	> 50	2°C	2°C
WMA	Top Lift	< 50	4°C	0°C
		≥ 50	2°C	0°C
	Other than top lift	> 50	0°C	-2°C

*Temperature shall be based on the nearest official meteorological office. The Contract Administrator may confirm the temperature by measuring the temperature in the shade and 150 mm above the surface.

6.4.4.2 Asphalt shall be placed on unfrozen material, free of water, snow, and ice. Frozen 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 material will be considered frozen. The Contractor shall use suitable heating methods to maintain the surface temperature above 0°C. Salt shall not be used to thaw ice, snow, or frost.

6.4.4.3 Paving shall not be permitted while there is frost within 750 mm of the surface upon which the asphalt is to be placed. Asphalt shall only be laid under conditions that the Contract Administrator determines to be conducive to obtaining the specified results.

6.4.4.4 Notwithstanding the above, when weather conditions are unfavourable, or are likely to become unfavourable, paving operations shall be suspended.

6.5 Joints

6.5.1 General

6.5.1.1 Joints shall be smooth, well bonded and tightly sealed. Joints shall conform smoothly and accurately to adjacent pavement surfaces such that when tested with a 3-metre straight edge placed across the joint the distance between the straight edge and the surface of the pavement shall not exceed 5 mm at any point.

6.5.1.2 When matching a compacted joint, the depth of the uncompacted lift shall be set to allow for compaction. The paver screed shall overlap the adjoining lift by no more than 25 mm.

6.5.1.3 On straight sections the joint line shall not deviate from a straight line by more than 75 mm at any point. On curved or tapered sections, the joint shall be shaped so as to be as smooth as possible. Jagged, stepped or wandering edges shall be reshaped to a smooth line, to the satisfaction of the Contract Administrator, before the adjacent lift is laid.

6.5.2 Location of Joints

6.5.2.1 The location of joints shall be subject to the approval of the Contract Administrator and shall conform to the following requirements:

6.5.2.1.1 Longitudinal joints shall not be located within 150 mm of a longitudinal joint in any underlying pavement structure.

6.5.2.1.2 Transverse joints shall not be located within two (2) meters of any other transverse joint in the same paving course or within one (1) meter of a transverse joint in any underlying pavement structure.

6.5.2.2 Longitudinal cold joints are to be avoided wherever possible. Transverse joints shall be established with sufficient frequency to allow the full width of the paving course to be placed in a single shift. No paving lane shall progress more than 500 m beyond the end of an adjacent paving lane in the same course without the prior approval of the Contract Administrator.

6.5.3 Preparation of Joints

6.5.3.1 Hot Joints

6.5.3.1.1 Hot joints shall be considered to be those longitudinal joints between adjacent mats in which the previously laid lift retains sufficient heat, above 90 °C for HMA and 75 °C for WMA, to facilitate good bonding and sealing of the joint. The edge of the previously laid lift shall be inspected prior to laying the new mat. Any areas not conforming to line and grade or having a rounded-off top corner shall be cut out to the full depth of the lift to a minimum width of 100 mm and replaced with fresh material and compacted when laying the new mat.

6.5.3.1.2 If the previously laid lift temperature is below 90 °C for HMA and 75 °C for WMA but higher than 60 °C, then the joints shall be painted with a thin uniform tack coat before the new asphalt is placed against it.

6.5.3.2 Cold Joints

6.5.3.2.1 Cold joints shall be considered to be those longitudinal and transverse joints where the existing adjacent pavement lift is at or below 60 °C. Transverse joints shall be cut back to a straight line for the full depth and width of the mat.

The transverse joint shall be cut back to a location such that the pavement immediately before the joint, where checked with a 3-metre straight edge, exhibits no tapering or rounding.

6.5.3.2.2 Longitudinal edges of existing mats shall be inspected before laying the new mat. Any areas not conforming to line and grade shall be cut out full depth to a minimum width of 150 mm and replaced with fresh material and compacted when laying the new mat. Any areas with a rounded corner shall be cut back to the full depth of the lift to form a vertical face with a square corner.

6.5.3.2.3 Joints against existing asphalt pavements shall be prepared by saw cutting, cold planning or other method(s) approved by the Contract Administrator, such that the face of the existing pavement is vertical with a square corner.

6.5.3.2.4 All contact surfaces of cold joints shall be painted with a uniform coat of tack before the new asphalt is placed against them.

6.5.4 Construction of Joints

6.5.4.1 Fresh asphalt shall not be placed against the existing lift until the joint preparation has been completed in accordance with 6.5.3 and is approved by the Contract Administrator.

6.5.4.2 The fresh lift shall be laid to an elevation such that, when compacted, it will conform accurately to the grade of the existing pavement. Wherever practicable, this shall be done using mechanical pavers.

6.5.4.3 Joints shall always be rolled before the remainder of the mat. Wherever practicable the joint shall be rolled with the roller travelling parallel to the joint and with a minimum of seventy-five (75%) percent of the width of the main roller(s) supported on the existing mat.

6.6 Asphalt Patching

6.6.1 Remove and replace existing asphalt pavements adjacent to proposed or renewed sidewalks and concrete approaches for grade adjustment to ensure drainage and rideability are maintained. Areas to be considered as asphalt patches shall be less than 1.5 meters in width. The locations requiring asphalt patching shall be shown on the Drawings or as directed by the Contract Administrator.

6.6.2 The Contractor shall saw cut the asphalt pavement full-depth along the limits designated. The asphalt pavement shall be removed and disposed of in accordance with CW 3110. Upon removal of asphalt, the existing base materials shall be levelled and compacted. The asphalt shall match the thickness of the existing pavement. The material shall be placed and compacted by acceptable methods in accordance with Clause 6.7 of this specification to the satisfaction of the Contract Administrator.

6.6.3 All costs incurred for asphalt removal, compaction of existing base materials and placement of Base Course and asphalt materials shall be included in the unit price for "Construction of Asphalt Patches"

6.7 Compaction of Asphalt Paving Mixture

6.7.1 General

6.7.1.1 A rolling pattern shall be established by the Contractor and approved by the Contract Administrator. The Contract Administrator shall approve any deviation from the rolling pattern.

6.7.1.2 The minimum number of rollers is identified in Table CW 3410.11.

Table CW 3410.11: Maximum Rates Per Paver and Roller Sequence

Asphalt Placement, tonnes/hr	Minimum Roller Combinations per Paver Breakdown + Intermediate + Finish*
≤ 100	S2 + R1 +S1 V1 + R1 + S1
> 100	S2 + 2 x R1 + S1 S2 + R2 + S1 V2 + 2 x R1 +S1 V2 + R2 + S1

*No vibration shall be used when paving bridge decks. If Class V rollers are used, they shall be in static mode. The V3 roller can be used as a substitute for the V2 roller.

6.7.1.3 The operating speed of rollers shall not exceed 5 km/hr and shall be slow enough to avoid undue displacement of the asphalt. Rollers shall operate with the drive wheel forward in the direction of paving.

6.7.1.4 Any displacement occurring as a result of reversing the direction of the roller or any other cause shall be corrected. Rolling shall proceed continuously until all roller marks are eliminated and no further compression is possible. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened with water, limewater, or an approved detergent. Excess moisture will not be permitted.

6.7.2 Rolling procedures

6.7.2.1 Compaction of the paving mixture shall consist of three (3) separate rolling operations as follows:

6.7.2.1.1 Breakdown rolling: Rolling shall start longitudinally at the sides and proceed toward the centre of the pavement overlapping on successive passes by at least 150 mm. Breakdown rolling shall consist of at least two complete coverages by the roller. Delays in rolling freshly placed asphalt shall not be permitted.

6.7.2.1.2 Intermediate rolling shall immediately follow breakdown rolling. Passes shall be arranged to ensure overlapping successive tire paths. The rolling operation shall prevent pick-up of the mixture on the tires.

6.7.2.1.3 Final rolling shall be undertaken while the paving mixture is still warm enough to eliminate roller marks. Where the width permits, the asphalt shall be rolled diagonally in two directions, the second diagonal rolling crossing the first rolling direction. Final rolling shall start longitudinally at the high edge and proceed towards the lower edge of the mat. Final rolling shall be continue until there is no evidence of consolidation.

6.8 Compaction of Irregular Areas

6.8.1 Along curbs, manholes and similar structures and at all places not accessible to rollers, compaction shall be performed by plate compactors to the satisfaction of the Contract Administrator. All joints around these structures shall be effectively sealed.

6.8.2 The asphalt may be heated to a maximum temperature of 120°C to facilitate the compaction where approved by the Contract Administrator.

6.9 Requirements After Final Rolling

6.9.1 After final rolling the surface of each lift shall be smooth and true to the established crown and grade. Any low or defective spots shall be remedied by milling to a minimum depth of 40 mm or as directed by the Contract Administrator, and replacing it with a fresh mixture.

6.9.2 The corrected area shall have a smooth transition to the surrounding pavement without negatively affecting any adjacent sections, impairing the functionality and the service life of the area.

6.10 Filling of Core Holes

6.10.1 Where cores are collected, the Contractor shall patch each core hole immediately with an approved cold asphalt product.

6.10.2 The patch shall be finished flush with the surface. Immediately before filling, the surface of each hole shall be thoroughly cleaned to ensure a proper bond. After filling each hole, all excess material shall be removed from the surface.

6.10.3 Where HMA or WMA are not available, use only those materials listed as Approved Products for Surface Works. The Approved Products are available in Adobe Acrobat (.pdf) format at the City of Winnipeg, Corporate Finance, Material Management Internet site at: https://legacy.winnipeg.ca/matmgt/spec/default.stm

6.11 Surface Tolerance

6.11.1 The surface of the asphalt pavement shall be checked with a 3-metre straight edge and be within ± 5 mm from the surrounding area. Areas that do not meet these tolerances shall be corrected to the satisfaction of the Contract Administrator.

6.11.2 Where the posted speed limit is greater than 60 km/hr, the Contract Documents shall identify smoothness requirements for longitudinal profile of the pavement surface. The smoothness requirements shall be approved by the City of Winnipeg, Research and Standards Engineer.

6.12 Opening to Traffic

6.12.1 In no case shall traffic or construction equipment be allowed on the asphalt pavement until completion of quality assurance testing by the Contract Administrator and until the completed pavement has cooled to atmospheric temperature or to such other temperature, as may be approved by the Contract Administrator, that will ensure no deformation of the pavement surface under traffic loading.

6.12.2 The Contract Administrator's decision as to when the pavement will be opened to traffic shall be final. Prior to opening to traffic, the pavement shall be clean and free of aggregates or other deleterious materials on the surface.

7. QUALITY ASSURANCE

7.1 General

7.1.1 Tests used for purposes of assessing compliance with this specification or for acceptance of any products shall be conducted by a certified laboratory approved by the City of Winnipeg, Research and Standards Engineer.

7.1.2 Field sampling and testing of asphalt shall be performed by a certified person.

7.1.3 The Contract Administrator shall be allowed access to all sampling locations and reserves the right to request quality assurance sample(s) at any time.

7.1.4 Samples shall be protected during transportation from any exposure to adverse conditions.

7.1.5 If any sample shows distinct evidence of improper sampling, handling, or testing, the test shall be disregarded and a new sample shall be collected.

7.1.6 Testing in addition to the requirements of this Specification shall be as directed by the Contract Administrator.

7.2 Testing Frequency

7.2.1 Asphalt shall be sampled for acceptance in accordance with Table CW 3410.12.

Table CW 3410.12: Frequency of Sampling and Testing of Asphalt

Asphalt Type	Quantity (tonnes)	Minimum Frequency
MS1, MS2	< 150 150 - 300 > 300	2 test/day 3 tests/day 2 test/150 tonnes
SP1, SP2	--	2 test/150 tonnes

7.2.2 Additional testing shall be as directed by the Contract Administrator.

7.2.3 Copies of all test results shall be sent to the City of Winnipeg, Research and Standards Engineer and to the Contract Administrator.

7.2.4 Copies of asphalt plant scale tickets shall be provided to the Contract Administrator.

7.3 Acceptance Criteria

7.3.1 The Contractor shall reimburse the City for any additional costs the City incurs as a result of failed tests.

7.3.2 Where the work is not funded or administered by the City of Winnipeg or their representative, the party approved by the City of Winnipeg to execute the work will be responsible for making pay adjustments to the City of Winnipeg.

7.3.3 All corrective actions shall be performed at the Contractor's expense.

7.3.4 Acceptance of asphalt shall be based on the following:

7.3.4.1 Visual Inspection:

7.3.4.1.1 The Contract Administrator may reject visually defective asphalt areas based on, but not limited to the following defects: flushing, bleeding, segregation, fat spot, surface damage, and surface contamination. Such defective areas shall be removed and replaced at the Contractor's expense.

7.3.4.2 Bituminous Mix Properties:

7.3.4.2.1 Air Voids: If the measured air voids fall outside the limits specified in Clause 3.3 of this Specification, the Contract Administrator shall apply a payment adjustment in accordance with Table CW 3410.13 against the entire Lot represented by the failed test(s).

TABLE CW 3410.13 – Payment Adjustment for Air Voids

Asphalt Type	Average of the Failed Tests	Percent of Price Reduction %
MS1, MS2	≤ 0.5%	0.0

	0.5% to 1%	0.0*
	> 1%	Remove and replace at Contractor's expense
SP1, SP2	≤ 0.1%	0.0
	0.1% to 0.5%	0.0*
	> 0.5%	Remove and replace at Contractor's expense

*Paving shall be suspended until necessary adjustments are made and approved by the Contract Administrator.

7.3.4.2.2 Voids in Mineral Aggregate (VMA): If the measured voids in mineral aggregate falls outside the limits specified in Clause 3.3 of this Specification, the Contract Administrator shall apply a payment adjustment in accordance with Table CW 3410.14 against the entire Lot represented by the failed test(s).

TABLE CW 3410.14 – Payment Adjustment for Voids in Mineral Aggregate

Average of the Failed Tests	Percent of Price Reduction %
≤ 0.5%	0.0
0.5% to 1%	0.0*
1% to 2%	
> 2%	Remove and replace at Contractor's expense

*Paving shall be suspended until necessary adjustments are made and approved by the Contract Administrator.

7.3.4.2.3 Asphalt Cement Content: If the measured asphalt cement content falls outside the limits specified in Clause 3.3 of this Specification, the Contract Administrator shall apply a payment adjustment in accordance with Table CW 3410.15 against the entire Lot represented by the failed test(s).

TABLE CW 3410.15 – Payment Adjustment for Asphalt Cement Content

Average of the Failed Tests	Percent of Price Reduction %
≤ 0.15%	0.0
0.15% to 0.5%	0.0*
> 0.5%	Remove and replace at Contractor's expense

*Paving shall be suspended until necessary adjustments are made and approved by the Contract Administrator.

7.3.4.2.4 Gradation: If the gradation falls outside the limits specified in Table CW 3410.1, the Contract Administrator shall apply a payment adjustment in accordance with Table CW 3410.16 against the entire Lot represented by the failed test(s).

TABLE CW 3410.16 – Payment Adjustment for Gradation

Percent Passing Outside the JMF for Each Sieve			Percent of Price Reduction %
19, 16, 12.5, 9.5	4.75, 2.36, 1.18, 0.425	0.075	
<2	<1	-	0.0
2-4	1-2	<1	0.0*
> 4	> 2	≥ 1	Remove and replace at Contractor's expense

*Paving shall be suspended until necessary adjustments are made and approved by the Contract Administrator.

7.3.4.3 Density:

7.3.4.3.1 Density testing shall be conducted at least once every 150 m^2. The Contract Administrator shall ensure that the density tests cover the full width of the construction area.

7.3.4.3.2 An area is deemed unacceptable if the compaction does not meet all of the following:

7.3.4.3.2.1 The average density results shall be between 93% and 95% of the theoretical maximum density; and,

7.3.4.3.2.2 No individual location shall be less than 90% or higher than 98% of the theoretical maximum density.

7.3.4.3.3 Nuclear density test gauge results shall be used to assess in-place density. When density test results do not meet the minimum percent density specified herein, a coring and testing program can be undertaken to verify density percentage of the mix by Core Density Testing. If core density results confirm the Nuclear density results, the Contractor shall reimburse the City for any additional costs associated with coring, transmittal of cores, filling of cores and testing the City incurs as a result of failed tests.

7.3.4.3.4 The Contract Administrator shall apply a payment adjustment in accordance with Table CW 3410.17 against the entire lot represented by the failed test(s).

TABLE CW 3410.17 – Payment Adjustment for Density

Average of the Density Tests	Percent of Price Reduction %
> 98%	Remove and replace at Contractor's expense
97.9% to 97.1%	0%*
97% to 93%	0%
92.9% to 90%	0%*
< 90%	Remove and replace at Contractor's expense

*Paving shall be suspended until necessary adjustments are made and approved by the Contract Administrator.

7.3.4.4 Segregation and Surface Defects

7.3.4.4.1 Surface defects include but are not limited to: gouges, slippage, cracking, tearing, pocketing, blistering, shoving, wash boarding, surface depressions or surface defects shall be repaired to the satisfaction of the Contract Administrator.

7.3.4.5 Asphalt Thickness:

7.3.4.5.1 A Lot is deemed unacceptable if the asphalt thickness does not meet all of the following:

7.3.4.5.1.1 The average thickness is less than the required thickness; and,

7.3.4.5.1.2 No individual thickness shall be less than 90% of the required thickness.

7.3.4.5.2 The Contract Administrator shall apply a payment adjustment in accordance with Table CW 3410.19 against the entire Lot represented by the insufficient thickness.

TABLE CW 3410.19 – Payment Adjustment for Pavement Thickness

Average Thickness	Percent of Price Reduction %
Less than specified thickness but more than 90% of specified thickness	0.0*
Less than 90% of specified thickness	Remove and replace at Contractor's expense

*Paving shall be suspended until necessary adjustments are made and approved by the Contract Administrator.