THE CITY OF WINNIPEG

TENDER

TENDER NO. 172-2022

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

TABLE OF CONTENTS

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, **June 7, 2022**.

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

B3. SITE INVESTIGATION

B3.1 Further to C3.1, the Bidder shall attend a Site meeting at Ray Marius and the GWWD rail line at **09:30 on May 26, 2022** or **09:30 on May 31, 2022**. Attendance is mandatory, and the Bid of any Bidder not having attended will be rejected on the basis that it is non-responsive.

B3.2 The Bidder is advised that the meeting is required due to the unique nature of working around the aqueduct and a site with an active railway. Additional access requirements, adjacent construction activities and mobilizing strategies should be considered and reviewed during the site visit.

B3.3 The Bidder shall not be entitled to rely on any information or interpretation received at the Site Meeting unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D5.1.

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 0 unless that response or interpretation is provided by the Contract Administrator in writing.

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

B5. CONFIDENTIALITY

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

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

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

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

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

B6. ADDENDA

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

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

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

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

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

B6.6 Notwithstanding 0, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D5.

B7. SUBSTITUTES

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

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

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

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

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

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

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

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

(e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same

function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.

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

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

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

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

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

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

B8. BID COMPONENTS

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

(a) Form A: Bid/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 his/her own name, his/her name shall be inserted;

(b) if the Bidder is a partnership, the full name of the partnership shall be inserted;

(c) if the Bidder is a corporation, the full name of the corporation shall be inserted;

(d) if the Bidder is carrying on business under a name other than his/her own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

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

B9.3 In Paragraph 3 of Form A: Bid/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 his/her own name, it shall be signed by the Bidder;

(b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;

(c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;

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

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 D29. Any such costs shall be determined in accordance with D29.

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 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 its participation in the Tender process or the Work; or

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

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

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

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

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

B12.4 Without limiting B12.3, the City may, in its sole discretion, waive any and all perceived, potential or actual Conflicts of Interest. The City's waiver may be based upon such terms and conditions as the City, in its sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately avoided or mitigated, including requiring the Bidder to put into place such policies, procedures, measures and other safeguards as may be required by and be acceptable to the City, in its sole discretion, to avoid or mitigate the impact of such Conflict of Interest.

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

(a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of its employees proposed for the Work;

(b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in its sole discretion, determines cannot be avoided or mitigated;

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

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

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

B13. QUALIFICATION

B13.1 The Bidder shall:

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

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

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

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

(a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website 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);

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

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

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

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

(b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/.

B13.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B13.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B14. BID SECURITY

B14.1 The Bidder shall include in its Bid Submission bid security in the form of a digital bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in Form G1: Bid Bond and Agreement to Bond, available on The City of Winnipeg, Corporate Finance, Materials Management Division website at https://www.winnipeg.ca/MatMgt/templates/files/eBidsecurity.pdf.

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(b).

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 his/her Bid without penalty at any time prior to the Submission Deadline.

B18. EVALUATION OF BIDS

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

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

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

(c) Total Bid Price;

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

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

B18.3 Further to B18.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is qualified.

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

B18.4.1 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.

B18.4.2 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

B19. AWARD OF CONTRACT

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

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

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

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

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

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

(d) only one Bid is received; or

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

B19.3 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D29 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.

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

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

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

C0.1 The *General Conditions for Construction* (Revision 2020 01 31) are applicable to the Work of the Contract.

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

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

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. 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:

(a) Bridge Works

(i) Construction of a new cast-in-place single span concrete solid slab bridge and approach slabs with cast-in-place concrete pile caps supported by concrete piles.

(b) Track Work

(i) Dismantling existing rail siding and converting to two spur lines adjacent to Ray Marius.

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

(a) Bridge Works

(i) Drilling and placement of concrete cast-in-place piles;

(ii) Construction of concrete pile caps, bridge deck and approaches; and

(iii) Placement of granular material and grading around edges of the structure.

(b) Track Work

(i) Removal of 78 m of existing rail track siding;

(ii) Salvage and stockpile rail material in approved locations;

(iii) Supply and install appropriate bumping posts at specified distances from Ray Marius Road; and

(iv) Supply and install of rubber mud rails and crossing signage.

D3.3 The following shall apply to the Services:

(a) Universal Design Policy

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

D4. DEFINITIONS

D4.1 When used in this Tender:

(a) "**ACI**" means the American Concrete Institute that complies with the latest edition of standards including amendments and supplements in effect on the date of issue of this Bid Opportunity shall apply to the Work.

(b) "**ASTM**" means the American Society for Testing and Materials that complies with the latest edition of standards including amendments and supplements in effect on the date of issue of this Bid Opportunity shall apply to the Work.

(c) "**CSA**" means the Canadian Standards Association that complies with the latest edition of standards including amendments and supplements in effect on the date of issue of this Bid Opportunity shall apply to the Work.

(d) "**ICRI**" means the International Concrete Repair Institute that complies with the latest edition of standards including amendments and supplements in effect on the date of issue of this Bid Opportunity shall apply to the Work.

(e) "**RSIC**" means the Reinforcing Steel :Institute of Canada that complies with the latest edition of standards including amendments and supplements in effect on the date of issue of this Bid Opportunity shall apply to the Work.

D5. CONTRACT ADMINISTRATOR

D5.1 The Contract Administrator is Stantec Consulting Ltd., represented by:

Eric Tranquada, B.Env.D., P.Eng.
Project Manager

Telephone No. 204 228 2574
Email Address eric.tranquada@stantec.com

D5.2 At the pre-construction meeting, the Contract Administrator will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D6. CONTRACTOR'S SUPERVISOR

D6.1 At the pre-construction meeting, the Contractor shall identify his/her designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D7. NOTICES

D7.1 Except as provided for in C22.4, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid/Proposal.

D7.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D7.3 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D5.

D7.3 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

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

D8. FURNISHING OF DOCUMENTS

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

SUBMISSIONS

D9. AUTHORITY TO CARRY ON BUSINESS

D9.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D10. SAFE WORK PLAN

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

D10.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/Safety/default.stm

D10.3 Notwithstanding B13.4 at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D11. INSURANCE

D11.1 The Contractor shall provide and maintain the following insurance coverage:

(a) wrap-up liability insurance in an amount of no less than five million dollars ($5,000,000) inclusive per occurrence and five million dollars ($5,000,000) general aggregate, covering bodily injury, personal injury, property damage and products and completed operations consistent with industry standard insurance policy wordings. Wrap up liability insurance to also include evidence of contractual liability and cross liability clauses.

(i) The Contractor shall be responsible for deductibles up to $50,000 maximum of any one loss.

(ii) Such insurance to be written in the joint names of the City, Contractors, subcontractors, consultants and sub-consultants.

(iii) BellMTS, Manitoba Hydro, Shaw and Telus shall be shown as additional insureds, if required by contract.

(iv) Wrap-up liability insurance shall be maintained from the date of the commencement of the Work until the date of Total Performance of the work and shall include an additional 24 months completed operations coverage which will take affect after Total Performance.

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

(c) all risks course of construction insurance in the amount of one hundred percent (100%) of the total Contract Price, written in the name of the Contractor and the City at all times during the performance of the Work and until the date of Substantial Performance.

(d) contractor's pollution liability (CPL) in the amount of at least one million dollars ($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.

D11.2 Deductibles shall be borne by the Contractor.

D11.3 All policies shall be taken out with insurers licensed in the Province of Manitoba.

D11.4 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.

D11.5 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.

D12. CONTRACT SECURITY

D12.1 The Contractor shall provide and maintain the performance bond and the labour and material payment bond until the expiration of the warranty period in the form of:

(a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; and

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

D12.1.1 Where the contract security is a performance bond, it may be submitted in hard copy or digital format. If submitted in digital format the contract security must meet the following criteria:

(a) the version submitted by the Contractor must have valid digital signatures and seals;

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

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

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

(e) the results of the verification must provide a clear, immediate and printable indication of pass or fail regarding D12.1(b).

D12.1.2 Digital bonds failing the verification process will not be considered to be valid and may be determined to be an event of default in accordance with C18.1. If a digital bond fails the verification process, the Contractor may provide a replacement bond (in hard copy or digital format) within seven (7) Calendar Days of the City's request or within such greater period of time as the City in its discretion, exercised reasonably, allows.

D12.1.3 Digital bonds passing the verification process will be treated as original and authentic.

D12.2 The Contractor shall provide the City Solicitor with the required performance and labour and material payment bonds within seven (7) Calendar Days of notification of the award of the Contract by way of an award letter and prior to the commencement of any Work on the Site but

in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D12.3 The Contractor shall, as soon as practicable after entering into a contract with a Subcontractor:

(a) give the Subcontractor written notice of the existence of the labour and material payment bond in D12.1(b); and

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

D13. DETAILED PRICES

D13.1 The Contractor shall provide the Contract Administrator with a detailed price breakdown (Form I: Detailed Prices) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D13.2 The Contractor shall state a price for each item or sub-item of the Work identified on Form I: Detailed Prices. The detailed prices must be consistent with the price(s) provided in the Contractor's Bid.

D14. SUBCONTRACTOR LIST

D14.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D15. EQUIPMENT LIST

D15.1 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 least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D16. DETAILED WORK SCHEDULE

D16.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents if applicable.

D16.2 The detailed work schedule shall consist of the following:

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

is acceptable to the Contract Administrator.

D16.3 Further to D16.2(a), the C.P.M. schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path.

D16.4 Further to D16.2(a), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

D16.5 Further to D16.2(a), the daily manpower schedule shall list the daily number of individuals on the Site for each trade.

SCHEDULE OF WORK

D17. COMMENCEMENT

D17.1 The Contractor shall not commence any Work until he/she is in receipt of an award letter from the Award Authority authorizing the commencement of the Work.

D17.2 The Contractor shall not commence any Work on the Site until:

(a) the Contract Administrator has confirmed receipt and approval of:
  (i) evidence of authority to carry on business specified in D9;
  (ii) evidence of the workers compensation coverage specified in C6.15;
  (iii) the Safe Work Plan specified in D10;
  (iv) evidence of the insurance specified in D11;
  (v) the contract security specified in D12;
  (vi) the detailed prices specified in D13;
  (vii) the Subcontractor list specified in D14
  (viii) the equipment list specified in D15;
  (ix) the detailed work schedule specified in D16;
  (x) the construction method statement and equipment list specified in E5.7; and
  (xi) the direct deposit application form specified in D26.

(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.

D17.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the award letter.

D17.4 The City intends to award this Contract by **July 13, 2022**.

D17.4.1 If the actual date of award is later than the intended date, the dates specified for Commencement, Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D18. CRITICAL STAGES

D18.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

(a) Maximum Allowable GWWD Mainline Outage Period of 7 Calendar Days.

D19. SUBSTANTIAL PERFORMANCE

D19.1 The Contractor shall achieve Substantial Performance by **September 21, 2022**.

D19.2 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.

D19.3 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.

D20. TOTAL PERFORMANCE

D20.1 The Contractor shall achieve Total Performance by **September 30, 2022**.

D20.2 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.

D20.3 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.

D21. LIQUIDATED DAMAGES

D21.1 If the Contractor fails to achieve Critical Stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Calendar Day for each and every Calendar Day following the days fixed herein for same during which such failure continues:

(a) Critical Stage – Maximum Allowable GWWD Mainline Outage Period of 7 Calendar Days –Five thousand dollars ($5,000);

(b) Substantial Performance – Five thousand dollars ($5,000);

(c) Total Performance – Five thousand dollars ($5,000).

D21.2 The amounts specified for liquidated damages in D21.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

D21.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D22. COVID-19 SCHEDULE DELAYS

D22.1 The City acknowledges that the schedule for this Contract may be impacted by the COVID-19 pandemic. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the health and safety of workers and the public, directives from health authorities and various levels of government and in close consultation with the Contract Administrator.

D22.2 If the Contractor is delayed in the performance of the Work by reason of the COVID-19 pandemic, the Work schedule may be adjusted by a period of time equal to the time lost due to such delay and costs related to such delay will be determined as identified herein.

D22.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether COVID-19 will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to COVID-19, including but not limited to evidence related to availability of staff, availability of Material or work by others.

D22.4 For any delay related to COVID-19 and identified after Work has commenced, the Contractor shall within seven (7) Calendar Days of becoming aware of the anticipated delay declare the additional delay and shall provide sufficient evidence as indicated in D22.3. Failure to provide this notice will result in no additional time delays being considered by the City.

D22.5 The Work schedule, including the durations identified in D18 to D20 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.

D22.6 Where Work not previously identified is being carried over solely as a result of delays related to COVID-19, as confirmed by the Contract Administrator, the cost of temporary works to maintain the Work in a safe manner until Work recommences, will be considered by the Contract

Administrator. Where the Work is carried over only partially due to COVID-19, a partial consideration of the cost of temporary works will be considered by the Contract Administrator.

D22.7 Any time or cost implications as a result of COVID-19 and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

CONTROL OF WORK

D23. DAMAGE TO AQUEDUCT

D23.1 Adequate care shall be taken to avoid damage to the Aqueduct, adjacent structures, or properties during the course of the work. The Aqueduct is a non-reinforced concrete structure and has very limited capacity to withstand any additional loads imposed directly above or adjacent to it. It also has a very limited capacity to withstand asymmetrical loading. The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D23.2 Bidders are advised that internal inspections of the Aqueduct within the work area will have been carried out prior to construction. Subsequent inspections will be carried out during and after construction to confirm that no damage to the Aqueduct has occurred as a result of construction.

D23.3 The contractor further agrees that should the Shoal Lake Aqueduct be damaged due to the fault of the Contractor during any construction phase, the Contractor must immediately repair the damage at his own expense. The City reserves the right to handle all engineering and construction aspects of the repair at the Contractor's expense.

D23.4 In the event that the Aqueduct is damaged, and the damage is unrelated to the Contractor's activities, it is advised that the City has developed an Emergency Repair Plan to respond to a structural collapse of the Aqueduct. In the event of such an emergency, the highest priority would be the mobilization to the site of the necessary materials and equipment necessary to effect the repair.

D23.5 Should it be necessary to invoke the Emergency Repair Plan the Contractor may not be able to continue the Work during this time.

D23.6 During the course of emergency repairs, the City may request assistance from the Contractor and his equipment.

D24. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D24.1 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).

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

D25.1 Further to B13.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B13.4.

MEASUREMENT AND PAYMENT

D26. PAYMENT

D26.1 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

D27. WARRANTY

D27.1 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.

D27.2 Notwithstanding C13.2 or D27.1, 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.

D27.2.1 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

DISPUTE RESOLUTION

D28. DISPUTE RESOLUTION

D28.1 The entire text of C21.4 is deleted, and amended to read: “Intentionally Deleted”

D28.2 The entire text of C21.5 is deleted, and amended to read:

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

D28.3 Further to C21, prior to the Contract Administrator’s issuance of a Final Determination, the following informal dispute resolution process shall be followed where the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator (“Dispute”):

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

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

(i) The Contract Administrator;

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

(iii) Department Head.

D28.4 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.

D28.5 As these negotiations are not an adjudicative hearing, neither party may have legal counsel present during the negotiations.

D28.6 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.

D28.7 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 D28.6, as extended if applicable, has elapsed, the Contract Administrator will issue a Final Determination as defined in C1.1(v), at which point the parties will be governed by the Dispute Resolution process set out in C21.

THIRD PARTY AGREEMENTS

D29. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D29.1 In the event that funding for the Work of the Contract is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, the following terms and conditions shall apply, as required by the applicable funding agreements.

D29.2 Further to D29.1, in the event that the obligations in D29 apply, actual costs legitimately incurred by the Contractor as a direct result of these obligations ("Funding Costs") shall be determined by the actual cost to the Contractor and not by the valuation method(s) outlined in C7.4. In all other respects Funding Costs will be processed in accordance with Changes in Work under C7.

D29.3 For the purposes of D29:

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

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

D29.4 Modified Insurance Requirements

D29.4.1 If not already required under the insurance requirements identified in D11, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars ($2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and its Ministers, officers, employees, and agents shall be added as additional insureds.

D29.4.2 If not already required under the insurance requirements identified in D11, the Contractor will be required to provide builders' risk insurance (including boiler and machinery insurance, as applicable) providing all risks coverage at full replacement cost, or such lower level of insurance that the City may identify on a case-by-case basis, such as an installation floater.

D29.4.3 The Contractor shall obtain and maintain third party liability insurance with minimum coverage of two million dollars ($2,000,000.00) per occurrence on all licensed vehicles operated at the Site. In the event that this requirement conflicts with another licensed vehicle insurance requirement in this Contract, then the requirement that provides the higher level of insurance shall apply.

D29.4.4 Further to D11.4, insurers shall provide satisfactory Certificates of Insurance to the Government of Manitoba prior to commencement of Work as written evidence of the insurance required. The Certificates of Insurance must provide for a minimum of thirty (30) days prior written notice to the Government of Manitoba in case of insurance cancellation.

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

D29.5 Indemnification By Contractor

D29.5.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for Construction, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers, servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.

D29.6 Records Retention and Audits

D29.6.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.

D29.6.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for Construction, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total Performance, all records, documents, and contracts referred to in D29.6.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.

D29.7 Other Obligations

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

D29.7.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.

D29.7.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.

D29.7.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.

D29.7.5 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.

D29.7.6 The Contractor represents and warrants that no member of the House of Commons or of the Senate of Canada or of the Legislative Assembly of Manitoba is a shareholder, director

or officer of the Contractor or of a Subcontractor, and that no such member is entitled to any benefits arising from this Contract or from a contract with the Contractor or a Subcontractor concerning the Work.

FORM H1: PERFORMANCE BOND
(See D12)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 172-2022

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

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

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

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

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

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

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

_____ day of _____ , 20____ .

SIGNED AND SEALED
in the presence of:

_____
(Witness as to Principal if no seal)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

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

FORM H2: LABOUR AND MATERIAL PAYMENT BOND
(See D12)

KNOW ALL MEN BY THESE PRESENTS THAT

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

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 172-2022

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

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

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

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

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

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

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

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

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

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

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

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

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

_____ day of _____ , 20____ .

SIGNED AND SEALED
in the presence of:

_____
(Witness as to Principal if no seal)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

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

FORM I: DETAILED PRICES
(See D13)

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

ITEM NO.	DESCRIPTION	SPEC. REF.	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						
19.						
20.						
21.						
22.						
23.						
24.						
25.						
26.						
27.						
28.						
29.						
30.						

FORM I: DETAILED PRICES

(See D13)

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

ITEM NO.	DESCRIPTION	SPEC. REF.	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
31.						
32.						
33.						
34.						
35.						
36.						
37.						
38.						
39.						
40.						
41.						
42.						
43.						
44.						
45.						
46.						
47.						
48.						
49.						
50.						
51.						
52.						
53.						
54.						
55.						

FORM J: SUBCONTRACTOR LIST
(See D13)

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

Name	Address

FORM K: EQUIPMENT
(See D15)

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

1. Category/type: **Earthmoving / Excavation**

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

2. Category/type: **Pile Drilling**

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

3. Category/type: **Compaction and Grading**

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

FORM K: EQUIPMENT
(See D15)

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

4. Category/type: **Concrete Paving**

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

5. Category/type: **Asphalt Paving**

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

6. Category/type: **Concrete Placement / Pumping**

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

FORM K: EQUIPMENT
(See D15)

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

7. Category/type: **Lifting / Craning**

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

8. Category/type: **Soft Digging / Hydro Excavation**

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

9. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

FORM K: EQUIPMENT
(See D15)

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

10. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

11. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

12. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

FORM L: DETAILED WORK SCHEDULE

(See D15)

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

For each item of Work, indicate the cumulative percentage proposed to be completed by the end of each time period until 100% completion is achieved.

Items of Work	Time Period in Working Days					
	0	10	20	30	40	50

FORM L: DETAILED WORK SCHEDULE

(See D15)

ST. BONIFACE INDUSTRIAL PARK – PHASE 2 RAY MARIUS ROAD AQUEDUCT BRIDGE

For each item of Work, indicate the proposed date that each cumulative percentage to be completed will be achieved.					
Items of Work	Percentage of Work Completed				
	Start	25%	50%	75%	100%

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

E1.2 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.

E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/Spec/Default.stm .

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

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

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

E1.4 The following are applicable to the Work:

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
B254-20-01	Cover Sheet & Drawing Index	A1 (594x841)
B254-20-02	General Arrangement	A1 (594x841)
B254-20-03	Foundation Plan & Concrete Details	A1 (594x841)
B254-20-04	Reinforcing Details	A1 (594x841)
B254-20-05	Rail Details	A1 (594x841)

E2. SOILS INVESTIGATION REPORT

E2.1 The soils investigation report will be available to the Contractor for viewing at Stantec Consulting Ltd.'s office at 500-311 Portage Avenue. The report may not be copied or removed from Stantec's office.

GENERAL REQUIREMENTS

E3. WORKING IN PROXIMITY TO MANITOBA HYDRO OVERHEAD LINES

E3.1 Description

E3.1.1 Any work within 3 m of a Manitoba Hydro overhead line requires Manitoba Hydro Safety watch, unless altered by Manitoba Hydro in writing.

E3.1.2 The Contractor shall organize all safety watches that may be required.

E3.2 Measurement and Payment

E3.2.1 Manitoba Hydro Safety watch will be considered incidental to the Work. No measurement and payment will be made within this section.

E4. WORKING NEAR RAIL

E4.1 The Contractor is advised that the GWWD Railway will remain in operation throughout the construction period and that regular communication and coordination with GWWD dispatch and operations be maintained for the duration of the project.

E4.2 Operation of the GWWD Railway is of critical importance to the quantity and quality of the City's water supply. Supply of water treatment chemicals for the treatment and disinfection of the water supply is of paramount importance. Water treatment chemicals are hauled to the Drinking Water Treatment Plant at Deacon as well as the Aqueduct Intake at Shoal Lake in rail car quantities via the GWWD Railway. Due to the limited storage capacity at these facilities, it is imperative that the work be sufficiently complete at the date of Substantial Performance to allow the railway to resume full operations at that time.

E4.3 Any work remaining after the date of Substantial Performance must be carried out without interfering with GWWD Railway operations. No work or the situating of vehicles or equipment closer that 4 m to the nearest rail on the GWWD main line is allowed without prior consent of the GWWD Railway.

E4.4 General Requirements

E4.4.1 The Contractor shall be responsible to meet all railway company, Greater Winnipeg Water District (GWWD), constraints, requirements, and safety measures.

E4.4.2 Prior to commencement of roadworks within the Rail right-of-way the Contractor is responsible to coordinate a kick-off meeting with GWWD to determine limits of Work Foul of Track.

E4.4.3 The Contractor shall coordinate with the City of Winnipeg for any closure of the GWWD Rail line. Notice of any proposed closure requested a minimum of 3-4 weeks in advance of the scheduled activity with a maximum mainline outage of seven (7) days. Mainline outages shall be considered critical stages to the work as referenced in Sections D18 and D21.

E4.5 Description of Work

E4.5.1 The Contractor will construct the railway crossing with required resurfacing roadworks. The intended detailed railway crossing shall be City of Winnipeg SD-231A.

E4.6 Safety Requirements

E4.6.1 Contractor safety requirements are included in Appendix 'B' and conform to the CP Minimum Safety Requirements for Contractors. The Contractor is advised that the requirements are applicable to all of the Contractor's personnel and equipment crossing GWWD tracks and property.

E4.7 Railway Flagging Costs

E4.7.1 The Contractor shall coordinate work so as to limit operations requiring railway flagging, to minimize these costs to the project to the satisfaction of the Contract Administrator. Railway flagging costs identified by the Contract Administrator to be a result of poor coordination shall be borne by the Contractor.

E4.8 Working Within the Shoal Lake Aqueduct (SLA) Property

E4.8.1 The Contractor shall minimize the time working within the SLA property. The Contractor shall only enter for;

(a) Construction of the new rail crossing;

(b) Construction of the pavement and related works adjacent to the rail only if required and;

(c) Track Work as described in E16;

E4.9 Measurement and Payment

E4.9.1 Working Near Rail will considered incidental to the Work. No measurement and payment will be made within this section.

E5. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO CRITICAL WATER INFRASTRUCTURE

E5.1 This section describes specific requirements for Work in close proximity to critical water infrastructure. Close proximity shall be deemed to be any construction activity within a 5 m horizontal offset from a feeder main/water main, aqueduct, within 5 m of valve chambers and other appurtenances, and any other infrastructure identified below.

E5.2 The following shall be considered critical pipelines and water infrastructure for this project:

(a) Shoal Lake Aqueduct, 1650 mm Concrete Aqueduct - Installed on the south side of the GWWD rail line siding and running parallel to the main line tracks.

(b) Shoal Lake Aqueduct Underdrain, 200 mm vitrified clay tile or PVC in some sections – Installed on the north side of the aqueduct running parallel to reduce groundwater elevations adjacent to the aqueduct.

(c) South Transcona Feedermain, 750 mm Prestressed Concrete Pressure (PSC) Pipe installed south of the aqueduct crossing beneath Ray Marius Road.

E5.3 The above noted critical pipelines are critical components of the City's regional water supply system and work in close proximity to the critical pipelines shall be undertaken with an abundance of caution. The above noted critical pipelines and in particular the Shoal Lake Aqueduct cannot typically be taken out of service for extended periods to facilitate construction. Inadvertent damage caused to these pipes would likely have catastrophic consequences.

E5.4 Work around critical water infrastructure shall be planned and implemented to minimize the time period that Work is carried out in close proximity to the critical water infrastructure and to ensure that the critical water infrastructure is not subjected to excessive construction related loads, including excessive vibrations and/or concentrated or asymmetrical lateral loads during backfill placement.

E5.5 Construction in close proximity to critical infrastructure shall not commence until both the equipment list and construction method statement have been submitted, reviewed, and accepted by the Contract Administrator.

E5.6 The Contract Administrator reserves the right to issue a Stop Work Order if the Contractor uses equipment not previously approved, or if equipment is used in an area not previously approved by the Contract Administrator.

E5.7 Submittals:

(a) Submit an equipment travel path plan indicating travel paths for all vehicles that are required to travel off of paved portions of the Site (gravel, asphalt and concrete) or over GWWD infrastructure (rail lines, siding etc.).

(b) Submit the proposed construction equipment specifications to the Contract Administrator for review a minimum of five (5) Business Days prior to commencing work around critical water infrastructure. The equipment submission shall include:

(i) Equipment operating and payload weights;

(ii) Equipment dimensions, including wheel or track base, track length or axle spacing, and track widths or wheel configurations; and

(iii) Load distributions in the intended operating configuration.

(c) Submit a detailed craning plan including the location of setup, the rigging configuration and lifting devices, and probable ground pressures resulting below the crane wheels and all outriggers.

(d) Submit crane mat Shop Drawings sealed, signed, and dated by a Professional Engineer licensed to practice in the Province of Manitoba for all crane mats necessary to complete the Works.

(e) Submit a construction method statement to the Contract Administrator a minimum of five (5) Business Days prior to commencing Work around critical water infrastructure. The construction method statement shall contain the following minimum information:

(i) Proposed construction plan including excavation locations, haul routes, excavation equipment locations, and loading positions; and

(ii) Excavation plans, including shoring designs.

(f) Incomplete or partial submissions will not be reviewed and will be returned to the Contractor for re-submission.

(g) Allow five (5) Business Days for review of all Submittals by the Contract Administrator.

E5.8 Pre-Work Planning and General Execution

(a) No work shall commence in close proximity to critical infrastructure until the equipment specifications and construction method statement have been submitted and accepted, and critical infrastructure locations have been clearly delineated in the field. Work over piping shall only be carried out with equipment that has been reviewed and quantified in terms of its loading implications on the pipe.

(b) Contact the City of Winnipeg Water and Waste Department, Construction Services Coordinator prior to construction.

(c) Locate critical infrastructure and confirm their position horizontally and vertically prior to undertaking Work in close proximity to the identified critical infrastructure. Note, exact locations to be identified in the field. Deviations from the elevations noted on the drawings shall be reported to the Contract Administrator prior to proceeding with Work.

(d) Visually delineate all critical infrastructure identified herein on Site by use of paint, staking/flagging, construction fencing, snow fencing, or other suitable methods.

(e) Only utilize construction practices and procedures that do not impart excessive vibratory loads on critical infrastructure or that would cause settlement of the subgrade below critical infrastructure.

(f) Only equipment and construction practices stipulated in the accepted construction method statement and the supplemental requirements noted herein may be utilized in close proximity to critical infrastructure identified herein.

(g) Granular material, construction material, soil, and/or other material shall not be stockpiled on the pipelines or within 5 m of critical infrastructure identified herein.

(h) The Contractor shall ensure that all crew members understand and observe the requirements of working near critical infrastructure. Prior to commencement of on-Site work, the Contractor shall jointly conduct an orientation meeting with the Contract Administer, all superintendents, foreman, and heavy equipment operators to make all workers on the Site fully cognizant of the limitations of altered loading on, the ramifications of inadvertent damage to, and the constraints associated with work in close proximity to critical infrastructure. New personnel introduced after commencement of the project need to be formally orientated as outlined herein. It is recommended that restrictions associated with the crossing, consistent with the Contractor's submitted method statement be posted on Site and near the crossing.

E5.9 Demolition, Excavation, and Shoring

(a) Use of pneumatic concrete breakers within 3 m of a critical pipeline is prohibited. Pavement shall be full depth sawcut and carefully removed. Use of hand-held jackhammers for pavement removal will be allowed.

(b) Offset excavation equipment a minimum of 3 m from the center line of critical pipelines when undertaking excavations.

E5.10 Excavation

(a) Utilize only smooth edged excavation buckets, soft excavation, or hand excavation techniques where there is less than 1.5 m of earth cover over the pipeline.

(b) Where there is less than 1.0 m of soil cover above the pipeline, provide full time supervision and complete the excavation utilizing hand excavation, soft excavation methods, or machine excavation. Where machine excavation is to be used, the crown of

the pipeline must be exposed (or suitable located) using hand or soft excavation methods a minimum of every 1.8 m.

(c) Where there is less than 0.5 m of soil cover above the pipeline, provide full time supervision and complete the excavation utilizing hand excavation or soft excavation methods only.

(d) Excavations within 3 m of the outside edge of critical infrastructure (hydrovac holes for confirming trenchless installations excluded} and which extend below obvert of piping shall utilize shoring methods that precludes the movement of native in-situ soils (i.e., a tight shoring system).

E5.11 Subgrade Construction

(a) Subgrade and backfill compaction within 3 metres (horizontal) of piping shall be limited to non-vibratory methods only. Small walk behind vibratory packers will be permitted.

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

(c) Fill material shall not be dumped directly on pipelines but shall be stockpiled outside the limits noted in these recommendations.

E5.12 Subbase and Base Construction

(a) Subbase or base course materials shall not be dumped directly on pipelines but shall be stockpiled outside limits noted in these recommendations.

(b) Subbase compaction within 3 m horizontal of a critical pipeline shall be either carried out by static methods (without vibration) or with smaller approved equipment such as hand-held plate packers or smaller roller equipment.

E5.13 Crane Mats

(a) The Contractor shall furnish 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 associated with the crane mats.

(b) The Work associated with the crane mats shall include, but is not limited to:

(i) Design, supply, and installation of all crane mats necessary to complete the Works.

(ii) Removal of crane mats off-Site upon the completion of all crane Works.

(c) References

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

City of Winnipeg's Specification CW-3130 (latest edition) - Supply and Installation of Geotextile Fabrics.

(d) Equipment

(i) The Contractor's equipment shall conform to the requirements of the Works and all notes shown on the Drawings.

(e) Measurement and Payment

(i) Crane mats will be considered incidental to "Mobilization and Demobilization" on Form B: Prices and no additional measurement or payment will be made.

E6. MOBILIZATION AND DEMOBILIZATION

E6.1 Description

E6.1.1 This Specification shall cover all operations relating to the mobilization and demobilization of the Contractor to the Site, as specified herein.

E6.1.2 The Work to be done by the Contractor under this Specification shall include labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all works hereinafter specified.

E6.2 Scope of Work

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

(i) Mobilizing and demobilizing on-site Work facilities;

(ii) Construction of the structure detailed in the attached drawings

(iii) Supplying and installing of materials required for the construction of the structure detailed in the attached drawings;

(iv) Restoration and clean-up of the site following the construction of the structure to its original condition.

(v) Obtaining utility locates on site (CN and/or GWWD signal and communication lines; feedermain; aqueduct; underdrain etc.)

E6.3 Materials

E6.3.1 The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification. All materials to be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E6.3.2 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.

E6.4 Equipment

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

E6.5 Construction Methods

E6.5.1 Layout of On-Site Work Facilities

(a) The Contractor shall mobilize all on-site Work and other temporary facilities and submit their proposed on-site location for approval prior to commencing the Work.

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

E6.5.2 Restoration of Existing Facilities

(a) Upon completion of the Work and demobilization, the Contractor shall restore existing facilities.

(b) Restoration of areas disturbed by the Contractor's laydown areas and access to the works shall be performed as directed by the Contract Administrator. Restoration of disturbed areas outside of those areas identified in the Drawings will be considered incidental to Mobilization and Demobilization and no measurement or payment will be made for the restoration work.

E6.6 Quality Control

E6.6.1 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.

E6.6.2 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.

E6.7 Measurement and Payment

E6.7.1 Mobilization and demobilization will not be measured and will be paid for at the Contract Lump Sum Price for "Mobilization and Demobilization", which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

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

(a) 30% when the Contract Administrator is satisfied that construction has commenced.

(b) 60% when Substantial Performance has been met, or sooner as determined by the Contract Administrator.

(c) 10% upon completion of the project.

E7. SHOP DRAWINGS

E7.1 Description

(a) This Specification provides instructions for the preparation and submission of Shop Drawings. The term 'Shop Drawings' means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data including Site erection drawings which are to be provided by the Contractor to illustrate details of the portion of the Work.

(b) Further to C6.9, the Contractor shall arrange for the preparation of Shop Drawings required by the Contract, or as reasonably required by the Contract Administrator.

(c) The Contractor shall submit to the Contract Administrator for review, all specified Shop Drawings. All submissions must be in metric units. Where data is in imperial units, the correct metric equivalent shall also be shown on all submissions for the Contract Administrators review.

E7.2 Shop Drawings

(a) Original drawings shall be prepared by the Contractor, to illustrate the appropriate portion of Work including fabrication, layout, setting, or erection details as specified in the appropriate sections.

(b) Shop Drawings shall bear the seal of a Professional Engineer licenced to practice in the Province of Manitoba.

(c) Shop Drawings shall be prepared by the Contractor.

E7.3 Contractor's Responsibilities.

(a) Review Shop Drawings, product data, and samples prior to submission and stamp and sign drawings indicating conformance to the Contract requirements.

(b) Verify:

(i) Field Measurements;

(ii) Field Construction Criteria; and

(iii) Catalogue numbers and similar data.

(c) Coordinate each submission with requirement of Work and Contract Documents. Individual Shop Drawings will not be reviewed until all related drawings are available.

(d) Promptly submit Shop Drawings in an orderly sequence to prevent delay in the Work or the Work of other Contractors.

(e) Notify the Contract Administrator, in writing at the time of submission, of deviations from requirements of Contract Documents.

(f) Responsibility of deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator's review of submission unless Contract Administrator gives written acceptance of specified deviations.

(g) Responsibility for errors and omissions in submissions is not relieved by Contract Administrator's review of submittals.

(h) Make any corrections required by the Contract Administrator and resubmit the required number of corrected copies of Shop Drawings. Direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the Contract Administrator on previous submission.

(i) After Contract Administrator's review and return copies, distribute to Subcontractors and others as appropriate.

(j) Maintain one (1) complete set of reviewed Shop Drawings, filed by Specification Section Number, at the Site of the Work for use and reference of the Contract Administrator and Subcontractors.

E7.4 Submission Requirements

(a) Allow for a ten (10) Business Day period for review by the Contract Administrator of each individual and re-submission, unless noted in the Contract Documents.

(b) Accompany submissions with transmittal letter containing:

(i) Date;
(ii) Project title and Tender Number;
(iii) Contractor's name and address;
(iv) Number of each Shop Drawing, product data and sample submitted;
(v) Specification Section, Title, Number, and Clause;
(vi) Drawing Number and Detail/Section Number; and
(vii) Other pertinent data.

(c) Submission shall include:

(i) Date revision dates; and
(ii) Project title and tender number.

(d) Name of:

(i) Contractor;
(ii) Subcontractor;
(iii) Supplier;
(iv) Manufacturer;
(v) Detailer (if applicable);
(vi) Identification of product or material;
(vii) Relation to adjacent structure or materials;
(viii) Field dimensions, clearly identified as such;
(ix) Specification section name, number, and clause number or drawing number and detail/section number.
(x) Applicable standard, such as CSA or CGSB numbers; and
(xi) Contractor's stamp, initialed or signed, certifying review of submission, verification of field measurements and compliance with Contract Documents.

E7.5 Other Considerations

(a) Fabrication, erection, installation, or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent Shop Drawings and resubmit.

(b) Material and equipment delivered to the Site of the Works will not be paid for at least until pertinent Shop Drawings have been submitted and reviewed.

(c) Incomplete Shop Drawing information will be considered as stipulated deductions for the proposes of progress payment certificates.

(d) No delay or cost claims will be allowed that arise because of delays in submissions, resubmissions, and the review of the Shop Drawings.

E8. TRAFFIC AND PEDESTRIAN CONTROL MANAGEMENT DURING BRIDGE CONSTRUCTION

E8.1 Description

(a) This Specification shall cover all operations relating to the supply, erection, and maintenance of all applicable traffic control for the completion of the Bridge Works.

E8.2 General

(a) The City of Winnipeg is responsible for traffic control for the GWWD Rail line.
(b) The Contractor is responsible for controlling public access to the site and for safety within the site.

E8.3 Measurement and Payment

E8.4 Traffic and Pedestrian Control During Bridge Construction will be considered incidental to E4, “Mobilization and Demobilization.” No measurement and payment will be made within this section.

E9. REINFORCING STEEL

E9.1 Description

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

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

E9.2 Referenced Specifications and Drawings

(a) The latest edition and subsequent revisions of the following:
  (i) ASTM A955M – Standard Specification for Deformed and Plain Stainless-Steel Bars for Concrete Reinforcement;
  (ii) ASTM A615M – Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement;
  (iii) ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete;
  (iv) CAN/CSA A23.1/A23.2 – Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete;
  (v) CAN/CSA G30.18 – Carbon-Steel Bars for Concrete Reinforcement;
  (vi) Reinforcing Steel Institute of Canada – Reinforcement Steel Manual of Standard Practice.

E9.3 Scope of Work

(a) The Work under this Specification shall involve supplying and placing all black and stainless steel reinforcing (including dowels), as shown on the Drawings for the following Works:
  (i) Cast in-place reinforced concrete pile caps
  (ii) Cast in-place reinforced deck slab

(iii) Cast in-place reinforced approach slabs

(iv) Cast in-place reinforced curb barrier

E9.4 Submittals

(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) Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any Work on Site a Certificate of Compliance from the Manufacturer stating that the stainless steel materials supplied comply with the provisions of ASTM A955M and these Specifications, including corrosion resistance.

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

(d) Contractor to submit Quality Control Testing Program to the Contract Administrator in accordance with E9.9, “Quality Assurance”.

(e) Shop Drawings shall be submitted in accordance with the latest edition of the Reinforcement Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada (RSIC).

E9.5 Materials

E9.5.1 General

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

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

E9.5.2 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 the latest edition and all subsequent revisions of CAN/CSA-A23.1, “Storage of Materials”, except as otherwise specified herein.

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

(c) The Contractor shall handle and store the reinforcing steel in a manner that ensures it is not damaged or contaminated with dirt or other materials.

(d) The reinforcing steel shall not be placed directly on the ground. Timber pallets shall be placed under the reinforcing steel to keep them free from dirt and mud and to provide easy handling.

E9.5.3 Handling and Storage of Stainless-Steel Reinforcing

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

(b) Chains or steel bands used for shipping shall not be in direct contact with stainless steel reinforcing. Use wood or other soft material to protect the bars, or use nylon or polypropylene slings.

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

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

E9.5.4 Reinforcing Steel

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

(b) Black steel as shown on the Drawings and shall conform to the requirements of CAN/CSA G30.18, Grade 400W.

(c) Stainless steel, as shown on the Drawings, shall be a high-manganese, low-nickel, nitrogen-strengthened austenitic stainless steel. Stainless steel reinforcing shall meet or exceed the minimum requirements of ASTM A955M, 300 Series, minimum Grade 420, of the Types listed below in **TABLE 1**, "Type of Stainless Steel Reinforcing". Reinforcing deformations shall conform to the requirements of ASTM A615M. All hooks and bends shall be bent using pin diameters and dimensions recommended by RSIC.

(d) If, in the opinion of the Contract Administrator, any reinforcing steel provided for the concrete Works exhibit flaws in manufacture or fabrication, such material shall be immediately removed from the site and replaced with acceptable reinforcing steel.

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

TABLE 1 – TYPE OF STAINLESS STEEL REINFORCING

Common or Trade Name	AISI Type	UNS Designation
Type 316 LN	316 LN	S31653
Type 2205	Duplex 2205	S31803
Type 2304	Duplex 2304	S32304

E9.5.5 Bar Accessories

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

(b) Bar chairs, bolsters, and bar supports shall be made from cementitious material. No plastic or PVC, or galvanized bar supports shall be used.

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

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

(e) Tie wire shall be the following:

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

(ii) Nylon-, epoxy-, or plastic-coated wire for black steel reinforcing; and

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

(f) Bar accessories shall include bar chairs, spacers, clips, wire ties, wire (18 gauge minimum), or other similar devices that may be approved by the Contract Administrator. The supplying and installation of bar accessories shall be deemed to be incidental to the supplying and placing of reinforcing steel.

E9.5.6 Mechanical Splices

(a) Mechanical splices shall be stainless steel, meeting the requirements of ASTM A955M, Type 316L, Type 2005, or Type XM-28.

E9.5.7 Bonding Agent/Grout

(a) Epoxy resin shall conform to the requirements of ASTM C881. Type I Grade 3 epoxy shall be used for bonding reinforcing steel into hardened concrete.

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

(c) Bonding agents for bonding reinforcing steel into holes in hardened concrete other than epoxy resin may be permitted provided that they develop a minimum pullout resistance of 50 kN within 48 hours after installation.

(d) Fabrication of stainless steel reinforcing shall take place in an area isolated from carbon steel reinforcing to prevent surface contamination.

(e) Stainless steel reinforcing shall be stored separately from carbon steel reinforcing.

(f) All equipment shall be cleaned prior to bending stainless steel reinforcing.

E9.6 Equipment

E9.6.1 General

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

(b) All tools used for stainless steel reinforcing shall be stainless steel and shall not be contaminated with iron or non-stainless steel.

E9.7 Construction Methods

E9.7.1 Fabrication of Reinforcing Steel

(a) All reinforcing steel shall be fabricated in accordance with the latest edition of the Reinforcement Steel Manual of Standard Practice by the RSIC, to the lengths and shapes as shown on the Drawings.

(b) Stainless steel reinforcing shall be bent to the proper shape in a plant that has suitable devices for bending stainless steel as recommended in Reinforcing Steel Institute of Canada (RSIC) Manual of Standard Practice. Heating shall not be used as an aid in bending. The equipment used in the plant shall not cause any surface contamination or damage to the surface of the bars. Stainless steel shall be tagged, indicating the mill and fabricator, stainless steel type and grade, and bar mark number including stainless designation.

E9.7.2 Fabrication of Stainless-Steel Reinforcing

(a) Fabrication of the solid stainless steel reinforcing shall be such that the bar surfaces are not contaminated with deposits of iron and non-stainless steels.

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

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

E9.7.3 Placing and Fastening of Reinforcing Steel

(a) General

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

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

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

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

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

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

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

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

(ix) Distances from the forms shall be maintained by means of stays, spacers, or other approved supports. Spacers and supports for holding reinforcing steel at the required location and ensuring the specified concrete cover over the reinforcing steel shall be as specified in E9.5.5, “Bar Accessories”.

(x) Welding or tack welding is not permitted.

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

(b) Placing Stainless Steel Reinforcing

(i) Stainless steel reinforcing will be rejected if:

- Any area of contamination of the stainless steel by iron exceeds 100 mm in length;
- Two or more areas of iron contamination greater than 25 mm in length occur along the length of the bar; or
- There are frequent small occurrences of rust contamination along the full length of the bar.

(ii) If stainless steel reinforcing bars have been rejected due to excessive iron contamination, the Contractor may attempt to treat the bar to remove the contamination. This treatment can be accomplished by mechanical cleaning with a stainless steel wire brush, or by a polishing machine, or by chemical treatment, pickling. If the treatment(s) are not successful, the contaminated bar(s) shall be replaced at no cost to the Owner.

(iii) If the stainless steel reinforcing is mechanically damaged, the bars will be rejected, and the Contractor shall replace the rejected bars at no cost to the Owner. Any cuts into a bar, sharp tears, or flattening of the deformations on the bars will be cause for rejection.

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

(v) All tools used for placing shall be stainless steel and shall not be contaminated with iron or non-stainless steel.

(vi) For lapping steel reinforcing bars at the joints and intersection, an ample supply of stainless steel wire shall be provided. The wire shall not be contaminated with non stainless steel.

(vii) Proper stainless steel cutting pliers shall be used and the bending and tying of the wires done as neatly as possible.

(viii) Twisted ends of the tie wire shall be bent away from forms and surfaces so that they do not project into the concrete cover over the reinforcing steel.

E9.7.4 Splicing

(a) General

(i) Splices shall only be provided as shown on the Drawings. Splices other than as shown on the Drawings will not be permitted without the written approval of the Contract Administrator.

(ii) For lapped splices, the bars shall be placed in contact and wired together in such a manner as to maintain a clearance of not less than the required minimum clear distance to other bars, and the required minimum distance to the surface of the concrete. In general, suitable lap lengths shall be supplied as detailed on the Drawings. If this information is not detailed on the Drawings, a minimum of thirty-five (35) bar diameters lap length shall be provided.

E9.8 Quality Control

E9.8.1 Inspection

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

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

(c) A minimum of two (2) Business Days advance notice shall be given to the Contract Administrator prior to the pouring of any concrete to allow for inspection of the reinforcing steel.

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

E9.8.2 Access

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

E9.9 Quality Assurance

E9.9.1 Testing

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

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

E9.10 Measurement and Payment

E9.10.1 Supplying and placing reinforcing steel will be measured on a mass basis and will be paid for at the Contract Unit Price per kilogram for the “Items of Work” listed here below, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

Items of Work:

Supplying and placing reinforcing steel:

(a) Supply Black Reinforcing Steel

(b) Supply Stainless Reinforcing Steel

(c) Place Black Reinforcing Steel

(d) Place Stainless Reinforcing Steel

E10. STRUCTURAL CONCRETE

E10.1 Description

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

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

E10.2 Scope of Work

(a) The Work under this Specification shall involve the following structural concrete Works:

(ii) Piles and Pile Caps:

(i) Pile and pile cap construction works shall comprise of new cast-in-place concrete, Type 1.

(iii) Approach Slab Works:

(i) Approach slab Works shall comprise of the work associated with concrete approach slabs, Type 2. In addition, working base concrete beneath the approach slabs shall be associated with this Work.

(ii) Approach slab curb barrier Works shall comprise of new cast-in-place concrete, Type 2.

(iv) Bridge Deck Slab Works

(i) Bridge deck slab Works shall comprise the new concrete Type 2.

(ii) Bridge deck curb barrier Works shall comprise the new concrete Type 2.

E10.3 Submittals

(a) General

(i) The Contractor shall submit to the Contract Administrator for review and approval, at least five (5) Business Days prior to the commencement of any scheduled Work on the Site, a proposed schedule, including methods and sequence of operations.

(ii) 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, the proposed materials to be used.

E10.4 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 outlined on the concrete mix design statement as shown on the Manitoba Ready Mix Concrete Association website (www.mrmca.com). In addition, the mix design statement must indicate the expected method of placement (buggies, chute, or pump). If pumping 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 Contract Administrator, 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.

(ix) 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 Contract Administrator a minimum of five (5) Business Days prior to the scheduled commencement of concrete placement for each the concrete types.

(x) 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 with CSA A23.1-19 Clause 4.3.2.3.2.

(xi) 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.

E10.5 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 post-cracking residual strength index (R_i) and fibre dispersion in accordance with the Canadian Highway Bridge Design Code (CHBDC) CAN/CSA-S6-19, Section 15, Fibre Reinforced Structures, Clause 16.6

(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.

(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 A23.2A.

(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 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 A23.2-20A.

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

(c) Notification of Ready Mix Supplier

(i) 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.

E10.6 Temporary False Work, Formwork and Shoring Works

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the scheduled commencement of concrete placement, detailed design calculations and Shop Drawings for any temporary Works, including false work, formwork, and shoring, that are sealed, signed and dated by a Professional Engineer licensed to practice in the Province of Manitoba.

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

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

(d) The Contractor shall construct false work, formwork and shoring for the new deck slab concrete and pile caps strictly in accordance with the approved Shop Drawings.

(e) The false work, formwork, and shoring for these Works shall be designed to safely support all vertical and lateral loads until such loads can be supported by the concrete all in accordance with CSA Standard CAN/CSA S269.3-M92.

(f) The supply, placement and removal of temporary false work, formwork, rigid insulation and void forms shall be considered incidental to the placement of structural concrete, and no separate measurement or payment shall be made for this Work.

(g) 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.

(h) As a minimum, the following spacings shall apply, for studding and waling:

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

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

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

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

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

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

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

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

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

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

(s) Shop Drawings shall show design loads, type, and number of equipment to be used for placing the concrete, method of construction, method of removal, type and grade of materials, and any further information that may be required by the Contract Administrator. The Contractor shall not proceed with any Work on site until the Shop Drawings have been reviewed and approved in writing by the Contract Administrator.

(t) For timber formwork and false work, the Shop Drawings shall specify the type and grade of lumber and show the size and spacing of all members. The Shop Drawings shall also show the type, size and spacing of all ties or other hardware, and the type, size and spacing of all bracing.

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

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

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

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

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

back type form ties shall have all spacing washers removed and the tie shall be broken back a distance of at least 20 mm from the concrete surface. All fittings for metal ties shall be of such design that, upon their removal, the cavities which are left will be of the smallest possible size. Torch cutting of steel hangers and ties will not be permitted. Formwork hangers for exterior surfaces of decks and curbs shall be an acceptable break-back type with surface cone, or removable threaded type. Cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in colour.

(z) 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.

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

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

(cc) All form lumber, studding, etc., becomes the property of the Contractor when the Work is finished, and it shall be removed from the concrete and the site by the Contractor after the concrete is set, incidental to the work of this Specification, and the entire site shall be left in a neat and clean condition.

(dd) Screed for Deck Slab Concrete

(ee) Plans for anchoring support rails shall be submitted to the Contract Administrator for review and acceptance at least ten (10) Business Days prior to the scheduled commencement of concrete placement. The Contract Administrator's written acceptance must be received by the Contractor prior to the installation of any anchorage devices.

E10.7 Materials

(a) General

(i) 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.

(ii) 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.

(b) Handling and Storage of Materials

(i) All materials shall be handled and stored in a careful and workmanship like manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with CSA Standard CAN/CSA-A23.1-19.

(c) Concrete

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

(ii) Concrete shall have nominal compressive strengths (f'_c) and meet the requirements for hardened concrete as specified in the following **TABLE 2**.

TABLE 2 – REQUIREMENTS FOR HARDENED CONCRETE								
Type of Concrete	**Location**	**Cement**	**Nominal Compressive Strength [MPa]**	**Class of Exposure**	**Air Content Category**	**Max Aggregate Size**	**Special Requirements**	**Post Residual Cracking Index**
Type 1	**Pile Caps, Piles**	**HS**	**35 @ 28 Days**	**C-1**	**1**	**20 mm**	**-**	**-**
Type 2	**Deck Slab, Deck Curbs, Approach Slabs**	**GU**	**35 @ 28 Days**	**C-1**	**1**	**20 mm**	**Corrosion Inhibitor, Synthetic Fibres**	**0.15**

E10.8 Lean Mix Working Base Concrete

(a) Lean Mix Working base concrete shall be placed in the locations as shown on the Drawings.

(b) The Contractor shall construct a working base concrete slab as shown on the Drawings to provide a stable, clean and level working area for subsequent operations required to construction Works as shown on the Drawings.

E10.9 Aggregates

(a) General

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

(ii) The potential for deleterious alkali-aggregate reactivity shall be assessed in accordance with CSA A23.2-27A-19. Current (less than 18 months old) test data evaluating the potential alkali-silica reactivity of aggregates tested in accordance with CSA A23.2-14A-19 or CSA A23.2-25A-19 is required.

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

(b) Fine Aggregate

(i) Fine aggregate shall meet the grading requirements of CSA A23.1-19, Table 10, FA1, be graded uniformly and not more than 3% shall pass a 75 um sieve. Fine aggregate shall consist of sand, stone, screenings, other inert materials with similar characteristics or a combination thereof, having clean, hard, strong, durable, uncoated grains free from injurious amounts of dust, lumps, shale, alkali, organic matter, loam or other deleterious substances.

(ii) Tests of the fine aggregate shall not exceed the limits for standard requirements prescribed in CSA A23.1-19, Table 12.

(c) Coarse Aggregate - Standard

(i) The maximum nominal size of coarse aggregate shall be 20 mm and meet the grading requirements of CSA A23.1-19, Table 11, Group I. Coarse aggregate shall be uniformly graded and not more than 2% shall pass a 75 um sieve. Coarse aggregate shall consist of crushed stone or gravel or a combination thereof, having hard, strong, durable particles free from elongation, dust, shale,

earth, vegetable matter or other injurious substances. Coarse aggregate shall be clean and free from alkali, organic or other deleterious matter; shall have a minimum of two fractured faces; and shall have an absorption not exceeding 3%.

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

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

(iv) Tests of the coarse aggregate shall not exceed the limits for standard requirements prescribed in CSA A23.1-19, Table 12, for concrete exposed to freezing and thawing.

E10.10 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.

E10.11 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 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 C-1 or F and the substitution shall not exceed 15% 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.

E10.12 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 A23.1-19 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.

E10.13 Corrosion Inhibitor

(a) Corrosion inhibitor shall be MCI 2005 NS, or equal as accepted by the Contract Administrator, in accordance with B7. Dosage shall be 1 L/m3.

E10.14 Synthetic Fibres

(a) The synthetic fibres shall consist of 100% virgin polypropylene or equal as accepted by the Contract Administrator, in accordance with B7. The dosage shall be designed by the Contractor to meet the requirements for post-cracking residual strength index (Ri) and fibre dispersion in accordance with the CHBDC CSA-S6-19, Fibre-Reinforced Structures, Clause 16.6.

E10.15 Formwork

(a) Formwork materials shall conform to CSA Standard A23.1-19, and American Concrete Publication SP4, “Formwork for Concrete.”

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

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

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

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

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

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

(h) Walers shall be spruce or pine, minimum 2 ply 38 x 140 mm built up member. Studding shall be spruce or pine, with minimum dimensions of 38 x 140 mm.

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

E10.16 Form Coating

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

E10.17 Permeable Formwork Liner

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

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

E10.18 Curing Compound

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

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

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

E10.19 Curing Blankets

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

E10.20 Bonding Agents

(a) Latex Bonding Agent

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

(b) Bonding Grout

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

(ii) 1 part water;

(iii) 1 part latex bonding agent; and

(iv) 1½ parts Type GUSF Portland cement.

(v) 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.

E10.21 Epoxy Adhesive

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

E10.22 Epoxy Grout

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

E10.23 Cementitious Grout

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

E10.24 Patching Mortar

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

E10.25 Flexible Joint Sealant

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

E10.26 Fibre Joint Filler

(a) Fibre joint filler shall be rot-proof and of the preformed, non-extruding, resilient type made with a bituminous fibre such as Flexcell and shall conform to the requirements

of ASTM Standard D1751-99 or equal as accepted by the Contract Administrator, in accordance with B7.

E10.27 Pre-compressed Foam Joint Filler

(a) Pre-compressed expanding filler shall be compressed to 20% of its expanded width and be a polyurethane foam, impregnated throughout with a latex modified asphalt. Approved products are “Emseal” BOR-0075 by Emseal/Sika. Manufacturer’s recommended primer and topcoat are to be used.

E10.28 Low Density Styrofoam

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

E10.29 Backup Rod

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

E10.30 Expansion Board Cap

(a) The expansion board cap shall be installed between the fibre joint filler and backup rod. The approved product is Greenstreak Expansion Board Cap No. 941.

E10.31 Screed Bases and Chairs

(a) Screed bases shall be Hilti HAS 304 stainless steel threaded rods, or equal as accepted by the Contract Administrator, in accordance with B7.

(b) Screed chairs shall be Mega Screed as supplied by Brock White Canada Company, or equal as accepted by the Contract Administrator, in accordance with B7.

E10.32 Galvanized Dowels and Galvanized Expansion Sleeves

(a) Dowels and expansion sleeves shall be fabricated in accordance with CSA Standard CAN/CSA-G30.18-M92.

(b) The dowels shall be galvanized in accordance with CSA Standard G164-M92, to a minimum net retention of 600 g/m2.

E10.33 Miscellaneous Materials

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

E10.34 Equipment

(a) General

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

(b) Vibrators

(i) 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.

(ii) The Contractor shall use rubber coated vibrators for consolidating concrete containing epoxy-coated or stainless reinforcing steel, such as in locations that the existing deck reinforcing is exposed.

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

(c) Placing and Finishing Equipment for Bridge Deck Concrete

(i) Placing Equipment

(ii) Adjacent exposed deck reinforcing steel shall be adequately protected during concrete placement.

(iii) Screed for Deck Slab Concrete

(iv) The Contractor may choose to use a mechanical or non-mechanical screed to strike the surface of the deck slab concrete.

(v) Screed rails are required and shall be sufficient in number and length to ensure that the concrete cover is maintained, and the finished elevation of the deck slab concrete meets the design elevations.

(vi) Screed guides shall be placed and fastened in position to ensure finishing of the concrete to the required profile. Supporting rails, upon which the finishing machine travels, shall be placed outside the area to be concreted. Provisions for anchorage of supporting rails shall provide for horizontal and vertical stability; positive anchorage may be required by the Contract Administrator. A hold-down device shot into concrete will not be permitted, unless the concrete is to be subsequently resurfaced.

(vii) The mechanical screed on guides or rails shall be supported so that they are completely clear of the finished surface.

(viii) Internal vibration of the concrete will be required with mechanical screeding. Care shall be taken not to overwork the concrete surface.

(ix) Care shall be taken to ensure that the screed bars are seated uniformly on the screed chairs and that the ends of the screed bars do not overhang the screed chairs by more than 75 mm.

(x) Screed surface touching concrete shall not be made of aluminum (magnesium acceptable).

(xi) The supply, setup, operation, and takedown of the screed for deck slab concrete shall be considered incidental to the placement of the deck slab concrete. No separate measurement or payment shall be made for this Work.

(d) Moveable Work Bridges for Deck Slab Concrete

(i) At least two moveable Work Bridges will be required (one for finishing operations and one for curing operations), independent of the screeding and finishing machines for the deck slab concrete.

(ii) These moveable Work Bridges shall travel guided on rails supported clear of the finished deck slab.

(iii) The Contractor shall install a sturdy walkway with safety railing on each side of the Work area for the purpose of providing access to the Work Bridge.

(iv) The supply, set up, operation, and takedown of the moveable Work Bridges shall be considered incidental to the placement of the Bridge Deck concrete. No separate measurement or payment shall be made for this Work.

E10.35 Placing and Finishing Equipment for Approach Slab Concrete

(a) Mechanical Screed for Approach Slab Concrete

(b) The mechanical screed shall be:

(i) Constructed to span the full width of the approach slab being placed;

(ii) Supported on screed rails positioned above the surface being screeded;

(iii) Sufficiently strong (truss type) to retain its shape under all working conditions, especially if any Work scaffolds are supported on the same screed rails;

(iv) Capable of producing the required flatness tolerance as specified in Clause (ii) of this Specification; and

(v) The supply, setup, operation, and takedown of the movable mechanical screed shall be considered incidental to the placement of the approach slabs, and no separate measurement or payment shall be made for this Work.

(c) Movable Work Bridge for Approach Slab Concrete Works

(i) The Contractor shall provide a movable Work Bridge, spanning the approach slab at right angles to the centreline of roadway in order to facilitate a broom finish, the application of curing compound, the inspection of the freshly-placed concrete, and any remedial Work required to be done to the screeded surface, including filling in any holes left by the screed bars. After the surface has been screeded, all further Work that may be required shall be done from the Work Bridge.

(ii) The Contractor shall install a sturdy walkway with safety railing on each side of the Work area, as required, for the purpose of providing safe access to the Work Bridge.

(iii) The supply, setup, operation, and takedown of the movable Work Bridge shall be considered incidental to the placement of the approach slabs, and no separate measurement or payment shall be made for this Work.

E10.36 Construction Methods

(a) General

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

(ii) Rate of application shall be the rate required to meet the requirements of ASTM C309-98a for the texture of concrete the curing compound is being applied to.

(iii) Structural concrete work in proximity to the Critical Water Infrastructure described in E5 shall be done in accordance with the construction method statement developed as described in E5.7

E10.37 Temporary False Work, Formwork, and Shoring

E10.38 Concrete Construction Joints

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

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

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

(d) Refer to, E10.44, “Preparation for Concreting Against Hardened Concrete”, for the requirements to prepare the hardened concrete at a construction joint for receiving new concrete.

E10.39 Bridge Deck Forms

(a) Setting Deck Forms

(i) The Contractor shall adjust forms, maintain uniform slab thickness, and adjust screed heights to plan elevations or to such other elevation as may be determined by the Contract Administrator in the field. Screed bases shall be permitted to be drilled and grouted into existing concrete and shall be adjustable to achieve the required elevations.

(ii) Side forms shall be set to the grade and alignment indicated on the Drawings or as set by the Contract Administrator in the field. The screed chairs and screed rail supports shall be spaced to prevent deflections of the screed bars or screed rails during screeding operations.

E10.40 Permeable Formwork Liner

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

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

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

E10.41 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 120 minutes after batching. Batching of all types of concrete is considered to occur when any of the mix ingredients are introduced into the mixer, regardless of whether or not the mixer is revolving. For concrete that includes silica fume and fly ash, this requirement is reduced to 90 minutes.

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

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

(iv) Unless otherwise noted in **TABLE 2**, “Requirements for Hardened Concrete”, no retarders shall be used.

(v) The concrete, when discharged from truck mixers or truck agitators, shall be of the consistency and workability required for the job without the use of additional mixing water. If the slump of the concrete is less than that designated by the mix design statement, then water can be added on site provided the additional water meets the requirements of CSA A23.1-19 5.2.4.3.2. If additional water is to be added on site, it must be done under the guidance of the Suppliers’ designated quality control person. The Supplier shall certify that the addition of water on site does not change the Mix Design for the concrete supplied. Any other water added to the concrete without such control will be grounds for rejection of the concrete by the Contract Administrator.

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

E10.42 Delivery of Concrete

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

E10.43 Concrete Placement Schedule

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

opinion of the Contract Administrator, the volume of the placement is deemed larger than can be placed with the facilities provided, the Contractor shall either:

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

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

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

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

E10.44 Preparation for Concreting Against Hardened Concrete

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

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

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

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

E10.45 Placing Structural Concrete

(a) General

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

(b) Dry Run for Deck Slab Screed Machine

(i) The Contractor shall conduct a dry run of the screed machine in the presence of the Contract Administrator to verify that the screed supporting rails are properly set to ensure compliance with the specified longitudinal and transverse deck grades. Sufficient screed supporting guide rails to provide the required coverage for the entire pour, as approved by the Contract Administrator, shall be set out and adjusted for height at least one (1) Working Day prior to the proposed pour. The Contract Administrator will verify that the screed machine and screed rails have been adjusted so that the height of the screed above the existing concrete at each point meets the requirements. To confirm the Contractor's adjustments of the machine and screed rails, the screed machine shall be "dry run", and screed clearance measurements taken at each support point by the Contractor. Resetting of the machine and/or screed rails shall be done by the Contractor as required by the Contract Administrator.

(c) Placing Structural Concrete

(i) Placement of deck concrete shall not be permitted when the surface moisture evaporation exceeds 0.75 kg/m^2/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, Appendix 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. Pumping of concrete will be allowed for all substructure concrete. 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.

(x) 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.

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

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

(xiii) 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.

(xiv) Before any concrete is placed for the approach slabs, or Bridge deck slab, 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 camber, crown, slab thickness, and concrete cover. 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.

E10.46 Finishing of Concrete Surfaces

(a) Finishing Operations for Unformed Surfaces

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

(b) Type 1 Finish – Exposed Formed Surfaces

(i) A permeable formwork liner finish shall be applied to all exposed formed surfaces including all exposed concrete surfaces not included in Type 2, Type 3, Type 4 finishes, but excluding soffit surfaces where an architectural form finish is specified.

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

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

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

(c) Type 2 Finish – Unformed Surfaces

(i) All unformed concrete surfaces, with the exception of the approach slab concrete 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) The final finish of the Bridge slab shall receive coarse transverse scored texture by steel tired broom finish. Prior to beginning texturing work, a test panel shall be textured on the deck slab concrete for approval by the Contract Administrator.

(d) Type 3 Finish – Approach Slab Concrete

(i) 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.

(e) Type 4 Finish - Surfaces Below Finished Grade

(i) All surfaces below 300 mm below finished grade except underside of footings shall be patched in accordance with the requirements of Sections E10.24, E10.20, and (i) of this Specification.

(ii) All surfaces below 300 mm below finish grade shall receive damp proofing in accordance with E10.30 of this Specification.

(f) Lean Mix Working Base Concrete Finish

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

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

(g) General Curing Requirements

(i) Refer to E10.47 for cold weather curing requirements and E10.48 of this Specification for hot weather curing requirements.

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

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

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

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

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

(vii) 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.

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

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

(h) Form Removal

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

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

(iii) Notwithstanding the above, the minimum strength of in-place concrete prior to removal of vertical forms for pile caps shall be 25 MPa, with the added provision that the member shall be of sufficient strength to safely carry its own weight, together with super-imposed construction loads. Bridge deck overhang forms shall remain in place to support construction live loads during the placement of traffic barriers.

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

(i) Patching of Formed Surfaces

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

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

(iii) Patching of formed surfaces shall take place within 24 hours of formwork removal.

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

(v) Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched, then applying bonding grout followed by patching mortar. Bonding grout shall be well

brushed onto the area immediately prior to patching. When the bonding grout begins to lose the water sheen, the patching mortar shall be thoroughly trowelled into the repair area to fill all voids. It shall be struck off slightly higher than the adjacent concrete surface and left for one hour before final finishing, to facilitate initial shrinkage of the patching mortar. It shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification. The final colour shall match the surrounding concrete.

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

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

E10.47 Cold Weather Concreting

(a) The requirements of CSA Standard A23.1-19 shall be applied to all concreting operations during cold weather, i.e., if the mean daily temperature falls below 5°C during placing or curing.

E10.48 Hot Weather Concreting

(a) General

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

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

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

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

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

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

(b) Hot-Weather Curing

(i) When the air temperature is at or above 25°C, curing shall be accomplished by fog misting and by using saturated absorptive fabric, in order to achieve cooling by evaporation. Note that fog misting is mandatory for all deck slab and sidewalk slab pours at all temperatures.

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

(c) Job Preparation

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

(d) Concrete Temperature

(i) The temperature of the concrete as placed shall be as low as practicable and in no case greater than the following temperatures, as shown in **TABLE 3**, "Acceptable Concrete Temperature", for the indicated size of the concrete section.

TABLE 3 – ACCEPTABLE CONCRETE TEMPERATURES		
THICKNESS OF SECTION, M	**TEMPERATURES °C**	
	MINIMUM	**MAXIMUM**
Less than:		
1	10	27
1.2	5	25

E10.49 Cleanup

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

E10.50 Concrete Quality

E10.50.1 Inspection

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

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

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

E10.50.2 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.

E10.50.3 Materials

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

(b) All materials shall conform to CSA Standard A23.1-19.

(c) All testing of materials shall conform to CSA Standard A23.2-19.

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

then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E10.50.4 Quality Assurance and Quality Control

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

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

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

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

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

(f) The frequency and number of concrete Quality Control tests shall be in accordance with the requirements of CSA Standard A23.1-19. An outline of the quality tests is indicated below.

E10.50.5 Concrete Testing

(a) Slump tests shall be made in accordance with CSA Standard Test Method A23.2-5C-19, "Slump of Concrete". If the measured slump falls outside the limits in E10.4 of this Specification, a second test shall be made. In the event of a second failure, the Contract Administrator reserves the right to refuse the use of the batch of concrete represented.

(b) Air content determinations shall be made in accordance with CSA Standard Test Method A23.2-4C-19, "Air Content of Plastic Concrete by the Pressure Method". If the measured air content falls outside the limits in (a) of this Specification, a second test shall be made at any time within the specified discharge time limit for the mix. In the event of a second failure, the Contract Administrator reserves the right to reject the batch of concrete represented.

(c) The air-void system shall be proven satisfactory by data from tests performed in accordance with the test method of ASTM C457. The spacing factor, as determined on concrete cylinders moulded in accordance with CSA Standard Test Method A23.2-3C-19, shall be determined prior to the start of construction on cylinders of concrete made with the same materials, mix proportions, and mixing procedures as intended for the project. If deemed necessary by the Contract Administrator to further check the air-void system during construction, testing of cylinders may be from concrete as delivered to the job Site and will be carried out by the Contract Administrator. The concrete will be considered to have a satisfactory air-void system when the average of all tests shows a spacing factor not exceeding 230 microns with no single test greater than 260 microns.

(d) Rapid chloride permeability testing shall be performed in accordance with ASTM C 1202.

(e) Testing for post-cracking residual strength index of FRC shall be tested as follows:

(i) One set of five concrete beam specimens, 100 mm by 100 mm by 350 mm long, shall be tested to failure using the same test set up in ASTM C 1609/1609M-19a without the steel plate. The average of the peak loads is the cracking load of the concrete (Pcr), and shall be provided to the Contract Administrator.

(ii) A second set of five concrete beam specimens shall be tested to failure in accordance with ASTM C 1609/1609M-19a. The average of the peak loads is

the post cracking load of the concrete (Ppcr). The Contractor shall submit a summary of the results of all post-cracking residual strength index tests. Specimens shall be sampled in accordance with E10.50.5(g).

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

(g) Test specimens shall be made and cured in accordance with CSA Standard Test Method A23.2-3C-19, "Making and Curing Concrete Compression and Flexure Test Specimens".

(h) Compressive strength tests at twenty-eight (28) days shall be the basis for acceptance of all concrete supplied by the Contractor. For each twenty-eight (28) day strength test, the strength of two companion standard-cured test specimens shall be determined in accordance with CSA Standard Test Method A23.2-9C-19, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the average of the strengths of the two specimens. A compressive strength test at seven (7) days shall be taken, the strength of which will be used only as a preliminary indication of the concrete strength, a strength test being the strength of a single standard cured specimen.

(i) Compressive strength tests on specimens cured under the same conditions as the concrete Works shall be made to check the strength of the in-place concrete so as to determine if the concrete has reached the minimum allowable working compressive strength as specified in **TABLE 2** of this Specification and also to check the adequacy of curing and/or cold weather protection. At least two (2) field-cured test specimens shall be taken to verify strength of the in-place concrete. For each field-cured strength test, the strength of field-cured test specimens shall be determined in accordance with CSA Standard Test Method A23.2-9C-19, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the strength of the specimen.

E10.50.6 Corrective Action

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

E10.51 Measurement and Payment

E10.51.1 Structural Concrete

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

Items of Work:

Structural concrete:

(i) Piles;
(ii) Pile Caps;
(iii) Deck Slab;
(iv) Approach Slabs;
(v) Curb Barriers;

E11. ASPHALTIC CONCRETE PAVEMENT WORKS

E11.1 Description

(a) This Specification shall cover the preparation of hot-mixed, hot-laid, asphaltic concrete paving mix for, and all placing operations relating to, the construction of asphaltic concrete base courses, pavements, overlays and other related pavement works. 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.

E11.2 General

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

E11.3 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.

E11.4 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.

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 the Specification 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.

E11.5 Materials

(a) Aggregates

(i) The Contractor shall furnish in writing to the Contract Administrator the location of the sources where aggregate will be obtained in order that same may be inspected and tentatively approved by the Contract Administrator. Changes in the source of aggregate supply during the course of the Contract will not be permitted without notification in writing to and the express approval of the Contract Administrator.

E11.5.1 Fine Aggregate

(a) 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, loam or other deleterious substances.

E11.5.2 Coarse Aggregate

(a) Coarse aggregate shall consist of natural gravel, crushed stone or other approved materials of similar characteristics having clean, hard, strong, durable, uncoated particles free from injurious amounts of soft, friable, thin, elongated or laminated pieces, alkali, organic or other deleterious matter. Crushed stone shall consist of angular, cubical fragments of aggregate of uniform quality throughout. It shall be produced from rock formations or from boulders and stones and shall be from sources of approved nature and origin. Coarse aggregate will not be accepted from rock formations or from boulders and stones containing intrusions or stratifications of an undesirable nature or from source showing signs of disintegration from the elements or other causes. Coarse aggregate shall conform to the following additional requirements:

(i) 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, or have in the opinion of the Contract Administrator a satisfactory soundness record. The method of testing shall be in accordance with ASTM Standard C88, Test for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

(ii) Abrasion - Coarse aggregate when subjected to the abrasion test shall have a loss of not more than thirty-five (35%) percent by weight, of any hand picked portion of a sample containing a minimum of one and a half (1.5%) percent by weight of the original sample. The method of testing shall be in accordance with ASTM Standard C131, Test for Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine.

(iii) Crushed Aggregate - Aggregate retained on a No. 5 000 sieve shall contain not less than the percent of crushed aggregate as determined by actual particle count and as shown in **TABLE 6**.

E11.5.3 Asphalt Cement

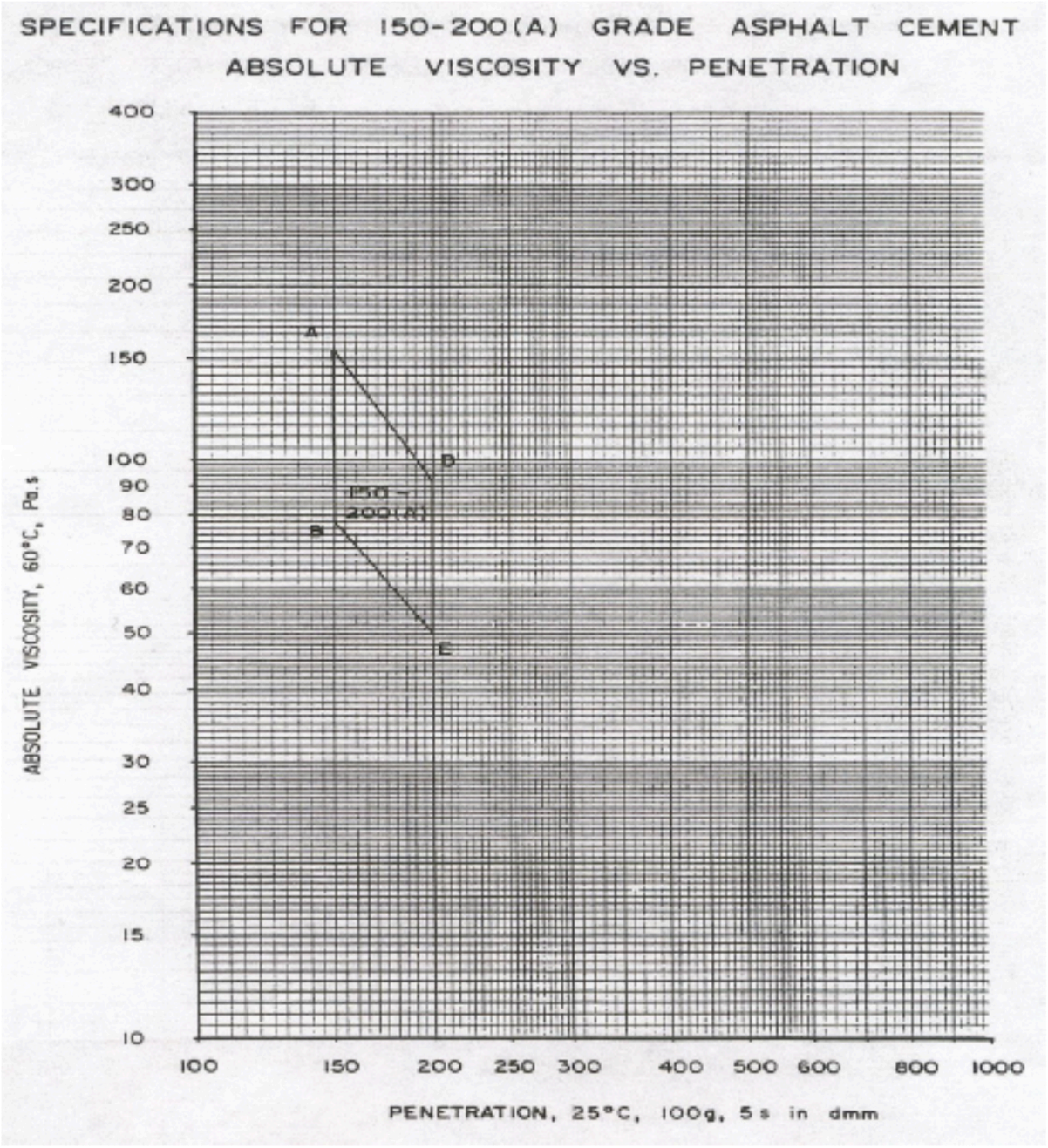
(a) The asphalt cement shall be prepared by the refining of petroleum, it shall be uniform in character and shall not foam when heated to 175oC. 150 - 200(A) Grade asphalt cement shall conform to the requirements specified in the following table:

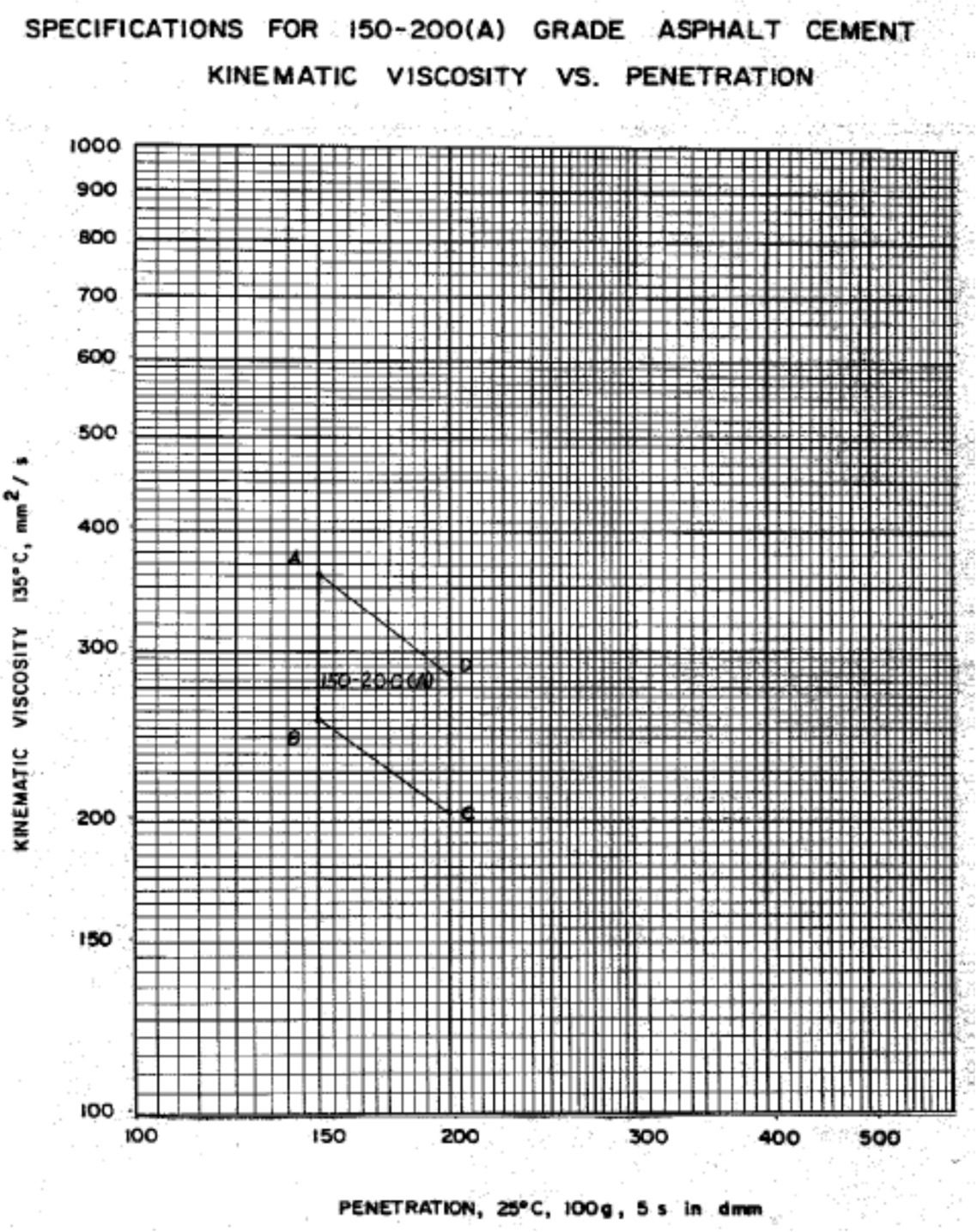
TABLE 4 – ASPHALT CEMENT PARAMETERS

Test Characteristics	ASTM Test Methods	150-200(A)
Kinematic Viscosity, 135° C, mm^2/s	D2171	The viscosity and penetration values must fall within the area bounded by A to B to C to D to A, plotted as straight lines on a full logarithmic plot (log-log) as shown on Fig. CW 3410.1-R5, with the co-ordinates of the points as follows:
Penetration, 25° C, 100 g, 5 s in dmm	D5	
		Point A: Abs. Visc. 360, Pen. 150 Point B: Abs. Visc. 255, Pen. 150 Point C: Abs. Visc. 205, Pen. 200 Point D: Abs. Visc. 285, Pen. 200
Flash Point, Cleveland Open Cup, min. °C.	D92	205
Solubility in Trichloroethylene, min. %	D2042	99.5
Tests on Residue from Thin-Film Oven Test:	D1754	
Ratio of Absolute Viscosity of Residue from Thin-Film Oven Test to Original Absolute Viscosity, max.	D2171	4.0
Ductility, 25° C, 5 cm/min., min., cm	D113	100
15.56° C, 5 cm/min., min., cm		-

E11.5.4 Mineral Filler

(a) 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.


SPECIFICATIONS FOR 150-200(A) GRADE ASPHALT CEMENT
ABSOLUTE VISCOSITY VS. PENETRATION
ABSOLUTE VISCOSITY, 60°C, Pa.s
400
300
250
200
150
100
90
80
70
60
50
40
30
25
20
15
10
A
D
150 - 200(A)
B
E
100
150
200
250
300
400
500
600
800
1000
PENETRATION, 25°C, 100g, 5 s in dmm



E11.6 Incidental Materials

(a) Prime Coat

(i) Prime coat shall consist of either an emulsified or cutback asphalt. Selection shall be based upon existing field conditions and shall be subject to the approval of the Contract Administrator. Method of application shall conform to manufacturer's recommendations.

(b) Tack Coat

(i) Tack coat shall consist of either an emulsified or cutback asphalt. Selection shall be based upon existing field conditions and shall be subject to the approval of the Contract Administrator. Method of application shall conform to manufacturer's recommendations.

(c) Miscellaneous Materials

(i) Miscellaneous materials shall be of the type specified on the Drawings or approved by the Contract Administrator.

(d) Reclaimed Asphalt Pavement

(i) Reclaimed asphalt pavement (RAP) shall be processed hot mix asphaltic concrete material recovered from planing or full depth removal. The reclaimed asphalt pavement material shall consist of sound durable particles produced by crushing and screening.

(e) Recycled Asphalt Shingles

(i) Blending of recycled asphalt shingles (RAS) material shall be during production of the asphalt and the mix produced shall consist of a uniform blend of all materials.

E11.7 Design Requirements for Asphaltic Concrete Paving Mix

(a) Mix Design Statement

(i) For each type of asphaltic paving mix to be used, the Contractor shall provide the Contract Administrator with a Mix Design Statement certifying the constituent materials and mix proportions that will be used in the asphaltic concrete paving mix. The Contractor shall also supply reasonable evidence to the Contract Administrator that the mix proportions selected will produce asphaltic concrete conforming to the requirements specified in Sections E11.7(b)(b), 0 and E11.7(d) of this Specification.

One (1) week prior to the start of paving the Contractor shall provide the Contract Administrator with the results of three (3) separate sets of Marshall Tests to show that the requirements of the mix design statement have been met. Where a correction of the mix design statement is necessary to reflect actual production, the Contractor will submit to the Contract Administrator a minimum of five (5) separate sets of Marshall test results for approval of the corrected mix design statement. This mix design statement, or revised mix design statement, as necessary, will be called the Job Mix Formula.

Should a change occur in the Job Mix Formula during the course of the work, the Contractor shall re-submit to the Contract Administrator a minimum of five (5) separate sets of Marshall test results to support approval of the revision.

Should a lengthy break occur in the paving operation, the Contract Administrator may request that the Contractor submit the results of three (3) recent, separate sets of Marshall test results as evidence that the Job Mix Formula is being achieved.

No changes in the Job Mix Formula will be permitted without following the above procedure.

(b) Aggregate Gradation Requirements

For each type of paving mixture, the mineral constituents shall be combined in such proportions so as to fall within the Gradation Limits shown in **TABLE 6**, unless the Contractor can conclusively show to the Contract Administrator that he can meet the physical requirements specified in Section 6.4 only by deviating from these gradation limits

(c) Allowable Deviation from Job Mix Formula

(i) Aggregate Gradation

The aggregate gradation of the asphaltic concrete supplied by the Contractor shall not deviate from that of the Job Mix Formula by more than the Allowable Deviations shown hereafter and shall fall within the gradation limits shown in **TABLE 6**.

TABLE 5 – MAXIMUM ALLOWABLE DEVIATION FROM JOB MIX FORMULA	
CANADIAN METRIC SIEVE SIZE	**PERCENT OF TOTAL DRY WEIGHT PASSING EACH SIEVE**
10 000	± 5%
5 000	± 5%
2 500	± 4%
1 250	± 4%
630	± 4%
315	± 4%
160	± 2%
80	± 2%

(ii) Asphalt Cement Content

The asphalt cement content of the asphaltic concrete supplied by the Contractor shall not deviate from that of the Job Mix Formula by more than + 0.4%, provided that the asphalt cement content requirements are maintained in accordance with **TABLE 7** of this Specification.

(d) Physical Requirements

For each type of paving mixture, the asphaltic concrete paving mix shall conform to the physical requirements shown in **TABLE 7**.

(e) Method of Testing

The aggregate gradation and physical properties of asphaltic concrete paving mix shall be determined in accordance with the requirements of Sections E11.11(d) and E11.11(e) of this Specification.

(f) Reclaimed Asphalt Pavement Content

Reclaimed asphalt pavement (RAP) material may be incorporated to a maximum of 10% by mass of total mix into the Type 1A mix design for asphalt pavements and overlays.

Blending of the reclaimed asphalt pavement material shall be during production and the mix produced shall consist of a uniform blend of all materials.

A mix design statement in accordance with section E11.7(a) shall be submitted to the Contract Administrator for approval.

All physical requirements and combined aggregate gradation limits shall met the requirements of **TABLE 6** and **TABLE 7**.

(g) Recycled Asphalt Shingles

RAS material shall consist of sound durable particles produced from recovered organic asphalt shingles, asphalt caps and asphalt rolled roofing. Fiberglass shingles are not allowed.

Recycled asphalt shingles (RAS) material shall be incorporated to a maximum 3% by weight of the total mix into Type 1A mix design asphalt.

RAS particles shall be a maximum size of 10 mm and otherwise shall meet the grading limits in **TABLE 6** and physical requirements in **TABLE 7**. 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. A mix design statement in accordance with section E11.7(a) shall be submitted to the Contract Administrator for approval.

E11.8 Supply of Asphaltic Concrete Paving Mix

(a) Mixing Plant

The asphaltic concrete paving mix shall be supplied from an approved mixing plant. The mixing plant shall be a batch mix plant, a continuous mix plant or a drum mix plant, conforming to the requirements of ASTM Standard D995, Specifications for Requirements for Mix Plants for Hot-Mixed, Hot-Laid, Bituminous Paving Mixtures.

TABLE 6 – COMBINED AGGREGATE GRADATION LIMITS

Percent of Total Dry Weight Passing Each Sieve

Canadian Metric Sieve Size	Type 1A (Surface Course) %	Type I (Surface Course) %	Type II (Surface Course) %	Type III (Base Course) %
40 000				100%
25 000				90% to 100%
16 000	99% to 100%	100%		60% to 90%
12 500	-	-		56% to 80%
10 000	70% to 88%	70% to 85%	100%	-
5 000	55% to 70%	45% to 70%	90% to 95%	29% to 59%
2 500	40% to 60%	25% to 55%	74% to 80%	20% to 50%
1 250	25% to 50%	20% to 40%	55% to 64%	-
630	15% to 40%	15% to 30%	35% to 46%	15% to 30%
315	5% to 28%	5% to 20%	22% to 30%	5% to 17%
160	4% to 11%	-	-	-
80	3% to 7%	3% to 6%	8% to 11%	1% to 7%
Crush Count: E11.5.2(a)(iii)	60% min. (2 fractured faces)	50% min. (1 fracture face)	-	60% min. (2 fractured faces)

TABLE 7 – PHYSICAL REQUIREMENTS

	Type 1A (Surface Course) %	Type I (Surface Course) %	Type II (Surface Course) %	Type III (Base Course) %
Asphalt Cement, % total sample weight	5.0% to 6.0%	5.0% to 6.0%	5.0% to 7.0%	4.0% to 5.5%
Voids in Mineral Aggregate, VMA	14.0% min.	14.5% min.	16.0% min.	12.0% min.
Air Voids	3.0% to 5.0%	2.5% to 5.0%	2.5% to 5.0%	2.5% to 5.0%
Marshall Stability, kN, at 60° C	7 min.	5 min.	4 min.	5 min.
Flow Index, units of 250 µm	6.0 to 16.0	6.0 to 16.0	6.0 to 16.0	6.0 to 16.0

(b) Batch Mix and Continuous Mix Plant Operations

(i) Aggregate Storage

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.

(ii) Preparation of Asphalt Cement

The asphalt cement shall be heated at the paving plant to a temperature of 135°C to 160°C before mixing with the aggregates. The temperature of the asphalt cement and aggregates immediately prior to mixing shall be approximately that of the completed batch. In no case shall the temperature of the asphalt and aggregates differ by more than l5°C when placed in the pug mill. The penetration of the asphalt cement shall be maintained within the limits of penetration specified.

(iii) Preparation of Mineral Aggregate

The coarse and fine aggregate shall be fed by feeders to the cold elevators in their proper proportions and at a rate to permit correct and uniform temperature control of the heating and drying operation. The aggregates shall be dried and delivered to the mixer at a temperature between 135°C and 160°C. The temperature between these limits shall be regulated according to the penetration grade of the asphalt, temperature of the atmosphere and workability of the mixture, but shall be as low as possible consistent with proper mixing and laying. Immediately after heating, the aggregates shall be screened into bins with separation on such coarse sieves as the number of bins permits. All aggregates in the bins that contain sufficient moisture to cause foaming in the mixture shall be removed and replaced in their respective stockpiles.

(iv) Preparation of Asphaltic Concrete Paving Mix

Each size of hot aggregate and the asphalt cement shall be measured separately and accurately to the proportions in which they are to be mixed. When the mixture is prepared in a twin pug mixer, the volume of mineral aggregate and asphalt cement shall not be so great as to extend above the tips of the mixer blades when these blades are in a vertical position. For batch mixing, the aggregates shall be mixed dry for a period of not less than 15 seconds, after which the asphalt cement shall be added and the mixing continued for a period of at least 30 seconds or longer if necessary to produce a uniform homogeneous mixture in which all particles of the mineral aggregate are thoroughly and uniformly coated. For continuous mixing, the total mixing time shall be not less than 45 seconds when calculated by the formula in Section 4.4 of ASTM Standard D995 or longer if necessary to produce a homogeneous mixture.

(v) Mixing Plant Inspection

The Contract Administrator shall have access at any time to all parts of the mixing plant in order to ensure the manufacture of the mixture in strict accordance with this Specification.

(c) Drum Mix Plant Operations

Drum mix plants, as approved by the Contract Administrator, shall conform to the requirements of Section 5.4 of Manitoba Highways and Transportation Specification Number 800 for Bituminous Pavement

(d) Transportation of Asphaltic Concrete Paving Mix

The mixture shall be transported from the mixing plant to the work in tight vehicles with metal bottoms previously cleaned of all foreign materials. The Contractor shall ensure that the vehicles are 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. The inside surface of all vehicles used for hauling mixture may be lightly lubricated with thin fuel oil, paraffin oil, lime water or soap solution just before loading, but an excess of lubricant will not be permitted. No loads of mixture shall be dispatched from the plant after sunset or during hours of darkness unless loads can be placed and compacted in accordance with this Specification and suitable artificial illumination is provided, all of which shall be subject to approval of the Contract Administrator. In no case shall temperatures be increased above 165° C at the plant to offset long distance hauling.

E11.9 Equipment

All equipment shall be of a type approved by the Contract Administrator. The equipment shall be in good working condition and shall be so maintained for the duration of the Contract.

E11.10 Construction Methods

(a) Base Preparation

(i) Preparation of Base for Asphaltic Concrete Pavement

The placing of the asphaltic concrete paving 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.

(ii) Preparation of Existing Pavement for Asphaltic Concrete Overlay

(i) A layer of the existing asphaltic concrete 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.

If the existing asphaltic concrete overlay is removed down to the existing Portland cement concrete pavement, the preparation of existing Portland cement concrete pavement for asphaltic concrete overlay shall be in accordance with E11.10(a)(ii)(ii) of this Specification.

If the surface remaining after the removal of the specified layer of asphaltic concrete surface course is asphaltic concrete, the Contractor shall proceed to fill any remaining holes and depressions with asphaltic concrete paving mixture and compact said areas with a steel wheel roller. The asphaltic concrete surface upon which the asphaltic concrete overlay is to be placed shall be as true to grade and cross-section as possible, as approved by the Contract Administrator. At the locations designated on the Drawings and at any other locations designated by the Contract Administrator, the Contractor shall make adjustment to 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.

(ii) Existing Portland Cement Concrete Pavement

At the locations designated on the Drawings and at any other locations designated by the Contract Administrator, the Contractor shall make adjustments to the 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.

(b) Placing Asphaltic Concrete Paving Mixture

The Contract Administrator shall approve the surface upon which new asphaltic concrete paving mix is to be placed before the paving operations for that course may begin.

The first course shall be laid upon a surface which is dry, clean and free from standing water, and only when weather conditions are suitable. The cleaning operation shall be done with a mechanical street sweeper.

In the case of placing new asphaltic concrete pavement, the base course shall have been previously prepared with one uniform application of Prime Coat prior to the delivery of the asphaltic concrete paving mixture.

In the case of asphaltic concrete overlay, the existing pavement surface shall have been previously prepared with one uniform application of Tack Coat prior to the delivery of the

asphaltic concrete paving mixture. The Tack Coat shall be applied in small quantities only sufficient to wet the pavement surface on which the overlay is to be placed.

The type and amount of Prime Coat/Tack Coat applied, and the method of application, shall be as recommended by the manufacturer and shall be subject to the approval of the Contract Administrator.

No paving course shall be started until any frost or moisture from previous inclement weather has evaporated to leave a dry surface. The surface course shall be laid only under such conditions that the Contract Administrator determines to be conducive to obtaining the specified results.

The mixture shall be delivered to the job and placed at a temperature optimum 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 mixture be placed at a temperature of less than 125°C nor greater than 155°C.

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.

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. When laying the mixture, pavers shall operate so as to provide as continuous an operation as possible at a speed of between three metres and six metres per minute as may be decided by the Contract Administrator. They shall be equipped with a quick and efficient steering device and shall have forward and reverse travelling speeds of not less than 30 metres per minute.

Pavers shall be capable of spreading the mixture, without segregation, in thicknesses of not less than 25 mm and not more than 75 mm. Placement widths shall vary from a minimum of 1.5 metres to a maximum of 4.5 metres unless approved by the Contract Administrator. They shall be equipped with blending or joint leveling devices for smoothing and adjusting all longitudinal joints between strips or courses of the same thickness. Pavers shall be equipped with screeds.

The term screed includes any strike-off device operated by cutting, crowding or other practical action which is effective on the mixtures at workable temperature without tearing, shoving or gouging the finished surface.

Where the thickness of the mixture exceeds 75 mm, the mixture shall be placed in two layers. The leveling course, shall be placed such that the final layer or surface course is of uniform thickness and of minimum thickness of 40 mm. Asphalt material shall be removed from curb inlet grates to ensure a minimum 100 mm vertical opening in the curb inlet grate.

(c) Main Line Paving, Tie-Ins and Approaches

(i) Main Line Paving

Main line paving shall include the placement of leveling and surface courses for pavements and overlays utilizing mechanical pavers with automatic grade control for; all through and parallel turning lanes greater than 15.0 metres in length, intersections through which the main line continues, and other lanes greater than 15.0 metres in length. Main line paving also includes major and minor intersecting side streets through and turning lanes over 15.0 metres in length.

Main line paving with mechanical pavers shall utilize automatic grade control, except for; intersections through which the main line continues where side street traffic must be maintained, and the side of the paver adjacent to active traffic.

Asphalt materials placed by mechanical pavers shall be placed in accordance with Section E11.10(b) of this specification.

Hand placed asphalt materials shall be spread and compacted to match the finished grade to the satisfaction of the Contract Administrator. The Contractor shall ensure that the amount of material delivered to the site is placed within the placement temperatures.

(ii) Tie-Ins and Approaches

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 E11.10(c)(i) 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.

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.

Asphalt materials placed by mechanical pavers shall be placed in accordance with Clause E11.10(c) of this specification.

Hand placed asphalt materials shall be spread and compacted to match the finished grade to the satisfaction of the Contract Administrator. The Contractor shall ensure that the amount of material delivered to the site is placed within the placement temperatures.

(d) Asphalt Patching

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 metres in width. The locations requiring asphalt patching shall be shown on the Drawings or as directed by the Contract Administrator.

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 Contractor shall place, and compact base course material as required to a maximum thickness of 50 mm. The asphalt shall be Type 1A material and match the thickness of the existing pavement. The material shall be placed and compacted by hand methods in accordance with Clause 9.3 of this specification to the satisfaction of the Contract Administrator.

(e) Joints

Joints shall be constructed in a careful and workmanlike manner by experienced and competent personnel. 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. Longitudinal joints shall be made true to line and parallel to the pavement edge wherever practicable. 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 mat is laid.

(i) Location of Joints

The location of joints shall be subject to the approval of the Contract Administrator and in addition shall conform to the following requirements:

(i) Longitudinal Joints

Longitudinal joints shall not be located within 150 mm of a longitudinal joint in any underlying pavement structure.

(ii) Transverse Joints

Transverse joints shall not be located within 2 m of any other transverse joint in the same paving course or within 1 m of a transverse joint in any underlying pavement structure.

Note: Longitudinal cold joints are to be avoided wherever possible. To facilitate this:

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.

(ii) Preparation of Joints

(i) Hot Joints

Hot joints shall be considered to be those longitudinal joints between successive mats in which the previously laid mat retains sufficient heat to facilitate good bonding and sealing of the joint. The edge of the previously laid mat 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 mat to a minimum width of 100 mm and replaced with fresh material and compacted when laying the new mat.

(ii) Cold Joints

Cold joints shall be considered to be those longitudinal and transverse joints where the existing pavement mat is at or near ambient temperatures and shall include joints against pavement mats laid on previous days and joints against existing pavement structures. 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 m straight edge, exhibits no tapering or rounding down.

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 off top corner shall be cut back to the full depth of the mat to form a vertical face with a square top corner.

Joints against existing asphaltic concrete pavements shall be prepared by saw cutting, cold planing or other method(s) approved by the Contract Administrator, such that the face of the existing pavement is vertical with a square top corner.

All contact surfaces of cold joints shall be painted with a thin uniform coat of tack before the new asphaltic concrete is placed against them.

(f) Construction of Joints

Fresh asphaltic concrete shall not be placed against the existing mat until the joint preparation has been completed in accordance with E11.10(e)(ii) and is approved by the Contract Administrator. Immediately after placing and before initial rolling the joint shall be checked and "set-up" by experienced and competent personnel so that an absolute minimum of back patching is required after rolling.

The fresh mat 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 equipped with suitable automatic joints matching controls.

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. After the first pass of the roller the joint shall be checked and corrected if necessary, before any additional rolling is done.

(g) Compaction of Asphaltic Concrete Paving Mixture

Compaction of the mixture shall be obtained by the methods specified hereinafter. A rolling pattern shall be established by the Contractor and approved by the Contract Administrator. The Contract Administrator must approve any deviation from the rolling pattern.

(i) Static Rolling

A minimum of two approved rollers will be required on every contract. When the output of the mixing plant exceeds 70 tonnes per hour an extra roller will be required for each additional 35 tonnes of mix produced per hour.

The speed of the roller shall not exceed five kilometres per hour and shall at all times be slow enough to avoid displacement of the hot mixture. Any displacements occurring as a result of reversing the direction of the roller or from any other cause shall at once 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 by the use of water, limewater, or approved detergent. An excess of moisture will not be permitted.

Compaction of the paving mixture shall consist of three (3) separate rolling operations as follows:

(i) Breakdown Rolling

Breakdown rolling with a tandem steel wheel roller weighing between seven and nine tonnes shall commence as soon as possible after the mixture has been spread without causing undue checking and displacement of the mixture. Delays in rolling freshly spread mixture will not be tolerated. Rolling shall start longitudinally at the sides and proceed toward the centre of the pavement overlapping on successive trips by at least 150 mm. Breakdown rolling shall consist of at least two complete coverages by the roller.

(ii) Intermediate Rolling

The intermediate rolling shall be performed with a self-propelled pneumatic-tired roller having a minimum wheel load of 1100 kilograms and minimum tire pressure of 450 kPa. Intermediate rolling shall begin while the mix is still of a temperature that will result in the maximum density from this operation.

(iii) Final Rolling

The final rolling shall be performed with a tandem steel wheel roller weighing not less than nine (9) tonnes, and shall be undertaken while the paving mixture is still warm enough for the removal of roller marks. Where the width permits, the pavement shall be subjected to diagonal rolling in two directions, the second diagonal rolling crossing the lines of the first. Final rolling shall be carried on until there is no further evidence of consolidation.

(ii) Vibratory Rolling

Vibratory rolling in proximity to the critical water infrastructure to be done in accordance with E5.

Vibratory rollers shall be of a type designed for asphalt finish rolling. They shall provide for the adjustment of both amplitude and frequency of vibration, and shall be equipped with an automatic device that positively prevents the drum from vibrating unless the roller is moving.

The optimum combination of amplitude, vibration frequency and roller speed shall be determined by the Contractor and approved by the Contract Administrator except that the maximum rolling speed in m/min. shall not exceed the vibration frequency per minute divided by 40.

$$\text{Maximum rolling speed (m/min.)} = \frac{\text{vibration frequency (VPM)}}{40}$$

Where vibratory rollers are used, the rolling pattern shall in all cases include at least one complete coverage in the static mode as the final rolling pass.

(iii) Compaction of Areas Inaccessible to Rollers

Along curbs, manholes and similar structures and at all places not accessible to the roller, thorough compaction must be secured by means of hot tampers and at all contacts of this character the joints between these structures and the mixture must be effectively sealed.

(h) Requirements After Final Rolling

After final rolling the surface of each course shall be smooth and true to the established crown and grade. Any low or defective spots shall immediately be remedied by cutting out the course, or planing to a depth of 40 mm, at such spots and replacing it with a fresh hot mixture that shall be immediately compacted to conform with the surrounding area and shall be thoroughly bonded to it. The surface of the finished pavement shall be free from depressions exceeding 5 mm as measured with a three (3) metre straight edge.

The measured in-place density of the completed course shall be an average of ninety-seven (97%) percent of the 75 Blow Marshall Density of the paving mixture, with no individual test being less than ninety-five (95%) percent.

(i) Opening to Traffic

In no case shall traffic or construction equipment be allowed on the asphaltic concrete pavement until completion of quality control 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.

The Contract Administrator's decision as to when the pavement will be opened to traffic shall be final.

E11.11 Quality Control

(a) Inspection

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

(b) Access

The Contract Administrator shall be afforded full access for the inspection and control testing of asphaltic concrete paving mixture and constituent materials, both at the site of work and at any plant used for the production of asphaltic concrete paving mixture, to determine whether the mixture is being supplied in accordance with this Specification.

(c) Materials

All materials supplied under this Specification shall be subject to testing and approval by the Contract Administrator in accordance with Section E11.6(c) of this Specification.

(d) Quality of Asphaltic Concrete Paving Mixture

Quality control tests will be used to determine the acceptability of the asphaltic concrete paving mixture supplied by the Contractor. The latest revisions of the test methods at the time of testing shall be used.

The Contract Administrator shall obtain samples of asphaltic concrete paving mixture and of the constituent materials required for quality control tests. The Contractor shall make no charge for these materials.

An outline of some of the quality control tests that will be used to check the physical properties of the mixture, and to check the properties, gradations and proportions of the constituent materials is as follows:

Samples of mineral aggregates shall be taken in accordance with ASTM Standard D75, Standard Methods of Sampling Aggregates. Samples of asphaltic concrete paving mixtures shall be taken in accordance with ASTM Standard D979, Standard Methods of Sampling Bituminous Paving Mixtures.

The determination of the particle size distribution of aggregates shall be made in accordance with ASTM Standard C136, Standard Method of Test for Sieve or Screen Analysis of Fine and Coarse Aggregates.

The specific gravity of aggregates shall be determined in accordance with ASTM Standard C127, Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate, and ASTM Standard C128, Standard Method of Test for Specific Gravity and Absorption of Fine Aggregate.

The determination of the percent of asphalt cement in asphaltic concrete paving mixtures and pavement specimens shall be made in accordance with ASTM D2172, Standard Methods of Test of Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.

The percent air voids, the percent voids in the mineral aggregate, the Marshall density, Marshall stability and flow index shall be determined in accordance with the Standard Marshall Procedure (75 Blows) and in accordance with ASTM Standard D1559, Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures using Marshall Apparatus.

(e) Quality of Asphaltic Concrete Pavement

Quality control tests will be used to determine the acceptability of the compacted asphaltic concrete pavement, as placed and compacted by the Contractor. The latest revisions of the test methods at the time of testing shall be used. Pavement specimens will be taken from each compacted pavement course by the Contract Administrator and the holes made by the removal of said specimens shall be carefully filled by the contractor with the approved asphaltic concrete paving mixture and thoroughly compacted, so as to conform in every way with the adjoining undisturbed pavement.

(f) Quality Assurance

The Contract Administrator shall ensure the frequency and number of quality assurance tests for each type of asphalt as follows:

1. Marshall test:

   A minimum of 1 test for every 300 tonnes of production.

2. Densometer Density test:

   Frequency of tests below shall be per type of asphalt and per lift of asphalt:

   Production < 500t: A minimum of one field density test for every 50m per lane with a minimum of three (3) tests per site visit by the test lab.

   Production ≥ 500t: A minimum of one field density test for every 100m per lane.

3. Core Sample for thickness and density:

   For all production quantities per day below: A minimum of 3 core samples shall be sufficient for the entire contract if the type of asphalt produced, remains unchanged and production continues from day to day.

   Frequency of tests below shall be per type of asphalt and per lift of asphalt:

   Production <500t: A minimum of 3 core samples per day.

   Production ≥500t: One core sample for every 400m per lane with a minimum of 3 core samples per day.

Additional number and frequency of testing shall be determined by the Contract Administrator.

Copies of test results shall be sent to the Research and Standards Engineer at the Public Works Department and to the Contract Administrator in a timely manner.

An outline of the quality assurance tests that will be used to check the compaction of the completed asphaltic concrete pavement is as follows:

In-place density determinations shall be made in accordance with ASTM Standard D2950, Standard Method of Test for Density of Bituminous Concrete in Place by Nuclear Method.

Density determinations on pavement specimens shall be made in accordance with ASTM Standard D2726, Standard Method of Test for Bulk Specific Gravity of Compacted Bituminous Mixtures using Saturated Surface-Dry Specimens.

(g) Corrective Action

The Contractor shall, at his own expense, correct such work or replace such materials found to be defective under this Specification in an approved manner to the satisfaction of the Contract Administrator.

E11.12 Method of Measurement

As a requirement of this Specification the Contractor, at his own expense, shall provide, install and operate a weigh scale convenient to the mixing plant and of such capacity as to accurately weigh any single loaded truck leaving the plant. The scale shall be tested by the proper authority at the Contractor's expense prior to any paving mix being weighed on said scale and the customary certificate shall be exhibited to the Contract Administrator upon request. Whenever considered necessary by the Contract Administrator, the scale shall be re-tested at the Contractor's expense.

(a) Construction of Asphaltic Concrete Pavement

Construction of asphaltic concrete pavement will be measured on a weight basis. The weight to be paid for shall be the total number of tonnes placed and compacted in accordance with this Specification and accepted by the Contract Administrator, as measured on a certified weigh scale.

E11.13 Basis of Payment

(a) Construction of Asphaltic Concrete Pavement

Construction of asphaltic concrete pavement will be paid for at the Contract Unit Price per tonne for the “Items of Work ” listed here below, measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this Specification.

Items of Work

Construction of Asphaltic Concrete Pavement

(i) GWWD Railway Crossing (Type IA)

E12. CONSTRUCTION OF CAST-IN-PLACE CONCRETE PILES

E12.1 Description

(a) This Specification shall cover all operations relating to the construction of cast-in-place concrete piles, including drilling, supply and placement of concrete, reinforcing and casing, as specified herein and as shown on the Drawings.

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

E12.2 Subsurface Conditions

(a) A copy of the geotechnical report is available for review by the Contractor. The Contractor shall carry out any additional investigations or testing he/she feels are necessary.

E12.3 Submittals

(a) The Contractor shall submit for review an installation procedure for the construction of the cast-in-place concrete piles including equipment, pile drilling location and construction stages. The installation procedure shall address protection of the aqueduct and coordination with the GWWD Railway.

E12.4 Concrete

(a) Concrete shall conform to the requirements of Section E10 of this Specification.

E12.5 Reinforcing Steel

(a) Reinforcing Steel shall conform to the requirements of Section E9 of this Specification.

E12.6 Inspection

(a) Supervise all drilling and concreting to ensure piles are the required length, diameter and in the proper location as shown on the drawings.

Keep an up-to-date record of all cast piles including length of pile and horizontal deviation from planned location.

Notify the Contract Administrator to permit inspection of the pile before reinforcement is placed.

E12.7 Installation

(a) Cast pile with a variation from the vertical or specified batter of not more than 2% of the lengths nor more than 75 mm lateral deviation from the location shown on the plans.

(b) Do not drill and pour piles closer than 2.5 pile diameters consecutively unless approved by the Contract administrator.

(c) Drill all piles using equipment with auger type drilling bits operated by competent operators. Equipment and method used for forming of bells shall be approved by the Contract Administrator.

(d) Clean all loose material from the base of the pile before placing concrete.

(e) Provide spacers on outside of reinforcing steel cage to ensure cage is centred in shaft.

(f) Place concrete only in shafts with firm side walls exhibiting no water seepage or caving of shaft walls. Otherwise, install temporary casings and withdraw as concrete is placed, keeping the bottom of the casing below the top of concrete until shaft is filled.

(g) The use of casing, if required, will be provided at Contractor's expense.

(h) If water flow is encountered, use adequate pumping equipment to maintain the hole free of water.

(i) Place concrete immediately after drilling and inspection of the pile hole to reduce soil sloughing and groundwater seepage.

(j) Drilling equipment shall not be placed directly on, and shall be located sufficiently far enough so as to avoid transmitting loads into the aqueduct.

(k) Place concrete in accordance with Section E10 of this Specification.

E12.8 Measurement and Payment

Construction of cast-in-place concrete piles shall be measured on a length basis. The total length to be paid for shall be the total number of vertical metres measured in accordance with Form B: Prices, and in conjunction with the drawings.

Construction of cast-in-place concrete piles will be paid for at the Contract Unit Price for the "Items of Work" listed in E12.8.1, measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this specification.

E12.8.1 Items of Work

(a) Construction of cast-in-place concrete piles

E13. EXCAVATION

E13.1 Description

(a) This Specification shall cover all operations related to excavation for the pile caps, approaches and deck.

(b) The work to be done by the Contractor under this Specification shall include the furnishings 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 Materials

(a) General

(i) The Contractor shall be responsible for the excavation, stockpiling and removal of all materials as set forth in this Specification. Materials to be stockpiled shall be handled in careful and workmanlike manner, to the satisfaction of the Contract Administrator.

(ii) The Contractor shall be responsible for design, construction and removal of any temporary shoring deemed necessary by the Contractor to ensure the safety of the workers.

(iii) The Contractor shall also be responsible for all utility locates and required permits required to complete this work.

E13.3 Excavation

(a) Excavated material shall include the excavation and satisfactory disposal of all surplus concrete pavement, asphalt pavement, ballast, earth, gravel, sand, clay, silt, and all other material of whatever character which may be encountered.

(b) Soft dig methods shall be used within 1600 mm of exterior face of Aqueduct.

E13.4 Equipment

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

E13.5 Construction Methods

(a) Scope of Work

(i) Excavation: The excavation of material to a depth as shown on the Drawings for the pile caps, approaches and concrete deck.

(ii) Off-site disposal of all excavated materials.

(iii) Dewatering and or precipitation removal of the excavations as may be required for construction of the structure in the dry.

E13.6 Survey Monuments

(a) The Contractor shall avoid damaging survey monument and shall take all necessary precautions to protect the same. The Contract Administrator at the sole expense of the Contractor will rectify any damage to the survey monuments.

E14. BACKFILL

E14.1 Description

(a) This Specification shall cover backfill for abutments

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

E14.2 Materials

(a) General

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

E14.3 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.

(b) 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 the Contract Administrator for testing purposes.

(c) All material shall be accepted 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 Specification detailed herein, or are found to be defective in manufacture, or have become damaged in transit, storage or handling operation, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E14.4 Granular Backfill Material

(a) Granular sub-base material shall be in accordance with CW 3110 – R10 Sub-Base Materials 50 mm MAX AGG.

E14.5 Granular Base Material

(a) Granular base material shall be in accordance with CW 3110 – R10 Base Course Material.

E14.6 Geotextile Fabric

(a) The non-woven geotextile shall conform to:
  (i) Mass 240 g/m2 min in accordance with ASTM D5261
  (ii) Grab Tensile Strength 60 N min in accordance with ASTM D 4632
  (iii) Mullen Burst Strength 2000 kPa min in accordance with ASTM D3786
  (iv) The non-woven geotextile shall be Armtec 250 supplied by Armtec Construction Products and Century Petroleum Construction, Geotex 701 supplied by Specialty Construction or ProPex 4552 supplied by Brock White Company Canada or equal in accordance with B7 as accepted by the Contract Administrator.

E14.7 Equipment

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

E14.8 Construction Methods

(a) Scope of work
  (i) The work shall comprise of the supply, placement, and compaction of backfill material for the pile caps.

E14.9 Backfill Operations

(a) The Contract Administrator shall be notified at one (1) working day in advance of any backfilling operation. No backfill shall be placed against any concrete until approved by the Contract Administrator and in no case before cylinders show the concrete strength to be at least 25 MPa.

(b) The abutments shall be backfilled with backfill materials described below to the grade line as shown on the Drawings. Backfill materials shall be free of frozen lumps and shall be placed and compacted in an unfrozen state. Backfill shall not be placed on frozen subsoil.

(c) The Contractor shall be required to provide necessary water or equipment during compaction of backfill material to achieve the required densities.

(d) The Contractor shall place backfill material in 150 mm lifts and shall compact each lift. The backfill shall be compacted to 98% Standard Proctor.

(e) Compaction not permitted under the deck slab.

E14.10 Quality Control

(a) Inspection

(i) 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 operation from the selection and production of materials through to final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or acceptance that may have previously been given. The Contract Administrator reserves the right to reject any materials or works, which are not in accordance with requirements of this Specification.

E14.11 Materials

(a) All material supplied and placed under this Specification shall be subject to testing and acceptance by the Contract Administrator in accordance with E14.12 and E14.13 of this Specification.

E14.12 Quality of Backfill Material

(a) The Standard Proctor Density for granular backfill material shall be determined at the optimum moisture content in accordance with standard laboratory Proctor Compaction Test Procedure. The field density of each backfill layer shall be 98% of the applicable Proctor Density, as specified in E14.9(d) of this Specification.

(b) Quality control test will be used to determine the acceptability of each backfill layer, as place and compacted by the Contractor before any succeeding layer may be applied.

(c) The filed density of the compacted layers shall be verified by Field Density Tests in accordance with ASTM Standard D155560-64, Test for Density of Solid in Place by the Sand-Cone Method, or equivalent as accepted by the Contract Administrator.

(d) The frequency and number of tests to be made shall be as determined by the Contract Administrator. The Contractor is responsible for all testing costs. The Contract Administrator will select the Testing Agency.

(e) Holes made by removal of samples from the layer shall be promptly filled by the Contractor with appropriate material and thoroughly compacted so as to conform in every way with the adjoining compacted material.

E14.13 Corrective Action

(a) Any backfill material that does not meet the gradation and/or compaction requirements of the Specification shall be removed and replaced by the Contractor at his own expense, to the satisfaction of the Contract Administrator.

E15. MISCELLANEOUS METAL

E15.1 Description

(a) This Specification shall cover supply, fabrication, galvanizing, transportation, handling, and delivery of miscellaneous metal. This Specification shall include, but is not limited to, the supply and installation of the items of work listed herein:

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

E15.2 Materials

(a) General

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

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

E15.3 Steel

(a) Unless otherwise specified, all steel shall conform to the requirements of CSA Standard CAN/CSA-G40.21, Grade 350W.

E15.4 Hot-Dip Galvanizing

(a) All items supplied under this Specification shall be hot-dip galvanized in accordance with CSA Standard G164 to retention of 600 g/m2. All metal surfaces to be galvanized shall be thoroughly cleaned of rust, rust scale, mill scale, dirt and other contaminants by commercial sand, grit or shot blasting and/or pickling prior to galvanizing. Heavy deposits of oil and grease shall be removed with solvents prior to blasting or pickling.

E15.5 Galvanizing Touch-up

(a) Field-applied galvanizing, to touch-up damaged hot-dip galvanizing on-site and to galvanize field welds, shall be done with self fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780-80 for “Repair of Damaged Hot Dip Galvanizing Coating”. Accepted products are Galvalloy as manufactured by Metalloy Products Company, P.O. Box No. 3093, Terminal Annex, Los Angeles, California and Welco Gal-Viz Galvanizing Alloy, as manufactured by Thermocote Welco, Highway 161 York Road, Kings Mountain, North Carolina. Locally, both products are available from Welder Supplies Limited, 25 McPhillips Street, Winnipeg, Manitoba.

E15.6 Anchor Studs

(a) Anchor studs shall conform to the requirements of ASTM Specification A108, Grade Designation 1020 and shall be galvanized.

E15.7 Welding

(a) Welding shall conform to CSA-W59. All work is to be performed by a firm certified by the Canadian Welding Bureau to the requirements of Division 2 (minimum) of CSA W47.1.

(b) Welding operators employed on the work are to be currently qualified by the C.W.B. Qualification is to have been issued within two years of the commencement of fabrication.

(c) Trim and bevel ends and other items to enable satisfactory welding.

(d) Keep all paint back from areas requiring welding after fabrication.

E15.8 Hardware

(a) All bolts, nuts and washers to be hot dip galvanized.

(b) Structured bolts shall meet the requirements of ASTM A325 C/W ASTM A563 Grade DH Heavy hex nuts and ASTM F436 Hardened Steel Washers.

(c) Manufactures compliance certificates for bolts, nuts and washers are to be submitted for Contract Administrator approval.

(d) Bolts to be shipped as a unit.

(e) Bolts to be installed by the turn of nut method.

E15.9 Non-Shrink Grout

(a) Non-shrink grout shall be supplied as specified in Specification E10, “Structural Concrete”.

E15.10 Equipment

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

E15.11 Construction Methods

(a) Scope of Work

(i) It is intended that this Specification cover the following miscellaneous metal elements and all others not specifically noted within this Specification, including all components and related fasteners as shown on the Drawings:

(ii) Galvanized steel angles.

E15.12 Quality Control

(a) Inspection

(i) 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.

(ii) 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.

E15.13 Access

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

E15.14 Qualifications of Contractor

(a) The Contractor shall produce evidence that his plant is recently fully approved by the C.W.B. to the requirement of CSA Standard 47.1, Division 2.

E15.15 Qualifications of Operators

(a) The Contractor shall produce evidence that all welding operators to be employed on the work are currently qualified by the C.W.B. at the time of fabrication and in the processes in which they are to be employed on the work. Such qualification shall have been issued within two years of the commencement of fabrication.

(b) The Contractor shall also produce evidence relative to each operator, that he has been executing satisfactory welding in the required processes within the six-month period previous to the award of this contract.

E15.16 Welding Procedures

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

(b) Such procedures shall be accompanied by documentary proof that they have been qualified previously by the C.W.B. at the plant where the work is to carried out.

E15.17 Quality Control

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the work. The Contractor shall be wholly responsible for the control of all operation incidental thereto notwithstanding any inspection or acceptance that may have been previously given.

(b) The Contract Administrator reserves the right reject any materials or works, which are not in accordance with the requirements of this Specification.

E15.18 Submissions

(a) At least seven (7) days prior to the scheduled commencement of any fabrication, the qualifications of Contractor, the qualifications of operator, the shop drawings, mill certificates, welding procedures, and welding consumable certificates shall be submitted to the Contract Administrator for his acceptance.

(b) The shop drawings shall consist of three (3) sets of full size prints and one (1) reproducible sepia set.

(c) The shop drawings shall clearly show shapes, weights, dimensions, detail, connection (including proper CSA welding identification), bolt holes, and accessories.

(d) Calculated mass of miscellaneous metal for each shop drawing following shop drawing final acceptance shall be submitted.

E15.19 Preparation of Material

(a) Bending Material

(b) Steel items to be bent shall be bent by methods that will not injure the metal. The steel shall not be heated unless permission is given by the Contract Administrator. Any damage to the galvanizing surface shall be repaired in accordance with Clause E15.5 of this Specification.

(c) Edge Preparation of Welding

(d) The edges of plates or sections which are to be welded together shall be prepared by sawing, shearing, flame-cutting, machining, chipping or arc air gouging to the details shown on the shop drawings. Surfaces and edges to be welded shall be smooth, uniform and free from thins, tears, cracks, and other defects, which would adversely affect the quality or strength of the weld. Surfaces to be welded shall also be free from loose scale, slag, rust, grease, moisture or other material that will prevent proper welding. Mill scale that withstands vigorous wire brushing, alight film of drying oil or a thin rust inhibitive coating may remain.

(e) Surfaces within 50 mm of any weld location shall be free from any paint or other material that would prevent proper welding or produce objectionable fumes while welding.

(f) Edges of material thicker than specified in the following list shall be trimmed if and as required to produce a satisfactory welding edge wherever a weld along the edge is to carry calculated stress:

(i) Sheared edges of material thick than 12 mm

(ii) Rolled edges of plates (other than Universal Mill Plates) thicker than 9 mm

(iii) Toes of angles thicker than 16 mm

(iv) Universal Mill Plates or edges of flanges of wide section thicker than 25 mm.

(g) Edges may be prepared by oxygen cutting, providing that a smooth and regular surface free from cracks and notches is secured, and providing that an accurate profile is secured by the use of mechanical guide. Freehand cutting shall be done only where accepted by the Contract Administrator.

E15.20 Edge Preparation (Non-welded Edges)

(a) Steel may be cut to size by sawing, shearing or machining.

E15.21 Butt Joints

(a) Minimize the number of butt joint by maximizing the length of plates. Details of all butt joints shall be submitted to the Contract Administrator for his review. The fabricator may submit an alternative butt joint design provided that such design has been pre-qualified by A.W.S.

E15.22 Anchor Studs

(a) Welding of anchor studs shall conform to the requirements of CSA Standard W59, Section 3.1.2.2 and 5.5.6.5.

E15.23 Assembly

(a) The shop assemble of the various component of the weldments shall be executed in accordance with CSA.

(b) Tack welding shall be done by qualified operators, using the smallest size weld required to hold the components of the assembly together. Tack welds shall not be less the 50 mm in length and shall be incorporated in the final weld.

(c) Tack welds shall be made with 4 mm maximum size electrodes and shall be subject to the preheat requirement of CSA-W59.

(d) Preheat and Interpass Temperatures

(e) No welding shall be done when the temperature of the base metal is lower than -20°C. At temperatures below 0°C, the steel shall be preheated to a temperature of at least 10°C in excess of that stated in **TABLE 8**.

(f) Preheat shall be applied to all steel to welded so that the steel within 75 mm of the weld is heated to the temperature shown in **TABLE 8**.

(g) Preheat shall be applied in such a manner that moisture from the heating equipment does not penetrate the joint.

(h) For all welding processes, preheat and interpass temperatures shall be maintained during welding at temperature not less that stated in **TABLE 8**.

(i) Preheat requirements of tack welds shall be as in **TABLE 8** except where single pass tack welds are used and are to be incorporated and consumed in a weld made by the submerged arc and the gas metal arc processes, preheat is unnecessary.

TABLE 8

E15.23.2	Minimum Preheat and Interpass Temperatures		
E15.23.3	Thickness of Thickest Part at Point of Welding	E15.23.4	CSA Standard CAN/CSA Grade 350 W G40.21
E15.23.5	Less than 19 mm	E15.23.6	21°C
E15.23.7	19 mm to 38 mm	E15.23.8	66°C
E15.23.9	38 mm to 64 mm	E15.23.10	107°C
E15.23.11	Over 64 mm	E15.23.12	150°C

E15.24 Bent Plates

(a) When bending plates, the plates hall be so taken from the stock plates that the bend line will be at right angles to the direction of rolling. The radius of the bend measured inside, shall be not less than the thickness of the plate.

E15.25 Weld Profiles

(a) Weld profiles shall meet the requirements of CSA Standard W59, Clause 5.9.

E15.26 Shipping

(a) Structural members shall be loaded in such a manner that hey can be transported and unloaded at their destination without being excessively stressed, deformed or otherwise damaged.

E15.27 Handling and Storing Materials

(a) Material to be stored shall be placed on skids above the ground. It shall be kept clean and properly drained. Long members shall be supported on skids placed near enough to prevent injury from deflection.

E15.28 Straightening Bent Material

(a) The straightening of plates and angles or other shapes shall be done by methods that will not produce a fracture or other injury. The metal shall not be heated unless permitted by the Contract Administrator, in which case the heating shall not be to a higher temperature than that producing a “dark cherry red” colour. After heating, the metal shall be cooled as slowly as possible.

(b) Following the straightening of a bend or buckle, the surface of the metal shall be carefully inspected for evidence of fracture, and if necessary, replaced or repaired to the satisfaction of the Contract Administrator.

E15.29 Welding of Galvanized Metal

(a) All field welding to galvanized metal shall be touched up by the Galvalloy Process in accordance with Clause E15.5 of these Specifications. All Galvalloy repairs shall be made flush with adjacent metal.

E15.30 Measurement and Payment

(a) Miscellaneous Metal will be considered incidental to the Work. No measurement and payment will be made within this section.

E16. TRACK WORK

E16.1 General

E16.1.1 Description

(a) Comply with General Conditions, Supplementary Conditions, Addenda thereto, specifications and Drawings.

(b) All track work will comply with CP's current Standard Practice Circulars and Redbook of Track Requirements.

(c) Site must be kept in a neat and tidy condition.

E16.1.2 Scope of Work

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 for and incidental to the satisfactory performance and completion of all work as hereinafter specified and as shown on the Drawings including but not necessarily confined to the following:

(a) Dismantle, Sort and Stockpile 78 m of siding track

(b) Supply and install bumping posts on either side of bisected siding

(c) Supply and install stop sign and crossbucks on Ray Marius

(d) Supply and install railway crossing signage on Ray Marius Road and Black Diamond Boulevard

(e) Supply and install rubber mud rail.

E16.1.3 Coordination With Others

(a) The Contractor shall coordinate and schedule work with the Contract Administrator.

(b) The Contractor shall coordinate with other contractors as required.

(c) The Contractor shall complete the daily check-in and check-out procedure with GWWD dispatch.

(d) The Contractor shall allow for periodic train movements along the GWWD mainline to permit transport of equipment, materials and water treatment chemicals. The current estimated schedule for July to September is anticipated to have the following movements through the construction site:

(i) Ten (10) train movements per week (one train per day, round trip through site)

(ii) Two (2) maintenance equipment movements per week (one round trip)

(e) The Contractor shall provide a minimum of 3-4 weeks' notice to GWWD of their anticipated start date to permit additional chemical storage at the Deacon Water Treatment Plant.

E16.1.4 References

(a) Canadian Pacific, Standard Practice Circulars (SPC) – Track

(b) Canadian Pacific, Redbook of Track Requirements

(c) Canadian Pacific Track Safety Rules

(d) AREMA Manual for Railway Engineering

(e) Material and Equipment Specification Section 01600

(f) CN TS-724

(g) Transport Canada Grade Crossing Standards

(h) Grade Crossing Regulations

(i) Railway Safety Act

E16.2 Materials

(a) All track materials shall be supplied by the Contractor and shall conform to current AREMA specifications for the material being supplied.

(b) Reuse of any track material generated from track removals will be at the discretion of the Contract Administrator.

(c) Rail Anchors – Rail anchors shall be new or reconditioned and be "Fair" or equal and of a drive on type so that they can be applied and removed without a special tool.

(d) Spikes – Shall be new 5/8”x 6” cut spikes.

(e) Bumping posts shall be Hayes Type WG or HD for the designated rail section, or equal as accepted by the Contract Administrator, in accordance with B7.

(f) Rubber mud rails shall be Type ILF-2212 by PPI, or equal as accepted by the Contract Administrator, in accordance with B7

E16.2.1 Handling and Storage of Materials

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

(b) All ballast materials, ties and rails shall be handled and stored in a careful and workmanship like manner, to the satisfaction of the Contract Administrator.

(c) Materials shall not be stockpiled within 3.0 metres of the centerline of the Critical Water Infrastructure described in E5.

E16.3 Construction Methods

E16.3.1 Location of Work Site

(a) The location of the work and the estimated work planned for the site is shown in the Contract Drawings.

(b) Prior to commencing track work, the Contractor shall ensure that all buried railway signal and communication cables and utilities have been field verified as to location and are noted on a working drawing and flagged on the ground.

(c) Any work requiring protection of buried railway signal and communication cables, or other utilities shall be performed in accordance with the appropriate standards.

E16.3.2 Surveying

(a) The Contractor shall supply all surveying of lines and levels, including the initial centreline, in order to complete the project as shown on the Drawings and as specified in these Specifications.

(b) Upon completion of the work, the Contractor shall perform an as-built survey and provide the Contract Administrator with a drawing showing all details as constructed.

E16.3.3 Removals

(a) The Contractor shall supply all labour, tools, and equipment for the removal of existing track to facilitate installation of the new aqueduct bridge as specified on Contract Documents.

(b) All salvaged track material gained from track removal shall remain the property of the City of Winnipeg and shall be moved from the site to the location defined by the City at the expense of the Contactor.

(c) Ties shall be disposed of in accordance with all applicable regulations.

(d) Rail anchoring patterns for plain track and turnouts on wood ties shall be in accordance with SPC No. 19 – Rail Anchors, 12 per 39 ft. rail; box anchoring shall be used on all tracks where required. Additional rail anchors or change in anchor pattern may be required on some installations.

(e) Connection of rail ends shall be in accordance with SPC No. 14 – Rail Joint Maintenance.

(f) Cutting and drilling of rail shall be performed as needed for the construction of bolted rail track.

(g) Tolerance for gauge shall be -0, + ¼”.

(h) The Contractor shall remove excess ballast and spillage from culverts, ditch lines, or other locations and as instructed by the Contract Administrator.

(i) Final tolerance for rail surface shall be +/- ½".

(j) Signs: Place or replace all signs required as a result of new track construction or the regrading or removal of existing track.

E16.3.4 Bumping Posts

(a) Stub end tracks require the installation of a bumping post.

(b) Install bumping posts 15 feet from the end of track with 10 ties in front of, and all ties behind it fully anchored.

(c) No car is to be spotted within 30 feet of the bumping post.

E16.3.5 Signage

(a) Stop signs and crossbucks shall be installed in accordance with the Transport Canada Grade Crossing Standards and conform to CN TS-724.

(b) Railway crossing signage shall be type WA-18 and installed 150 m from the crossing (each direction) and in accordance with the latest version of the Manual of Uniform Traffic Control Devices for Canada.

E16.3.6 Rubber Mud Rail

(a) Installation of rubber mud rail shall be in accordance with the manufacturer's recommendations.

E16.4 Quality Control

E16.4.1 Inspection

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

E16.4.2 Access

The Contract Administrator shall be afforded full access for the inspection and control testing of constituent materials both at the site of work and at any plant used for production of the materials to determine whether the material is being supplied and placed in accordance with this Specification.

E16.4.3 Materials

All material supplied and placed under this Specification shall be subject to testing and acceptance by the Contract Administrator in accordance with this Specification.

E16.4.4 Corrective Action

Any ballast or track material that does not meet the requirements of this Specification shall be removed and replaced by the Contractor at his own expense, to the satisfaction of the Contract Administrator.

E16.5 Measurement and Payment

E16.5.1 Dismantle, Sort and Stockpile Existing Track

Dismantling, sorting and stockpiling existing track shall be measured on a length basis. The total length to be paid for shall be the total number of track metres of track dismantled, including dismantling of existing rail, sorted and stockpiled in accordance with this

Specification, and in conjunction with the drawings. Anchoring or securing the newly severed track shall be considered incidental to this work and no measurement or payment shall be given for this item.

E16.5.2 Supply and Install Bumping Posts

Supply and Install Bumping Posts shall be measured and paid per each unit that has been installed and properly secured to the existing tracks in accordance with the manufacturer's specifications and in conjunction with the drawings. Any fasteners including nuts, bolts or rail spikes shall be considered incidental to this work and no payment shall be given for these items.

E16.5.3 Supply and Install Stop Signs and Crossbucks

Supply and Install Stop Signs and Crossbucks shall be measured and paid per each unit that has been installed in accordance with the latest version of the Transport Canada Grade Crossing Standards and in conjunction with the drawings.

E16.5.4 Supply and Install Railway Crossing Signage

Supply and Install Railway Crossing Signage (WA-18) shall be measured and paid per each unit that has been installed in accordance with the latest version of the Manual of Uniform Traffic Control Devices for Canada and in conjunction with the drawings.

E16.5.5 Supply and Install Rubber Mud Rail

Supply and Install Rubber Mud Rail shall be measured on a per track metre basis for each track metre of mud rail installed as per the manufacturer's specifications. The total length to be paid for shall be the total number of track metres of rubber mud rail installed at the crossing. Fasteners such as clamps, nuts and spikes shall be considered incidental to this work and no measurement or payment shall be given for these items.

E17. HYDRO EXCAVATION

E17.1.1 Description

E17.1.2 This specification covers the removal of earthen material immediately adjacent to underground utilities infrastructure by means of high-pressure water spray, and the recovery of evacuated material by vacuum type means or equivalent method as approved by the Contract Administrator. It is to be used to excavate the material over the utility line and not used as confirming utility elevations/ exploratory to find utilities.

E17.2 Equipment

E17.2.1 Hydro Excavation unit shall be capable of maintaining a minimum working pressure of 10,000 psi, at a rate of 10 to 12 gallons per minute. Unit should be adjustable, so as to provide adequate pressure to remove earthen material identified by the Contract Administrator.

E17.2.2 Spray head shall be equipped with a rotating nozzle, in order to provide a wider path of cut.

E17.3 Construction Methods

E17.4 Hydro-Removal of Earthen Material

E17.4.1 Earthen material adjacent to utility entity shall be sprayed with high pressure water so as to remove all such material identified by the Contract Administrator.

E17.5 Recovery of Excavated Material

E17.5.1 The recovery of excavated material shall be done using a vacuum type method, or other type of method approved by the Contract Administrator.

E17.5.2 The recovery of material shall follow immediately behind the excavation, to avoid excavated areas from filling with excavated material.

E17.5.3 The use of mechanical sweepers will not be allowed.

E17.5.4 Depose of material in accordance with Section 3.4 of CW-1130.

E17.6 Backfill of Hydro Excavated Hole

E17.6.1 The Contractor shall be responsible for the backfill of the hydro excavated hole upon the completion of the Work described herein, to the approval of the Contract Administrator.

E17.7 Measurement and Payment

E17.7.1 Hydro Excavation of earthen material will be measured on an hourly basis and paid for at the Contract Unit Price per hour for "Hydro Excavation". The hours to be paid for will be the total number of hours of Hydro Excavation in accordance with this Specification, accepted and measured by the Contract Administrator.

E18. ENVIRONMENTAL PROTECTION PLAN

E18.1 The Contractor shall plan and implement the Work of this Contract strictly in accordance with the requirements of the Environmental Protection Plan as herein specified.

E18.2 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work. Some are available for viewing at the office of the Contract Administrator.

E18.3 Federal Legislation

(a) Canadian Environmental Assessment Act (CEAA) c.37

(b) Fisheries Act c.F14

(c) Transportation of Dangerous Goods Act and Regulations c.34

(d) Navigable Waters Protection Act

(e) And any other applicable Acts, Regulations, and By-laws

E18.4 Provincial Legislation

(a) The Dangerous Goods Handling and Transportation Act D12

(b) The Endangered Species Act E111

(c) The Environment Act c.E125

(d) The Fire Prevention Act F80

(e) The Manitoba Heritage Resources Act H39-1

(f) The Manitoba Noxious Weeds Act N110

(g) The Manitoba Nuisance Act N120

(h) The Public Health Act c.P210

(i) The Workplace Safety and Health Act W210

(j) And current applicable associated regulations (Note: Provincial regulations updated as of September 1999)

(k) The *Manitoba Stream Crossing Guidelines for the Protection of Fish Habitat*, Manitoba Natural Resources, 1996

(l) And any other applicable Acts, Regulations, and By-laws

E18.5 Municipal Legislation

(a) The City of Winnipeg By-law No. 1/2008 and all amendments

(b) The City of Winnipeg By-law No. 1573/77 and all amendments up to and including 7670/2000

(c) And any other applicable Acts, Regulations, and By-laws

E18.6 Materials Handling and Storage

(a) Storage of construction materials shall be confined to the defined storage areas as shown on the Drawings.

(b) Construction materials shall not be deposited or stored on riverbanks or river shorelines unless written acceptance from the Contract Administrator is received in advance.

E18.7 Fuel Handling and Storage

(a) The Contractor shall obtain all necessary permits from Manitoba Environment for the handling and storage of fuel products and shall provide copies to the Contract Administrator.

(b) All fuel handling and storage facilities shall comply with The Dangerous Goods and Transportation Act Storage and Handling of Petroleum Products Regulation and any local land use permits.

(c) Fuels, lubricants, and other potentially hazardous materials as defined in The Dangerous Goods and Transportation Act shall be stored and handled within the approved storage areas.

(d) The Contractor shall ensure that any temporary fuel storage areas established for construction of the project are contained by an impermeable dyke and are located a minimum distance of 100 m away from the high water line of the Assiniboine River. Dykes shall be designed, constructed, and maintained to retain not less than 100% of the capacity of the total number of containers or 110% of the largest container, whichever is greatest. The dykes shall be constructed of clay or similar impervious material. If this type of material is not available, the dyke shall be constructed of locally available material and lined with high-density polyethylene (HDPE). Furthermore, the fuel storage area(s) shall be secured by a barrier such as a high fence and gate to prevent vandalism.

(e) The Contractor shall ensure that all fuel storage containers are inspected daily for leaks and spillage.

(f) Products transferred from the fuel storage area(s) to specific work Sites shall not exceed the daily usage requirement.

(g) When servicing requires the drainage or pumping of fuels, lubricating oils or other fluids from equipment, a groundsheet of suitable material (such as HDPE) and size shall be spread on the ground to catch the fluid in the event of a leak or spill.

(h) Refuelling of mobile equipment and vehicles shall take place at least 100 m from a watercourse.

(i) The area around storage Sites and fuel lines shall be distinctly marked and kept clear of snow and debris to allow for routine inspection and leak detection.

(j) A sufficient supply of materials, such as absorbent material and plastic oil booms, to clean up minor spills shall be stored nearby on Site. The Contractor shall ensure that additional material can be made available on short notice.

E18.8 Waste Handling and Disposal

(a) The construction area shall be kept clean and orderly at all times during and at completion of construction.

(b) At no time during construction shall personal or construction waste be permitted to accumulate for more than one day at any location on the construction Site, other than at a dedicated storage area as may be approved by the Contract Administrator.

(c) The Contractor shall, during and at the completion of construction, clean-up the construction area and all resulting debris shall be deposited at a Waste Disposal Ground operating under the authority of Manitoba Regulation #150/91. Exceptions are liquid industrial and hazardous wastes which require special disposal methods (refer to Section 30.5.D) in Manitoba Regulation #150/91.

(d) Indiscriminate dumping, littering, or abandonment shall not take place.

(e) No on-site burning of waste is permitted.

(f) Waste storage areas shall not be located so as to block natural drainage.

(g) Runoff from a waste storage area shall not be allowed to cause siltation of a watercourse.

(h) Waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.

(i) Equipment shall not be cleaned near watercourses; contaminated water from onshore cleaning operations shall not be permitted to enter watercourses.

(j) Discharge from any dewatered areas shall be released into a well-vegetated area, filter bag, settling basin, or storm sewer system to remove suspended material and other deleterious substances from the discharge before it finds its way into any watercourse.

E18.9 Dangerous Goods/Hazardous Waste Handling and Disposal

(a) Dangerous goods/hazardous waste are identified by, and shall be handled according to The Dangerous Goods Handling and Transportation Act and Regulations.

(b) The Contractor shall be familiar with The Dangerous Goods Handling and Transportation Act and Regulations.

(c) The Contractor shall have on Site staff that is trained and certified in the handling of the dangerous/hazardous goods, when said dangerous/hazardous goods are being utilized on Site for the performance of the Work.

(d) Different waste streams shall not be mixed.

(e) Disposal of dangerous goods/hazardous wastes shall be at approved hazardous waste facilities.

(f) Liquid hydrocarbons shall not be stored or disposed of in earthen pits on Site.

(g) Used oils shall be stored in appropriate drums, or tankage until shipment to waste oil recycling centres, incinerators, or secure disposal facilities approved for such wastes.

(h) Used oil filters shall be drained, placed in suitable storage containers, and buried or incinerated at approved hazardous waste treatment and disposal facilities.

(i) Dangerous goods/hazardous waste storage areas shall be located at least 100 m away from the high water line and be dyked.

(j) Dangerous goods/hazardous waste storage areas shall not be located so as to block natural drainage.

(k) Runoff from a dangerous goods/hazardous waste storage area shall not be allowed to cause siltation of a watercourse.

(l) Dangerous goods/hazardous waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.

E18.10 Emergency Response

(a) The Contractor shall ensure that due care and caution is taken to prevent spills.

(b) The Contractor shall report all major spills of petroleum products or other hazardous substances with significant impact on the environment and threat to human health and safety (as defined in **TABLE 9**: Spills That Must be Reported to Manitoba Conservation as Environmental Accidents) to Manitoba Environment, immediately after occurrence of the environmental accident, by calling the 24-hour emergency phone number (204) 945-4888.

(c) The Contractor shall designate a qualified supervisor as the on Site emergency response coordinator for the project. The emergency response coordinator shall have the authority to redirect manpower in order to respond in the event of a spill.

(d) The following actions shall be taken by the person in charge of the spilled material or the first person(s) arriving at the scene of a hazardous material accident or the on Site emergency response coordinator:

(i) Notify emergency response coordinator of the accident:
- Identify exact location and time of accident.
- Indicate injuries, if any.
- Request assistance as required by magnitude of accident (Manitoba Environment 24-hour Spill Response Line (204) 945-4888, Police, Fire Department, Ambulance, company back-up).

(ii) Attend to public safety:
- Stop traffic, roadblock/cordon off the immediate danger area.
- Eliminate ignition sources.
- Initiate evacuation procedures if necessary.

(iii) Assess situation and gather information on the status of the situation, noting:
- Personnel on Site.
- Cause and effect of spill.
- Estimated extent of damage.
- Amount and type of material involved.
- Proximity to waterways, sewers, and manholes.

(iv) If safe to do so, try to stop the dispersion or flow of spill material:
- Approach from upwind.
- Stop or reduce leak if safe to do so.
- Dyke spill material with dry, inert absorbent material or dry clay soil or sand.
- Prevent spill material from entering waterways and utilities by dyking.
- Prevent spill material from entering manholes and other openings by covering with rubber spill mats or dyking.

(e) Resume any effective action to contain, clean up, or stop the flow of the spilled product.

(f) The emergency response coordinator shall ensure that all environmental accidents involving contaminants shall be documented and reported to Manitoba Environment according to The Dangerous Goods Handling and Transportation Act, Environmental Accident Report Regulation 439/87.

(g) When dangerous goods are used on Site, materials for containment and cleanup of spill material (e.g., absorbent materials, plastic oil booms, and oversized recovery drums) shall be available on Site.

(h) Minor spills of such substances that may be contained on land with no significant impact on the environment may be responded to with in-house resources without formal notification to Manitoba Environment.

(i) City emergency response, 9-1-1, shall be used if other means are not available.

(j) The on Site emergency response coordinator shall contact the Canadian Coast Guard, Kenora, Ontario (807) 468-6441, if the spill material reaches and is on or in the Assiniboine or Red Rivers.

TABLE 9
Spills That Must be Reported to
Manitoba Conservation as Environmental Accidents

Classification	Hazard	Reportable Quantity/Level
1	Explosives	All
2.1	Compressed Gas (flammable)	100 L*
2.2	Compressed Gas	100 L*
2.3	Compressed Gas (toxic)	All
2.4	Compressed Gas (corrosive)	All
3	Flammable Liquids	100 L
4	Flammable Solids	1 kg
5.1 PG**I&II	Oxidizer	1 kg or 1 L

TABLE 9 Spills That Must be Reported to Manitoba Conservation as Environmental Accidents		
Classification	**Hazard**	**Reportable Quantity/Level**
PG III	Oxidizer	50 kg or 50 L
5.2	Organic Peroxide	1 kg or 1 L
6.1 PG I	Acute Toxic	1 kg or 1 L
PG II & III	Acute Toxic	5 kg or 5 L
6.2	Infectious	All
7	Radioactive	Any discharge or radiation level exceeding 10 mSv/h at the package surface and 200 uSv/h at 1 m from the package surface
8	Corrosive	5 kg or 5 L
9.1	Miscellaneous (except PCB mixtures)	50 kg
9.1	PCB Mixtures	500 g
9.2	Aquatic Toxic	1 kg or 1 L
9.3	Wastes (chronic toxic)	5 kg or 5 L
* Container capacity (refers to container water capacity) ** PG = Packing Group(s)		

E18.11 Noise

(a) Noise-generating activities shall be limited to the hours indicated in the City of Winnipeg Neighbourhood Liveability By-Law, unless otherwise accepted in advance by the Contract Administrator.

(b) The Contractor shall be responsible for scheduling Work to avoid potential noise problems and/or employ noise reduction measures to reduce noise to acceptable limits. The Contractor shall also demonstrate to the Contract Administrator that Works to be performed during the night-time period, on Sundays, and Holidays shall not exceed the approved limit.

E18.12 Dust

(a) Dust control practices implemented by the Contractor during construction shall include regular street cleaning and dampening of construction access roads and Work areas with water or approved chemicals at an adequate frequency to prevent the creation of dust.

(b) Only water or chemicals approved by the Contract Administrator shall be used for dust control. The use of waste petroleum or petroleum by-products is not permitted.

(c) The Contractor shall ensure that trucks which are used to haul excavated material and backfill material to and from the work Site utilize tarpaulin covers during transport to prevent material from falling onto the street and creating dust.

(d) Stockpiled soils shall be covered with tarpaulin covers to prevent the creation of dust.

E18.13 Erosion Control

(a) The Contractor shall develop a sediment control plan prior to beginning construction to the satisfaction of the Contract Administrator.

(b) Exposure of soils along riverbank slopes shall be kept to the minimum practical amount, acceptable to the Contract Administrator. The cover of trees and undergrowth shall be preserved to the maximum extent possible.

(c) Sediment control fencing, or other such erosion control structures, shall be employed wherever construction activity increases the potential for runoff to carry sediment into a drainage channel or other watercourse. The Contractor shall inspect all such structures daily during heavy construction activity in the areas of the structures and after a heavy rainfall to ensure their continued integrity.

(d) All areas disturbed during construction shall be landscaped and revegetated with native and/or introduced plant species in order to restore and enhance the Site and to protect against soil erosion unless otherwise indicated.

(e) The disturbed surface shall be revegetated so as to create a dense root system in order to defend against soil erosion on the right-of-way, stream banks, and any other disturbed areas susceptible to erosion.

(f) The loss of topsoil and the creation of excessive dust by wind during construction shall be prevented by the addition of temporary cover crop, water, or tackifier, if conditions so warrant.

(g) Effective sediment and erosion control measures (e.g., straw mulch, erosion control blankets, interceptor ditches) are used both during construction and until vegetation is re-established to prevent sediment-laden runoff from entering the Red River.

(h) The Contractor shall routinely inspect all erosion and sediment control structures and immediately carry out any necessary maintenance. Several inspections shall be performed during rainy days.

E18.14 Runoff Control

(a) Measures shall be undertaken to ensure that runoff containing suspended soil particles is minimized from entering the river to the extent possible to the satisfaction of the Contract Administrator.

(b) Areas that are heavily disturbed and vulnerable to erosion or gullying shall be dyked to redirect surface runoff around the area prior to spring runoff.

(c) Construction activities on erodible slopes and riverbanks shall be avoided during spring runoff and heavy rainfall events.

(d) Soil and fill shall not be stockpiled on immediate riverbank areas.

E18.15 Vegetation

(a) Vegetation shall not be disturbed without written permission from the Contract Administrator.

(b) The Contractor shall protect plants or trees which may be at risk of accidental damage. Such measures may include protective fencing or signage and shall be approved in advance by the Contract Administrator.

(c) Herbicides and pesticides shall not be used adjacent to any surface watercourses.

(d) Trees or shrubs shall not be felled into watercourses.

(e) Areas where vegetation is removed during clearing, construction, and decommissioning activities, shall be revegetated as soon as possible in accordance with the landscaping plans forming part of the contract, or as directed by the Contract Administrator.

(f) Trees damaged during construction activities shall be examined by bonded tree care professionals; viable trees damaged during construction activities shall be pruned according to good practice by bonded tree care professionals.

(g) Damaged trees which are not viable shall be replaced at the expense of the Contractor.

E18.16 Landscaping

(a) Construction waste (excluding common construction gravel, sand, etc.) shall be removed to a minimum depth of 600 mm below final grade in all areas that are to be backfilled with suitable material and revegetated in accordance with the City of Winnipeg Standard Construction Specifications.

(b) The Contractor shall adhere to the landscaping plan for maintenance of initial stages and development stages of the plant community.