THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 775-2015

SASKATCHEWAN AVENUE AT OMAND'S CREEK BRIDGE REPLACEMENT

TABLE OF CONTENTS

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 SASKATCHEWAN AVENUE AT OMAND'S CREEK BRIDGE REPLACEMENT

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, November 17, 2015.

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

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

B3. SITE INVESTIGATION

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

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D3.1.

B4.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, 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 Bid Opportunity 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 Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.

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

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 Bid Opportunity 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 Bid Opportunity, 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.

B6.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/bidopp.asp

B6.2.2 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B6.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B7. SUBSTITUTES

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

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 B17.

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;

(b) Form B: Prices, hard copy;

(c) Bid Security

(i) Form G1: Bid Bond and Agreement to Bond, or
Form G2: Irrevocable Standby Letter of Credit and Undertaking, or
a certified cheque or draft.

B8.2 Further to B8.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B7.

B8.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Bid.

B8.4 The Bid shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.

B8.4.1 Samples or other components of the Bid which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder’s Bid.

B8.4.2 A hard copy of Form B: Prices must be submitted with the Bid. If there is any discrepancy between the Adobe PDF version of Form B:Prices and the Microsoft Excel version of Form B:Prices, the PDF version shall take precedence.

B8.5 Bidders are advised not to include any information/literature except as requested in accordance with B8.1.

B8.6 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B17.1(a).

B8.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B8.8 Bids shall be submitted to:

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

B9. BID

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

B9.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:

(a) if the Bidder is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;

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

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

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

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, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B9.4 Paragraph 12 of Form A: Bid shall be signed in accordance with the following requirements:

(a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;

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

(c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers and the corporate seal, if the corporation has one, should be affixed;

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

B9.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed 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 For the convenience of Bidders, and pursuant to B8.4.2 and B17.4.2, an electronic spreadsheet Form B:Prices in Microsoft Excel (.xls) format is available along with the Adobe PDF documents for this Bid Opportunity on the Bid Opportunities page at the Materials Management Division website at http://www.winnipeg.ca/matmgt/.

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).

B11. DISCLOSURE

B11.1 N/A

B12. QUALIFICATION

B12.1 The Bidder shall:

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

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

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

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

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

B12.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

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

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

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

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

(a) 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

(b) 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

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

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

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

B13. BID SECURITY

B13.1 The Bidder shall provide bid security in the form of:

(a) a bid bond, in the amount of at least fifty percent (50%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or

(b) an irrevocable standby letter of credit, in the amount of at least fifty percent (50%) of the Total Bid Price, and undertaking issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or

(c) a certified cheque or draft payable to "The City of Winnipeg", in the amount of at least fifty percent (50%) of the Total Bid Price, drawn on a bank or other financial institution registered to conduct business in Manitoba.

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

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

B13.1.3 The Bidder shall sign the Bid Bond.

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

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

B13.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B13.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B13.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

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

B14. OPENING OF BIDS AND RELEASE OF INFORMATION

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

B14.1.1 Bidders or their representatives may attend.

B14.2 Following the Submission Deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at

The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/default.stm

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

B14.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B15. IRREVOCABLE BID

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

B15.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly executed and the performance security furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid.

B16. WITHDRAWAL OF BIDS

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

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

B16.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

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

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

(b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid; and

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

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

B17. EVALUATION OF BIDS

B17.1 Award of the Contract shall be based on the following bid evaluation criteria:

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

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

(c) Total Bid Price;

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

B17.2 Further to B17.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.

B17.3 Further to B17.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is responsible and qualified.

B17.4 Further to B17.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

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

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

B18. AWARD OF CONTRACT

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

B18.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.

B18.2.1 Without limiting the generality of B18.2, the City will have no obligation to award a Contract where:

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

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

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

(d) only one Bid is received; or

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

B18.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B17.

B18.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

B18.3.2 The City's intent is to award this Contract no later than December 18, 2015.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

C0.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.

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

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

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of the construction of a cast-in-place concrete slab bridge over Omand's Creek at Saskatchewan Avenue.

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

(a) Creek flow maintenance;

(b) Demolition and removal of existing bridge;

(c) Excavation and backfill;

(d) Steel piling;

(e) Cast-in-place concrete;

(f) Riprap;

(g) Asphalt waterproofing and paving;

(h) Road and sidewalk restoration.

D3. CONTRACT ADMINISTRATOR

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

Bill Ebenspanger, P.Eng.
Sr. Structural Engineer

Telephone No. 204 977 8370
Facsimile No. 204 487 7470

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

D3.3 Bids Submissions must be submitted to the address in 0.

D4. CONTRACTOR'S SUPERVISOR

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

D5. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

D5.1 The Contract, all deliverables produced or developed, and information provided to or acquired by the Contractor are the property of the City and shall not be appropriated for the Contractors own use, or for the use of any third party.

D5.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.

D5.3 The following shall be confidential and shall not be disclosed by the Contractor to the media or any member of the public without the prior written authorization of the Contract Administrator;

(a) information provided to the Contractor by the City or acquired by the Contractor during the course of the Work;

(b) the Contract, all deliverables produced or developed; and

(c) any statement of fact or opinion regarding any aspect of the Contract.

D5.4 A Contractor who violates any provision of D5 may be determined to be in breach of Contract.

D6. NOTICES

D6.1 Except as provided for in C23.2.2, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid.

D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D6.3, D6.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the facsimile number identified in D3.1.

D6.3 Notwithstanding C21., all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following facsimile number:

The City of Winnipeg
Chief Financial Officer

Facsimile No.: 204 949-1174

D6.4 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services

Facsimile No.: 204 947-9155

D6.5 Bids Submissions must be submitted to the address in 0

D7. FURNISHING OF DOCUMENTS

D7.1 Upon award of the Contract, the Contractor will be provided with five (5) complete sets of the Bid Opportunity. If the Contractor requires additional sets of the Bid Opportunity, they will be supplied to him/her at cost.

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

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

D9. SAFE WORK PLAN

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

D9.2 The Safe Work Plan 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

D9.3 Notwithstanding B12.4 at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D10. INSURANCE

D10.1 The Contractor shall provide and maintain the following insurance coverage:

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

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

(c) 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, Sub-Contractors and The City of Winnipeg, at all times during the performance of the Work and until the date of Total Performance.

D10.2 Deductibles shall be borne by the Contractor.

D10.3 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4.1 for the return of the executed Contract.

D10.4 The certificate of insurance for the commercial general liability insurance must clearly state "operations to include demolition work".

D10.5 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.

D10.6 The Contractor shall require each of its sub-contractors to provide comparable insurance to that set forth under D10.1 (a) and (b) above.

D10.7 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D11. PERFORMANCE SECURITY

D11.1 The Contractor shall provide and maintain performance security 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; or

(b) an irrevocable standby letter of credit issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form attached to these Supplemental Conditions (Form H2: Irrevocable Standby Letter of Credit), in the amount of fifty percent (50%) of the Contract Price; or

(c) a certified cheque or draft payable to "The City of Winnipeg", drawn on a bank or other financial institution registered to conduct business in Manitoba, in the amount of fifty percent (50%) of the Contract Price.

D11.1.1 Where the performance security is in the form of a certified cheque or draft, it will be deposited by the City. The City will not pay any interest on certified cheques or drafts furnished as performance security.

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

D12. SUBCONTRACTOR LIST

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

D13. DETAILED WORK SCHEDULE

D13.1 The Contractor shall provide the Contract Administrator with a detailed work schedule (Form L: 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.

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

(a) a critical path method (C.P.M.) schedule for the Work;

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

all acceptable to the Contract Administrator.

D13.3 Further to D13.2(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:

D13.4 Further to D13.2(b), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

SCHEDULE OF WORK

D14. COMMENCEMENT

D14.1 The Contractor shall not commence any Work until he/she is in receipt of a letter of intent from the Award Authority authorizing the commencement of the Work.

D14.2 The Contractor shall not commence any Work on the Site until:

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

(i) evidence of authority to carry on business specified in D8;

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

(iii) the Safe Work Plan specified in D9;

(iv) evidence of the insurance specified in D10;

(v) the performance security specified in D11;

(vi) the Subcontractor list specified in D12;

(vii) the detailed work schedule specified in D13.

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

D14.3 The Contractor shall not commence the Work on the Site before January 4, 2016.

D14.4 The City intends to award this Contract by December 18, 2015.

D14.4.1 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.

D15. SUBSTANTIAL PERFORMANCE

D15.1 The Contractor shall achieve Substantial Performance by May 27, 2016.

D15.2 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.

D15.3 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.

D16. TOTAL PERFORMANCE

D16.1 The Contractor shall achieve Total Performance by June 3, 2016.

D16.2 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.

D16.3 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.

D17. LIQUIDATED DAMAGES

D17.1 If the Contractor fails to achieve Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City two thousand dollars ($2,000.00) per Calendar Day for each and every Calendar Day following the days fixed herein for same during which such failure continues.

D17.2 The amount specified for liquidated damages in D17 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Substantial Performance by the day fixed herein for same.

D17.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

CONTROL OF WORK

D18. JOB MEETINGS

D18.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D18.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D19. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D19.1 Further to C6.24, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

D20. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D20.1 Further to B12.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B12.4.

D21. WORK BY OTHERS

D21.1 Work by others on or near the Site will include but not necessarily be limited to:

(a) City of Winnipeg Traffic Services Branch – Set up, maintenance, and removal of required signage and traffic control.

(b) Manitoba Hydro – Removal of existing Hydro pole street lighting and installation of new relocated Hydro pole and street lighting.

(c) CP Rail – Possible stream bed profile regrading upstream of bridge.

(d) Any additional unidentified Work if and as necessary.

D21.2 The Contract Administrator will attempt to arrange and coordinate Work to be performed by others so that such Work does not interfere with the Work and Schedule of the Contractor. Where Work by others interferes, as determined by the Contract Administrator, with the Contractor's planned Work, the Contractor shall modify his plans and do other Work. Unless the Contract Administrator determines that there was no opportunity for the Contractor to do a similar amount of Work, no consideration will be made to extending the Contract time.

D22. COOPERATION WITH OTHERS

D22.1 The Contractor's attention is directed to the fact that other Contractors, the personnel of Utilities and the staff of the City may be working on the structure, approach roadways, adjacent roadways or rights-of-way. The activities of these agencies may coincide with the Contractor's execution of the Work, and it will be the Contractor's responsibility to cooperate to the fullest extent with the other personnel working in the area, and such cooperation is an obligation of the Contractor under the terms of the Contract.

D23. AUTHORIZED WORK ON PRIVATE PROPERTY

D23.1 The Contractor shall confine his Works to the right-of-way or easements as much as possible. Where Work is required to be done on or accessed through private property, the Contractor shall obtain written permission from the property owner and provide a copy to the Contract Administrator.

D24. ENCROACHMENT ON PRIVATE PROPERTY

D24.1 Further to Section 3.11 of CW 3110 of the General Requirements, the Contractor shall confine his Work to the public right-of-ways and construction easements at all times, except if he has received written permission from the property owner. The Contractor shall provide the Contract Administrator with a copy of any written permission he has received to enter onto private property.

D24.2 The Contractor's construction activities shall be confined to the minimum area necessary for undertaking the Work and he shall be responsible for all damage to private property resulting from his Work. Particular care shall be taken to assure no damage is done to buildings, fencing, trees and plants, and provision shall be made to maintain full drainage for private properties during construction.

D25. DAMAGE TO EXISTING STRUCTURES AND PROPERTY

D25.1 Further to Section 3.13 of CW 1130 of the General Requirements, special care shall be taken to avoid damage to existing adjacent structures and properties during the course of Work.

D25.2 Any damage caused by the Contractor or his Subcontractors to the adjacent structures of properties shall be promptly repaired by the Contractor at his own expense to the satisfaction of the Contract Administrator.

D26. LAYOUT OF WORK

D26.1 Further to C6, the Contract Administrator shall provide the basic centrelines and a benchmark for construction.

D26.2 The Contractor shall be responsible for the true and proper laying out of the Work and for the correctness of the location, levels, dimensions, and alignment of all aspects of the Work. He shall provide all required instruments and competent personnel for performing all layouts.

D26.3 The Contract Administrator shall be notified at least one (1) Business Day prior to any Work being commenced in order to have the option to check and review all elevations and layouts at his discretion.

D26.4 Should any error appear or arise in location, levels, dimensions, and/or alignments during the course of the Work, the Contractor shall promptly rectify such errors to the satisfaction of the Contract Administrator, at his own expense.

D26.5 The Contractor shall carefully protect and preserve all benchmarks, stakes, and other items of the basic data supplied by the Contract Administrator. Any such benchmarks or stakes removed or destroyed by the Contractor, without the consent of the Contract Administrator, shall be replaced by the Contract Administrator at the expense of the Contractor.

D27. ENVIRONMENTAL PROTECTION PLAN

D27.1 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.

D27.2 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work:

(a) Federal

(i) Canadian Environmental Assessment Act (CEAA), 1992 c.37;

(ii) Canadian Environmental Protection Act;

(iii) Fisheries Act, 1985 c.F-14;

(iv) Transportation of Dangerous Goods Act and Regulations, c.34;

(v) Migratory Birds Convention Act and Regulations, c.22;

(vi) Species at Risk Act, c.29;

(vii) Transportation Association of Canada's Transportation Association of Canada *National Guide to Erosion and Sediment Control on Roadway Projects*, 2005;

(viii) Applicable Fisheries and Oceans Canada Operational Statements for Manitoba for Temporary Stream Crossings;

(ix) The Department of Fisheries and Oceans *Freshwater Intake End-of-Pipe Fish Screen Guidelines*, DFO 1995;

(x) Fisheries and Oceans Policy for the *Management of Fish Habitat* 1986;

(xi) Federal Policy on Wetland Conservation 1991;

(xii) Navigable Waters Best Practices; and

(xiii) Any other applicable Acts, Regulations, and By-laws.

(b) Provincial

(i) The Dangerous Goods Handling and Transportation Act, D12;

(ii) The Endangered Species Act, c.E111;

(iii) The Environment Act, c.E125;

(iv) The Fire Prevention Act, c.F80;

(v) The Heritage Resources Act, c.H39.1;

(vi) The Noxious Weeds Act , c.N110;

(vii) The Nuisance Act, c.N120;

(viii) The Pesticides Regulation, M.R. 94/88R

(ix) The Public Health Act, c.P210;

(x) The Water Protection Act, c.W65;

(xi) The Workplace Safety and Health Act c.W210;

(xii) Current applicable Associated Regulations;

(xiii) The Manitoba Stream Crossing Guidelines for the *Protection of Fish and Fish Habitat, Manitoba National Resources*, 1996.; and

(xiv) Any other applicable Acts, Regulations, and By-laws.

(c) Municipal

(i) The City of Winnipeg Neighbourhood Liveability By-law No. 1/2008;

(ii) The City of Winnipeg By-law No. 1573/77 and all amendments up to and including 7670/2000;

(iii) City of Winnipeg *Best Management Practices for Activities In and Around the City's Waterways and Watercourses*, City of Winnipeg 2005;

(iv) The City of Winnipeg *Motor Vehicle Noise Policies and Guidelines*;

(v) The City of Winnipeg By-law No. 2480/79 and all amendments up to and including 7976/2000;

(vi) The City of Winnipeg By-law No. 92/2010; and

(vii) Any other applicable Acts, Regulations, and By-laws.

D27.3 Work shall be undertaken with consideration of the mitigation measures outlined in DFO's letter 15-HCAA-00955, dated September 9, 2015. This letter is included as Appendix A.

D27.4 An Environment Act License is currently underway for this Project. The license shall be provided to the Contractor when it is formally issued. The Contractor shall comply with the requirements outlined in the license.

D27.5 City of Winnipeg Waterways permit is currently underway for this Project. The permit shall be provided to the Contractor when it is formally issued. The Contractor shall comply with the requirements outlined in the permit.

D27.6 The Contractor is advised that the following environmental protection measures apply to the Work.

(a) Materials Handling and Storage

(i) Storage on construction materials shall be confined to the defined laydown areas as shown on the Contract Drawings or at a location approved by the Contract Administrator.

(ii) Construction materials shall not be deposited or stored on or near watercourses unless written acceptance from the Contract Administrator is received in advance.

(iii) Construction materials and debris shall be tied down or secured if severe weather and high wind velocities are forecasted. Work shall be suspended during extreme high wind conditions.

(iv) Construction materials and debris shall be prevented from entering watercourses. In the event that materials and/or debris inadvertently enter the land drainage system, the Contractor will be required to remove the material to an appropriate landfill or storage facility and restore the watercourse to its original condition.

(b) Fuel Handling and Storage

(i) The Contractor shall obtain all necessary permits from Manitoba Conservation and Water Stewardship for the handling and storage of fuel products and shall provide copies to the Contract Administrator.

(ii) 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.

(iii) 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.

(iv) The Contractor shall ensure that any temporary fuel storage areas established for construction of the project are contained by an impermeable dyke. 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 impervi8ous 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 battier such as a high fence and gate to prevent vandalism.

(v) The Contractor shall ensure that all fuel storage containers are inspected daily for leaks and spillage.

(vi) Products transferred from the fuel storage area(s) to specific Work Sites shall not exceed the daily usage requirement.

(vii) 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.

(viii) Washing, refuelling, and servicing of machinery and storage of fuel and other materials for the machinery shall take place at least 100 metres from a watercourse to prevent deleterious substances from entering the water.

(ix) 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.

(x) The deposit of deleterious substances into water frequented by fish is prohibited under the Fisheries Act, 1985. The Contractor shall take appropriate precautions to ensure that potentially deleterious substances (such as fuel, hydraulic fluids, oil, sediment, etc.) do not enter any water body.

(xi) 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.

(xii) Machinery shall arrive on Site in a clean condition and shall be maintained to be free to fluid leaks.

(xiii) 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 upon short notice. Additionally, appropriate staff on Site shall be trained for proper handling of deleterious liquids (i.e. fueling) and trained in preventing and cleaning up minor spills.

(c) Waste Handling and Disposal

(i) The construction area shall be kept clean and orderly at all times during and at completion of construction.

(ii) 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.

(iii) 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 30.5D).

(iv) On Site volumes of sewage and/or septage will be removed on a weekly basis.

(v) The Contractor shall ensure sewage, septage, and other liquid wastes generated on Site are handled and disposed of by a certified disposal contractor.

(vi) Indiscriminate dumping, littering, or abandonment shall not take place.

(vii) No on-Site burning of waste is permitted.

(viii) Structurally unsuitable site excavation material will be removed by the Contractor.

(ix) Waste storage areas shall not be located so as to block natural drainage.

(x) Runoff from a waste storage area shall not be allowed to cause siltation of a watercourse.

(xi) 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.

(xii) Equipment shall not be cleaned near watercourses; contaminated water from onshore cleaning operations shall not be permitted to enter watercourses.

(xiii) The Contractor shall notify and receive written approval from the Contract Administrator prior to discharge from any dewatered areas. The discharge will be released into a well-vegetated area, filter bag, settling basin, or storm sewer system to remove the suspended material and other deleterious substances from the discharge before it finds its way into any watercourse. Discharge from dewatering areas may require approved disposal via the sanitary sewer system or disposal truck in accordance with Construction Specifications, at the request of the Contract Administrator.

(xiv) Flows will be dissipated so that dewatering discharges minimize erosion at the discharge point.

(d) Dangerous Goods/Hazardous Waste Handling and Disposal

(i) Dangerous goods/hazardous waste are identified by, and shall be handled according to, The Dangerous Goods Handling and Transportation Act and Regulations.

(ii) The Contractor shall be familiar with The Dangerous Goods Handling and Transportation Act and Regulations.

(iii) 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.

(iv) Different waste streams shall not be mixed.

(v) Disposal of dangerous goods/hazardous wastes shall be at approved hazardous waste facilities.

(vi) Liquid hydrocarbons shall not be stored or disposed of in earthen pits on Site.

(vii) 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.

(viii) Used oil filters shall be drained, placed in suitable storage containers, and buried or incinerated at approved hazardous waste treatment and disposal facilities.

(ix) Dangerous goods/hazardous waste storage areas shall be located at least 107 metres away from the edge of the water line for normal summer water levels and be dyked.

(x) Dangerous goods/hazardous waste storage areas shall not be located so as to block natural drainage.

(xi) Runoff from a dangerous goods/hazardous waste storage areas shall not be allowed to cause siltation of a watercourse.

(xii) 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.

(e) Emergency Response

(i) The Contractor shall ensure that due care and caution is taken to prevent spills.

(ii) 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 1 below) to Manitoba Environment, immediately after occurrence of the environmental accident, by calling the 24-hour emergency phone number (204) 945-4888.

(iii) 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.

(iv) 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 backup).

(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; and
- 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; and
- Resume any effective action to contain, clean up, or stop the flow of the spilled product.

(v) 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.

(vi) 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.

(vii) Minor spills of such substances that may be contained on land with no significant impact on the environment may be responded to within-house resources without formal notification to Manitoba Environment.

(viii) City Emergency response, 9-1-1, shall be used if other means are not available.

TABLE 1
SPILLS THAT MUST BE REPORTED TO THE
MANITOBA CONSERVATION AS ENVRIONMENTAL 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	K kg or 1 L
PG** III	Oxidizer	50 kg or 50 L
5.2	Organic Peroxide	1 kg or 1 L
6.1 PG** I & II	Acute Toxic	1 kg or 1 L
PG** 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
9.2	PCB Mixtures	500 g
9.3	Aquatic Toxic	1 kg or 1 L
9.4	Wastes (chronic toxic)	5 kg or 5 L

* Container capacity (refers to container water capacity)
** PG = Packing Group(s)

(f) Noise and Vibration

(i) Noise-generating activities shall be limited to the hours indicated in the City of Winnipeg Noise Bylaw, and the Province of Manitoba Environment Act Licence, unless otherwise accepted in advance by the Contract Administrator. The activities will generally be restricted to 7:00 a.m. to 7:00 p.m. weekdays with written permission of the Contract Administrator and the City of Winnipeg for any afterhours or weekend work required for special cases. No extended or alternative working hours/dates will be permitted for pile driving activities.

(ii) 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 as stated in the Licence shall not exceed the approved limit.

(iii) The Contractor shall locate stationary noise generating equipment (i.e. generators) away from sensitive receptors and wildlife areas.

(iv) Construction vehicles and equipment will adhere to posted speed limits.

(g) Dust and Emissions

(i) 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.

(ii) The Contractor shall minimize construction equipment idling times and turn off machinery, when feasible.

(iii) Dust control practices implemented by the Contractor during construction will 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.

(iv) 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.

(v) 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.

(vi) Stockpiled soils shall be covered with tarpaulin covers to prevent the creation of dust.

(h) Erosion Control

(i) The Contractor shall develop a sediment control plan prior to beginning construction in adherence to the Transportation Association of Canada National Guide to Erosion and Sediment Control on Roadway Projects, the City of Winnipeg's *Best Management Practices for Activities In and Around the City's Waterways and Watercourses*, and to the satisfaction of the Contract Administrator.

(ii) Exposure of soils shall be kept to a minimum practical amount, acceptable to the Contract Administrator. The cover of trees and undergrowth shall be preserved to the maximum extent possible.

(iii) 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.

(iv) 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.

(v) 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 and any other disturbed areas susceptible to erosion.

(vi) 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.

(vii) The Contractor shall routinely inspect all erosion and sediment control structures and immediately carry out any necessary maintenance. Several inspections will be performed during rainy days.

(viii) Construction activities will be avoided during periods of high winds to prevent erosion and the creation of dust.

(i) Runoff Control

(i) Measures shall be undertaken to ensure that runoff containing suspended soil particles is minimized from entering the land drainage system and Omand's Creek to the greatest extent possible, to the satisfaction of the Contract Administrator.

(ii) Areas that are heavily disturbed and vulnerable to erosion or gullying will be dyked to redirect surface runoff around the area prior to spring runoff.

(iii) Construction activities on erodible slopes shall be avoided during spring runoff and heavy rain fall events.

(iv) Soil and fill shall not be stockpiled on immediate watercourse bank areas. Stockpile locations shall be presented for review and approval to the Contract Administrator.

(j) Fish

(i) Due to the presence of spawning fish species no instream works will occur between April 1 and June 15 of any given year.

(ii) Culvert removal, instream bridge construction works, and specified underground works occurring within the riverbank shall be constructed during periods of low flow. Flowing water should be diverted around the construction area using a cofferdam and bypass pump. Water will be diverted in a manner that avoids sediment generation to downstream areas and does not alter the volume of flow in the watercourse. Use cofferdams made of non-earthen material such as aquadams, sand bags, sheet pile or clean granular material wrapped in poly-plastic or other suitable isolation materials. Ensure any pump inlets are appropriately screened following the DFO Freshwater Intake End-of-Pipe Fish Screen Guidelines. Ensure all isolation materials are completely removed from the watercourse once construction is complete.

(iii) Any fish trapped within the isolated area will be captured and returned to the watercourse unharmed. Fish includes fin fish, crayfish, and mussels (clams).

(iv) A buffer of vegetation will be maintained when working along waterways, where possible.

(v) The duration of Work and amount of disturbance to the bed and banks of the waterbody will be minimized.

(k) Wildlife

(i) No clearing of trees, shrubs, or vegetation is permitted between May 1 and July 31 of any year to protect the nesting and breeding season for migratory birds and other wildlife, unless otherwise identified by a Project biologist.

(ii) No disruption, movement, or destruction shall occur to any migratory bird nests.

(iii) In the event that a species at risk or a nest is encountered during construction, all Work will cease in the immediate area, the site will be made safe, and the Contract Administrator shall be contacted for further direction.

(l) Vegetation

(i) Vegetation shall not be disturbed without written permission from the Contract Administrator.

(ii) 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.

(iii) The Contractor will limit the removal of trees and snags (standing dead trees), surface disturbance, and vegetation clearing.

(iv) Herbicides and pesticides shall not be used adjacent to any surface watercourses.

(v) Trees or shrubs shall not be felled into watercourses.

(vi) 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.

(vii) Trees damaged during construction activities shall be examined by bonded tree carte professionals; viable trees damaged during construction activities shall be pruned according to good practice by bonded tree care professionals.

(viii) Damaged trees which are not viable shall be replaced at the expense of the Contractor.

(m) Landscaping

(i) 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 Standard City Practice.

(ii) The Contractor shall adhere to the landscaping plan for maintenance of initial stage and development stages of the plant community

(n) Construction Traffic

(i) Workforce parking shall be limited to the areas designated for such as detailed in the Contract Documents, or as otherwise may be directed by the Contract Administrator.

(ii) The Contractor shall adhere to the Standard Provisions of the Standard Construction Specifications, and of the Manual of Temporary Traffic Control in Work Areas on City Streets of The City of Winnipeg, Works & Operations Division.

(iii) The Contractor's laydown area, construction Site and access road shall be fenced and gated to secure the Site and materials and to discourage pedestrian entrance to construction area and to control any potential hazard to the public, particularly children.

(iv) For circumstances where the Contract Administrator has accepted Site access of special equipment or material, the Contractor shall provide adequate flagmen for traffic control in the vicinity of any public buildings.

(o) Access

(i) The Contractor shall maintain access to affected residential properties.

(p) The Contractor shall provide or maintain general and off-street access to any affected business during construction.

MEASUREMENT AND PAYMENT

D28. PAYMENT

D28.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D29. WARRANTY

D29.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

FORM H1: PERFORMANCE BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

BID OPPORTUNITY NO. 775-2015

SASKATCHEWAN AVENUE AT OMAND'S CREEK BRIDGE REPLACEMENT

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: IRREVOCABLE STANDBY LETTER OF CREDIT
(PERFORMANCE SECURITY)
(See D11)

_____
(Date)

The City of Winnipeg
Legal Services Department
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 775-2015

SASKATCHEWAN AVENUE AT OMAND'S CREEK BRIDGE REPLACEMENT

Pursuant to the request of and for the account of our customer,

_____ ,
(Name of Contractor)

_____
(Address of Contractor)

WE HEREBY ESTABLISH in your favour our irrevocable Standby Letter of Credit for a sum not exceeding in the aggregate

_____

_____ Canadian dollars.

This Standby Letter of Credit may be drawn on by you at any time and from time to time upon written demand for payment made upon us by you. It is understood that we are obligated under this Standby Letter of Credit for the payment of monies only and we hereby agree that we shall honour your demand for payment without inquiring whether you have a right as between yourself and our customer to make such demand and without recognizing any claim of our customer or objection by the customer to payment by us.

The amount of this Standby Letter of Credit may be reduced from time to time only by amounts drawn upon it by you or by formal notice in writing given to us by you if you desire such reduction or are willing that it be made.

Partial drawings are permitted.

We engage with you that all demands for payment made within the terms and currency of this Standby Letter of Credit will be duly honoured if presented to us at:

_____
(Address)

and we confirm and hereby undertake to ensure that all demands for payment will be duly honoured by us.

All demands for payment shall specifically state that they are drawn under this Standby Letter of Credit.

Subject to the condition hereinafter set forth, this Standby Letter of Credit will expire on

_____ .
(Date)

It is a condition of this Standby Letter of Credit that it shall be deemed to be automatically extended from year to year without amendment from the present or any future expiry date, unless at least 30 days prior to the present or any future expiry date, we notify you in writing that we elect not to consider this Standby Letter of Credit to be renewable for any additional period.

This Standby Letter of Credit may not be revoked or amended without your prior written approval.

This credit is subject to the Uniform Customs and Practice for Documentary Credit (2007 Revision), International Chamber of Commerce Publication Number 600.

_____
(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

FORM J: SUBCONTRACTOR LIST

(See D12)

SASKATCHEWAN AVENUE AT OMAND'S CREEK BRIDGE REPLACEMENT

Name	Address

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 Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.

E1.3 The following are applicable to the Work:

Drawing Index:

Sheet No.	City Drawing No.	Sheet Title
01	B144-16-01	Cover Sheet, Location Plan & Drawing Index
02	B144-16-02	General Notes & Design Data
03	B144-16-03	Scope of Work
04	B144-16-04	General Arrangement
05	B144-16-05	Borehole Logs
06	B144-16-06	Demolition
07	B144-16-07	Creek Work
08	B144-16-08	Foundations & Substructure I
09	B144-16-09	Substructure II
10	B144-16-10	Substructure III
11	B144-16-11	Substructure IV
12	B144-16-12	Bridge Deck
13	B144-16-13	Approach Slabs
14	B144-16-14	Concrete Barriers
15	B144-16-15	Bridge Aluminum Barrier Rail Standard Details
16	B144-16-16	Saskatchewan Avenue Plan, Profile, Horizontal Geometry & Guardrail Layout
17	B144-16-17	Aluminum Balanced Barrier Standard Details
18	B144-16-18	Bill of Steel Reinforcement & Bill of Materials

Reference Drawings:

Drawing No.	Drawing Title
B144-1936-4361	Proposed Renewal of Timber Bridge – Plan and Elevation
B144-1936-4362	Proposed Renewal of Timber Bridge – Details of Framing and Bill of Materials
B144-1936-4363	Proposed Renewal of Timber Bridge – Details of Framing and Bill of Materials
B136-68-BC4522	Plan & Elevation
B144-68-BC4523	Bridge Widening – Cross-Section Details
B144-79-01	Bridge Maintenance Grouted Rip Rap Channel
B144-81-01	Bridge Maintenance Traffic Barrier Repairs
B144-81-02	Bridge Maintenance Resurfacing
B144-84-01	Bridge Handrail Renewal Works (South Side Only) – B-5526
8629-1	Bridge Handrail Renewal Works (South Side Only)
B144-1981-01	Saskatchewan Avenue at Omand's Creek – Resurfacing
B144-1981-02	Saskatchewan Avenue at Omand's Creek – Resurfacing
B144-09-01	Saskatchewan Avenue Timber Bridge (Omand's Creek) East Abutment Pile Cap Repair

E2. GEOTECHNICAL INVESTIGATION

E2.1 Further to C3.1, the preliminary geotechnical report is available for viewing to aid the bidder's evaluation of the pavement structure and/or existing soil conditions during the tender period. Borehole logs are also provided on the Drawings. Bidders may view the report during the tender period by contacting the Contract Administrator identified in D3. Borehole logs are also provided on the Drawings.

GENERAL REQUIREMENTS

E3. SHOP DRAWINGS

E3.1 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 a 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 Administrator's review.

E3.2 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 licensed to practice in the province of Manitoba.

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

E3.3 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 Contract Administrator, in writing at time of submission, of deviations from requirements of Contract Documents.

(f) Responsibility for 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 submission 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 of copies, distribute copies 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.

E3.4 Submission Requirements

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

(b) Submit two (2) paper prints of Shop Drawings. The Contract Administrator will retain one (1) copy of all submittals and return one (1) copy to the Contractor.

(c) Accompany submissions with transmittal letter containing:
  (i) Date;
  (ii) Project title and Bid Opportunity 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.

(d) Submissions shall include:
  (i) Date and revision dates; and
  (ii) Project title and Bid Opportunity number.

(e) Name of:
  (i) Contract;
  (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.

E3.5 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 purposes of progress payment certificates.

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

E4. VERIFICATION OF WEIGHT

E4.1 Weight Verification

(a) All material which is paid for on a weight basis shall be weighed on a scale certified by Consumer & Corporate Affairs, Canada.

(b) All weight tickets shall have the gross weight and the time and date of weighing printed by an approved electro/mechanical printer coupled to the scale.

(c) The tare weight and net weight may either be hand written or machine printed. All weights, scales and procedures shall be subject to inspection and verification by the Contract Administrator. Such inspection and verification may include, but shall not be limited to:

(i) Checking Contractor's scales for Consumer & Corporate Affairs certification seals;

(ii) Observing weighing procedures;

(iii) Random checking of either gross or tare weights by having such trucks or truck/trailer(s) combinations as the Contract Administrator shall select weighed at the nearest available certified scale; and Checking tare weights shown on delivery tickets against a current tare.

(d) No charge shall be made to the City for any delays or loss of production caused by such inspection and verification.

E4.2 Evaluation of Tare Weight

(a) The Contractor shall ensure that each truck or truck/trailer(s) combination delivering material which is paid for on a weight basis carries a tare not more than one (1) month old.

(b) The tare shall be obtained by weighing the truck or truck/trailer(s) combination on a certified scale and shall show:

(i) Upon which scale the truck or truck/trailer(s) combination was weighed;

(ii) The mechanically printed tare weight;

(iii) The license number(s) of the truck and trailer(s); and

(iv) The time and date of weighing.

E5. MOBILIZATION AND DEMOBILIZATION

E5.1 Description

(a) This Specification shall cover all operations relating to the mobilization and demobilization of the Contractor to the Bridge Site, as specified 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 Works as hereinafter specified.

E5.2 Referenced Specifications and Drawings

(a) The latest edition and subsequent revisions of the following:

(i) CW 3550 – Chain Link and Drift Control Fence.

E5.3 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) Supplying, setting up, laying out, and removing site office facilities as detailed in E6 "Site Office Facilities";

(iii) Supplying and installing secure fencing around the site;

(iv) Maintaining and removing any access roadways; and

(v) Restoring all existing facilities.

E5.4 Materials

(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.

E5.5 Equipment

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

E5.6 Construction Methods

E5.6.1 Layout of On-Site Work Facilities

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

(b) Possible locations for the Contractor's staging areas include the Saskatchewan Avenue right-of-way east of the Bridge. The Contractor shall coordinate with relevant parties to make arrangements for use of these areas.

(c) Upon completion of construction activities, the Contractor shall remove all on-site Work and other temporary facilities, and restore to pre-existing conditions.

E5.6.2 Cellular Telephone Communication

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

E5.6.3 Secure Site Fencing

(a) A minimum 1.8 m high chain-link, or equivalent as approved by the Contract Administrator in accordance with B7 "Substitutes", secure fence around the site laydown and Work site areas shall be installed prior to commencement of site activities.

(b) During winter months, a minimum 1.2 m high snow fence shall be installed across Omand's Creek.

(c) The fencing shall remain secure and in place during all construction facilities.

(d) The fencing shall be removed upon demobilization of on-site Work facilities.

E5.6.4 Traffic Gates

(a) The Contractor shall supply, install, maintain, and remove steel gates to keep non-Contract traffic and pedestrians out of the Work site, wherever required.

(b) The gates shall be removed upon completion of construction activities.

E5.6.5 Access Roadway

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

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

(c) City of Winnipeg streets and alleys adjacent to all access roads and staging areas must be kept clean at all times.

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

E5.6.6 Restoration of Existing Facilities

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

E5.7 Quality Control

E5.7.1 Inspection

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

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

E5.7.2 Access

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

E5.8 Measurement and Payment

E5.8.1 Mobilization and Demobilization

(a) Mobilization and demobilization shall not be measured. This item of work shall be paid for at the Contract Lump Sum Price for "Mobilization and Demobilization", which price shall be paid in full for supply all materials and performing all operations herein described and all other items incidental to the Work. Payment will be based on the following breakdown:

(i)	Commencement of Construction	30%
(ii)	During Construction	60%
(iii)	Upon Completion of the Work	10%

E6. SITE OFFICE FACILITIES

E6.1 Description

(a) This Specification shall cover all operations relating to the supply of site office facilities, as specified 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 Works as hereinafter specified.

E6.2 Materials

(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.

E6.3 Equipment

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

E6.4 Construction Methods

E6.4.1 Site Office Facilities

(a) The Contractor shall supply the Contract Administrator’s site office facilities meeting the following requirements:

(i) A site office shall be provided for the exclusive use of the Contract Administrator;

(ii) The office shall be conveniently located within the site lay-down area near the Work site;

(iii) The office shall be a newer building with a minimum floor area of 15 square metres, having a ceiling height of 2.4 m and adequate windows (complete with security bars) to provide for cross ventilation, with door entrance(s) with suitable lock(s);

(iv) The office shall be suitable for all weather use. It shall be equipped with suitable heating and air conditioning systems, so that the interior room temperature can be maintained between 20 to 22ºC at any outside ambient temperature;

(v) The office shall be adequately lighted with fluorescent fixtures and have a minimum of ten – 120 volt ac electrical receptacles;

(vi) The office shall be furnished with one office desk and two chairs, one drafting table, one meeting table, one stool, one legal size filing cabinet, two bookcases, and a minimum of eight (8) chairs;

(vii) Two separate land lines for a fax machine and a computer modem shall also be supplied and serviced by the Contractor;

(viii) One refrigerator, approximately 5 ft3 and one mid-size microwave shall be supplied by the Contractor;

(ix) A bottled water supply, with associated consumables, shall be supplied fresh regularly by the Contractor;

(x) A portable flush or chemical-type toilet, lavatory, and mirror shall be located near the site office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and personnel from the City;

(xi) The site office building and the portable toilet shall be cleaned on a weekly basis. The Contract Administrator may request additional cleaning when he deems it necessary;

(xii) A minimum of three parking stalls shall be made available for use by the Contract Administrator immediately adjacent to the site office; and

(xiii) All site office facilities and furnishings shall be approved by the Contract Administrator;

(b) The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the site office facilities.

(c) The site office facilities shall be provided from the date of the commencement of the Work to the date of Total Performance unless otherwise approved in writing by the Contract Administrator.

E6.5 Measurement and Payment

E6.5.1 Site Office Facilities

(a) The supply of site office facilities shall not be measured. This item of Work shall be paid for at the Lump Sum Price for "Mobilization and Demobilization", which price shall be paid in full for supply all materials and performing all operations herein described and all other items incidental to the Work.

E7. TRAFFIC CONTROL AND MANAGEMENT

E7.1 Description

(a) This Specification shall cover all operations relating to the supply, erection, and maintenance of all applicable traffic control devices in accordance with the provision contained in the latest edition of the “Manual of Temporary Traffic Control on City Streets,” and Clauses 3.6 and 3.7 of the latest version of the City of Winnipeg Standard Construction Specification CW 1130, and as specified 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 Works as hereinafter specified.

E7.2 Scope of Work

(a) The City of Winnipeg is responsible for traffic control related to the movement of vehicles outside of the Work area. The City shall bear all costs associated with these Works. This includes:

(i) Turning restrictions and related signage;

(ii) All regulatory signage;

(iii) Traffic signal modifications and installations (temporary signal poles and indicators, relocations, and reinstallations); and

(iv) Daily maintenance of all items above.

(b) The Work done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified, excluding that being performed by the City of Winnipeg as listed above in E7.2(a). This generally includes:

(i) Installation of barricades in areas under construction, including chevrons or other directional signage to facilitate construction vehicle access and prevent general traffic access;

(ii) Installation, adjustment, and maintenance of sidewalk barricades stating “sidewalk closed”;

(iii) Installation, adjustment, and maintenance of signage and barricades along the Omand’s Creek pathways stating “pathway closed”;

(iv) Assisting Traffic Services in the setup and closing down of traffic control near the Work area, including sweeping and any clean up associated with these operations;

(v) Securing Work areas to provide safe pedestrian and vehicular movements; and

(vi) Daily maintenance of all items listed above.

E7.3 Materials

(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.

E7.4 Equipment

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

E7.5 Notification

(a) The Contractor shall notify the City of Winnipeg Customer Service at 986-5640, one (1) Calendar Day in advance of any traffic lane closures.

E7.6 Construction Methods

E7.6.1 General

(a) The Contractor shall provide and maintain flagmen in accordance with the “Manual of Temporary Traffic Control on City Streets”, issued by the City of Winnipeg .

(b) The Contractor shall take all other safety measures necessary to cope with any peculiar or unusual circumstances that have not been set out in the above-mentioned

manual and shall, at all times, ensure that maximum protection is afforded to the road users and that his operations in no way interfere with the safe operation of traffic.

(c) Improper signing will be sufficient reason for the Contract Administrator or Inspector to immediately shut down the entire job.

(d) Barricades supplied and installed by the Contractor shall show the telephone number(s) at which he can be reached twenty-four (24) hours per day, seven (7) days per week.

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

(f) Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of twenty-four (24) hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

(g) Where directed, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planning drop-offs to the satisfaction of the Contract Administrator. Payment shall be in accordance with CW 3410.

(h) The Contractor shall maintain access to all intersecting side streets and approaches within the project limits except during the placement of the final asphalt lift.

(i) Ambulance / emergency vehicle access must be maintained at all times.

E7.7 Quality Control

E7.7.1 Inspection

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

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

E7.7.2 Access

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

E7.8 Measurement and Payment

E7.8.1 Traffic Control

(a) Traffic control shall not be measured. This item of Work shall be paid for at the Contract Lump Sum Price for “Traffic Control” performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and performing all operations herein described and all other items incidental to the Work. Payment will be based on the following breakdown:

(i) Traffic Control Initiation 50%

(ii) Site Restoration 50%

E8. CREEK FLOW MAINTENANCE

E8.1.1 Description

(a) This Specification shall cover all operations relating to maintaining flows in Omand's Creek through Ness Avenue for the duration of the construction Works and constructing a cofferdam to facilitate removal of the existing bridge, and to accommodate riprap works and construction of the new bridge.

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

E8.1.2 Scope of Work

(a) The Work under this Specification shall include the following items, to the limits as shown on the Drawings or as otherwise directed by the Contract Administrator:

(i) Designing creek flow maintenance methods;

(ii) Maintaining creek flows during construction;

(iii) Removing and disposing of material to maintain creek flows;

(iv) Confining suspended matter in Omand's Creek;

(v) Constructing cofferdams and dewatering of Omand's Creek; and

(vi) Complying with all requirements outlined in D27, "Environmental Protection Plan".

E8.2 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) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any Work on Site, a detailed plan and schedule for the construction of cofferdams, clearly illustrating the method and sequence by which he proposes to perform the Work, including a description of the measures that will be implemented to meet the environmental requirements outlined in D27, "Environmental Protection Plan". The submission shall also include detailed drawings and design details of the proposed cofferdam.

(c) The Contractor shall submit to the Contract Administrator for review and approval, at least five (5) Business Days prior to the commencement of any Work on site, a Creek Flow Maintenance Plan showing how the Contractor will undertake dewatering activities and maintain creek flow at the Site during construction. This plan shall be comprised of drawings and/or description of the proposed maintenance methods. The Contractor's Creek Flow Maintenance Plan shall be designed to meet the following requirements:

(i) Cofferdams shall be constructed on both the upstream and downstream ends of the Site, as shown on the Drawings. Water shall be pumped from upstream to downstream. Water or ice elevations upstream of any upstream cofferdam shall not exceed a level to cause overflowing of the banks at any upstream point.

(ii) The Contractor shall have backup pump(s) available on site with adequate capacity to maintain 100% of downstream flow at all times. Pumps shall be ready to be put into operation if the operating pump(s) fail. The pump(s) shall be continually monitored to ensure downstream flow is maintained at all times until normal flows are fully restored to the creek.

E8.3 Materials

E8.3.1 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.

E8.3.2 Cofferdams

(a) Cofferdams shall be designed to use non-erodible material such as sandbags. Earthen berms shall not be used as cofferdams.

E8.4 Construction Methods

E8.4.1 In general, the Work shall include, but not necessarily be limited to:

(a) Design of creek flow maintenance methods including the preparation and submission for review and approval by the Contract Administrator of a Creek Flow Maintenance Plan.

(b) Maintenance of creek flows for the duration of construction.

(c) Removal of materials and/or equipment required to maintain creek flows, at the end of their use.

(d) Confinement of suspended matter in the creek water generated at the Site through excavation and structural removal activities, within the Project area. This will require the construction of a cofferdam and floating turbidity barrier through the creek to confine the suspended matter.

E8.4.2 Silt Fence

E8.4.3 A silt fence, as approved by the Contract Administrator, shall be installed across Omand's Creek and maintained at the downstream extent of the work area. Additional silt fences shall be installed and maintained parallel to the creek as required during melting conditions to prevent debris from entering the waterway.

E8.4.4 Bypass Pumping Operations

(a) Structural removals, riprap works, and new bridge construction are anticipated to take place during freezing conditions, when flow within Omand's Creek is minimal. As such, the Contractor shall install a cofferdam at the upstream limit of the work area and install and maintain temporary by-pass diversion pumps to handle any flows.

(b) The Contractor shall be required to supply and operate a minimum of one (1) 100 mm diameter flood pump, in the event that creek levels rise.

(c) To fairly mitigate anticipated costs, if the flows encountered during the period from commencement of construction up to and including March 15, 2016 exceed the capacity of the required pump, the Contractor shall be reimbursed for expenses as specified in C7.4(d).

E8.4.5 Cofferdam Construction

(a) The construction of cofferdams are required in order to dewater Omand's Creek to remove the existing bridge, excavate channel material for the new bridge opening, and complete construction of the new bridge.

(b) The proposed cofferdam locations are shown on the Drawings. Cofferdams shall be provided at the upstream and downstream limits of the site to allow structural removals of the existing bridge and perform all required channel works under dry conditions. Cofferdams shall be designed and constructed with granular materials and as watertight as is necessary for the proper performance of the Work. The cofferdams shall be designed and constructed to meet the requirements of the Contractor's Creek Flow Maintenance Plan.

(c) Efforts shall be made to minimize the period of time for which Omand's Creek is dewatered. As part of the submittals noted in E8.2, the Contractor shall provide an anticipated timeline for which the channel will be dewatered.

E8.4.6 Complying with Environmental Protection Requirements

(a) The Contractor shall be responsible for maintaining sediment control measures at the site to prevent sediment releases into Omand's Creek from areas disturbed as a result of his work during and following construction. Sediment and erosion control measures shall comply with the requirements of D27, "Environmental Protection Plan". Specific sediment and erosion control measures are outlined in E10, "Silt Fence Barrier" and E11, "Erosion Control Blanket".

(b) The Contractor shall monitor his work and implement appropriate sediment control measures as site conditions warrant. Such measures may include installation of silt fences, straw bales, or other measures as required in the event that there is runoff from the site.

(c) The Contractor shall monitor, maintain, repair all sediment control measures until vegetation has re-established in restored areas and there no longer is a potential for sediment releases due to construction.

(d) Disturbed areas shall be restored. Erosion control blankets, as approved by the Contract Administrator, shall be used to control potential erosion of areas where vegetation has been damaged, up until permanent vegetation has been reestablished.

E8.5 Measurement and Payment

E8.6 Creek Flow Maintenance

(a) Creek flow maintenance shall not be measured. This item of Work shall be paid for at the Contract Lump Sum Price for "Creek Flow Maintenance", performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. Payment will be based upon the following breakdown:

(i) Installation: 50%

(ii) Removal: 50%

E9. CREEK BANK EXCAVATION

E9.1 Description

(a) This Specification shall cover the requirements for surface excavation near Omand's Creek including removal of topsoil and vegetation, and shall amend and supplement CW 3170.

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

E9.2 Referenced Specifications and Drawings

(a) The latest edition and subsequent revisions of the following:

(i) CW 2030 – Excavation Bedding and Backfill;

(ii) CW 2130 – Gravity Sewers;

(iii) CW 2160 – Concrete Underground Structures and Works;

(iv) CW 3130 – Supply and Installation of Geotextile Fabrics;

(v) CW 3610 – Installation of Culverts; and

(vi) CW 3615 – Riprap.

E9.3 Scope of Work

(a) The Work under this Specification shall involve:

(i) Excavating all material required to construct the Works;

(ii) The design, fabrication and erection of all stay-in-place temporary shoring and such temporary protective measures as may be required to construct the Works;

(iii) Coordinate Work with CP Rail and arrange and pay for any CP Rail flagging services if required;

(iv) Clearing and grubbing operations in areas where excavation is required;

(v) Excavating topsoil where excavation is required;

(vi) Off-site disposing of surplus and unsuitable material;

(vii) Dewatering of all excavations, as required; and

(viii) Complying with the requirements outlined in D27, “Environmental Protection Plan”.

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) 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, the proposed material(s) to undertake the Work.

(c) Shop drawings for the temporary shoring in accordance with Specification E3 for information purposes, bearing the seal of a Professional Engineer registered in the Province of Manitoba.

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 Testing

(a) All excavated materials 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.

E9.5.3 Excavation

(a) Excavated material shall be unclassified excavation and shall include the excavation and satisfactory disposal of all cleared and grubbed materials, surplus concrete pavement, asphalt pavement, earth, gravel, sandstone, loose detached rock, shale, rubbish, cemented gravel or hard pan, disintegrated stone, rock in ledge or mass formation wet or dry, trees, shrubs, or all other material of whatever character which may be encountered.

(b) All excavated materials 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 Owner for any materials taken by the Contract Administrator for testing purposes.

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.

E9.7 Construction Methods

E9.7.1 Excavation

E9.7.2 Alterations to Site

(a) The Contractor shall excavate only material that is necessary for the expeditious construction of the Works or as set out by the Contract Administrator in the field. If the Contract Administrator permits the excavation of runways, existing stock piling, or trenches within the right-of-way, the Contractor shall, on completion of the Work, backfill the runways and trenches to the elevation of the original ground existing at the time of excavation and compact the backfill material, all at his own expense and as directed by the Contract Administrator.

E9.7.3 Protection of Existing Embankment Slopes

(a) The Contractor shall not disturb the embankment slopes outside the excavation limits and shall not dump excavated material onto the roadway embankment or the riverbank.

E9.7.4 Excess Material

(a) All excess excavated material shall become the property of the Contractor and shall be removed from the Site. Excavated material shall not be disposed of in a manner that will obstruct the flow of watercourses.

E9.7.5 Excavating Creek Bank Material

(a) Prior to commencing any excavation Works, underground clearances shall be obtained from all applicable utilities by the Contractor. Due care and caution shall be taken by the Contractor to work around all identified underground utilities.

(b) Excavations shall be completed to the elevations required to construct the Works, to the lines and grades as shown on the Drawings, or to such other elevations as may be directed by the Contract Administrator in the field.

(c) In general creek bank excavation shall consist of removing existing material to facilitate removal of the existing bridge, channel excavation to provide the new channel profile, bridge and slopes and hydraulic opening, excavation required for construction of the new retaining wall and excavation required for installation of riprap.

(d) Excavation sequence shall be done in a “top down” direction, in order to maintain stability. The dimensions of excavation shall be such as to give sufficient clearances for the construction of forms and their subsequent removal.

(e) All material shall be brought to the surface by approved method, and shall be disposed of away from the Site and not into the existing river channel. Shored excavations shall be dewatered and maintained dewatered so that the material is excavated in its natural state. The bottom of the excavation shall be kept free from excessive moisture or free-flowing water.

(f) Double handling of excavated material may be required due to the depth of excavation and height of the bank, and material should be transferred up the slope in an expeditious manner. No temporary material piles may remain on the slope for longer than one hour during the transferring process. The Contractor should pace the excavation to keep up with the removal from site.

E9.7.6 Clearing and Grubbing

(a) Some removal of brush and other vegetation may be required to facilitate the Works. Existing vegetation shall not be removed without prior approval from the Contract Administrator. The Contractor shall load and haul any removed vegetation, and dispose of the material off site.

E9.7.7 Excavating Topsoil

(a) Some removal of vegetation and topsoil may be required to facilitate the Works. Existing vegetation shall not be removed without prior approval from the Contract

Administrator. The Contractor shall load and haul any removed vegetation, and dispose of the material off site.

(b) Stripping of topsoil and creek bank excavation shall not be measured or paid for directly, but shall be considered incidental to other construction works including slope stabilization, outfall installation, and riprap placement.

E9.7.8 Off-Site Disposing of Surplus and Unsuitable Material

(a) All excess excavated material shall become the property of the Contractor and shall be removed from the Site. Excavated material shall not be disposed of in a manner that will obstruct the flow of Omand's Creek.

(b) Stockpiling will not be permitted.

E9.7.9 Alterations to Site

E9.7.10 The Contractor shall excavate only material that is necessary for the expeditious construction of the structure or as set out by the Contract Administrator in the field. If the Contract Administrator permits the excavation of runways, or trenches within the right-of-way, the Contractor shall, on completion of the Work, backfill the runways and trenches to the elevation of the original ground existing at the time of excavation and compact the backfill material, all at his own expense and as directed by the Contract Administrator

E9.7.11 Protection of Existing Embankment Slopes

(a) The Contractor shall not disturb the embankment slopes outside the excavation limits and shall not dump excavated material onto the roadway embankment or the creek bank.

E9.7.12 Complying with Environmental Protection Requirements

(a) The Contractor shall be responsible for maintaining sediment control measures at the site to prevent sediment releases into Omand's Creek from areas disturbed as a result of his work during and following construction. Sediment and erosion control measures shall comply with the requirements of D27, "Environmental Protection Plan" and E8, "Creek Flow Maintenance". Specific sediment and erosion control measures are outlined in E10, "Silt Fence Barrier" and E11, "Erosion Control Blanket".

(b) The Contractor shall monitor his work and implement appropriate sediment control measures as site conditions warrant. Such measures may include installation of silt fences, straw bales, or other measures as required in the event that there is runoff from the site.

(c) The Contractor shall monitor, maintain, repair all sediment control measures until vegetation has re-established in restored areas and there no longer is a potential for sediment releases due to construction.

(d) Disturbed areas shall be restored. Erosion control blankets, as approved by the Contract Administrator, shall be used to control potential erosion of areas where vegetation has been damaged, up until permanent vegetation has been reestablished.

E9.8 Quality Control

E9.8.1 Inspection

(a) After each excavation is completed, the Contractor shall notify the Contract Administrator to inspect the excavation.

E9.8.2 Access

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

E9.9 Measurement and Payment

E9.10 Creek Bank Excavation

(a) Creek bank excavation shall not be measured. This item of Work shall be paid for at the Contract Lump Sum Price for "Creek Bank Excavation", performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

E10. SILT FENCE BARRIER

E10.1 Description

(a) This Specification shall cover all operations relating to the work necessary for the supply, installation, and maintenance of silt fence barrier, as herein specified.

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

E10.2 Referenced Specifications and Drawings

(a) The latest edition and subsequent revisions of the following:

(i) ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft_3 (600 kN-m/m_3);

(ii) ASTM D3786 – Standard Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method;

(iii) ASTM D4355 – Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus;

(iv) ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity;

(v) ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles;

(vi) ASTM D4632 – Grab Breaking Load and Elongation of Geotextiles;

(vii) ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile; and

(viii) ASTM D4833 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.

(ix) CW 3550 – Chain Link and Drift Control Fence

E10.3 Scope of Work

(a) The Work under this Specification shall include the following items, to the limits as shown on the Drawings or as otherwise directed by the Contract Administrator:

(i) Supplying and installing temporary silt fence barrier;

(ii) Maintaining silt fence barrier until final site restoration;

(iii) Removing silt fence barrier; and

(iv) Complying with all requirements outlined in D27, "Environmental Protection Plan".

E10.4 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) 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, the

proposed material(s) to undertake the Work. Data submitted shall summarize the physical, mechanical, and chemical characteristics of the material.

E10.5 Materials

E10.5.1 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.

E10.5.2 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.

E10.5.3 Fence Posts

(a) Fence posts shall be 38x38 mm untreated wood posts, 41 mm steel tee posts, or punched steel U posts, minimum length of 1.2 m.

E10.5.4 Filter Fabric

(a) Filter fabric shall be a woven geotextile material specifically designed for a silt fence applications, meeting the following minimum requirements:

Property	**Test Method**	**Value**
Grab Tensile Strength	ASTM D4632	0.55kN
Grab Tensile Elongation	ASTM D4632	15%
Mullen Burst	ASTM D3786	2060 kPa
Puncture	ASTM D4833	0.285 kN
Trapezoid Tear	ASTM D4533	0.285 kN
UV Resistance	ASTM D4355	80% @ 500 hrs
Apparent Opening Size (AOS)	ASTM D4751	0.60 mm
Flow Rate	ASTM D4491	405 l/min/m^2

(b) The fabric shall be inert to commonly encountered soil chemicals, hydrocarbons, mildew and bacteria.

E10.5.5 Wire Mesh

(a) Wire mesh shall be galvanized or plain metal with 3.0 mm wire gauge and wire spacing @ 150 mm o/c.

E10.5.6 Fencing Material Fasteners

(a) Staples or wire ties of sufficient strength and spacing to withstand a 530N (120lbf) pull test at any point on the wire mesh.

E10.6 Equipment

E10.6.1 General

E10.7 All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order

E10.8 Construction Methods

E10.8.1 General

(a) The locations of the reinforced silt fence barrier shall be as shown on the Drawings. However, final locations of the silt fence barrier will be dependent upon site conditions and the Contractor’s activities and methods, and may require adjustment.

(b) Locations of silt fence barrier will be confirmed on site with the Contract Administrator.

(c) Work shall be undertaken in accordance with D27, “Environmental Protection Plan” to prevent deleterious substances from entering into Omand’s Creek during construction.

E10.8.2 Silt Fence Barrier Installation

(a) Excavate a 150 x 150 anchor trench along alignment of silt fence barrier.

(b) Install fence posts in accordance with Manufacturer’s recommended installation methods. Fence posts shall be firmly driven into undisturbed soil, or are completely and firmly backfilled if installed via auger methods.

(c) Attach wire mesh as support backing for silt fence barrier filter fabric with specified fasteners. Attach silt fence barrier filter fabric on top of wire mesh in similar fashion. Overlap any fence seams (wire mesh or filter fabric) by 450 mm minimum. Ensure that wire mesh and filter fabric are installed on the upslope side of the post and are fully laid within the anchor trench.

(d) Install and compact impermeable excavated materials into anchor trench and slope as required. Compact to 95% of maximum dry density in accordance with ASTM D-698.

E10.8.3 Silt Fence Barrier Maintenance

(a) Silt fence barrier shall be inspected daily and prior to commencing other construction activities.

(b) All silt fences shall be inspected immediately after runoff event and at least daily during prolonged rainfall or runoff. Any required repairs shall be made immediately. The silt fence barriers shall be maintained in place, without gaps, and without undermining, so as to prevent sediment passage through and under the barrier. Silt fence barriers shall be maintained vertical without tears and without sagging. Fence posts shall remain upright and shall not be loosely placed into the ground.

(c) Accumulated sediment that is 300 mm or greater in depth shall be carefully removed and disposed of offsite without disturbing the silt fence barrier. Accumulated sediment shall also be removed as necessary to perform maintenance repairs. Accumulated sediment shall be removed immediately prior to removal of the silt fence barrier.

E10.8.4 Silt Fence Barrier Removal

(a) Remove silt fences following completion of all site construction activities (including final restoration and cleanup) and after installation of all permanent erosion control measures and satisfactory establishment of permanent vegetation.

(b) Restore areas disturbed, without releasing any deleterious substances to the adjacent watercourse.

E10.8.5 Complying with Environmental Protection Requirements

(a) The Contractor shall be responsible for maintaining sediment control measures at the site to prevent sediment releases into Omand’s Creek from areas disturbed as a result of his work during and following construction. Sediment and erosion control measures shall comply with the requirements of D27, “Environmental Protection Plan” and E8, “Creek Flow Maintenance”.

E10.9 Quality Control

E10.9.1 Inspection

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

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

E10.10 Measurement and Payment

E10.10.1 Silt Fence Barrier

(a) Supplying, installing, maintaining, and removing silt fence barrier shall be measured on a length basis and shall be paid for at the Contract Unit Price per lineal metre for "Supply and Install Silt Fence Barrier", measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. The length to be paid for shall be the total lineal metres of silt fence barrier supplied, installed, maintained, and removed in accordance with this Specification, and as accepted by the Contract Administrator.

(b) Payment for silt fence barrier shall be based on the following breakdown:

(i) Following supply and installation 60%

(ii) Following final removal 40%

(c) Removal of accumulated sediment from the silt fence shall be considered incidental to the Work and no separate measurement or payment shall be made.

(d) Temporary removal and reinstallation of the silt fence to facilitate other project activities such as revegetation shall be considered incidental to the Work and no separate measurement or payment shall be made.

E11. EROSION CONTROL BLANKET (ECB)

E11.1.1 Description

(a) This Specification shall cover the supply, installation, and maintenance of erosion control blanket (ECB), as herein specified.

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

E11.1.2 Referenced Specifications and Drawings

(a) The latest edition and subsequent revisions of the following:

(i) ASTM D1117 – Standard Guide for Evaluating Nonwoven Fabrics;

(ii) ASTM D1388 – Standard Test Method for Stiffness of Fabrics;

(iii) ASTM D6525 – Standard Test Method for Measuring Nominal Thickness of Rolled Erosion Control Products;

(iv) ASTM 6818 – Standard Test Method for Ultimate Tensile Properties of Rolled Erosion Control Products; and

(v) Erosion Control Technology Council (ECTC) Guidelines.

E11.1.3 Scope of Work

(a) The Work under this Specification shall include the following items, to the limits as shown on the Drawings or as otherwise directed by the Contract Administrator:

(i) Supplying and installing erosion control blanket on disturbed slopes and channel banks above riprap limits;

(ii) Supplying and temporarily installing erosion control blanket to protect disturbed slopes where sodding and permanent vegetation/restoration is eventually to take place; and

(iii) Complying with all requirements outlined in D27, "Environmental Protection Plan".

E11.2 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) 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, the proposed material(s) to undertake the Work. Data submitted shall summarize the physical, mechanical, and chemical characteristics of the material.

E11.3 Materials

E11.3.1 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.

E11.3.2 Handling and Storage of Materials

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

E11.3.3 Erosion Control Blanket

(a) Erosion Control Blanket shall be a machine-produced mat of 70% agricultural straw and 30% coconut blanket with a functional longevity of up to 24 months. Suitable products include SC 150 Extended Term manufactured by North American Green, or approved equivalent in accordance with B7, “Substitutes”.

(b) The blanket shall be of consistent thickness with the straw and coconut evenly distributed over the entire area of the mat.

(c) The blanket shall be covered on the topside with heavyweight photodegradable polypropylene netting having ultraviolet additives to delay breakdown and a maximum 159 mm x 159 mm mesh and on the bottom side with a lightweight photodegradable polypropylene netting with a maximum 127 mm x 127 mm mesh. The blanket shall be sewn together on 381mm centres (maximum) with degradable thread.

(d) ECB shall have the following properties:

(i) Matrix 70% Straw Fibre (0.19kg/m2) and 30% Coconut Fibre (0.08kg/ m_2);

(ii) Netting top side heavyweight photodegradable with UV additives (1.47kg/100m_2);

(iii) Bottom side lightweight photodegradable minimum netting weight (0.73 kg/100m_2); and

(iv) Degradable thread.

(e) Staples used to secure EBC shall be biodegradable and as recommended by the Manufacturer.

E11.4 Equipment

E11.4.1 General

E11.5 All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order

E11.6 Construction Methods

E11.6.1 General

(a) ECB shall be placed on all disturbed and exposed slopes for which revegetation is required.

(b) Locations of ECB will be confirmed on site with the Contract Administrator.

E11.6.2 ECB Installation

(a) The blanket shall be rolled out in the direction of the water flow.

(b) The upper edges of the blanket on the side slopes and the edges at the terminal ends of the installation shall be placed in a 150 mm x 150 mm trench.

(c) The upper edges shall be stapled at 1 000 mm intervals and the terminal edges shall be stapled at 300 mm intervals within the trench. The trench shall be then be backfilled and compacted. The side and end seams shall be overlapped edge over edge (shingle style) with an overlap of 150 mm. The side seams shall be stapled at 1000 mm intervals and the end seams shall be stapled at 300 mm intervals.

(d) At 10 m intervals, the Contractor shall place a double row of staggered staples to secure the blankets. The staples shall be spaced 100 mm apart. The remainder of the blanket shall be stapled at a rate of four staples per m_2. The blanket may have to be trimmed to size to conform to the area to be covered.

(e) Transverse joints and end seams in the ECB shall have a minimum overlap of 150 mm and secured with 200 mm staples a maximum of 300 mm apart.

(f) Should the Contract Administrator determine that the Contractor has not installed the ECB properly or has damaged the blankets from construction activities resulting in sediment releases beyond the Work area; the Contractor shall retrieve all sediment that has left the construction area, to the fullest extent possible, at his own cost. As a minimum, the Contractor shall remove all deltas and sediment deposited in drainage ways and regrade the areas where sediment removal results in exposed soil. The removal and restoration shall take place within five (5) working days of discovery unless precluded by legal, regulatory, or physical access restraints. If precluded, removal and restoration must take place within five (5) working days of obtaining access. The Contractor is responsible for contacting all local, regional, provincial, and federal authorities before working in surface waters and for obtaining applicable permits. The Contractor's restoration Work to restore property outside of the designated Work area shall be at his own cost.

E11.6.3 Complying with Environmental Protection Requirements

(a) The Contractor shall be responsible for maintaining sediment control measures at the site to prevent sediment releases into Omand’s Creek from areas disturbed as a result of his work during and following construction. Sediment and erosion control measures shall comply with the requirements of D27, “Environmental Protection Plan” and E8, “Creek Flow Maintenance”.

(b) The Contractor shall monitor his work and implement appropriate sediment control measures as site conditions warrant. Such measures may include installation of silt fences, straw bales, or other measures as required in the event that there is runoff from the site.

(c) The Contractor shall monitor, maintain, repair all sediment control measures until vegetation has re-established in restored areas and there no longer is a potential for sediment releases due to construction.

(d) Disturbed areas shall be restored. Erosion control blankets, as approved by the Contract Administrator, shall be used to control potential erosion of areas where vegetation has been damaged, up until permanent vegetation has been reestablished.

E11.7 Quality Control

E11.7.1 Inspection

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

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

E11.8 Measurement and Payment

E11.8.1 Erosion Control Blanket

(a) Supplying and installing erosion control blanket shall be paid for at the Contract Unit Price per square metre for “Supply and Install Erosion Control Blanket”, measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. The area to be paid for shall be the total area of ECB supplied and installed as noted on the Drawings, confirmed by survey, and as measured and accepted by the Contract Administrator.

E12. BRIDGE DEMOLITION AND REMOVALS

E12.1 Description

(a) This Specification shall cover all operations related to the demolition and removal of the entire existing bridge and previous bridge components as herein specified and as shown on the Drawings.

(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.

(c) Scope of Work

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

(i) Removal of all existing components of the existing bridge and previous bridges as shown on the Drawings;

(ii) All material from the demolished bridge shall be removed from Site by the Contractor in accordance with the Contractor’s Environmental Protection Plan; and

(iii) Excavation or any other works beyond the limits shown on the Drawings to facilitate the removals and demolition of the existing bridge.

E12.2 Materials

E12.2.1 General

(a) The Contractor shall be responsible for design and construction works related to the demolition and removal of the existing bridge and is subject to the approval of the Contract Administrator.

E12.3 Submittals

(a) The Contractor shall prepare a demolition and removals plan. The plan shall include the design and drawings, Sealed by an Engineer Registered in the Province of Manitoba, the sequence and methods to be used to demolish and remove the existing bridge. The

demolition plan shall be in strict accordance with the Regulatory Approvals and the Environmental Protection Plan.

(b) The demolition and removals plan shall indicate the sequence, machinery, methods and proposed access to accomplish the demolition of the existing bridge.

(c) The demolition plan shall be submitted a minimum of 7 days prior to the commencement of demolition.

E12.4 Measurement and Payment

(a) Bridge demolition and removal will not be measured and will be paid for at the Contract Lump Sum Price for "Bridge Demolition and Removals", 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.

E13. STRUCTURAL BACKFILL

E13.1 Description

E13.1.1 The Works in this section include the following:

(a) Granular Backfill required behind the abutments around the wingwalls, under miscellaneous structural slabs, and under riprap in the vicinity of the bridge as shown on the Drawings and to the requirements of this Specification.

(b) For winter construction, heating of subgrade and granular backfill prior to placement.

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

E13.2 References

E13.2.1 All related Specifications and reference Standards are in accordance with the most current issue or latest revision:

(a) CW 3110 – Subgrade, Sub-Base, and Base Course Construction;

(b) CW 3170 – Earthwork and Grading.

(c) CW 3130 – Supply and Installation of Geotextile Fabrics

E13.3 Equipment

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

E13.4 Materials

E13.4.1 Granular Material

(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 Owner for any materials taken by the Contract Administrator for testing purposes.

(b) All materials shall be accepted by the Contract Administrator at least fourteen (14) 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 operations, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

(c) 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.

(d) All granular backfill, including levelling base fill, shall be clean and free from organic material, meeting the following gradation requirements:

CANADIAN METRIC SIEVE SIZE	PERCENT PASSING BY WEIGHT
50 000	100
20 000	75 – 100
5 000	45 – 85
2 500	35 – 55
315	15 – 35
160	5 – 20
80	0 - 7

(e) Excavated material may be used for backfilling provided it meets the above requirements. Excavated granular material intended to be used for backfilling is not be contaminated by top soil or organic materials.

E13.4.2 Geotextile Fabric

(a) Geotextile fabric placed along the limits or within structural backfill shall be "Separation Geotextile Fabric" supplied in accordance with CW 3130.

(b) Supply of geotextile fabric for structural backfill shall be considered incidental to Structural Backfill and no separate measurement or payment will be made.

E13.5 Construction Methods

E13.5.1 Granular Backfill Material

(a) The Contract Administrator shall be notified at least one (1) working day in advance of any backfilling operations. No backfill shall be placed against any concrete until accepted by the Contract Administrator.

(b) All granular backfill material shall be supplied, placed, and compacted in lifts of 150 m (maximum) to a minimum of 98% of Standard Proctor Dry Density, except for an area within 2.0 m from the back face of the wall shall be compacted to 92%of Standard Proctor Dry Density. Lifts shall be brought up on all sides at the same time.

(c) The Contractor shall be required to provide necessary water or equipment during compaction of backfill material to achieve the required densities.

(d) The Standard Proctor Density for granular shall be determined at the optimum moisture content in accordance with standard laboratory Proctor Compaction Test Procedure.

(e) The field density of the compacted layers shall be verified by Field Density Tests in accordance with ASTM Standard, Test for Density of Soil in Place by the Sand-Cone Method, or equivalent as accepted by the Contract Administrator.

(f) The frequency and number of tests to be made shall be as determined by the Contract Administrator.

(g) All granular backfill material shall be placed and compacted before placement of structural concrete for the deck slab.

E13.5.2 Heating for Granular Backfill

(a) In locations of frozen subgrade, the Contractor shall preheat the subgrade prior to placement of granular backfill such that a minimum of 300 mm of unfrozen subgrade material is present during placement and compaction of granular backfill.

(b) The Contractor shall pre-heat all granular backfill such that it is placed and compacted in an unfrozen state.

(c) For subsequent lifts of granular backfill, the previous lift(s) will be considered the subgrade, and the requirements for unfrozen subgrade shall apply.

(d) Heating for Granular Backfill shall be considered incidental to Structural Backfill.

(e) Heating of the subgrade for the purposes of placing riprap bedding will not be required.

E13.5.3 Installing Geotextile Fabric

(a) Geotextile fabric shall be installed in accordance with CW 3130, and as shown on the Drawings.

(b) Installation of geotextile fabric for structural backfill shall be considered incidental to Structural Backfill and no separate measurement or payment will be made.

E13.6 Quality Control

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

(b) The Contract Administrator shall be afforded full access for the inspection and control testing of constituent materials both at the Site of the 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.

(c) Any backfill material that does not meet the gradation and/or compaction requirements of this Specification shall be removed and replaced by the Contractor at his own expense, to the satisfaction of the Contract Administrator.

E13.7 Measurement and Payment

(a) The backfilling required behind the abutments around the wingwalls, under miscellaneous structural slabs, and under riprap in the vicinity of the bridge as shown on the Drawings will not be measured and paid for at the Contract Lump Sum Price for “Structural Backfill” which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

E14. STRUCTURAL CONCRETE

E14.1 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.

E14.2 Referenced Specifications and Drawings

(a) The latest edition and subsequent revisions of the following:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

E14.3 Scope of Work

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

(i) Abutments and Wingwalls;

(ii) Deck Slab;

(iii) Reinforced Sidewalk;

(iv) Traffic Barriers;

(v) Approach Slabs; and

(vi) Retaining Wall.

E14.4 Submittals

E14.4.1 General

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

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

E14.4.2 Concrete Mix Design Requirements

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

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

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

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

(iii) Aggregate source location(s);

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

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

(vi) The limits for slump;

(vii) The limits for air content; and

(viii) Quantity of other admixtures.

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

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

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

E14.4.3 Concrete Mix Design Test Data

(a) Concrete

(i) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty (20) 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 (Ri) and fibre dispersion in accordance with the requirements of the Canadian Highway

Bridge Design Code (CHBDC) CAN/CSA-S6, Section 15, Fibre Reinforced Structures, Clause 16.6. Testing for Ri of concrete shall be completed in accordance with E14.8.5(e).

(iii) Testing for air void system shall be completed in accordance with E14.8.5(c).

(iv) Testing for rapid chloride permeability shall be completed in accordance with E14.8.5(d).

(v) 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 twenty (20) Business Days prior to the scheduled commencement of concrete placement, the location of the sources where aggregate will be obtained in order that some may be inspected and tentatively accepted by the Contract Administrator. Changes in the source of aggregate supply during the course of the Contract shall not be permitted without notification in writing to and the expressed approval of the Contract Administrator.

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

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

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

(v) The Contractor shall submit to the Contract Administrator for review and approval recent test information on petrographic examination of aggregates for concrete, in accordance with CSA Standard Test Methods A23.2-15A. The purpose of the petrographic analysis is to ensure the aggregates provided are of the highest quality for use in the production of concrete and will produce a durable overlay. An acceptable aggregate will have an excellent rating as judged by an experienced petrographer, with a (weighted) petrographic number typically in the range of 100 to 120.

(vi) 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.

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

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

E14.4.4 Notification of Ready Mix Supplier

(a) The Contractor shall submit to the Contract Administrator the name and qualifications of the Ready Mix Concrete Supplier that he is proposing to use, at least twenty (20) 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.

E14.4.5 Temporary False Work, Formwork and Shoring Works

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty (20) 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) Design Requirements

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

(ii) 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 the requirements of the CAN/CSA S269.1. The Shop Drawings shall bear the Professional Engineer's seal. Shop Drawings submitted without the seal of a Professional Engineer will be rejected. The submission of such Shop Drawings to the Contract Administrator shall in no way relieve the Contractor of full responsibility for the safety and structural integrity of the formwork and shoring.

(iii) The 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 the requirements of CAN/CSA S269.3. All proposed fastening methods to the existing deck superstructure must be submitted to the Contract Administrator for review and approval. Drilling into the precast concrete girders will not be accepted.

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

(v) As a minimum, the following spacings shall apply, for studding and waling:
- 20-mm plywood: studding 400 mm centre to centre (max.),
- Walers 760 mm centre to centre (max.)

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

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

(viii) Slots, recesses, chases, sleeves, inserts, bolts, hangers, and other items shall be accommodated in the design, in coordination and cooperation with the trade concerned. No openings in structural members are to be shown on the Shop Drawings without the prior written approval of the Contract Administrator.

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

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

(xi) Shores shall be braced horizontally in two 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.

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

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

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

(c) Shop Drawings shall show design loads, type, and number of equipment to be used for placing the concrete, method of construction, method of removal, type and grade of materials, and any further information that may be required by the Contract Administrator. The Contractor shall not proceed with any Work on site until the Shop Drawings have been reviewed and approved in writing by the Contract Administrator. False work must be designed to carry all loads associated with construction of overhangs including deflection due to dead loads, placement of concrete, hoarding, construction live loads, and any other loads that may occur.

(d) For timber formwork and 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.

E14.4.6 Screed for Deck Slab Concrete

(a) 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.

E14.4.7 Concrete Deck Slab Pour Sequence and Schedule

(a) The Contractor shall submit to the Contract Administrator for review, at least ten (10) Business Days prior to the placement of concrete, details of the construction joints.

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

E14.5 Materials

E14.5.1 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.

E14.5.2 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.

E14.5.3 Concrete

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

(b) Concrete shall have nominal compressive strengths (f'c) and meet the requirements for hardened concrete as specified in the following Table 14.1

TABLE 14.1
REQUIREMENTS FOR HARDENED CONCRETE

Type of Concrete	Location	Nominal Compressive Strength MPA	Class of Exposure	Air Content Category	Max Aggregate Size	Special Requirements	Minimum Post Residual Cracking Index
Type 1	Abutments, Wingwalls, Retaining Wall	35 @ 28 Days	S-1	2	20 mm	-	-
Type 2	Deck Slab, Reinforced Sidewalk, Traffic Barriers, Approach Slabs	35 @ 28 Days	C-1	1	20 mm	Synthetic Fibres	0.15

E14.5.4 Working Base Concrete

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

(b) Working base shall be concrete meeting the requirements of the latest edition and all subsequent revisions of CAN/CSA A23.1, for Class S-1 exposure, except as follows

(i) 20 MPa at 28 days.

(c) Supplying and placing working base concrete shall be considered incidental to the Work and no separate payment will be made.

E14.5.5 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 Standard Test Method A23.2-27A. Current (less than 18 months old) test data evaluating the potential alkali-silica reactivity of aggregates tested in accordance with CSA Standard Test Method A23.2-1 4A or CSA A23.2-25A is required.

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

(b) Fine Aggregate

(i) Fine aggregate shall meet the grading requirements of CAN/CSA A23.1, 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 CAN/CSA A23.1, Table 12.

(c) Coarse Aggregate - Standard

(i) The maximum nominal size of coarse aggregate shall be 20 mm and meet the grading requirements of CAN/CSA A23.1, 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) Course aggregate when tested for abrasion in accordance with the requirements of the 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 CAN/CSA A23.1, Table 12, for concrete exposed to freezing and thawing.

E14.5.6 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.

E14.5.7 Cementitious Materials

(a) Cementitious materials shall conform to the requirements of CAN/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 30% by mass of cement.

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

E14.5.8 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 CAN/CSA A23.1 and shall be free of oil, alkali, acidic, organic materials or deleterious substances. The Contractor shall not use water from shallow, stagnant or marshy sources.

E14.5.9 Corrosion Inhibitor

(a) Corrosion inhibitor shall be MCI 2005 NS at a dosage of 1 L/m3, or equal as accepted by the Contract Administrator, in accordance with B6, “Substitutes”.

E14.5.10 Synthetic Fibres

(a) The synthetic fibres shall consist of 100% virgin polypropylene or 100% virgin polylefin as accepted by the Contract Administrator. The dosage shall be designed by the Contractor to meet the requirements for post-cracking residual strength index (Ri) and

fibre dispersion in accordance to CHBDC CAN/CSA S6, “Fibre-Reinforced Structures”, Clause 16.6.

E14.5.11 Formwork

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

(b) Form sheeting plywood to be covered with form liner or to be directly in contact with soil shall be exterior Douglas Fir, concrete form grade, conforming to CSA Standard O121-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 CAN/CSA “O121”. 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, with minimum dimensions of 100 mm x 150 mm. Studding shall be spruce or pine, with minimum dimensions of 50 x 150.

(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.

E14.5.12 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, “Substitutes”.

E14.5.13 Permeable Formwork Liner

(a) Formwork liner shall be Texel Drainaform, Hydroform, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”. 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.

E14.5.14 Curing Compound

(a) Curing compound shall conform to the requirements of ASTM C309, either Type D with fugitive dye or Type 2.

(b) Type 2 shall only be used on surfaces that will not be exposed to view.

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

E14.5.15 Curing Blankets

(a) Curing blankets for wet curing shall be 100 percent polyester, 3 mm thick, white in colour. An approved product is “Mirafi Geotextile P150”. Alternately, a 10 oz burlap, 5 mil polyethylene, curing blanket white in colour shall be used; “Curelap” manufactured

by Midwest Canvas, together with a second layer of burlap, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

E14.5.16 Bonding Agents

(a) Latex Bonding Agent

(i) Latex bonding agent shall be Acryl-Stix, SikaCem 810, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”. 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:
(i) 1 part water;
(ii) 1 part latex bonding agent; and
(iii) 11/2 parts Type GUSF Portland cement.

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

E14.5.17 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, “Substitutes”.

E14.5.18 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, “Substitutes”.

E14.5.19 Cementitious Grout

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

E14.5.20 Patching Mortar

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

E14.5.21 Flexible Joint Sealant

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

E14.5.22 Fibre Joint Filler

(a) Fibre joint filler shall be rot-proof and of the preformed, nonextruding, resilient type made with a bituminous fibre such as Flexcell and shall conform to the requirements of ASTM D1751 or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

E14.5.23 Precompressed Foam Joint Filler

(a) Precompressed foam joint filler shall be “Emseal BEJS System” or “Emseal Submerseal” or “Emseal 2H” where shown on the drawings, satisfying the requirements of ASTM C711 and G155, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(b) Precompressed foam joint filler shall be used around roadway approach slabs and approach sidewalk slabs, and shall be used also between barrier joints.

(c) The sealant system shall be comprise of three components:

(i) Cellular polyurethane foam impregnated with hydrophobic 100% acrylic, waterbased emulsion, factory coated and highway-grade, fuel resistant silicone;

(ii) Field-applied epoxy adhesive primer; and

(iii) Field-injected silicone sealant bands.

(d) Impregnation agent shall have proven non-migratory characteristics. Silicone coating shall be highway grade, low-modulus, fuel resistant silicone applied to the impregnated foam sealant at a width greater than maximum allowable joint extension and which when cured and compressed will form a bellows. The depth of seal shall be as recommended by the Manufacturer.

(e) Material shall be capable, as a dual seal, of movements of +50% to -50% (100% total) of nominal material size. Changes in plan and direction shall be executed using factory fabricated transition assemblies. Transitions shall be watertight at the inside and outside corners through the full movement capabilities of the product.

(f) All substitute candidates shall be free in composition of any waxes or asphalts, wax compounds or asphalt compounds. All substitute candidates shall be:

(i) Capable of withstanding 65^{o}C for three (3) hours while compressed down to the minimum movement capability (-50% nominal material size) without evidence of any bleeding of impregnation medium from the materials; and

(ii) Capable of self-expanding to the maximum movement capability (+50% nominal material size) within twenty-four (24) hours at 20^{o}C.

E14.5.24 Ethafoam Joint Filler

(a) Ethafoam joint filler shall be non-staining, polyethylene, closed-cell product for expansion and contraction and/or isolation joint application.

E14.5.25 Low Density Styrofoam

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

E14.5.26 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%.

E14.5.27 Void Form

(a) Void form shall be supplied by Void Form International, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

E14.5.28 Abutment Drainage System

(a) The drain pipe shall be 150mm PVC perforated Schedule 80 drain pipe complete with filter sock and galvanized screens for the outlet ends.

(b) The filter fabric shall be A Class II non-woven geotextile, as approved by the Contract Administrator.

(c) The subsurface drainage fill shall be a coarse granular free draining material consisting of either gravel or crushed limestone aggregate conforming to the following gradation requirements:

TABLE 14.2
REQUIREMENTS FOR SUBSURFACE DRAINAGE

Sieve Size	% Passing Standard Sieve
40 mm	95-100
20 mm	35-70
10 mm	10-30
5 mm	0-5

E14.5.29 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, “Substitutes”.

(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, “Substitutes”.

E14.5.30 Sheet Drain

(a) Sheet drain materials shall be applied to all buried concrete surfaces in contact with the soil as shown on the Drawings. Sheet drain materials shall be Nudrain DN50-1 or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

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

E14.5.31 Galvanized Steel Dowels and Expansion Sleeves for Bridge Traffic Barrier Expansion Assembly

(a) Dowels and expansion sleeves shall be fabricated in accordance with CAN/CSA G40.21, Grade 300W.

(b) The dowels and expansion sleeves shall be galvanized in accordance with CAN/CSA G164-M92, to a minimum net retention of 610 g/m2.

(c) Field-applied galvanizing, to touch-up damaged hot-dip galvanizing, metallizing, or field welds, shall be done with self-fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780.

(d) Approved products are:

(i) Galvalloy as manufactured by Metalloy Products Company, P.O. Box No. 3093, Terminal Annex, Los Angeles, California; and

(ii) 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.

E14.5.32 Elastomeric Bearing Pad

(a) Elastomeric shall be natural rubber, low temperature Grade 4 or 5 with a Shore A durometer hardness of 55.

E14.5.33 Anchor Rods

(a) Stainless steel anchor rods shall conform to the requirements of ASTM Specification A193 Grade B8M with yield strength of 517 MPa.

E14.5.34 Miscellaneous Materials

(a) Miscellaneous materials shall be of the type specified on the Drawings or as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

E14.5.35 Benchmark Plugs

(a) Benchmark plugs shall be supplied by the City. Installation by the Contractor shall be considered incidental to these Works. Installation locations shall be shown on all Drawings.

E14.6 Equipment

E14.6.1 General

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

E14.6.2 Vibrators

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

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

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

E14.6.3 Placing and Finishing Equipment for Bridge Deck Concrete

(a) Placing Equipment

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

(b) Screed for Deck Concrete

(i) The Contractor shall use a mechanical screed to strike the surface of the deck concrete.

(ii) 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.

(iii) 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.

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

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

(vi) 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.

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

(viii) 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.

(c) Moveable Work Bridges for Deck 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 surface.

(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.

E14.6.4 Placing and Finishing Equipment for Sidewalk Concrete

(a) Placing Equipment

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

(b) Screed for Concrete Sidewalk

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

(ii) 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.

(iii) 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.

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

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

(vi) 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.

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

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

E14.6.5 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) 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.

E14.7 Construction Methods

E14.7.1 General

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

E14.7.2 Abutments

(a) Abutment works shall comprise of the Work associated with the cast-in-place concrete for the abutment walls, and wingwalls.

(b) Abutment works shall also include any dampproofing operations required for concrete below grade.

(c) Abutment works shall also include the perforated drainage pipe and drainage material, and geotextile material placed at the abutment backwalls as shown on the Drawings.

E14.7.3 Deck Slab

(a) Deck slab works shall comprise of the Work associated with the cast-in-place concrete bridge deck slab, including the deck below the bridge sidewalk.

E14.7.4 Traffic Barrier

(a) Traffic barrier works shall comprise of the Work associated with the cast-in-place concrete Bridge traffic barriers on the Bridge deck and on the approach slabs.

E14.7.5 Reinforced Sidewalk

(a) Reinforced sidewalk works shall comprise of the Work associated with the cast-in-place concrete sidewalk on the bridge and for the approaches.

E14.7.6 Approach Slabs

(a) Approach slab works shall comprise of the Work associated with the cast-in-place concrete approach slabs.

(b) In addition, working base concrete beneath the approach slabs shall be associated with this Work.

E14.7.7 Retaining Wall

(a) Retaining wall works shall comprise of the Work associated with the cast-in-place concrete retaining wall.

(b) Retaining wall works shall also include any dampproofing operations required for concrete below grade.

E14.7.8 Temporary False Work, Formwork, and Shoring

(a) Construction Requirements

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

(ii) All forms shall be of wood, metal or other materials as approved by the Contract Administrator. No formwork shall extend beneath the underside of the girders.

(iii) The false work, formwork, and shoring for these Works shall be erected, and braced, as designed, and maintained to safely support all vertical and lateral loads until such loads can be supported by the concrete. All proposed fastening shall be as shown on the accepted Shop Drawings.

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

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

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

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

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

(ix) Shores shall be braced horizontally in two 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.

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

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

(xii) Forms shall be constructed so as to be sufficiently tight to prevent leakage of grout or cement paste.

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

(c) 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.

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

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

(f) Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be commercially manufactured types. The portion remaining within the concrete shall leave no metal within 50 mm of the surface when the concrete is exposed to view. Spreader cones on ties shall not exceed 30 mm in diameter. All fittings for metal ties shall be of such design that, upon their removal, the cavities which are left will be of the smallest possible size. Torch cutting of steel hangers and ties will not be permitted. Formwork hangers for exterior surfaces of decks and curbs shall be an acceptable break-back type with surface cone, or removable threaded

type. Cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in colour to match the surrounding concrete.

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

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

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

(j) All form lumber, studding, 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.

E14.7.9 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, E16.7.27, “Preparation for Concreting Against Hardened Concrete”, for the requirements to prepare the hardened concrete at a construction joint for receiving new concrete.

E14.7.10 Bridge Deck Screeds

(a) Setting Deck Screeds

(i) The Contractor shall adjust screeds to maintain the specified slab thickness. 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) The screed chairs and screed rail supports shall be spaced to prevent deflections of the screed bars or screed rails during screeding operations.

E14.7.11 Sidewalk Screeds

(a) Setting Sidewalk Screeds

(i) The Contractor shall adjust screeds to the specified slab thickness. 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) The screed chairs and screed rail supports shall be spaced to prevent deflections of the screed bars or screed rails during screeding operations.

E14.7.12 Bridge Traffic Barrier Joints

(a) Finishing of Concrete Barrier Joints

(i) Finishing of concrete barrier joints shall be completed prior to application of any waterproofing membrane and asphalt overlay.

(ii) The installation of the precompressed foam joint filler and fibre joint filler shall be undertaken as shown on the Drawings.

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

(iv) The precompressed foam joint filler shall be installed at barrier joints in accordance with the Manufacturer's recommended methods to fully seal the joint.

(v) The supply and installation of all materials required for the barrier joints shall be considered incidental to the Work, and no additional measurement or payment shall be made for this work.

E14.7.13 Galvanized Steel Dowels and Expansion Sleeves for the Bridge Traffic Barrier Expansion Joint Assembly

(a) All galvanized steel dowels and expansion sleeves shall be installed as shown on the Drawings.

(b) Each galvanized steel dowel and expansion sleeve shall be held in place securely by a wooden template during concrete placement operations.

(c) Expansion assemblies shall be installed in a sequential fashion into the concrete barrier panel cast first.

E14.7.14 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.

E14.7.15 Control Joint Seals

(a) Formed control joint sealant for all horizontal, vertical, and sloping joints shall be completed in strict accordance with the details shown on the Drawings and in accordance with the Manufacturers recommended methods.

E14.7.16 Benchmarks

(a) The Contractor shall install benchmark plugs supplied by the Contract Administrator at such locations on the structure as may be directed by the Contract Administrator.

E14.7.17 Abutment Drainage

(a) Abutment drainage shall be installed as shown on the Drawings.

(b) The installation of abutment drainage shall be considered incidental to abutment works.

E14.7.18 Abutment, Wingwall and Retaining Wall Works

(a) Application of Sheet Drain

(i) Spot glue sheet drain materials to concrete surfaces as recommended by the Manufacturer.

(b) The application of sheet drain shall be considered incidental to abutment, wingwall and retaining wall works.

E14.7.19 Installation of Elastomeric Bearings

(a) Protect bearings from damage or distortion during handling, transport, storage and installation and keep clean and free of all deleterious matter and contaminants including moisture and dust.

(b) Verify the condition of the bearings supplied to the site.

(c) Bearings, when received by the Contractor, shall be unloaded and stored in accordance with the Manufacturer's recommendations.

(d) Install bearings in the structure as specified on the Drawings and directed by the bearing supplier.

(e) After installation leave bearings and their surrounding area clean. Bed bearings over their entire area. Voids or hard spots after installation are not acceptable.

(f) The supply and installation of elastomeric bearings shall be considered incidental to deck slab works.

E14.7.20 Stainless Steel Anchor Rods

(a) Anchor rods shall be installed as shown on the Drawings.

(b) The installation of anchor rods shall be considered incidental to deck slab works.

E14.7.21 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 CAN/CSA A23.1, 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 E14.1, "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 CAN/CSA A23.1 5.2.4.3.2. If additional water is to be added on site, it must be done under the guidance of the Suppliers' designated quality control person. The Supplier shall certify that the addition of water on site does not change the Mix Design for the concrete supplied. Any other water added to the concrete without such control will be grounds for rejection of the concrete by the Contract Administrator.

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

(d) Delivery of Concrete

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

(e) Concrete Placement Schedule

(i) The Contractor shall submit to the Contract Administrator the proposed concrete placement schedule for all concrete placements for review and approval. If, in the opinion of the Contract Administrator, the volume of the placement is deemed larger than can be placed with the facilities provided, the Contractor shall either:

i. Limit the amount to be placed at any time (using adequate construction joints);
ii. Augment his facilities and Plant in order to complete the proposed placement;
iii. In the case of continuous placing, provide additional crews and have adequate lighting to provide for proper placing, finishing, curing and inspecting; and

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

E14.7.22 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.

(iv) For the Bridge traffic and median barriers, during concreting of the deck slab, the top surface of the concrete shall be roughened using a small rake running longitudinally between barrier dowels.

E14.7.23 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 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 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/m2/h. Fog misting is mandatory regardless of drying conditions. The Contractor shall use fog misting operations as accepted by the Contract Administrator.

(ii) The nomograph, Figure D1, Appendix D of CAN/CSA A23.1 shall be used to estimate surface moisture evaporation rates.

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

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

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

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

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

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

(ix) When the Contractor chooses to pump the concrete, the operation of the pump shall produce a continuous flow of concrete without air pockets. The equipment shall be arranged such that vibration is not transmitted to freshly placed concrete that may damage the concrete. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients.

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

(xi) 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.

(xii) 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.

(xiii) 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.

(xiv) 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.

(xv) Before any concrete is placed for the approach slabs the Bridge deck slab or the sidewalk 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.

E14.7.24 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

(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, 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 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.

(d) Type 3 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 E14.5.20 “Patching Mortar”, E14.5.16 “Bonding Agents”, and E14.7.27 “Patching of Formed Surfaces” of this Specification.

(e) 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 working base concrete shall be considered incidental to the placement of working base concrete, and no separate measurement or payment shall be made for this Work.

E14.7.25 General Curing Requirements

(a) Refer to E14.7.28, “Cold Weather Concreting” for cold weather curing requirements and E14.7.29, “Hot Weather Concreting” of this Specification for hot weather curing requirements.

(b) 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.

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

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

(e) 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. Water shall be applied as necessary to keep the concrete and curing blankets saturated. The Contractor must ensure the concrete and curing blankets are kept saturated with water for the entire seven (7) days.

(f) Immediately following finishing of the deck and sidewalk slab concrete, apply fog misting until the concrete has enough strength to support the placement of the predampened curing blankets. The misting device shall not be used to apply water to the concrete’s surface for finishing purposes. The misting device shall not be directed towards the concrete surface. Only a fine coating or sheen should be applied by the misting device. There should be no standing water. Failure to apply wet curing blankets within 40 minutes after the deck slab concrete has been deposited shall be cause for rejecting the Works. Concrete in the rejected area shall be removed and replaced at no additional cost to the City.

(g) 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. Formed surfaces shall receive, immediately after stripping and patching, the same curing as finished surfaces, with the exception of the Bridge deck overhang surfaces.

(h) 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.

(i) The sidewalk slab shall be moist cured in accordance with E14.7.25(e).

(j) Curing compound shall be applied at the rate specified by the Manufacturer for the accepted product. The compound must be applied uniformly and by roller.

(k) Where curing compound is permitted, and following the completion of finishing operations, the surface shall be sprayed with an initial coating of curing compound, in accordance with the Manufacturer’s recommended methods. As soon as initial set has occurred, the surface shall receive a second roller-applied application of curing compound, to the satisfaction of the Contract Administrator.

E14.7.26 Form Removal

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

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

(c) 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.

E14.7.27 Patching of Formed Surfaces

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

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

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

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

(e) Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched, then applying bonding grout followed by patching mortar. Bonding grout shall be well brushed onto the area immediately prior to patching. When the bonding grout begins to lose the water sheen, the patching mortar shall be thoroughly trowelled into the repair area to fill all voids. It shall be struck off slightly higher than the adjacent concrete surface and left for one hour before final finishing to facilitate initial shrinkage of the patching mortar. It shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification. The final colour shall match the surrounding concrete.

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

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

E14.7.28 Cold Weather Concreting

(a) The requirements of CAN/CSA A23.1 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.

E14.7.29 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 sun shades.

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

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

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

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

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

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

(b) Hot-Weather Curing

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

(ii) Mass concrete shall be water cured for the basic curing period when the air temperature is at or above 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 14.3, “Acceptable Concrete Temperatures”, for the indicated size of the concrete section.

TABLE 14.3
ACCEPTABLE CONCRETE TEMPERATURES

THICKNESS OF SECTION, M	TEMPERATURES ^{0}C	
	MINIMUM	MAXIMUM
Less than:		
1	10	27
1.2	5	25

E14.7.30 Cleanup

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

E14.8 Concrete Quality

E14.8.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator

including all operations from the selection and production of materials through to final acceptance of the specified Work.

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

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

E14.8.2 Access

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

E14.8.3 Materials

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

(b) All materials shall conform to the latest edition and all subsequent revisions of CAN/CSA A23.1.

(c) All testing of materials shall conform to the latest edition and all subsequent revisions of CAN/CSA A23.2.

(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.

E14.8.4 Quality Assurance and Quality Control

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

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

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

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

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

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

E14.8.5 Concrete Testing

(a) Slump tests shall be made in accordance with CSA Standard Test Method A23.2-5C, "Slump of Concrete". If the measured slump falls outside the limits in E12.4.2, “Concrete Mix Design Requirements” 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, "Air Content of Plastic Concrete by the Pressure Method". If the measured air content falls outside the limits in, E19.4.3, “Concrete Mix Design Statement” of this Specification, a second test shall be made at any time within the specified discharge time limit for the mix. In the event of a second failure, the Contract Administrator reserves the right to reject the batch of concrete represented.

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

(d) Rapid chloride permeability testing shall be performed in accordance with ASTM C1202.

(e) Testing for post-cracking residual strength index (Ri) of FRC shall be tested as follows. 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 C1609-10. The average of the peak loads is the cracking load of the concrete (Pcr), and shall be provided to the Contract Administrator. A second set of five concrete beam specimens shall be tested to failure in accordance with ASTM C1399-07. The average of the peak loads during the reloading is the post cracking load of the concrete (Ppcr). The Ri is equal to the ratio of Ppcr over Pcr. The Contractor shall submit a summary of the results of all post-cracking residual strength index tests, including all load defection curves. Tests conducted in accordance to ASTM C1399-07 will be considered invalid by the Engineer if the initial crack in the specimen has occurred after 0.5mm deflection. Specimens shall be sampled in accordance with E14.8.5(f).

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

(g) Test specimens shall be made and cured in accordance with CSA Standard Test Method A23.2-3C, "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, "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 15.1 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, "Compressive Strength of

Cylindrical Concrete Specimens", and the test result shall be the strength of the specimen.

E14.8.6 Corrective Action

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

E14.9 Measurement and Payment

E14.9.1 Structural Concrete

(a) Supplying and placing structural concrete shall not be measured. This Work shall be paid for at the Contract Lump Sum Price for the “Items of Work” listed here below, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

(b) Items of Work:
Supply and Place Structural Concrete:

(i) Abutments and Wingwalls;
(ii) Deck Slab;
(iii) Reinforced Sidewalk;
(iv) Traffic Barriers;
(v) Approach Slabs and;
(vi) Retaining Wall.

(c) Supplying and installing all the listed materials, concrete design requirements, equipment, construction methods, and quality control measures associated with this Specification and Drawings shall be considered incidental to “Supply and Place Structural Concrete”, unless otherwise noted herein. No measurement or payment shall be made for this Work unless indicated otherwise.

E14.9.2 Concrete Heating and Hoarding

(a) Heating concrete and supplying, setting up, heating, and removing the hoarding will not be measured and will be paid for at the Contract Lump Sum Price for “Concrete Heating and Hoarding”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

E15. SUPPLYING AND PLACING REINFORCING STEEL

E15.1 Description

(a) This Specification shall cover all operations relating to the supply, fabrication, delivery, and placement of black steel reinforcing, and stainless steel reinforcing, 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.

E15.2 Scope of Work

(a) The Work under this Specification shall involve supplying and placing all steel reinforcing, as shown on the Drawings for the following Works:

SCOPE OF WORK	
Item	**Type of Steel Reinforcing**
Abutments and Wingwalls	Black Steel Reinforcement
Deck Slab	Stainless Steel Reinforcement
Reinforced Sidewalk	Stainless Steel Reinforcement
Retaining Wall	Stainless Steel Reinforcement
Approach Slabs	Stainless Steel Reinforcement
Traffic Barriers	Stainless Steel Reinforcement

E15.3 References

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

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

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

(iii) ASTM A143 – Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedures for Detecting Embrittlement.

(iv) ASTM A780/A780M – Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings;

(v) ASTM A767/A767M – Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement;

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

(vii) CAN/CSA G30.18-M92 – Billet Steel Bars for Concrete Reinforcement;

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

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

E15.4 Submittals

E15.4.1 General

(a) At least twenty-one (21) Days prior to the scheduled commencement of any fabrication, the qualifications of the Contractor and its Operators shall be submitted to the Contract Administrator for review and approval.

(b) The Contractor shall submit to the Contract Administrator for review and approval, at least fourteen (14) Days prior to commencement of any schedule Work on the Site, a proposed schedule, including methods and sequence of operations.

(c) The Contractor shall submit to the Contract Administrator for review, at least fourteen (14) 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.

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

(e) Contractor to submit Quality Control Testing Program to the Contract Administrator in accordance with E15.7.3.

(f) Contractor to submit Shop Drawings (including bar lists) in accordance with section E3 and the latest edition of the Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada (RSIC).

E15.5 Materials

E15.5.1 General

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

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

(c) The reinforcing steel shall not be placed directly on the ground. Sufficient timber pallets or blocking shall be placed under the reinforcing steel to keep them free from dirt and mud.

E15.5.2 Handling and Storage of Stainless Steel Reinforcing

(a) Stainless steel reinforcing shall be store 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 for steel bands used for shipping shall not be in direct contact with stainless steel reinforcing. Wood or approved alternate should be used to protect the bars

(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.

E15.5.3 Reinforcing Steel

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

(b) All reinforcing steel shall conform to the requirements of CSA Standard CAN/CSA G30.18-M92, Grade 400W, Billet-Steel Bars for Concrete Reinforcement.

(c) Stainless steel reinforcing as shown on the Drawings shall meet or exceed the minimum requirements of ASTM A955M, 300 Series, minimum Grade 420, of the Types listed below in Table E15.1, “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 dimension recommended by Reinforcing Steel Institute of Canada (RSIC), Manual of Standard Practice.

(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. No additional costs will be applied to this Contract for the replacement of deficient 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 CSA Standard CAN/CSA G30.18-M92 and ASTM A955M.

TABLE 15.1
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

E15.5.4 Bar Accessories

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

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

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

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

(e) Tie wire shall be the following:

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

(ii) Nylon coated wire or 1.6 mm galvanized coated wire for hot-dipped galvanized steel reinforcing; and,

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

(f) Approved products are as supplied by Con Sys Inc., Box 341, Pinawa, Manitoba, Canada R0E 1L0 (204) 753-2404, or equal as accepted by the Contract Administrator in accordance with B7.

(g) Bar accessories are not included in the Drawings and shall include bar chairs, spacers, clips, wire ties, wire (18 gauge minimum), or other similar devices and are to be acceptable to the Contract Administrator. The supplying and installation of bar accessories shall be deemed to be incidental to the supplying and placing of reinforcing steel.

E15.5.5 Mechanical Splices

(a) Mechanical splices shall be stainless steel, meeting the requirements of ASTM A955M, Type 316L, Type 2005, or Type 2304.

E15.6 Construction Methods

E15.6.1 Fabrication of Reinforcing Steel

(a) General

(i) Reinforcing steel shall be fabricated in accordance with CSA Standard CAN/CSA G30.18-M92 to the lengths and shapes as shown on the Drawings.

(b) Black Steel Reinforcing

(i) Heating shall not be used as an aid in bending black steel reinforcing.

(ii) Hooks and bends should be smooth and not sharp.

(iii) Fabrication of the black steel reinforcing shall be straight and free of paint, oil, mill scale, and injurious defects.

(c) Stainless Steel Reinforcing

(i) Heating shall not be used as an aid in bending stainless steel reinforcing.

(ii) Hooks and bends should be smooth and not sharp.

(iii) Fabrication of the solid stainless steel reinforcing shall be such that the bar surfaces are not contaminated with deposits of iron and/or non-stainless steel or damage to the surface of the bars.

(iv) 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 wire brushes only.

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

E15.6.2 Placing of Reinforcing Steel

(a) Reinforcing steel shall be placed accurately in the positions shown on the Drawings and shall be retained in such positions by means of a sufficient number of bar

accessories so that the bars shall not be moved out of alignment during or after the depositing of concrete. The Contract Administrator's decision in this matter shall be final.

(b) 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.

(c) 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 will not be permitted.

(d) Place reinforcing bars to provide a clear space between the reinforcing bars as shown on the Drawings to accurately place preformed holes where necessary.

(e) Reinforcing steel shall not be straightened or rebent in a manner that will injure the metal or create excess damage to the galvanized coating. Bars with bends not shown on the Drawings shall not be used.

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

(g) A minimum of twenty-four (24) hours advance notice shall be given to the Contract Administrator prior to the pouring of any concrete to allow for inspection of the reinforcement.

E15.7 Quality Control

E15.7.1 Inspection

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

E15.7.2 Access

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

E15.7.3 Quality Testing

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

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

E15.8 Measurement and Payment

(a) Reinforcing steel bars will be paid for on a unit basis and paid for at the Contract Unit Price for “Items of Work” listed below. The amount to be paid for will be on a mass basis and shall be paid for at the Contract Unit Price per kilogram in accordance with this Specification, Drawings, and accepted and measured by the Contract Administrator.

E15.8.1 Items of Work:

(a) Supply and Delivery of Reinforcing Steel
  (i) Black Steel Reinforcing
  (ii) Stainless Steel Reinforcing

(b) Placing Reinforcing Steel
  (i) Black Steel Reinforcing
  (ii) Stainless Steel Reinforcing

E16. STEEL BEARING PILES

E16.1 Description

(a) This Specification shall cover the supply and driving of steel bearing piles.

(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 other things necessary for and incidental to the satisfactory completion of all Work as hereinafter specified.

E16.2 Scope of Work

(a) The Work under this Specification shall involve:
  (i) Supplying and driving steel H piles for the abutments and wingwalls and retaining wall.

E16.3 Referenced Specifications

(a) The latest edition and all subsequent revisions to the following Standards:
  (i) CAN/CSA G40.20/G40.21 – General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel;
  (ii) CSA W59 – Welded Steel Construction (Metal Arc Welding); and
  (iii) AASHTO/AWS D1.5m / D1.5 Bridge Welding Code.

E16.4 Submittals

E16.4.1 General

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

E16.4.2 Steel Mill Certificates

(a) The Contractor shall submit to the Contract Administrator for review and acceptance, at least ten (10) Business Days prior to the commencement Work on site, the steel mill certificates.

E16.4.3 Pile Driving System

(a) The Contractor shall submit to the Contract Administrator for review and acceptance, at least ten (10) Business Days prior to the commencement of Work on Site, details of the proposed pile driving system and Manufacturer's specifications and catalogue for all mechanical hammers used, showing the data necessary for computing the bearing value of the pile driven.

E16.4.4 Welding Certification

(a) The Contractor shall submit to the Contract Administrator for review and acceptance, at least ten (10) Business Days prior to the commencement of Work on Site, proof of qualification for the Contractor and the welders conducting the Work (if applicable).

(i) The Contractor shall produce evidence that all welding operators to be employed on the Work are currently qualified by the C.W.B. in the processes in which they are to be employed on the Work.

(ii) The Contractor shall 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.

E16.4.5 Welding Procedures

(a) The Contractor shall submit to the Contract Administrator for review and acceptance, at least ten (10) Business Days prior to the commencement of Work on Site, the welding procedures specific to the Work (if applicable). The procedures shall include the following information: joint type, welding process, welding position, base metal specification, welding consumable specification and size, preheat requirements, amperage and voltage requirements, speed, polarity, and welding equipment.

(b) The Contractor shall submit to the Contract Administrator for review and acceptance, at least ten (10) Business Days prior to the commencement of Work on Site, Shop Drawings for pile tip and cutting shoe installations.

E16.5 Materials

E16.5.1 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. Piling shall be handled, hauled, and stored in a manner that avoids damage to piles and all associated piling material.

(b) The Contractor shall not be permitted to drag piles along the ground.

(c) Any piles excessively damaged through negligence or improper handling operations shall be immediately removed from the site and replaced with sound piles. This shall be done at the Contractor's own expense.

E16.5.2 Steel "H" Piles

(a) Steel "H" piles shall be structural HP360X132 steel members conforming to CSA G40.21, Grade 350W or ASTM A572 Grade 50.

(b) Pile driving points shall be Point No. HPP-S-12, by Titus Steel Co. Ltd., Mississauga, Ontario, or Pruyn HP75750, by Associated Pile and Fitting Corporation, Clifton, NJ, USA or an alternated to be accepted at the discretion of the Engineer.

(c) All welding shall conform to CSA Standard W59, electric arc method.

(d) Splices shall not be permitted for piles.

E16.6 Equipment

(a) Pile driving system to be used by the Contractor shall be of such a capacity that the required bearing and pile penetration shall be obtained without damaging the piles.

(b) The pile driving hammer used to install steel H piles shall be capable of delivering a minimum energy of 35 kJ to the pile head, with the ability to reliably operate at different energy levels (i.e. different fuel settings, variable strokes, variable ram weight, etc.). The amount of energy delivered to the pile head may need to be increased to reach refusal and to prevent pile damage.

(c) Pile driver leads shall be used to support the piles while they are being driven.

(d) The heads of steel bearing piles shall be cut squarely if required and protected by a pile cap. The pile cap shall be designed to hold the axis of the pile in line with the axis of the hammer. The top of the cap shall have a timber or polyethylene shock block (ie. capblock or hammer cushion).

E16.7 Construction Methods

E16.7.1 Geotechnical Report

(a) The preliminary geotechnical report is available for bidders to view during the tender period. Bidders may view the report during the tender period by contacting the Contract Administrator identified in D3.1. Borehole logs are also provided on the Drawings.

E16.7.2 Location and Alignment of Piles

(a) The piles shall be located to the positions shown on the Drawings. Pile lengths on Drawings have been calculated based on estimated tip elevation and pile cut-off elevations. The Contractor shall be responsible for reviewing all boring logs and geotechnical information for the verification of required supply pile lengths to support their driving equipment and operations.

(b) Piles shall not be jacked or pulled into their final positions.

E16.7.3 Installing Pile Tips

(a) All pile driving points shall be welded by the Contractor prior to commencement of pile driving operations.

(b) Material to be welded shall be preheated in accordance with CSA W59.

E16.7.4 Pile Refusal Requirements

(a) H piles shall be driven to practical refusal into the bedrock layer.

(b) Refusal criteria for all piles shall be considered to be three consecutive sets of ten (10) to fifteen (15) blows per 25mm of pile penetration, provided that a well maintained hammer capable of delivering the required energy to the pile head per blow is utilized. Final refusal criteria will be confirmed by the Contract Administrator following submission of the items noted in E16.4, and following driving of the first pile to refusal.

E16.7.5 Driving of Piles

(a) Pile driving equipment shall be operated from existing grade.

(b) The piles shall be driven to the positions shown on the Drawings. Piles shall not deviate more than two (2) percent for battered piles, nor more than two (2) percent out-of-plumb for vertical piles. Piles shall not be more than 75 mm off centre, measured at time of cut off.

(c) The method of driving shall be such as not to impair the strength of the pile. All piles shall be driven to refusal as end bearing piles. The Contractor will be required to remove any surface and/or shallow depth obstruction(s) to obtain the required penetration of the pile.

(d) Piles shall be driven in the most practicable manner to ensure that the piles at the boundaries are in their correct final positions.

(e) Driving stresses shall not exceed 85% of the yield stress of the steel.

(f) All piles shall be re-driven for one set of the refusal criteria a minimum of twenty-four (24) hours following installation of all piles for a given footing. If relaxation of any pile is observed upon re-driving, all piles shall be re-driven to a minimum of one set of the specified refusal criteria on a daily basis until no further relaxation of piles is observed.

(g) Upon re-driving a pile, all adjacent piles exhibiting heave of 6mm or more should be re-driven to a minimum of one set of the refusal criteria.

(h) Driving of all piles shall be continuous without intermission until the pile has been driven to final elevation.

(i) Where boulders or other obstructions make it difficult to drive certain piles in the location shown and to the proper bearing strata or depth, the Contractor shall resort to all usual methods to install piles as required.

(j) Any piles that are excessively crushed or bent through negligence or carelessness the Contractor shall be removed or otherwise replaced, unless, in the opinion of the Contract Administrator, the damage is so slight that the pile can be repaired properly, which repairs shall be done by this Contractor.

(k) Pile driver leads shall be used to support the piles while they are being driven and shall be braced to the supporting crane, to be used for securely and accurately support the pile in its required position during driving. Leads shall be of sufficient length to be supported firmly on the ground. The use of hanging or swinging leads will not be allowed unless they can be held in a fixed position during the driving operations. Battered piles shall be driven with inclined leads.

(l) For pile installation monitoring purposes, the Contractor shall paint markings on each pile at 0.25 metre intervals, with a label at each 1.0 metre interval, starting from the toe of the pile.

(m) Pre-boring of piles is not permitted, unless approved by the Contract Administrator.

(n) For practical refusal of piles, the final set shall be determined by three consecutive readings meeting the set criterial identified by the Contract Administrator. Final set will be measured and recorded in blows per 25mm by the Contract Administrator. Refer also to E16.7.4 regarding refusal requirements.

E16.7.6 Splicing of Piles

(a) Splicing of piles will not be permitted for any of the Work, unless approved by the Contract Administrator. If splices are required at the Contract Administrator's direction, the Contractor shall be reimbursed for the cost of providing a splice as specified in C7.4(d).

E16.7.7 Cut-Off of Piles

(a) After piles have been driven to the required penetration and re-driven, the Contractor shall mark the required cut-off elevation on each pile. The top of all piles shall be neatly cut off (true and level) at the cut-off elevation specified on the Drawings.

E16.8 Quality Control

E16.8.1 Inspection

(a) 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.

E16.8.2 Pile Driving Records

(a) The Contract Administrator will keep a record of each and every pile driven. The records shall give the driving date, installation time, pile type, size, length, location, final penetration depth, rate of penetration (i.e. number of blows per 250mm of pile penetration), final three sets meeting refusal criteria, hammer type and fuel setting (drop height). Any unusual phenomena shall be noted and recorded, especially if they indicate possible damage to the pile.

(b) Energy output of driving equipment at the time of final set shall be reported immediately to the Contract Administrator. The required set per blow will be subject to acceptance by the Contract Administrator, showing regard to the specific driving equipment and piles permitted.

E16.9 Measurement and Payment

E16.9.1 Steel H Piles

(a) Supplying of steel H piles shall be measured per lineal metre of steel piling supplied as measured by the Contract Administrator. This item of Work shall be paid for at the Contract Unit Price per metre for "Supply Steel H Piles", performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be

paid in full for supplying all materials and performing all operations herein described and all other items incidental to the Work.

(b) Driving of steel H piles shall be measured per lineal metre of driven steel piling. The length to be paid for shall be the total number of lineal metres of piling shown on the Drawings or authorized by the Contract Administrator, less fifty (50) percent of the total number of lineal metres of piling cut off after driving as measured in the field by the Contract Administrator. This item of Work shall be paid for at the Contract Unit Price per metre for "Drive Steel H Piles", performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and performing all operations herein described and all other items incidental to the Work.

(c) Supplying and installing all the listed materials, equipment, construction methods, and quality control measures associated with this Specification and Drawings shall be considered incidental to "Supply Steel H Piles", unless otherwise noted herein. No measurement or payment shall be made for this Work unless indicated otherwise.

E17. HOT-POURED RUBBERIZED ASPHALT WATERPROOFING

E17.1 Description

(a) This Specification shall cover the supply of labour, equipment, tools, and material necessary for the application of hot poured rubberized asphalt waterproofing on the bridge deck, 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 other things necessary for and incidental to the satisfactory completion of all Work as hereinafter specified.

E17.2 Referenced Specifications and Drawings

(a) The latest version of the City of Winnipeg Standard Construction Specifications and the latest edition and all subsequent revisions of the following standards:

(i) CAN/CGSB-27.9M – Primer, Asphalt, Unfilled for Asphalt Roofing, Dampproofing and Waterproofing;

(ii) CGSB-37-GP-50M – Hot Applied Rubberized Asphalt for Roofing and Waterproofing;

(iii) CGSB-37-GP-51M – Application of Hot Applied Rubberized Asphalt for Roofing and Waterproofing; and

(iv) CGSB-37-GP-56M – Membrane, Bituminous, Prefabricated and Reinforced for Rooting.

E17.3 Scope of Work

(a) The Work under this Specification shall involve:

(i) Preparing the concrete deck surface to receive the waterproofing membrane;

(ii) Applying primer to the concrete deck surface;

(iii) Placing the asphalt waterproofing membrane on the concrete deck surface;

(iv) Placing polyester fabric protection layers and protection board; and

(v) Supplying and installing wick drains and associated end drainage.

E17.4 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) 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, the

proposed material(s) to undertake the Work. Data submitted shall summarize the physical, mechanical, and chemical characteristics of the material.

E17.5 Materials

E17.5.1 General

(a) 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.

(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.

E17.5.2 Hot Poured Rubberized Asphalt Waterproofing

(a) The hot poured rubberized asphalt waterproofing system shall consist of the following compounds:

(i) Primer;

(ii) Hot applied rubberized asphalt waterproofing membrane;

(iii) Polyester fabric; and

(iv) Protection board.

(b) The hot poured rubberized asphalt waterproofing membrane shall be a two layer, fabric-reinforced system. Each layer shall be 2.0 to 3.0 mm in thickness. The intermediate fabric reinforcement shall be placed between the layers.

(c) The Contractor shall supply and install approved protection board to cover the hot poured rubberized asphalt waterproofing membrane

E17.5.3 Primer

(a) The entire concrete surface to be waterproofed shall receive a prime coat of CGSB37-GP-9Ma, 930-18 (BAKOR) or approved equivalent in accordance with B7, “Substitutes”, at an application rate in accordance with the Manufacturer’s recommended methods.

(b) Primer shall be stored at temperatures of 5C and above to facilitate handling. Materials shall be stored in a dry location and shall be kept in an upright position.

E17.5.4 Hot Poured Rubberized Asphalt Waterproofing Membrane (2 layers)

(a) The hot poured rubberized asphalt waterproofing membrane shall be Bemalastic 1213 BDM by Bemac products or 790-11 by BAKOR, or an approved equivalent, in accordance with B7, “Substitutes”.

(b) The waterproofing membrane shall be melted, mixed, and applied according to the Manufacturer’s recommendations.

(c) The layering operation shall be such that the waterproofing membrane is applied in two 2.0 – 3.0 mm thick layers.

(d) Discontinuities in the waterproofing membrane shall be avoided and joints lapped a minimum of 150 mm. The waterproofing membrane shall be applied to the entire bridge deck surface and north abutment roof slab (excluding approach slabs) and shall extend up the face of the barriers to the top (proposed elevation) of the asphalt pavement.

(e) At the Contract Administrator’s discretion, samples from the kettles shall be tested by the Contractor.

E17.5.5 Polyester Fabric

(a) An intermediate reinforcing layer shall be placed between the layers of waterproofing membrane. The intermediate reinforcing layer shall be spun-bonded polyester fabric such as Reemay 2016 grade, BAKOR Polyester Fabric Reinforcing Sheet, McAsphalt Fabric Reinforcement BP-16 or approved equivalent in accordance with B7,

"Substitutes", and set into the first layer of waterproofing membrane to achieve a minimum of 50% bleed through. Maximum overlap or gap between sheets of 6 mm.

E17.5.6 Protection Board

(a) The protection board shall be a durable panel of 3 mm thickness specifically designed to provide a protective cushion between the hot mix asphalt pavement and the hotapplied rubberized asphalt waterproofing membrane for bridges and shall be approved by the Contract Administrator.

(b) The protection board shall be BAKOR Asphalt Protection Board, McAsphalt Protection Board BP-Asp PB, or approved equivalent in accordance with B7, "Substitutes".

(c) The protection boards shall be placed on top of the upper layer of waterproofing and rolled by means of a linoleum or lawn type roller while the membrane is still warm to ensure good contact with the membrane. The protection boards shall be placed with edges overlapping 25 mm both longitudinally and transversely. The protection board's edge shall be within 5 mm of all wick drains. Protection boards shall be placed such that the longitudinal (direction of traffic) joints are staggered at least 150 mm. Instances where edges of the protection board curl up, the edges shall be cemented down using asphalt waterproofing. Protection boards that are warped, distorted, or damaged in any way shall be rejected.

E17.5.7 Surface Conditioner

(a) Surface conditioner shall be applied to the concrete surfaces of the bridge deck and shall conform to the Manufacturer's recommended methods.

E17.5.8 Wick Drains

(a) Wick drains shall consist of composite polypropylene with a total thickness of 3.6 mm, supplied in widths of 100 mm.

(b) The puncture strength shall be a minimum of 0.45 kN, measured in accordance with the requirements of the latest edition of ASTM D4833.

(c) Wick Drain shall be one of the approved products: American Wick Drain and distributed by Layfield and Nilex Inc. under private labels Nilex NuDdrain MD7407 and Layfield Wick Drain Type 1, or an approved equal as accepted by the Contract Administrator in accordance with B7, "Substitutes".

(d) The rubber membrane shall consist of butyl rubber with a total thickness of 1.2 mm.

(e) Rubber membrane shall be one of the approved products: Elastoshet 6147, BP47 Elastomeric Reinforcement, BAKOR 990-25, or an approved equal as accepted by the Contract Administrator in accordance with B7, "Substitutes".

E17.6 Equipment

E17.6.1 General

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

E17.7 Construction Methods

E17.7.1 General

(a) No installation work shall be performed during rainy or inclement weather and on frost or wet covered surfaces.

(b) Temporary protection of the membrane shall be provided to prevent mechanical damage or damage from spillage of oil or solvents until such time as permanent protection is provided.

E17.7.2 Melting On Site

(a) Cakes of rubberized asphalt waterproofing shall be melted in an approved double shell melter under continuous agitation until the material can be drawn free flowing and lump free from the melter.

(b) The temperature of the rubberized asphalt waterproofing shall not exceed 218C at any time during the entire melting procedure.

E17.7.3 Application

(a) The entire concrete surface area onto which the hot poured rubberized asphalt waterproofing is to be applied shall be thoroughly cleaned by means of sand blasting. The sand blasted surfaces shall be sound, free from curing compounds, laitance, and scaling. All rough spots, ridges and edges in the concrete surface resulting from protrusions of concrete aggregate or cement paste shall be removed by light chipping or grinding to leave a smooth and level surface. Immediately prior to the application of the hot poured rubberized asphalt waterproofing, a final cleaning of the concrete surfaces shall be done using high velocity compressed air. The concrete surfaces shall be dry, clean, and free from frost, dust, dirt, and all foreign matter. The Contractor shall contain and collect all products of the sand blasting operation including dust, debris, and spent abrasive so as to ensure that all of these materials are prevented from entering into and being deposited into Sturgeon Creek. All debris and spent abrasive shall be collected and disposed of off-site by the Contractor at a proper disposal facility. The Contractor is responsible for the preparation of the concrete surfaces to ensure that the hot-poured rubberized asphalt waterproofing can be installed in accordance with the Manufacturer's requirements.

(b) The Contractor shall ensure that the concrete surfaces onto which the hot poured rubberized asphalt waterproofing is to be applied is prepared (including supply and application or waterproofing primer) to the degree that the hot poured rubberized asphalt waterproofing can be installed in accordance with the Manufacturer's requirements.

(c) After the concrete deck has been cleaned, they shall be covered with surface conditioner. The quantity used shall be 160 mL/m_2, or as recommended by the Manufacturer. The surface conditioner shall be allowed to dry before the application of the rubberized asphalt waterproofing.

(d) The primer shall be applied at a uniform rate, as recommended by the Manufacturer, avoiding over-spraying or ponding of material. The primer shall be dry before applying the rubberized asphalt waterproofing.

(e) The rubberized asphalt waterproofing shall be brought to a temperature of between 190C and 218C.

(f) The application of the rubberized asphalt waterproofing shall be carried out under the supervision of experienced personnel.

(g) Apply membrane in a smooth fashion, free from air pockets, wrinkles, or tears, and in accordance with the Manufacturer's recommended methods. Ensure full bond of membrane to substrate.

(h) Apply the first layer of hot rubberized asphalt membrane evenly to a minimum thickness of 2mm to form a continuous monolithic coating over horizontal and vertical surfaces.

(i) Apply fabric reinforcing sheet and firmly press into first layer of hot membrane. Overlap fabric approximately 6mm ensuring that a layer of membrane is present between overlaps. Apply a second layer of membrane over the fabric to a minimum thickness of 3mm.

(j) The Contractor shall supply and install an elastomeric sheet membrane which is compatible with the hot-poured rubberized asphalt waterproofing material. The elastomeric sheet membrane shall be installed at the designated locations shown on

the Drawings. Installation of the heavy-duty elastomeric sheet membrane shall be in accordance with the Manufacturer's recommendations.

(k) Protection course shall be rolled onto hot applied rubberized asphalt membrane surface while still warm and tacky.

(l) Lap protection course shall be 50mm on side laps and 150mm on end laps, staggering laps.

E17.7.4 Installation of Wick Drains

(a) Wick drains shall be installed along the full length of the bridge deck at the interface between the bridge deck and bridge traffic barrier.

(b) Wick drains shall be installed when the hot poured rubberized asphalt waterproofing membrane is still hot and tacky.

(c) Special attention shall be given to waterproofing and wick drain modifications at deck drain pipe locations.

(d) Tack coat shall not be applied to wick drains.

E17.8 Quality Control

E17.8.1 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.

E17.8.2 Access

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

E17.9 Measurement and Payment

E17.9.1 Hot-Poured Rubberized Asphalt Waterproofing

(a) Hot-poured rubberized asphalt waterproofing shall be paid for at the Contract Unit Price per square metre for "Hot-Poured Rubberized Asphalt Waterproofing", measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. The area to be paid for shall be the waterproofed surface area as shown on the Drawings and herein specified.

E18. ASPHALTIC CONCRETE PAVING ON BRIDGE

E18.1 Description

(a) This Specification shall cover all operations relating to the supply of labour, equipment, tools, and material necessary for the application of tack coat and the placing and compaction of the asphaltic hot mix overlay on the bridge deck and approach slabs.

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

E18.2 Referenced Specifications and Drawings

(a) The latest edition and subsequent revisions of the following:

(i) City of Winnipeg CW 3410 – Asphaltic Concrete Pavement Works;

E18.3 Scope of Work

(a) The Work under this Specification shall involve:

(i) Preparing the surface of the bridge deck and approach slabs;

(ii) Supplying and applying the tack coat; and

(iii) Supplying, hauling, placing, and compacting the asphaltic hot mix overlay on the bridge deck and approach slabs.

E18.4 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) In accordance with CW 3410, the Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any Work on Site, the proposed approved materials to be used and mix design statement.

E18.5 Materials

E18.5.1 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.

(c) Asphaltic concrete paving mix to be used is Type 1A.

E18.6 Equipment

E18.6.1 General

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

E18.7 Construction Methods

E18.7.1 Surface Preparation

(a) The bridge deck and approach slabs shall be thoroughly cleaned by means of a power broom and compressed air. All surfaces to which the tack coat is to be applied shall be dry and free from scale, dirt, grime, grease, oil, or other contaminants.

(b) Care shall be taken to protect and avoid damaging the hot-pour rubberized asphalt waterproofing membrane and protection board. Any damage incurred shall be corrected at the Contractor's own expense.

E18.7.2 Application of Tack Coat

(a) The tack coat shall be applied to the entire surface of the bridge deck and approach slabs. The quantity used shall not exceed 550 mL/m^2.

(b) Barriers and other structural elements with a vertical face shall receive a brushed-on application of tack coat for the total asphalt thickness. These surfaces shall also receive a further coating of paving grade (150/200 penetration) asphalt cement.

(c) Any puddles or excess material shall be thoroughly spread by brushing material over the surrounding concrete surface.

(d) The treated surface shall be fully cured, until it becomes tacky, prior to application of the asphalt overlay.

E18.7.3 Placing Asphaltic Concrete Paving Mixture

(a) The paver shall produce a uniformly textured surface free from tearing, tracking, or other objectionable surface irregularities. If the surface condition is not deemed to be acceptable by the Contract Administrator, operations shall cease until equipment adjustments, repairs or replacement are made. Spreading operations shall not recommence without the approval of the Contract Administrator. Delays and expense associated with adjustments, repairs, or replacement of equipment shall be the responsibility of the Contractor.

(b) The paver shall proceed in the same direction as the lap of the protection board.

(c) The sequence of spreading operations with respect to lanes and lifts shall be approved by the Contract Administrator.

(d) The spreader shall be capable of spreading the mixture true to the elevations, grades, and crown, as shown on the Drawings. The allowable variation in the bituminous pavement surface shall not exceed 6 mm when measured using a three metre straight edge. Particular attention shall be paid to the setting of the spreader when laying the mixture in the areas adjacent to protruding joints in order to avoid bumps in the areas of such joints. In correcting the areas adjacent to a joint or when removing excess mixture, the material shall be picked up and not cast on the surface of the freshly spread bituminous pavement.

(e) Immediately after the course is screeded, and before roller compaction begins, the remainder of the surface shall be verified, with all inequalities addressed and corrected, high spots removed, and low spots replaced. Irregularities in alignment and grade along the barrier shall be corrected by the addition or removal of mixture before the edge is rolled.

(f) The speed of the spreader shall be maintained at a uniform rate that is in balance with the amount of bituminous pavement mixture being delivered to the site.

E18.7.4 Construction Joints in Asphalt Overlay

(a) Longitudinal and transverse joints shall be made in a careful manner in order to assure a well-bonded, sealed, and level joint. A transverse joint shall be cut back to its full depth perpendicular to the mat at the end of the run. On resuming laying of the paving mixture, the exposed edges shall be painted with a thin coat of hot asphalt cement.

(b) Before placing the paving mixture against them, all contact surfaces of longitudinal joints, curbs, barriers, etc. shall be painted with a thin coat of hot asphalt cement, and heated with a propane joint heater.

(c) The allowable variation in the surface across a transverse joint shall not exceed 6 mm when measured using a three metre straight edge centered on the joint.

(d) In raking joints, excess mix material shall be picked up and removed from the surface of the freshly spread asphalt.

E18.7.5 Joints in Asphalt Overlay

(a) When called for on the Drawings, the Contractor shall, after the completion of the asphalt paving, sawcut the asphalt in the transverse direction for the full roadway width.

E18.7.6 Weather

(a) Paving asphalt of thickness less than 40 mm shall not begin until the ambient air temperature is at least 10C and rising. Paving operations shall not begin until all frost and moisture has evaporated from the concrete surfaces. For thicker asphalt pavement layers, the minimum ambient air temperature must be 5C and rising.

E18.7.7 Protection of Bridge Components and Appurtenances

(a) Utmost care shall be taken to protect bridge components and appurtences, such as barriers, sidewalks, expansion joints, aluminum pedestrian handrail, from disfiguration by asphalt materials, including tack coat, caulking compound, cement, and asphalt mixture.

(b) If exposed surfaces are marred as a result of the Contractor's operations, restoration shall be made by the Contractor at his own expense, to the satisfaction of the Contract Administrator.

E18.8 Quality Control

E18.8.1 Inspection

(a) All workmanship and materials furnished and supplied under this Specification are subject to the close and systematic inspection 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 approval 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.

E18.8.2 Access

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

E18.8.3 Materials

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

E18.9 Measurement and Payment

(a) Asphalt paving on the bridge deck and approach slabs shall be paid at the Contract Unit Price per tonne for "Main Line Paving Type 1A", as per Specification CW 3410.

E19. BRIDGE ALUMINUM BARRIER RAIL

E19.1 Description

(a) The specification shall amend and supplement City of Winnipeg specification CW 3650.

E19.2 Scope of Work

(a) The Work under this Specification shall involve:

(i) Supply and installation of the bridge aluminum barrier rails and posts on the concrete traffic barriers.

(ii) Supply and installation of the anchors for the bridge aluminum barrier rails on the concrete traffic barriers.

E19.3 Submissions

(a) At least fourteen (14) 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 clearly show shapes, dimensions, detail, connection (including proper CSA welding identification), bolt holes, and accessories.

E19.4 Materials

(a) Zinc for hot dipped, galvanized coatings shall conform to the requirements of ASTM A123.

(b) Stainless steel bolts, nuts, washers, inserts, and the like as shown on the Drawings shall conform to the requirements of ASTM A320, Grade B8, Class 2.

E19.5 Measurement and Payment

(a) Supplying and installing the bridge aluminum barrier rail, posts and anchors will not be measured and will be paid for at the Contract Lump Sum Price for "Supply and Install Bridge Aluminum Barrier Rail", 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.

E20. RIPRAP

E20.1 General

(a) Riprap shall be random stone riprap and supplied and installed in accordance with Specification CW 3615, except as specified herein.

E20.2 Materials

E20.2.1 Riprap

(a) The Contractor shall supply quarried rock, or quarried limestone which is dense, durable, sound, resistant to the action of water and frost, and suitable in all respects or the purpose intended. Stone riprap shall be free from sod, roots, organic material and debris prior to placement. Individual pieces of stone shall be free of defects such as seams or cracks that would cause rapid or excessive deterioration or degradation. The Contract Administrator shall approve the rock for riprap prior to placing.

(b) Quarried limestone shall have a maximum Los Angeles Abrasion Loss of 32% (ASTM C535) and a maximum Magnesium Sulphate Soundness Loss of 13% (ASTM C88).

(c) The stone riprap shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation:

(i) 100% passing 350 mm

(ii) 50% passing 200 mm

(iii) 20% passing 100 mm

(d) 30% by volume of granular will be blended with the stone riprap prior to placement in order to fill the interstitial voids within the rock.

(e) The granular blended with the riprap shall be clean gravel or clean crushed rock with the following gradation:

(i) 100% passing 19 mm

(ii) 50% passing 9 mm

(iii) 20% passing 3 mm

E20.2.2 Geotextile

(a) The geotextile shall be non-woven type, and supplied and placed in accordance with CW 3130-R4 for "Separation Geotextile Fabric".

E21. CHAIN LINK FENCE

E21.1 Further to CW 3550 – Chain Link Fencing

(a) The chain link fencing shall be installed on the wingwalls as detailed on the Plans. All work and materials associated with installing the chain link fencing as shown on the Plans shall be considered incidental to the Contract Unit Price for Chain Link Fence 1.22 m Height.

E22. MATCHING EXISTING GRADES

E22.1 Whenever the proposed paving or sod meets existing building edge, doorway, or property line, the Contractor shall construct the proposed element to an acceptable grade, as directed by the Contract Administrator, to ensure that proper drainage and accessibility are maintained.

E23. SITE CLEAN UP

E23.1 The Contractor shall upon the completion of Work each day, load and dispose of all excess asphalt cuttings, spoiled concrete, reinforcing steel, granular and other material associated with the Works from the Work Site. The Contractor shall secure or remove all of his machinery and equipment at the end of each day from the immediate work site. The Contractor will not be permitted to store machinery, equipment, or materials on public roads overnight. Any costs in connection with the above mentioned Works are incidental.

E23.2 Unless otherwise specified the Contractor shall restore all areas which have been disturbed by his operations to as good as or better than original condition including removal of all construction debris, repair all vegetation, sod, concrete pavement, concrete curbs, concrete sidewalk and asphalt paving to remain etc. to the satisfaction of the Contract Administrator. Any costs incurred in connection with the above mentioned Work are incidental to unit prices bid under this contract.

E23.3 Total Performance of the Work shall not be attained until the Contractor has cleaned up the Site and has removed all tools, equipment, waste, debris and surplus foundation earth to the satisfaction of the Contract Administrator. Unless otherwise specified, the Contractor shall restore all areas of the Site beyond the established limit of Work, which have been disturbed by the Contractor's operations to as good as or better than the original condition to the satisfaction of the Contract Administrator. The Contractor shall pay all costs associated with this Work.

E23.4 Sod and Topsoil (repair to damaged areas). The Contractor shall install mineral sod and a minimum 75mm compacted thickness of topsoil, as required, and in accordance with CW 3510 and CW 3540.

E24. WORK NEAR OVERHEAD MANITOBA HYDRO POWER LINES

E24.1 Description

E24.1.1 General

(a) This Specification shall cover all operations relating to the supply of labour, equipment, tools, and material necessary for working near the Manitoba Hydro power lines.

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

E24.2 Construction Methods

E24.2.1 General

(a) Further to CW1120, the Contractor is advised that there is a Manitoba Hydro overhead power line near the south side of the bridge site that will affect construction works. The power line is 12kv. The power is in the cables located across the top of the cross-beam at the top of each post, approximately 12m off the ground. These overhead cables must remain live at all times. Cables which are lower down the pole, approximately 5m or 8m off the ground, includes MTS fibre, ground wire and other cables that are not energized.

E24.2.2 Safety Watch

(a) The Contractor is advised that, without a Manitoba Hydro Safety Watch on site requiring placement of a rubber blanket over the energized cable, you are not allowed to have equipment or non- Manitoba Hydro workers any closer than 3m of the nearest energized cable. The Contractor's equipment operating slowly and controlled and workers may come as close as 0.6m to the non-energized cables, without a Safety Watch.

(b) With a Manitoba Hydro Safety Watch in place, Manitoba Hydro will allow slow and controlled operation of equipment and non-Manitoba Hydro workers to come as close as 0.6m to these energized cables.

(c) Currents costs for Manitoba Hydro to provide a Safety Watch are $75.00 per hour for a person with a bucket truck to blanket the cables and observe the work during weekdays and $215.00 per hour on weekends.

E24.3 Measurement and Payment

(a) Costs associated with Manitoba Hydro to provide a Safety Watch shall be borne by the Contractor. This Work will not be measured or separately paid for. This Work will be considered incidental to the Contract.

E25. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO THE WESTEND FEEDERMAIN

E25.1 Description

E25.1.1 General

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

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

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

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

E25.1.2 Submittals

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

E25.2 Construction Methods

E25.2.1 General

(a) The section of the Feedermain affected by construction crosses Omand's Creek approximately 6.0 m south of the south property line of Saskatchewan Avenue.

E25.2.2 Contractors carrying out Work in close proximity to the Feedermain shall meet the following conditions and technical requirements: As per City of Winnipeg Specification CW 3110.

(a) Pre-work, Planning and General Execution

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

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

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

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

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

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

(vii) Construction operations should be staged in such a manner as to limit multiple construction loads at one time. A reasonable offset distance is 3m between loads).

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

(b) Demolition and Excavation

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

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

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

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

(c) Riprap

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

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

E25.3 Mandatory Orientation Meeting

E25.3.1 The Contractor shall ensure that all work crew members understand and observe the requirements of this Specification. Prior to commencement of on-site Work, the Contractor shall attend an orientation meeting with the Contract Administrator. Attendance is mandatory for all superintendents, foremen and heavy equipment operators. The purpose of the meeting is to make all workers fully cognizant of the limitations of altered loading on the Feedermain, the ramifications of inadvertent damage to the pipelines, the constraints associated with work in close proximity to the Feedermain and the specific details of the Construction Method Statement in instances where a Construction Method Statement is in effect.

E25.3.2 Employees of the Contractor or any sub-contractor that fail to attend the mandatory orientation or fail to comply with the conditions for working in close proximity to the Feedermain shall be promptly removed from the Site.

E25.4 Measurement and Payment

E25.4.1 No measurement or payment will be made for the works listed in this specification.