THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 1051-2013

NAIRN AVENUE OVERPASS MAINTENANCE WORKS

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 Nairn Avenue Overpass Maintenance Works

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, March 27, 2014.

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 D4.1.

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, only to the Bidder who requested approval of the substitute.

B7.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely 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 B16.

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.

B7.10 Notwithstanding B7.2 to B7.9, in accordance with B8.6, deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B16.1(a).

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 B16.1(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, shall 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 B16.4.2, 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. QUALIFICATION

B11.1 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.

B11.2 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

B11.3 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);

B11.4 Further to B11.3(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/.

B11.5 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.

B11.6 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.

B12. BID SECURITY

B12.1 The Bidder shall provide bid security in the form of:

(a) a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in 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 ten percent (10%) 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.

B12.1.1 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.

B12.1.2 All signatures on bid securities shall be original.

B12.1.3 The Bidder shall sign the Bid Bond.

B12.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.

B12.2 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.

B12.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B12.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B12.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B12.3 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.

B13. OPENING OF BIDS AND RELEASE OF INFORMATION

B13.1 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.

B13.1.1 Bidders or their representatives may attend.

B13.1.2 Bids determined by the Manager of Materials, or his/her designate, to not include the bid security specified in B12 will not be read out.

B13.2 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/

B13.3 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/

B13.4 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.

B14. IRREVOCABLE BID

B14.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.

B14.2 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.

B15. WITHDRAWAL OF BIDS

B15.1 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.

B15.1.1 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.

B15.1.2 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.

B15.1.3 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 B15.1.3(b), declare the Bid withdrawn.

B15.2 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 B14.2 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.

B16. EVALUATION OF BIDS

B16.1 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 therefrom (pass/fail);

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B11 (pass/fail);

(c) Total Bid Price;

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

B16.2 Further to B16.1(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.

B16.3 Further to B16.1(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.

B16.4 Further to B16.1(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.

B16.4.1 Further to B16.1(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.

B16.4.2 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 or 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.

B17. AWARD OF CONTRACT

B17.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B17.2 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.

B17.2.1 Without limiting the generality of B17.2, 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.

B17.3 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 B16.

B17.3.1 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.

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 major components of this Work are as follows:

(a) Stage 1 – Construction of Westbound Lanes
  (i) Construct asphalt median crossovers;
  (ii) Detour traffic to Eastbound Lanes;
  (iii) Construct temporary pedestrian access;
  (iv) Remove existing concrete approach slabs and portions of the roadway slabs;
  (v) Remove portions of existing concrete traffic barriers;
  (vi) Remove portions of existing abutment back wall;
  (vii) Remove existing expansion joints at the abutments;
  (viii) Remove and salvage portions of existing aluminum balanced barrier;
  (ix) Construct new abutment backwall;
  (x) Complete miscellaneous deck/barrier repairs;
  (xi) Supply and install new expansion joints c/w expansion dams;
  (xii) Construct new approach slabs, expansion slabs, and roadway slabs;
  (xiii) Repair miscellaneous areas of concrete roadway slabs, curb and sidewalk;
  (xiv) Reinstall salvaged aluminum balanced barrier;
  (xv) Placement of asphalt overlay (average thickness 60 mm); and
  (xvi) Remove temporary pedestrian access.

(b) Stage 2 – Construction of Eastbound Lanes
  (i) Detour traffic to Westbound Lanes;
  (ii) Remove existing concrete approach slabs and portions of the roadway slabs;
  (iii) Remove portions of existing concrete traffic barriers;
  (iv) Remove portions of existing abutment back wall;
  (v) Remove existing expansion joints at the abutments;
  (vi) Remove and salvage portions of existing aluminum balanced barrier;
  (vii) Construct new abutment backwall;
  (viii) Complete miscellaneous deck/barrier repairs;
  (ix) Supply and install new expansion joints c/w expansion dams;
  (x) Construct new approach slabs, expansion slabs, and roadway slabs;
  (xi) Repair miscellaneous areas of concrete roadway slabs, curb and sidewalk;
  (xii) Reinstall salvaged aluminum balanced barrier; and
  (xiii) Placement of asphalt overlay (average thickness 60 mm).

(c) Stage 3 – Construction of Tie-ins
  (i) Construct concrete median barriers;
  (ii) Remove temporary asphalt overlay;
  (iii) Construct monolithic concrete median slab; and
  (iv) Placement of asphalt overlay (average thickness 60 mm).

D3. DEFINITIONS

D3.1 When used in this Bid Opportunity:

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

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

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

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

(e) "**MTO**" means the Ministry of Transportation Ontario that complies with the latest edition of standards including amendments and supplements in effect on the date of issue of this Bid Opportunity shall apply to the work.

(f) "**OPSS**" means the Ontario Provincial Standard Specification that complies with the latest edition of standards including amendments and supplements in effect on the date of issue of this Bid Opportunity shall apply to the work.

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

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is Morrison Hershfield represented by:

Bill Ebenspanger, P.Eng.
Senior Structural Engineer

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

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

D4.3 Bids Submissions must be submitted to the address in B8.8

D5. CONTRACTOR'S SUPERVISOR

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

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

D6. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

D6.1 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.

D6.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.

D6.3 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.

D6.4 A Contractor who violates any provision of D6 may be determined to be in breach of Contract.

D7. NOTICES

D7.1 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.

D7.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D7.3 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the facsimile number identified in D4.1.

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

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

Facsimile No.: 204-947-9155

D8. FURNISHING OF DOCUMENTS

D8.1 Upon award of the Contract, the Contractor will be provided with 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

D9. AUTHORITY TO CARRY ON BUSINESS

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

D10. SAFE WORK PLAN

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

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

D11. INSURANCE

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

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

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

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

D11.2 Deductibles shall be borne by the Contractor.

D11.3 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 the C4.1 for the return of the executed Contract.

D11.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D12. PERFORMANCE SECURITY

D12.1 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.

D12.1.1 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.

D12.2 If the bid security provided in his/her Bid was not a certified cheque or draft pursuant to B12.1(c), 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 and in no event later than the date specified in the C4.1 for the return of the executed Contract.

D13. SUBCONTRACTOR LIST

D13.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at or prior to a pre-construction meeting, or at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the C4.1 for the return of the executed Contract.

D14. DETAILED WORK SCHEDULE

D14.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Conditions for the return of the executed Contract.

D14.2 The detailed work schedule shall consist of the following:

(a) a Gantt chart for the Work acceptable to the Contract Administrator.

D14.3 Further to D14.2(a), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

SCHEDULE OF WORK

D15. COMMENCEMENT

D15.1 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.

D15.2 The Contractor shall not commence any Work on the Site until:

(a) the Contract Administrator has confirmed receipt and approval of:
  (i) evidence of authority to carry on business specified in D9;
  (ii) evidence of the workers compensation coverage specified in C6.15;
  (iii) the twenty-four (24) hour emergency response phone number specified in D5.2.
  (iv) the Safe Work Plan specified in D10;
  (v) evidence of the insurance specified in D11;
  (vi) the performance security specified in D12;
  (vii) the subcontractor list specified in D13, and;
  (viii) the detailed work schedule specified in D14.

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

D15.3 The Contractor shall commence the work within seven (7) Working Days of receipt of the letter of intent. The Contractor shall not commence work on the Site which affects traffic flow earlier than June 15, 2014.

D15.4 The City intends to award this Contract by May 1, 2014.

D15.4.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D16. RESTRICTED WORK HOURS

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

D16.2 The following work hour restrictions shall also apply:

(a) In accordance the Manual of Temporary Traffic Control, Sections 2.03, 2.04, 2.05 and 2.06, should the traffic Management Branch of the Public Works Department require that work on Regional Street be carried out at night or on Sundays or on public holidays, where permitted by the City of Winnipeg Police Department, or that work be restricted or suspended during peak traffic hours, no additional compensation will be considered to meet these requirements;

D17. WORK BY OTHERS

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

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

D17.2 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 Contractor Administrator determines that the there was no opportunity for the Contractor to do a similar amount of Work, no consideration will be made to extending the Contract time.

D18. SEQUENCE OF WORK

D18.1 Further to D2.1, the Work shall be divided into three (3) stages.

D18.1.1 Stage 1 construction shall commence after June 15, 2014, beginning with closure of the westbound lanes.

D18.1.2 Stage 2 construction shall commence immediately following completion of Stage 1, beginning with the closure of the eastbound lanes.

D18.1.3 Immediately following completion of Stage 2 of the Work, the Contractor shall commence and complete Stage 3 of the Work, clean and remove all plant, surplus material, waste and debris, other than that left by the City or other contractors.

D19. SUBSTANTIAL PERFORMANCE

D19.1 The Contractor shall achieve Substantial Performance by October 15, 2014.

D19.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.

D19.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

D20. TOTAL PERFORMANCE

D20.1 The Contractor shall achieve Total Performance by October 31, 2014.

D20.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.

D20.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

D21. LIQUIDATED DAMAGES

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

(a) Substantial Performance – three thousand dollars ($3,000)

(b) Total Performance – five hundred dollars ($500)

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

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

D22. SCHEDULED MAINTENANCE

D22.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

(a) Seeding as specified in the latest version of the City of Winnipeg Standard Construction Specification CW 3520; and

(b) Reflective crack maintenance during the two year maintenance. Warranty as specified in the latest version of the City of Winnipeg Construction Specification CW 3250.

D22.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

CONTROL OF WORK

D23. JOB MEETINGS

D23.1 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 of Winnipeg and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City of Winnipeg 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.

D23.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D24. LAYOUT OF THE WORK

D24.1 Further to C6, the Contract Administrator shall provide the basic centrelines and a benchmark for construction.

D24.2 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.

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

D25.1 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).

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

D26.1 Further to B11.4, 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 B11.4.

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) Transportation Association of Canada's Transportation Association of Canada National Guide to Erosion and Sediment Control on Roadway Projects, 2005;
  (vi) Navigable Waters Protection Act; and
  (vii) 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 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; and

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

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

(vi) Navigable Waters Protection Act; and

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

(e) 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 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.

(f) 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; and

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

D27.3 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 impervious material. If this type of material is not available, the dyke shall be constructed of locally available material and lined with high-density polyethylene (HDPE). Furthermore, the fuel storage area(s) shall be secured by a barrier such as a high fence and gate to prevent vandalism.

(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) 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.

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

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

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

(x) 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.

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

(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 with in-house resources without formal notification to Manitoba Environment.

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

(v) The on-site emergency response coordinator shall contact The Canadian Coast Guard, Kenora, Ontario (807) 468-6441, if the spill material reaches and is on or in the Red or Assiniboine Rivers.

TABLE 1
SPILLS THAT MUST BE REPORTED TO THE
MANITOBA CONSERVATION AS ENVIRONMENTAL ACCIDENTS

Classification	Hazard	Reportable quantity/level
1	Explosives	All
2.1	Compressed Gas (Flammable)	100 L*
2.2	Compressed Gas	100 L*
2.3	Compressed Gas (Toxic)	All
2.4	Compressed Gas (Corrosive)	All
3	Flammable Liquids	100 L
4	Flammable Solids	1 Kg
5.1 PG** I & II	Oxidizer	1 kg or 1 L
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)

Source: Environmental Accident Reporting Regulation M.R. 439/87

(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.

(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.

(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 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.

(i) Runoff Control

(i) Measures shall be undertaken to ensure that runoff containing suspended soil particles is minimized from entering the land drainage system to the 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.

(j) 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 practise by bonded tree care professionals.

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

(k) 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.

(l) 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.

(m) Access

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

(ii) 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.

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 in which case it shall expire when provided for thereunder.

FORM H1: PERFORMANCE BOND
(See D12)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

BID OPPORTUNITY NO. 1051-2013

Nairn Avenue Overpass Maintenance Works
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____ .

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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 D12)

_____
(Date)

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

RE: PERFORMANCE SECURITY – BID OPPORTUNITY NO. 1051-2013

Nairn Avenue Overpass Maintenance Works

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 D13)

Nairn Avenue Overpass Maintenance Works

Portion of the Work	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 No.	Drawing Name/Title	Drawing (Original) Sheet Size
B121-14-01	Cover Sheet, Location Plan and Drawing Index	A1
B121-14-02	Construction Stage 1 - Scope of Work	A1
B121-14-03	Construction Stage 2 - Scope of Work	A1
B121-14-04	Construction Stage 3 - Scope of Work	A1
B121-14-05	Abutment Modifications	A1
B121-14-06	Approach Slabs	A1
B121-14-07	Expansion Joints 1	A1
B121-14-08	Expansion Joints 2	A1
B121-14-09	Reinforced Concrete Pavement	A1
B121-14-10	Traffic Barrier Replacement	A1
B121-14-11	Reinforcing Steel Schedule	A1

E1.4 The following are provided for the Contractor's reference:

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
B121-85-01	Cover Sheet	A1
B121-85-02	Design Data and Drawing List	A1
B121-85-03	General Arrangement and Items of Proposed Works	A1
B121-85-04	Plan and General Explanation of Existing and Proposed Overpass	A1
B121-85-05	Abutment and Wingwall Modifications	A1
B121-85-06	Pier Modifications	A1
B121-85-07	Girder Strengthening- I	A1
B121-85-08	Girder Strengthening- II	A1
B121-85-09	Bearing Details	A1
B121-85-10	Deck Dimensions and Reinforcing	A1
B121-85-11	Screed Elevations	A1
B121-85-12	Concrete Traffic Barrier Details	A1
B121-85-13	Aluminum Traffic Barrier Rail Details	A1
B121-85-14	Aluminum Pedestrian Handrail Details- I	A1
B121-85-15	Aluminum Pedestrian Handrail Details- II	A1
B121-85-16	Expansion Joint Details	A1
B121-85-17	Deck Drain Details	A1
B121-85-18	Electrical and Embedded Work and Miscellaneous Details	A1

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
B121-85-19	Approach Slab	A1
B121-85-20	Slope Paving Drainage Channel Details	A1
B121-85-21A	Reinforcing Steel Schedule	A1
B121-85-21B	Reinforcing Steel Schedule	A1

E2. SHOP DRAWINGS

E2.1 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.

E2.2 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.

E2.3 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.

E2.4 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, initialled or signed, certifying review of submission, verification of field measurements and compliance with Contract Documents.

E2.5 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, re-submissions, and review of the Shop Drawings

E3. PROTECTION OF EXISTING TREES

E3.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within the limits of the construction area:

(a) The contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.

(b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400mm wood planks, or suitably protected as approved by the Contract Administrator.

(c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.

(d) Operations of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the dripline of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.

(e) Work on-site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.

E3.2 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirement and satisfaction of the Contract Administrator and the City Forester or his/her designate.

E4. MOBILIZATION AND DEMOBILIZATION

E4.1 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.

E4.2 Scope of Work

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

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

(ii) Supplying, setting up, laying out, and removing site office facilities as detailed in E5 "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.

E4.3 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.

E4.4 Equipment

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

E4.5 Construction Methods

E4.6 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 City of Winnipeg Park areas on the north side 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.

E4.7 Cellular Telephone Communication

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

E4.8 Secure Site Fencing

(a) A minimum 1.8 m high chain-link secure fence around the site lay-down and Work site areas shall be installed prior to commencement of site activities.

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

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

E4.9 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, as shown in the Drawings and wherever else required.

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

E4.10 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.

E4.11 Restoration of Existing Facilities

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

E4.12 Quality Control

E4.12.1 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.

E4.12.2 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.

E4.13 Measurement and Payment

E4.13.1 Mobilization and Demobilization

(b) Mobilization and demobilization 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. Payment will be based on the following breakdown:

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

E5. SITE OFFICE FACILITIES

E5.1 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.

E5.2 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.

E5.3 Equipment

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

E5.4 Construction Methods

E5.4.1 Site Office Facilities

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

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

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

(v) The office shall be a newer building with a minimum floor area of 20 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);

(vi) 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;

(vii) The office shall be adequately lighted with fluorescent fixtures and have a minimum of 3 wall outlets;

(viii) 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;

(ix) 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;

(x) 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;

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

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

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

(xiv) 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.

E5.5 Measurement and Payment

E5.5.1 Site Office Facilities

(b) The supply of site office facilities shall not be measured. This item of Work shall be included in 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.

E6. TRAFFIC CONTROL AND MANAGEMENT

E6.1 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 in Work Areas 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) This Specification shall include all operations related to establishing and executing the public access and traffic control plan as specified herein and as shown on the Drawings.

(c) 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 Scope of Work

(a) The City of Winnipeg is responsible for traffic control related to the movement of vehicles through the Project area in the lanes that are not under construction. The City shall bear all costs associated with these Works. This includes:

(i) Installation of poly post lane delineation for Eastbound and Westbound traffic;

(ii) Turning restrictions and related signage for side streets;

(iii) All regulatory signage;

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

(v) 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 E6.2(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) Triton water filled barricades or approved equal to separate work area from traffic;

(iii) Adjustment of barricades to provide bus stop bays out of main traffic lanes where possible;

(iv) Installation and adjustment of sidewalk barricades if required;

(v) Maintaining access for buses and emergency vehicles;

(vi) Maintaining access to all bus stops (or relocated bus stops);

(vii) Assisting Traffic Services in the setup and closing down of traffic staging between all Phases of work, including sweeping and any clean up associated with these operations;

(viii) Securing Work areas to provide safe pedestrian and vehicular access; and

(ix) Daily maintenance of all items listed above.

E6.3 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.

E6.4 Equipment

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

E6.5 Notification

(a) The Contractor shall notify the City of Winnipeg Customer Service at 986-5640, at least two (2) Calendar Days in advance of any traffic lane closures.

E6.6 Construction Methods

E6.6.1 General

(a) The Contractor shall provide and maintain flagmen in accordance with the “Manual of Temporary Traffic Control in Work Areas 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.

E6.7 Quality Control

E6.7.1 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.

E6.8 Access

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

E6.9 Measurement and Payment

E6.9.1 Traffic Control

(a) Traffic control shall not be measured. This item of Work shall be included in the Lump Sum Price paid for "Mobilization and Demobilization", 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.

E7. PEDESTRIAN ACCOMMODATION

E7.1 Description

(a) This Specification shall cover all operations relating to the provision of safe access for pedestrians through the construction 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 Work as hereinafter specified.

E7.2 Scope of Work

(a) The Work under this Specification shall involve:

(i) The design, supply, erection, and maintenance of a temporary pedestrian pathway, as specified herein;

(ii) The provision of all signage necessary to direct pedestrian traffic;

(iii) The provision of all other measures necessary to ensure safe pedestrian access through the construction site to the satisfaction of the Contract Administrator; and

(iv) It is intended that the Contractor provide pedestrian protection and guidance at all times during the Project.

E7.3 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, details of the proposed enclosure following the completion of each construction phase, and if required due to abnormally high water levels.

E7.4 Materials

E7.4.1 General

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

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

E7.5 Equipment

E7.5.1 General

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

E7.6 Construction Methods

E7.6.1 Temporary Pedestrian Pathway

(a) Temporary Pedestrian Pathway structures at the locations of abutments (two locations), shall be a minimum of 2000 mm wide, complete with a minimum 1220 high railing and shall consist of support posts and minimum 20 mm thick plywood floor. The support posts shall have provision for anchorage to prevent movement or overturning of the pedestrian pathway due to wind, hydraulic, or other loads. The pedestrian pathway shall be designed for all applicable loading including wind loading in accordance with the requirements of the Manitoba Building Code.

E7.7 Safety Precautions

(a) The Contractor shall provide flagmen, barricades, railings, signs and warning lights as required at all times to secure the safety of the public and shall comply with all provincial statues and laws in force in Manitoba applicable to the Work of this nature.

E7.7.1 Maintenance of the Temporary Pedestrian Pathway

(a) The Contractor shall maintain the Pedestrian Pathway in good working order at all times to the satisfaction of the Contract Administrator.

(b) The sidewalk shall be kept free of all construction materials, debris, and equipment.

E7.8 Quality Control

E7.8.1 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.

E7.8.2 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.

E7.9 Measurement and Payment

E7.9.1 Temporary Pedestrian Pathway

(i) The temporary pedestrian pathway shall not be measured. This item of Work shall be included in the Lump Sum Price paid for “Mobilization and Demobilization”, 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.

E8. STRUCTURAL REMOVALS

E8.1 Description

(a) This Specification shall cover all operations relating to the removal and disposal of miscellaneous existing Bridge components, as specified herein and as shown on the Drawings. This Specification shall cover structural removal Works, including all necessary

staging, demolition, removal, salvaging, transporting, unloading, stockpiling, dismantlement, and disposal of applicable materials.

(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.

E8.2 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) Removing and disposing of the sidewalk and roadway approach slabs;

(ii) Removing and disposing of a portion of the existing deck concrete adjacent to the abutment expansion joints;

(iii) Removing and disposing of existing concrete traffic barriers adjacent to the abutment expansion joints;

(iv) Removing and disposing of the abutment expansion joints;

(v) Removing and disposing of a portion of the existing abutment back walls;

(vi) Removing and disposing of the approach slabs c/w traffic barriers;

(vii) Removing and disposing of a portion of the roadway slabs within the limits of Work.

(b) The Work also includes:

(i) Temporarily protecting the live Manitoba Hydro Lighting cables.

(c) Removing concrete and other items with appropriate equipment satisfactory to the Contract Administrator.

(d) Providing saw cuts where necessary to limit the extent of demolition.

(e) Repairing any over demolition and reinforcing damage to the satisfaction of the Contract Administrator.

(f) All structural removal materials not identified for salvage shall revert to the Contractor for off-site disposal.

E8.3 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.

E8.4 Materials

E8.4.1 General

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

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

E8.5 Equipment

E8.5.1 General

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

E8.5.2 Demolition Catch Platforms and Work Platforms

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

(b) Demolition catch platforms and work platforms shall not extend beyond the underside of the girders. Drilling into the girders to secure any platforms shall not be permitted.

(c) All access/work platforms shall be restored to the preconstruction condition or better, which shall be incidental to the Work.

E8.6 Construction Methods

E8.6.1 General

(a) The Contractor shall prevent movement, settlement, or damage of existing structures to remain, services, paving, trees, landscaping and adjacent grades. The Contractor shall provide bracing, shoring and underpinning as required and shall have this Work certified by a Professional Engineer registered to practice in the Province of Manitoba employed by the Contractor. If the safety of the structure and/or existing structures or services appears to be endangered during structural removal operations, the Contractor shall cease operations and notify the Contract Administrator immediately.

(b) The Contractor shall provide flagmen, guards, barricades, railings, and necessary warning lights, and whenever necessary, warning signs and lights at the excavations, temporary sidewalks, removals, and/or other construction, to secure the safety of workmen and the public. The safety precautions shall comply with all Provincial Statutes applicable to the Work. The Contractor shall provide all other protective measures as may be required by any law in force in Manitoba and the Canada Labour Code.

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

(d) Under no circumstances shall the Contractor close any portion of existing roadways or walkways to traffic without prior written approval of the Contract Administrator. If any existing roadway is to be closed to traffic in no case shall the Contractor commence any construction operations until such time as all the signs, barricades, and flashers have been erected to the satisfaction of the Contract Administrator.

(e) Traffic and pedestrian control shall conform to the requirements of E6 “Traffic Control and Management” and E7 “Pedestrian Accommodation”.

(f) Remove concrete and other removal items with appropriate equipment satisfactory to the Contract Administrator. The Contractor shall take all necessary precautions to ensure that material do not fall onto any roadways or sidewalks during removal operations.

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

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

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

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

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

E8.6.2 Details of Existing Structure

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

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

E8.6.3 Sequence of Structural Removals

(a) Construction sequencing of all structural removals shall take place as shown on the Drawings.

E8.7 Removal of Sidewalk Slab

(a) The concrete sidewalk slab on the approaches shall be removed and disposed of in Stage1, as shown on the Drawings.

E8.7.1 Removal of Deck Slab

(a) Remove the concrete deck slab to the depths and limits of removals for each construction stage, as specified on the Drawings.

(b) Removals shall be undertaken using a combination of sawcutting, scraping, and chip hammering, or by other means, as approved by the Contract Administrator.

(c) The existing deck slab concrete surface shall be roughened and prepared in accordance with ICRI Guideline No. 03732 CSP6 (Medium Scarification).

E8.7.2 Removal of Traffic Barriers

(a) Traffic and median barrier concrete shall be removed for each construction stage, to the limits specified on the Drawings.

(b) Removals shall be undertaken using a combination of sawcutting, scraping, and chip hammering, or by other means, as approved by the Contract Administrator.

(c) The existing concrete surface shall be roughened and prepared in accordance with ICRI Guideline No. 03732 CSP6 (Medium Scarification).

E8.7.3 Expansion Joints

(a) Remove and dispose of the existing abutment expansion joints and seals for each construction stage, as shown on the Drawings.

(b) Concrete encasing the expansion joints shall be removed to the limits shown on the Drawings.

(c) Equipment used for the removal of the expansion joints and expansion joint dams shall be selected so that no damage is caused to the remaining deck and abutment concrete.

E8.7.4 Removal of Approach Slabs

(a) Remove and dispose of the approach slabs for each construction stage, as shown on the Drawings.

(b) Remove existing granular compacted backfill required for structural removals as shown on the Drawings. Remove existing granular compacted backfill as required for the placement of new concrete, as shown on the Drawings.

E8.7.5 Removal of Roadway Slabs

(a) Remove and dispose of approach roadway slabs for each construction stage, as shown on the Drawings.

(b) Remove existing granular compacted backfill required for structural removals as shown on the Drawings. Remove existing granular compacted backfill as required for the placement of new concrete, as shown on the Drawings.

E8.7.6 Abutment Backwall Removals

(a) Remove existing granular compacted backfill required for abutment backwall removals as shown on the Drawings.

(b) Remove and dispose of abutment backwall concrete as directed by the Contract Administrator. Following removal of the granular backfill, the Contract Administrator shall undertake an inspection of the backwall and will confirm the extent of backwall removal areas.

E8.7.7 Waste Handling and Disposal of Removed Materials

(a) Dispose of all surplus and unsuitable material off-site, in accordance with D28, “Environmental Protection Plan”.

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

(c) The Contractor shall submit a list of locations of disposal/recycling for all removed materials to the Contract Administrator.

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

E8.8 Quality Control

E8.8.1 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.

E8.8.2 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.

E8.9 Measurement and Payment

E8.9.1 Structural Removals

(a) Removing and disposing of sidewalk, bridge deck, traffic barriers, expansion joints, expansion joint dams, approach slabs and roadway slabs shall not be measured and will be paid for at the Contract Lump Sum Price for the "Structural Removals", which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in in this Specification and accepted by the Contract Administrator..

E8.9.2 Backwall Removals

(b) Backwall removals shall be paid for at the Contract Unit Price per square metre for "Backwall Removals", which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work, included in this Specification and accepted by the Contract Administrator.

E9. STRUCTURAL EXCAVATION

E9.1 Description

(a) This Specification shall cover all operations relating to the clearing, grubbing, and structural excavation for abutment and approach slab Works, as specified herein and in the latest version of the City of Winnipeg Standard Construction Specification CW 2030, and as shown on the Drawings.

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

E9.2 Referenced Specifications and Drawings

(a) The latest version of the City of Winnipeg Standard Construction Specifications
  (i) CW 2030 – Excavation Bedding and Backfill.

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, erection, and removal of all temporary shoring, and such temporary protective measures as may be required to construct the Works;

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

(iv) Dewatering of all excavations, as required, to construct the Works.

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 Work on the Site, detailed design calculations and Shop Drawings for all shoring that is signed, sealed, and dated by a Professional Engineer experienced in shoring design and licensed to practice in Province of Manitoba.

(c) The Professional Engineer who designed the shoring system shall inspect the shoring system during construction, and certify, in writing to the Contract Administrator, that construction is in conformance with the approved design.

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

(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

(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) The shored excavations shall be made in a manner such that all abutment Works may be properly constructed to the required depths and without reduction of dimensions as shown on the Drawings.

(c) The dimensions of the shored excavation shall be such as to give sufficient clearances for the construction of forms and their subsequent removal and the construction of cutoff trenches and/or sumps to permit the pumping of water outside the limits of the excavations.

(d) Excavations shall be completed to the elevations required to construct the Works or to such other elevations as may be directed by the Contract Administrator in the field. 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.

E9.7.2 Alterations to Site

(a) 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, 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

(b) 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.

E9.8 Quality Control

E9.8.1 Inspection

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

(b) 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.

(c) 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.

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

E9.9.1 Structural Excavation

(a) Structural excavation shall be considered incidental to the applicable portions of structural Work requiring excavation, and no separate measurement or payment shall be made for this Work.

E10. STRUCTURAL BACKFILL

E10.1 Description

(a) This specification shall cover all operations related to backfill work as herein specified and in the latest version of the City of Winnipeg Standard Construction Specification CW 3110, 3170, 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, tolls, supplies, and all tings 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 version of the City of Winnipeg Standard Construction Specifications

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

(ii) CW 3170 – Earthwork and Grading.

E10.3 Scope of Work

(a) The Work under this Specification shall involve:

(i) Supplying and placing granular backfill for the east and west approach slabs;

(ii) Supplying and placing granular backfill for abutment modification Work at the east and west abutment backwalls;

(iii) Supplying and placing granular backfill for the approach sidewalk slabs;

(iv) Supplying and placing structural backfill for all other elements required to construct the Works.

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.

E10.5 Materials

E10.5.1 General

(a) All materials supplied under this Specification shall be of 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 Suitable Site Backfill

(a) Suitable site backfill material shall be of a type approved by the Contract Administrator and shall conform to the requirements of the latest version of the City of Winnipeg Standard Construction Specification CW 3170.

(b) Excavated material may be used for backfilling provided it meets the above requirements.

E10.5.3 Granular Backfill

(a) Granular backfill shall conform to the requirements of the latest version of the City of Winnipeg Standard Construction Specification CW 3110 for Sub-base material of maximum 50 mm size.

E10.5.4 Equipment

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

E10.6 Construction Methods

E10.6.1 Backfilling

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

(b) 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.

(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.

E10.7 Quality Control

E10.7.1 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.

(c) 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.

(d) 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.

(e) All backfilling work shall take place under the supervision of the Contract Administrator. The Contractor shall notify the Contract Administrator when backfilling work is to take place.

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

E10.8 Access

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

E10.9 Measurement and Payment

E10.9.1 Structural Backfill

E10.9.2 Supplying and placing structural backfill shall be considered incidental to the applicable portions of structural concrete work requiring backfill, and no measurement or payment shall be made for this Work.

E11. REINFORCING STEEL

E11.1 Description

(a) This Specification shall cover all operations relating to the supply, fabrication, and placement of black reinforcing steel, hot-dipped galvanized 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

E11.2 Referenced Specifications and Drawings

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

(i) ASTM 615M – Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement;

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

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

(iv) CAN/CSA G30.18 – Billet-Steel Bars for Concrete Reinforcement;

(v) Reinforcing Steel Institute of Canada (RSIC) – Reinforcement Steel Manual of Standard Practice.

E11.3 Scope of Work

(a) The Work under this Specification shall involve supplying and installing all reinforcing, as shown on the Drawings.

E11.4 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) Shop Drawings shall be submitted in accordance with the latest edition of the Reinforcement Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada (RSIC).

E11.5 Materials

E11.6 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.

E11.6.1 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. Storage of materials shall be in accordance with the latest edition and all subsequent revisions of CAN/CSA-A23.1, “Storage of Materials”, except as otherwise specified herein.

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

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

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

E11.6.2 Field Applied Epoxy Coating

(a) Field Applied epoxy coating shall be approved touch-up epoxy coating material as specified by the manufacturer for touching up the shop applied epoxy coated rebar.

E11.7 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 CAN/CSA G30.18, Grade 400W.

(c) 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.

(d) 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 specified.

E11.8 Bar Accessories

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

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

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

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

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

E11.9 Galvanizing

E11.9.1 Shop Applied

(a) The galvanizing shall be shop applied and strictly in accordance with CSA Standard G164 and ASTM A767M latest edition to a retention equal to a Class II level (610 g/m²), except as otherwise specified herein.

(b) Submit an original and tree (3) copies of the coating applicator's notarized Certificate of Compliance that the hot-dip galvanized coating meets or exceeds the specified requirements.

(c) Preclean reinforcing steel using acceptable methods to produce an acceptable surface for quality hot-dip galvanizing. If sulfuric acid or hydrochloric acid is used as a pickling bath for precleaning, care shall be exercised to minimize the immersion time. If signs of hydrogen embrittlement are present after pickling due to excessive immersion time, all reinforcing in that shipment will be rejected and shall be replaced at no additional cost to this Contract.

(d) Handle all articles to be galvanized in such a manner as to avoid any mechanical damage and to minimize distortion. The surface finish shall be continuous, adherent, as smooth and evenly distributed as possible, and free from any defect detrimental to the stated end use of the coated article.

(e) The surface finish

(f) Coating adhesion shall withstand normal handling consistent with the nature and thickness of the coating and normal use of the article.

(g) Sheared ends of bars shall be coated with a zinc-rich formulation before rusting occurs and before shipment to the job site.

(h) Furthermore, all fields welds, as well as cracking and other visible damage or deterioration of the hot-dip galvanizing as a result of handling or bending operations, or any other causes, shall be galvanized-coated with field applied galvanizing touch-up material as specified hereinafter.

E11.9.2 Field Applied

(a) All field applied galvanized coatings shall be applied in accordance with ASTM A780M.

(b) Further to ASTM A780M, paints used for field applied galvanizing shall contain zinc dust above 92% in the dried film.

(c) At least seven (7) days prior to any field applied galvanizing, the Contract shall submit the galvanizing product and application details to the Contract Administrator for review.

(d) Spray applied field galvanizing will not be permitted. Where restrictions occur that brush applied field galvanizing is not possible, spray applied field galvanizing may be permitted if accepted in writing by the Contracts Administrator prior to application.

(e) All field applied galvanized coatings shall be applied in accordance with the manufacturer's recommendations and as directed by the Contract Administrator.

(f) The maximum area to be repaired in the field shall be 2,000 mm². Any damaged article with a damaged area greater shall be rejected, removed, and replaced at the Contractor's expense.

E11.10 Bonding Agent/Grout

(a) Epoxy resin shall conform to the requirements of ASTM C881. Type I or Type IV, Grade 3 epoxy shall be used for bonding reinforcing steel into hardened concrete. An approved product is Hilti RE500 or equal, as approved by the Contract Administrator in accordance with B7, "Substitutes".

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

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

E11.11 Equipment

E11.11.1 General

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

E11.12 Construction Methods

E11.12.1 Fabrication of Reinforcing Steel

(a) 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.

E11.13 Reinforcing Steel

E11.13.1 Black Steel Reinforcing

(a) Heating shall not be used as an aid in bending black steel reinforcing.

(b) Hooks and bends should be smooth and not sharp.

(c) Fabrication of the black steel reinforcing shall be straight and free of paint, oil, mill scale, and injurious defects.

E11.13.2 Galvanized Reinforcing Steel

(a) The reinforcing fabricator shall consult with the Contractor, Contract Administrator and hot-dip galvanizer regarding potential problems or potential handling problems prior or during the galvanizing process.

(b) Remove all welding slag, splatter, antisplatter compounds, and burrs prior to delivery for galvanizing.

(c) Avoid unsuitable marking paints. Consult with the galvanizer about removal of grease, oil, paint, and other deleterious material prior to fabrication.

(d) Remove by blast cleaning or other methods surface contaminants and coating which would not be removable by the normal chemical cleaning process in the galvanizing operation.

(e) Hooks or bend should be smooth and not sharp. Bars are to be bent prior to galvanizing. Minimum bend diameters shall be provided in accordance with ASTM A767 latest edition.

(f) The reinforcing shall be a minimum of 10ºC prior to bending and galvanizing operations, regardless of ambient temperatures in the plant. Where ambient temperatures fall below 10ºC bending and galvanizing in a facility that is not enclosed and temperature controlled will not be permitted.

(g) The Contractor is responsible to ensure that accelerated strain-embrittlement does not occur during the manufacturing, bending practices and galvanizing of the reinforcing steel. The Contractor shall submit to the Contract Administrator the following;

(i) Reinforcing Supplier standards of practice for working of reinforcing steel. This shall include bending practices as per ASTMA767-latest additional and temperature requirements during fabrication (bending) of reinforcing. This is to be submitted with the Certificate of Compliance from the Manufacturer as specified in E11.5

(ii) Contractor is to carry out a Quality Control Testing Program following the requirements as per ASTM A143/A 143M-latest addition. This will include but not limited to random bent bars to be tested after galvanizing, photos of items before and after testing, and a report submitted to the Contract Administrator for each trailer load received on site. Testing criteria shall be submitted for review and approval to the Contract Administrator at least en (10) Business days prior to manufacturing of reinforcing.

E11.14 Placing and Fastening of Reinforcing Steel

(a) General

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

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

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

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

(v) Reinforcing steel shall not be straightened or re-bent in a manner that will injure the metal. Bars with bends not shown on the Drawings shall not be used. Heating of reinforcing steel shall not be permitted without prior acceptance by the Contract Administrator.

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

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

(viii) Distances from the forms shall be maintained by means of stays, spacers, or other approved supports. Spacers and supports for holding reinforcing steel at the required location and ensuring the specified concrete cover over the reinforcing steel shall be as specified in E11.8 "Bar Accessories.

(ix) Welding or track welding is not permitted.

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

(xi) Following placement of galvanized bars, all areas of damaged coating shall be repaired using approved touch-ups material specified in Clause E11.9.2

E11.15 Splicing

(a) General

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

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

E11.16 Installing Reinforcing Steel into Hardened Concrete

(a) The Contractor shall drill holes into adjacent slabs for hooks of the diameters and depths specified for each size of reinforcing steel, as shown on the Drawings. Drill bits shall have a diameter no larger than 2 mm larger than the nominal dowel, tie bar, or stud diameter.

(b) Holes shall be located to the correct depth and alignment as indicated on the Drawings. The spacing of the holes shall be as per RSIC.

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

(d) Holes for reinforcing steel shall be blown clean with compressed air. Bonding agent shall be placed in the back of the drilled hole. The reinforcing steel shall be worked back into the holes for complete coverage around the portion of the bar that extends into the hole, such that bonding agent is squeezed from the hole.

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

E11.17 Recoating of Existing Epoxy-Coated Reinforcing Steel

(a) Incidental to the works of this specification, the Contractor shall realign and reposition existing rebar to the locations as shown on the Drawings. The reinforcing steel shall also be cleaned of all loose rust and other materials, to the satisfaction of the Contract Administrator.

(b) The Contractor shall sandblast clean to white metal in accordance with Specifications SSPC-SP5. The applicable section of existing reinforcing steel and apply a coat of approved touch-up epoxy coating, as supplied for touching up damage to the epoxy coated rebar.

E11.18 Quality Control

E11.18.1 Inspection

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

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

(c) A minimum of one (1) Business Day advance notice shall be given to the Contract Administrator prior to the pouring of any concrete to allow for inspection of the reinforcing steel.

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

E11.18.2 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.

E11.19 Quality Assurance

E11.19.1 Testing

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

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

E11.20 Measurement and Payment

E11.20.1 Reinforcing Steel

(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, Drawing, and accepted and measured by the Contract Administrator.

Items of Work:

(b) Supply and Place Reinforcing Steel

(i) Black Steel Reinforcing

(ii) Galvanized Steel Reinforcing

E11.20.2 Supplying and installing all the listed materials, construction methods, and quality control measures associated with this Specification and Drawings shall be considered incidental to "Supply and Delivery of Reinforcing Steel", unless otherwise noted herein. No measurement or payment shall be made for this Work unless indicated otherwise.

E11.20.3 Install Reinforcing into Existing Concrete

(a) Installing reinforcing steel Into hardened concrete shall be paid for at the Contract Unit Price per unit for "Install Reinforcing Steel Into Hardened Concrete", measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for performing all operations herein described and all other items incidental to the Work. This payment shall be made in addition to the mass of steel measured above.

E12. STRUCTURAL CONCRETE

E12.1 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.

E12.2 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.

E12.3 Scope of Work

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

(i) Traffic Barriers:

(i) Traffic barrier Works shall comprise of new cast-in-place concrete traffic barriers on the bridge deck, at the abutments, and on the approach slabs and wingwalls.

(ii) Expansion Joint Dams:

(i) Expansion joint concrete Works shall comprise of the new cast-in-place concrete dams anchoring the expansion joints into the adjacent concrete Bridge deck and abutments.

(iii) Roadway Approach Slabs:

(i) Approach slab Works shall comprise of the Work associated with the new cast-in-place concrete approach slabs. In addition, working base concrete beneath the approach slabs shall be associated with this Work, including sidewalk and curb.

(iv) Roadway Expansion Slabs:

(i) Roadway slab works shall comprise of the new cast-in-place concrete roadway expansion slabs at the ends of the Bridge, including sidewalk and curb.

(v) Sidewalk Approach Slabs:

(i) Sidewalk approach slab works shall comprise of the new cast-in-place sidewalk approach slabs at the ends of the Bridge, including curb.

(vi) Abutment Backwall:

(i) Abutment modification Works shall comprise of all new cast-in-place concrete modifications to the abutment backwalls.

(vii) Roadway Slabs:

(i) Roadway Slabs shall comprise of the new cast-in-place concrete roadway slabs connecting to the existing roadway pavement.

E12.4 Submittals

E12.4.1 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.

E12.4.2 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.

E12.5 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 (R_i) 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 R_i of concrete shall be completed in accordance with E12.9.5(e).

(iii) Testing for air void system shall be completed in accordance with E12.9.5(c).

(iv) Testing for rapid chloride permeability shall be completed in accordance with E12.9.5(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.

E12.5.1 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.

E12.5.2 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 spacing's shall apply, for studding and waling:

(vi) 20-mm plywood: studding 400 mm centre to centre (max.),

(vii) Walers 760 mm centre to centre (max.)

(viii) 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.

(ix) 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.

(x) 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.

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

(xii) 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.

(xiii) 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.

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

(xv) 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.

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

(b) 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.

(c) 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.

E12.6 Materials

E12.6.1 General

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

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

E12.6.2 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.

E12.6.3 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 E12.1.

TABLE E12.1
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	Miscellaneous Repairs	35 @ 28 Days	C-1	1	20 mm	-	-
Type 2	All other locations	35 @ 28 Days	C-1	1	20 mm	Synthetic Fibres	0.15

E12.6.4 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.

E12.6.5 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.

E12.6.6 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.

E12.6.7 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.

E12.6.8 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.

E12.6.9 Corrosion Inhibitor

(a) Corrosion inhibitor shall be MCI 2005 NS at a dosage of 1 L/m^3, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

E12.6.10 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 (R_i) and

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

E12.6.11 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 non-rusting 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.

E12.6.12 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”.

E12.6.13 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.

E12.6.14 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 of approach slabs, structural slabs, on surfaces that will not be exposed to view.

E12.6.15 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”.

E12.6.16 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.

E12.6.17 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”.

E12.6.18 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”.

E12.6.19 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.

E12.6.20 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.

E12.6.21 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”.

E12.6.22 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".

E12.6.23 Precompressed Foam Joint Filler

(a) Precompressed expanding filler shall be "Emseal BEJS System", satisfying the requirements of ASTM C711 and G155, or equal as accepted by the Contract Administrator, in accordance with B7, "Substitutes".

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

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

(ii) Field-applied epoxy adhesive primer; and

(iii) Field-injected silicone sealant bands.

E12.6.24 Low Density Styrofoam

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

E12.6.25 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%.

E12.6.26 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".

E12.6.27 Dampproofing

(a) Dampproofing materials shall be applied to all buried concrete surfaces in contact with the soil to within 300 mm of Finished Ground Elevation, with the exception of those surfaces cast directly against the soil or in contact with prefabricated drainage composite. Dampproofing materials shall be mineral colloid emulsified asphalt complying with Canadian General Standards Board Specification No. 37.16-M89. Acceptable product is Bakelite/Flintguard 710-11 Foundation Coating as manufactured by Bakor, Elsro Fibrated Foundation Coating, Insulmastic 7103 Fibered Waterproofing, 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 dampproofing.

(c) Primer for dampproofing shall be asphalt primer, penetrating type conforming to CGSB 37-GP-9Ma. Acceptable products are Bakor Penetrating 910-01 Asphalt Primer as manufactured by Bakor Inc., Elsro Asphalt Primer No. 510, Insulmastic 7501 C/B Roof & Foundation Primer, or equal as accepted by the Contract Administrator, in accordance with B7, "Substitutes".

E12.6.28 Anchor Units for Aluminum Pedestrian Handrail

(a) Anchor units for the aluminum pedestrian handrail shall be Acrow-Richmond Type DGRS-1.

E12.6.29 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 shall be galvanized in accordance with CAN/CSA G164-M92, to a minimum net retention of 610 g/m^2.

(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.

E12.6.30 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”.

E12.6.31 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.

E12.7 Equipment

E12.7.1 General

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

E12.7.2 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.

E12.7.3 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.

E12.8 Construction Methods

E12.8.1 General

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

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

E12.8.2 Temporary False Work, Formwork, and Shoring

(a) Construction Requirements

(i) Temporary false work, formwork, and shoring shall satisfy all requirements of the Navigable Waters Protection Program. The permits are presently being finalized, but will be made available to the Contractor prior to commencement of the Work.

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

(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) Forms for the concrete barriers shall be accordingly aligned to each other and to the geometry shown on the Drawings so as to provide a smooth, continuous barrier. Any

misalignments in the barrier shall be cause for rejection and removal of same. No snap ties within the barriers shall be placed below 250 mm above the top of the upper lift elevation.

(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.

(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.

E12.8.3 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, E12.8.12, “Preparation for Concreting Against Hardened Concrete”, for the requirements to prepare the hardened concrete at a construction joint for receiving new concrete.

E12.8.4 Concrete Bridge Traffic Barrier Joints

(a) Finishing of Concrete Barrier Joints

(i) The installation of the fibre joint filler, the backup rod, and the flexible joint sealant shall be undertaken as shown on the Drawings.

(ii) 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. Expansion board caps shall be adhered to fibre joint filler prior to closing barrier formwork. These caps shall be used to position and secure backup rod in place prior to flexible joint sealing operations.

(iii) The flexible joint sealant at the barrier joints shall be installed as per the Manufacturer's recommendations and shall be tooled smooth, after installation, to provide a clean, uniform finish and a properly sealed joint..

(iv) The supply and installation of flexible joint sealant and fibre joint fillers shall be considered incidental to the Work, and no additional measurement or payment shall be made for this Work.

E12.8.5 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.

E12.8.6 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.

E12.8.7 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.

E12.8.8 Roadway Approach Slabs

(a) The Contractor shall undertake the approach slab Works to the limits as shown on the Drawings. This shall also include the approach sidewalk and curb.

E12.8.9 Roadway Expansion Slabs

(a) The Contractor shall undertake the reinforced roadway slab Works to the limits as shown on the Drawings. This shall also include the approach sidewalk and curb.

E12.8.10 Abutment Backwall

(a) Abutment modification Works include the modifications to the east and west abutment back wall, to the limits as directed by the Contract Administrator.

(b) Application of Dampproofing

(i) Brush or spray primer on all surfaces, brushing into all corners. Apply two (2) coats of dampproofing allowing the first coat to dry before applying the second coat. Minimum application rate per coat shall be 0.6 L/m^2.

(ii) After application of the second coat, dampproofed areas shall be allowed to dry a minimum of forty-eight (48) hours prior to backfilling.

(c) The application of dampproofing shall be incidental to abutment modification Works.

E12.8.11 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 E12.1, “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.

E12.8.12 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.

E12.8.13 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 Sidewalk Slab Overlay Screed Machine

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

(c) Placing Structural Concrete

(i) Placement of deck concrete shall not be permitted when the surface moisture evaporation exceeds 0.75 kg/m^2/h. Fog misting is mandatory regardless of drying conditions. The Contractor shall use fog misting operations as accepted by the Contract Administrator.

(ii) The nomograph, Figure D1, Appendix D of 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.

E12.8.14 Finishing of Concrete Surfaces

(a) Finishing Operations for Unformed Surfaces

(i) The Contractor shall ensure that sufficient personnel are provided for the finishing of the slab surfaces. In the event that the depositing, vibrating, and screeding operations progress faster than the concrete finishing, the Contractor shall reduce the rate of concrete placement or cease the depositing of concrete until the exposed area of unfinished concrete has been satisfactorily minimized.

The Contract Administrator's judgement in this matter shall be final and binding on the Contractor. All loads of concrete that exceed the 120 minute discharge time limit during the delay, while the finishing operations catch up, shall be rejected.

(b) Type 1 Finish – Exposed Formed Surfaces

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

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

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

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

(c) Type 2 Finish – Unformed Surfaces

(i) All unformed concrete surfaces, with the exception of the approach slab concrete shall be finished as outlined hereinafter.

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

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

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

(d) Type 3 Finish – Approach Slab Concrete

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

(e) Type 4 Finish - Surfaces Below Finished Grade

(i) All surfaces below 300 mm below finished grade except underside of footings shall be patched in accordance with the requirements of Sections E12.6.20 “Patching Mortar”, E12.6.16 “Bonding Agents”, and E12.8.17 “Patching of Formed Surfaces” of this Specification.

(ii) All surfaces below 300 mm below finish grade shall receive dampproofing in accordance with E12.6.27, “Dampproofing” of this Specification.

(f) 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.

E12.8.15 General Curing Requirements

(a) Refer to E12.8.18, “Cold Weather Concreting” for cold weather curing requirements and E12.8.19, “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 sidewalk slab overlay concrete, apply fog misting until the concrete has enough strength to support the placement of the pre-dampened 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 so affected. 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 E12.8.15(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, as per the Manufacturer's recommendations. 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.

E12.8.16 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.

E12.8.17 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.

E12.8.18 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.

E12.8.19 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 E12.2, "Acceptable Concrete Temperatures", for the indicated size of the concrete section.

TABLE 12.2:
ACCEPTABLE CONCRETE TEMPERATURES

THICKNESS OF SECTION, M	TEMPERATURES °C	
	MINIMUM	MAXIMUM
Less than: 1 1.2	 10 5	 27 25

E12.8.20 Removal, Salvage and Reinstallation of Aluminum Balanced Barrier

(a) The Contractor shall remove, salvage and reinstall the existing aluminum balanced barrier from the four corners of the bridge as required to facilitate construction. All Work shall be carried out in accordance with CW 3650.

(b) The removal, salvage and reinstallation of aluminum balanced barrier shall be considered incidental to the applicable portions of structural concrete work requiring aluminum balanced barrier work, and no separate measurement or payment shall be made for this work.

E12.8.21 Cleanup

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

E12.9 Concrete Quality

E12.9.1 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.

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

E12.9.2 Access

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

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

E12.9.3 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.

E12.9.4 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.

E12.9.5 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 E12.4.2, “Concrete Mix Design Requirements” 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 (R_i) 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 (P_{cr}), 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 (P_{pcr}). The R_i is equal to the ratio of P_{pcr} over P_{cr}. 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 E12.9.5(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 E12.1 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.

E12.9.6 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.

E12.10 Measurement and Payment

E12.10.1 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) Traffic Barriers;
(ii) Expansion Joint Dams;
(iii) Roadway Approach Slabs;
(iv) Roadway Expansion Slabs;
(v) Roadway Slabs;
(vi) Sidewalk Approach Slabs.

(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.

E12.10.2 Galvanized Steel Bridge Traffic Barrier Expansion Joint Assembly

(a) Supplying and installing galvanized steel Bridge traffic barrier expansion joint assemblies shall be paid for at the Contract Unit Price per unit for "Supply and Install Galvanized Steel Bridge Traffic Barrier Expansion Joint Assembly", 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 performing all operations herein described and all other items incidental to the Work.

E12.10.3 Abutment Backwall

(a) Supplying and placing structural concrete for the abutment backwall shall be paid for at the Contract Unit Price per square metre for "Abutment Backwall", 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 performing all operations herein described and all other items incidental to the Work.

E13. Repair Miscellaneous Areas of Concrete

E13.1 Description

(a) This Specification shall cover all operations relating to the repair of miscellaneous areas of Bridge deck and traffic barriers, 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.

E13.2 Reference Specifications and Drawings

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

(i) ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete;
(ii) ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete;
(iii) ASTM C494 – Standard Specification for Chemical Admixtures for Concrete;
(iv) ASTM C1017 – Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete;
(v) CAN/CSA A23.1/A23.2 – Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete;
(vi) CAN/CSA A3001 – Cementitious Materials for Use in Concrete;
(vii) ICRI No. 03730 – Guide for Surface Preparation for the Repair of Deteriorated Concrete resulting from Reinforcing Steel Corrosion;

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

(ix) ICRI Guideline No. 03737 – Guide for Selecting Application Methods for the Repair of Concrete Surfaces resulting from Reinforcing Steel Corrosion;

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

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

E13.3 Scope of Work

(a) The Work under this Specification shall involve:

(i) Repair of isolated areas of damaged or deteriorated existing deck slab concrete;

(ii) Repair of isolated areas of damaged or deteriorated existing traffic barrier concrete;

(iii) Repair of isolated areas of damaged or deteriorated abutment concrete;

(b) Preparing and repairing concrete on other locations of deteriorated concrete as directed by the Contract Administrator.

E13.4 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 Work on Site, the proposed approved materials to be used.

E13.5 Materials

E13.5.1 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.

E13.5.2 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.

E13.5.3 Testing and Approval

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

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

E13.5.4 Material for Concrete Repair

(a) General

(i) Concrete repair material may be either one or a combination of concrete repair mortars, conventional concrete.

(b) Concrete Repair Mortar

(i) The concrete repair mortar shall be a shrinkage compensated, fibre reinforced product suitable for application by hand trowelling, or spraying, or form and pour, or pump. The mortar product shall be EMACO S88 CI for trowelling or spraying or EMACO S66 CI for form and pour or pump by Masterbuilders or equivalent as approved by the Contract Administrator, in accordance with B7, "Substitutes". Mix in accordance with Manufacturer's Specifications, including addition of aggregate for deep repairs.

(c) Conventional Concrete

(i) Conventional concrete shall be in accordance with the requirements of Type 1 Concrete as specified in Table E12.1.

E13.5.5 Concrete Aggregate

(a) Concrete aggregate shall be in accordance with the requirements of Clauses E12.6.4(c).

E13.5.6 Admixtures

(a) Admixtures shall be in accordance with the requirements of Clause E12.6.6 or equal as accepted by the Contract Administrator, in accordance with B7, "Substitutes".

E13.5.7 Cementitious Materials

(a) Cementitious Materials shall be in accordance with the requirements of Clause E12.6.7, or equal as accepted by the Contract Administrator, in accordance with B7, "Substitutes".

E13.5.8 Water

(a) Water shall be in accordance with the requirements Clause E12.6.8.

E13.5.9 Bonding Agent

(a) Bonding agents shall be in accordance with Clause E12.6.16 or equal as accepted by the Contract Administrator, in accordance with B7, "Substitutes".

E13.5.10 Curing Compound

(a) If permitted for use, curing compounds 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 of approach slabs, structural slabs, on surfaces that will not be exposed to view.

E13.5.11 Epoxy Adhesive

(a) Epoxy Adhesive shall be in accordance with the requirements of Clause E12.6.17, or equal as accepted by the Contract Administrator, in accordance with B7, "Substitutes".

E13.5.12 Permeable Formwork Liner

(a) Permeable formwork liner shall be "Hydroform", in accordance with the requirements of Clause E12.6.13, or equal as accepted by the Contract Administrator, in accordance with B7, "Substitutes".

E13.6 Equipment

E13.6.1 General

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

E13.7 Construction Methods

E13.7.1 General

(a) Repair all miscellaneous areas of concrete as directed by the Contract Administrator.

(b) The Contract Administrator will undertake an inspection of the existing concrete surfaces and will confirm the extent of the repair of miscellaneous areas of concrete.

E13.7.2 Preparation

(a) Remove all loose and deteriorated concrete to sound concrete from the surface of the bridge deck & barrier concrete areas which are to receive new concrete.

(b) For partial and full depth repair, the deteriorated concrete shall be removed using a chipping hammer no heavier than 20 lbs, so as not to damage the reinforcing steel.

(c) Following the completion of concrete removals, the Contractor shall notify the Contract Administrator to inspect the Work. All resulting concrete and reinforcing steel surfaces shall be thoroughly cleaned by gritblasting. All gritblast materials shall be blown out of the repair area, cleaned up, and removed off and away from the Site.

(d) All rusted steel shall be chased until rust is not evident on reinforcing steel. Once the limits of each repair area is identified, saw cut a square perimeter around the patch to a minimum edge depth of 25 mm. Do not cut or damage existing reinforcing steel.

(e) Additional reinforcing steel, if required, shall be installed as directed by the Contract Administrator. Concrete shall be removed at least 50 mm behind all exposed rebar and more as required to fit in the anodes.

(f) If recommended by the mortar/grout Manufacturer's directions, pre-wet the patched surfaces for the duration recommended.

E13.7.3 Repair Miscellaneous Areas of Concrete

(a) Minimum ambient air temperatures during repair work shall be 5°C.

(b) The surface temperature of the concrete and reinforcing steel shall be above 5°C during repair.

(c) Place concrete repair mortar or standard concrete if minimum formed dimensions permit.

(d) The Contractor is responsible to create a bond between the new mortar/concrete and the existing substrates. This may be done by either the application of a suitable bonding agent or grout or by using a self-bonding mortar or concrete. Place mortar or concrete by trowelling, pumping, spraying, or into forms ensuring that all entrapped air is removed.

(e) The Contract Administrator shall inspect all repaired areas for bond using a hammer "sounding" method after form removal.

E13.7.4 General Curing

(a) Unformed concrete surfaces shall be covered and kept moist by means of wet curing blankets for seven (7) consecutive days immediately following finishing operations, or as otherwise approved by the Contract Administrator, and shall be maintained at above 10°C for at least seven (7) consecutive days thereafter.

(b) After wet curing, a curing compound shall be applied at the rate of not less than 4 m^2/L. The compound must be applied uniformly and by roller. Spraying of the compound will not be permitted.

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

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

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

E13.7.5 Debris and Cleanup

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

E13.8 Quality Control

E13.8.1 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.

E13.8.2 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.

E13.9 Measurement and Payment

E13.9.1 Repair of Miscellaneous Areas of Concrete

(a) Repairing miscellaneous areas of concrete shall be paid for at the Contract Unit Price per square metre for “Repair Miscellaneous Areas of Concrete”, 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 performing all operations herein described and all other items incidental to the Work.

E14. EXPANSION JOINTS

E14.1 Description

(a) This Specification shall cover the supply and installation of expansion joints and miscellaneous steel items, as specified herein and 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 performance and completion of all Work hereinafter specified.

E14.2 Referenced Specifications and Drawings

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

(i) ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished;

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

(iii) ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension;

(iv) ASTM D471 – Standard Test Method for Rubber Property – Effect of Liquids;

(v) ASTM D573 – Standard Test Method for Rubber – Deterioration in an Air Oven;

(vi) ASTM D1149 – Standard Test Methods for Rubber Deterioration – Cracking in an Ozone Controlled Environment;

(vii) ASTM D2240 – Standard Test Method for Rubber Property – Durometer Hardness;

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

(ix) CAN/CSA W59 – Welded Steel Construction (Metal Arc Welding);

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

(xi) Ontario Provincial Standard Specification OPSS 1210 – Material Specification for Deck Joint Assemblies.

E14.3 Scope of Work

(a) The Work under this Specification shall involve:

(i) Supplying and installing the abutment expansion joints;

(ii) Supplying and installing the expansion joint seals;

(iii) Completing a watertight verification of the expansion joint seals;

(iv) Supply and installing the expansion joint cover plates and other miscellaneous steel items; and

(v) Seal welding the flange of the expansion joint edge members to the corner plates.

E14.4 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 twenty (20) Business Days prior to the scheduled commencement of any fabrication, the proposed Shop Drawings showing all fabrication details and any proposed field splice details of the steel components of the expansion joints. The complete expansion joint shop fabrication and installation shall be done by or under the direct supervision of a trained factory representative, who shall also be responsible for the expansion joint installation procedure.

(c) 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.

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.

(b) Store materials under cover in a dry and clean location off the ground.

E14.5.3 Modular Expansion Joints

(a) Expansion joints shall be of a modular type where and as shown on the Drawings.

(b) The modular expansion joints shall be Wabo Modular Joint System “D-300” box seal system, as specified in the Drawings, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(c) Expansion joints shall have fabricated cover plates and slider plates as shown on the Drawings.

(d) The seals at each joint shall be made out of neoprene, as accepted by the Contract Administrator and shall be supplied in one continuous piece, separate from the steel extrusions or joint. No shop or field splicing will be allowed in the seals.

(e) All fasteners and hardware of the modular bridge deck expansion joints shall be Grade 316, stainless steel.

E14.5.4 Steel

(a) Steel supplied for the fabrication of the bridge deck expansion joints shall conform to the requirements of CAN/CSA G40.21, Grade 300W, or equal as accepted by the Contract Administrator, in accordance with B6, “Substitutes”. They shall be galvanized after shop fabrication in accordance with CAN/CSA G164-M92 to a minimum net retention of 610 g/m^2.

E14.5.5 Steel Extrusions

(a) Steel for the extrusions shall conform to the requirements of CAN/CSA G40.21, Grade 230G minimum.

E14.5.6 Anchor Studs

(a) Anchor studs shall conform to the requirements of ASTM A108, Grade Designation 1020 and shall be galvanized.

E14.5.7 Miscellaneous Steel Items

(a) Rods, cover plates, brackets and washer plates, slider plates, and all other associated steel items shown on the Drawings shall be fabricated from steel conforming to the requirements of CAN/CSA G40.21, Grade 300W and shall be galvanized in accordance with CAN/CSA G164 M92 to a minimum net retention of 610 g/m^2.

(b) The sidewalk cover plate shall be coated with an approved non-slip grit paint.

E14.5.8 Galvanizing Touch-up and Field Applied Galvanizing

(a) 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.

(b) 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.

E14.5.9 Welding

(a) Welding shall be of a low oxygen classification. Manual electrodes shall be E7016 or E7018. All welding shall be in accordance with CAN/CSA W59.

E14.5.10 Preformed Neoprene Joint Seals

(a) Further to E14.5.3(d), the preformed neoprene expansion joint seals shall be manufactured from a vulcanized elastomeric compound using crystallization resistant polychoroprene (neoprene) as the only polymer.

(b) The preformed neoprene expansion joint seals shall meet the requirements of the latest edition and all subsequent revisions of Ontario Provincial Standard Specification (OPSS) 1210 "Material Specification for Preformed Neoprene Joint Seals", and as amended herein; and of Table E14.1 of this Specification. All tests will be made on specimens prepared from the extruded seals.

E14.5.11 Epoxy Adhesive

(a) Epoxy adhesive for concrete to steel bonding 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 B6, Substitutes”.

E14.5.12 Epoxy Grout

(a) Where epoxy grout is used, it shall be Sternson Talygrout 100, Sika Sikadur 42, CPD Epoxy Grout by Specialty Construction Products, Meadows Rezi-Weld EG-96, Duralcrete, Dural 103 Gel, or equal as accepted by the Contract Administrator, in accordance with B6, “Substitutes”.

E14.5.13 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 B6, “Substitutes”. The minimum compressive strength of the grout at 28 days shall be 40 MPa

E14.6 Equipment

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

E14.7 Construction Methods

E14.7.1 Fabrication

(a) No fabrication shall commence until acceptance of the Shop Drawings from the Contract Administrator has been obtained.

(b) Care shall be taken to ensure that all members are straight and flat and free from twists, bends, and distortions due to welding. The units shall be shop assembled and checked for matching of sliding surfaces, correct cross-fall and skew, as well as accurate positioning and alignment of supporting brackets. The Contractor shall exercise care in the handling of all units during shipping and loading operations prevent twists, bends, and warping.

(c) Matching expansion joint assemblies shall be assembled and bolted together for shipping.

(d) Expansion joint assemblies shall be shop checked for fit and match marked.

(e) All metal surfaces to be galvanized shall be cleaned thoroughly of rust, rust scale, mill scale, dirt, paint, and other foreign material by commercial sand, grit or shop blasting, and pickling prior to galvanizing. Heavy deposits or oil and grease shall be removed with solvents prior to blasting and pickling.

(f) In no case shall weldments be substituted for extrusion shapes.

(g) The zinc coating shall be adherent, continuous, and reasonably smooth. It shall be free from imperfections such as blisters; gritty or uncoated areas; acid, black spots, or dross particle adhering to the coating; or other imperfections inconsistent with good commercial galvanizing practice. Globules of zinc that will interfere with the intended use of the material will not be permitted.

(h) The colour of the galvanizing shall be consistent and continuous.

E14.7.2 Installation

(a) The Contractor shall install expansion joints as shown on the Drawings and shall be responsible for the correct matching and seating of parts. The expansion joints shall be checked for accurate matching of sliding plates with the bridge deck expansion joints installed at the specified skews and crossfalls. One field splice in the length of the expansion joint is permitted.

(b) The edges of the expansion joint cover plates shall be seal welded to the expansion joint cover plates as shown on the Drawings.

E14.7.3 Galvanizing Touch-up Prior to Placement of Concrete

(a) Any areas of damaged galvanizing and field welds are to receive field applied galvanizing.

(b) Surfaces to receive field-applied galvanizing shall be cleaned using a wire brush, a light grinding action, or mild blasting to remove loose scale, rust, paint, grease, dirt, or other contaminants. Preheat the surface to 315°C and wire brush the surface during preheating. Rub the cleaned preheated area with the repair stick to deposit an evenly distributed layer of zinc alloy. Spread the alloy with a wire brush, spatula, or similar tool. Field-applied galvanizing shall be blended into existing galvanizing of surrounding surfaces and shall be buffed and polished if required to match the surrounding surfaces. Care shall be taken to not overheat surfaces beyond 400°C and to not apply direct flame to the alloy rods.

(c) The process is to be repeated as required to achieve a thickness comparable to original galvanizing, as approved by the Contract Administrator.

E14.7.4 Placement of Concrete at Expansion Joints

(a) The expansion joint assemblies shall be set in position, and secured rigidly in place, such that they will remain true to line and elevation during and after concreting, in accordance with approved details as shown on the Shop Drawings.

(b) Care shall be taken during consolidation of the concrete to ensure that there are no voids in the concrete under and around the expansion joint components and associated reinforcing steel.

(c) Before concreting, the expansion joint opening shall be set to give the correct width for the mean concrete temperature of the deck. The gap width shall be obtained from the Temperature Width Adjustment Table provided on the Drawings, as approved on-site by the Contract Administrator immediately prior to the start of concrete placement.

(d) Immediately in front of concrete placement at the expansion joints, all metal contact surfaces between the expansion joint and concrete shall be coated with epoxy adhesive.

(e) After the concrete has set for seventy-two (72) hours, and after the removal of the Manufacturer's temporary clamping channels, epoxy grout shall be used to fill any associated bolt holes

E14.7.5 Field Welding and Touch-Up Galvanizing

(a) Prior to installation of the seals, the flange of the expansion joint edge members shall be vulcanized or seal welded to the corner plates, as shown on the Drawings, to provide watertight joints.

(b) Any areas of damaged galvanizing or metallizing on miscellaneous steel items shall receive field-applied touch-up galvanizing, in accordance with ASTM A780.

(c) Surfaces to receive touch-up galvanizing shall be cleaned using a wire brush, a light grinding action, or mild blasting to remove loose scale, rust, paint, grease, dirt, or other contaminants. Preheat the surface to 315°C and wire brush the surface during preheating. Rub the cleaned preheated area with the repair stick to deposit an evenly distributed layer of zinc alloy. Spread the alloy with a wire brush, spatula, or similar tool. Field-applied galvanizing shall be blended into existing galvanizing of surrounding surfaces and shall be buffed and polished if required to match the surrounding surfaces. Care shall be taken to not overheat surfaces beyond 400°C and to not apply direct flame to the alloy rods.

E14.7.6 Installation of Seal

(a) A permanent seal at each expansion joint unit shall be installed as one continuous piece after completion of all concreting operations , to the satisfaction of the Contract Administrator.

(b) Only upon completion of all concrete cleanup operations shall the Contractor open up the seating areas and prepare them for them installation of the seals.

(c) The installation of the expansion joint seal will be completed according to the construction phasing, as detailed on the Drawings.

E14.7.7 Watertight Verification of Joint Seal

(a) Prior to installing the expansion joint and sidewalk cover plates, the Contractor shall dyke off the bridge deck expansion joints and maintain a minimum of 75 mm of water over all areas of the seal for a period of not less than four (4) hours, with no leakage. Any and all leaks shall be corrected, using mechanical or other adjustment of the bridge deck expansion joints to the satisfaction of the Contract Administrator. In no case shall caulk or other temporary devices or materials be used to seal leaks in the expansion joints. The Contract Administrator's decision in this regard shall be final.

(b) Prior to commencing the test, the Contractor shall remove all expansion joints forming materials and debris from the deck and from the substructure units below. The

Contractor shall provide safe access, acceptable to the Contract Administrator, to the pier tops for inspection of the expansion joints during the testing.

E14.7.8 Watertight Verification of Expansion Joint and Concrete Blockouts

(a) Prior to installing the expansion joint and sidewalk cover plates, the Contractor shall dyke off the bridge deck expansion joints and maintain a minimum of 75 mm of water over all areas of the seal for a period of not less than four (4) hours, with no leakage. Any and all leaks shall be corrected, using mechanical or other adjustment of the bridge deck expansion joints to the satisfaction of the Contract Administrator. In no case shall caulk or other temporary devices or materials be used to seal leaks in the expansion joints. The Contract Administrator's decision in this regard shall be final.

(b) Prior to commencing the test, the Contractor shall remove all expansion joints forming materials and debris from the deck and from the substructure units below. The Contractor shall provide safe access, acceptable to the Contract Administrator, to the pier tops for inspection of the expansion joints during the testing.

E14.7.9 Installation of Expansion Joint Cover Plates on the Concrete Bridge Traffic Barriers, Bridge Sidewalk Slab, and Bridge Sidewalk Curbs

(a) Perform cutting, drilling, and fitting required for installation of expansion joint cover assemblies. Touch-up galvanizing shall be completed in accordance with E14.7.5, “Field Welding and Touch-Up Galvanizing”.

(b) Install joint cover assemblies in true alignment and proper relationship to the opening of the expansion joint and adjoining finished surfaces measured from the established lines and levels.

(c) Allow for thermal expansion and contraction of metal to avoid buckling.

(d) Set floor covers at elevations flush with adjacent finished floor materials unless otherwise shown.

(e) Locate wall, ceiling, and overhang covers in continuous contact with adjacent surfaces. Securely attach in place using required accessories. Make allowances for change in joint size due for installation.

(f) Maintain continuity of expansion joint cover assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints.

E14.8 Fabrication Warranty

(a) Before final acceptance of the expansion joints by the Contract Administrator, the bridge deck expansion joints supplier shall provide the City with a written warranty stating that they will perform satisfactorily within the design range of movement and under the design loads for a period of five (5) years from the date of issuance of the Certificate of Acceptance (Certificate of Acceptance is issued after the successful completion by the Contractor of the Project's standard warranty period), provided that the expansion joints have been properly installed, acceptable to the Contract Administrator. The Supplier shall state that they have observed the installation and found it to be in accordance with their recommended procedure. The Supplier shall warranty the replacement of the expansion joints, including removal of the defective expansion joint assemblies and supply and installation of the replacement expansion joint, at no cost to the City, in the event that the joint does not perform satisfactorily within the design range of movement and under the design loads for a period of five (5) years from the date of issuance of the Certificate of Acceptance.

E14.9 Installation Warranty

(a) The Contractor shall ensure that the expansion joints are installed in such a manner that will not void the fabrication warranty.

(b) Similar to the expansion joint Supplier, and before final acceptance by the Contract Administrator, the Contractor shall warranty, in writing, the performance of the expansion joints and concrete expansion joint blockouts for a period of five (5) years from the date of issuance of the Certificate of Acceptance (Certificate of Acceptance is issued after the successful completion by the Contractor of the Project's standard warranty period). Provide

in the warranty for the replacement of the expansion joints at no cost to the City, including all direct and indirect costs in the event that the expansion joints do not perform satisfactorily in the range of design movement and under the design loads for a period of five (5) years from the date of issuance of the Certificate of Acceptance.

E14.10 Quality Control

E14.10.1 General

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

(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.

E14.10.2 Access

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

E14.10.3 Expansion Joint Seal Markings

(a) All expansion joint seals shall be identified as to the Manufacturer by means of a continuous permanent mould mark. The mould marks shall be registered with the Contract Administrator and shall be used on all seals produced by the respective Manufacturer. The seal shall also be permanently marked, on the side of the seal, with the date of production and the batch/lot, at intervals of not more than 1.2 m.

(b) The Contractor shall supply to the Contract Administrator a summary of the seals identifying the date of manufacture, the batch/lot, and the proposed installation location.

E14.10.4 Joint Seal Samples and Testing Procedures

(a) The Contractor shall supply seal sample material at no charge to The City for quality control testing purposes. The samples will each be 1.5 m long. Each sample will represent not more than three expansion joint seals of the same size, lot, and make and shall be continuous with same until sampled by the Contract Administrator. As soon as the seals to be used in the joint assemblies have been manufactured, they shall be available to the Contract Administrator for sampling.

(b) Testing procedures will be in accordance with the latest revisions of the methods indicated on Table E14.1, “Physical Requirements”.

(c) All materials failing to meet the Specification requirements will be rejected.

(d) Lots rejected may be culled by the supplier and, upon satisfactory evidence of compliance with the Specifications, will be accepted.

Table E14.1: Physical Requirements

Property	Physical Requirements	Test Procedure*
1. Tensile Strength	Minimum 13.5 MPa	ASTM D412 OPSS 1210.07.03.01.02
2. Elongation at Break	Minimum 250%	ASTM D412 OPSS 1210.07.03.01.02
3. Hardness, Type A Durometer	55: +7 Points -5 Points	ASTM D2240 OPSS 120.07.03.01.03

4. Oven aging Test 70 Hours at 100°C Reduction in Tensile Strength Reduction in Elongation Increase in Hardness	Maximum 20% Maximum 20% Maximum 10 Points	ASTM D573
5. Permanent Set at Break	Maximum 10%	ASTM D412
6. Low Temperature Stiffening Hardness, Type A Durometer	Maximum 15 Points	ASTM D2240 OPSS 1210.07.03.01.03
7. Oil Swell, ASTM Oil No. 3 70 H at 40°C (wipe with toluene to remove surface contamination)	45 max	ASTM D471
8. Ozone Resistance	No Cracks	ASTM D1149
9. **Safe Compressibility Test (Z min.) Bridge Seal - < 63.5 mm > 63.5 mm	Minimum 50% Minimum 55%	OPSS 1210.07.03.01.04
10. **Pressure Generation at 15% Deflection	Minimum 20 kPa	OPSS 1210.07.03.01.04
11. **Recovery 22 h at -28°C 70 h at -10°C 70 h at + 100°C	Minimum 80% No Cracking Minimum 88% Splitting or Minimum 85% Sticking	OPSS 1210.07.03.01.05

* ASTM - American Society for Testing and Materials
OPSS - Ontario Provincial Standard Specification
** This physical requirement not applicable to lock-in type joint seals

E14.11 Measurement and Payment

E14.11.1 Expansion Joints

(a) Supplying and installing expansion joints shall be measured on a unit basis. This item of Work shall be paid for at the Contract Unit Price per unit for "Supply and Install Expansion Joints", 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 performing all operations herein described and all other items incidental to the Work.

E15. SALT TOLERANT GRASS SEEDING

DESCRIPTION

E15.1 Further to CW 3520 and CW3540, this specification shall cover sub-grade preparation and the supply and placement of Salt Tolerant Grass Seed.

MATERIALS

E15.2 Salt Tolerant Grass Seed

E15.2.1 Salt Tolerant Grass Seed for regional and collector boulevards, medians and interchange areas shall be a mixture composed of:

(a) Seventy percent (70%) Fults or Nuttals Alkaligrass (Puccinellia spp.), twenty percent (20%) Audubon or Aberdeen Creeping Red Fescue and ten percent (10%) Perennial Ryegrass.

EQUIPMENT

E15.3 Scarification equipment shall be suitable for the area being scarified, shall be capable of scarifying the sub-grade to the specified depth and shall be accepted by the Contract Administrator. For confined areas a toothed bucket may be acceptable. For larger areas tilling equipment may be required.

E15.4

CONSTRUCTION METHODS

E15.5 Preparation of Existing Grade

E15.5.1 Prior to placing topsoil, in areas to be seeded greater in width than 600mm, prepare the existing sub-grade by scarifying to a minimum depth of 75mm and to a maximum depth of 100mm to the satisfaction of the Contract Administrator.

E15.5.2 Scarification shall consist of breaking up and loosening the sub-grade. No scarification shall occur within the edge of a tree canopy (or drip line).

E15.6 Salt Tolerant Grass Seeding

E15.6.1 Salt Tolerant Grass Seed shall be sown at a rate of 2.2 kilograms per 100 square meters.

MEASUREMENT AND PAYMENT

E15.7 Supply, placement and maintenance of Salt Tolerant Grass Seed will be paid for at the Contract Unit Price per square metre for "Salt Tolerant Grass Seeding", measured as specified herein, which price shall be payment in full for supplying all materials and for completing all operations herein described and all other items incidental to the work included in this Specification. Payment for Salt Tolerant Grass Seeding shall be in accordance with the following:

(a) Sixty five (65%) percent of quantity following supply and placement.

(b) Remaining thirty five (35%) percent of quantity following termination of the Maintenance Period.