THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 77-2008

FORT GARRY TWIN BRIDGES – WESTBOUND STRUCTURE REHABILITATION AND ASSOCIATED ROADWORKS

NOTE:	**INCLUDES POTENTIAL FOR A FUTURE CONTRACT FOR THE EASTBOUND STRUCTURE REHABILITATION IN 2009 – SEE B17.**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 FORT GARRY TWIN BRIDGES – WESTBOUND STRUCTURE REHABILITATION AND ASSOCIATED ROADWORKS

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, March 06, 2008.

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 Contract Administrator or an authorized representative will be available on Site at the southeast end of the Westbound Bridge from 10:00 a.m. to 01:00 p.m. on February 19 and 21, 2008, to provide Bidders access to the Site.

B3.2 The Bidder shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

B4. ENQUIRIES

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

B5.1 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.

B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.

B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

B5.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Branch internet site for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B5.3 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.

B6. SUBSTITUTES

B6.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.

B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.

B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:

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

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

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

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

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

B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.

B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, only to the Bidder who requested approval of the substitute.

B6.6.1 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 wishes to inform.

B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.

B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his 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 B15.

B6.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B7. BID COMPONENTS

B7.1 The Bid shall consist of the following components:

(a) Form A: Bid;

(b) Form B: Prices;

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

B7.2 Further to B7.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B6.

B7.3 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.

B7.4 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.

B7.4.1 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.

B7.4.2 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 Adobe PDF version will take precedence.

B7.5 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.

B7.6 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, may result in the Bid being determined to be non-responsive.

B7.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B7.8 Bids shall be submitted to:

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

B8. BID

B8.1 The Bidder shall complete Form A: Bid, making all required entries.

B8.2 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 own name, his 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 own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.

B8.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B8.4 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 own name, it shall be signed by the Bidder;

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

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

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

B8.4.1 The name and official capacity of all individuals signing Form A: Bid shall be printed below such signatures.

B8.4.2 All signatures should be witnessed, except where a corporate seal has been affixed.

B8.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B9. PRICES

B9.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B9.1.1 For the convenience of Bidders, and pursuant to B.7.4.2 and B15.4.2 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 Branch Internet Website at http://www.winnipeg.ca/matmgt.

B9.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.

B9.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B10. QUALIFICATION

B10.1 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.

B10.2 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 Branch internet site at http://www.winnipeg.ca/matmgt).

B10.3 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).

B10.4 Further to B10.3(c), the Bidder shall, within three (3) 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 valid COR certification number under the Certificate of Recognition (COR) Program administered by the Manitoba Construction Safety Association or by the Manitoba Heavy Construction Association's Safety, Health and Environment Program; or

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

B10.5 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.

B10.6 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.

B11. BID SECURITY

B11.1 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.

B11.1.1 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.

B11.1.2 All signatures on bid securities shall be original, and shall be witnessed or sealed as required.

B11.2 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.

B11.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B11.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B11.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B11.3 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.

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

B12.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Branch, or in such other office as may be designated by the Manager of Materials.

B12.1.1 Bidders or their representatives may attend.

B12.1.2 Bids determined by the Manager of Materials, or his designate, to not include the bid security specified in B11 will not be read out.

B12.2 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 Branch internet site at http://www.winnipeg.ca/matmgt.

B12.3 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 Branch internet site at http://www.winnipeg.ca/matmgt.

B12.4 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.

B13. IRREVOCABLE BID

B13.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.

B13.2 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.

B14. WITHDRAWAL OF BIDS

B14.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B14.1.1 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.

B14.1.2 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.

B14.1.3 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 B14.1.3(b), declare the Bid withdrawn.

B14.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B13.2 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.

B15. EVALUATION OF BIDS

B15.1 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 (pass/fail);

(b) Qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);

(c) Total Bid Price; and

(d) Economic analysis of any approved alternative pursuant to B6.

B15.2 Further to B15.1(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.

B15.3 Further to B15.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid or in other information required to be submitted, that he is responsible and qualified.

B15.4 Further to B15.1(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.

B15.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.

B15.4.2 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 the Total Bid Price performed as a function of the formulas within the electronic Form B: Prices are correct.

B16. AWARD OF CONTRACT

B16.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B16.2 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.

B16.2.1 Without limiting the generality of B16.2, 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.

B16.3 Subject to B16.2, 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.

B16.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his Bid upon written request to the Contract Administrator.

B17. POTENTIAL FOR FUTURE CONTRACT FOR EASTBOUND FORT GARRY BRIDGE IN 2009

B17.1 The City of Winnipeg, in its sole discretion after consideration of the Contractor's performance on Bid Opportunity No. 77-2008, may negotiate and enter into a contract with the Contractor, to undertake the work associated with the rehabilitation of the Eastbound Fort Garry Bridge during the summer of 2009, without a public bid solicitation. With the exception of the additional lane widening required for the Westbound Fort Garry Bridge, it is anticipated that the scope of this project would be similar in nature to the Westbound Structure, including removal of detours, Site restoration upon completion and any ancillary Work. The City will provide terms, construction Specifications and other details if it initiates negotiations with the Contractor. No compensation will be provided to the Contractor for participating in this negotiation. The City of Winnipeg will be under no obligation to initiate negotiations or enter into a subsequent contract, and may choose to issue a public bid solicitation for the Work with respect to the Eastbound Fort Garry Bridge.

PART C - GENERAL CONDITIONS

C1. GENERAL CONDITIONS

C1.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.

C1.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

C1.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix "**C**" designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of Fort Garry Twin Bridges – Westbound Structure Rehabilitation and Associated Roadworks.

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

(a) Bridge Work:

(i) Strengthen existing steel box girders;
(ii) Install stiffeners to the abutment diaphragms;
(iii) Coordinate with Manitoba Hydro to disconnect and remove the existing roadway lighting on the Bridge;
(iv) Remove existing aluminum traffic rails and posts, salvage aluminum traffic rails;
(v) Remove existing asphalt wearing surface, waterproofing membrane, and portion of existing concrete deck;
(vi) Remove existing concrete barriers on bridge deck and abutment wingwalls;
(vii) Abutment demolition;
(viii) Saw cut and remove existing bridge deck overhang;
(ix) Remove existing deck drains; patch concrete deck and girder web;
(x) Remove existing expansion joints;
(xi) Remove existing approach slabs;
(xii) Construct new wingwalls and widen abutment roof slabs;
(xiii) Construct reinforced concrete deck overhang;
(xiv) Construct new approach slabs;
(xv) Construct new east roadway expansion slab;
(xvi) Construct new concrete deck and concrete barriers;
(xvii) Install new expansion joints;
(xviii) Construct new concrete overlay;
(xix) Construct asphalt overlay and waterproofing membrane on west approach slab and west abutment roof slab;
(xx) Install new aluminum posts and refurbished aluminum traffic rails;
(xxi) Install new street lights (six locations) - coordinate with Manitoba Hydro;
(xxii) Repair designated areas of existing concrete slope paving;
(xxiii) Paint exterior girder surfaces of Spans 1 and 5 (both girders);
(xxiv) Repair miscellaneous areas of abutment concrete;
(xxv) Install electrical conduits and underbridge lighting on each end of the Bridge;
(xxvi) Coordinate with Manitoba Hydro for their installation, wiring and connection of new poles and luminaires for roadway lighting on the Bridge; and
(xxvii) Install, wire, and connect new underbridge walkway lighting, including controls and power provisions.

(b) Roadwork

(i) Pavement Reconstruction:

- Remove existing pavement;
- Excavation;
- Earth embankment;
- Installation of subdrains;
- Compaction of existing subgrade;
- Installation of catchbasins and sewer service pipe;
- Placement of subbase and base course materials;
- Construction of 230 mm plain doweled concrete pavement c/w integral mountable curb utilizing slip-form paving equipment;
- Adjustment or abandonment of existing pavement and boulevard structures and appurtenances;
- Construction of mountable curb and gutter;
- Construction of asphalt pavement shoulders; and
- Barrier rail relocation.

(ii) Pavement Widening and Asphalt overlay

- Curb and gutter removal;
- Excavation;
- Compaction of existing subgrade;
- Installation of catchbasins and sewer service pipe;
- Placement of subbase and base course materials;
- Construction of 200 mm reinforced concrete pavement (east of River Road);
- Construction of 230 mm plain doweled concrete pavement c/w integral mountable curb (west of Bridge);
- Construction of asphalt shoulders (average thickness of 100 mm);
- Placement of asphalt overlay Type 1A (average thickness of 60 mm);
- Ditch construction and regrading;
- Renewal of existing sidewalk; and
- Boulevard restoration.

(c) Detour Work

- Westbound detour pavement removal;
- Salvage and reuse of detour subbase;
- Removal and salvage of corrugated steel pipes for reuse;
- Backfilling and levelling Westbound detour excavations with stockpiled soils;
- Excavation of Eastbound detour;
- Installing new and salvaged corrugated steel pipes;
- Placement of salvaged subbase materials;
- Placement of new subbase and base course materials;
- Placement of asphalt pavement Type 1A (average thickness of 75 mm);
- Relocation of precast concrete traffic barriers; and
- Boulevard and median restoration.

D2.3 The sequence of construction may be revised by the Contractor provided that it is approved by the Contract Administrator.

D3. DEFINITIONS

D3.1 When used in this Bid Opportunity:

(a) "**Working Day**" means any Calendar Day, other than a Saturday, Sunday, or a statutory or civic holiday, on which the Contract Administrator determines atmospheric and Site conditions are such that the Contractor is able to work at least seven (7) hours during the period between 7:00 a.m. Winnipeg time or the time the Contractor's operations normally commence, whichever is the earlier, and 7:00 p.m. Winnipeg time;

(b) "**Business Day**" means any Calendar Day, other than a Saturday, Sunday, or a statutory or civic holiday; and

(c) "**Calendar Day**" means the period from one midnight to the following midnight;

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is Wardrop Engineering Inc., represented by:

Mr. Rick Haldane-Wilsone, P.Eng.
Principal and Manager
400-386 Broadway
Winnipeg, MB R3C 4M8

Telephone No. (204) 956-0980
Facsimile No. (204) 957-5389

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

D5. CONTRACTOR'S SUPERVISOR

D5.1 At the pre-construction meeting, the Contractor shall identify his 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 at which the supervisor identified in D5.1, or an alternate, can be contacted 24 hours a day to respond to an emergency.

D6. NOTICES

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

D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, shall be sent to the attention of the Contract Administrator at the address or facsimile number identified in D4.1.

D6.3 All notices of appeal to the Chief Administrative Officer shall be sent to the following address or facsimile number:

The City of Winnipeg
Chief Administrative Officer Secretariat
Attn: Chief Administrative Officer
Administration Building, 3rd Floor
510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: (204) 949-1174

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

The City of Winnipeg
Corporate Services Department
Legal Services Division
Attn: City Solicitor
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

Facsimile No.: (204) 947-9155

D7. FURNISHING OF DOCUMENTS

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

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

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

D9. SAFE WORK PLAN

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

D9.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

D10. INSURANCE

D10.1 The Contractor shall provide and maintain the following insurance coverage at all times during the performance of the Work and throughout the warranty period, except for all claims made policies, which shall be maintained for a minimum period of twenty four (24) months after the dated of Total Performance:

(a) Commercial general liability insurance, in the amount of at least five million dollars ($5,000,000.00) 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 (Contractor's equipment), non-owned automobile liability and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;

(b) Automobile liability insurance for owned automobiles used for or in connection with the Work in the amount of at least two million dollars ($2,000,000.00) at all times during the performance of the Work and until the date of Total Performance;

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

D10.2 Deductibles shall be borne by the Contractor, and the Contractor shall carry deductibles of no more than $10,000.00.

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

D10.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D11. PERFORMANCE SECURITY

D11.1 The Contractor shall provide and maintain performance security until the expiration of the warranty period in the form of:

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

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

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

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

D11.2 If the bid security provided in his Bid was not a certified cheque or draft pursuant to B11.1(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 but in no event later than the date specified in C4.1 for the return of the executed Contract.

D12. SUBCONTRACTOR LIST

D12.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D13. EQUIPMENT LIST

D13.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

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 C4.1 for the return of the executed Contract.

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

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

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

(c) A daily manpower schedule for the Work.

All acceptable to the Contract Administrator.

D14.3 Further to D14.2(a), the C.P.M. schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path:

(a) Pedestrian and Traffic Control Installation and Removals;

(b) Installation of Temporary Catch Platforms;

(c) Structural Removals;

(d) Girder Strengthening;

(e) Painting Exterior Girder Ends;

(f) Forming for Deck, Cantilevers, Barriers, and Abutments;

(g) Abutment Reinforcing and Concrete Placement;

(h) Deck and Barrier Reinforcing and Concrete Placement;

(i) Deck Slab Overlay;

(j) Approach Slabs for Roadways;

(k) Barrier Rail Removal and Storage;

(l) Barrier Rail Reinstallation;

(m) Excavation;

(n) Subbase and Base Course Construction;

(o) Construction of 200 mm Reinforced Concrete Roadway Pavement;

(p) Construction of 230 Plain Dowelled Concrete Roadway Pavement;

(q) Asphalt Overlay;

(r) Removal of Westbound Detour Roads;

(s) Construction of Eastbound Detour Roads;

(t) Boulevard Restoration of Westbound Detour Roads;

(u) Relocation of Precast Concrete Traffic Barriers; and

(v) Landscaping.

D14.4 Further to D14.2(b), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

D14.5 Further to D14.2(c), the daily manpower schedule shall list the daily number of individuals on the Site for each trade.

SCHEDULE OF WORK

D15. COMMENCEMENT

D15.1 The Contractor shall not commence any Work until he 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 D8;

(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 D9;

(v) Evidence of the insurance specified in D10;

(vi) The performance security specified in D11;

(vii) The Subcontractor list specified in D12;

(viii) The equipment list specified in D13; and

(ix) 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 Complete shutdown of the Bridge may not occur until after April 14, 2008. A lane closure in accordance with E.11.4.3, for Work on girder strengthening or installing temporary overhang brackets on the girders that may be required, is permitted.

D15.4 Structural steel strengthening of girders shall take place prior to deck demolition Work.

D15.5 The Contractor shall coordinate all Work associated with street light poles and fixture installations and wiring with Manitoba Hydro such that the Work does not affect the critical stages detailed in D16.

D15.6 The City intends to award this Contract by March 20, 2008.

D15.6.1 If the actual date of award is later than the intended date, the dates specified for Commencement, Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D16. CRITICAL STAGES

D16.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

(a) Part A – Bridge Work and Part B – Roadwork by August 29, 2008, completed such that the entire Westbound facility is safely open to traffic and the Westbound detour can be closed, as determined by the Contract Administrator.

D16.2 When the Contractor considers the Work associated with Part A and Part B to be completed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Completion. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.

D16.3 The date on which the Part A and Part B Work have been accepted by the Contract Administrator as being completed to the requirements of the Contract is the date on which completion of Part A – Bridge Work and Part B – Roadwork has been achieved.

D17. RESTRICTED WORK HOURS

D17.1 Further to Clause 3.10 of the City of Winnipeg Specification CW 1130, the Contractor shall require written permission 48 hours in advance from the Contract Administrator for any Work to be performed between 20:00 hours and 07:00 hours, or on Saturdays, Sundays, Statutory Holidays, and /or Civic Holidays.

D17.2 In accordance with 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 Streets be carried out at night, 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.

D17.3 During the removal of the Westbound detour roads and the construction of the Eastbound detour roads the following Work hour restrictions shall also apply:

(a) The Contractor shall not close any lanes on Bishop Grandin Boulevard during the hours of 06:30 hours to 09:00 hours and 15:30 hours to 18:00 hours, except on Saturdays and Sundays, and shall remove temporary traffic control devices from these lanes accordingly. One (1) lane on Bishop Grandin Boulevard may be closed outside these hours when working within four (4) metres of the edge of travelled lanes.

D18. WORK BY OTHERS

D18.1 Work by Others

(a) Work by Others on or near the Site will include but not necessarily be limited to:

(i) Manitoba Hydro Gas Division;

(ii) Manitoba Hydro – Removal and subsequent reinstallation and wiring of Bridge street lights;

(iii) MTS Allstream Inc.;

(iv) Shaw Cable;

(v) Various Work on survey monuments by the City of Winnipeg's Geomatics Branch;

(vi) Fort Garry Twin Bridges – Supply and Delivery of Fabricated MMFX2 Reinforcing Steel to be used in this Contract will be awarded under bid opportunity 69-2008. Dates for coordination of availability are identified in E13.1;

(vii) City Traffic Signals – Relocation of existing traffic signals plant;

(viii) City Traffic Services – Placement of new traffic signs;

(ix) City Traffic Services – Set up, maintain and remove required signage and traffic control of designated route for the Manitoba Marathon event taking place on June 15, 2008;

(x) Separate Contract – Replacement of existing overhead sign structure just west of the bridge and installation of new overhead sign structure just east of the Bridge; and

(xi) Red Light Camera – City of Winnipeg, Police Service.

D19. SUBSTANTIAL PERFORMANCE

D19.1 The Contractor shall achieve Substantial Performance by October 31, 2008.

D19.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted

during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

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

D20. TOTAL PERFORMANCE

D20.1 The Contractor shall achieve Total Performance by December 1, 2008.

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

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

D21. ACCELERATED COMPLETION

D21.1 Description

D21.1.1 This Specification shall cover the accelerated completion of the Works of this Contract.

D21.2 Acceleration of Work

D21.2.1 At no risk to the City, the Contractor at his own initiative, means, and expense, may undertake to complete the Works of this Contract to facilitate the safe reopening of the entire Westbound Structure to traffic in advance of the Critical Stage of August 29, 2008, specified herein.

D21.2.2 In recognition of the fact that an early completion of the Works is of benefit to the City, the City will compensate the Contractor for said early completion on a per diem unit price basis, as hereinafter set out, provided that the City will not be liable to pay for any period of acceleration in excess of twenty (20) Days.

D21.2.3 It is noted that certain delays on Bridge rehabilitation Work are normal, due to site conditions, necessary layout and dimensional changes. The Contract Administrator will attempt to resolve the situation as soon as possible. The Contractor is advised that no extension to time will be given for events of this sort which cause construction delay and are resolved within 48 hours of the requirement of change becoming known to both the Contractor and the Contract Administrator.

D21.3 Method of Measurement

D21.3.1 Subject to Clause D21.2 hereof, accelerated completion will be measured on a unit basis per diem. The number of days to be paid for will be the total number of Calendar Days which the entire facility is safely re-opened to vehicular and pedestrian traffic in advance of the Critical Completion Date of August 29, 2008, specified herein, with all specified Works completed acceptable to the Contract Administrator.

D21.4 Basis of Payment

D21.4.1 Subject to Clause D21.2 hereof, accelerated completion will be paid for at the Unit Price per diem specified hereinafter for "Accelerated Completion" which price shall be payment in full for performing all operations undertaken and all other items incidental to the Work included in this Specification. Unit Price per diem = $10,000.00.

D21.4.2 Payment for this item is not identified on Form B: Prices, and shall not be included thereon. If accelerated completion does occur as specified herein, then payment will be made for this item as an addition to the Contract.

D22. LIQUIDATED DAMAGES

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

(a) Critical Stage – Substantial Performance of Part A, Bridge Work and Part B, Roadwork – Ten Thousand Dollars ($10,000);

(b) Substantial Performance – One Thousand Dollars ($1,000); and

(c) Total Performance – One Thousand Dollars ($1,000).

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

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

D23. SCHEDULED MAINTENANCE

D23.1 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 City of Winnipeg Specification CW 3520-R7.

(b) Reflective crack maintenance as specified in the City of Winnipeg Specification CW 3250-R6.

D23.2 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

D24. JOB MEETINGS

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

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

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. ENVIRONMENTAL PROTECTION PLAN

D26.1 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.

D26.2 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work and are available for viewing at the office of the Contract Administrator.

(a) Federal
  (i) Canadian Environmental Assessment Act (CEAA) c.37
  (ii) Fisheries Act C.F14
  (iii) Transportation of Dangerous Goods Act and Regulations c.34
  (iv) Navigable Waters Protection Act

(b) Provincial
  (i) The Dangerous Goods Handling and Transportation Act D12
  (ii) The Endangered Species Act E111
  (iii) The Environment Act c.E125
  (iv) The Fire Prevention Act F80
  (v) The Manitoba Heritage Resources Act H39-1
  (vi) The Manitoba Noxious Weeds Act N110
  (vii) The Manitoba Nuisance Act N120
  (viii) The Public Health Act c.P210
  (ix) The Workplace Safety and Health Act W210
  (x) And current applicable associated regulations (Note: Provincial regulations updated as of September 1999).
  (xi) The Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat, Manitoba National Resources, 1996.

(c) Municipal
  (i) The City of Winnipeg By-law No. 2480/79 and all amendments up to and including 7976/2000.
  (ii) The City of Winnipeg By-law No. 1573/77 and all amendments up to and including 7670/2000.
  (iii) And any other applicable Acts, Regulations, and Bylaws.

D26.3 The Contractor is advised that the following environmental protection measures apply to the Work.

(a) Materials Handling and Storage
  (i) Storage of construction materials shall be confined to the defined laydown areas as shown on the Contract Drawings.
  (ii) Construction materials shall not be deposited or stored on riverbanks or river shorelines unless written acceptance from the Contract Administrator is received in advance.
  (iii) Construction materials and debris shall be prevented from entering the Red River. In the event that materials and/or debris inadvertently enter the watercourse, the Contractor shall be required to remove the material and restore the watercourse to its original condition.

(b) Fuel Handling and Storage
  (i) The Contractor shall obtain all necessary permits from Manitoba Environment for the handling and storage of fuel products and shall provide copies to the Contract Administrator.

(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 and are located a minimum distance of 100 metres away from the high water line of the Red River. Dykes shall be designed, constructed, and maintained to retain not less than 100% of the capacity of the total number of containers or 110% of the largest container, whichever is greatest. The dykes shall be constructed of clay or similar impervious material. If this type of material is not available, the dyke shall be constructed of locally available material and lined with high-density polyethylene (HDPE). Furthermore, the fuel storage area(s) shall be secured by a barrier such as a high fence and gate to prevent vandalism.

(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) Refuelling of mobile equipment and vehicles shall take place at least 100 metres from a watercourse.

(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.

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

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

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

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

(viii) 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.

(ix) 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 100 metres away from the high water line 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; and
- 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; and
- 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.

(ix) 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 (toxix)	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
9.1	PCB Mixtures	500 g
9.2	Aquatic Toxic	1 kg or 1 L
9.3	Wastes (chronic toxic)	5 kg or 5 L
* Container capacity (refers to container water capacity) ** PG = Packing Group(s)		

(f) Noise

(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 preformed during the night-time period, on Sundays, and Holidays as stated in the Licence shall not exceed the approved limit.

(g) Dust

(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) 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.

(iii) 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.

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

(h) Riprap

(i) All areas of the Red River banks disturbed by construction activities shall be riprapped with rock to limit erosion and sedimentation into the rivers.

(ii) Riprap shall be free of fine materials prior to placement.

(i) 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 along riverbank slopes 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, stream banks, 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.

(j) Aquatic Resources

(i) The Contractor shall adhere to the Manitoba Conservation guidelines titled Recommended Fish Protection for Stream Crossings in Manitoba.

(ii) All construction activities that may impact the Red River stream channel and which may affect fish mobility and fish habitat shall cease from April 1 to June 1 of each year during construction.

(iii) The use of creosoted timbers in the river channel is not permitted.

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

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

(v) 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.

(vi) 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.

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

(l) 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.

(m) 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.

(n) 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.

D27. AUTHORIZED WORK ON PRIVATE PROPERTY

D27.1 The Contractor shall confine his Works to the right-of-way or easements as much as possible. Where Work is required to be done on or accessed through private property, the Contractor shall obtain written permission from the property owner and provide a copy to the Contract Administrator.

D28. LAYOUT OF WORK

D28.1 Bridge Work

D28.1.1 The Contract Administrator shall provide the basic centrelines and a benchmark for construction of Part A – Bridge Work.

D28.1.2 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.

D28.1.3 The Contract Administrator shall be notified at least one (1) Business Day prior to any Work being commenced in order to have the option to check and review all elevations and layouts at his discretion.

D28.1.4 The Contractor shall carefully protect and preserve all benchmarks, stakes, and other items of the basic data supplied by the Contract Administrator. Any such benchmarks or stakes removed or destroyed by the Contractor, without the consent of the Contract Administrator, shall be replaced by the Contract Administrator at the expense of the Contractor.

D28.2 Roadwork

D28.2.1 Further to the City of Winnipeg Specification GC 6.28(h), the Contract Administrator shall mark, to the extent determined to be necessary, the location, alignment and elevation of the Work by means of stakes or marks, and the Contractor shall make the completed Works conform to the lines and marks thus indicated.

D28.2.2 Stakes and marks required shall be provided no later than one (1) Business Day following the day on which the Contractor requests such stakes and/or marks, except where the Contractor's request is made immediately following asphalt planning operations. Then the Contract Administrator may require a maximum of two (2) Business Days to provide stakes and marks as a result of required adjustments to final design grades.

D28.2.3 The Contractor shall notify the Contract Administrator immediately of the disturbance of any such stakes or marks. The cost of correcting any errors arising out of neglect of the Contractor to so notify the Contract Administrator shall be borne entirely by the Contractor, as well as the cost of replacing any disturbed stakes or marks.

D28.2.4 Before commencing Work, the Contractor shall satisfy themselves as to the meaning and correctness of all stakes and marks and no claims shall be entertained by the City on account of any alleged inaccuracies. If any error is suspected in the Drawings, Specifications or the directions of the Contract Administrator, Work shall be discontinued until the errors are rectified, but no claims shall be made on account of any delay occasioned thereby.

D28.2.5 The Contractor shall determine and provide all dimensions and elevations measured from the stakes or marks.

D29. COOPERATION WITH OTHERS

D29.1 The Contractor's attention is directed to the fact that other Contractors, the personnel of Utilities and the staff of the City may be working on the structure, approach roadways, adjacent roadways or rights-of-way. The activities of these agencies may coincide with the Contractor's execution of the Work, and it will be the Contractor's responsibility to cooperate to the fullest extent with the other personnel working in the area, and such cooperation is an obligation of the Contractor under the terms of the Contract.

MEASUREMENT AND PAYMENT

D30. PAYMENT

D30.1 Further to C12, effective January 1, 2007, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

D31. PAYMENT SCHEDULE

D31.1 Further to C12, payment shall be in accordance with the following payment schedule:

(a) Custom manufactured items may be included in progress estimates prior to installation on site based on the following payment schedule:

(i) 50% of the bid supply costs, on manufacture and delivery to site;

(ii) 50% of the bid supply costs on installation;

(iii) 100% of the bid installation costs on installation.

WARRANTY

D32. WARRANTY

D32.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter, except where longer warranty periods are specified in the Specifications, unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

D32.2 Notwithstanding C13.2 or D31.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:

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

D32.2.1 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

D32.3 At least two (2) weeks prior to the expiration of the Warranty Period, or upon correction of all outstanding defects and deficiencies, whichever is later, the Contractor shall arrange, attend, and assist in acceptance inspection of the Work. The Contract Administrator shall, on being satisfied that all outstanding defects and deficiencies in the Work have been corrected, issue a Certificate of Acceptance for the Work to be dated not earlier than two (2) years after the date of the Certificate of Total Performance, or the date that the Contractor corrects the final defects and deficiencies, whichever is the later, thereby terminating the Warranty Period. The Certificate of Acceptance will indicate acceptance of the due performance of the Contract.

FORM H1: PERFORMANCE BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

_____ day of _____ , 20____ , for:

BID OPPORTUNITY NO. 77-2008

FORT GARRY TWIN BRIDGES – WESTBOUND STRUCTURE REHABILITATION AND ASSOCIATED ROADWORKS

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

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

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

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

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

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

_____ day of _____ , 20____ .

SIGNED AND SEALED in the presence of: _____ (Witness)	_____ (Name of Principal) Per: _____ (Seal) Per: _____ _____ (Name of Surety) By: _____ (Seal) (Attorney-in-Fact)

FORM H2: IRREVOCABLE STANDBY LETTER OF CREDIT
(PERFORMANCE SECURITY)
(SeeD11)

_____

(Date)

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

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 77-2008

FORT GARRY TWIN BRIDGES – WESTBOUND STRUCTURE REHABILITATION AND ASSOCIATED ROADWORKS

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 (1993 Revision), International Chamber of Commerce Publication Number 500.

_____
(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

FORM J: SUBCONTRACTOR LIST
(See D12)

FORT GARRY TWIN BRIDGES – WESTBOUND STRUCTURE REHABILITATION AND ASSOCIATED ROADWORKS

Name	Address
PART A: BRIDGE WORK	
SUPPLY OF MATERIALS:	
Structural Steel	
Abutment Stiffeners	
Black Reinforcing Steel	
Structural Concrete – Type 1	
Structural Concrete – Type 2	
Structural Concrete – Type 3	
Formwork	
Permeable Formwork Liner	
Architectural Formwork Liner	
Lean Mix Concrete	
Patching Materials for Abutments	
Dampproofing	
Galvanized Dowels & Expansion Sleeves	
Expansion Joints	
Aluminum Bridge Posts	
Aluminum Bridge Rails	
Granular Backfill	
Asphaltic Concrete Overlay	
Hot-Poured Rubberized Asphalt Waterproofing	
CONSTRUCTION/INSTALLATION/PLACEMENT:	
Traffic Control	
Structural Removals	

Bridge Deck Surface Preparation
Girder Strengthening
Abutment Stiffeners
Paintin Girders
Black and MMFX Steel Reinforcing
Damp Proofing
Expansion Jouints
Granular Backfill
Asphalic Concrete Overlay
Hot-Poured Rubberized Asphalt Waterproofing
PART B: ROADWORK
SUPPLY OF MATERIALS:
Underground
Base Course and Subbase
Geotextiles
Asphalt
Concrete
Soil and Seed
CONSTRUCTION / INSTALLATION / PLACEMENT:
Underground Works
Excavation and Compaction
Soft Excavation
Placement of Geotextiles
Installation of Corregated Steel Pipes
Placement of Base and Subbase
Placement of Asphalt Pavement
Placement of Concrete Pavement
Construction of Concrete Curbing and Sidewalks

FORM K: EQUIPMENT
(See D13)

FORT GARRY TWIN BRIDGES – WESTBOUND STRUCTURE REHABILITATION AND ASSOCIATED ROADWORKS

1. Category/type: Rotomill_

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

2. Category/type: Hydrodemolition Unit

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

3. Category/type: Underbridge Crane

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

FORM K: EQUIPMENT
(See D13)

FORT GARRY TWIN BRIDGES – WESTBOUND STRUCTURE REHABILITATION AND ASSOCIATED ROADWORKS

4. Category/type: Mechanical Screed

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

5. Category/type: Moveable Deck Hoarding

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

6. Category/type: Excavator

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

FORM K: EQUIPMENT
(See D13)

FORT GARRY TWIN BRIDGES – WESTBOUND STRUCTURE REHABILITATION AND ASSOCIATED ROADWORKS

7. Category/type: Dozer

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

Registered owner: _____

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

Registered owner: _____

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

8. Registered owner: _____

9. Category/type: Grader

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

10. Category/type: Compactors

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

FORM K: EQUIPMENT
(See D13)

FORT GARRY TWIN BRIDGES – WESTBOUND STRUCTURE REHABILITATION AND ASSOCIATED ROADWORKS

11. Category/type: Asphalt Paver

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

12. Category/type: Slip Form Concrete Paver

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

13. Category/type: Loader_

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

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

E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

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
PART A – BRIDGE WORK	
B173-08-001W	COVER SHEET
B173-08-002W	DESIGN DATA AND LIST OF DRAWINGS
B 173-08-003W	SITE PLAN - GENERAL LAYOUT
B173-08-004W	BRIDGE - SCOPE OF WORK
B 173-08-005W	GENERAL ARRANGEMENT - PLAN, ELEVATION AND CROSS SECTION
B 173-08-006W	DECK PROFILE 1
B 173-08-007W	DECK PROFILE 2
B 173-08-008W	WEST ABUTMENT DEMOLITION
B 173-08-009W	WEST ABUTMENT - CONCRETE DETAILS 1
B 173-08-010W	WEST ABUTMENT - CONCRETE DETAILS 2
B 173-08-011W	WEST ABUTMENT - CONCRETE DETAILS 3
B173-08-012W	WEST ABUTMENT - REINFORCING DETAILS 1
B173-08-013W	WEST ABUTMENT - REINFORCING DETAILS 2
B173-08-014W	EAST ABUTMENT DEMOLITION
B173-08-015W	EAST ABUTMENT - CONCRETE DETAILS 1
B173-08-016W	EAST ABUTMENT - CONCRETE DETAILS 2
B173-08-017W	EAST ABUTMENT - CONCRETE DETAILS 3
B173-08-018W	EAST ABUTMENT - REINFORCING DETAILS 1
B173-08-019W	EAST ABUTMENT - REINFORCING DETAILS 2
B173-08-020W	STIFFENER PLATES INSTALLATION ON ABUTMENT DIAPHRAGMS
B173-08-021W	GIRDER BOTTOM FLANGE STRENGTHENING - PLANS AND SECTION
B173-08-022W	GIRDER BOTTOM FLANGE STRENGTHENING - SPANS 1, 3, AND 4
B173-08-023W	GIRDER BOTTOM FLANGE STRENGTHENING - SPAN 5
B173-08-024W	GIRDER BOTTOM FLANGE STRENGTHENING - SECTIONS AND DETAILS
B173-08-025W	BRIDGE DECK - CONCRETE DETAILS 1
B173-08-026W	BRIDGE DECK - CONCRETE DETAILS 2
B173-08-027W	BRIDGE DECK - REINFORCING DETAILS 1
B173-08-028W	BRIDGE DECK - REINFORCING DETAILS 2
B173-08-029W	BRIDGE DECK - REINFORCING DETAILS 3
B173-08-030W	BRIDGE DECK - REINFORCING DETAILS 4
B173-08-031W	LAYOUT OF CONCRETE BARRIER AND ALUMINUM TRAFFIC BARRIER
B173-08-032W	CONCRETE BARRIER - SECTIONS AND DETAILS
B173-08-033W	CONCRETE BARRIER & STREET LIGHT BASE - REINFORCING DETAILS
B173-08-034W	ALUMINUM TRAFFIC BARRIER - SECTIONS AND DETAILS

B173-08-035W EXPANSION JOINTS - DETAILS 1
B173-08-036W EXPANSION JOINTS - DETAILS 2
B173-08-037W EAST AND WEST APPROACH SLABS - CONCRETE DETAILS
B173-08-038W EAST AND WEST APPROACH SLABS - REINFORCING DETAILS
B173-08-039W SLOPE PAVING MODIFICATIONS - PLANS AND SECTIONS
B173-08-040W REINFORCING SCHEDULE 1 (MMFX 2)
B173-08-041W REINFORCING SCHEDULE 2 (BLACK)
B173-08-042W REINFORCING SCHEDULE 3 (BLACK)
B173-08-043W BRIDGE AND PEDESTRIAN UNDERPASS LIGHTING AND DETAILS

PART B – ROADWORK

B173-08-044W LEGENDS AND ABBREVIATIONS
B173-08-045W TRAFFIC CONTROL, WESTBOUND DETOURS AND TRAFFIC MOVEMENTS
B173-08-046W PAVEMENT RECONSTRUCTION & WIDENING, BISHOP GRANDIN BOULEVARD WESTBOUND EXIT LANES TO PEMBINA HIGHWAY
B173-08-047W PAVEMENT RECONSTRUCTION & WIDENING, BISHOP GRANDIN BOULEVARD WESTBOUND LANES TO WAVERLEY STREET WEST OF RED RIVER
B173-08-048W PAVEMENT RECONSTRUCTION & WIDENING, BISHOP GRANDIN BOULEVARD WESTBOUND BRIDGE PROFILE & PROPOSED LANE CONFIGURATION
B173-08-049W PAVEMENT RECONSTRUCTION & WIDENING, BISHOP GRANDIN BOULEVARD WESTBOUND LANES FROM RED RIVER TO 80 m EAST OF RIVER RD.
B173-08-050W PAVEMENT CONSTRUCTION, BISHOP GRANDIN BOULEVARD WESTBOUND NORTH LANES FROM 80 m E OF RIVER RD. TO 400 m E OF RIVER RD
B173-08-051W NEW PAVEMENT CONSTRUCTION, BISHOP GRANDIN BOULEVARD WESTBOUND NORTH LANE FROM 400 m E OF RIVER RD. TO 680 m E
B173-08-054W DETAILS

PART C – DETOUR WORK

B173-08-052W EASTBOUND DETOUR LANES FOR 2009 OPERATIONS, THOUGH LANES FROM WAVERLEY STREET, CONSTRUCTION SEPT 1, 2008 TO NOV 1, 2008
B173-08-053W EASTBOUND DETOUR LANES FOR 2009 OPERATIONS, THOUGH LANES EAST OF RED RIVER, CONSTRUCTION SEPT 1, 2008 TO NOV 1, 2008

REFERENCE DRAWINGS

P.D.NO. 77.23A EXISTING 1977 FORT GARRY BRIDGE DRAWINGS (62 PAGES)

GENERAL REQUIREMENTS

E2. MOBILIZATION AND DEMOBILIZATION

E2.1 General

(a) This Specification shall cover all operations relating to the mobilization and demobilization of the Contractor to the 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.

E2.2 Materials

E2.2.1 General

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

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

E2.3 Construction Methods

E2.3.1 Scope of Work

(a) Layout of On-Site Work Facilities and Site Office Facilities

(i) The Work shall include all operations related to mobilization and demobilization to the Site, as well as all items associated with Specification E3, “Site Office Facilities.”

(b) Cellular Telephone Communication

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

(c) Miscellaneous

(i) This Specification shall also include travel and accommodation, minimum 1.8 m high chain-link secure fencing around the site lay down area, set-up, and demobilization of site office facilities, storage conveniences and other temporary facilities, construction plant, restoration of existing facilities following demobilization, and any other items not required to form part of the permanent Works and not covered by other prices.

E2.4 Measurement and Payment

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

(b) The Supply of Site Office Facilities shall not be measured. This item of Work shall be paid at the Contract Lump Sum Price for “Mobilization and Demobilization” 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.

E3. SITE OFFICE FACILITIES

(a) The Contractor shall supply site office facilities meeting the following requirements:

(i) A field office shall be provided for the exclusive use of the Contract Administrator.

(ii) The building shall be conveniently located near the site of the Work.

(iii) The building shall be 60'x10', with a ceiling height of 2.4 m with adequate windows (complete with security bars) to provide for cross ventilation, and a door entrance with a suitable lock.

(iv) The building shall be suitable for all weather use. It shall be equipped with heater(s) air conditioner(s) so that the interior room temperature can be maintained between 20 to 22ºC at any outside ambient temperature.

(v) The building shall be adequately lighted with fluorescent fixtures and have a minimum of six – 120 volt ac electrical receptacles.

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

(vii) One field office telephone line in the Contract Administrator's office for his/her exclusive use shall be supplied by the Contractor. Two additional separate land lines for a fax machine and a computer modem shall also be supplied.

(viii) One refrigerator, approximately 5 ft^3 and one mid-size microwave shall be supplied by the Contractor.

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

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

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

(xii) A minimum of three parking stalls shall be made available for use by the Contract Administrator immediately adjacent to the Contract Administrator's trailer.

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

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

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

E4. PROTECTION OF EXISTING TREES

E4.1 General

(a) This Specification shall cover all operations relating to the protection of existing trees.

(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.

E4.2 Materials

E4.2.1 General

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

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

E4.3 Construction Methods

E4.3.1 Scope of Work

(a) 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:

(i) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 m of trees.

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

(iii) 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.

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

(v) 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.

E4.3.2 Damage to Existing Trees

(a) All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the City Forester or his designate.

E4.4 Measurement and Payment

(a) No separate measurement or payment will be made for the Protection of Trees. Except as required in Clause E4.3.1(iii) and E4.3.1(v) of this Specification, Elm trees shall not be pruned at any time between April 1 and July 31.

E5. TRAFFIC CONTROL

E5.1 General

(a) This Specification covers 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 City of Winnipeg Specifications CW1130-R10, and as specified herein. It also includes construction of the Works necessary for the detour Works as specified herein and shown on the Drawings.

(b) In accordance with the Manual of Temporary Traffic Control, the Contractor ("Agency" in the manual) shall make arrangements with the Traffic Services Section of the City of Winnipeg to place all temporary regulatory signs. The Contractor shall bear all costs associated with the installation, maintenance, and removal of temporary traffic control devices by the Traffic Services Section of the City of Winnipeg in connection with the Works undertaken by the Contractor.

E5.2 Further to Clauses 3.6 and 3.7 of the City of Winnipeg Specification CW 1130-R1:

(a) Where directed, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planning drop-offs to the satisfaction of the Contract Administrator. No measurement for payment will be made for this Work.

E5.3 Materials

E5.3.1 General

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

(b) Unless specified otherwise herein, supply material in accordance with the City of Winnipeg Specifications for the applicable Works.

E5.4 Construction Methods

E5.4.1 Scope of Work

(a) This Work shall include all operations related to the installation, maintenance, and removal of traffic control items.

E5.4.2 Signage

(a) The Contractor shall be required to supply and erect traffic control signing for the construction of the surface Works related to the widening of Bishop Grandin Boulevard including advance signage and to erect and maintain road and sidewalk closure barricades at the east and west limits of the Worksite.

(b) The City shall undertake all temporary traffic control signage Works for the detours that will include traffic signal modifications, advance signings, signings for the detour across the Eastbound structure and maintenance of those temporary traffic control Works.

(c) If the Contractor requires lanes to be closed on the Westbound Bridge before it is fully closed to vehicular traffic, he must supply and erect the necessary signage. The following conditions shall also apply:

(i) One of the two lanes must be open at all times; and

(ii) No lanes may be closed between the hours of 06:30 and 09:00 hours and 15:30 to 18:00 hours, except on Saturdays and Sundays.

E5.4.3 Work by Others

(a) The Contractor shall coordinate with his schedule the following Work by Others related to this section:

(i) Removal of the traffic signals and bases required for the detour.

(ii) All traffic detour signing and maintenance of detour signing.

(iii) Public advertising of the traffic detour.

E5.5 Measurement and Payment

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

(i) Installation 50%

(ii) Removal 50%

E6. TRAFFIC MANAGEMENT

E6.1 Further to Clause 3.7 of the City of Winnipeg Specification CW 1130-R1:

(a) Construction site to be closed off to public use on Westbound Bishop Grandin Boulevard between River Road and the westbound exit detour road to Pembina Highway.

(b) Maintain a minimum of one lane of traffic westbound on Bishop Grandin Boulevard between the Westbound detour entrance (east of River Road) and River Road.

(c) Maintain one left turn lane and one right turn lane Westbound Bishop Grandin Boulevard at River Road.

(d) No lane closures will be permitted on Westbound Bishop Grandin Boulevard east of the Westbound detour (east of River Road).

(e) North/south traffic at Bishop Grandin Eastbound lanes and River Road must be maintained during construction to allow for one lane of traffic in each direction to go straight or turn right and another lane in each direction to turn left.

(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 Contact Administrator, and take reasonable measures to minimize the impact. The Contactor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

(g) Pedestrian and ambulance/emergency vehicle access must be maintained at all times.

E7. TRAFFIC DETOUR

E7.1 General

(a) This Specification shall cover all operations relating to the operation of existing Westbound detour roads.

(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.

E7.2 Materials

E7.2.1 General

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

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

E7.3 Construction Methods

E7.3.1 Scope of Work

(a) This Work shall involve the diversion of East/West traffic on Bishop Grandin Boulevard.

E7.3.2 Description

(a) The diversion of East/West traffic on Bishop Grandin Boulevard shall be performed as shown on Drawing B173-08-045W.

(b) Construction of the Westbound detour roads for the Bridge rehabilitation/widening, pavement reconstruction and lane widening was completed in the fall of 2007. The following scheduled Works are to be completed to put the detour roads into operation:

(i) Relocate the north barrier rail system at the west end of the Eastbound Bridge so the face of the rail is flush with the face of the Bridge concrete barrier;

(ii) Remove asphalt pavement plannings and place asphalt pavement hot mix on Bishop Grandin Boulevard Eastbound shoulder from the west end of the Eastbound Bridge to approximately 60 m west. This is required to complete the westbound detour road (works by 2007 Westbound detour contract).

(iii) Relocate existing concrete traffic barriers situated at the ends of the detour roads to designated locations required to close off the construction site. Any excess barriers are to be stored on site as directed by the Contract Administrator.

(c) City of Winnipeg forces including Traffic Services and Traffic Signals will sign, open and maintain all detour road signage.

E7.3.3 Removal of Existing Westbound Detour Roads

(a) Following Substantial Performance of Part A – Bridge Structural Works and Part B – Roadwork (Critical Stage of August 29, 2008) and Bishop Grandin Boulevard Westbound traffic has been taken off the detour road, removal of the Westbound detour roads may begin.

(b) The Contractor shall be responsible for providing the necessary traffic control and signage during the removal of the detour roads. One lane in both directions must be maintained at all times. Two lanes in both directions must be maintained between the hours of 06:30 and 09:00 and 15:30 to 18:00, except Saturdays and Sundays.

(c) Base course and subbase materials shall be salvaged and reused for the construction of the Eastbound detour roads.

(d) Culverts are to be salvaged and reused in the construction of the Eastbound detour roads.

(e) The Contactor shall backfill all detour road excavations with on site stockpiled fill material.

(f) Landscape restoration shall be completed in accordance with E28 Seeding.

(g) Original pavement curbing that was removed for the construction of the Westbound detour roads are to be replaced where shown on the Drawings and as directed by the Contract Administrator. Works shall be paid under contract pay items.

E7.3.4 Construction of Eastbound Detour Roads.

(a) The Contractor shall be responsible for providing the necessary traffic control and signage during construction of the Eastbound detour roads. One lane in both directions must be maintained at all times. Two lanes in both directions must be maintained between the hours of 06:30 and 09:00 and 15:30 to 18:00, except on Saturdays and Sundays.

(b) Construct the Eastbound detour roads in accordance with the Drawings and as directed by the Contract Administrator.

(c) Detour road excavations to be stockpiled on site shall be placed in a location approved by the Contract Administrator.

(d) Remove Bishop Grandin pavement curbing for the detour roads where shown on the Drawings, in accordance with E25 “Planing Integral Curb” and as directed by the Contract Administrator.

(e) After completion of the Eastbound detour roads, install precast concrete barriers closing off the newly constructed detour in accordance with E23 “Relocation of Precast Concrete Traffic Barriers”, as directed by the Contract Administrator.

E7.4 Measurement and Payment

E7.4.1 Roadway Base and Subbase

(a) Removal of Existing Roadway Base and Subbase shall be paid for at the Contract Unit Price per cubic metre, for “Excavation”, measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid for in full for supplying all materials and performing all operations herein described and all other items incidental to the Work. The volume shall be measured and accepted by the Contract Administrator.

(b) Placement of Salvaged Roadway Base and Subbase shall be paid for at the Contract Unit Price per cubic metre for “Place Salvage Roadway Subbase Material”, measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid for in full for supplying all materials and performing all operations herein described and all other items incidental to the Work. The volume shall be measured and accepted by the Contract Administrator.

E7.4.2 Remove and Salvage Existing Culverts

(a) The Removal and Salvaging of Existing Culverts shall be paid for at the Contract Unit Price per metre for “Remove and Salvage Corrugated Steel Pipe”, measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid for in full for supplying all materials and performing all operations herein described and all other items incidental to the Work. The length shall be measured and accepted by the Contract Administrator.

E7.4.3 Common Excavation

(a) Excavating, transporting, and placing of site fill material shall be measured and paid for in accordance with the City of Winnipeg Specification CW 3170-R3 for “Common Excavation – Suitable Site Material”.

E8. PEDESTRIAN PROTECTION/ACCOMMODATION

E8.1 General

(a) This Specification shall cover the provision of safe access for pedestrians and cyclists on the underbridge pathway at the East and West ends of the Bridge.

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

E8.2 Materials

E8.2.1 General

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

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

E8.3 Pedestrian Protection Enclosure

(a) A pedestrian protection wall on the East and West sides of the Site, complete with overhead protection, shall be a minimum of 2400 mm high and shall consist of support posts and minimum 13 mm thick plywood. The support posts shall have provision for anchorage to prevent movement or overturning of the pedestrian protection due to wind.

The pedestrian protection shall be designed for all applicable loading including wind loading in accordance with the requirements of the National Building Code. Adequate lighting shall be provided attached to the temporary pedestrian enclosure.

E8.4 Traffic Gates

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

E8.5 Construction Methods

E8.5.1 Scope of Work

(a) It is intended that the Contractor provide, at all times during the project, Pedestrian Protection and Guidance involving:

(i) The supply (as applicable), erection and maintenance of pedestrian protection, as specified herein;

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

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

E8.5.2 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.

E8.5.3 Maintenance of the Pathway

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

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

E8.6 Measurement and Payment

(a) Pedestrian Protection/Accommodation shall not be measured. This item of Work shall be paid for at the Contract Lump Sum Price for “Pedestrian Protection/Accommodation" performed in accordance with this Specification and accepted by the Contract Administrator. “Pedestrian Protection/Accommodation" shall be pro-rated on a weekly basis over the construction period, 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. Prorated payment will be based on the following Work.

(i)	Installation	40%
(ii)	Maintenance	30%
(iii)	Removal	30%

E9. STRUCTURAL REMOVALS

E9.1 Description

(a) This Specification shall cover all operations related to removal and disposal of miscellaneous existing Bridge components as listed below. 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 Work as hereinafter specified.

E9.2 Submittals

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any Work on Site, a detailed plan and schedule, clearly illustrating the method and sequence by which he proposes to perform the structural removals, including a description of the measures that will be implemented to meet the environmental requirements. The demolition procedure shall include detailed design notes and Shop Drawings that are sealed, signed, and dated by a Professional Engineer licensed to practice in the Province of Manitoba necessary to describe the following:

(i) Work platforms;

(ii) Type and capacity of equipment;

(iii) Sequence of operations;

(iv) Design of demolition catch platforms; and

(v) Description of the measures that will be implemented to meet the requirements of D25 – Environmental Protection Plan.

(b) The Contractor shall prepare and submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any Work on Site, a plan detailing the Contractor's hydrodemolition runoff control and disposal methods and procedures. Wastewater from the hydrodemolition process shall be controlled and filtered to produce visibly clear water prior to entering the City's land drainage sewer system. Bridge deck drain openings shall be plugged during the hydrodemolition process. At no time can runoff of wastewater be permitted to enter the watercourse or the City's land drainage system unfiltered.

E9.3 Materials

E9.3.1 General

(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 workmanship like manner, to the satisfaction of the Contract Administrator.

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

E9.4 Equipment

E9.4.1 General

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

E9.4.2 Demolition Catch Platforms and Work Platforms

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

E9.5 Construction Methods

E9.5.1 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.

(b) This section of Work comprises of the following structural removals:

(i) Remove and salvage aluminum traffic rails;

(ii) Asphalt wearing surface and waterproofing membrane;

(iii) Reinforced concrete barriers and Bridge deck overhang;

(iv) Stage I deck concrete;

(v) Deck drains;

(vi) Expansion joints;
(vii) Abutment wingwalls and roof slabs;
(viii) Approach slabs; and
(ix) Stage II deck concrete
(a) Type 1
(b) Type 2

(c) Remove concrete and other removal items with appropriate equipment satisfactory to the Contract Administrator. No demolition products shall find their way into the watercourse. Provide saw cuts as shown on the Drawings and where otherwise necessary to limit the extent of demolition. Repair any over demolition and reinforcing damage to the satisfaction of the Contract Administrator.

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

E9.5.2 Removal and Salvaging of Aluminum Traffic Rails

(a) Remove traffic posts and rails. Salvage traffic rails.

(b) New hardware shall be supplied in accordance with E17, “Installation of Balanced Barrier and Aluminum Traffic Barrier”.

(c) The Contractor shall be responsible for any damaged or missing components of items to be salvaged.

(d) The installation of aluminum Traffic Bridge posts and rail is covered in the Specification E17 “Installation of Balanced Barrier and Aluminum Traffic Barrier”.

E9.5.3 Removal and Salvaging of Approach Roadway Barrier Rails and Posts

(a) Remove and Salvage barrier rails and posts on approach roadways.

(b) Install Salvage barrier rails and posts as indicated on the Drawings in accordance with the City of Winnipeg Specification CW 3650-R4.

E9.5.4 Removal of Asphalt Wearing Surface and Waterproofing Membrane

(a) The asphalt wearing surface and waterproofing membrane shall be completely removed by rotomilling, scraping, or other means as approved by the Contract Administrator.

E9.5.5 Removal of Reinforced Concrete Barriers and Bridge Deck Overhang

(a) This Work shall include removal of the precast reinforced traffic barriers and the cast-in-place Bridge deck overhangs.

(b) Removal of the concrete barriers, and the Bridge deck overhang concrete shall be to the limits of excavation as shown on the Drawings.

(c) The existing barriers are precast and attached to the Bridge deck overhang as shown in the existing Drawings, P.D. 77.23A. In addition, 15 m dowels at 600 mm on centre have been grouted into the existing deck. However, there are no reference Drawings for this additional Work.

(d) The deck overhang shall be removed by saw cutting as shown on the Drawings. Following the initial overhang removal an additional 100 to 240 mm of concrete shall be removed by hydrodemolition. The existing reinforcement shall be exposed and shall remain. The exposed concrete surface shall be roughened to a minimum amplitude of 6 mm and a maximum frequency of 15 mm.

E9.5.6 Removal of Stage I Concrete

(a) Stage I concrete removal shall be the removal of the concrete deck, if necessary, to a maximum depth of 14 mm measured from the top of the existing concrete deck surface or up to the mid height of the existing top reinforcing mat.

(b) Following the removal of the asphalt wearing surface and waterproofing membrane, the Contractor shall conduct a deck survey as indicated on the Drawings. The Contract

Administrator shall utilize this survey to develop a limit of excavation. It is estimated that a thickness varying between 25 and 40 mm is to be removed. The Contract Administrator will update the Drawings for the Contractor within (5) five Business Days.

(c) Stage I concrete removal shall be undertaken by a combination of rotomilling and hydrodemolition. The top layer of reinforcing steel is being salvaged. Therefore it must be ensured that the reinforcing steel is not damaged. Touch-ups of the coated reinforced steel shall be required if damaged during concrete removal. Acceptable epoxy coating material is 3M Scotchkote or equivalent. No additional payment shall be made for touch-ups. Any reinforcing steel damaged shall be replaced to the satisfaction of the Contract Administrator at no additional cost to the City.

E9.5.7 Removal of Stage II Concrete

(a) Stage II concrete removal shall be defined by the following types:

(i) Type 1 – Removal of the concrete deck below the existing top reinforcement mat to a maximum depth of the top of the bottom layer of deck reinforcing; and

(ii) Type 2 – Full depth concrete deck removal.

(b) Forming of the deck soffit in accordance with E14 shall be considered incidental to this Work.

(c) Removal of Stage II concrete shall be conducted by hydrodemolition.

E9.5.8 Bridge Deck Surface Preparation Works

(a) The final surface preparation of the Bridge deck shall be conducted by hydrodemolition, unless otherwise approved by the Contract Administrator. The resulting surface shall be roughened to a minimum amplitude of 6 mm and maximum frequency of 15 mm.

(b) Prior to the commencement of the removal operation by hydrodemolition, the hydrodemolition equipment shall be calibrated on an area of sound concrete approximately 600 x 1500, as directed by the Contract Administrator. The cost of the calibration procedure is incidental to the Work. The Contractor shall provide the Contract Administrator with the following settings:

(i) Water pressure;

(ii) Machine staging control (step);

(iii) Nozzle size; and

(iv) Nozzle speed.

(c) During the calibration, any or all of the above settings may be adjusted in order to achieve removal in accordance with the requirements of the Drawings. When the designated depth of removal is attained, the settings shall be recorded and maintained throughout the removal operation unless otherwise directed by the Contract Administrator. The depth of removal shall be verified periodically and, if necessary, the equipment recalibrated to ensure the depth of removal as indicated on the Drawings is achieved.

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

(e) Where applicable, any "shadowing" of the reinforcing steel by concrete not removed by the process of hydrodemolition shall be removed by the Contractor through other approved means.

(f) After the hydrodemolition is completed, the deck shall be inspected through methods of sounding by the Contract Administrator to ensure that all partial depth deteriorated concrete has been removed. Should deteriorated concrete be found, the Contractor shall remove the areas of deteriorated concrete by additional passes of the hydrodemolition equipment or jackhammers. Payment for removal of these areas shall be considered as part of Stage II deck concrete removals.

(g) Upon completion of the hydrodemolition of each section of the concrete deck, the Contractor shall remove all cuttings, slurry containing the products of hydrodemolition, and all other debris from the resulting concrete surface so as to produce a thoroughly clean surface. Cleaning of each section shall be done before debris and water are allowed to dry on the deck surface and prior to the placement of reinforcing steel.

(h) There is a possibility that during hydrodemolition blow-throughs of the deck may occur. Since it is difficult to predict when or even if a blow-through will occur, the following contingency plan shall be undertaken by the Contractor for this eventuality:

(i) In instances where a blow-through of the Bridge deck does occur, the Contractor will be required to halt the water jet immediately and stop the flow of water and deck solids. The latter may be accomplished by immediately placing sandbags in the location of the blow-through opening.

E9.5.9 Deck Survey

(a) The Contractor shall conduct a survey for the existing concrete after all types of removals have been performed as indicated on the Drawings.

(b) The Contract Administrator shall provide the final elevations for the new deck concrete and for the top of the HPC deck overlay.

(c) The Contract Administrator shall update the Drawings for the Contractor within (10) ten Business Days.

E9.5.10 Removal of Deck Drains

(a) Remove and dispose of the existing deck drains.

(b) Patch concrete deck as shown on the Drawings. Patch the girder web as shown in the Drawings and in accordance with E14. All patching materials for this Work shall be approved by the Contract Administrator prior to patching operations.

E9.5.11 Removal of Expansion Joints

(a) Remove of and dispose of the existing Bridge deck expansion joints and seals.

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

E9.5.12 Removal of Abutment Wingwalls and Roof Slabs

(a) The demolition of the abutment wingwalls and roof slabs shall be conducted to the limits shown on the Drawings.

(b) This Work shall include removal of the cast-in-place traffic barriers mounted on the abutments and wingwalls.

(c) All abutment demolition operations, as well as all prepatory measures associated with the construction of new wingwalls and widened abutment roof slabs shall be incidental to this Work.

E9.5.13 Removal of Approach Slabs

(a) Remove and dispose of the existing approach slabs.

E9.6 Measurement and Payment

E9.6.1 Structural Removals

(a) Structural Removals shall not be measured. This item of 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:

Structural Removals

(i) Remove and Salvage Aluminum Traffic Rail;

(ii) Asphalt Wearing Surface and Waterproofing Membrane;
(iii) Reinforced Concrete Barriers and Bridge Deck Overhang;
(iv) Stage I Deck Concrete;
(v) Deck Drains;
(vi) Expansion Joints;
(vii) Abutment Wingwalls and Roof Slabs; and
(viii) Approach Slabs.

(c) Structural Removals shall be paid for at the Contract Unit Price per square metre for the "Items of Work" listed here below, 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. The area to be paid for shall be the total concrete removed as provided by the joint survey profiles conducted by the Contract Administrator and the Contractor.

(d) Items of Work:

Structural Removals

(ix) Stage II Deck Concrete
(a) Type 1
(b) Type 2

E9.6.2 Bridge Deck Surface Preparation

(a) Bridge Deck Surface Preparation shall not be measured. This item of Work shall be paid for a the Contract Lump Sum Price for "Bridge Deck Surface Preparation", 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.

E10. STRUCTURAL EXCAVATION

E10.1 Description

(a) This Specification shall cover all operations related to clearing, grubbing, and structural excavation for abutment Works, and approach slab, as herein specified and the City of Winnipeg Specification CW 2030, and as indicated on the Drawings.

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

E10.2 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 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.

(b) 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.

E10.3 Materials

E10.3.1 General

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

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

E10.3.2 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.

E10.3.3 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.

E10.4 Equipment

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

E10.5 Construction Methods

E10.5.1 Scope of Work

(a) The Work shall comprise:

(i) The excavation of all material required to construct the Works, including clearing and grubbing;

(ii) The off-Site disposal of surplus and unsuitable material; and

(iii) Dewatering of all excavations, as required, for the abutment Works and approach slabs.

E10.5.2 Excavation

(a) 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.

(b) 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.

(c) 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.

(d) 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.

E10.5.3 Inspection

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

E10.5.4 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.

E10.5.5 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 riverbank.

E10.5.6 Excess Material

(a) All 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.

E10.6 Measurement and Payment

E10.6.1 Excavation

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

E11. STRUCTURAL STEEL STRENGTHENING

E11.1 Description

(a) This Specification shall cover the preparation of the existing structural steel, the supply, fabrication and installation of new structural steel, and the coating of the new structural steel within the strengthening areas as specified herein.

(b) It is critical that this Work is completed prior to the Bridge deck demolition Work.

(c) This Specification shall cover all operations relating to installation of abutment stiffeners as specified herein and as shown on the Drawings.

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

E11.2 Submittals

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

(b) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the scheduled commencement of any fabrication, the operator's qualifications, Shop Drawings, and mill certificates. No engineer seal is required for the Shop Drawings.

(c) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty-one (21) days prior to the scheduled commencement of any fabrication, the proposed welding procedures and welding consumable certificates. No engineer seal is required for the Shop Drawings.

(i) The Contractor shall submit copies of the welding procedures which he intends to use, for examination and acceptance by the Contract Administrator.

(ii) Such procedures shall be accompanied by documentary proof that they have been qualified previously by the Canadian Welding Bureau at the plant where the Work is to be carried out.

(iii) The procedures shall include the following information: joint type, welding process, welding position, base metal specification, welding consumable specification and size, preheat requirements, amperage and voltage requirements, speed, polarity, and welding equipment, including a description of travel for automatic welding.

(d) The Contractor shall submit to the Contract Administrator for review and approval, at least five (5) Business Days prior to the commencement of Work on the Site, access methods for workers and equipment to the repair areas.

E11.3 Materials

E11.3.1 General

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

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

E11.3.2 Structural Steel

(a) All general structural steel, except as noted shall conform to the requirements of CSA Standard CAN/CSA-G40.21-04, Grade 350WT, Category 3.

(b) Structural steel for stiffener plates shall be in accordance with CSA G40.21 Grade 300W. The stiffener plates are to be hot-dip galvanized or metallized.

E11.3.3 High Strength Bolts, Nuts and Washers

(a) High strength bolts shall conform to the requirements of ASTM Specification A325, Type 1. Nuts shall conform to the requirements of ASTM Specification A563, Grade DH. Washers shall conform to the requirements of ASTM Specification F436, Type 1.

E11.3.4 Self-Priming Topcoat

(a) Self-priming topcoat shall be Termarust Series 2100 (RAVCS) as manufactured by Termarust Technologies. The colour shall be 402TR2100, to match the weathered steel.

(b) No primer shall be applied between faying surfaces.

E11.3.5 Abrasive for Blast Cleaning

(a) The blast cleaning abrasive shall be free of corrosion-producing contaminants. Silica or other sand will not be permitted. Slag abrasives shall contain no more than 0.1% oil by weight. The blast-cleaning abrasives and grit size employed shall be capable of achieving a surface anchor-tooth profile having a peak-to-valley height of 2 to 4 mils.

E11.3.6 Welding Consumables

(a) Welding consumables for all processes shall be certified by the Manufacturer as complying with the requirements of CSA Standard W59-03 and the following Specifications:

(i) Manual, Shielded Metal Arc Welding (SMAW):

- All electrodes for manual, shielded metal arc welding shall conform to CSA W48.1-01, CSA W48.3-98 classification E480XX or imperial equivalent.

(ii) Gas, Metal Arc Welding (GMAW):

- All electrodes used in the gas, metal arc-welding process shall be composite electrodes conforming to CSA W48.4-06 classification ER480S-X or imperial equivalent.

(iii) Shielding gas shall be welding grade carbon-dioxide with a guaranteed dew point of -46°C.

(iv) Submerged Arc Welding (SAW):

(v) Welding electrodes and fluxes used in the submerged arc welding process shall conform to CSA W48.6-96 classification F480X-EXXX or imperial equivalent.

(vi) All electrodes, wires and fluxes used shall be of a classification requiring a minimum impact of 27 joules at -30°C as outlined in the various codes mentioned above.

- In multiple pass welds, the weld may be deposited such that at least two layers on all surfaces and edges are deposited with one of the filler metals listed above for each particular welding process, provided the underlying layers are deposited with one of the filler metals specified in CSA Standard W59-03.

E11.3.7 Galvanizing Touch-up and Field-Applied Galvanizing

(a) The blast cleaning abrasive shall be free of corrosion-producing contaminants. Silica or other sand will not be permitted. Slag abrasives shall contain no more than 0.1% oil by weight. 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 A780-80 for "Repair of Damaged Hot-Dip Galvanized Coatings."

Approved products are:

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

(ii) 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.

E11.3.8 Incidental and Miscellaneous Materials

(a) All incidental and miscellaneous materials required for the undertaking the Works of this Specification shall be as approved by the Contract Administrator.

E11.4 Construction Methods

E11.4.1 Scope of Work

(a) The scope of Work shall include the following items:

(i) Installation and removal of access to all areas identified on the Drawings;

(ii) Fabrication, surface preparation, coating, and installation of new structural steel; and

(iii) Installation of abutment stiffeners.

E11.4.2 Details of Existing Structure

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

(b) The information shown has been obtained from existing drawings, measurements, and observations at the Site. The accuracy of this information is not guaranteed and the Contractor must verify all information before commencing Work.

E11.4.3 Access and Scaffolding

(a) The City shall make available the use of an underbridge crane for inaccessible Work areas for the Contractor's use. The underbridge crane shall be made available for a period of two weeks prior to the commencement of demolition, and for one week prior to the opening of the Bridge. The Contractor shall provide to the City a minimum of one month's notice for the use of the underbridge crane. Should a lane closure be required for this Work, the Contractor shall not close any lanes on Bishop Grandin Boulevard during the hours of 06:30 to 09:00 and 15:30 to 18:00, except on Saturday and Sundays, and shall remove temporary traffic control devices from these lanes accordingly. One (1) lane on Bishop Grandin Boulevard may be closed outside these hours when working within four (4) metres of the edge of travelled lanes.

(b) All scaffolding, platforms, and swing-stages shall be designed, constructed, erected and operated in accordance with Workplace Safety and Health Act, applicable Regulations and as approved by the Contract Administrator.

(c) All access routes shall be restored to the pre-construction condition or better incidental to the Works of this Specification.

E11.4.4 Surface Preparation of Existing Structural Steel

(a) General

(i) All surfaces of the existing girder bottom flange shall be solvent cleaned as specified herein.

(ii) The Contractor shall comply with all applicable environmental, health, and safety regulations related to the surface preparation of the existing structural steel.

(b) Surface Cleaning

(i) All organic materials such as bird droppings, nests and other non-structural obstructions or pollutants attached to the existing structural steel shall be removed by hand cleaning operations. All such materials shall be disposed of off and away from the site by the Contractor in accordance with the appropriate regulations to the satisfaction of the Contract Administrator.

(ii) Grind smooth all surface defects, such as burrs, that will hinder the installation of the new structural steel.

(iii) All oil and grease shall be removed manually with solvent cleaning as per SSPC Specification SP1.

E11.4.5 Fabrication and Installation of New Structural Steel

(a) General

(i) Except as otherwise specified herein, steelwork shall be fabricated in accordance with the latest A.W.S. Specification D1.1 and subsequent revisions.

(ii) No fabrication shall commence until permission to do so has been received from the Contract Administrator.

(iii) The repair of any members damaged during fabrication shall be approved by the Contract Administrator.

(b) Preparation of New Material

(i) Prior to being used in fabrication, all new structural steel shall be straight and free from kinks or bends. If straightening is necessary, it shall be done by methods that will not injure the metal. The steel shall not be heated unless permission is given by the Contract Administrator. Sharp kinks and bends will be cause for rejection of the steel.

(ii) Steel may be cut to size by sawing, shearing, flame-cutting or machining. All steel, after cutting, shall be marked by a method agreed to by the Contract Administrator so that its Specification may be immediately identified.

(iii) Sheared edges of plates more than 16 mm in thickness shall be planed to a depth of 6 mm.

(iv) Special attention shall be given to the cutting of cover plates or flange plates. Occasional gouges not in excess of 6 mm deep will be accepted in areas of low stress at the discretion of the Contract Administrator. The repair or removal of such gouges shall be to the Contract Administrator's instructions.

(v) Edges of flame cut edges shall be ground to a radius of 2 mm. Re-entrant cuts shall be filleted to a radius of not less than 19 mm.

(c) Bolt Holes

(i) All bolt holes for high strength bolts shall be drilled and shall be of a nominal diameter not more than 2 mm in excess of the nominal bolt diameter.

(ii) Drilling shall be done with twist drills. Burrs on the outside surface shall be removed.

(iii) Poor matching of holes will be cause for rejection.

(d) Edge Preparation for Welding

(i) The edges of plates or sections which are to be welded together shall be prepared by sawing, shearing, flame-cutting, machining, chipping or arc air gouging to the details shown on the Shop Drawings. Surfaces and edges to be welded shall be smooth, uniform and free from fins, tears, cracks, and other defects which would

adversely affect the quality or strength of the weld. Surfaces to be welded shall also be free from loose scale, slag, rust, grease, moisture or other material that will prevent proper welding. Mill scale that withstands vigorous wire brushing, a light film of drying oil or a thin rust-inhibitive coating may remain, except that all mill scale shall be removed from the surfaces on which welds are to be made by submerged arc welding or by shielded metal arc welding with low hydrogen electrodes. Surfaces within 50 mm of any weld location shall be free from any paint or other material that would prevent proper welding or produce objectionable fumes while welding.

(ii) All flange plates shall be cut so that the direction of applied stress is parallel to the direction of plate rolling.

(iii) Edges of material thicker than specified in the following list shall be trimmed if and as required to produce a satisfactory welding edge wherever a weld along the edge is to carry calculated stress:

Sheared edges of material thicker than ..... 12 mm
Rolled edges of plates (other than Universal Mill Plates)
thicker than ..... 9 mm
Toes of angles or rolled shapes (other than
wide flange sections) thicker than ..... 16 mm
Universal Mill Plates or edges of flanges
of wide flange section thicker than ..... 25 mm

(iv) Edges may be prepared by oxygen cutting, providing a smooth and regular surface free from cracks and notches is secured, and providing that an accurate profile is secured by the use of a mechanical guide. Freehand cutting shall be done only where acceptable to the Contract Administrator.

(v) All flange plates prepared by flame cutting shall be preheated in accordance with E11.4.5(g).

(vi) In all oxygen cutting, the cutting flame shall be so adjusted and manipulated as to avoid cutting beyond (inside) the prescribed lines. Roughness of cut surfaces shall not be greater than that defined by the United States Standards Institute surface roughness value of 1,000 (USAI B46.1, Surface Texture). Roughness exceeding this value shall be removed by machining or grinding. Occasional gouges will be tolerated only at the discretion of the Contract Administrator and shall be repaired in accordance with his instruction.

(e) Edge Preparation (Nonwelded Edges)

(i) Steel may be cut to size by sawing, shearing, flame-cutting or machining. All steel after cutting shall be marked by a method agreed to by the Contract Administrator so that its Specification may be immediately identified.

(ii) Sheared edges of plates more than 16 mm in thickness shall be planed to a depth of 6 mm.

(iii) Any flame cutting of steel shall be in accordance with E11.4.5(g).

(iv) Special attention shall be given to the cutting of cover plates or flange plates. Occasional gouges not in excess of 6 mm deep will be accepted in areas of low stress at the discretion of the Contract Administrator. The repair or removal of such gouges shall be to the Contract Administrator's instructions.

(v) Edges of flame cut flange plates shall be ground to a radius of 2 mm. Re-entrant cuts shall be filleted to a radius of not less than 19 mm.

(f) Assembly and Welding Sequences

(i) If requested by the Contract Administrator, the Fabricator shall supply full details of the proposed assembly and welding sequence of any particular weldment.

(ii) The shop assembly of the various components of the weldments shall be executed in accordance with A.W.S. D1.1 Subsections 3.3 and 3.4.

(iii) Tack welding shall be done by qualified operators, using the smallest size weld required to hold the components of the assembly together. Tack welds shall not be less than 50 mm in length and shall be incorporated in the final weld.

(iv) Tack welds shall be made with 4 mm maximum size electrodes and shall be subject to the preheat requirements of E11.4.5(g).

(g) Preheat and Interpass Temperatures

(i) No welding shall be done when the ambient temperature is lower than -20°C.

(ii) At temperatures below 0°C, the steel shall be preheated to a temperature of at least 10°C in excess of that stated in Table E11.1, "Minimum Preheat and Interpass Temperatures".

(iii) Preheat shall be applied to all steel to be welded so that the steel within 80 mm of the weld is heated to the temperature shown in Table E11.1, "Minimum Preheat and Interpass Temperatures".

(iv) Preheat shall be applied in such a manner that moisture from the heating equipment does not penetrate the joint.

(v) For all welding processes, preheat and interpass temperatures shall be maintained during welding, at temperatures not less than stated in Table E11.1, "Minimum Preheat and Interpass Temperatures".

TABLE E11.1
MINIMUM PREHEAT AND INTERPASS TEMPERATURES

Thickness of Thickest Part at Point of Welding	CSA Standard W59-M1989 Grade 350WT
Less than 19 mm	10°C
19 mm to 38 mm	10°C
38 mm to 64 mm	65°C
Over 64 mm	107°C

(vi) Preheat temperatures above the minimum shown in Table E.11.1, "Minimum Preheat and Interpass Temperatures", may be required for highly restrained joints if designated by the Contract Administrator.

(vii) Preheat temperature shall in no case exceed 200°C but there shall be no limit on interpass temperature.

(viii) Preheat requirements for tack welds shall be as in the above table except that where single pass tack welds are used and are to be incorporated and consumed in a weld made by the submerged arc and the gas metal arc processes, preheat is unnecessary.

(h) Surface Preparation of New Structural Steel

(i) All surfaces of new prepared structural steel shall be thoroughly shop cleaned to SSPC-SP6/NACE No. 3, Commercial Blast Cleaning or equivalent as approved by the Contract Administrator.

(i) Field Assembly

(i) The new structural steel W shapes and angles shall be snug tight to the girder bottom flange. Steel filler plates shall be installed where necessary as shown on the Drawings.

(ii) All field connections shall be bolted with high strength bolts. Bolting with high strength bolts shall be carried out in accordance with "AASHTO Standard Specifications for Highway Bridges-1996 Division II, Clause 11.5-Assembly – turn of nut method."

(j) Straightening of Bent Material

(i) The straightening of new plates and angles or other shapes shall be done by methods that will not produce fracture or injury. The metal shall not be heated unless permitted by the Contract Administrator, in which case the heating shall not be a higher temperature than that producing a “dark cherry red” colour. After heating, the metal shall be cooled as slowly as possible.

(ii) Following the straightening of a bend or buckle, the surface of the metal shall be carefully inspected for evidence of fractures and if necessary, replaced or repaired to the satisfaction of the Contract Administrator.

(k) Misfits

(i) The correction of minor misfits involving harmless amounts of reaming, cutting and chipping as determined by the Contract Administrator will be considered a legitimate part of erection. However, the correction of any error associated with shop fabrication or field installation, which prevents the proper assembling and fitting up of parts by the moderate use of drift pins or by a moderate amount of reaming and slight chipping or cutting, shall be the responsibility of the Contractor.

E11.4.6 Coating of Existing and New Structural Steel

(a) All exposed surfaces of the new structural steel within the strengthening areas shall be coated with Termarust Series 2100 (RAVCS) to the Recommended DFT (Dry Film Thickness) of 250 – 300 microns (10 – 12 mils) in accordance with the Manufacturer’s recommendations.

(b) The coating shall not be applied at temperatures below 2°C. In addition, there must be a 2°C spread between the temperature and the dew point. The relative humidity must be no greater than 99% and the steel should be free of surface moisture.

E11.4.7 Stiffener Plates

(a) Stiffener plates are to be installed in the temporary jacking locations as shown on the Drawings. They shall be installed by welding and shall be left permanently in place. Welding shall be completed as specified herein.

E11.4.8 Welding

(a) Welding shall be done the manual, shielded metal arc, gas shielded metal arc, or submerged arc processes in accordance with the approved procedures and A.W.S. D1.1 Section 4, Technique.

(b) All welding shall be done under cover and, in the case of gas metal arc welding, shall be done in an area free from wind or draft.

(c) Where the submerged arc or gas metal arc processes are to be used, the Contract Administrator may order that:

(i) A preliminary test run of the accepted procedure be made over the length of the joint to prove that the disposition of the equipment, the handling of hoses, and the method and accuracy of travel are satisfactory.

(ii) Each operator make a weld specimen not less than 1.2 m in length for fillet welds and 150 mm in length for butt welds. Steel of the same specification and thickness as that to be used in the Work shall be used in the specimen welds. No welding shall be done on the Work until such a specimen is satisfactory to the Contract Administrator.

(d) Materials to be used for backing strips and runoff tabs shall conform to the same Specifications as the base material.

(e) Butt welds shall be extended beyond the edges of the parts to be joined by means of start and runoff tabs providing sufficient thickness to avoid the weld burning through and with a joint preparation similar to that on the main material. For manual shielded metal arc welding, the width of the tabs shall be not less than the thickness of the thicker part being joined or 75 mm, whichever is greater. For submerged arc welding, the width of the tabs shall be not less than 75 mm. Each weld pass shall be carried far enough beyond the

edge of the parts being joined to ensure sound welds in the joint. Tabs shall be removed upon completion and cooling of the weld without damage to the parent plate and the end of the weld made smooth and flush with the edges of the abutting parts.

(f) In gas metal arc welding, the equipment shall be capable of sustaining a gas flow rate of from 0.85 to 1.27 m^3 per hour.

(g) Mechanical scaling tools shall not be used on any weld surface that is a final weld surface. Scaling tools may be used on welded passes provided their use does not crack or injure the first pass of a multi-pass weld.

(h) Semiautomatic machines may be used only when they are equipped with a mechanical control of travel speed.

(i) Repairs to welds of base metal shall be made by grinding or arc air-gouging followed by grinding. The use of flame gouging or oxygen gouging shall not be permitted.

(j) The quality and details of welds shall be in accordance with CSA Standard W59-03, Clause 12.5.4.

(k) Welds shall have no cracks, inadequate penetration or lack of fusion, and shall have no other defects exceeding the limits in size and frequency of occurrence as specified in CSA Standard W59-03, Clause 12.5.4. Fusion type defects referred to in the Clause shall be interpreted as slag inclusions and similar generally elongated defects.

(l) Undercut at the toe of the flange-to-web fillet weld shall not be allowed, except in regions of low stress at the discretion of the Contract Administrator.

E11.4.9 Weld Profiles

(a) Weld profiles shall meet the requirements of CSA Standard W49-89 Clause 5.9.

E11.4.10 Welding Consumables

(a) All electrodes having low hydrogen coverings shall be dried for at least two hours between 230°C and 260°C, before they are used. Electrodes shall be stored immediately after drying in storage ovens held at a temperature of at least 120°C. Electrodes that are not used within four hours after removal from a drying or storage oven shall be redried before use. Electrodes that have been wet shall not be used.

(b) Electrode wire used in submerged arc welding and gas metal arc welding shall be stored in the original container at room temperature and kept free of moisture, oil, dirt or other contaminators.

(c) Flux used for submerged arc welding shall be dry and free of contamination from dirt, mill scale, oil, or other foreign material. Fused flux shall not be used on the Work.

(d) Gas for gas metal arc welding shall be stored in marked steel bottles and shall not be subjected to temperatures in excess of 50°C or temperatures of less than 0°C.

E11.4.11 Field Applied Touch-Up Galvanizing

(a) Any areas of damaged galvanizing or metallizing on miscellaneous steel items shall receive field-applied touch-up galvanizing, in accordance with ASTM A780-00.

(b) 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.

E11.4.12 Dimensional Tolerances

(a) Members and parts of members shall be straight, true to line, and free from twists and bends. In determining acceptability under these general requirements, the tolerances stated herein after shall be applied.

(b) Deviation from specified camber at centre of beam: in accordance with CSA Standard W59-03, Clause 5.8 (c).

(c) Lateral deviation on H or I members: ± 6 mm.

(d) Deviation from flatness of girder webs measured between flanges or between stiffeners: As per CSA Standard W59-03, Clause 12.5.3.

(e) Combined warpage and tilt of flanges of girders, determined by measuring the offset between the end of the flange plate and the flange plate at the centre of the web plate: As per CSA Standard W59-03, Clause 5.8(f).

(f) This tolerance does not apply to the following cases:

(i) Abutting parts of flanges to be butt welded, which shall meet the requirements of CSA Standard W59.1-03, Clause 5.4.4.

(ii) Flange plates at bearings shall meet the requirements of the following:

- Flanges of members at bearings shall not be out of square with the theoretical vertical axis of the member. The flange plate shall have full contact with the bearing sole plate.

(g) Deviation from specified depth: As per CSA Standard W59-03, Clause 5.8 (j).

(h) Intermediate Stiffeners: As per CSA Standard W59-03, Clause 5.8 (k).

(i) Bearing Stiffeners: As per CSA Standard W59-03, Clause 5.8 (l).

(j) The maximum deviation from the specified length measured on centreline of web: ± 6 mm.

E11.5 Quality Control

E11.5.1 Qualifications of Contractor

(a) The Contractor shall produce evidence that his plant is recently fully approved by the C.W.B. to the requirements of CSA Specification W47.1-03, Division 1 or 2.1.

E11.5.2 Qualifications of Operators

(a) The Contractor shall produce evidence that all welding operators to be employed on the Work are currently qualified by the C.W.B. at the time of fabrication and in the processes in which they are to be employed on the Work. Such qualification shall have been issued within two (2) years of the commencement of fabrication.

(b) The Contractor shall also produce evidence relative to each operator, that he has been executing satisfactory welding in the required processes within the six-month period previous to the award of this Contract.

E11.5.3 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or acceptance that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works which are not in accordance with the requirements of this Specification.

E11.5.4 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.

E11.5.5 Material Storage and Care

(a) Structural steel, either plain or fabricated shall be stored on above the ground platforms, skids or other supports. It shall be kept free from dirt and other foreign matter, and shall be

protected, as far as practical, from corrosion. Long members shall be supported on skids placed near enough together to prevent injury from deflection.

(b) Prior to fabrication, all steel shall be marked for identification by heat number and specification by a marking system approved by the Contract Administrator.

E11.5.6 Testing

(a) In addition to the Contractor's own quality control testing, all materials, welding procedures, Shop Drawings, and steelwork fabrication shall be inspected by the Contract Administrator to ascertain compliance with the Specifications and Drawings.

(b) A testing agency shall work with the Contract Administrator to carry out inspection and testing. The Contractor shall cooperate fully with the testing firm.

(c) The minimum extent and frequency of weld inspection shall be as follows:

(i) Radiographic Inspection:

- 100% of all flange butt welds
- 100% of all web butt welds

(ii) Magnetic Particle Inspection

- 50% of web-to-flange welds
- 10% of web-to-stiffener welds
- 100% of stiffener-to-tension flange welds

(d) All welds shall be visually inspected.

(e) The inspector shall have access to all of the fabricator's normal quality control records for this Contract specified herein.

(f) Weld inspection will be carried out in accordance with the requirements of CSA Standard W59-03.

(g) Welds that are found to be inadequate and unsatisfactory shall be repaired in accordance with CSA Standard W59-03, retested and paid for by the Contractor. All initial testing will be paid for by the City.

(h) No repair shall be made until agreed to by the Contract Administrator.

E11.5.7 Unacceptable Work

(a) Any Work found to be unacceptable shall be corrected in accordance with CSA Standard W59-03, Clause 5.10.

(b) No repair shall be made until agreed to by the Contract Administrator.

E11.6 Measurement and Payment

(a) Structural Steel Strengthening shall be paid for at the Contract Unit Price per kilogram for “Strengthen Structural Steel”, measured and specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. The mass to be paid for shall be the total number of kilograms of steel supplied and placed in accordance with this Specification, as accepted by the Contract Administrator, and as computed from details on the reviewed Shop Drawings.

(b) Installation of Abutment Stiffeners shall be paid for at the Contract Unit Price per kilogram for “Supply and Install Abutment Stiffeners”, measured and specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. The mass to be paid for shall be the total number of kilograms of steel supplied and placed in accordance with this Specification, as accepted by the Contract Administrator, and as computed from details on the reviewed Shop Drawings.

E12. COATING OF EXISTING STRUCTURAL STEEL BOX GIRDERS

E12.1 Description

(a) This Specification shall cover the preparation and coating of the existing structural steel box girders 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, supplied and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E12.2 Submittals

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

(b) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site, a protection and capture system. The Contractor shall comply with all applicable environmental, health, and safety regulations related to the surface preparation and coating of the existing structural steel.

(c) The Contractor shall submit to the Contract Administrator for review and approval, at least five (5) Business Days prior to the commencement of Work on the Site, access methods for workers and equipment to the girder areas to receive a field coating.

E12.3 Materials

E12.3.1 General

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

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

E12.3.2 Self-Priming Topcoat

(a) Self-priming topcoat shall be Termarust Series 2100 (RAVCS) as manufactured by Termarust Technologies. The colour shall be 402TR2100, to match the weathered steel.

E12.3.3 Abrasive for Blast Cleaning

(a) The blast cleaning abrasive shall be free of corrosion-producing contaminants. Silica or other sand will not be permitted. Slag abrasives shall contain no more than 0.1% oil by weight. The blast-cleaning abrasives and grit size employed shall be capable of achieving a surface anchor-tooth profile having a peak-to-valley height of 2 to 4 mils.

E12.3.4 Incidental and Miscellaneous Materials

(a) Incidental and miscellaneous materials utilized in undertaking the surface preparation and coating Works shall be supplied strictly in accordance with the Manufacturer's guidelines, as approved in advance by the Contract Administrator, and in accordance with these Specifications.

(b) This will include solvent mixtures associated with solvent cleaning operations, and any other incidental materials used in conjunction with the Works of this Specification.

(c) The use of all such materials shall be reviewed with the Contract Administrator to ensure conformance with the Specification, prior to the use of same in the Works. The Contract Administrator's decision in these matters shall be final.

E12.4 Construction Methods

E12.4.1 Scope of Work

(a) The scope of Work shall include the following items:

(i) Supply, installation, and removal of access to all repair box girder locations as specified below;

(ii) Surface preparation of the existing structural steel; and

(iii) Field coating of the existing structural steel. Coating shall take place on the box girders along spans 1 and 5. Coating shall extend 25 metres in length from the centreline of the abutment bearings and from the centreline of the abutment bearings to the end of each girder.

E12.4.2 Details of Existing Structure

(a) The applicable details and structure dimensions of the existing structure are shown on the Drawings for the information of the Contractor in establishing the methods and limits of removal and determining the cost of the Work from his examination of the Site.

(b) The information shown has been obtained from existing drawings, measurements, and observations at the Site. The accuracy of this information is not guaranteed and the Contractor must verify all information before commencing Work.

E12.4.3 Access and Scaffolding

(a) All scaffolding, platforms, and swing-stages shall be designed, constructed, erected and operated in accordance with Workplace Safety and Health Act, applicable regulations and as approved by the Contract Administrator.

(b) All access routes shall be restored to the pre-construction condition or better incidental to the Works of this Specification.

E12.4.4 Surface Preparation of Existing Structural Steel

(a) General

(i) The Contractor shall comply with all applicable environmental health and safety regulations related to the surface preparation and coating of the existing structural steel.

(ii) As a minimum, the Contractor shall collect all spent blasting abrasives, cleaned off paint residue, and new coating material overspray from the work area. All such materials shall be disposed of off and away from the Site by the Contractor in accordance with the appropriate regulations to the satisfaction of the Contract Administrator.

(b) Surface Cleaning

(i) Before any blast cleaning operations or coating applications commence, the following surface cleaning operations shall be undertaken on all structural steel designated to receive coating.

- All organic materials such as bird droppings, nests and other non-structural obstructions or pollutants attached to the steel are to be removed by hand cleaning operations.
- All oil and grease shall be removed manually with solvent cleaning as per SSPC Specification SP1.
- The entire area shall be washed clean of road salt using high pressure washing.
- Water used for high pressure water washing shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances. It shall be equal to potable water in physical and chemical properties.

(c) Blast Cleaning Operation

(i) The Contractor shall prepare the structural steel immediately prior to, by blast cleaning in accordance with SSPC Specification SP 10/NACE No. 2 – "Near White Metal Blast Cleaning."

(ii) The Contractor shall ensure that the amount of blasting medium used for blast cleaning is kept to the absolute minimum by conscientious efforts of his workforce and by the efficient use of equipment.

(iii) No rust scale shall remain in the designated areas.

(iv) The blasting shall be performed so as not to damage or contaminate any previously coated areas.

(d) Blast Cleaning-Up Operations

(i) Following all blast cleaning operations and prior to the Contract Administrator's inspection, all surfaces involved shall be blown off with compressed air or cleaned by vacuum for the purpose of removing any and all traces of blast products from the surface, and for the removal of abrasion from all pocket and corners.

(ii) Following surface preparation cleanup operations, the Contractor shall immediately notify the Contract Administrator so that testing and inspection can be undertaken prior to the application of any coating.

(e) Surface Testing and Inspection

(i) The Contractor shall provide the Contract Administrator with access and notice to allow for testing and inspection of prepared surfaces.

(ii) Immediately following blast cleaning and clean-up operations, the Contractor shall notify the Contract Administrator in order that a chemical analysis of the blasted steel and a surface profile inspection can be carried out. No structural steel installation shall take place until the prepared surface is approved by the Contract Administrator.

(iii) The Contract Administrator will analyze the blasted steel surface for chloride ion content. The allowable upper limit for all surface preparation is 5 $\mu g/cm^2$.

(iv) Under no circumstances shall the coating be applied until the surface preparation has been inspected and approved by the Contract Administrator immediately prior to commencement of coating application operations.

E12.4.5 Coating of Existing Structural Steel

(a) In areas where prepared steel is not coated on a timely basis, the steel may need to be flushed and re-blasted.

(b) All exposed surfaces of the existing box girders within the identified areas shall be coated with Termarust Series 2100 (RAVCS) to the recommended DFT (Dry Film Thickness) of 250 – 300 microns (10 – 12 mils) in accordance with the Manufacturer's recommendations.

(c) The coating shall only be carried out when the surfaces are dry, free of dirt, oil, grease, and other surface contaminants.

(d) The coating shall not be applied at temperatures below 2°C. In addition, there must be a 2°C spread between the temperature and the dew point. The relative humidity must be no greater than 99% and the steel should be free of surface moisture.

(e) Any coating damaged by cold, heat, or other environmental condition shall be replaced by the Contractor to the satisfaction of the Contract Administrator.

(f) The coating application equipment shall be designed such that the coating will be applied uniformly to all surfaces in the locations required as shown on the Drawings and approved by the Contract Administrator and shall be kept in good working order.

E12.5 Quality Control

E12.5.1 Inspection

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

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

E12.5.2 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.

E12.6 Measurement and Payment

(a) Coating of Existing Structural Steel Box Girders shall be paid for at the Contract Unit Price per square metre for “Paint Exterior Girder Ends”, 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. The area to be paid shall be the total surface area to be painted as specified herein.

E13. SUPPLYING AND PLACING REINFORCING STEEL

E13.1 Description

(a) This Specification shall cover the supply, fabrication, and placement of black reinforcing steel.

(b) This Specification shall cover the placement of MMFX 2 Grade 520 reinforcing steel and associated bar accessories. The Contractor shall be responsible for scheduling delivery in co-operation with the General Contractor for the Fort Garry Twin Bridges – Supply and Delivery of Fabricated of MMFX 2 Reinforcing Steel, Bid opportunity 69-2008. For purposes of this Contract, MMFX 2 reinforcing steel shall be available for pickup in Winnipeg no later than June 6, 2008. All reinforcing steel shall be picked up no later than June 15, 2008. Safe and secure storage of MMFX 2 reinforcing steel is the responsibility of the General Contractor after the date of availability.

(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 Work as hereinafter specified.

E13.2 Submittals

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty-one (21) Business Days prior to the scheduled commencement of any fabrication, the qualifications of the Contractor, and the qualifications of Operators, the Shop Drawings including bar lists, and the mill certificates.

(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).

E13.3 Materials

E13.3.1 General

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

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

E13.3.2 Handling and Storage of Materials

(a) All materials shall be handled in a careful and workmanship like manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with the requirements of CSA Standard CAN/CSA-A23.1-04, Storage of Materials, except as otherwise specified herein.

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

E13.3.3 Reinforcing Steel

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

(b) Reinforcing steel for abutment modifications shall be black steel as shown on the Drawings and shall conform to the requirements of CAN/CSA G30.18-M Grade 400W.

(c) All other reinforcing steel shall be MMFX micro-composite rebar meeting the requirements of ASTM A615 Grade 75 and ASTM A1035-04.

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

(e) All reinforcing steel shall be straight and free from paint, oil, mill scale, 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 meeting the requirements of ASTM A615 Grade 75 and ASTM A1035-04.

E13.3.4 Bar Accessories

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

(b) Bar chairs, bolsters, and bar supports shall be of cementitious material. No plastic, PVC, or galvanized bar supports shall be used. Total Bond Precast High Performance Concrete Bar Supports as supplied by:

(i) Con Sys Inc.
Box 341
Pinawa, Manitoba, R0E 1L0
(204) 753-2404

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

(d) For MMFX deck reinforcement, MMFX hooks shall be drilled and grouted at the correct elevation into the existing concrete deck as a chairing mechanism.

(e) Tie wire shall be the following:

(i) Black, soft-annealed 1.6 mm diameter wire;

(ii) Nylon-, epoxy-, or plastic-coated wire.

(f) Bar accessories are not included in the Drawings and shall include bar chairs, spacers, clips, wire ties, wire, hooks, or other similar devices and are to be acceptable to the Contract Administrator, with exception to MMFX bar accessories. The supplying and installation of bar accessories shall be deemed to be incidental to the supplying and placing of reinforcing steel.

E13.3.5 Bonding Agent

(a) Epoxy resin shall be of a type listed in the approved products list, Specification CW3310 conforming to the requirements of ASTM Standard C881. Type 1, Grade 3 epoxy shall be used for bonding reinforcing steel into hardened concrete.

(b) 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 withing 48 hours after installation. Alternative bonding agents are listed in the approved products list.

E13.4 Construction Methods

E13.4.1 Scope of Work

(a) This Work shall include the supply and installation of all black reinforcing steel and the installation of all MMFX reinforcing steel.

E13.4.2 Fabrication of Reinforcing Steel

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

E13.4.3 Placing of Reinforcing Steel

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

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

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

(d) 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.

(e) 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.

(f) Reinforcing steel shall be placed within the tolerances specified in CSA A23.1-04.

E13.4.4 Installing Reinforcing Steel into Hardened Concrete

(a) If shown on the Drawings, the Contractor shall drill holes into adjacent slabs for hooks of the diameters and depths specified for each size of reinforcement Drill bits shall have a diameter no larger than 2 mm larger than the nominal hook.

(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 and 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 and approved by the Contract Administrator before any new concrete is placed. Otherwise, the concrete may be rejected by the Contract Administrator and shall be removed by the Contractor at his own expense.

E13.5 Quality Control

E13.5.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or acceptance that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works which are not in accordance with the requirements of this Specification.

(b) A minimum of twenty-four (24) hours advance notice shall be given to the Contract Administrator prior to the pouring of any concrete to allow for inspection of the reinforcement.

E13.5.2 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.

E13.5.3 Quality Testing

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

E13.6 Measurement and Payment

E13.6.1 Supply and Place Black Reinforcing Steel

(a) Supplying and Placing Black Reinforcing Steel shall be paid for at the Contract Unit Price per kilogram for “Supply and Place Black Reinforcing Steel”, measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. The mass to be paid for shall be the total number of kilograms of reinforcing steel supplied and placed in accordance with this Specification, as accepted by the Contract Administrator, as computed from the reviewed Shop Drawings, excluding the mass of bar accessories.

E13.6.2 Place MMFX Reinforcing Steel

(a) Placing MMFX Reinforcing Steel shall be paid for at the Contract Unit Price per kilogram for “Place MMFX Reinforcing Steel”, 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. The mass to be paid for shall be the total number of kilograms of MMFX reinforcing placed in accordance with this Specification, as accepted by the Contract Administrator, as computed from details on the reviewed Shop Drawings, excluding the mass of bar accessories. Installation of MMFX hooks into the existing concrete shall be considered incidental to the Work and no payment shall be made for this Work.

E13.6.3 Install Reinforcing Steel Into Hardened Concrete

(a) Installation of 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.

E14. STRUCTURAL CONCRETE

E14.1 Description

(a) This Specification shall cover the preparation of Portland Cement Concrete for, and all concreting operations related to, the construction of Portland Cement Concrete Works 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.

E14.2 Submittals

E14.2.1 Concrete Mix Design Requirements

(a) The Contractor shall submit to the Contract Administrator for review and approval concrete mix design(s) that meets the minimum performance criteria for the various types of concretes as shown on the Drawings and described in Table E14.1 "Requirements for Hardened Concrete" of this Specification. The concrete mix design shall be sealed, signed and dated by a Professional Engineer licensed to practice in the Province of Manitoba. Any changes to the concrete mix design(s) shall be reviewed by the Contract Administrator prior to the Contractor implementing the change.

(b) The concrete mix design(s) for the required type(s) of concrete shall specify 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 intended method of placement shall be taken into consideration in the development of the concrete mix design as concrete to be pumped must be designed accordingly.

(d) Any change in the constituent materials of the concrete shall require a new concrete mix design. If, during the progress of the Work, the mix design is found to be unsatisfactory for any reason, including poor workability, the Contract Administrator may require the Contractor to make the necessary adjustments.

E14.2.2 Concrete Mix Design Test Data

(a) The Contractor shall submit to the Contract Administrator for review and approval test data showing that the concrete supplied will meet the performance criteria stated in this Specification for each concrete type. At a minimum, the test data shall prove that the minimum compressive strength, flexural strength (Fibre Reinforced Concrete only), air content, and slump of the concrete to be supplied meets or exceeds the performance criteria. 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 should the Contractor wish to pump the concrete into place.

E14.2.3 Notification of Ready Mix Supplier

(a) The Contractor shall advise the Contract Administrator of the qualified Ready Mix Concrete Supplier that he is proposing to use at least twenty-one (21) days prior to placing concrete. 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.

(b) The Contractor shall furnish, in writing to the Contract Administrator, 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.

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

E14.2.4 Formwork and False Work

(a) The Contractor shall design formwork and false work for the new deck cantilevers to be released prior to the placement of the High Performance Concrete (HPC) deck overlay.

(b) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty-one (21) Business Days prior to the scheduled commencement of any concrete placement, detailed design calculations and Shop Drawings for any temporary Works, including false work and formwork, that are sealed, signed and dated by a Professional Engineer licensed to practice in the Province of Manitoba.

(c) 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. 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 Site Work until the Shop Drawings have been reviewed and approved.

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

E14.2.5 Sequence of Concrete Deck Pour Construction

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty-one (21) Business Days prior to any concrete placement, a detailed sequence of construction for the concrete deck and HPC deck overlay. Included within this submittal shall be the details of all construction joints.

E14.2.6 Moveable Deck Hoarding

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty-one (21) Business Days prior to the scheduled commencement of any Work on Site, Shop Drawings showing the fabricated details of the movable deck hoarding, design loads, method of construction, type and grade of materials, and any further information that may be required by the Contract Administrator.

(b) The movable deck hoarding shall be designed by a Professional Engineer registered in the Province of Manitoba and constructed to the following requirements:

(i) Sufficient clearances shall be provided to enable the placing and finishing of the concrete to proceed unhindered inside the hoarding;

(ii) The minimum length of the hoarding shall be 25 m or the length of the structure, whichever is shorter;

(iii) The hoarding shall have a clear, unsupported span of at least the clear deck width, plus room for the mechanical screed machine;

(iv) The roof and sides of the hoarding shall be covered with waterproof and insulated material, with all joints overlapping and rendered waterproof and not subjected to heat loss. The material shall be strong enough to withstand the force of "driving" rain or snow, and at least two thirds of the roof and the entire sides shall be opaque in order to prevent the deck concrete from being exposed to direct sunlight;

(v) The sides of the hoarding at the junction of the hoarding with the deck forms shall be constructed to prevent the entrance of rain from the sides. Provisions shall be made for enclosing the ends of the hoarding on short notice in the event that closing of the ends proves necessary during the concrete placing operations; and

(vi) The hoarding shall be constructed on wheels or rollers for ready mobility. Another acceptable method is to have stationary sides, with the roof on wheels or rollers.

E14.2.7 Concrete Placement Schedule

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

E14.3 Materials

E14.3.1 General

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

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

E14.3.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and workmanship like manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with CSA Standard CAN/CSA-A23.1-04.

E14.3.3 Testing

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

(b) All materials shall conform to CSA Standard CAN/CSA-A23.1-04.

(c) All testing of materials shall conform to CSA Standard CAN/CSA-A23.2-04.

(d) All materials shall be accepted by the Contract Administrator at least twenty-one (21) days before any construction is undertaken. If, in the opinion of the Contract Administrator, such materials, in whole or in part, do not conform to the Specifications detailed herein or are found to be defective in manufacture or have become damaged in transit, storage, or handling operations, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E14.3.4 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.

TABLE E14.1
REQUIREMENTS FOR HARDENED CONCRETE

Type of Concrete	Location	Nominal Compressive Strength [MPa]	Class of Exposure	Air Content Category	Special Requirements	Post Residual Cracking Index
Type 1	Substructure, Slope Paving	35 @ 28 Days	C-1	1	-	-
Type 2	Deck, Barriers, Approach Slabs, Roadway and Expansion Slab	35 @ 28 Days	C-1	1	Crushed Granite Aggregate; Synthetic Fibres	0.3
Type 3	High Performance Concrete Deck Overlay	50@ 56 Days	C-XL	1	Crushed Granite Aggregate; Synthetic Fibres	0.3

(c) The temperature of all types of concrete shall be between 15°C and 25°C at discharge. Temperature requirements for concrete containing silica fume shall be between 10°C and 18°C at discharge unless otherwise approved by the Contract Administrator.

E14.3.5 Lean Mix Concrete

(a) Lean concrete mix shall be supplied as specified in the City of Winnipeg Specification CW 3310, and shall have the following properties:

(i) Slump 25 – 75 mm

(ii) Compressive Strength @ 28 days 5 – 10 MPa

(iii) Air Content 5-8%

(iv) Fly Ash (10% of cement) 15 kg/m^3

(b) Lean mix concrete shall be placed at all locations shown on the Drawings.

E14.3.6 Aggregates

(a) General

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

(ii) The potential for deleterious alkali-aggregate reactivity shall be assessed in accordance with CSA A23.2-27A-04. Current (less than 18 months old) test data evaluating the potential alkali-silica reactivity of aggregates tested in accordance with CSA A23.2-14A-04 or CSA A23.2-25A-04 is required.

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

(b) Fine Aggregate

(i) Fine aggregate shall meet the grading requirements of CSA A23.1-04, Table 10, FA1, be graded uniformly and not more than 3% shall pass a 75 um sieve. Fine aggregate shall consist of sand, stone, screenings, other inert materials with similar characteristics or a combination thereof, having clean, hard, strong, durable,

uncoated grains free from injurious amounts of dust, lumps, shale, alkali, organic matter, loam or other deleterious substances.

(ii) Tests of the fine aggregate shall not exceed the limits for standard requirements prescribed in CSA A23.1-04, Table 12.

(c) Coarse Aggregate - Standard

(i) The maximum nominal size of coarse aggregate shall be 20 mm and meet the grading requirements of CSA A23.1-04, Table 11, Group I. Coarse aggregate shall be uniformly graded and not more than 1% 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 ASTM C131 shall not have a loss greater than 30%.

(iv) Tests of the coarse aggregate shall not exceed the limits for standard requirements prescribed in CSA A23.1-04, Table 12, for concrete exposed to freezing and thawing.

(d) Coarse Aggregate – Granite

(i) Crushed granite aggregate shall be used for the types shown in Table E14.1, “Requirements for Hardened Concrete”.

(ii) Coarse aggregate shall be 100% crushed, washed granite, low in quartz, clean and free from alkali, organic, or other deleterious matter, shall have two fractured faces, and shall have an absorption not exceeding 3%, graded as specified in the following Table E14.2, “Grading Requirements for Coarse Aggregate – Granite”.

(iii) When the thickness of HPC deck overlay is specified as 50 mm or less, the nominal maximum top size of aggregate shall be 12 mm.

TABLE E14.2
GRADING REQUIREMENTS FOR
COARSE AGGREGATE - GRANITE

Nominal Size of Aggregate (mm)	Percent of Total Dry Weight Passing Each Sieve (mm)						
	28	20	14	10	5	2.5	1.25
20 - 5	100	85 - 100	60 - 90	25 - 60	0 - 10	0 - 5	-

E14.3.7 Admixtures

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

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

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

E14.3.8 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 25% by mass of cement.

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

E14.3.9 Water

(a) Water to be used for mixing and curing concrete or grout and saturating the substrate shall conform to the requirements of CSA A23.1-04 and shall be free of oil, alkali, acidic, organic materials or deleterious substances. The Contractor shall not use water from shallow, stagnant or marshy sources.

E14.3.10 Synthetic Fibres

(a) The synthetic fibres shall consist of 100% virgin polypropylene as supplied by Grace (Microfibre) or Master Builders (Fibre Mesh MD), or equal as accepted by the Contract Administrator in accordance with B6. The dosage shall be designed by the Contractor to meet the requirements for post-cracking residual strength and fibre dispersion in accordance to the Canadian Highway Bridge Design Code, CAN/CSA-S6-06, Section 16, Fibre-Reinforced Structures, Clause 16.6. The minimum dosage rate shall be 1.5 kg/m^3 for the specified concrete types.

E14.3.11 Formwork

(a) Formwork materials shall conform to CSA Standard CAN/CSA A23.1-04, and American Concrete Publication SP4, “Formwork for Concrete.”

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

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

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

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

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

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

(h) Walers shall be spruce or pine, 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 accepted unless shown on the Drawings.

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

E14.3.12 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 B6.

E14.3.13 Permeable Formwork Liner

(a) Formwork liner shall be Texel Drainaform, Hydroform, or equal as accepted by the Contract Administrator in accordance with B6. 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.

E14.3.14 Architectural Formwork Liner

(a) The Contractor shall supply and install the architectural concrete finish formwork liner as shown on the Drawings in accordance with the Manufacturer's recommended procedures.

E14.3.15 Curing Compound

(a) Curing compounds shall be liquid membrane-forming and conform to the requirements of ASTM Standard C309-98a. Rate of application shall be the rate required to meet the requirements of ASTM C309-98a for the texture of concrete the curing compound is being applied to.

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

E14.3.16 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 B6.

E14.3.17 Bonding Agents

(a) Latex Bonding Agents

(i) Latex bonding agent shall be SCP Concrete Bond, as supplied by Specialty Construction Products, Surfacrete Concentrate by Sternson, or equal as accepted by the Contract Administrator in accordance with B6. Polyvinyl acetate-based latexes will not be permitted.

(b) Bonding Grout

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

- 1 part water
- 1 part latex bonding agent
- 1½ parts Type GUSF Portland cement

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

E14.3.18 Epoxy Adhesive

(a) Where epoxy adhesive for concrete to concrete and to steel is used, it shall be 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.

E14.3.19 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, or equal as accepted by the Contract Administrator in accordance with B6.

(b) For doweling Work as shown on the Drawings, epoxy grout shall be Hilti Hit HY150.

E14.3.20 Non-Shrink Cementitious Grout

(a) Where non-shrink cementitous grout is used, it shall be 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. The minimum compressive strength of the grout at 28 days shall be 40 MPa.

E14.3.21 Patching Mortar

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

E14.3.22 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. Accepted 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 B6.

E14.3.23 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 Standard D1751-99 or equal as accepted by the Contract Administrator in accordance with B6.

E14.3.24 Precompressed Foam Joint Filler

(a) Precompressed expanding filler shall be compressed to 20% of its expanded width and be a polyurethane foam, impregnated throughout with a latex modified asphalt. Approved products are “Emseal” by Emseal Corporation. Manufacturer’s recommended primer and top coat are to be used.

E14.3.25 Low Density Styrofoam

(a) Low density Styrofoam shall be the type accepted by the Contract Administrator.

E14.3.26 Backup Rod

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

E14.3.27 Dampproofing

(a) Dampproofing materials shall be applied to all buried 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. In addition, dampproofing shall be applied on the wingwall surfaces to be in contact with the lean mix concrete. 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 B6.

(b) Dampproofing materials shall be applied to the sides of the abutment which are buried by landscape Works.

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

(d) 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 B6.

E14.3.28 Galvanized Dowels and Galvanized Expansion Sleeves

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

(b) The dowels shall be galvanized in accordance with CSA Standard G164-M92, to the retention of 600 g/m^2.

E14.3.29 Preformed Neoprene Compression Seal

(a) Preformed neoprene compression seal shall be of the type specified in the Approved Products List.

E14.3.30 Miscellaneous Materials

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

E14.3.31 Benchmark Plugs

(a) Benchmark plugs shall be supplied by the City.

E14.4 Equipment

E14.4.1 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, such as in locations that the existing deck reinforcing is exposed.

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

E14.4.2 Placing and Finishing Equipment for Bridge Deck Concrete

(a) Placing Equipment

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

(b) Mechanical Screed

The mechanical screed shall be:

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

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

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

(iv) Capable of producing the required flatness tolerance as specified in E14.6.6;

(v) Capable to raise and to allow reworking of surfaces;

(vi) Screed surface touching concrete shall not be made of aluminum (magnesium acceptable) and equipment with a mechanism to properly vibrate the screed; and

(vii) The supply, setup, operation, and takedown of the movable mechanical screed shall be considered incidental to the placement of the deck slab concrete and HPC deck overlay, and no separate measurement or payment shall be made for this Work.

(c) Moveable Deck Hoarding

(i) The hoarding shall be constructed on wheels or rollers for ready mobility. Another acceptable method is to have stationary sides, with the roof on wheels or rollers;

(ii) The rail system for the movable deck hoarding shall be independent of the rail system used for the screeding machine and the Work Bridge;

(iii) The roof of the hoarding shall be checked for damage and water tested before each concrete pour, and all repairs shall be made, as required, before concrete placing will be allowed to begin;

(iv) The hoarding shall not be removed from overtop of a newly completed deck slab or HPC deck overlay without first obtaining permission from the Contract Administrator; and

(v) The supply, setup, operation, and takedown of the movable deck hoarding shall be considered incidental to the placement of the deck slab concrete and HPC deck overlay, and no separate measurement or payment shall be made for this Work.

E14.4.3 Placing and Finishing Equipment for Approach Slab Concrete

(a) Mechanical Screed

The mechanical screed shall be:

(i) Constructed to span the full width of the approach slabs and roadway approach slabs being placed;

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

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

(iv) Capable of producing the required flatness tolerance as specified in Clause E14.6.6 of this Specification; and

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

(b) Movable Work Bridge for Structural Approach Slab

(i) The Contractor shall provide a movable bridge, spanning the approach slab at a right angle 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; and

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

E14.5 Construction Methods

E14.5.1 Scope of Work

(a) It is intended that this Specification cover the construction of the following structural concrete Works, as indicated on the Drawings:

(i) Abutment Modifications:

(ii) Stage I Bridge Deck;

(iii) Barriers;

(iv) Approach Slabs;

(v) Roadway Expansion Slabs;

(vi) Expansion Joint Concrete Nosings;

(vii) Slope Paving;

(viii) High Performance Concrete Deck Overlay; and

(ix) Stage II Bridge Deck;

(a) Type 1

(b) Type 2

E14.5.2 Description

(a) Abutment modifications shall comprise of all Work involving modifications to the East and West abutment wingwalls and roof slabs. In addition, lean mix concrete between the existing and new wingwalls shall be associated with this Work.

(b) Stage I Bridge deck concrete shall comprise the new concrete deck falling within the limits of excavation of Stage I concrete removals. Stage I concrete shall also comprise the construction of new deck cantilevers.

(c) Stage II Bridge deck concrete shall comprise the new concrete deck falling within the limits of excavation of Stage II concrete removals.

(d) Barrier concrete shall comprise of the cast-in-place Bridge barriers and approach roadway barriers.

(e) Approach slab concrete shall comprise all Work involving the approach slabs. In addition, lean mix concrete beneath the approach slabs shall be associated with this Work.

(f) Expansion joint concrete nosings shall comprise of the concrete surrounding the expansion joints, specified in E16.6.4.

(g) Slope paving concrete shall concrete shall comprise of all Work involved with slope repair areas.

(h) HPC deck overlay shall comprise of the concrete deck overlay above the concrete Bridge deck concrete.

E14.5.3 Supplying Concrete

(a) Proportions of Concrete Materials

(i) Coarse and fine aggregate materials shall be separated and measured separately by weighing, except as otherwise specified in the Special Provisions or where other methods are approved by the Contract Administrator. The apparatus provided for weighing the aggregates and cement shall be suitably designed and constructed for this purpose. The course and fine aggregate and the cement shall be weighed separately. The accuracy of all weighing devices shall be such that successive quantities can be measured to within one percent of the desired amount. The mixing water shall be measured by volume or by weight. The water measuring device shall be capable of control accurate to ± 0.5% of the design quantity. All measuring devices will be subject to approval by the Contract Administrator. Unless otherwise approved, air entraining agent and other admixtures shall be added to the mix in a water-diluted solution. The dilution of the solution shall meet the Manufacturer's requirements. For mix adjustments at the Site, the Contractor shall maintain facilities and equipment to control the amount of superplasticizer and air entrainment so that the required tolerances can be met.

(ii) The Contractor shall ensure that all scaling devices have been calibrated within one year. They shall be tested and approved for accuracy prior to the commencement of batching operations. Scaling devices shall be subject to testing by the Contract Administrator at any time. The standard masses used for the testing of scaling devices shall be supplied to the Contract Administrator upon request. No adjustments to scaling devices shall be made without the Contract Administrator's approval.

(b) Mixing Concrete

(i) General

Ready-mix concrete shall be mixed and delivered by one of the following operations:

- Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in a truck agitator or in a truck mixer operating at agitating speed, or
- Mixed completely in a truck mixer. Continuous mixers used in conjunction with volumetric proportioning will not be approved. Concrete shall not be mixed and delivered without first obtaining the approval of the Contract Administrator.

(ii) Stationary Mixer

- The mixing of concrete shall be done in a batch mixer of a size and type approved by the Contract Administrator. Mobile continuous mixers or other such concrete supply equipment will not be approved for use.
- The mixing of concrete shall be done in a batch mixer of a size and type approved by the Contract Administrator. Mobile continuous mixers or other such concrete supply equipment will not be approved for use.
- Each mixer and agitator shall have attached by the Manufacturer in a prominent place, a metal plate or plates on which it is plainly marked the various uses for which the equipment is designed, the capacity of the drum or container in terms of the volume of concrete that can be mixed or agitated and the speed of rotation of the mixing drum or blades.
- All concrete shall be mixed thoroughly until it is uniform in appearance, with all ingredients uniformly distributed. In no case shall the mixing time per batch be less than one minute for mixers of one cubic metre capacity or less. The “batch” is considered as the quantity of concrete inside the mixer. This figure shall be increased by 15 seconds for each additional half cubic metre capacity or part thereof. The mixing period shall be measured from the time all materials are in the mixer drum.
- Stationary mixers shall be equipped with an acceptable timing device that will not permit the batch to be discharged until the specified mixing time has elapsed. Batches shall be used that do not require fractional bags of cement. Each batch shall be entirely discharged from the mixer before any of the ingredients for a following batch shall be placed in the drum of the mixer. All water used for cleaning the inside of the drum of the mixer shall be entirely drained before ingredients for a batch of concrete shall be placed in the drum.
- All water used for cleaning the inside of the drum of the mixer shall be entirely drained before ingredients for a batch of concrete shall be placed in the drum. The Contractor shall in no case load the mixer above its rated capacity. The Contractor shall maintain the mixer in good condition. Inner surfaces of the mixer shall be kept free of hardened concrete and mortar. Mixer blades that are bent or worn down so as to affect the mixing efficiency shall be repaired. Any mixer leaking mortar or causing waste of materials through faulty charging shall be taken out of service until repaired. The Contractor shall, at all times, operate the mixer at the speed recommended by the Manufacturer and shall, if requested, supply the Manufacturer's certification of the mixing capacity of the machine in use.
- The mixer shall be fitted with an accurate and dependable means for measuring the water added that is not affected by variation in pressure in the water supply line. All joints, valves and other parts shall be maintained so that there is no leakage of water into the mixer drum. Failure of the Contractor to have an accurately working and dependable water gauge on a

mixer shall be cause for the Contract Administrator to prohibit the mixer to be used.

- Water shall be released first and continue to flow while the solid materials are entering the mixer. The water discharge pipe shall be so arranged and be of such size that the flow into the mixer is completed within the first quarter of the mixing time, and the water is delivered well within the mixer where it will be quickly mixed with the entire batch.
- Air entraining agents and admixtures shall be placed in the mixer after the initial water is in the mixer drum but before the remaining materials are added. Superplasticizer shall be added after initial mixing and as per the Manufacturer's recommendation.
- A record of the actual proportions used for each batch shall be kept by the Contractor and a copy of this record shall be submitted to the Contract Administrator after each pour.
- The Contract Administrator may, from time to time, make slump tests of individual batches in order to determine the uniformity of the concrete consistency at approximately one-quarter and three-quarter points of the load. If these tests indicate a variation in the slump exceeding 50 mm, the mixer or agitator shall not be used until the condition is corrected.

(iii) Truck Mixing

- Truck mixers, unless otherwise approved by the Contract Administrator, shall be of the revolving drum type, watertight, and constructed so that the concrete can be mixed to ensure uniform distribution of materials throughout the mass. All materials for the concrete shall be accurately measured, and charged concurrently at the proportions that satisfy the approved mix design into the drum at the proportioning plant. Increases in water/cementitious ratio will not be permitted.
- The maximum size of batch in truck mixers shall not exceed the maximum rated capacity of the mixer as stated by the Manufacturer and stamped in metal on the mixer. Truck mixing shall commence immediately upon introduction of ingredients into the drum and be continued for not less than 50 revolutions. The speed shall not be less than 4 revolutions per minute (rpm), nor more than a speed resulting in a peripheral velocity of the drum of 70 m per minute. Not more than 100 revolutions of mixing shall be at a speed in excess of 6 rpm.
- When adjustment to the mix by adding water, air entrainment or superplasticizer at the Site is approved by the Contract Administrator, the mixer shall be run for a minimum of 20 additional revolutions to ensure homogeneity of the concrete before discharge.
- Discharge chutes shall be kept clean and free from hardened concrete and shall be wetted down prior to use.

(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) Under no circumstances shall the Contract Administrator allow the Contractor to add retarders to the concrete mix without first obtaining the approval of the Contract Administrator.

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

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

(d) Delivery

(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 provide to the Contract Administrator the proposed concrete placement schedule for all concrete placements. 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:

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

(ii) The Contractor shall adhere strictly to the concrete placement schedule, if shown on the Drawings or otherwise specified, as approved by the Contract Administrator.

E14.5.4 False Work, Formwork, and Shoring

(a) Design

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

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

(iii) The formwork and shoring for these Works shall be designed, erected, braced, and maintained to safely support all vertical and lateral loads until such loads can be supported by the concrete all in accordance with CSA Standard CAN/CSA S269.3-M92. <u>There shall be no welding to the steel box girders for supporting formwork. All proposed fastening methods to the steel box girders must be submitted to the Contract Administrator for review and approval.</u>

(iv) The loads and lateral pressures outlined in Part 3, Section 102 of "Recommended Practice for Concrete Formwork", (ACI 347) and wind loads as specified by the National Building Code shall be used for design. Additional design considerations

concerning factors of safety for formwork elements and allowable settlements outlined in Section 103 of the above reference shall apply.

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

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

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

(vii) 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.

(viii) 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 acceptance of the Contract Administrator.

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

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

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

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

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

(xiv) Forms shall 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 25 mm in diameter. Break-back type form ties shall have all spacing washers removed and the tie shall be broken back a distance of at least 20 mm from the concrete surface. All fittings for metal ties shall be of such design that, upon their removal, the cavities which are left will be of the smallest possible size. Torch cutting of steel hangers and ties will not be permitted. Formwork hangers for exterior surfaces of decks and curbs shall be an acceptable break-back type with surface cone, or removable threaded type. Cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in colour.

(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 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, free of extra charge, and the entire site left in a neat and clean condition.

E14.5.5 Setting Deck Forms

(a) The Contractor shall adjust forms, maintain uniform slab thickness, and adjust screed heights to plan elevations or to such other elevation as may be determined by the Contract Administrator in the field. The screed chairs shall be tack welded to the screed bases at the time that the screeds are adjusted to the required elevations.

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

E14.5.6 Setting Deck Joints

(a) The Contractor shall adjust all deck joints to the required elevations and gaps as accepted by the Contract Administrator prior to placement of concrete adjacent thereto. The adjustment shall be done in accordance with the procedures for adjusting of the deck joints as recommended by the Manufacturer or as directed by the Contract Administrator.

E14.5.7 Permeable Formwork Liner

(a) Permeable formwork liners shall be used on all exposed surfaces, except soffit surfaces, or where a normal 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 of payment shall be made for this Work.

E14.5.8 Architectural Formwork Liner

(a) Architectural formwork liner shall be used on areas specified on the Drawings.

(b) The architectural concrete finish formwork liner shall be replaced after each use unless specifically allowed to be reused by the Manufacturer.

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

E14.5.9 Anchor Units for Bridge Lighting Poles and BR1 Posts

(a) All anchor units and electrical embedded Work shall be as specified on the Drawings.

(b) All anchor units and embedded electrical Work shall be held securely in place so as not to become displaced during concrete placement operations. Conduit placement operations shall be performed so as not to damage the conduit.

(c) The Contractor shall coordinate the installation of all conduits, pull boxes, and junction boxes for the lighting electrical embedded Work described in the Specification E21, “Lighting and Miscellaneous PVC Conduit”.

(d) The Contractor shall coordinate the installation of aluminum traffic bridge posts and rails as described in the Specification E17, “Installation of Balanced Barrier and Aluminum Traffic Barrier”.

E14.5.10 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 is to be removed to sound concrete or to the limits as shown on the Drawings, whichever is greater. The resulting surface is to be rough with a minimum amplitude of 6 mm and maximum frequency of 15 mm.

(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, cement slurry bonding grout shall be applied to the entire surface of the existing concrete.

E14.5.11 Placing Structural Concrete

(a) General

(i) The Contract Administrator must be notified at least 24 hours prior to concrete placing so that an adequate inspection may be made of formwork, shoring, reinforcement, deck joints, mechanical screed setup, movable hoarding, and related Works. Placement without required prior notification will not be allowed.

(b) Placing Structural Concrete

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

(ii) 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.

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

(iv) 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.

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

(vi) 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.

(vii) Concrete shall be placed as nearly as possible in its final position. Rakes or mechanical vibrators shall not be used to transport concrete.

(viii) 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.

(ix) 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.

(x) 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.

(xi) Concrete shall not be placed during rain or snow unless adequate protection is provided for formwork and concrete surfaces.

(xii) Before any concrete is placed in the approach slabs, roadway approach slabs, expansion slab, or Bridge deck, 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 be 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.

(xiii) After verification that the surface meets acceptable limits and after final floating, the top surface shall be given Type 2 Finish – Unformed Surfaces.

E14.5.12 Finishing of Concrete Surfaces

(a) Type 1 Finish – Exposed Formed Surfaces

(i) 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.

(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 permeable formwork liner.

(iv) The surfaces shall be patched as specified in this Specification. The surface shall be rubbed with a carborundum brick or other abrasive, to achieve a smooth-rubbed finish.

Smooth-rubbed finish shall be produced on the newly hardened concrete surface no later than twenty-four (24) hours following form removal. Surfaces shall be thoroughly wetted and rubbed until uniform colour and texture are produced. No finishing mortar shall be used other than that produced from the concrete by the rubbing process.

(b) Type 2 Finish – Unformed Surfaces

(i) All unformed concrete surfaces except the approach slabs and HPC deck overlay 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. The surface shall then be consolidated with hand floats. Concrete surfaces after floating shall have a uniform, smooth, granular texture.

(c) Type 3 Finish – Top of Bridge Deck Lower Lift and Approach Slabs

(i) The top of the approach slab shall be finished using a mechanical screed acceptable to the Contract Administrator.

(ii) Screed guides shall be placed and fastened in position to ensure finishing of the concrete to the required profile. Supporting rails, upon which the finishing machine travels, shall be placed outside the area to be concreted. Provisions for anchorage of supporting rails shall provide for horizontal and vertical stability; positive

anchorage may be required by the Contract Administrator. A hold-down device shot into concrete will not be permitted, unless the concrete is to be subsequently resurfaced.

(iii) Plans for anchoring support rails shall be submitted to the Contract Administrator for acceptance. The Contract Administrator's written acceptance must be received by the Contractor prior to the installation of any anchorage devices.

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

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

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

(vii) After floating, the approach slab shall be given a coarse, transverse scored texture by drawing a steel broom, as accepted by the Contract Administrator, across the surface.

(viii) The Contractor shall ensure that sufficient personnel are provided for the finishing of the slab surfaces. In the event that the depositing, vibrating, and screening 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 finished. The Contract Administrator's judgement in this matter shall be final and binding on the Contractor. All loads of concrete that exceed the 90 minute discharge time limit during the day, while the finishing operations catch up, shall be rejected.

(d) 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 E14.3.20, E14.4.21, and E14.5.16 of this Specification.

(ii) All surfaces below 300 mm below finish grade shall receive dampproofing in accordance with E14.5.24 of this Specification.

E14.5.13 General Curing

Refer to E14.5.18 for cold weather curing requirements and E14.5.19 of this Specification for hot weather curing requirements.

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

(b) Freshly finished concrete shall have either a curing compound applied or covered and kept moist by means of wet polyester blankets immediately following finishing operations and shall be maintained at above 10°C for at least seven (7) consecutive days thereafter. Construction joints shall only be covered and kept saturated by means of wet polyester blankets for the curing period.

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

(d) Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping, running water, vibration, and mechanical shock. Concrete shall be protected from freezing until at least 24 hours after the end of the curing period.

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

(e) 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.

(f) Formed surfaces shall receive, immediately after stripping and patching, the same curing as finished surfaces, with the exception of the Bridge deck soffit surfaces.

E14.5.14 Curing of Approach Slab

(a) After the finishing is completed, the surface shall be promptly covered with a minimum of a single layer of clean, predamped polyester blanket.

(b) Care shall be exercised to ensure that the polyester 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 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.

(c) Water used for wetting the blankets for the first 72 hours shall be a minimum temperature of 40°C when applied to the blankets. Potable water only shall be used.

(d) Failure to apply wet polyester blankets within 30 minutes after the concrete has been deposited or before the finished surface comes out from under the blankets, shall be cause for rejecting the Work so affected. Concrete in the rejected area shall be removed and replaced at no additional cost to the City.

(e) As soon as the concrete can be walked on without damaging the surface, the polyester blankets shall be covered with a layer of 4 mil thick white polyethylene film. Black insulated tarps will not be allowed.

(f) For the approach slab, the surfaces shall receive a wet polyester blanket cure for at least 72 hours. Warm water, as specified, shall be applied, as necessary, to keep the polyester blankets wet for that period. If the wet cure is removed before seven days, curing compound is to be applied.

(g) Following 72 hours, regular water temperatures may be used to continue the curing with polyester blankets in place.

E14.5.15 Form Removal

(a) The Contract Administrator must be notified at least 24 hours prior to form removal and give acceptance prior to the Contractor beginning form removal operations.

(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 accepted by the Contract Administrator or noted otherwise on the Drawings.

(c) Notwithstanding the above, the minimum strength of concrete in place for safe removal of vertical forms for abutments shall be 25 MPa, with the added provision that the member shall be of sufficient strength to safely carry its own weight, together with super-imposed construction loads. Bridge deck soffit forms shall remain in place to support construction live loads during the placement of traffic barriers. Bridge deck soffit forms shall be removed prior to placement of the HPC deck overlay. Stripping of these forms shall not be permitted until a concrete strength of 35 MPa has been achieved.

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

E14.5.16 Patching of Formed Surfaces

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

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

(c) 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 and then applying patching mortar. A slurry grout consisting of water and cement shall be well brushed onto the area to be patched. When the slurry grout begins to lose the water sheen, the patching mortar shall be applied. It shall be struck off slightly higher than the surface and left for one hour before final finishing permitting 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.

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

(e) Concrete shall be cast against forms which will produce plane surfaces with no bulges, indentations, or protuberances other than those shown on the Drawings.

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

E14.5.17 High Performance Concrete Deck Overlay

(a) General

(i) The HPC deck overlay shall be constructed using fibre-reinforced silica fume concrete in accordance with the requirements of this Specification.

(ii) Any patching to the Bridge deck concrete shall reach a minimum compressive strength of 35 MPa, as determined by field-cured test cylinders, before the HPC deck overlay is placed.

(b) Surface Preparation

(i) The concrete Bridge deck surface, over which the HPC deck overlay placing is to be applied, shall be thoroughly cleaned to remove all laitance, dirt, or other deleterious material. The cleaning shall be accomplished by shot-blasting and/or other means deemed necessary as accepted by the Contract Administrator. The cleaning shall remove laitance and oil-contaminated areas and expose the upper portion of the fine aggregate and the top surface of the coarse aggregate. The cleaning operations shall be completed and acceptable to the Contract Administrator.

(ii) The time interval between the surface preparation and the placing of the deck overlay concrete shall be kept to a minimum, and utmost care shall be taken to keep the prepared surfaces clean during the interval.

(iii) Immediately before proceeding with each placement, the prepared surface shall be inspected for dirt and other deleterious materials that may have been deposited after the completion of cleaning. All such dirt and deleterious material shall be cleaned off in a manner and by procedures satisfactory to the Contract Administrator.

(c) Mixing

(i) The HPC deck overlay shall be provided using a certified ready-mix concrete plant.

(ii) A water-reducing admixture for improving Workability will be required. The admixture must be accepted by the Contract Administrator and shall be used in strict accordance with the Manufacturer's instructions.

(iii) Unless otherwise specified herein, the slump measured in accordance with AASHTO T119 shall be 70 mm ± 20 mm.

(iv) The slump shall be measured after the amount of concrete specified in CSA A23.204 has been discharged, in the case of ready-mix concrete.

(d) Dry Run of Mechanical Screed Machine

(i) The Contractor is responsible for properly setting the screed rails to ensure compliance with the specified longitudinal and transverse deck grades, without creating potential ponding areas or “bird baths.”

(ii) Sufficient screed 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 the day prior to the pour. The Contract Administrator will then check the deck grades, as follows:

- That the screed rail system upon which the finishing machine will travel has been placed outside the area to be concreted. Arrangements for positive anchorage of supporting rails shall provide for horizontal and vertical stability. Hold-down devices shot into the concrete will not be permitted.
- That the finishing machine and guide rails have been adjusted so that the height of the screed above the existing concrete at each point meets the Contract Administrator's requirements. To confirm the Contractor's adjustment of the machine and guide rails, the finishing machine shall be "dry run," and screed clearance measurements taken at each support point, by the Contractor. Resetting of the machine and/or guide rails shall be done by the Contractor as required by the Contract Administrator.

(e) Placing High Performance Concrete Deck Overlay

(i) No longitudinal or transverse joints will be allowed unless detailed on the Drawings or authorized in writing by the Contract Administrator. Where transverse and longitudinal joints are allowed, the HPC deck overlay previously placed shall be sawn to a straight edge and vertical edge before the adjacent concrete overlay is placed.

(ii) After the surface has been cleaned and immediately before placing concrete, a thin coating of bonding grout shall be scrubbed into the dry, prepared surface or latex bonding agent shall be sprayed onto the prepared surface in accordance with Manufacturer's recommendations. Care shall be exercised to ensure that all parts receive a thorough, even coating and that no excess of grout is permitted to collect in pockets. The rate of progress in applying grout shall be limited so that the grout does not become dry before it is covered with new concrete.

(iii) The Contractor shall take every precaution necessary to secure a smooth-riding Bridge deck, within the tolerances indicated in E14.6.6 in this Specification.

(iv) Concrete shall be placed so as to avoid segregation of constituent materials. The concrete finishing machine shall provide sufficient vibration to properly compact the mix. Excess vibration which may cause segregation shall be avoided. If over 75 mm in thickness, or if reinforcing steel is in the lift, the concrete shall be internally vibrated in advance of machine finishing.

(v) The temperature of the concrete shall not be less than 10ºC, nor more than 18ºC, at the time of placing, and shall be maintained below this maximum temperature by the inclusion of ice in the mix in place of a portion of the mix water, as approved by the Contract Administrator, taking care to maintain the design water/cementitious ratio.

(vi) The overall combination of labour and equipment for proportioning, mixing, placing, and finishing new concrete shall be of such minimum capability as to meet the following requirements, as shown on Table E14.3, "Minimum Requirement for Placing High Performance Concrete Deck Overlay", except when noted otherwise on the Drawings.

TABLE E14.3
MINIMUM REQUIREMENT FOR PLACING
HIGH PERFORMANCE CONCRETE DECK OVERLAY

TOTAL CONCRETE AREA PER BRIDGE (Square Metre)	MINIMUM REQUIREMENTS (Cubic Metres/Hour)
0 - 275	1.0
276 - 410	1.5
411 - 550	2.0
Over 550	2.5

(vii) The mechanical screed machine shall be so designed that, when concrete is mixed and placed at the specified minimum rate, under normal operating conditions, the elapsed time between depositing the concrete and final screeding shall not exceed 10 minutes. Similarly, the placing equipment and operations shall be such that in no case shall the elapsed time between batching of ready-mix concrete and final screeding exceed 90 minutes.

(viii) Placement of the concrete shall be a continuous operation throughout the pour. In the event of equipment breakdown, such that concrete placement is stopped or delayed for a period of 60 minutes or more, further placement shall be discontinued and may resume only after a period of not less than 12 hours. This restriction does not prohibit continuation of placement provided that a gap is left in the lane or pour strip. The gap shall be sufficient in length for the finishing machine to clear the previously placed concrete. The fill-in section shall be placed after a period of not less than 12 hours. The edge of any discontinued overlay shall be saw cut vertically to a depth of 50 mm and then shall be chipped out and thoroughly cleaned before placing further overlay concrete.

(ix) Screed guides shall be placed and fastened in position to ensure finishing of concrete to the required profile. Supporting rails upon which the finishing machine travels shall be placed outside the area to be concreted. Provisions for anchorage of supporting rails shall provide for horizontal and vertical stability; positive anchorage may be required by the Contract Administrator. A hold-down device shot into the lower lift deck concrete will not be permitted. Plans for anchoring support rails shall be submitted to the Contract Administrator for acceptance. The Contract Administrator's acceptance must be received by the Contractor prior to the installation of any anchorage devices.

(x) The finished Bridge deck grades shown on the Drawings are preliminary only and are subject to revision during construction by the Contract Administrator.

(xi) The deck overlay shall have a minimum thickness of 50 mm. Actual HPC deck overlay thickness may be greater. This would be to accommodate field adjustments for camber and deflection.

(xii) The vibratory screed of the finishing equipment shall be moved slowly and at a uniform rate, such that screeding shall be completed in no more than two passes. The screed vibrators shall not be allowed to run except when screeding is actually in progress. The screeded surface shall not be walked on or otherwise damaged.

(xiii) The concrete surface produced behind the mechanical screed machine shall be magnesium floated the minimum amount necessary to ensure that the surface is free from open texturing, plucked aggregate or projecting polypropylene fibres and local projections or depressions, to meet the surface tolerance specified. The Contractor shall ensure that the concrete surface is not overworked, resulting in excessive lost of air entrainment.

(xiv) During the concrete finishing operations, the Contractor shall utilize a 3.05 m (10 ft.) straightedge with a 75 mm (3 inch) semicircular shape, as supplied by Bidwell Inc., and as accepted by the Contract Administrator. It shall be used both for flattening the plastic concrete surface and for checking and verifying the surface flatness before commencing curing of the surface. The entire surface shall be checked and any areas not within the surface flatness tolerances specified under the Quality Control section of this Specification shall be corrected using the straight edge. Care shall be taken to preserve the crown and cross section of the roadway.

(xv) Upon completion of the straight-edge checking and final floating the joint with any previous pour (or any transverse joints) shall be sealed by the application of the bonding grout.

(f) Curing Concrete

(i) Immediately following finishing of the concrete, apply fog misting until the concrete has enough strength to support the placement of the predampened 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 with the misting device. There should be no standing water.

(ii) After the joint painting is completed, the surface shall be promptly covered with a single layer of clean, lightly pre-dampened, polyester curing blanket.

(iii) 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 to the satisfaction of the Contract Administrator.

(iv) The predampened polyester curing blankets shall be a temperature of 20°C, ± 5ºC, when applied to the deck.

(v) Failure to apply wet polyester curing blankets within 30 minutes after the deck concrete has been deposited shall be cause for rejecting the Works so affected. However, if the concrete is re-vibrated because of failure to meet density requirements within initial vibration, this time will be extended by 15 minutes. Concrete in the rejected area shall be removed and replaced at no additional cost to the City.

(vi) It is intended that the surface receive a wet polyester blanket cure for at least seven (7) days. Water shall be applied as necessary to keep the concrete and polyester curing blankets saturated. The Contractor must ensure the concrete and polyester curing blankets are kept saturated with water for the entire seven (7) days.

(vii) As soon as the deck concrete can be walked on without damaging the surface, as approved by the Contract Administrator, the polyester curing blankets shall be covered with a layer of minimum 4-mil polyethylene film and a layer of insulated tarps (during cold weather) in order to maintain the concrete temperature of 10°C.

(viii) If, in the opinion of the Contract Administrator, curing has not been maintained sufficiently, the curing period will be extended as directed with no additional payment made.

(g) Surface Texturing

(i) Grooves shall be cut into the concrete deck surface following the verification that the surface meets acceptable limits and after curing. Grooves are to be parallel (within 2 mm) and cut perpendicular to traffic flow. Grooves shall be cut into the concrete deck surface following the curing period. Grooving fresh concrete with no rack in place of cutting cured concrete will not be permitted. Grooves are to be parallel (within 2 mm) and cut perpendicular to traffic flow.

(ii) Saw cuts shall be 2.5 mm wide, 6 ± 2 mm deep, and spaced 25 mm on centre.

(iii) The area 600 mm from traffic barriers and curbs is not to be grooved and the end of the grooves shall be in a straight line parallel with the traffic barrier or curb face.

(iv) Saw cuts shall extend no closer than 100 mm to expansion joints and deck drains.

(v) The Contractor shall supply all water. All run-off from grooving operations and suspended solids shall be collected at either end of the Bridge off the Bridge approaches or deck, in collection tanks, passed through several settling and filtration processes before it is discharged into the sewer system. The final effluent shall meet the requirements of local/provincial standards for water quality.

(vi) All Work associated with surface texturing shall be considered incidental and no additional measurement or payment shall be made for this Work.

(h) Limitation of Operations

(i) Provisions shall be made to protect the concrete by only casting overlay concrete under good weather conditions. This means that the air temperatures shall be between 5°C and 25°C and the surface moisture evaporation rate is less than 0.75 kg/square metre per hour as determined by CSA A23.1-04, Appendix D, “Guidelines for Curing and Protection”. Also, it shall not be raining and no rain forecast for the duration of each pour. The Contract Administrator’s decision in this matter will be final.

E14.5.18 Cold Weather Concreting

(a) The requirements of CSA Standard CAN/CSA-A23.1-04 shall be applied to all concreting operations during cold weather, i.e., if the mean daily temperature falls below 5°C during placing or curing.

E14.5.19 Hot Weather Concreting

(a) General

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

(ii) Concrete shall be placed at as low a temperature as possible, preferably below 15°C but not above 27°C. Aggregate stockpiles may 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 then appear in the Mix Design Statement submitted to the Contract Administrator.

(viii) 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. Fog misting is mandatory for deck concrete 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 at or above 25°C, or when there is probability of its rising to 25°C during the placing period, facilities shall be provided for protection of the concrete in place from the effects of hot and/or drying weather conditions. Under severe drying conditions, the formwork, reinforcement, and concreting equipment shall be protected from the direct rays of the sun or cooled by mist fogging and evaporation.

(d) Concrete Temperature

(i) The temperature of the concrete as placed shall be as low as practicable and in no case greater than the following temperatures, as shown in Table E14.4, “Acceptable Concrete Temperature”, for the indicated size of the concrete section.

TABLE E14.4: ACCEPTABLE CONCRETE TEMPERATURES

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

E14.5.20 Cleanup

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

E14.5.21 Protection From Drying

(a) Placement of deck concrete and the HPC deck overlay 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.

(b) The nomograph, Figure D1, Appendix D of CSA Standard CAN/CSA-A23.1-04 shall be used to estimate surface moisture evaporation rates.

E14.5.22 Construction Joints

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

(b) The face of joints shall be cleaned of all laitance and dirt, after which an epoxy adhesive bonding agent shall be applied. Forms shall be re-tightened and all reinforcing steel shall be thoroughly cleaned at the joint prior to concreting.

(c) Prior to applying the bonding agent, the joints shall be thoroughly cleaned to make them free of all laitance, loose aggregates, form release agents, curing compound, and other surface treatments, roughened to provide a minimum amplitude of 6 mm, and primed with material as recommended by the bonding agent Manufacturer. No primer or sealant shall be installed until the joint preparation has been accepted by the Contract Administrator. Accepted means of roughening include the removal of laitance and mortar paste by water jet and soft brush when concrete is in hardened state.

E14.5.23 Finishing of Concrete Barrier Joints

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

(b) Fibre joint fillers and flexible joint sealant shall be installed as per the Manufacturer's recommendations.

(c) The flexible joint sealant at the barrier joints shall be tooled to provide a clean, uniform finish.

(d) 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.

E14.5.24 Application of Dampproofing

(a) Surfaces shall be patched as specified under E14.5.16 of this Specification prior to application of dampproofing.

(b) Brush or spray primer on all surfaces, brushing into all corners and allow drying. 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.

E14.5.25 Benchmarks

(a) The Contractor shall install a benchmark plug(s) supplied by the Contract Administrator at the locations on each structural item directed by the Contract Administrator.

E14.5.26 Structure Identification Date

(a) The Contractor shall indent into the exposed concrete a structure identification date at the location on each end of the structure as shown on the Drawings in accordance with the detail shown on the Drawings or as otherwise directed by the Contract Administrator.

E14.5.27 Installation of Dowels and Galvanized Expansion Sleeves in Barriers

(a) Dowels and galvanized expansion sleeves shall be installed across construction joints exactly parallel to the direction of movement and each other.

(b) The galvanized sleeves shall be installed in the side of the joint which is cast first.

(c) The sleeves and dowels shall be positioned as shown on the Drawings and shall be held in place by positive and satisfactory means, such as a template, so that their correct position will be maintained after the concrete has been placed, vibrated, and finished. If sleeves and/or dowels are displaced during concrete placing operations, concrete placement shall cease and shall not resume until the displaced dowels and/or sleeves have been reset to the correct alignment.

E14.6 Quality Control

E14.6.1 Inspection

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

E14.6.2 Access

(a) The Contract Administrator shall be afforded full access for the inspection and control 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.

E14.6.3 Materials

(a) All materials supplied under this Specification shall be subject to testing and acceptance by the Contract Administrator in accordance with this Specification.

E14.6.4 Concrete Quality

(a) Quality control tests will be used to determine the acceptability of the concrete supplied by the Contractor. Lean mix concrete for backfilling between the abutment wingwalls shall also be tested. Quality control testing shall be considered incidental to the placement of all concrete, and no separate measurement or payment shall be made for this Work.

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

(c) The frequency and number of concrete quality control tests shall be in accordance with the requirements of CSA Standard CAN/CSA-A23.1-04. An outline of the quality tests is as follows:

(d) Slump tests shall be made in accordance with CSA Standard Test Method CSA-A23.2-5C-04, "Slump of Concrete". If the measured slump falls outside the limits specified in Clause E14.2.1 of this Specification, a second test shall be made.

(e) In the event of a second failure, the Contract Administrator reserves the right to refuse the use of the batch of concrete represented.

(f) Air content determinations shall be made in accordance with CSA Standard Test Method CSA-A23.2-4C, "Air Content of Plastic Concrete by the Pressure Method". If the measured air content falls outside the limits in E14.2.1 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.

(g) The air-void system shall be proven satisfactory by data from tests performed in accordance with the test method of ASTM C457. The spacing factor, as determined on concrete cylinders moulded in accordance with CSA Standard Test Method CSA-A23.2-3C-04, 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.

(h) Samples of concrete for test specimens shall be taken in accordance with CSA Standard Test Method CSA-A23.2-1C-04, "Sampling Plastic Concrete".

(i) Test specimens shall be made and cured in accordance with CSA Standard Test Method CSA-A23.2-3C-04, "Making and Curing Concrete Compression and Flexure Test Specimens".

(j) Compressive strength tests at twenty-eight (28) days shall be the basis for acceptance of all concrete supplied by the Contractor, except for the HPC deck overlay where the fifty-six (56) day compressive strength tests shall be the basis for acceptance. For each twenty-eight (28) or fifty-six (56) day strength test, the strength of two companion standard-cured test specimens shall be determined in accordance with CSA Standard Test Method CSA-A23.2-9C-04, "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.

(k) 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 E14.1 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 a single field-cured test specimen shall be determined in accordance with CSA Standard Test Method CSA-A23.2-9C-04, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the strength of the specimen.

(l) Notwithstanding CSA A23.2-04, cores taken from HPC deck overlay must achieve the concrete design strength as a minimum.

E14.6.5 Corrective Action

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

E14.6.6 Surface Flatness Requirements

(a) The surface of the HPC deck overlay and the approach slab shall be finished to a flatness tolerance as specified herein. The surface flatness of the finished concrete shall be determined by measuring the elevation difference between equidistant points spaced 305 mm apart, along straight or curved lines running parallel or perpendicular (radial) to the direction of travel on the Bridge deck. An acceptable surface flatness, as measured along any such line on the finished surface, shall have the absolute difference between any two consecutive readings (a reading being the difference in elevation between two consecutive points) not exceeding 5 mm.

(b) At each location(s) where the absolute difference of 5 mm is exceeded, further detailed contour survey(s) shall be conducted by and at the discretion of the Contract Administrator to determine the extent of the area requiring corrective action, all at the Contractor's expense. Corrective measures shall involve immediate removal of the surface in the areas

not meeting the specified surface flatness tolerance and/or acceptable rideability, in the judgement of the Contract Administrator, and replacement of same to a minimum depth of 50 mm, with the perimeter of the area saw-cut to a depth of 25 mm (the cut face to be sloped to key-in the replacement concrete), as directed by the Contract Administrator. If more than 20 percent of the surface is rejected by the Contract Administrator based on the flatness tolerance and/or any other defect, the Contractor shall immediately remove and replace the entire area of the applicable pour.

(c) This criterion will not apply across the crown or at any deck drains, which must be constructed to meet design grades as shown on the Drawings or as directed by the Contract Administrator.

(d) The Contract Administrator shall take readings and determine the acceptability for the surface flatness within thirty-six (36) hours following the completion of each pour. The Contractor shall remove and replace the curing blankets, as required by the Contract Administrator, to undertake the necessary flatness testing and shall restore same immediately upon completion of the testing in each area to the satisfaction of the Contract Administrator.

E14.7 Measurement and Payment

E14.7.1 Structural Concrete

(a) The Supply and Placement of 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) Abutment Modifications;
(ii) Stage I Bridge Deck;
(iii) Barriers;
(iv) Approach Slabs;
(v) Roadway Expansion Slab;
(vi) Expansion Joint Concrete Nosings;
(vii) Slope Paving; and
(viii) High Performance Concrete Deck Overlay.

(c) Supplying and installing of all the listed materials, concrete design requirements, equipment, construction methods, and quality controls associated with this Specification and Drawings shall be considered incidental to "Supply and Place Structural Concrete", unless otherwise noted herein. No measurement or payment shall be made for this Work unless indicated otherwise.

E14.7.2 Additional Stage II Deck Concrete

(a) Where additional Stage II deck concrete removals took place, additional Stage II Deck Concrete shall be paid for at the Contract Unit Price per square metre for the "Items of Work", listed here below measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

(b) Items of Work:

Supply and Place Structural Concrete

(ix) Stage II Bridge Deck
  (a) Type 1
  (b) Type 2

E14.7.3 The Supply and Placement of Lean Mix Concrete

(a) The Supply and Placement of Lean Mix Concrete shall be paid for at the Contract Unit Price per cubic metre for "Supply and Place Lean Mix 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 for performing all operations herein described and all other items incidental to the Work.

E14.7.4 Dampproofing

(a) Dampproofing shall be paid for at the Contract Unit Price per square metre for "Supply and Install Dampproofing", 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. The area to be paid for shall be the dampproofed surface area as shown on the Drawings and herein specified.

E14.7.5 Bridge Street Lighting Poles and BR1 Anchor Units

(a) The Supply and Installation of Bridge Street Light Pole and BR1 Anchor Units shall not be measured. This item of Work shall be paid for at the Contract Lump Sum Price for "Supply and Install Anchor Units for Bridge Street Light Poles and BR1 Posts", 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.

E14.7.6 Galvanized Dowels and Galvanized Expansion Sleeves

(a) The Supply and Installation of Galvanized Dowels and Galvanized Expansion Sleeves shall not be measured. This item of Work shall be paid for at the Contract Lump Sum Price for "Supply and Install Galvanized Dowels and Expansion Sleeves" 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. REPAIR MISCELLANEOUS AREAS OF ABUTMENT CONCRETE

E15.1 Description

(a) This Specification shall cover all operations relating to the repair of miscellaneous areas of abutment concrete, as herein specified.

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

E15.2 Submittals

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

E15.3 Materials

E15.3.1 General

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

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

E15.3.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and Workmanlike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with CSA Standard CAN/CSA-A23.1-04.

E15.3.3 Testing and Approval

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

E15.3.4 Abutment Concrete Repair Material

(a) General

(i) Abutment concrete repair material may be either one or a combination of concrete repair mortars, conventional concrete or self-compacting 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 S88C1 for trowelling or spraying or EMACO S66 CI for form and pour or pump by Masterbuilders or equivalent as approved by the Contract Administrator. 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 Substructure Concrete as specified in: Table E14.1.

E15.3.5 Concrete Aggregate

(a) Concrete aggregate shall be in accordance with the requirements of Clauses E14.3.6 (a), (b), and (c).

E15.3.6 Admixtures

(a) Admixtures shall be in accordance with the requirements of Clause E14.3.7 or equal as accepted by the Contract Administrator in accordance with B6.

E15.3.7 Cementitious Materials

(a) Cementitious Materials shall be in accordance with the requirements of Clause E14.3.8, or equal as accepted by the Contract Administrator in accordance with B6.

E15.3.8 Water

(a) Water shall be in accordance with the requirements Clause E14.3.9.

E15.3.9 Bonding Agent

(a) Bonding agents shall be in accordance with Clause E14.3.17 or equal as accepted by the Contract Administrator in accordance with B6.

E15.3.10 Curing Compound

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

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

E15.3.12

(a) Epoxy Adhesive shall be in accordance with the requirements of Clause E14.3.18, or equal as accepted by the Contract Administrator in accordance with B6.

E15.3.13

(a) Formliner shall be “Hydroform” or equal as approved in accordance with Clause E14.3.13.

E15.4 Equipment

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

E15.5 Construction Methods

E15.5.1 Scope of Work

(a) This Work shall involve the preparation and repair of concrete on the undersides of the abutment roof slabs, sidewalls, and other locations of deteriorated concrete on the abutments.

E15.5.2 Debris and Cleanup

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

E15.5.3 Preparation

(a) Remove all loose and deteriorated concrete to sound concrete from the surface of the abutment concrete components which are to receive new concrete.

(b) Following the completion of concrete removals, the Contract Administrator shall 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.

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

E15.5.4 Repair Abutment Concrete

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

(b) 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. The Contract Administrator shall check all repaired areas for bond using a hammer "sounding" method after form removal. Place mortar or concrete by trowelling, pumping, spraying, or into forms ensuring that all entrapped air is removed.

E15.5.5 General Curing

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

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

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

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

(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 polyester curing blanket and 6 mil polyethylene.

E15.6 Measurement and Payment

E15.6.1 Mortar/Concrete Placement

(a) Mortar/Concrete Placement shall not be measured. This item of Work shall be paid for at the Contract Unit Price per square metre for "Repair Miscellaneous Areas of Abutment Concrete", measured and 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.

E16. EXPANSION JOINTS

E16.1 Description

(a) This Specification shall cover the supply and installation of expansion joints and miscellaneous steel items, 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 other things necessary for and incidental to the satisfactory performance and completion of all Work hereinafter specified.

E16.2 Submittals

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty-one (21) Business Days prior to the scheduled commencement of any fabrication, the fabrication details and proposed field splice details of the steel components of the Bridge deck 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 be responsible for the joint installation procedure

E16.3 Materials

E16.3.1 General

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

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

E16.3.2 Epoxy Adhesive

(a) Epoxy adhesive shall be ST 431, Dural Duralbond, Copper Capbound E, Sikadur 32 Hi-bond, Concresive 1001 LPL, or equal as accepted by the Contract Administrator in accordance with B6.

E16.3.3 Epoxy Grout

(a) Epoxy grout shall be Duralcrete as distributed by Specialty Construction Products, Dural 103 Gel, or equal as accepted by the Contract Administrator in accordance with B6.

E16.3.4 Grout

(a) Grout shall be nonmetallic and nonshrink grout. Acceptable grouts are: Master Builders Set Nonshrink Grout, Sika Grout 212, Sternson M-Bed Standard Grout, CPD Nonshrink Grout, or equal as accepted by the Contract Administrator in accordance with B6.

E16.3.5 Expansion Joints

(a) Expansion joints shall be modular expansion joints.

(b) The modular expansion joints shall be an equivalent to Wabo Modular Joint System “D-900” seals, as specified in the Drawings, and supplied by Watson Bowman Acme Corp.

(c) Modular 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.

E16.3.6 Steel

(a) Steel supplied for the fabrication of the Bridge deck expansion joints shall conform to CSA Standard CAN/CSA-G40.2l-M92, Grade 300W, or equal as accepted by the Contract Administrator in accordance with B6. They shall be galvanized after shop fabrication in accordance with CSA Standard CAN/CSA-G164-M92 to a minimum net retention of 600 gm/m^2.

E16.3.7 Steel Extrusions

(a) Steel for the extrusions shall conform to CSA Standard CAN/CSA-G40.2l-M92, Grade 230G minimum.

E16.3.8 Anchor Studs

(a) Anchor studs shall conform to the requirements of ASTM Specification A108-99, Grade Designation 1020 and shall be galvanized.

E16.3.9 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 CSA Standard CAN/CSA-G40.21-M92, Grade 300W and shall be galvanized in accordance with CSA Standard CAN/CSA-G164-M92 to a minimum net retention of 600 gm/m^2.

E16.3.10 Galvalloy

(a) Galvalloy shall be as supplied by:
Metalloy Products Company
P.O. Box #3093,
Terminal Annex, Los Angeles, California.

Locally, this is available from Welders Supplies Ltd., 25 McPhillips Street.

E16.3.11 Welding

(a) Welding shall be of a low oxygen classification. Manual electrodes shall be E7016 or E7018. All welding shall be in accordance with CSA Standard W59-03.

E16.3.12 Preformed Neoprene Joint Seals

(a) Preformed joint seal shall be manufactured from a vulcanized elastomeric compound using crystallization resistant polychoroprene (neoprene) as the only polymer.

(b) The preformed neoprene joint seal shall meet the requirements of Ontario Provincial Standard Specification (OPSS) 1210 "Material Specification for Preformed Neoprene Joint Seals," latest edition, and as amended herein; and of Table E16.1 of this Specification. All tests will be made on specimens prepared from the extruded seals.

E16.4 Equipment

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

E16.5 Fabrication

(a) 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 to prevent twists, bends, and warping.

(b) Matching expansion joints shall be assembled and bolted together for shipping.

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

(d) 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.

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

E16.6 Construction Methods

E16.6.1 Scope of Work

(a) This Work shall involve the supply and installation of expansion joints, miscellaneous steel items, concrete joint nosings, and all other items associated with the supply and installation of the expansion joints,

E16.6.2 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.

E16.6.3 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 315ºC 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.

E16.6.4 Placement of Concrete at Expansion Joints

(a) The assemblies shall be set in position such that they will remain true to line and elevation during and after concreting.

(b) Care shall be taken during compaction of the concrete to ensure that there are no voids in the concrete under and around the structural steel components.

(c) Before concreting, the expansion joint opening shall be set to give the correct width for the mean concrete temperature of the deck. The width shall be obtained from the Temperature Width Adjustment Table provided on the Drawings.

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

(e) Epoxy grout shall be used to fill any bolt holes left after the removal of Manufacturer's clamping channels.

E16.6.5 Installation of Seal

(a) The 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, and shall not be installed prior to casting of the expansion joints into the concrete.

E16.6.6 Watertight Verification of Joint Seal

(a) Prior to installing the expansion joint and walkway 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.

E16.7 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. The Supplier shall state that they have reviewed the installation procedures and find them in accordance with their recommendations. The Supplier shall warranty the replacement of the expansion joints, including removal of the defective expansion joints assembly 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.

E16.8 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 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.

E16.9 Quality Control

E16.9.1 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. 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.

E16.9.2 Joint Seal Markings

(a) All 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.

E16.9.3 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 E16.1, 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 E16.1 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 Strenth 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	No Cracks	ASTM D1149
**Safe Compressibility Test (Z min) Bridge Seal - ≤ 63.5mm < 63.5mm	 Minimum 50% Minimum 50%	 OPSS 1210.07.03.01.04
9. **Pressure Generation at 15% Deflection	Minimum 20kPa	OPSS 1210.07.03.01.04
10. **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

E16.10 Measurement and Payment

(a) The Supply and Installation of Expansion Joints shall not be measured. This item of Work shall be paid for each unit at the Contract Unit Price for “Supply and Install Expansion Joints”, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid for in full for supplying all materials and performing all operations herein described and all other items incidental to the Work.

E17. INSTALLATION OF BALANCED BARRIER AND ALUMINUM TRAFFIC BARRIER

E17.1 Description

(a) This Specification shall cover the supply and installation of the aluminum traffic posts and the installation of the aluminum traffic rails, in accordance with the City of Winnipeg Specification CW 3650-R4 and as specified herein.

E17.2 Materials

E17.2.1 General

(a) Materials shall be supplied in accordance with the City of Winnipeg Specification CW 3650-R4 and as specified herein.

(b) Aluminum traffic rails shall be salvaged from the existing Bridge, as shown on the Drawings. New splice plates and hardware shall be supplied.

E17.2.2 Aluminum Post Anchor Bolts

(a) Aluminum post anchor bolts shall be supplied new for the installation of the traffic posts. This item shall be considered incidental and no measurement or payment shall be made for this Work.

E17.2.3 Aluminum Post Shims and Hardware

(a) Aluminum post shims and hardware necessary for installation shall conform to ASTM Standard B221, Alloy 6061-T6, and shall be supplied as required to facilitate the installation of the traffic rail posts as shown on the Drawings. These items shall be considered incidental and no measurement or payment shall be made for this Work.

E17.2.4 Bituminous Paint

(a) Bituminous paint shall be an alkali-resistant coating and conform to CGSB 31-GP-3M. Supply of bituminous paint shall be incidental to the installation of aluminum traffic posts and rails.

E17.2.5 Antiseize Coating

(a) The antiseize coating to be applied to all threaded components when being assembled shall be LPS-3, Manufactured by Holt-Lloyd (Canada) Ltd., Markham, Ontario, L3R 2Z3.

E17.3 Construction Methods

E17.3.1 General

(a) The Contractor shall supply and use an approved anti-seize component on all of the fasteners and install hot-mix asphalt at the openings in the sidewalk for the buried posts and rails.

(b) All salvaged aluminum materials shall be cleaned prior to installation.

E17.3.2 Installation of Aluminum Traffic Posts

(a) The aluminum posts shall be installed in a careful, Workmanship-like manner onto the anchor bolts to the grade and alignment on the Drawings or as directed by the Contract Administrator.

(b) The grade of the aluminum posts must be averaged over irregularities in the grade of the concrete in order to ensure a smooth and uniform grade on the barrier rail and approach

roadway rail. The aluminum posts shall be set on aluminum shims, as required, to achieve the correct elevation and grade. Additional aluminum shims shall be installed as required to achieve the correct elevation and grade. The surface of the bottom shim that is in contact with concrete shall be painted with a minimum of two (2) coats of bituminous paint. Each coat shall have a minimum thickness of 1 mm.

E17.3.3 Installation of Aluminum Traffic Rails

(a) The aluminum traffic rails shall be salvaged from the existing Bridge in accordance with E9 and reinstalled on the new widened Bridge.

(b) The aluminum traffic rails shall be installed in a careful, Workmanship-like manner onto the anchor bolts to the grade and alignment on the Drawings or as directed by the Contract Administrator.

(c) The end treatment detail for the balanced barrier shall be installed as shown on the Drawings. The installation of the end treatments shall be considered incidental and no separate measurement of payment shall be made for this Work.

E17.3.4 Replacement of Damaged Materials

(a) In the event of damage to any materials, the Contractor shall immediately notify the Contract Administrator and make all necessary repairs or replacements, at his own expense, to the satisfaction of the Contract Administrator. In no case shall the Contractor install a damaged component on the barrier.

E17.4 Quality Control

(a) All Workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator, including all operations, from the selection and production of materials, through to final acceptance of the Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or acceptance that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works that are not in accordance with the requirements of this Specification.

E17.5 Measurement and Payment

(a) The Supply and Install Aluminum Traffic Posts shall be paid for at the Contract Unit Price per unit for “Supply and Install Aluminum Traffic Posts”, measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

(b) The Supply of Aluminum Traffic Rails shall be paid for at the Contract Unit Price per metre for “Supply Aluminum Traffic Rails”, measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

(c) The Installation of Aluminum Traffic Rails shall be paid for at the Contract Unit Price per metre for “Install Aluminum Traffic Rails”, measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

E18. ABUTMENT BACKFILLING

E18.1 Description

(a) This Specification shall cover all operations related to granular backfilling beneath the approach slabs and site backfilling on the exterior sides of the new wingwalls.

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

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

E18.2 Materials

E18.2.1 General

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

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

E18.2.2 Suitable Site Backfill

(a) Suitable site backfill material shall conform to the requirements of the City of the Winnipeg Specification CW3110-R10.

E18.2.3 Granular Backfill

(a) Granular backfill shall conform to the requirements of the City of Winnipeg Specification CW 3110-R10 for subbase material of maximum 50 mm size.

E18.2.4 Base Course Material

(a) Base course material shall be supplied in accordance with City of Winnipeg Specification CW 3110-R10 and may be either granular or crushed limestone.

E18.3 Construction Methods

E18.3.1 Scope of Work

(a) The Work shall comprise of supply and placement of:

(i) Site backfill on the exterior sides of the new abutment wingwalls.

(ii) Granular backfill beneath approach slabs and at the edges of the wingwalls beneath the roadway as indicated on the Drawings.

(b) Backfill in accordance with the requirements of the City of Winnipeg Specification CW 3110-R10.

(c) Backfill for pavement repairs and detour Works is covered elsewhere.

E18.4 Measurement and Payment

(a) Abutment Backfill shall be measured and paid for in accordance with the City of Winnipeg Specification CW 3110-R10.

(i) Site Backfill Material shall be paid in accordance with the City of Winnipeg Specification CW 3110-R10.4.5.2.

(ii) Granular Backfill Material shall be paid in accordance with the City of Winnipeg Specification CW 3110-R10.4.5.3.

E19. HOT-POURED RUBBERIZED ASPHALT WATERPROOFING

E19.1 Description

(a) This Specification shall consist of all operations related to the waterproofing of the West abutment roof slab and approach slab.

(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.

E19.2 Materials

(a) Rubberized asphalt waterproofing shall be American Hydrotech's Monolithic Membrane 125 or approved equivalent.

E19.2.1 Elastomeric Sheet Membrane

(a) The elastomeric sheet membrane shall be Elaso-Petrotech No. 240 or approved equivalent.

E19.2.2 Cement

(a) Cement shall be normal Portland Cement.

E19.2.3 Surface Conditioner

(a) Surface conditioner, to be applied to the Bridge deck, shall conform to the requirements of the Manufacturer of the rubberized asphalt waterproofing.

E19.2.4 Melting On-Site

(a) Cakes of rubberized asphalt waterproofing shall be melted in an approved double shell melter under continuous agitation until the material can be drawn free flowing and lump free from the melter.

(b) The temperature of the rubberized asphalt waterproofing shall not exceed 218°C at any time during and entire melting procedure

E19.3 Construction Methods

E19.3.1 Scope of Work

(a) The hot-poured rubberized asphalt waterproofing shall be applied on the West roof and approach slab as shown on the Drawings.

E19.3.2 Application

(a) The asphalt surfaces onto which the hot-poured rubberized asphalt waterproofing to be applied shall be thoroughly cleaned by means of gritblasting. All rough spots, ridges, and edges in the concrete surface resulting from protrusions of concrete aggregate or cement paste shall be removed by light chipping or grinding or other approved methods. A final cleaning of the concrete surfaces shall be done using high velocity compressed air. The concrete surfaces shall be dry, clean, and free from frost, dust, dirt, and all foreign matter.

(b) After the roof and approach slab has been cleaned, it shall be covered with surface conditioner. The quantity used shall be 160 mL/m^2, or as recommended by the Manufacturer. The surface conditioner shall be allowed to dry before the application of the waterproofing membrane.

(c) The rubberized asphalt waterproofing shall be brought to a temperature of between 190°C and 218°C, and then applied to the roof and approach slab.

(d) The application of the rubberized asphalt waterproofing shall be carried out under the supervision of experienced personnel.

(e) The in-place thickness of hot-poured rubberized asphalt waterproofing shall not be less than 3 mm nor more than 5 mm.

(f) The Contractor shall supply and install an approved heavy-duty elastomeric sheet membrane which is compatible with the hot-poured rubberized asphalt waterproofing material. The heavy-duty elastomeric sheet membrane shall be installed at the designated locations shown on the Drawings. Installation of the heavy-duty elastomeric sheet membrane shall be in accordance with the Manufacturer’s recommendations.

(g) The finished waterproofing membrane surface shall be lightly dusted with Normal Portland Cement. The quantity used shall be one bag of cement per 45 m^2.

E19.4 Measurement and Payment

E19.4.1 Hot-Poured Rubberized Asphalt Waterproofing

(a) Hot-Poured Rubberized Asphalt Waterproofing shall be paid for at the Contract Unit Price per square metre for "Hot-Poured Rubberized Asphalt Waterproofing,", measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. The area to be paid for shall be the waterproofed surface area as shown on the Drawings and herein specified.

E20. WATER USED BY CONTRACTOR

(a) Further to Clause 3.7 of the City of Winnipeg Specification CW 1120-R1, the Contractor shall pay for all costs associated with obtaining water in accordance with the WaterWorks By-law. Sewer charges will not be assessed for water obtained from a hydrant.

E21. LIGHTING AND MISCELLANEOUS PVC CONDUIT

E21.1 Description

(a) This Specification shall cover the supply and installation of conduits, lighting fixtures, pull boxes, junction boxes, couplings, and all required appurtenances and incidental components to serve the underbridge lighting and roadway lighting 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 the work as hereinafter specified.

(c) Underbridge walkway lighting as shown on the Drawings shall be supplied, installed, wired, and connected by the Contractor. Existing power distribution system shall be modified as required to accommodate new lighting circuit. A photocell control shall be provided to control the new underbridge lighting.

(d) Roadway luminaires located on the Bridge deck shall be supplied, erected, wired, and connected by Manitoba Hydro. The Contractor shall provide and install luminaire bases and conduit system associated with these luminaires, including conduits complete with pull cords and the necessary pull boxes, junction boxes, expansion fittings, and all required accessories. The Contractor shall coordinate all such work with Manitoba Hydro.

E21.2 Materials

E21.2.1 General

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

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

E21.2.2 Testing

(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. Furthermore all material supplied and installed shall be CSA approved.

E21.2.3 Lighting Fixtures

(a) Lighting fixtures for underbridge walkway lighting to be as specified in the luminaire schedule on the Drawings. Fixtures to be complete with lamps.

(b) HID ballasts to be integral with luminaires, 120V +/-10%, totally enclosed, suitable for ambient temperature ranging from +40oC to -40oC, minimum 95% power factor with 95% of rated lumens.

(c) Photocell to control underbridge lighting to be 15A-1P, wall-mounted, weather-proof, vandal-resistant.

E21.2.4 Conductors

(a) Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

(b) Copper conductors: size as indicated, with 600 V insulation of chemically cross linked thermosetting polyethylene material rated RW90.

E21.2.5 Conduits and Related Materials

(a) All conduit shall be as specified on the Drawings or otherwise accepted by the Contract Administrator in accordance with the Canadian Electrical Code, unless otherwise specified.

(b) Install polypropylene fish cord.

(c) All conduits, pull boxes and junction boxes for the electrical work embedded in concrete or exposed inside girders and abutments shall be Rigid PVC (polyvinyl chloride) conforming to the requirements of CSA C22.2 No. 136. Exposed conduits on the Bridge exterior shall be Rigid Galvanized Steel.

(d) All covers for boxes shall be stainless steel and fastened with stainless steel vandal-proof screws.

(e) Flexible couplings shall be such as Crouse-Hinds Type EC or equal accepted by Contract Administrator.

(f) Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

E21.3 Equipment

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

(b) All equipment shall be new and CSA certified.

E21.4 Construction Methods

E21.4.1 Scope of Work

(a) The Work shall include the supply and installation of all conduits complete with pull wire, lighting fixtures, circuit breakers, photocells, pull boxes, junction boxes, couplings, wiring, and all required appurtenances and incidental components to allow for provision of a complete and operational lighting system as indicated on the Drawings and specified herein.

E21.4.2 Permits, Codes, and Regulations

(a) The Contractor shall be responsible to obtain and pay for all electrical permits, inspections, etc., required by the authorities having jurisdiction over this work, and shall provide a copy of each permit to the Contract Administrator before commencing any work on the site.

(b) The Work shall be carried out in accordance with the latest regulations of the Canadian Electrical Code and all applicable Municipal and Provincial Codes and Regulations. In no instance, however, shall the standard established by the Drawings and Specifications be reduced by any of the Codes referred to above.

E21.4.3 Placement of Conduits, Pull Boxes, and Junction Boxes

(a) General

(i) All conduits, pull boxes and junction boxes shall be placed as shown on the Drawings. The conduit support system to be placed in concrete shall be firmly anchored in place to prevent movement during pouring of the concrete. Extreme care shall be exercised when pouring concrete to prevent damage to any conduit

support system. The open ends of the conduits shall be suitably capped, to protect the conduit from damage. The conduit system shall be watertight. Secure conduits with two-hole straps.

(ii) Fish wire shall be placed in all conduits provided for wiring supplied by Manitoba Hydro and shall be firmly anchored at the open ends of the conduits. The Contractor shall drill a small hole in the conduit cap for passage of the fish wire.

(iii) Upon completion of the conduit system, the Contractor shall ascertain that no obstructions are blocking any conduit. If any obstruction is encountered, it shall be removed by the Contractor at his own expense.

E21.4.4 Electrical Conductors

(a) Install conduits as indicated on the Drawings.

(b) Remove insulation carefully from ends of conductors and install mechanical pressure type connectors and tighten screws. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

(c) Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors. Colour code to CSA C22.1.

E21.4.5 Power Supply

(a) A new matching circuit breaker shall be installed in the existing panel in east abutment as shown on the Drawings. The panel shall be modified as required to accommodate new breaker. A new photocell shall be provided to control the new lighting circuit and installed on the exterior of the east abutment facing north.

E21.4.6 Lighting Fixtures

(a) Align luminaires mounted in a row to form straight uninterrupted line.

(b) Align luminaires parallel or perpendicular to the Bridge lines.

E21.5 Quality Control

E21.5.1 General

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

(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.

E21.6 Measurement and Payment

(a) The supply and installation of Underbridge and Roadway Lighting will be paid for on a lump sum basis for all types of conduit, wiring, and equipment supplied and/or installed in accordance with this Specification, accepted by the Contract Administrator, and no measurement will be made for this work.

(b) The Supply and Installation of Electrical Conduit, Pull Boxes, Junction Boxes, Power Provisions, and Lighting Fixtures shall not be measured. This Work shall be paid for at the Contract Lump Sum for the "Items of Work" listed herebelow, 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.

(c) Items of Work:

(i) Electrical

- Conduit System Complete with Pull Strings for Roadway Lighting;
- Conduit and Wiring for Underbridge Lighting;

- Modifications for Power Distribution to Accommodate New Lighting Circuit;
- Photocell Control for New Lighting Circuit; and
- Lighting Fixtures.

E22. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO THE BRANCH II AQUEDUCT AND FORT GARRY – ST. VITAL FEEDERMAIN

E22.1 Description

(a) This Specification details operating constraints for all Work to be carried out in close proximity to the Branch II Aqueduct and Fort Garry-St. Vital Feedermain. Close proximity shall be deemed to be any construction activity within a 5 m offset from the centreline of the feedermain or Aqueduct.

E22.2 General Considerations for Work in Close Proximity to the Branch II Aqueduct and Fort Garry-St. Vital Feedermain

(a) The Branch II Aqueduct and Fort Garry-St. Vital Feedermain are critical components of the City of Winnipeg Regional Water Supply System and Work in close proximity to either pipeline shall be undertaken with an abundance of caution. The pipes cannot be taken out of service to facilitate construction and inadvertent damage caused to either pipe would likely have catastrophic consequences.

(b) Work around the Aqueduct and Feedermain shall be planned and implemented to minimize the time period that Work is carried out in close proximity to them and to ensure that the pipelines are not subjected to excessive construction related loads, including excessive vibrations and/or concentrated or asymmetrical lateral loads during backfill placement.

(c) The Branch II Aqueduct and Fort Garry-St. Vital Feedermain are constructed of Prestressed Concrete Cylinder Pipe conforming to AWWA Standard C301. The Branch II Aqueduct east of the Red River was manufactured and constructed in 1959. The Branch II Aqueduct and Fort Garry-St. Vital Feedermain west of the Red River were generally manufactured and installed in 1988.

(d) AWWA C301 pipe has limited ability to withstand increased earth and live loading. Therefore, every precaution must be undertaken to ensure that applied loading during all phases of construction is within accepted loading parameters.

E22.3 Submittals

(a) Submit Form K: Equipment List at or prior to a pre-construction meeting, or at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the C4.1 for the return of the executed Contract.

(b) Submittal shall include:

(i) Equipment operating weight and dimensions including wheel or track base, track length or axle spacings, track widths or wheel configurations;

(ii) Payload weights; and

(iii) Load distributions in the intended operating configuration.

(c) Submit a Construction Method Statement with proposed construction plan including material haul route locations crossing the aqueduct/feedermain, excavation equipment locations, loading positioning and base construction sequencing to the Contract Administrator for review seven (7) days prior to construction. Do not commence construction until the Construction Method Statement has been reviewed and accepted by the Contract Administrator.

E22.4 Protection of the Branch II Aqueduct and Fort Garry-St. Vital Feedermain During Construction

(a) The Drawings provide all locations of the feedermain/Aqueduct infrastructure through the construction site. Pipe locations noted on the Drawings are based on the original record drawings.

(b) The Contractor shall determine pipeline location and obvert elevation at locations marked out by the Contract Administrator by soft excavation methods (hydrovac or hand digging) prior to construction. Soft excavation will be paid for on an hourly basis.

(c) Contractors carrying out repair Work or working in close proximity to the Aqueduct or feedermain shall meet the following conditions and technical requirements:

(i) Pre-Work, Planning and General Execution

- No Work shall commence at the site until the Construction Method Statement has been accepted and the Aqueduct and feedermain locations has been clearly delineated in the field.
- Work shall only be carried out with equipment that has been reviewed and quantified in terms of its loading implications by the Contract Administrator.
- For transverse crossings of the Aqueduct and/or feedermain in support of pavement and Bridge construction activities, designate crossing locations and confine equipment crossing the pipe(s) to these locations. Reduce equipment speeds to levels that minimize the impacts of impact loading.
- For construction Work activities either longitudinally or transverse to the alignment of the feedermain Work only with equipment and in the manner stipulated in the accepted Construction Method Statement and the supplemental requirements noted herein.
- Subgrade, subbase and base construction shall be kept in a rut free condition at all times. Construction equipment is prohibited from crossing pipelines if the grade is insufficient to support the equipment without rutting.
- Granular material, construction material, soil or other material shall not stockpiled on the pipelines or within 5.0 metres of the pipe centerline.
- Stage construction such that the Aqueduct and/or feedermain are not subjected to significant asymmetrical loading at any time.
- Where Work is in proximity to the Aqueduct and/or feedermain, utilize construction practices and procedures that do not impart excessive vibration loads on the Aqueduct and/or feedermain or that would cause settlement of the subgrade below the Aqueduct and/or feedermain.

(ii) Excavation

- Where there is less than 2.5 m of cover over the Aqueduct and/or feedermain, offset backhoe from Aqueduct and/or feedermain, a minimum of 2.5 m from Aqueduct/feedermain centerline, to carry out excavation.
- Where there is less than 1.5 metres of earth cover over the Aqueduct and/or feedermain and further excavation is required either adjacent to or over the aqueduct/feedermain, utilize only smooth edged excavation buckets, soft excavation or hand excavation techniques and continue offset excavation.
- Excavated materials intended for reuse shall not be dumped directly on pipelines but shall be carefully bladed in place.

(iii) Subgrade Construction

- Subgrade compaction shall be limited to static compaction methods and only with equipment that are well within the rated loading superimposed loading capacity of the Aqueduct and/or feedermain.
- Stage Work activities to minimize the time period that unprotected subgrade is exposed to the environment and protect the subgrade against the impacts of adverse weather if subbase/ base course construction activities are not sequential with excavation.

(iv) Subbase and Base Course Construction

- Place a 5.0 m length of Reinforcement/Separation Geotextile Fabric the width of the pavement subgrade in accordance with the City of Winnipeg Specification CW 3130-R1.

- Subbase or base course materials shall not be dumped directly on pipelines but shall be carefully bladed in-place.
- Subbase compaction shall be either carried out by static methods without vibration or with smaller approved equipment such as hand held plate packers or smaller roller equipment.
- The Contractor shall ensure that all Work crew members understand and observe the requirements of this specification. Prior to commencement of on-site Work, the Contractor shall jointly conduct an orientation meeting with the Contractor Administrator with all superintendents, foremen and heavy equipment operators to make all Workers on site are fully cognizant of the limitations of altered loading on the Aqueduct and feedermain, the ramifications of inadvertent damage to the pipelines, the constraints associated with Work in close proximity to the Aqueduct and the feedermain and the specific details of the Construction Method Statement in instances where a Construction Method Statement is in effect.
- Employees of the Contractor or any Subcontractor that fail to comply with the conditions for working in close proximity to the Aqueduct and/or feedermain shall be promptly removed from the Site.

E22.5 Measurement and Payment

E22.5.1 Soft Excavation

(a) Soft Excavation shall be paid for at the Contract Unit Price per hour for "Soft Excavation" measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

E23. RELOCATION OF PRECAST CONCRETE TRAFFIC BARRIERS

E23.1 Description

(a) This Specification covers removal of existing traffic concrete barriers form the existing Westbound detour roads, relocating them to required construction site closure areas and or storing them on site for further use.

E23.2 Materials

(a) The precast concrete traffic barriers are currently on the closed Westbound detour roads.

E23.3 Construction Methods

(a) The Contractor shall remove the concrete traffic barriers off the closed Westbound detour roads, transport and place the barriers to the construction site closure areas, and or store them on site in an area approved by the Contract Administrator. Schedule plans for removing traffic barriers off detour roads are to be approved by the Contract Administrator prior to any work beginning.

E23.4 Measurement and Payment

E23.4.1 Relocation of Precast Concrete Traffic Barriers

(a) Relocation of Precast Concrete Traffic Barriers shall be paid for at the Contract Unit Price per each unit for "Relocation of Precast Concrete Traffic Barriers" measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

E24. STOCKPILING OF EXCAVATION AND TOPSOIL STRIPPING

E24.1 Construction Methods

(a) Topsoil stripping and excavation from eastbound detour road construction shall be stockpiled and trimmed within the project limits for site restoration by the Bridge Contract in 2009. Stockpiling locations are to be approved by the Contract Administrator prior to use. No additional payment will be maid for stockpiling and trimming.

E25. PLANING INTEGRAL CURB

E25.1 Construction Methods

(a) Further to Section 3.1 - Concrete Curb Removal in the City of Winnipeg Specification CW 3240-R6 Renewal of Existing Curbs, where curb is to be removed for detour construction and where identified as Integral Curb and Gutter the curb is to be removed by planing.

E26. SALVAGE CORREGATED STEEL PIPE

E26.1 Construction Methods

(a) Culverts removed as part of the Westbound detour road removal are to be salvaged for reuse in the construction of the Eastbound detour road. Take care not to damage materials. Stockpile in a location approved by the Contract Administrator for reuse in the construction of the Eastbound detour road.

E26.2 Measurement and Payment

(a) Salvage Corrugated Steel Pipe shall be paid for at the Contract Unit Price per metre for “Salvage Corrugated Steel Pipe”, measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. The units to be paid for will be the total meters of Corrugated Steel Pipe salvaged in accordance with this specification, accepted, and measured by the Contract Administrator.

E27. ASPHALT PAVEMENT MAINTENANCE REPAIRS

E27.1 Description

(a) This Specification covers maintenance repairs on the asphalt pavement for the detour roads during operations for the duration of the Warranty period.

E27.2 Materials

(a) Asphalt Pavement materials shall be in accordance with the City of Winnipeg Specification CW 3410-R7.

E27.3 Construction Methods

E27.3.1 Repair Asphalt Pavement Surfaces

(a) Repair asphalt pavement surfaces that have deteriorated/broken away from the pavement where identified by the Contract Administrator.

(b) Saw cut and remove the area marked out for repair.

(c) Level base course and compact in accordance with the City of Winnipeg Specification CW 3110-R10. If required place base course material to meet the required grades. Contract Administrator to review surface for approval prior to proceeding with the repair.

(d) Place prime coat on the base coarse and tack coat on the saw cut vertical face of the asphalt pavement area being repaired in accordance with the City of Winnipeg Specification CW 3410-R7.

(e) Place asphalt Type 1A in repair area in accordance with the City of Winnipeg Specification CW 3410-R7.

(f) The Contractor shall maintain traffic during repair.

E27.4 Measurement and Pavement

E27.4.1 Asphalt Pavement Maintenance Repairs

(a) Asphalt Pavement Maintenance Repairs shall be paid for at the Contract Unit Price per square metre for "Asphalt Pavement Maintenance Repairs", measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.. The area to be paid for shalll be the total number of square metres of Asphalt Pavement Maintenance Repairs undertaken in accordance with this Specification, accepted, and measured by the Contract Administrator.

E28. SEEDING

E28.1 General

(a) Further to the City of Winnipeg Specification CW 3520-R7 and CW 3540-R5, this Specification covers the supply and placement of grass seed and preparation of existing grade for regional street boulevards and medians.

E28.2 Grass Seed

(a) Add revised grass seed mixture to clause 5.3 of the City of Winnipeg Specification CW 3520–R7:

(i) "For regional street boulevards and medians a mixture composed of:

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

E28.3 Seeding

(a) Replace first paragraph of Clause 9.5 of the City of Winnipeg Specification CW 3520-R7 with the following wording:

(i) "Grass seed will be sown at a rate of 2.2 kilograms per 100 square metres."

E28.4 Preparation of Existing Grade

(a) Add paragraph to clause 9.2 of the City of Winnipeg Specification CW 3540-R5:

(i) "Prior to placing topsoil for seeded areas, all sub-grade areas for regional street boulevards and medians except in areas within the edge of a tree canopy (or drip line) shall be scarified or pulverized to a minimum depth of 50 mm."

E29. SHOP DRAWINGS

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

(b) The Contractor shall review all Shop Drawings prior to submitting them to the Contract Administrator. By this review, the Contractor represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data, and that he has checked and coordinated each Shop Drawing with the requirements for the Work and of the Contract. The Contractor's review of each Shop Drawing shall be certified by stamp, date, and signature in the manner stipulated by the Contract Administrator.

(c) The Contractor shall promptly submit Shop Drawings to the Contract Administrator in an orderly sequence to prevent delay in the Work or in the Work of other contractors. At the

time of submission, the Contractor shall notify the Contract Administrator of any deviations in the Shop Drawings from requirements of the Contract. The Contractor shall allow five (5) Business Days for the Contract Administrator's review.

(d) The Contract Administrator shall review the Shop Drawings promptly or in accordance with a schedule agreed upon in writing. The Contract Administrator, upon completion of the review, shall communicate either his acceptance or rejection of the Shop Drawings to the Contractor. The Contract Administrator's review and acceptance shall be for conformity to the design concept of the Work and for compliance with the Contract.

(e) The acceptance of the Shop Drawings for a component or a subassembly shall not constitute acceptance of the assembly of which it is a part.

(f) The review shall not relieve the Contractor of responsibility for errors and omissions in the Shop Drawings or of responsibility for meeting all requirements of the Contract unless a deviation on the Shop Drawings, identified by the Contractor, has been approved by the Contract Administrator.

(g) The Contractor shall promptly make any changes in the Shop Drawings which the Contract Administrator may require and which are consistent with the Contract and shall promptly resubmit same to the Contract Administrator for review and acceptance unless otherwise directed by the Contract Administrator. When resubmitting the Shop Drawings, the Contractor shall notify the Contract Administrator of any revisions other than those requested by the Contract Administrator.

(h) No Work called for by Shop Drawings shall be undertaken by the Contractor until the Contract Administrator's review is completed and the acceptance of same has been communicated to the Contractor.

(i) Each Shop Drawing shall:

(i) Be sheet size ISO A4;

(ii) Be submitted as one (1) reproducible transparency and four (4) prints;

(iii) Show, in the lower right-hand corner, the following information:

- The project title
- The Bid Opportunity Number or other project number assigned by the Contract Administrator
- The name of the depicted item exactly as named in the Specifications or on the Drawings
- The project series number and the name of the area in which item is used
- The Specification section number (if applicable)
- The option proposed (if applicable)
- The drawing date (to be revised for each resubmission)

(iv) Be stamped with the seal of a Professional Engineer licensed to practise in the Province of Manitoba, and signed and dated by said Engineer.