



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 867-2007

ACCESS BRIDGE TO 330 AND 334 BONNER AVENUE

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 ACCESS BRIDGE TO 330 AND 334 BONNER AVENUE

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, December 18, 2007.

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

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

B3. SITE INVESTIGATION

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

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. BIDDERS' CONFERENCE

B4.1 Further to C3.1, the Contract Administrator will hold a Bidders' conference at the Site from 10:00 am to 12:00 (noon) on December 11, 2007.

B4.2 The Bidder is advised that, at the Bidders' Conference, all aspects of the Work may be discussed. Representatives from The City of Winnipeg Forestry Branch and Emergency Services are anticipated to attend the Bidder's conference and be available to discuss certain aspects of the Work.

B4.3 The Bidder shall not be entitled to rely on any information or interpretation received at the Bidders' Conference unless that information or interpretation is provided by the Contract Administrator in writing.

B5. ENQUIRIES

B5.1 All enquiries shall be directed to the Contract Administrator identified in D3.1.

B5.2 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.

B5.3 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.

B5.4 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.

B5.5 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.

B6. ADDENDA

- B6.1 The Contract Administrator may, at any time prior to the Submission Deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.
- B6.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.
- B6.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- B6.2.2 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.
- B6.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B7. SUBSTITUTES

- B7.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.
- B7.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B7.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.
- B7.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;
 - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
 - (c) identify any anticipated cost or time savings that may be associated with the substitute;
 - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;
 - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.
- B7.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.
- B7.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, only to the Bidder who requested approval of the substitute.

- B7.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely responsible for disseminating information regarding the approval to any person or persons he wishes to inform.
- B7.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B7.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B16.
- B7.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B8. BID COMPONENTS

- B8.1 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;
- B8.2 Further to B8.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B7.
- B8.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Bid.
- B8.4 The Bid shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.
- B8.4.1 Samples or other components of the Bid which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid.
- B8.5 Bidders are advised not to include any information/literature except as requested in accordance with B8.1.
- B8.6 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, may result in the Bid being determined to be non-responsive.
- B8.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.
- B8.8 Bids shall be submitted to:
- The City of Winnipeg
Corporate Finance Department
Materials Management Branch
185 King Street, Main Floor
Winnipeg MB R3B 1J1

B9. BID

- B9.1 The Bidder shall complete Form A: Bid, making all required entries.
- B9.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his 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.
- B9.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B9.2.
- B9.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.
- B9.4 Paragraph 12 of Form A: Bid shall be signed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his 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.
- B9.4.1 The name and official capacity of all individuals signing Form A: Bid shall be printed below such signatures.
- B9.4.2 All signatures should be witnessed, except where a corporate seal has been affixed.
- B9.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B10. PRICES

- B10.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.
- B10.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.
- B10.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B11. QUALIFICATION

- B11.1 The Bidder shall:
- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and

- (b) be financially capable of carrying out the terms of the Contract; and
- (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

B11.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) be responsible and not be suspended, debarred or in default of any obligations to the City (a list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>).

B11.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) have successfully carried out work similar in nature, scope and value to the Work; and
- (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
- (c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);

B11.4 Further to B11.3(c), the Bidder shall, within 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>.)

B11.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B11.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B12. BID SECURITY

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

- (a) a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or
- (b) an irrevocable standby letter of credit, in the amount of at least ten percent (10%) of the Total Bid Price, and undertaking issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or
- (c) a certified cheque or draft payable to "The City of Winnipeg", in the amount of at least one hundred percent (100%) of the Total Bid Price, drawn on a bank or other financial institution registered to conduct business in Manitoba.

- B12.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.
- B12.1.2 All signatures on bid securities shall be original, and shall be witnessed or sealed as required.
- B12.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.
- B12.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B12.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.
- B12.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.
- B12.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

B13. OPENING OF BIDS AND RELEASE OF INFORMATION

- B13.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Branch, or in such other office as may be designated by the Manager of Materials.
- B13.1.1 Bidders or their representatives may attend.
- B13.1.2 Bids determined by the Manager of Materials, or his designate, to not include the bid security specified in B12 will not be read out.
- B13.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- B13.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract Amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- B13.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B14. IRREVOCABLE BID

- B14.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.
- B14.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly executed and the performance security furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid.

B15. WITHDRAWAL OF BIDS

- B15.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.
- B15.1.1 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.
- B15.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.
- B15.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:
- (a) retain the Bid until after the Submission Deadline has elapsed;
 - (b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid; and
 - (c) if the notice has been given by any one of the persons specified in B15.1.3(b), declare the Bid withdrawn.
- B15.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B14.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B16. EVALUATION OF BIDS

- B16.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Bid Opportunity (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B11 (pass/fail);
 - (c) Total Bid Price;
 - (d) economic analysis of any approved alternative pursuant to B7.
- B16.2 Further to B16.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.
- B16.3 Further to B16.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid or in other information required to be submitted, that he is responsible and qualified.
- B16.4 Further to B16.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B16.4.1 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.

B17. AWARD OF CONTRACT

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

- B17.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.
- B17.2.1 Without limiting the generality of B17.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
 - (b) the prices are materially in excess of the prices received for similar work in the past;
 - (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
 - (d) only one Bid is received; or
 - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B17.3 Subject to B17.2, 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.
- B17.3.1 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.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.
- C0.1.1 The General Conditions for Construction are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- C0.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of demolition of an existing two span timber bridge and construction of a new cast-in-place single span concrete solid slab bridge with cast-in-place concrete abutments supported by driven steel H-piles.

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

- (a) Construction and maintenance of the temporary access road to 330 and 334 Bonner Ave.
- (b) Demolition of the existing access bridge.
- (c) Construction of a temporary pedestrian bridge from Bonner Ave. for emergency services access.
- (d) Supply and drive steel H-piles.
- (e) Construct the concrete abutments, deck, barriers and approach slabs.
- (f) Restoration of the Site to it's original condition.

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is Stantec Consulting Ltd., represented by:

Kevin Amy, M.Sc., P.Eng.
Structural Engineer
905 Waverley Street
Winnipeg MB R3T 5P4

Telephone No. (204) 488-5743

Facsimile No. (204) 453-9012

D3.2 At the pre-construction meeting, Kevin Amy, M.Sc., P.Eng. will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D4. CONTRACTOR'S SUPERVISOR

D4.1 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. NOTICES

D5.1 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.

D5.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D5.3, D5.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the address or facsimile number identified in D3.1.

- D5.3 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

- D5.4 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

D6. FURNISHING OF DOCUMENTS

- D6.1 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

D7. AUTHORITY TO CARRY ON BUSINESS

- D7.1 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.

D8. SAFE WORK PLAN

- D8.1 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.
- D8.2 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>.

D9. INSURANCE

- D9.1 The Contractor shall provide and maintain the following insurance coverage:
- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability, broad form property damage cover

and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;

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

D9.2 Deductibles shall be borne by the Contractor.

D9.3 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.

D9.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least fifteen (15) Calendar Days prior written notice to the Contract Administrator.

D10. PERFORMANCE SECURITY

D10.1 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 one hundred percent (100%) 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 one hundred percent (100%) 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 one hundred percent (100%) of the Contract Price.

D10.1.1 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.

D10.2 If the bid security provided in his Bid was not a certified cheque or draft pursuant to B12.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

SCHEDULE OF WORK

D11. COMMENCEMENT

D11.1 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.

D11.2 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 D7;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the Safe Work Plan specified in D8;
 - (iv) evidence of the insurance specified in D9;

- (v) the performance security specified in D10;

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.

D11.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the letter of intent.

D11.3 The City intends to award this Contract by January 11, 2008

D11.3.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D12. CRITICAL STAGES

D12.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

- (a) By March 14, 2008, the Temporary Pedestrian Crossing must be removed from Site; the area cleaned of foreign materials; the Temporary Access to 330 and 334 Bonner Ave. materials removed from Site; and the new access bridge is opened to all traffic.

D13. SUBSTANTIAL PERFORMANCE

D13.1 The Contractor shall achieve Substantial Performance by March 10, 2008

D13.2 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.

D13.3 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.

D13.4 Substantial Performance shall not be considered to have been achieved until the superstructure is completely installed, furnished with concrete barriers (aluminium railing on top not included), approach slab completed, approach graded such that vehicles may safely use the bridge. The condition of the bridge shall be such that the residences at 330 and 334 Bonner Ave. and emergency vehicles may use the bridge as required .

D14. TOTAL PERFORMANCE

D14.1 The Contractor shall achieve Total Performance by July 11, 2008

D14.2 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.

D14.3 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.

D15. LIQUIDATED DAMAGES

D15.1 If the Contractor fails to achieve critical stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the

City the following amounts per Calendar Day for each and every Calendar Day following the days fixed herein for same during which such failure continues:

- (a) Five Hundred dollars (\$500.00);
- (b) Substantial Performance – One Thousand Five Hundred dollars (\$1,500.00);
- (c) Total Performance – One Thousand dollars (\$1,000.00).

D15.2 The amounts specified for liquidated damages in D15.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

D15.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

CONTROL OF WORK

D16. JOB MEETINGS

D16.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D16.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

D17. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D17.1 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).

MEASUREMENT AND PAYMENT

D18. PAYMENT

D18.1 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.

WARRANTY

D19. WARRANTY

D19.1 Notwithstanding C13.2, the warranty period shall begin on the date of Substantial Performance and shall expire two (2) year thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for there under.

D19.2 Notwithstanding C13.2 or D19.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Substantial 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;

D19.2.1 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.

FORM H1: PERFORMANCE BOND
(See D10)

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. 867-2007

ACCESS BRIDGE TO 330 AND 334 BONNER AVENUE

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)**
(See D10)

(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. 867-2007
ACCESS BRIDGE TO 330 AND 334 BONNER AVENUE

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)

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:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>
B176-08-01	Cover Sheet & Drawing Index
B176-08-02	Temporary Site Access Plan
B176-08-03	Bridge Site Plan
B176-08-04	General Arrangement & Foundation Layout
B176-08-05	Concrete Plan, Section & Details
B176-08-06	Concrete Sections & Details
B176-08-07	Reinforcing Plan, Sections & Details
B176-08-08	Reinforcing Sections, Details & Schedule
B176-08-09	Aluminium Bridge Guardrail Details

E2. SOILS INVESTIGATION REPORT

- E2.1 The Geotechnical Reports are included in Appendix A of this Specification:
- (a) Geotechnical Investigation Proposed Bridge Replacement Bunn's Creek Crossing Bonner Avenue Winnipeg, Manitoba
 - (b) Prepared by: AMEC Earth & Environmental, A division of AMEC Americas Limited September 2007
- E2.2 The soils information presented in the Geotechnical Reports and shown on the Drawings is primarily for design purposes and the City does not Guarantee the information is free from errors or discrepancies.
- E2.3 No test hole shall be drilled without the approval of the Contract Administrator.
- E2.4 Further to C:3.1, the Contractor shall make his own investigation as to the soil conditions, which will be encountered in the Work. The City assumes no responsibility for failure or neglect on the part of the Contractor to determine the working conditions at the Site

GENERAL REQUIREMENTS

E3. OFFICE FACILITIES

- E3.1 The Contractor shall allow the Contract Administrator and his representative's use of the Contractor's office facilities as required for the duration of construction.

E4. SITE WORK

E4.1 Description

- (a) This Specification shall cover the Site Work required for the Work of this project.
- (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.

E4.2 Scope of Work

E4.2.1 General

- (a) Site Work shall include the Contractor's costs of mobilization at the beginning of the Work and the costs of demobilization at the end of the Work.
- (b) Included in Site Work are such items as permits, moving personnel, materials and equipment to and from the Site, setting up temporary facilities, temporary utilities and all Site preparation for performing the Work.
- (c) All costs associates with Site cleanup, general grading and restoration to the original condition of the Site and any disturbed areas upon completion shall be included herein this pay item.
- (d) Seeding of grassed areas for the restoration of the Site shall be in accordance CW 3520 – R7. Further to CW 3520 – R7 all seeding works shall be considered incidental to Site Work.
- (e) All regulatory body required costs (material, labour) shall be included herein this pay item.
- (f) Costs for construction and maintenance of the temporary access to residence at 330 and 334 Bonner Avenue.

E4.2.2 Commemorative Bench

- (a) The commemorative bench along the path near Delbrook Cr., as indicated on the drawings is to be removed from the Site prior to beginning any Works and stored by the Contractor until such time as the temporary access Works has been removed. At that time the commemorative bench is to placed back in its original position and original condition. The Contractor shall take pictures of the bench from all sides to capture the original condition of the bench prior to removal of the bench from the Site. The Contractor shall take pictures of the bench from all sides to capture the condition of the bench upon placement back on the Site to demonstrate the bench is undamaged and is in it's original condition. The Contract Administrator shall be present on Site during removal and placement of the bench.

E4.2.3 Temporary Lane Closure

- (a) The Contractor may temporarily close one lane of Bonner Ave., as indicated on the Drawings for additional staging and work area as required and as approved by the Contract Administrator. The Contractor shall request a temporary lane closure 48 hours prior to desired lane closure. The lane shall be closed for a maximum of two (2) consecutive days unless otherwise approved by the Contract Administrator.
- (b) The Contractor will be responsible for traffic control at the Site acceptable to the Contract Administrator.
- (c) For traffic control in the immediate work area, the Contractor shall erect and maintain 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," issued by the City of Winnipeg and as directed by the City of Winnipeg Traffic Services Department.
- (d) The Contractor shall provide and maintain flagmen in accordance with the above-mentioned manual.

- (e) The Contractor shall take all other safety measures necessary to cope with any peculiar or unusual circumstances that have not been set out in the above-mentioned manual and shall, at all times, ensure that maximum protection is afforded to the road-user and that his operations in no way interfere with the safe operation of traffic.
- (f) Improper signing will be sufficient reason for the Contract Administrator or Inspector to immediately shut down the entire job.
- (g) Barricades, as required by the above mentioned manual and the City of Winnipeg Traffic Services Department, are to be supplied and installed by the Contractor.
- (h) The Contractor shall supply the telephone number(s) at which the Contractor can be reached twenty-four (24) hours per day, seven (7) days per week if traffic control is in place.
- (i) During the hours when the Contractor is not working, equipment and stockpiled materials shall be left in such a location so as not to interfere with or present a hazard to motorists or pedestrians.

E4.2.4 Temporary Access to 330 and 334 Bonner Avenue

- (a) Items included in the construction, maintenance and restoration of the temporary access road to 330 and 334 Bonner Avenue are:
 - (i) Excavate and grade the path area as required and/or supply and place fill material in accordance with latest City of Winnipeg standard construction specification CW 3110 Base Coarse Material to ensure a maximum cross fall grade of 3% and a maximum longitudinal grade of 5% over the entire length the temporary access road.
 - (ii) Upon completion of the temporary access road Emergency services shall be contacted and allowed to complete a test drive if they desire, to ensure access to 330 and 334 Bonner Ave. is acceptable. The Contractor, the Contract Administrator shall be on Site when the test drive is conducted.
 - (iii) Snow removal from the access to the limits shown on the Drawings during construction.
 - (iv) At a minimum snow removal shall be undertaken when 100mm of snow has accumulated or equivalent local drifting conditions.
 - (v) Restoration to the original condition upon completion.

E4.2.5 The temporary access road to 330 and 334 Bonner Ave. shall be completely installed and accepted by the Contract Administrator prior to the undertaking of any demolition of the existing access bridge.

E4.2.6 Work Site Construction Fencing

- (a) The bridge construction Site and the staging area shall be protected from the public by a chain link fence. Lockable gates, with locks and keys, shall be provided at entrances to the Site. The area to be protected from the public is indicated on the Drawings.
- (b) The Work Site construction fencing shall not allow the public access to the temporary pedestrian crossing but shall allow access to Emergency Services via gates, removal of panels, removal of the fence at this location, or some other means that will not inhibit the access of the emergency personnel to the temporary pedestrian crossing.
- (c) The Contractor shall be responsible for maintenance of the Work Site construction fencing.

E4.3 Method of Measurement

- (a) Site Work, as defined in this Specification, will be paid for on a lump sum basis, as accepted by the Contract Administrator and no measurement will be made for this work.

E4.4 Basis of Payment

- (a) Site Work will be paid for at a percentage of the Contract Lump Sum Price for "Site Work", measured as specified herein, which price shall be payment in full for performing all operations herein described including the cost of furnishing all necessary labour, materials and all other items incidental to the work included in this Specification.
- (b) Site Work will be paid for at a percentage of the Contract Lump Sum Price, measured as specified herein. These percentages shall be as follows:
 - (i) when the Contract Administrator is satisfied that construction has commenced 20%
 - (ii) during construction 60%
 - (iii) upon total completion of the project 20%

E5. NIGHT WORK AND NOISE LIMITATIONS

- E5.1 Night work may have to be undertaken by the Contractor, as required by his Schedule of Work and by his actual work progress, to ensure timely completion of all Works of this Contract, all at his own cost.
- E5.2 Further to the General Conditions, the Contractor shall show that he has the approval of all applicable authorities in regard to said night work and to the anticipated/actual construction noise levels. In particular, such Work shall conform with the Noise Control By-Law No. 2480/79. Also, the Contractor, at his own cost, incidental to these Works, shall supply sufficient lighting to enable all night work to be done in a safe and efficient manner, satisfactory to the Contract Administrator.
- E5.3 The Contractor is advised that possible noise level problems may limit his Work activities on Sundays and at night. The Contractor must request and receive approval from the Contract Administrator at least 48 hours in advance of any Contract Work to be undertaken on Sundays or at night. It will be the Contractor's responsibility to schedule work activities to minimize potential problems and/or to employ noise-reduction measures to lower the noise to an acceptable level. Time extension will not be granted on the basis of the Contractor being ordered to limit his activities at night.

E6. TREE REMOVAL AND TREE PRUNING

- E6.1 Description
 - (a) This Specification shall amend the City of Winnipeg Standard Construction Specification CW 3010-R4 "Clearing and Grubbing", and shall cover the removal of trees as specified on the Contract Drawings. The City of Winnipeg, Forestry Branch must be contacted prior to removing and pruning any trees.
- E6.2 Construction Methods
 - (a) Remove trees in accordance with CW 3010-R4. Trees to be removed are indicated on the Drawings and shall be marked on Site by the Contract Administrator
 - (b) Trees shall be pruned according to good practice by bonded tree care professionals. Limits of tree pruning are indicated on the Drawings.
- E6.3 Measurement and Payment
 - E6.3.1 Method of Measurement
 - (a) Tree Removal will be measured on a unit basis. The number of trees to be paid for shall be the total number of trees removed in accordance with this Specification and Drawings, and as accepted by the Contract Administrator
 - (b) Tree Pruning, as defined in this Specification, will be paid for on a lump sum basis as accepted by the Contract Administrator and no measurement will be made for this work.

E6.3.2 Basis of Payment

- (a) The removal of trees will be paid for a the Contract Unit Price per tree for “Tree Removal”, measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.
- (b) Tree Pruning shall be paid for at the Contract Lump Sum Price for “Tree Pruning”, which price shall be payment in full for performing all operations herein described including the cost of furnishing all necessary labour, materials and all other items incidental to the work included in this Specification.

E7. DEMOLITION

E7.1 Description

- (a) This Specification shall cover demolition of existing structures and portions of Bonner Ave. as indicated on the Drawings, including all necessary staging, demolition, removal, salvaging, transporting, unloading, stockpiling, dismantlement, and disposal of applicable materials.

E7.2 Job Conditions

- (a) On-site burning will not be permitted.

E7.3 Do not use explosives for demolition unless their use is specified.

E7.4 The Contractor is allowed to utilize the bridge for construction purposes, prior to Demolition but the Contractor is solely responsible for any shoring works required to safely handled the anticipated loads as determined by the Contractor. The Contractor is advised the condition of the bridge is deteriorated and should be thoroughly reviewed by the Contractor prior to the use of the bridge for construction purposes.

E7.5 Execution

E7.5.1 Preparation

- (a) Schedule all Work in such a manner as not to remove items that are a necessary part of the operational function of the existing system before the replacement part of the system is operational.
- (b) Before commencing the Work of this section, verify with the Contract Administrator all objects to be removed and all objects to be preserved.

E7.5.2 Demolition and Abandonment

- (a) Demolish and remove all objects designated. Hidden or buried items which are to be abandoned may be left in place, with the approval of the Contract Administrator, provided all connections to these items are properly capped, plugged or disconnected and meet all regulatory requirements.

E7.5.3 Removal of Debris

- (a) All debris is to be removed from the Site and disposed of at a Site obtained by the Contractor and approved by the Contract Administrator. Salvageable items, as designated by the Contract Administrator, are to be deposited in the City’s storage yard.

E7.5.4 Protection

- (a) Use all means necessary to protect existing objects designated to remain and, in the event of damage, make all repairs and replacements necessary at no change in the Contract Price.
- (b) Environmental Protection Requirements

- (c) Demolition and removal works shall satisfy the requirements of E20, "Environmental Protection Plan"

E7.5.5 Regulatory Requirements

- (a) The regulatory requirements for demolition of the existing structures as defined in this Specification shall be strictly followed. These requirements are stated in the documentation in Appendix B through D with special emphasis on the requirements of the Department of Fisheries and Oceans in Appendix B.

E7.6 Measurement and Payment

E7.6.1 Method of Measurement

- (a) Demolition, as defined in this Specification, will be paid for on a lump sum basis as accepted by the Contract Administrator and no measurement will be made for this work.

E7.6.2 Basis of Payment

- (a) Demolition shall be paid for at the Contract Lump Sum Price for "Demolition", which price shall be payment in full for performing all operations herein described including the cost of furnishing all necessary labour, materials and all other items incidental to the work included in this Specification.

E8. TEMPORARY PEDESTRIAN BRIDGE

E8.1 Description

- (a) This Specification shall cover the design, fabrication and erection of the temporary pedestrian bridge 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.

E8.2 Materials

- (a) The materials used to construct this crossing are at the discretion of the Contractor. The Contractor may use the materials of the existing timber access bridge to construct the temporary pedestrian bridge.

E8.3 Requirements

- (a) The function of the temporary pedestrian bridge is to allow emergency personnel access from Bonner Ave. to the residences at 330 and 334 Bonner Ave. The general public should be blocked from having access to this temporary structure.
 - (i) The crossing does not have to span from bank to bank but is to have a maximum grade of 1 vertical to 12 horizontal at any point along the length of the crossing.
 - (ii) The crossing must have railings on both sides. The railings are to be 1000mm high with maximum post spacing of 1000mm.
 - (iii) The crossing width is to be a minimum width of 1000mm.

E8.4 Measurement and Payment

E8.4.1 Method of Measurement

- (a) Temporary pedestrian crossing, as defined in this Specification, will be paid for on a lump sum basis as accepted by the Contract Administrator and no measurement will be made for this work.

E8.4.2 Basis of Payment

- (a) Temporary Pedestrian Crossing shall be paid for at the Contract Lump Sum Price for "Temporary Pedestrian Crossing", which price shall be payment in full for performing

all operations herein described including the cost of furnishing all necessary labour, materials and all other items incidental to the work included in this Specification.

E9. SUPPLYING AND PLACING REINFORCING STEEL

E9.1 Description

- (a) This Specification covers the supply, fabrication, and placement of all reinforcing steel.
- (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 Materials

E9.2.1 General

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

E9.2.2 Handling and Storage of Materials

- (a) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with the latest edition of CSA Standard CAN3-A23.1, Storage of Materials, except as otherwise specified herein.

E9.2.3 Reinforcing Steel

- (a) Unless otherwise indicated on the Drawings, all reinforcing steel shall be hot-dip galvanized after fabrication in accordance with CSA Standard G164 to a minimum retention of 600 g/m². The galvanizer shall safeguard against hydrogen embrittlement using recommended practices from applicable standards. Reinforcing steel shall be deemed to include all reinforcing bars, tie-bars, and dowels.
- (b) All reinforcing steel shall conform to the requirements of CSA Standard G30.18, Grade 400W, Billet-Steel Bars for concrete reinforcement. If, in the opinion of the Contract Administrator, any reinforcing steel provided for the concrete works exhibits flaws in manufacture or fabrication, such material shall be immediately removed from the Site and replaced with acceptable reinforcing steel.
- (c) All galvanized reinforcing steel shall be straight and free from paint, oil, mill-scale, and injurious defects. Surface seams or surface irregularities will not be cause for rejection, provided that the minimum dimensions, cross section area, and tensile properties of a hand wire-brushed specimen are not less than the requirements of CSA Standard G30.18.

E9.2.4 Field-Applied Galvanizing

- (a) Field-applied galvanizing shall be a one-pack compound containing 99.995 percent pure electrolytic zinc dust. On application, it shall cure to a minimum of 96 percent zinc content in the dry film. The field galvanizing product shall be Zinga as distributed by Continental Mine & Industrial Supply, Saskatoon, Saskatchewan, phone (306) 975-1944, or approved equal in accordance with B7.

E9.2.5 Bar Accessories

- (a) Bar accessories shall be of a type approved by the Contract Administrator and shall be non-rusting. They shall be made from Type 316 stainless steel or hot-dip galvanized steel, or, in the case of chairs, from High Performance Concrete (HPC) or PVC. An approved HPC rebar support is supplied by Con Sys Inc. of Pinawa, Manitoba, phone: 753-2404, fax: 753-8329. They shall not stain, blemish, or spall the concreted surface for the life of the concrete.
- (b) Bar accessories shall include bar chairs, spacers, clips, wire ties, wire (18 gauge minimum), or other similar devices that may be approved by the Contract

Administrator. The supplying and installation of bar accessories shall be deemed to be incidental to the supplying and placing of reinforcing steel.

E9.2.6 Bonding Agent

- (a) Epoxy resin shall be of a type listed in the approved products list, Specification CW 3710 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 within 48 hours after installation. Alternative bonding agents are listed in the approved products list.

E9.3 Construction Methods

E9.3.1 Fabrication of Reinforcing Steel

- (a) Fabricate reinforcing steel in accordance with CSA Standard G30.18 to the lengths and shapes as shown on the Drawings.

E9.3.2 Placing of Reinforcing Steel

- (a) Place reinforcing steel accurately in the positions shown on the Drawings and retain 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. Remove any dry concrete, which may have been deposited on the steel from previous concrete placement, before additional concrete may be placed. Intersecting bars shall be tied positively at each intersection.
- (c) Make splices in reinforcing steel only where indicated on the Drawings. Obtain prior approval of the Contract Administrator where other splices must be made. Welded splices shall conform to CSA Standard W186, and are subject to prior written approval of the Contract Administrator.
- (d) Reinforcing steel shall not be straightened or rebent in a manner that will injure the metal. Bars with bends not shown on the Drawings shall not be used. Heating of reinforcing steel will not be permitted without the prior approval of the Contract Administrator. Give a minimum of twenty-four (24) hours' advance notice to the Contract Administrator prior to the placing of any concrete to allow for inspection of the reinforcement.
- (e) All field cut ends of galvanized steel and damaged galvanizing shall have one coat of a field-applied galvanizing coating applied.

E9.4 Quality Control/Quality Assurance

E9.4.1 Inspection

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

E9.4.2 Access

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

E9.4.3 Quality Testing

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

- (b) The Contractor shall provide, without charge, the samples of reinforcing steel required for quality control tests and provide such assistance and use of tools and construction equipment, as is required.

E9.5 Method of Measurement

E9.5.1 Supplying and Placing Reinforcing Steel

- (a) The supplying and placing reinforcing steel will be measured on a mass basis. The mass to be paid for shall be the total number of kilograms of reinforcing steel installed in accordance with this Specification, acceptable to the Contract Administrator, as computed from the approved reinforcing layout shown on the Drawings, excluding the mass of bar accessories.

E9.6 Basis of Payment

E9.6.1 Supplying and Placing Reinforcing Steel

- (a) The supplying and placing of reinforcing steel shall be paid for at the Contract Unit Price per kilogram for the "Items of Work" listed here below, measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification.
- (b) Items of Work: Supply and Place Reinforcing Steel
 - (i) Supply Reinforcing Steel
 - (ii) Place Reinforcing Steel

E10. STRUCTURAL CONCRETE

E10.1 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 Works as hereinafter specified.

E10.2 Submittals

- (a) Concrete mix design(s) that meets the minimum performance criteria for the various types of concretes as shown on the Drawings and described in Clause 10.3.13 "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.

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.
- (viii) Quantity of other admixtures.

- (b) 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.
- (c) 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.
- (d) The Contractor shall also submit 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.
- (e) Notification of Ready Mix Supplier
 - (i) The Contractor shall advise the Contract Administrator of the qualified Ready Mix Concrete Supplier that he is proposing to use at least 14 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.
- (f) Detailed design calculations and Shop Drawings for any temporary works, including falsework and formwork, that are sealed, signed and dated by a Professional Engineer licensed to practice in the Province of Manitoba. **Shop Drawings are to be submitted to the Contract Administrator prior to the Contractor proceeding with the Work.**
- (g) For timber formwork and falsework, 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.
- (h) The Contractor shall furnish in writing to the Contract Administrator the location of the sources where aggregate will be obtained in order that same may be inspected and tentatively accepted by the Contract Administrator. Changes in the source of aggregate supply during the course of the Contract will not be permitted without notification in writing to and the expressed approval of the Contract Administrator.
- (i) Copies of all material quality control test results.

E10.3 Materials

E10.3.1 General

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

E10.3.2 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.

E10.3.3 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 Owner for any materials taken by the Contract Administrator for testing purposes.

- (b) All materials shall conform to CSA Standard CAN/CSA-A23.1.
- (c) All testing of materials shall conform to CSA Standard CAN/CSA-A23.2.
- (d) All materials shall be accepted by the Contract Administrator at least less fourteen (14) days before any construction is undertaken. If, in the opinion of the Contract Administrator, such materials, in whole or in part, do not conform to the specifications detailed herein or are found to be defective in manufacture or have become damaged in transit, storage, or handling operations, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E10.3.4 Bonding Agents

- (a) If a concrete bonding agent is used, the Contractor shall identify the product(s) and submit product information to the Contract Administrator for review.

E10.3.5 Curing Compound

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

E10.3.6 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 NP 1 by Sonneborn, Sikaflex-1a by Sika, Bostik 915 by Bostik, or equal as accepted by the Contract Administrator.

E10.3.7 Form Coating

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

E10.3.8 Fibre Joint Filler

- (a) Fibre joint filler shall be rot-proof and of the preformed, non-extruding, resilient type made with a bituminous fibre such as Flexcell and shall conform to the requirements of ASTM Standard D1751 or equal as accepted by the Contract Administrator.

E10.3.9 Low Density Styrofoam

- (a) Low density styrofoam shall be the type specified on the Drawings or as accepted by the Contract Administrator.

E10.3.10 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.

E10.3.11 Formwork

- (a) Formwork materials shall conform to CSA Standard CAN/CSA-A23.1, and American Concrete Publication SP:4, "Formwork for Concrete."
- (b) No "stay-in-place" formwork or falsework is permitted.

- (c) Form sheeting plywood to be covered with form liner or to be directly in contact with soil shall be exterior Douglas Fir, concrete form grade, conforming to CSA Standard O121-M1978, a minimum of 20 mm thick.
- (d) Where form liner is not being used, form sheeting shall be Douglas Fir, overlay form liner type conforming to CSA Standard O121-M1978. Approved manufacturers are "Evans" and "C-Z".
- (e) Boards used for formwork shall be fully seasoned and free from defects such as knots, warps, cracks, etc., which may mark the concrete surface.
- (f) No formwork accessories will be allowed to be left in place within 50 mm of the surface following form removal. Items to be left in place, must be made from a non-rusting material or galvanized steel; and they shall not stain, blemish, or spall the concrete surface for the life of the concrete.
- (g) Forms for exposed surfaces that do not require a form liner may be either new plywood or steel as authorized by the Contract Administrator.
- (h) Studding shall be spruce or pine and shall have such dimensions and spacing that they shall withstand without distortion, all the forces to which the forms will be subjected.
- (i) 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.
- (j) Stay-in-place forms are not acceptable and will not be accepted unless shown on the Drawings.
- (k) 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.

E10.3.12 Permeable Formwork Liner

- (a) Form Liner shall be "Drainform," "Hydroform," or equal in accordance with B7 as accepted by the Contract Administrator. This form liner shall be used on all exposed formed surfaces, except soffit surfaces, or where a normal form finish is specified.
- (b) Paper-lined forms shall be used on all soffit surfaces.

E10.3.13 Non-Shrink Cementitious Grout

- (a) Where non-shrink cementitious grout is used, it shall be Sternson M-bed Standard, Specialty Construction Products CPD Non-Shrink Grout, Sika 212 Non-Shrink Grout, Meadows CG-86, or equal in accordance with B7 as accepted by the Contract Administrator. The minimum compressive strength of the grout at 28 days shall be 40 MPa.

E10.3.14 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 in accordance with B7 as accepted by the Contract Administrator.

E10.3.15 Backer Rod

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

E10.3.16 Precompressed Foam Joint Filler

- (a) Precompressed foam joint 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.

E10.3.17 Dowel Bars

- (a) Dowel bars shall of the type specified on SD 211B.

E10.3.18 PVC Water Stop

- (a) Extruded Polyvinyl Chloride (PVC) in accordance with CGSB 41-GP-35M.
- (b) 125 millimetres wide by 9.5 millimetres thick.
- (c) Multi-ribbed with center bulb.
- (d) Minimum 12 MPa tensile strength.
- (e) 275% allowable elongation.
- (f) .5 -45 degree C to 80 degree C working temperature range.

E10.3.19 Miscellaneous Materials

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

E10.3.20 Concrete

- (a) Concrete
 - (i) Concrete Materials susceptible to frost damage shall be protected from freezing.
 - (ii) Concrete shall have nominal compressive strengths (f'c) and meet the requirements for hardened concrete as specified in the following Table.

Type of Concrete	Nominal Compressive Strength at 28 Days [MPa]	Class of Exposure	Air Content Category
Solid Slab Deck, Approach Slab and Traffic Barrier Concrete	35	C-1	1
Abutment Wall Concrete	35	S-2	2

- (iii) 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.

(b) Aggregates

(iv) General

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.

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

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.

(v) Coarse Aggregate

The maximum nominal size of coarse aggregate shall be 20 mm and meet the grading requirements of CSA A23.1, Table 11, Group I. Coarse aggregate shall be uniformly graded and not more than 1% shall pass a 75 µm 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 percent.

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.

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

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

(vi) Fine Aggregate

Fine aggregate shall meet the grading requirements of CSA A23.1, Table 10, FA1, be graded uniformly and not more than 3% shall pass a 75 µm 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.

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

(c) Admixtures

- (i) Air-entraining admixtures shall conform to the requirements of ASTM C260.
- (ii) Chemical admixtures shall conform to the requirements of ASTM C494 or C1017 for flowing concrete.
- (iii) 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.

(d) Cementitious Materials

- (i) Cementitious materials shall conform to the requirements of CAN/CSA-A3001 and shall be free from lumps.
- (ii) 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.
- (iii) Should the Contractor choose to include fly ash in the concrete mix design, the fly ash shall be Class CI and the substitution shall not exceed 25% by mass of cement.
- (iv) 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.

(e) Water

- (i) Water to be used for mixing and curing concrete or grout and saturating the substrate shall conform to the requirements of CSA A23.1 and shall be free of oil,

alkali, acidic, organic materials or deleterious substances. The Contractor shall not use water from shallow, stagnant or marshy sources.

- (f) Synthetic Fibres not specified check code
 - (i) The synthetic fibres for bridge deck and bridge barrier concrete, only, shall consist of 100% virgin polypropylene as supplied by Grace (Microfibre) or Master Builders (Fibre Mesh MD), or equal in accordance with B7 as accepted by the Contract Administrator. 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, Section 16, Fibre-Reinforced Structures, Clause 16.6.

E10.4 Equipment

E10.4.1 General

- (a) All equipment shall be of a type accepted by the Contract Administrator. The equipment shall be in good working order, kept free from hardened concrete or foreign materials, and shall be cleaned at frequent intervals.
- (b) The Contractor shall have sufficient standby equipment available on short notice at all times.

E10.4.2 Vibrators

- (a) The Contractor shall have sufficient numbers of internal concrete vibrators and experienced operators on Site to properly consolidate all concrete in accordance with ACI 309. The type and size of vibrators shall be appropriate for the particular application, the size of the pour, and the amount of reinforcing and shall conform to standard construction procedures.
- (b) The Contractor shall use rubber coated vibrators for consolidating concrete containing epoxy-coated reinforcing steel.
- (c) The Contractor shall have standby vibrators available at all times during the pour.

E10.4.3 Miscellaneous Equipment

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

E10.5 Construction Methods

E10.5.1 Scope of Work

- (a) It is intended that this Specification cover the construction of the following items, as indicated on the Drawings:
 - (i) Solid Slab Deck.
 - (ii) Abutment Walls
 - (iii) Approach Slab
 - (iv) Barriers
- (b) Replacement of existing curb is covered by the applicable standard City of Winnipeg specifications.

E10.5.2 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 coarse 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 $\pm 0.5\%$ 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:

- (1) 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
- (2) 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.

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.

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 Contract Administrator or the City 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) Placement Schedules

- (i) The Contractor shall provide to the Contract Administrator the proposed 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:
 - (1) Limit the amount to be placed at any time (using adequate construction joints), or
 - (2) Augment his facilities and Plant in order to complete the proposed placement, or
 - (3) 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.

(f) Falsework and Formwork

(i) General

The Contractor shall construct the formwork and falsework in accordance with the submitted Shop Drawings. Variations from the formwork and falsework Shop Drawings will not be permitted unless the Contract Administrator is provided with revised Shop Drawings that have been sealed, signed and dated by the Professional Engineer.

(ii) Design

All forms shall be of wood, metal or other materials as approved by the Contract Administrator, and shall be designed and built mortar-tight. The forms shall be sufficiently rigid to prevent distortion due to the pressure of vibrated concrete and other loads incidental to the construction operations. The forms shall be substantial and unyielding, and shall be designed so that finished concrete will conform to the design dimensions and contours. The shape, strength, rigidity, watertightness and inner surface smoothness of re-used forms shall be maintained at all times. Any warped or bulged formwork shall not be used. Forms that are deemed unsatisfactory by the Contract Administrator in any respect shall not be used.

All forms shall be oiled or otherwise treated to facilitate stripping.

The tying of forms with wires or welded ties or the driving of bolts or nails by hand or by power tools into exposed and finished concrete surfaces will not be permitted.

For narrow walls and columns, where the bottom of the form is inaccessible, or wherever necessary, removable panels shall be provided in the bottom form panel to enable cleaning out of extraneous material immediately before placing the concrete.

The supporting of formwork on mudsills on the ground will not be permitted.

All falsework shall be designed and constructed to provide the necessary rigidity and to support the loads without appreciable settlement or deformation.

Falsework shall be set to give the completed structure the camber specified on the Drawings, and allowance shall be made for dead load deflection and form crushing.

(g) Forms for Exposed Surfaces

(i) All form material for exposed surfaces shall be full-sized sheets in good condition, and approved by the Contract Administrator. The re-use of any forms shall be approved by the Contract Administrator.

(ii) All forms for exposed surfaces shall be mortar-tight, filleted at all sharp corners, and given a bevel or draft in the case of all projections. At the top edges of exposed surfaces, the chamfers are to be formed by chamfer strips. Where fillets have been omitted, the concrete shall be thoroughly worked into the corners of the forms and, upon removal of the forms, the sharp edges of the concrete shall be carefully rubbed down to a 6 mm radius. The form lumber for filleted corners shall be a hard grade lumber which will leave a sharp, straight edge.

(iii) Metal bolts or anchorages within the forms shall be so constructed as to permit their removal to a depth of at least 50 mm from the concrete surface. 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 color.

E10.5.3 Permeable Formwork Liner

- (a) Form liners shall be used on all exposed surfaces, except underside of the deck, or where a normal form finish is specified.
- (b) The supply and use of the plain form liner finish shall be considered incidental to the Works of this Specification, and no additional payment will be made.
- (c) The form liner shall be used for only one (1) application.

E10.5.4 Placing Structural Concrete

- (a) 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 concrete. All equipment and processes are subject to acceptance by the Contract Administrator.
- (b) 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.
- (c) Runways for concrete buggies and all pumping equipment shall be supported directly by the formwork and not on reinforcement.
- (d) 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.
- (e) Form liners shall be cooled immediately prior to placing concrete by spraying with cold water.
- (f) 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.
- (g) Concrete shall be placed as nearly as possible in its final position. Rakes or mechanical vibrators shall not be used to transport concrete.
- (h) 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.
- (i) 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.
- (j) 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. Spare vibrators in good working condition shall be kept on the job Site during all placing operations.
- (k) Concrete shall not be placed during rain or snow unless adequate protection is provided for formwork and concrete surfaces.
- (l) Finishing of Concrete Surfaces
 - (i) Exposed Formed Surfaces

- Form liner finish shall be applied to all exposed formed surfaces except the underside of the deck.
 - Exposed surfaces imply all surfaces exposed to view including surfaces to 300 mm below finish grade elevations.
 - All surfaces to receive a form liner finish shall be formed using Form Liner.
 - 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.
- (ii) Unformed Concrete Surfaces
- Screeding of all unformed concrete surfaces shall be performed by sawing movement of a straightedge along wood or metal strips or form edges that have been accurately set at required elevations.
 - 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.
 - 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.
 - The top surface of the bridge deck and approach slabs shall be given a broom finish. Upon completion of finishing operations, and when excessive moisture has evaporated, the plastic surface of the concrete shall be given a textured finish by means of broom finishing with a steel or fibre broom of a type accepted by the Contract Administrator at right angles to the direction of traffic. Surface depressions introduced by the broom strands in the brooming operations shall not more than 3mm deep.

E10.5.5 General Curing

- (a) Refer to Clause E10.5.9 (Cold Weather Concreting) for cold weather curing requirements.
- (b) Refer to Clause E10.5.10 (Hot Weather Concreting) for hot weather curing requirements.
- (c) The use of curing compound will not be allowed on concrete areas that are to receive additional concrete or waterproofing.
- (d) Unformed concrete surfaces shall be covered and kept moist by means of 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. Construction joints shall only be covered and kept saturated by means of wet polyester curing blankets for the curing period.
- (e) Unformed surfaces shall have curing compound applied immediately after the wet curing period.
- (f) Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping, or running water, vibration, and mechanical shock. Concrete shall be protected from freezing until at least twenty-four hours after the end of the curing period.
- (g) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3° in any one hour period or 20° in any twenty-four hour period.
- (h) Care shall be exercised to ensure that the polyester curing blanket is well drained and that it is placed as soon as the surface will support it without deformation. The Contractor shall ensure that water from the polyester curing blankets does not run into areas where concrete placement and finishing operations are underway. If this

occurs, concrete placement shall stop until the problem is corrected satisfactory to the Contract Administrator.

E10.5.6 Form Removal

- (a) All forms shall remain in place for a minimum of seven (7) days. The Contract Administrator must be notified at least 24 hours prior to any form removal. The Contractor must receive approval from the Contract Administrator prior to beginning Work.
- (b) The minimum strength of concrete in place for safe removal of soffit forms for horizontal or inclined members, as well as vertical forms shall be 25 MPa, with the added provisions that the member shall be of sufficient strength to carry safely its own weight, together with superimposed construction loads, and that the forms shall stay in place a minimum of seven (7) days unless otherwise approved by the Contract Administrator.
- (c) Field-cured test specimens, representative of the in-place concrete being stripped, may be tested to verify the concrete strength.

E10.5.7 Patching of Formed Surfaces

- (a) Immediately after forms have been removed, but before any repairing or surface finishing is started, the concrete surface shall be inspected by the Contract Administrator. Any repair or surface finishing started before this inspection may be rejected and required to be removed.
- (b) All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purposes cut back fifty (50) mm from the surface before patching.
- (c) Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, and voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched and then applying patching mortar. A slurry grout consisting of water and cement, shall be thoroughly brushed onto the area to be patched. When the slurry grout begins to lose the water sheen, the patching mortar shall be applied. It shall be struck-off slightly higher than the adjacent surface and left for one hour before final finishing to permit initial shrinkage of the patching mortar and it shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification, and the final colour shall match the surrounding concrete.
- (d) All objectionable fins, projections, offsets, streaks, or other surface imperfections shall be removed by approved means to the Contract Administrator's satisfaction. Cement washes of any kind shall not be used.
- (e) Concrete shall be cast against forms that will produce plane surfaces with no bulges, indentations, or protuberances other than those shown on the Drawings. The arrangement of panel joints shall be kept to a minimum. Panels containing worn edges, patches, or other defects that will impair the texture of concrete surfaces shall not be used. All fins on the concrete surfaces shall be removed.

E10.5.8 Cold Weather Concreting

- (a) The requirements of this section 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.
- (b) The Contract Administrator will advise the Contractor, in writing, as to the degree of heating of water and aggregates.
- (c) Supplementary equipment, as required below, shall be at the job Site if concrete is likely to be placed in cold weather.
- (d) Formwork and reinforcing steel shall be heated to at least 5°C before concrete is placed.

- (e) The temperature of the concrete shall be maintained at not less than 10°C for seven days or 15°C for five days or 20°C for three days after placing. The concrete shall be kept above freezing temperature for at least a period of seven days. In no case shall the heating be removed until the concrete has reached a minimum compressive strength, which will be specified by the Contract Administrator for Work under construction, and as determined from compressive strength tests for specimens secured under the same conditions as the concrete works in question.
- (f) Aggregates shall be heated to a temperature of not less than 20°C and not more than 65°C. Water shall be heated to a temperature between 55°C and 65°C. The temperature of the concrete at the time of placement shall be within the range specified in CSA Standard CAN/CSA-A23.1 for the thickness of the section being placed.
- (g) When the mean daily temperature may fall below 5°C, a complete hoarding of the Work, together with supplementary heat, shall be provided.
- (h) When the ambient temperature is below -15°C, the hoarding shall be constructed so as to allow the concrete to be placed without the hoarding having to be opened. If the mixing is done outside of the hoarding, the concrete shall be placed by means of hoppers installed through the hoarding. The hoppers are to be plugged when not in use.
- (i) When the ambient temperature is equal to or above -15°C, the Contractor will be permitted to open small portions of the hoarding for a limited time to facilitate the placing of the concrete.
- (j) Before depositing any of the concrete, the Contractor shall show that enough heating equipment is available to keep the air temperature surrounding the forms within the specified range. This shall be accomplished by bringing the temperature inside of the hoarding to the specified 20°C, at least 12 hours prior to the start of the concrete placing.
- (k) The Contractor shall supply all required heating apparatus and the necessary fuel. When dry heat is used, a means of maintaining atmospheric moisture shall be provided. The relative humidity within the heated enclosure shall be maintained at a minimum of 40 percent during concrete placing and finishing operations. Surface moisture evaporation rates shall not exceed the limits specified in E10.5.10(b) (Hot Weather Concreting). Following finishing operations, exposed concrete surfaces shall be protected from excessive drying by applying curing compound, covering the surfaces with polyethylene, or providing water curing.
- (l) Sufficient standby heating equipment must be available to allow for any sudden drop in outside temperatures and any breakdowns which may occur in the equipment.
- (m) Combustion-type heaters may be used if their exhaust gases are vented outside the enclosures and not allowed to come into contact with concrete surfaces. Fire extinguishers must be readily at hand wherever combustion-type heaters are used.
- (n) The Contractor shall keep a curing record of each concrete pour. The curing record shall include: date and location of the pour, mean daily temperature, hoarding relative humidity, temperatures above and below the concrete surface at several points, and notes regarding the type of heating, enclosure, unusual weather conditions, etc. This record shall be available for inspection by the Contract Administrator at the end of the concrete operations.

E10.5.9 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 22°C. Aggregate stockpiles may be cooled by water sprays and sunshades.

- (iii) Ice may be substituted for a portion of the mixing water, providing it has melted by the time mixing is completed.
- (iv) Form and conveying equipment shall be kept as cool as possible before concreting, by shading them from the sun, painting their surfaces white, and/or the use of water sprays.
- (v) Sunshades and wind breaks shall be used as required during placing and finishing.
- (vi) Work shall be planned so that concrete can be placed as quickly as possible to avoid "cold joints."
- (vii) The Contract Administrator's approval is necessary before the Contractor may use admixtures, such as retardants, to delay setting or water-reducing agents to maintain workability and strength, and these must then appear in the Mix Design Statement submitted to the Contract Administrator.
- (viii) Curing shall follow immediately after the finishing operations.

(b) Hot-Weather Curing

- (i) When the air temperature is at or above 25°C, curing shall be accomplished by water spray or by using saturated absorptive fabric, in order to achieve cooling by evaporation. 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 a probability of it's 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 fogging and evaporation.

(d) Concrete Temperature

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

Thickness of Section (m)	Temperatures, °C	
	Minimum	Maximum
Less than 0.3	10	35
0.3 to 1.0	10	30
1.0 to 2.0	5	25

E10.5.10 Cleanup

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

E10.5.11 Protection From Drying

- (a) Placement of deck concrete will not be permitted when the surface moisture evaporation exceeds 0.75 kg/m²/h. Fog misting is mandatory regardless of drying conditions. The Contractor shall use fog misting operations as accepted by the Contract Administrator. The chart, Figure D.1, Annex D of CSA Standard CAN/CSA-A23.1 shall be used to estimate surface moisture evaporation rates.

E10.6 Quality Control

E10.6.1 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.

E10.6.2 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.

E10.6.3 Materials

- (a) All materials supplied under this Specification shall be subject to testing and acceptance by the Contract Administrator in accordance with this Specification.

E10.6.4 Concrete Quality

- (a) Quality control tests will be used to determine the acceptability of the concrete supplied by the Contractor.
- (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.
- (d) An outline of the quality tests is as follows:
- (e) Slump tests shall be made in accordance with CSA Standard Test Method CAN/CSA-A23.2-5C, "Slump of Concrete". If the measured slump falls outside the limits specified in this Specification, a second test shall be made.
- (f) In the event of a second failure, the Contract Administrator reserves the right to refuse the use of the batch of concrete represented.
- (g) Air content determinations shall be made in accordance with CSA Standard Test Method CAN/CSA-A23.2-4C, "Air Content of Plastic Concrete by the Pressure Method". If the measured air content falls outside the limits specified in 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.
- (h) The air-void system shall be proven satisfactory by data from tests performed in accordance with CSA Test Method CAN/CSA A23.1-17C. The spacing factor, as determined on concrete cylinders moulded in accordance with CSA Standard Test Method CAN/CSA-A23.2-3C, shall be determined prior to the start of construction on cylinders of concrete made with the same materials, mix proportions, and mixing procedures as intended for the project. If deemed necessary by the Contract Administrator to further check the air-void system during construction, testing of cylinders may be from concrete as delivered to the job Site and will be carried out by the Contract Administrator. The concrete will be considered to have a satisfactory air-void system when the average of all tests shows a spacing factor not exceeding 230 microns with no single test greater than 260 microns.
- (i) Samples of concrete for test specimens shall be taken in accordance with CSA Standard Test Method CAN/CSA-A23.2-1C, "Sampling Plastic Concrete".

- (j) Test specimens shall be made and cured in accordance with CSA Standard Test Method CAN/CSA-A23.2-3C, "Making and Curing Concrete Compression and Flexure Test Specimens".
- (k) Compressive strength tests at twenty-eight (28) days shall be the basis for acceptance of all concrete supplied by the Contractor. For each twenty-eight (28) day strength test, the strength of two companion standard-cured test specimens shall be determined in accordance with CSA Standard Test Method CAN/CSA-A23.2-9C, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the average of the strengths of the two specimens. A compressive strength test at seven (7) days shall be taken, the strength of which will be used only as a preliminary indication of the concrete strength, a strength test being the strength of a single standard cured specimen.
- (l) 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 Clause E10.5.6b) and also to check the adequacy of curing and/or cold weather protection. At least two (2) field-cured test specimens will 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 CAN/CSA-A23.2-9C, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the strength of the specimen.
- (m) Notwithstanding CSA A23.2, cores taken from deck must achieve the concrete design strength as a minimum.

E10.6.5 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.

E10.7 Measurement and Payment

E10.7.1 Method of Measurement

- (a) Structural Concrete, as defined in this Specification, will be paid for on a lump sum basis as accepted by the Contract Administrator and no measurement will be made for this work.

E10.7.2 Basis of Payment

- (a) Structural Concrete shall be paid for at the Contract Lump Sum Price for "Structural Concrete", which price shall be payment in full for performing all operations herein described including the cost of furnishing all necessary labour, materials and all other items incidental to the work included in this Specification.

E11. STEEL PILES

E11.1 Description

- (a) This Specification shall cover the supply and driving of steel bearing piles.
- (b) The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E11.2 Scope of Work

- (a) The work to be done under this Specification consists of the supply of all material, labour, plant and equipment required to complete the work as hereinafter specified and as shown on the Drawings including but not necessarily confined to the following:
 - (i) Supply and installation of steel piles.
 - (ii) Supply and installation of steel pile tips.
 - (iii) Splicing steel piles.

E11.3 Materials

- (a) Steel piles shall conform to CSA G40.21. The size and length shall be as shown on the Drawings. Minimum yield strength shall be 300 MPa. Pile tips shall be APF HARD-BITE 77750-B Drive Shoes.

E11.4 Construction Methods

E11.4.1 Handling and Storage of Piling

- (a) The method of handling and storing shall be such as to avoid injury to the piles.
- (b) Any piles excessively damaged through negligence or carelessness in handling operations shall be replaced with sound piles by the Contractor at his own expense.

E11.4.2 Location and Alignment of Piles

- (a) The piles shall be driven in the positions shown on the plans or as directed by the Contract Administrator. Piles shall be driven vertically unless shown otherwise on the plans. Batter piles shall be driven to the batter specified and shall not be jacked or pulled into their final positions. The Contractor will be required to remove surface and shallow depth obstructions in order to obtain the required penetration of the piles.

E11.4.3 Pile Driving Equipment

- (a) All pile driving equipment to be used by the Contractor shall be of such a capacity that the required bearing and penetration will be obtained without undue damage being done to the piles.
- (b) Fixed lead pile drivers shall be used when driving all piles. The use of hanging or swinging leads will not be allowed unless they are so constructed that they can be held in a fixed position during the driving operations. The leads must be so constructed to enable all piles to be driven to their true and correct alignment, batter or verticality as indicated on the plans. Batter piles shall be driven employing leads adapted for the driving of such piles.
- (c) The Contractor shall furnish the Contract Administrator with the manufacturer's specifications and catalogue for all steam, diesel or air hammers used, showing all the data necessary for computing the bearing value of piles driven. Gravity or drop hammers shall be weighted in the presence of the Contract Administrator, or a certificate of weight shall be furnished to the Contract Administrator. Hammers so weighted shall have a minimum weight of 1000 kilograms (2,200 pounds) exclusive of pile cap.
- (d) All piles shall be driven using a hammer having a minimum driving energy of 40kJ/blow (30,000 lb-ft/blow)
- (e) The heads of steel piles shall be protected by a cap of a design approved by the Contract Administrator. The bottom of the cap shall have a recess with a cushion of rope or other suitable material next to the pile head, and the top of the cap shall have a timber shock block.
- (f) Water jetting shall not be used without the written permission of the Contract Administrator.

E11.4.4 Installation of Steel Pile Tips

- (a) Installation of steel pile tips shall be as detailed on the plans and in accordance with the manufacturer's recommendations.
- (b) All costs associated with the supply and installation of steel pile tips shall be incidental to the Contract Unit Price for "Supply Steel Piles"

E11.4.5 Driving Steel Bearing Piles

- (a) Piles shall be driven to the depths indicated on the plans or to such other depths as shall be directed by the Contract Administrator. Any piles excessively crushed or bent through negligence or carelessness in driving operations shall be replaced and driven by the Contractor at his own expense unless, in the opinion of the Contract Administrator, the damage is so slight that the pile can be properly repaired by the Contractor at his own expense.
- (b) The Contractor must drive all piling in the sequence specified by the Contract Administrator. This procedure is necessary to limit upheaval of the piles to an absolute minimum. If upheaval does occur, the Contractor will be required to redrive the lifted piles down to their original elevations. The Contractor will also be required to excavate material which has boiled up during pile driving operations. If the material through which the piles are driven is such that cavities remain around the piles after driving, the cavities shall be filled with sand or other material as approved by the Contract Administrator.

E11.4.6 Cutoff of Piles

- (a) The piles shall be driven to the elevations shown on the plans wherever possible. If a cutoff is necessary, the pile must be cut off level at the required elevation.
- (b) All costs associated with pile cutoffs shall be incidental to the Contract Unit Price for "Drive Steel Piles".

E11.4.7 Splicing

- (a) Splicing shall be done in accordance with the following and as per details shown on the plans or provided by the Contract Administrator.
- (b) The butting ends between the driven pile and its extension shall be cut square to give reasonable bearing between the mating surfaces.
- (c) The butting surface of the extension piece shall be levelled to facilitate a full penetration butt weld. Temporary clamping plates may be used as required.
- (d) Before welding over previously deposited metal, the slag shall be cleaned off. This requirement shall apply not only to successive layers but also to successive beads and to the catered area when welding is resumed after any interruption.
- (e) All butt welds shall have the root of the initial weld gouged, chipped or otherwise removed to sound metal before welding is started from the second side. Preheating of the pile material, to a minimum of 38.7°C will be required if the air temperature is below freezing.
- (f) Welding shall conform to CSA-W59. All work is to be performed by a firm certified by the Canadian Welding Bureau to the requirements of Division 2 (minimum) of CSA W47.1.
- (g) Welding operators employed on the work are to be currently qualified by the C.W.B. Qualification is to have been issued within two years of the commencement of splicing.
- (h) All costs associated with splicing steel piles shall be incidental to the Contract Unit Price for "Supply Steel Piles".
- (i) In cases where splicing is not originally contemplated but is deemed necessary by the Contract Administrator at a later date, the supply of the materials and the actual work done in this operation shall be paid for as indicated on Form B Provisional Item "Steel H-Pile Splice".

E11.5 Method of Measurement

E11.5.1 Supply Steel Piles

- (a) Supply of steel piles will be measured on a length basis. The length to be paid for shall be the total number of lineal metres of steel piling supplied as measured by the Contract Administrator.

E11.5.2 Driving Steel Piles

- (a) Driving steel piles will be measured on a length basis. The length to be paid for shall be the total number of lineal metres of piling shown on the Drawings or authorized by the Contract Administrator, less fifty (50) percent of the total number of lineal metres of piling cut off after driving as measured in the field by the Contract Administrator.

E11.6 Basis of Payment

E11.6.1 Supply Steel Piles

- (a) Supply of steel piles will be paid for at the Contract Unit Price per lineal metre for "Supply Steel Piles" measured as specified herein which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.

E11.6.2 Driving Steel Piles

- (a) Driving steel piles will be paid for at the Contract Unit Price per lineal metre for "Drive Steel Piles" measured as specified herein which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.

E12. EXCAVATION

E12.1 Description

- (a) This Specification shall cover all operations related to excavation for the abutments.
- (b) The work to be done by the Contractor under this Specification shall include the furnishings of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E12.2 Materials

E12.2.1 General

- (a) The Contractor shall be responsible for the excavation, stockpiling and removal of all materials as set forth in this Specification. Materials to be stockpiled shall be handled in careful and workmanlike manner, to the satisfaction of the Contract Administrator.
- (b) The Contractor shall be responsible for design, construction and removal of any temporary shoring deemed necessary by the Contractor to ensure the safety of the workers.

E12.2.2 Excavation

- (a) Excavated material shall include the excavation and satisfactory disposal of all surplus concrete pavement, asphalt pavement, ballast, earth, gravel, sand, clay, silt and all other material of whatever character which may be encountered.

E12.3 Equipment

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

E12.4 Construction Methods

E12.4.1 Scope of Work

- (a) Excavation: The excavation of material to a depth as shown on the Drawings for piers, abutments and prestressed precast concrete box girders.
- (b) Off-site disposal of all excavated materials.
- (c) Dewatering and or precipitation removal of the excavations as may be required for construction of the structure in the dry.

E12.5 Survey Monuments

- (a) The Contractor shall avoid damaging survey monument and shall take all necessary precautions to protect the same. The Contract Administrator at the sole expense of the Contractor will rectify any damage to the survey monuments.

E12.6 Measurement and Payment

E12.6.1 Method of Measurement

- (a) Excavation, as defined in this Specification, is a lump sum pay item. No measurement will be made for this work.

E12.6.2 Basis of Payment

- (a) Excavation will be paid for at the Contract Lump Sum Price for "Excavation", which price shall be payment in full for performing all operations herein described including the cost of furnishing all necessary labour, materials, and equipment for the protective works necessary for safe excavation, disposal, preparation of slopes and channels, and all other items incidental to the work included in this Specification.

E13. BACKFILL

E13.1 Description

- (a) This Specification shall cover backfill for abutments
- (b) The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supply, and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E13.2 Materials

E13.2.1 General

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

E13.2.2 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.
- (b) All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Testing Laboratory designated by the Contract Administrator. There shall be no charge to the City for any materials taken the Contract Administrator for testing purposes.
- (c) All material shall be accepted by the Contract Administrator at least seven (7) days before any construction is undertaken. If, in the opinion of the Contract Administrator, such materials in whole or in part, so not conform to the Specification detailed herein, or are found to be defective in manufacture, or have become damaged in transit, storage or handling operation, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

- E13.2.3 Granular Backfill Material
- (a) Granular sub-base material shall be in accordance with CW 3110 – R10 Sub-Base Materials 50 mm MAX AGG.
- E13.2.4 Granular Base Material
- (a) Granular base material shall be in accordance with CW 3110 – R10 Base Course Material.
- E13.2.5 Geotextile Fabric
- (a) The non-woven geotextile shall conform to:
 - (i) Mass 240 g/m² min in accordance with ASTM D5261
 - (ii) Grab Tensile Strength 60 N min in accordance with ASTM D 4632
 - (iii) Mullen Burst Strength 2000 kPa min in accordance with ASTM D3786
 - (iv) The non-woven geotextile shall be Armtech 250 supplied by Armtech Construction Products and Century Petroleum Construction, Geotex 701 supplied by Specialty Construction or ProPex 4552 supplied by Brock White Company Canada or equal in accordance with B7 as accepted by the Contract Administrator.
- E13.3 Equipment
- (a) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.
- E13.4 Construction Methods
- E13.4.1 Scope of work
- (a) The work shall comprise of the supply, placement, and compaction of backfill material for the abutments.
- E13.4.2 Geotextile Fabric
- (a) Install geotextile fabric under all backfill material.
 - (b) Unroll geotextile fabric as smooth as possible.
 - (c) Install the geotextile fabric in the longest continuous practical length, free from tension, stress, folds, wrinkles and creases.
 - (d) Install geotextile fabric in accordance with this Specification and procedures recommended by the manufacturer.
 - (e) Overlap joint a minimum of 600 millimetres and as indicated on the Drawings.
 - (f) Install pins as required to hold geotextile fabric in place.
 - (g) Cut or fold geotextile fabric to conform to curves.
 - (h) Construction vehicles shall be permitted directly on the geotextile fabric.
 - (i) Remove or replace geotextile fabric improperly installed or damaged as directed by the Contract Administrator.
- E13.4.3 Backfill Operations
- (a) The Contract Administrator shall be notified at one (1) working day in advance of any backfilling operation. No backfill shall be placed against any concrete until approved by the Contract Administrator and in no case before cylinders show the concrete strength to be at least 25 MPa.
 - (b) The geotextile fabric shall be placed prior to any backfilling operations.
 - (c) The abutments shall be backfilled with backfill materials described below to the grade line as shown on the Drawings. Backfill materials shall be free of frozen lumps and shall be placed and compacted in an unfrozen state. Backfill shall not be placed on frozen subsoil.

- (d) The Contractor shall be required to provide necessary water or equipment during compaction of backfill material to achieve the required densities.
- (e) The Contractor shall place backfill material in 150 mm lifts and shall compact each lift. The backfill shall be compacted to 98% Standard Proctor.

E13.5 Quality Control

E13.5.1 Inspection

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

E13.5.2 Materials

- (a) All material supplied and placed under this Specification shall be subject to testing and acceptance by the Contract Administrator in accordance with E13.2 and E13.4 of this Specification.

E13.5.3 Quality of Backfill Material

- (a) The Standard Proctor Density for granular backfill material shall be determined at the optimum moisture content in accordance with standard laboratory Proctor Compaction Test Procedure. The field density of each backfill layer shall be 100% of the applicable Proctor Density, as specified in E13.5.2.d) of this Specification.
- (b) Quality control test will be used to determine the acceptability of each backfill layer, as place and compacted by the Contractor before any succeeding layer may be applied.
- (c) The filed density of the compacted layers shall be verified by Field Density Tests in accordance with ASTM Standard D155560-64, Test for Density of Solid in Place by the Sand-Cone Method, or equivalent as accepted by the Contract Administrator.
- (d) The frequency and number of tests to be made shall be as determined by the Contract Administrator. The Contractor is responsible for all testing costs. The Contract Administrator will select the Testing Agency.
- (e) Holes made by removal of samples from the layer shall be promptly filled by the Contractor with appropriate material and thoroughly compacted so as to conform in every way with the adjoining compacted material.

E13.5.4 Corrective Action

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

E13.6 Method of Measurement

- (a) Backfill, as defined in this Specification, is a lump sum pay item. No measurement will be made for this work.

E13.7 Basis of Payment

- (a) Backfill will be paid for at the Contract Lump Sum Price for "Backfill", which price shall be payment in full for performing all operations herein described including the cost of furnishing all necessary labour, materials, and equipment for the protective works necessary for safe placement of backfill material in accordance with the contract specification and accepted by the Contract Administrator.

E14. MISCELLANEOUS METAL

E14.1 Description

- (a) This Specification shall cover supply, fabrication, galvanizing, transportation, handling, and delivery of miscellaneous metal. This Specification shall include, but is not limited to, the supply and installation of the items of work listed herein:
 - (i) Miscellaneous metal items not covered specifically within this Specification
- (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 Materials

E14.2.1 General

- (a) The Contractor shall be responsible for the supply, safe storage and handling of all miscellaneous metal materials as set forth in this Specification.
- (b) All materials supplied under this Specification shall be of a type accepted by the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.

E14.2.2 Steel

Unless otherwise specified, all steel shall conform to the requirements of CSA Standard CAN/CSA-G40.21, Grade 350W.

E14.2.3 Hot-Dip Galvanizing

- (a) All items supplied under this Specification shall be hot-dip galvanized in accordance with CSA Standard G164 to retention of 600 gm/m². All metal surfaces to be galvanized shall be thoroughly cleaned of rust, rust scale, mill scale, dirt and other contaminants by commercial sand, grit or shot blasting and/or pickling prior to galvanizing. Heavy deposits of oil and grease shall be removed with solvents prior to blasting or pickling.

E14.2.4 Galvanizing Touch-up

- (a) Field-applied galvanizing, to touch-up damaged hot-dip galvanizing on-site and to galvanize field welds, shall be done with self fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780-80 for "Repair of Damaged Hot Dip Galvanizing Coating". Accepted products are Galvalloy as manufactured by Metalloy Products Company, P.O. Box No. 3093, Terminal Annex, Los Angeles, California and Welco Gal-Viz Galvanizing Alloy, as manufactured by Thermocote Welco, Highway 161 York Road, Kings Mountain, North Carolina. Locally, both products are available from Welder Supplies Limited, 25 McPhillips Street, Winnipeg, Manitoba.

E14.2.5 Anchor Studs

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

E14.2.6 Welding

- (a) Welding shall conform to CSA-W59. All work is to be performed by a firm certified by the Canadian Welding Bureau to the requirements of Division 2 (minimum) of CSA W47.1.
- (b) Welding operators employed on the work are to be currently qualified by the C.W.B. Qualification is to have been issued within two years of the commencement of fabrication.
- (c) Trim and bevel ends and other items to enable satisfactory welding.
- (d) Keep all paint back from areas requiring welding after fabrication.

- E14.2.7 Hardware
- (a) All bolts, nuts, washers, inserts, pintels, etc., as required shall be ASTM A325, galvanized, unless noted otherwise.
- E14.2.8 Non-Shrink Grout
- (a) Non-shrink grout shall be supplied as specified in Specification E10, "Structural Concrete".
- E14.3 Equipment
- (a) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.
- E14.4 Construction Methods
- E14.4.1 Scope of Work
- (a) It is intended that this Specification cover the following miscellaneous metal elements and all others not specifically noted within this Specification, including all components and related fasteners as shown on the Drawings:
 - (i) Galvanized steel angle at SU1.
- E14.5 Quality Control
- E14.5.1 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.
- E14.5.2 Access
- (a) The Contractor shall allow the Contract Administrator free access to all parts of the work at all times.
- E14.5.3 Qualifications of Contractor
- (a) The Contractor shall produce evidence that his plant is recently fully approved by the C.W.B. to the requirement of CSA Standard 47.1, Division 2.
- E14.5.4 Qualifications of Operators
- (a) The Contractor shall produce evidence that all welding operators to be employed on the work are currently qualified by the C.W.B. at the time of fabrication and in the processes in which they are to be employed on the work. Such qualification shall have been issued within two years of the commencement of fabrication.
 - (b) The Contractor shall also produce evidence relative to each operator, that he has been executing satisfactory welding in the required processes within the six-month period previous to the award of this contract.
- E14.5.5 Welding Procedures
- (a) The Contractor shall submit copies of the welding procedures, which he intends to use, for examination and acceptance by the Contract Administrator.
 - (b) Such procedures shall be accompanied by documentary proof that they have been qualified previously by the C.W.B. at the plant where the work is to be carried out.

E14.6 Quality Control

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

E14.6.1 Submissions

- (a) At least fourteen (14) days prior to the scheduled commencement of any fabrication, the qualifications of Contractor, the qualifications of operator, the shop drawings, mill certificates, welding procedures, and welding consumable certificates shall be submitted to the Contract Administrator for his acceptance.
- (b) The shop drawings shall consist of three (3) sets of full size prints and one (1) reproducible sepia set.
- (c) The shop drawings shall clearly show shapes, weights, dimensions, detail, connection (including proper CSA welding identification), bolt holes, and accessories.
- (d) Calculated mass of miscellaneous metal for each shop drawing following shop drawing final acceptance shall be submitted.

E14.6.2 Preparation of Material

- (a) Bending Material
- (b) Steel items to be bent shall be bent by methods that will not injure the metal. The steel shall not be heated unless permission is given by the Contract Administrator. Any damage to the galvanizing surface shall be repaired in accordance with Clause E14.2.4 of this Specification.
- (c) Edge Preparation of Welding
- (d) The edges of plates or sections which are to welded together shall be prepared by sawing, shearing, flame-cutting, machining, chipping or arc air gouging to the details shown on the shop drawings. Surfaces and edges to be welded shall be smooth, uniform and free from thins, tears, cracks, and other defects, which would adversely affect the quality or strength of the weld. Surfaces to be welded shall also be free from loose scale, slag, rust, grease, moisture or other material that will prevent proper welding. Mill scale that withstands vigorous wire brushing, alight film of drying oil or a thin rust inhibitive coating may remain.
- (e) Surfaces within 50 mm of any weld location shall be free from any paint or other material that would prevent proper welding or produce objectionable fumes while welding.
- (f) Edges of material thicker than specified in the following list shall be trimmed if and as required to produce a satisfactory welding edge wherever a weld along the edge is to carry calculated stress:
 - (i) Sheared edges of material thick than 12 mm
 - (ii) Rolled edges of plates (other than Universal Mill Plates) thicker than 9 mm
 - (iii) Toes of angles thicker than 16 mm
 - (iv) Universal Mill Plates or edges of flanges of wide section thicker than 25 mm.
- (g) Edges may be prepared by oxygen cutting, providing that a smooth and regular surface free from cracks and notches is secured, and providing that an accurate profile is secured by the use of mechanical guide. Freehand cutting shall be done only where accepted by the Contract Administrator.

E14.6.3 Edge Preparation (Non-welded Edges)

- (a) Steel may be cut to size by sawing, shearing or machining.

E14.6.4 Butt Joints

- (a) Minimize the number of butt joint by maximizing the length of plates. Details of all butt joints shall be submitted to the Contract Administrator for his review. The fabricator may submit an alternative butt joint design provided that such design has been pre-qualified by A.W.S.

E14.6.5 Anchor Studs

- (a) Welding of anchor studs shall conform to the requirements of CSA Standard W59, Section 3.1.2.2 and 5.5.6.5.

E14.6.6 Assembly

- (a) The shop assemble of the various component of the weldments shall be executed in accordance with CSA.
- (b) Tack welding shall be done by qualified operators, using the smallest size weld required to hold the components of the assembly together. Tack welds shall not be less the 50 mm in length and shall be incorporated in the final weld.
- (c) Tack welds shall be made with 4 mm maximum size electrodes and shall be subject to the preheat requirement of CSA-W59.
- (d) Preheat and Interpass Temperatures
- (e) No welding shall be done when the temperatures of the base metal is lower than - 20°C. At temperatures below 0°C, the steel shall be preheated to a temperature of at least 10°C in excess of that stated in Table 1.
- (f) Preheat shall be applied to all steel to welded so that the steel within 75 mm of the weld is heated to the temperature shown in Table 1.
- (g) Preheat shall be applied in such a manner that moisture from the heating equipment does not penetrate the joint.
- (h) For all welding processes, preheat and interpass temperatures shall be maintained during welding at temperature not less that stated in Table.1.

Table 1

Minimum Preheat and Interpass Temperatures	
Thickness of Thickest Part at Point of Welding	CSA Standard CAN/CSA Grade 350 W G40.21
Less than 19 mm	21°C
19 mm to 38 mm	66°C
38 mm to 64 mm	107°C
Over 64 mm	150°C

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

E14.6.7 Bent Plates

- (a) When bending plates, the plates shall be so taken from the stock plates that the bend line will be at right angles to the direction of rolling. The radius of the bend measured inside, shall be not less than the thickness of the plate.

- E14.6.8 Weld Profiles
- (a) Weld profiles shall meet the requirements of CSA Standard W59, Clause 5.9.
- E14.6.9 Shipping
- (a) Structural members shall be loaded in such a manner that they can be transported and unloaded at their destination without being excessively stressed, deformed or otherwise damaged.
- E14.6.10 Handling and Storing Materials
- (a) Material to be stored shall be placed on skids above the ground. It shall be kept clean and properly drained. Long members shall be supported on skids placed near enough to prevent injury from deflection.
- E14.6.11 Straightening Bent Material
- (a) The straightening of plates and angles or other shapes shall be done by methods that will not produce a fracture or other injury. The metal shall not be heated unless permitted by the Contract Administrator, in which case the heating shall not be to a higher temperature than that producing a "dark cherry red" colour. After heating, the metal shall be cooled as slowly as possible.
 - (b) Following the straightening of a bend or buckle, the surface of the metal shall be carefully inspected for evidence of fracture, and if necessary, replaced or repaired to the satisfaction of the Contract Administrator.
- E14.6.12 Welding of Galvanized Metal
- (a) All field welding to galvanized metal shall be touched up by the Galvalloy Process in accordance with Clause E14.2.4 of these Specifications. All Galvalloy repairs shall be made flush with adjacent metal.
- E14.7 Measurement and Payment
- E14.7.1 Method of Measurement
- (a) The supply and installation of miscellaneous metal will be paid for on a lump sum basis, as accepted by the Contract Administrator and no measurement will be made for this work.
- E14.7.2 Basis of Payment
- (a) The supply and installation of miscellaneous metal shall be paid for at the Contract Lump Sum Price for "Miscellaneous Metal", which price shall be payment in full for performing all operations herein described including the cost of furnishing all necessary labour, materials and all other items incidental to the work included in this Specification.
- E15. ALUMINUM BALANCED RAILING**
- E15.1 Further to CW 3650 – R4.
- E15.2 Description
- (a) Aluminium balanced railing includes the approach railing and pedestrian railing on the concrete traffic barriers as indicated on the Drawings.
- E15.3 Submissions
- (a) At least fourteen (14) days prior to the scheduled commencement of any fabrication, the qualifications of Contractor, the qualifications of operator, the shop drawings, mill certificates, welding procedures, and welding consumable certificates shall be submitted to the Contract Administrator for his acceptance.
 - (b) The shop drawings shall consist of three (3) sets of full size prints and one (1) reproducible sepia set.

- (c) The shop drawings shall clearly show shapes, dimensions, detail, connection (including proper CSA welding identification), bolt holes, and accessories.

E15.4 Measurement and Payment

E15.4.1 Method of Measurement

- (a) The aluminum balanced railing shall be paid for on a lump sum basis, as accepted by the Contract Administrator and no measurement will be made for this work.

E15.4.2 Basis of Payment

- (a) The aluminum balanced railing shall be paid for at the Contract Lump Sum Price for "Aluminum Balance Railing", which price shall be payment in full for performing all operations herein described including the cost of furnishing all necessary labour, materials and all other items incidental to the work included in this Specification.

E16. PAINT

E16.1 Description

- (a) This Specification shall cover the supply and application of paint to all exposed surfaces of the abutments, wingwalls and superstructure excluding the top of the deck.
- (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 Materials

E16.2.1 General

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

E16.2.2 Handling and Storage of Materials

- (a) All materials shall be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with the requirements of the manufacturer.

E16.2.3 Paint Type

- (a) The paint shall be Flat Exterior Latex and shall be approved by the Contract Administrator in writing prior to being applied. Colour to be specified by the Contract Administrator.

E16.3 Construction Methods

E16.3.1 General

- (a) All work shall be carried out by personnel skilled in this type of operation and all work shall be subject to acceptance by the Contract Administrator.
- (b) All concrete surfaces to be painted shall be smooth, free of voids, moisture and contaminants, including curing compound/sealer and form release agents, and cleared of dust and all loose material.
- (c) All concrete surfaces to be painted shall receive a light brush sandblast to clean the surface and expose voids. Voids shall be filled using an approved patching material.
- (d) After the concrete surfaces have been prepared, a prime coat shall be applied in such a manner that the surfaces to receive painting shall be uniformly and completely covered.
- (e) Paint shall be applied with a roller or sprayed on with a gun.

E16.3.2 Scope of Work:

- (a) All exposed surfaces of the following components shall receive one coat of primer and two coats of paint :
 - (i) Abutments
 - (ii) Superstructure, excluding complete top and soffit of deck.

E16.4 Quality Control

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

E16.5 Measurement and Payment

E16.5.1 Method of Measurement

- (a) The painting of the structure will be paid for on a lump sum basis, as accepted by the Contract Administrator and no measurement will be made for this work.

E16.5.2 Basis of Payment

- (a) The painting of the structure shall be paid for at the Contract Lump Sum Price for "Paint", which price shall be payment in full for performing all operations herein described including the cost of furnishing all necessary labour, materials and all other items incidental to the work included in this Specification.

E17. RIPRAP

E17.1 Further to CW 3615 – R2.

E17.2 The riprap shall be field stone of the gradation indicated in the following table.

SIZE Smaller than (mm)	
350	100%
250	
200	15-50%
150	
100	0-15%

E17.3 Non-woven geotextile shall be placed under all the riprap.

E17.4 The non-woven geotextile shall conform to:

- (a) Mass 240 g/m² min in accordance with ASTM D5261
- (b) Grab Tensile Strength 60 N min in accordance with ASTM D 4632
- (c) Mullen Burst Strength 2000 kPa min in accordance with ASTM D3786

- (d) The non-woven geotextile shall be Armtech 250 supplied by Armtech Construction Products and Century Petroleum Construction, Geotex 701 supplied by Specialty Construction or ProPex 4552 supplied by Brock White Company Canada or equal in accordance with B7 as accepted by the Contract Administrator.

- E17.5 Install geotextile fabric in accordance with this Specification and procedures recommended by the manufacturer.
- E17.6 Overlap joint a minimum of 600 millimetres and as indicated on the Drawings.
- E17.7 Install pins as required to hold geotextile fabric in place.
- E17.8 Cut or fold geotextile fabric to conform to curves.
- E17.9 Construction vehicles shall be permitted directly on the geotextile fabric.
- E17.10 Remove or replace geotextile fabric improperly installed or damaged as directed by the Contract Administrator.
- E17.11 Supply and placement of the non-woven geotextile shall be incidental to the supply and placement of the riprap.

E18. PERMANENT CHAIN LINK FENCE

- E18.1 Further to CW 3550 – R2.
- E18.2 Measurement and Payment
 - E18.2.1 Method of Measurement
 - (a) The permanent chain link fence will be paid for on a lump sum basis, as accepted by the Contract Administrator and no measurement will be made for this work.
 - E18.2.2 Basis of Payment
 - (a) The permanent chain link fence shall be paid for at the Contract Lump Sum Price for “Permanent Chain Link Fence”, which price shall be payment in full for performing all operations herein described including the cost of furnishing all necessary labour, materials and all other items incidental to the work included in this Specification.

E19. LAYOUT OF THE WORK

- E19.1 Further to C6, the Contract Administrator will provide the basic centrelines and an elevation of the Works as shown on the Drawings.
- E19.2 The Contractor shall be responsible for the true and proper layout 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.
- E19.3 Should any error appear or arise in location, levels, dimensions, and/or alignments during the course of the Work, the Contractor shall promptly rectify such errors to the satisfaction of the Contract Administrator, at his own expense.
- E19.4 The Contract Administrator shall be notified at least one (1) working day prior to any Work being commenced in order to have the option to check and review all elevations and layouts at his discretion.
- E19.5 The Contractor shall carefully protect and preserve all benchmarks, stakes, and other items used in giving 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.

E20. ENVIRONMENTAL PROTECTION PLAN

- E20.1 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.
- E20.2 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work. Some are available for viewing at the office of the Contract Administrator.
- E20.3 Federal Legislation
- (a) Canadian Environmental Assessment Act (CEAA) c.37
 - (b) Fisheries Act c.F14
 - (c) Transportation of Dangerous Goods Act and Regulations c.34
 - (d) Navigable Waters Protection Act
 - (e) And any other applicable Acts, Regulations, and By-laws
- E20.4 Provincial Legislation
- (a) The Dangerous Goods Handling and Transportation Act D12
 - (b) The Endangered Species Act E111
 - (c) The Environment Act c.E125
 - (d) The Fire Prevention Act F80
 - (e) The Manitoba Heritage Resources Act H39-1
 - (f) The Manitoba Noxious Weeds Act N110
 - (g) The Manitoba Nuisance Act N120
 - (h) The Public Health Act c.P210
 - (i) The Workplace Safety and Health Act W210
 - (j) And current applicable associated regulations (Note: Provincial regulations updated as of September 1999)
 - (k) The *Manitoba Stream Crossing Guidelines for the Protection of Fish Habitat*, Manitoba Natural Resources, 1996
 - (l) And any other applicable Acts, Regulations, and By-laws
- E20.5 Municipal Legislation
- (a) The City of Winnipeg By-law No. 2480/79 and all amendments up to and including 7976/2000
 - (b) The City of Winnipeg By-law No. 1573/77 and all amendments up to and including 7670/2000
 - (c) And any other applicable Acts, Regulations, and By-laws
- E20.6 The Contractor is advised that the Fisheries and Oceans Canada (DFO), Transport Canada Navigable Waters (TCNW), Manitoba Conservation and the City of Winnipeg Planning, Property and Development Department Waterway Permit approvals are applicable to all Works. The materials submitted for approval are attached as well as all approvals received from the various agencies. DFO and TCNW approval letters will be supplied to the Contractor upon receipt.
- E20.7 The Contractor is advised that the following environmental protection measures apply to the Work.

E20.8 Materials Handling and Storage

- (a) Storage of construction materials shall be confined to the defined storage areas as shown on the Drawings.
- (b) Construction materials shall not be deposited or stored on riverbanks or river shorelines unless written acceptance from the Contract Administrator is received in advance.
- (c) Construction materials and debris shall be prevented from entering the Assiniboine 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.

E20.9 Fuel Handling and Storage

- (a) The Contractor shall obtain all necessary permits from Manitoba Environment for the handling and storage of fuel products and shall provide copies to the Contract Administrator.
- (b) All fuel handling and storage facilities shall comply with The Dangerous Goods and Transportation Act Storage and Handling of Petroleum Products Regulation and any local land use permits.
- (c) Fuels, lubricants, and other potentially hazardous materials as defined in The Dangerous Goods and Transportation Act shall be stored and handled within the approved storage areas.
- (d) The Contractor shall ensure that any temporary fuel storage areas established for construction of the project are contained by an impermeable dyke and are located a minimum distance of 100 m away from the high water line of the Assiniboine River. Dykes shall be designed, constructed, and maintained to retain not less than 100% of the capacity of the total number of containers or 110% of the largest container, whichever is greatest. The dykes shall be constructed of clay or similar impervious material. If this type of material is not available, the dyke shall be constructed of locally available material and lined with high-density polyethylene (HDPE). Furthermore, the fuel storage area(s) shall be secured by a barrier such as a high fence and gate to prevent vandalism.
- (e) The Contractor shall ensure that all fuel storage containers are inspected daily for leaks and spillage.
- (f) Products transferred from the fuel storage area(s) to specific work Sites shall not exceed the daily usage requirement.
- (g) When servicing requires the drainage or pumping of fuels, lubricating oils or other fluids from equipment, a groundsheet of suitable material (such as HDPE) and size shall be spread on the ground to catch the fluid in the event of a leak or spill.
- (h) Refuelling of mobile equipment and vehicles shall take place at least 100 m from a watercourse.
- (i) The area around storage Sites and fuel lines shall be distinctly marked and kept clear of snow and debris to allow for routine inspection and leak detection.
- (j) A sufficient supply of materials, such as absorbent material and plastic oil booms, to clean up minor spills shall be stored nearby on Site. The Contractor shall ensure that additional material can be made available on short notice.

E20.10 Waste Handling and Disposal

- (a) The construction area shall be kept clean and orderly at all times during and at completion of construction.
- (b) At no time during construction shall personal or construction waste be permitted to accumulate for more than one day at any location on the construction Site, other than at a dedicated storage area as may be approved by the Contract Administrator.
- (c) The Contractor shall, during and at the completion of construction, clean-up the construction area and all resulting debris shall be deposited at a Waste Disposal Ground operating under the authority of Manitoba Regulation #150/91. Exceptions are liquid

industrial and hazardous wastes which require special disposal methods (refer to Section 30.5.D) in Manitoba Regulation #150/91.

- (d) Indiscriminate dumping, littering, or abandonment shall not take place.
- (e) No on-site burning of waste is permitted.
- (f) Waste storage areas shall not be located so as to block natural drainage.
- (g) Runoff from a waste storage area shall not be allowed to cause siltation of a watercourse.
- (h) Waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.
- (i) Equipment shall not be cleaned near watercourses; contaminated water from onshore cleaning operations shall not be permitted to enter watercourses.
- (j) Discharge from any dewatered areas shall be released into a well-vegetated area, filter bag, settling basin, or storm sewer system to remove suspended material and other deleterious substances from the discharge before it finds its way into any watercourse.

E20.11 Dangerous Goods/Hazardous Waste Handling and Disposal

- (a) Dangerous goods/hazardous waste are identified by, and shall be handled according to The Dangerous Goods Handling and Transportation Act and Regulations.
- (b) The Contractor shall be familiar with The Dangerous Goods Handling and Transportation Act and Regulations.
- (c) The Contractor shall have on Site staff that is trained and certified in the handling of the dangerous/hazardous goods, when said dangerous/hazardous goods are being utilized on Site for the performance of the Work.
- (d) Different waste streams shall not be mixed.
- (e) Disposal of dangerous goods/hazardous wastes shall be at approved hazardous waste facilities.
- (f) Liquid hydrocarbons shall not be stored or disposed of in earthen pits on Site.
- (g) Used oils shall be stored in appropriate drums, or tankage until shipment to waste oil recycling centres, incinerators, or secure disposal facilities approved for such wastes.
- (h) Used oil filters shall be drained, placed in suitable storage containers, and buried or incinerated at approved hazardous waste treatment and disposal facilities.
- (i) Dangerous goods/hazardous waste storage areas shall be located at least 100 m away from the high water line and be dyked.
- (j) Dangerous goods/hazardous waste storage areas shall not be located so as to block natural drainage.
- (k) Runoff from a dangerous goods/hazardous waste storage area shall not be allowed to cause siltation of a watercourse.
- (l) Dangerous goods/hazardous waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.

E20.12 Emergency Response

- (a) The Contractor shall ensure that due care and caution is taken to prevent spills.
- (b) The Contractor shall report all major spills of petroleum products or other hazardous substances with significant impact on the environment and threat to human health and safety (as defined in Table 1: Spills That Must be Reported to Manitoba Conservation as Environmental Accidents) to Manitoba Environment, immediately after occurrence of the environmental accident, by calling the 24-hour emergency phone number (204) 945-4888.
- (c) The Contractor shall designate a qualified supervisor as the on Site emergency response coordinator for the project. The emergency response coordinator shall have the authority to redirect manpower in order to respond in the event of a spill.

- (d) The following actions shall be taken by the person in charge of the spilled material or the first person(s) arriving at the scene of a hazardous material accident or the on Site emergency response coordinator:
- (i) Notify emergency response coordinator of the accident:
 - Identify exact location and time of accident.
 - Indicate injuries, if any.
 - Request assistance as required by magnitude of accident (Manitoba Environment 24-hour Spill Response Line (204) 945-4888, Police, Fire Department, Ambulance, company back-up).
 - (ii) Attend to public safety:
 - Stop traffic, roadblock/cordon off the immediate danger area.
 - Eliminate ignition sources.
 - Initiate evacuation procedures if necessary.
 - (iii) Assess situation and gather information on the status of the situation, noting:
 - Personnel on Site.
 - Cause and effect of spill.
 - Estimated extent of damage.
 - Amount and type of material involved.
 - Proximity to waterways, sewers, and manholes.
 - (iv) If safe to do so, try to stop the dispersion or flow of spill material:
 - Approach from upwind.
 - Stop or reduce leak if safe to do so.
 - Dyke spill material with dry, inert absorbent material or dry clay soil or sand.
 - Prevent spill material from entering waterways and utilities by dyking.
 - Prevent spill material from entering manholes and other openings by covering with rubber spill mats or dyking.
 - (v) Resume any effective action to contain, clean up, or stop the flow of the spilled product.
 - (vi) 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..
 - (vii) 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.
 - (viii) 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.
 - (ix) City emergency response, 9-1-1, shall be used if other means are not available.
 - (x) The on Site emergency response coordinator shall contact the Canadian Coast Guard, Kenora, Ontario (807) 468-6441, if the spill material reaches and is on or in the Assiniboine or Red Rivers.

Table 1 Spills That Must be Reported to Manitoba Conservation as Environmental Accidents		
Classification	Hazard	Reportable Quantity/Level
1	Explosives	All
2.1	Compressed Gas (flammable)	100 L*
2.2	Compressed Gas	100 L*
2.3	Compressed Gas (toxic)	All
2.4	Compressed Gas (corrosive)	All
3	Flammable Liquids	100 L
4	Flammable Solids	1 kg
5.1	PG**I&II Oxidizer	1 kg or 1 L
	PG III Oxidizer	50 kg or 50 L
5.2	Organic Peroxide	1 kg or 1 L
6.1	PG I Acute Toxic	1 kg or 1 L
	PG II & III Acute Toxic	5 kg or 5 L

Table 1 Spills That Must be Reported to Manitoba Conservation as Environmental Accidents		
Classification	Hazard	Reportable Quantity/Level
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)		

E20.13 Noise

- (a) Noise-generating activities shall be limited to the hours indicated in the City of Winnipeg Noise By-law, unless otherwise accepted in advance by the Contract Administrator.
- (b) The Contractor shall be responsible for scheduling Work to avoid potential noise problems and/or employ noise reduction measures to reduce noise to acceptable limits. The Contractor shall also demonstrate to the Contract Administrator that Works to be performed during the night-time period, on Sundays, and Holidays shall not exceed the approved limit.

E20.14 Dust

- (a) Dust control practices implemented by the Contractor during construction shall include regular street cleaning and dampening of construction access roads and Work areas with water or approved chemicals at an adequate frequency to prevent the creation of dust.
- (b) Only water or chemicals approved by the Contract Administrator shall be used for dust control. The use of waste petroleum or petroleum by-products is not permitted.
- (c) The Contractor shall ensure that trucks which are used to haul excavated material and backfill material to and from the work Site utilize tarpaulin covers during transport to prevent material from falling onto the street and creating dust.
- (d) Stockpiled soils shall be covered with tarpaulin covers to prevent the creation of dust.

E20.15 Erosion Control

- (a) The Contractor shall develop a sediment control plan prior to beginning construction to the satisfaction of the Contract Administrator.
- (b) Exposure of soils along riverbank slopes shall be kept to the minimum practical amount, acceptable to the Contract Administrator. The cover of trees and undergrowth shall be preserved to the maximum extent possible.
- (c) Sediment control fencing, or other such erosion control structures, shall be employed wherever construction activity increases the potential for runoff to carry sediment into a drainage channel or other watercourse. The Contractor shall inspect all such structures daily during heavy construction activity in the areas of the structures and after a heavy rainfall to ensure their continued integrity.
- (d) All areas disturbed during construction shall be landscaped and revegetated with native and/or introduced plant species in order to restore and enhance the Site and to protect against soil erosion unless otherwise indicated.
- (e) The disturbed surface shall be revegetated so as to create a dense root system in order to defend against soil erosion on the right-of-way, stream banks, and any other disturbed areas susceptible to erosion.

- (f) The loss of topsoil and the creation of excessive dust by wind during construction shall be prevented by the addition of temporary cover crop, water, or tackifier, if conditions so warrant.
- (g) Effective sediment and erosion control measures (e.g., straw mulch, erosion control blankets, interceptor ditches) are used both during construction and until vegetation is re-established to prevent sediment-laden runoff from entering the Red River.
- (h) The Contractor shall routinely inspect all erosion and sediment control structures and immediately carry out any necessary maintenance. Several inspections shall be performed during rainy days.

E20.16 Runoff Control

- (a) Measures shall be undertaken to ensure that runoff containing suspended soil particles is minimized from entering the river to the extent possible to the satisfaction of the Contract Administrator.
- (b) Areas that are heavily disturbed and vulnerable to erosion or gulying shall be dyked to redirect surface runoff around the area prior to spring runoff.
- (c) Construction activities on erodible slopes and riverbanks shall be avoided during spring runoff and heavy rainfall events.
- (d) Soil and fill shall not be stockpiled on immediate riverbank areas.

E20.17 Vegetation

- (a) Vegetation shall not be disturbed without written permission from the Contract Administrator.
- (b) The Contractor shall protect plants or trees which may be at risk of accidental damage. Such measures may include protective fencing or signage and shall be approved in advance by the Contract Administrator.
- (c) Herbicides and pesticides shall not be used adjacent to any surface watercourses.
- (d) Trees or shrubs shall not be felled into watercourses.
- (e) Areas where vegetation is removed during clearing, construction, and decommissioning activities, shall be revegetated as soon as possible in accordance with the landscaping plans forming part of the contract, or as directed by the Contract Administrator.
- (f) Trees damaged during construction activities shall be examined by bonded tree care professionals; viable trees damaged during construction activities shall be pruned according to good practice by bonded tree care professionals.
- (g) Damaged trees which are not viable shall be replaced at the expense of the Contractor.

E20.18 Landscaping

- (a) Construction waste (excluding common construction gravel, sand, etc.) shall be removed to a minimum depth of 600 mm below final grade in all areas that are to be backfilled with suitable material and revegetated in accordance with the City of Winnipeg Standard Construction Specifications.
- (b) The Contractor shall adhere to the landscaping plan for maintenance of initial stages and development stages of the plant community.