



**THE CITY OF WINNIPEG**

# **BID OPPORTUNITY**

**BID OPPORTUNITY NO. 349-2007**

**HAMILTON AVENUE BRIDGE REHABILITATION AND HAMILTON AVENUE  
NORTHBOUND STREET REHABILITATION FROM VIMY ROAD TO SILVER  
AVENUE**

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## **PART B - BIDDING PROCEDURES**

### **B1. CONTRACT TITLE**

B1.1 HAMILTON AVENUE BRIDGE REHABILITATION AND HAMILTON AVENUE NORTHBOUND STREET REHABILITATION FROM VIMY ROAD TO SILVER AVENUE

### **B2. SUBMISSION DEADLINE**

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, May 25, 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 AND EXISTING DRAWINGS**

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.

B3.3 Available existing drawings may be viewed at the office of the Contract Administrator. The accuracy of these drawings is not guaranteed and the Bidder must interpret based on Site investigation.

### **B4. ENQUIRIES**

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

B4.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.

B4.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator to all Bidders by issuing an addendum.

B4.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.

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

### **B5. ADDENDA**

B5.1 The Contract Administrator may, at any time prior to the Submission deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.

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

- B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- B5.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Branch internet website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

## **B6. SUBSTITUTES**

- B6.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.
- B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.
- B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;
  - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
  - (c) identify any anticipated cost or time savings that may be associated with the substitute;
  - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;
  - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.
- B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his sole discretion grant approval for the use of a substitute as an "approved equal" or as an "approved alternative", or may refuse to grant approval of the substitute.
- B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, only to the Bidder who requested approval of the substitute.
- B6.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely responsible for disseminating information regarding the approval to any person or persons he wishes to inform.
- B6.7 If the Contract Administrator approves a substitute as an "approved equal", any Bidder may use the approved equal in place of the specified item.
- B6.8 If the Contract Administrator approves a substitute as an "approved alternative", any Bidder bidding that approved alternative may base his Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B15.

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

## **B7. BID COMPONENTS**

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

- (a) Form A: Bid;
- (b) Form B: Prices, hard copy;
- (c) Form G1: Bid Bond and Agreement to Bond, or  
Form G2: Irrevocable Standby Letter of Credit and Undertaking, or  
a certified cheque or draft;

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

B7.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Bid.

B7.4 The Bid shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.

B7.4.1 Samples or other components of the Bid which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid.

B7.4.2 A hard copy of Form B: Prices must be submitted with the Bid. If there is any discrepancy between the Adobe PDF version of Form B: Prices and the Microsoft Excel version of Form B: Prices, the PDF version shall take precedence.

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

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

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

B7.8 Bids shall be submitted to:

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

## **B8. BID**

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

B8.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in his own name, his name shall be inserted;
- (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
- (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;

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

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

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

B8.4 Paragraph 12 of Form A: Bid shall be signed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in his own name, it shall be signed by the Bidder;
- (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
- (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers and the corporate seal, if the corporation has one, shall be affixed;
- (d) if the Bidder is carrying on business under a name other than his own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

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

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

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

## **B9. PRICES**

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

B9.1.1 For the convenience of Bidders, and pursuant to B7.4.2 and B15.4.2, an electronic spreadsheet Form B: Prices in Microsoft Excel (.xls) format is available along with the Adobe PDF documents for this Bid Opportunity on the Bid Opportunities page at the Materials Management Branch internet website at <http://www.winnipeg.ca/matmgt>.

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

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

## **B10. QUALIFICATION**

B10.1 The Bidder shall:

- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and
- (b) be financially capable of carrying out the terms of the Contract; and
- (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

- B10.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) be responsible and not be suspended, debarred or in default of any obligations to the City (a list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>).
- B10.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) have successfully carried out work similar in nature, scope and value to the Work; and
  - (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
  - (c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);
- B10.4 Further to B10.3(c), the Bidder shall, within three (3) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:
- (a) a valid COR certification number under the Certificate of Recognition (COR) Program administered by the Manitoba Construction Safety Association or by the Manitoba Heavy Construction Association's Safety, Health and Environment Program; or
  - (b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.)
- B10.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.
- B10.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

## **B11. BID SECURITY**

- B11.1 The Bidder shall provide bid security in the form of:
- (a) a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or
  - (b) an irrevocable standby letter of credit, in the amount of at least ten percent (10%) of the Total Bid Price, and undertaking issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or
  - (c) a certified cheque or draft payable to "The City of Winnipeg", in the amount of at least one hundred percent (100%) of the Total Bid Price, drawn on a bank or other financial institution registered to conduct business in Manitoba.
- B11.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.
- B11.1.2 All signatures on bid securities shall be original, and shall be witnessed or sealed as required.

B11.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

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

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

B11.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

## **B12. OPENING OF BIDS AND RELEASE OF INFORMATION**

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

B12.1.1 Bidders or their representatives may attend.

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

B12.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.

B12.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract Amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.

B12.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

## **B13. IRREVOCABLE BID**

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

B13.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly executed and the performance security furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid.

## **B14. WITHDRAWAL OF BIDS**

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

B14.1.1 Notwithstanding General Condition C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

- B14.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.
- B14.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:
- (a) retain the Bid until after the Submission Deadline has elapsed;
  - (b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid; and
  - (c) if the notice has been given by any one of the persons specified in B14.1.3(b), declare the Bid withdrawn.
- B14.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B13.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

## **B15. EVALUATION OF BIDS**

- B15.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Bid Opportunity (pass/fail);
  - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);
  - (c) Total Bid Price;
  - (d) economic analysis of any approved alternative pursuant to B6.
- B15.2 Further to B15.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.
- B15.2.1 Any bid with an apparent imbalance between the unit prices in Part 1 and Part 2 may be determined to be non-responsive and rejected by the Award Authority in its sole discretion, acting reasonably.
- B15.3 Further to B15.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid or in other information required to be submitted, that he is responsible and qualified.
- B15.4 Further to B15.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B15.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.
- B15.4.2 The electronic Form B: Prices and the formulas imbedded in that spreadsheet are only provided for the convenience of Bidders. The City makes no representations or warranties as to the correctness of the imbedded formulas. It is the Bidder's responsibility to ensure the extensions of the unit prices and the sum of Total Bid Price performed as a function of the formulas within the electronic Form B: Prices are correct.

## **B16. AWARD OF CONTRACT**

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

- B16.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.
- B16.2.1 Without limiting the generality of B16.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
  - (b) the prices are materially in excess of the prices received for similar work in the past;
  - (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
  - (d) only one Bid is received; or
  - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B16.3 Subject to B16.2, where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid.
- B16.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his Bid upon written request to the Contract Administrator.

## **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:

- (a) Bridge structural rehabilitation and modifications
- (b) Approach roadways and sidewalk rehabilitation and modifications

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

- (a) Bridge Structural Works
  - (i) Removal of bridge except for existing piles and parts of the existing abutments
  - (ii) Installation of additional piles
  - (iii) Reconstruction of bridge superstructure with an additional sidewalk and modified abutments
  - (iv) New concrete barriers and a median curb slab
  - (v) New deck overlay
  - (vi) New approach slabs for roadway and sidewalks
  - (vii) New electrical and telephone conduits
  - (viii) Temporary pedestrian bridge and access
- (b) Roadworks
  - (i) Concrete pavement replacement
  - (ii) Asphalt overlay
  - (iii) Concrete curb replacement
  - (iv) Aluminum traffic railing
  - (v) Concrete sidewalk replacement and addition
  - (vi) Landscape restoration

#### **D3. CONTRACT ADMINISTRATOR**

D3.1 The Contract Administrator is UMA Engineering Ltd., represented by:

Barry Biswanger, P. Eng.  
Senior Engineer, Structures  
1479 Buffalo Place, Winnipeg, MB R3T 1L7  
Telephone No. (204) 284-0580  
Facsimile No. (204) 475-3646

D3.2 At the pre-construction meeting, Barry Biswanger, 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.
- D4.2 At least two (2) business days prior to the commencement of any Work on the Site, the Contractor shall provide the Contract Administrator with a phone number where the supervisor identified in D4.1 or an alternate can be contacted 24 hours a day to respond to an emergency.

#### **D5. NOTICES**

- D5.1 Except as provided for in General Condition 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 General Condition C4.1 for the return of the executed Contract.
- D8.2 The Safe Work Plan shall be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.

#### **D9. INSURANCE**

- D9.1 The Contractor shall provide and maintain the following insurance coverage at all times during the performance of the Work and throughout the warranty period except for all claims made policies, which shall be maintained for a minimum period of twenty-four (24) months after the date of Total Performance:
- (a) commercial general liability insurance, in the amount of at least two million dollars (\$10,000,000.00) inclusive, with The City of Winnipeg and the Contract Administrator 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 the General Condition 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 thirty (30) 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 B11.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site and in no event later than the date specified in the General Condition C4.1 for the return of the executed Contract.

#### **D11. SUBCONTRACTOR LIST**

D11.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at or prior to a pre-construction meeting, or at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Condition C4.1 for the return of the executed Contract.

#### **D12. EQUIPMENT LIST**

D12.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment List) at or prior to a pre-construction meeting, or at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Condition C4.1 for the return of the executed Contract.

#### **D13. DETAILED WORK SCHEDULE**

D13.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Conditions for the return of the executed Contract.

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

- (a) a critical path method (C.P.M.) schedule for the Work;
- (b) a Gantt chart for the Work based on the C.P.M. schedule; and
- (c) a daily manpower schedule for the Work

all acceptable to the Contract Administrator.

D13.3 Further to D13.2(a), the C.P.M. schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path:

- (a) Installation of temporary pedestrian bridge and access
- (b) Pedestrian and Traffic Control installation and removal
- (c) Installation of temporary catch platforms
- (d) Existing bridge removals
- (e) Pile installation
- (f) Forming for deck, sidewalk and abutments
- (g) Abutment reinforcing and concrete placement
- (h) Deck and sidewalk reinforcing and concrete placement
- (i) Concrete barriers and median curb slab

- (j) Approach slabs for roadway and sidewalks
- (k) Deck slab overlay
- (l) Excavation
- (m) Subbase and Base Course Construction
- (n) Concrete Pavement Construction
- (o) Concrete Sidewalk
- (p) Joint and Slab Repairs
- (q) Asphalt Overlay
- (r) Landscaping

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

D13.5 Further to D13.2(c), the daily manpower schedule shall list the daily number of individuals on the Site for each trade.

## **SCHEDULE OF WORK**

### **D14. COMMENCEMENT**

D14.1 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.

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

- (a) the Contract Administrator has confirmed receipt and approval of:
  - (i) evidence of authority to carry on business specified in D7;
  - (ii) evidence of the workers compensation coverage specified in General Condition C6.15;
  - (iii) the twenty-four (24) hour emergency response phone number specified in D4.2.
  - (iv) the Safe Work Plan specified in D8;
  - (v) evidence of the insurance specified in D9;
  - (vi) the performance security specified in D10;
  - (vii) the subcontractor list specified in D11;
  - (viii) the equipment list specified in D12;
  - (ix) the detailed work schedule specified in D13; and
- (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D14.3 The City intends to award this Contract by June 15, 2007.

D14.3.1 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.

### **D15. RESTRICTED WORK HOURS**

D15.1 Further to clause 3.10 of CW 1130, the Contractor shall require written permission 48 hours in advance from the Contract Administrator for any work to be performed between 2000 hours and 0700 hours, or on Saturdays, Sundays, Statutory Holidays and or Civic Holidays.

D15.2 In accordance with the Manual of Temporary Traffic Control, Sections 2.03, 2.04, 2.05 and 2.06, should the Traffic Management Branch of the Public Works Department require that work on

Regional Streets be carried out at night or on Sundays or on public holidays, where permitted by the City of Winnipeg Police Department, or that work be restricted or suspended during peak traffic hours, no additional compensation will be considered to meet these requirements.

**D16. WORK BY OTHERS**

D16.1 Work by others on or near the Site will include but not necessarily be limited to:

- (a) Manitoba Hydro Gas Division – lowering and/or rock wrapping of underground mains and services, if required;
- (b) Manitoba Hydro – relocation of street light poles
- (c) MTS Allstream Inc. – manhole adjustments and duct line adjustments, as required,
- (d) Various work on survey monuments by City of Winnipeg Geomatics Branch.

**D17. SUBSTANTIAL PERFORMANCE**

D17.1 The Contractor shall achieve Substantial Performance by October 19, 2007, including re-opening of the bridge to all traffic.

D17.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.

D17.3 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.

**D18. TOTAL PERFORMANCE**

D18.1 The Contractor shall achieve Total Performance by October 31, 2007.

D18.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.

D18.3 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.

**D19. LIQUIDATED DAMAGES**

D19.1 If the Contractor fails to achieve Total Performance in accordance with the Contract by the day fixed herein for Total Performance, the Contractor shall pay the City three thousand dollars (\$3,000.00) per Calendar Day for each and every Calendar Day following the day fixed herein for Total Performance during which such failure continues.

D19.2 The amount specified for liquidated damages in D19.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Total Performance by the day fixed herein for same.

D19.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

## **D20. SCHEDULED MAINTENANCE**

- D20.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:
- (a) Sod maintenance as specified in CW3510-R9;
  - (b) Reflective crack maintenance during two year maintenance warranty as specified in CW3250-R6.
- D20.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

## **CONTROL OF WORK**

### **D21. JOB MEETINGS**

- D21.1 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.
- D21.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

### **D22. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)**

- D22.1 Further to General Condition 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**

### **D23. PAYMENT SCHEDULE**

- D23.1 Further to General Condition C12, payment shall be in accordance with the following payment schedule:
- (a) Custom manufactured items may be included in progress estimates prior to installation on Site based on the following payment schedule:
    - (i) 50% of the bid supply costs, on manufacture and delivery to Site.
    - (ii) 50% of the bid supply costs on installation.
    - (iii) 100% of the bid installation costs on installation.

## **WARRANTY**

### **D24. WARRANTY**

- D24.1 Notwithstanding General Conditions C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to General Conditions C13.2.1 or General Conditions C13.2.2, in which case it shall expire when provided for thereunder.

D24.2 Notwithstanding General Condition C13.2 or D24.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:

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

D24.2.1 In such case the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in General Condition C13.2 for the warranty period to begin.

D24.3 At least two (2) weeks prior to the expiration of the Warranty Period, or upon correction of all outstanding defects and deficiencies, whichever is later, the Contractor shall arrange, attend and assist in an acceptance inspection of the Work. The Contract Administrator shall, on being satisfied that all outstanding defects and deficiencies in the Work have been corrected, issue a Certificate of Acceptance for the Work to be dated not earlier than two (2) years after the date of the Certificate of Total Performance, or the date that the Contractor corrects the final defects and deficiencies, whichever is the later, thereby terminating the Warranty Period. The Certificate of Acceptance will indicate acceptance of the due performance of the Contract.

## **D25. ENVIRONMENTAL PROTECTION PLAN**

D25.1 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.

D25.2 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work and are available for viewing at the office of the Contract Administrator.

### **(a) Federal**

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

### **(b) Provincial**

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

### **(c) Municipal**

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

D25.3 The Contractor is advised that the following environmental protection measures apply to the Work.

**(a) Materials Handling and Storage**

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

**(b) Fuel Handling and Storage**

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

**(c) Waste Handling and Disposal**

- (i) The construction area shall be kept clean and orderly at all times during and at completion of construction.
- (ii) At no time during construction shall personal or construction waste be permitted to accumulate for more than one day at any location on the construction Site, other than at a dedicated storage area as may be approved by the Contract Administrator.
- (iii) The Contractor shall, during and at the completion of construction, clean-up the construction area and all resulting debris shall be deposited at a Waste Disposal

Ground operating under the authority of Manitoba Regulation #150/91. Exceptions are liquid industrial and hazardous wastes which require special disposal methods (refer to Section 30.5D.).

- (iv) Indiscriminate dumping, littering, or abandonment shall not take place.
- (v) No on-Site burning of waste is permitted.
- (vi) Waste storage areas shall not be located so as to block natural drainage.
- (vii) Runoff from a waste storage area shall not be allowed to cause siltation of a watercourse.
- (viii) Waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.
- (ix) Equipment shall not be cleaned near watercourses; contaminated water from onshore cleaning operations shall not be permitted to enter watercourses.

**(d) Dangerous Goods/Hazardous Waste Handling and Disposal**

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

**(e) Emergency Response**

- (i) The Contractor shall ensure that due care and caution is taken to prevent spills.
- (ii) The Contractor shall report all major spills of petroleum products or other hazardous substances with significant impact on the environment and threat to human health and safety (as defined in Table 1 below) to Manitoba Environment, immediately after occurrence of the environmental accident, by calling the 24-hour emergency phone number (204) 945-4888.
- (iii) The Contractor shall designate a qualified supervisor as the on-Site emergency response coordinator for the project. The emergency response coordinator shall have the authority to redirect manpower in order to respond in the event of a spill.
- (iv) The following actions shall be taken by the person in charge of the spilled material or the first person(s) arriving at the scene of a hazardous material accident or the on-Site emergency response coordinator:

- i. Notify emergency-response coordinator of the accident:
    - identify exact location and time of accident
    - indicate injuries, if any
    - request assistance as required by magnitude of accident (Manitoba Environment 24-hour Spill Response Line (204) 945-4888, Police, Fire Department, Ambulance, company backup).
  - ii. Attend to public safety:
    - stop traffic, roadblock/cordon off the immediate danger area
    - eliminate ignition sources
    - initiate evacuation procedures if necessary
  - iii. Assess situation and gather information on the status of the situation, noting:
    - personnel on Site
    - cause and effect of spill
    - estimated extent of damage
    - amount and type of material involved
    - 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.
- (v) The emergency response coordinator shall ensure that all environmental accidents involving contaminants shall be documented and reported to Manitoba Environment according to The Dangerous Goods Handling and Transportation Act Environmental Accident Report Regulation 439/87.
  - (vi) When dangerous goods are used on Site, materials for containment and cleanup of spill material (e.g. absorbent materials, plastic oil booms, and oversized recovery drums) shall be available on Site.
  - (vii) Minor spills of such substances that may be contained on land with no significant impact on the environment may be responded to with in-house resources without formal notification to Manitoba Environment.
  - (viii) City emergency response, 9-1-1, shall be used if other means are not available.
  - (ix) The on-Site emergency response coordinator shall contact The Canadian Coast Guard, Kenora, Ontario (807) 468-6441, if the spill material reaches and is on or in the Red or Assiniboine Rivers.

<b>Table 1 Spills That Must be Reported to the Manitoba Conservation as Environmental Accidents</b>		
<b>Classification</b>	<b>Hazard</b>	<b>Reportable Quantity/Level</b>
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

<b>Table 1 Spills That Must be Reported to the Manitoba Conservation as Environmental Accidents</b>		
<b>Classification</b>	<b>Hazard</b>	<b>Reportable Quantity/Level</b>
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
6.2	Infectious	All
7	Radioactive	Any discharge or radiation level exceeding 10 mSv/h at the package surface and 200 uSv/h at 1 m from the package surface
8	Corrosive	5 kg or 5 L
9.1	Miscellaneous (except PCB mixtures)	50 kg
9.1	PCB Mixtures	500 g
9.2	Aquatic Toxic	1 kg or 1 L
9.3	Wastes (chronic toxic)	5 kg or 5 L
*Container capacity (refers to container water capacity)		
**PG = Packing Group(s)		

**(f) Noise**

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

**(g) Dust**

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

**(h) Riprap**

- (i) All areas of Sturgeon Creek banks disturbed by construction activities shall be riprapped with rock to limit erosion and sedimentation into the rivers.
- (ii) Riprap shall be free of fine materials prior to placement.

**(i) Erosion Control**

- (i) The Contractor shall develop a sediment control plan prior to beginning construction to the satisfaction of the Contract Administrator.

- (ii) Exposure of soils along riverbank slopes shall be kept to a minimum practical amount, acceptable to the Contract Administrator. The cover of trees and undergrowth shall be preserved to the maximum extent possible.
- (iii) Sediment control fencing, or other such erosion control structures, shall be employed wherever construction activity increases the potential for runoff to carry sediment into a drainage channel or other watercourse. The Contractor shall inspect all such structures daily during heavy construction activity in the areas of the structures and after a heavy rainfall to ensure their continued integrity.
- (iv) All areas disturbed during construction shall be landscaped and revegetated with native and/or introduced plant species in order to restore and enhance the Site and to protect against soil erosion unless otherwise indicated.
- (v) The disturbed surface shall be revegetated so as to create a dense root system in order to defend against soil erosion on the right-of-way, stream banks, and any other disturbed areas susceptible to erosion.
- (vi) The loss of topsoil and the creation of excessive dust by wind during construction shall be prevented by the addition of temporary cover crop, water, or tackifier, if conditions so warrant.

**(j) Runoff Control**

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

**(k) Bank Stabilization**

- (i) The banks of Sturgeon Creek shall be stabilized from channel level to high water elevation at bank-full conditions at the completion of construction.

**(l) Aquatic Resources**

- (i) The Contractor shall adhere to the Manitoba Conservation guidelines titled Recommended Fish Protection for Stream Crossings in Manitoba.
- (ii) All construction activities that may impact Sturgeon Creek stream channel and which may affect fish mobility and fish habitat shall cease from April 1 to June 1 of each year during construction.
- (iii) The use of creosoted timbers in the river channel is not permitted.

**(m) Vegetation**

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

**(n) Landscaping**

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

**(o) Construction Traffic**

- (i) Workforce parking shall be limited to the areas designated for such as detailed in the Contract Documents, or as otherwise may be directed by the Contract Administrator.
- (ii) The Contractor shall adhere to the Standard Provisions of the Standard Construction Specifications, and of the Manual of Temporary Traffic Control in Work Areas on City Streets of The City of Winnipeg, Works & Operations Division.
- (iii) The Contractor's laydown area, construction Site and access road shall be fenced and gated to secure the Site and materials and to discourage pedestrian entrance to construction area and to control any potential hazard to the public, particularly children.
- (iv) For circumstances where the Contract Administrator has accepted Site access of special equipment or material, the Contractor shall provide adequate flagmen for traffic control in the vicinity of any public buildings.

**(p) Access**

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

**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. 349-2007

HAMILTON AVENUE BRIDGE REHABILITATION AND HAMILTON AVENUE NORTHBOUND STREET REHABILITATION FROM VIMY ROAD TO SILVER 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. 349-2007

HAMILTON AVENUE BRIDGE REHABILITATION AND HAMILTON AVENUE NORTHBOUND STREET  
REHABILITATION FROM VIMY ROAD TO SILVER 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)

**FORM J: SUBCONTRACTOR LIST**  
(See D11)

HAMILTON AVENUE BRIDGE REHABILITATION AND HAMILTON AVENUE NORTHBOUND STREET  
REHABILITATION FROM VIMY ROAD TO SILVER AVENUE

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
<u>Supply of Materials:</u>		
Precast Piles		
Concrete for Bridge		
Concrete for Roads and Sidewalks		
Asphalt		
Base and Subbase		
Frames and Covers		
Catchbasins		
Sod		
<u>Installation:</u>		
Piling		
Concrete for Bridge		
Concrete for Roads and Sidewalks		
Asphalt		
Base and Subbase		
Catchbasins		
Sod		

**FORM K: EQUIPMENT**  
(See D12)

HAMILTON AVENUE BRIDGE REHABILITATION AND HAMILTON AVENUE NORTHBOUND STREET  
REHABILITATION FROM VIMY ROAD TO SILVER AVENUE

<p><b>1. Category/type:</b></p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p><b>2. Category/type:</b></p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p><b>3. Category/type:</b></p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>

**FORM K: EQUIPMENT**  
(See D12)

HAMILTON AVENUE BRIDGE REHABILITATION AND HAMILTON AVENUE NORTHBOUND STREET  
REHABILITATION FROM VIMY ROAD TO SILVER AVENUE

**4. Category/type:**

Make/Model/Year: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Registered owner: \_\_\_\_\_

Make/Model/Year: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Registered owner: \_\_\_\_\_

Make/Model/Year: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Registered owner: \_\_\_\_\_

**5. Category/type:**

Make/Model/Year: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Registered owner: \_\_\_\_\_

Make/Model/Year: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Registered owner: \_\_\_\_\_

Make/Model/Year: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Registered owner: \_\_\_\_\_

**6. Category/type:**

Make/Model/Year: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Registered owner: \_\_\_\_\_

Make/Model/Year: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Registered owner: \_\_\_\_\_

Make/Model/Year: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Registered owner: \_\_\_\_\_

## PART E - SPECIFICATIONS

### GENERAL

#### E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

- E1.1 These Specifications shall apply to the Work.
- E1.2 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.
- E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.2.3 Further to General Conditions 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>	<u>Drawing (Original) Sheet Size</u>
B133-07-01	Cover Sheet and Location Plan	A1
B133-07-02	Drawing List, Design Data and Abbreviations	A1
B133-07-03	Limits of Work and Location of Proposed New Work	A1
B133-07-04	General Arrangement	A1
B133-07-05	Pile Layout	A1
B133-07-06	West Abutment Concrete Details	A1
B133-07-07	East Abutment Concrete Details	A1
B133-07-08	West Abutment Reinforcing Details	A1
B133-07-09	East Abutment Reinforcing Details	A1
B133-07-10	Deck Slab Concrete Details	A1
B133-07-11	Deck Slab Reinforcing Details I	A1
B133-07-12	Deck Slab Reinforcing Details II	A1
B133-07-13	Barrier and Median Curb Concrete Details I	A1
B133-07-14	Barrier Concrete and Reinforcing Details II	A1
B133-07-15	Pedestrian Handrail Details I	A1
B133-07-16	Pedestrian Handrail Details II	A1
B133-07-17	Approach Slab Concrete and Reinforcing Details I	A1
B133-07-18	Approach Slab Concrete and Reinforcing Details II	A1
B133-07-19	Approach Guardrail Details I	A1
B133-07-20	Approach Guardrail Details II	A1
B133-07-21	Reinforcing Steel Schedule I	A1
B133-07-22	Reinforcing Steel Schedule II	A1
B133-07-23	Abbreviations, Key Plan, Drawing List, Horizontal and Vertical Control	A1
B133-07-24	Horizontal Geometry	A1
B133-07-25	Horizontal and Vertical Alignment-Vimy Road to Sta 0+300	A1
B133-07-26	Horizontal and Vertical Alignment-Sta 0+300 to Sta 0+420	A1
B133-07-27	Horizontal and Vertical Alignment-Sta 0+420 to Sta 0+540	A1
B133-07-28	Horizontal and Vertical Alignment-Sta 0+540 to Sta 0+660	A1
B133-07-29	Horizontal and Vertical Alignment-Sta 0+660 to Silver Avenue	A1
B133-07-30	Sidewalk Vertical Alignment-Sta 0+200 to Silver Avenue	A1

## **E2. VERIFICATION OF WEIGHTS**

- E2.1 All material which is paid for on a weight basis shall be weighed on a scale certified by Consumer & Corporate Affairs, Canada.
- E2.1.1 All weight tickets shall have the gross weight and the time and date of weighing printed by an approved electro/mechanical printer coupled to the scale.
- E2.1.2 The tare weight and net weight may either be hand written or machine printed. All weights, scales and procedures shall be subject to inspection and verification by the Contract Administrator. Such inspection and verification may include, but shall not be limited to:
- (a) Checking Contractor's scales for Consumer & Corporate Affairs certification seals.
  - (b) Observing weighing procedures.
  - (c) Random checking of either gross or tare weights by having such trucks or truck/trailer(s) combinations as the Contract Administrator shall select weighed at the nearest available certified scale.
  - (d) Checking tare weights shown on delivery tickets against a current tare.
- E2.1.3 No charge shall be made to The City for any delays or loss of production caused by such inspection and verification.
- E2.2 The Contractor shall ensure that each truck or truck/trailer(s) combination delivering material which is paid for on a weight basis carries a tare not more than one (1) month old.
- E2.2.1 The tare shall be obtained by weighing the truck or truck/trailer(s) combination on a certified scale and shall show:
- (a) upon which scale the truck or truck/trailer(s) combination was weighed.
  - (b) the mechanically printed tare weight.
  - (c) the license number(s) of the truck and trailer(s).
  - (d) the time and date of weighing.

## **E3. MOBILIZATION AND DEMOBILIZATION**

- E3.1 Description
- E3.1.1 This Specification covers all operations relating to the mobilization and demobilization of the Contractor to the Site, as specified herein.
- E3.2 Construction Method
- E3.2.1 Section includes, but is not limited to:
- (a) Cellular Telephone Communication  
The Contractor's Site supervisor is required to carry, at all times, a cellular telephone equipped with voicemail.
  - (b) Miscellaneous  
This section shall also include travel and accommodation, set-up, and demobilization of Site offices, storage conveniences, and other temporary facilities, construction plant, and other items not required to form part of the permanent Works and not covered by other prices.

### E3.3 Method of Measurement

Mobilization and demobilization shall be paid for on a Lump Sum basis, as accepted by the Contract Administrator, and no measurement will be made for this Work.

### E3.4 Basis of Payment

Mobilization and demobilization will be paid for at the Contract Lump Sum Prices for "Mobilization and Demobilization".

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

- |  |     |
|--|-----|
| (a) when Contractor Administrator is satisfied that construction has commenced | 30% |
| (b) during construction  | 60% |
| (c) upon completion of the project   | 10% |

## E4. PEDESTRIAN AND TRAFFIC PROTECTION/ACCOMMODATION

### E4.1 Description

E4.1.1 This Specification shall cover the provision of a temporary bridge and access for pedestrians south of the Hamilton Avenue Bridge during the entire period for the Work of this Contract, as specified herein.

E4.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

### E4.2 Materials for Temporary Bridge, Access, Protection and Guidance Requirements

#### E4.2.1 General

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

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

#### E4.2.2 Pedestrian Protection

A pedestrian protection wall shall be provided on the north side of the temporary pedestrian bridge and access sidewalk and shall be a minimum of 2400 mm high and shall consist of support posts and minimum 13 mm thick plywood. The support posts shall have provision for anchorage to prevent movement or overturning of the pedestrian protection due to wind. The pedestrian protection shall be designed for all applicable loading including wind loading in accordance with the requirements of the National Building Code. Adequate lighting shall be provided attached to the temporary pedestrian protection or attached to the temporary pedestrian bridge.

#### E4.2.3 Temporary Pedestrian Bridge and Sidewalk

The temporary bridge and sidewalk shall accommodate a clear width of 2000 mm for pedestrians and accommodate the pedestrian protection on the north side as well as guardrailing on the south side. The walking surface shall be slip resistant and provide barrier free access. The temporary pedestrian bridge and sidewalk shall be designed for all applicable loading in accordance with AASHTO.

#### E4.2.4 Traffic Gates

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

#### E4.3 Construction Methods

##### E4.3.1 Scope of Work

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

- i) Supply (as applicable), erection and maintenance of pedestrian protection, temporary pedestrian bridge, and pedestrian sidewalk as specified herein.
- ii) Provision of all signage necessary to direct pedestrian traffic.
- iii) Provision of all other measures necessary to ensure safe pedestrian access through the construction Site to the satisfaction of the Contract Administrator.

##### E4.3.2 Temporary Pedestrian Bridge, and Temporary Sidewalk

###### E4.3.2.1 Installation/Removal of Pedestrian Bridge, Protection and Temporary Sidewalk

The pedestrian bridge, protection, and sidewalk shall be erected prior to the commencement of any Work that would affect pedestrian traffic and to the satisfaction of the Contract Administrator.

The pedestrian bridge, protection and temporary pedestrian sidewalk shall provide a walkway to direct the pedestrian traffic past the Work area as shown on the Drawings. The pedestrian protection shall be securely anchored at all times while Work is being performed.

###### E4.3.2.2 Shop Drawings

At least seven (7) Working Days prior to the scheduled commencement of any fabrication, the shop drawings shall be submitted to the Contract Administrator for his review.

The shop drawings shall consist of: three (3) sets of prints, one (1) reproducible sepia set.

The shop drawings shall clearly show materials, dimensions, details, connections, accessories, and design loads and shall be stamped by a Professional Engineer registered in the Province of Manitoba.

The Contractor shall determine the Work area extents and the associated pedestrian bridge, protection, and temporary sidewalks required prior to submission of the pedestrian bridge, protection, and temporary sidewalk shop drawings.

###### E4.3.2.3 Safety Precautions

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

###### E4.3.2.4 Maintenance of the Pedestrian Bridge, Protection, and Temporary Sidewalk

The Contractor shall maintain the pedestrian bridge, protection, and temporary sidewalk in good working order at all times to the satisfaction of the Contract Administrator. Any item exhibiting rips, breakage or other defects shall be promptly repaired or replaced.

The walkway shall be kept free of all construction materials, debris and equipment at all times.

#### E4.4 Method of Measurement

Pedestrian and traffic protection/accommodation will be paid for on a Lump Sum basis, as accepted by the Contract Administrator, and no measurement will be made for this Work.

#### E4.5 Basis of Payment

Pedestrian and traffic protection/accommodation will be paid for at the Contract Lump Sum price for "Traffic and Pedestrian Control", pro-rated on a weekly basis over the construction period, 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.

Pro-rated payment will be based on the following breakdown:

Installation	40%
Maintenance	30%
Removal	30%

### **E5. LANDSCAPE RESTORATION**

E5.1 Restore all landscaping to a condition equal to that which existed before the Work started. This may be accomplished by sodding or seeding. Maintenance or landscape restoration will be in accordance with CW 3510-R9 and CW 3520-R7.

E5.2 Landscape restoration will not be measured. This item of Work will be paid for at the Contract Lump Sum Price for "Landscape Restoration" performed in accordance with this Specification and accepted by the Contract Administrator. Payment will be in accordance with:

- (a) Seventy-five (75) percent following supply and placement
- (b) Twenty-five (25) percent following termination of the maintenance period

### **E6. STRUCTURAL REMOVALS**

#### E6.1 Description

This Specification shall cover structural removal Works, including all necessary staging, demolition, removal, salvaging, transporting, unloading, stockpiling, dismantlement, and disposal of applicable materials.

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.

#### E6.2 Equipment

##### E6.2.1 General

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

#### E6.3 Construction Methods

##### E6.3.1 Scope of Work

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

- (a) Concrete Removals – Removal and disposal of all concrete Works to the limits shown on the Drawings, from the existing Hamilton Avenue Bridge structure including

concrete deck, abutment partial depth concrete removal, sidewalks, approach slab, including all reinforcing steel, embedments, attachments, other removal and disposal of miscellaneous structures will be considered for removal upon acceptance of the Contract Administrator.

- (b) Telephone and Cable T.V. Cabling Conduits Support and Protection –support and protection of all telephone and cable T.V. cabling on the bridge.
- (c) Salvage Items – Removal and salvaging of the existing railings.

#### E6.3.2 Fees and Permits

The Contractor shall obtain and pay for all licenses and permits necessary for the removal Work.

The Contractor shall comply with all Municipal, Provincial, and Federal Government regulations relating to the demolition of structures.

#### E6.3.3 Explosives

The use of explosives is prohibited.

#### E6.3.4 Protection of Existing Structures and Services

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

#### E6.3.5 Safety Precautions

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

#### E6.3.6 Traffic and Pedestrian Control

Traffic and pedestrian control shall conform to E4. Pedestrian and Traffic Protection/ Accommodation.

#### E6.3.7 Structure Removal Schedule and Procedures

At least ten (10) Working Days prior to the scheduled commencement of any demolition and removal Work, the Contractor shall submit to the Contract Administrator details of the proposed equipment, schedule, and methods of removal for each type of demolition or removal for review and acceptance. No demolition and removal Works shall commence without prior acceptance of the Contract Administrator.

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

All removed material shall become the responsibility of the Contractor except as otherwise indicated herein.

The Contractor shall promptly haul all removed materials indicated for disposal, off and away from the Site. No storage of any materials on Site will be allowed without written approval of the Contract Administrator.

It shall be the Contractor's responsibility to find suitable disposal areas away from the Site.

The Contractor shall take all necessary precautions to ensure that materials do not fall onto any roadways or into Sturgeon Creek during removal operations.

The Contractor shall take all necessary precautions to ensure that existing telephone and cable T.V. cables inside the existing conduits on the bridge and beyond are not damaged in any way and shall pay for any repairs required.

The Contractor shall visit the Site to become familiar with the existing conditions and scope of Work prior to bid submission. No allowance for extras will be made for any structural removals, not foreseen by the Contractor, required to complete the scope of Work.

The Contractor shall be responsible for any damage to items marked for salvaging.

#### E6.3.8 Structural Removal Methods

##### E6.3.8.1 General

Structural removals shall be deemed to include all the items of Work as listed under Clause E6.3.1, "Scope of Work", of this Specification and to the limits as shown on the Contract Drawings or otherwise directed by the Contract Administrator.

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

##### E6.3.8.2 Access/Work Platforms

The Contractor shall provide all necessary access/Work platforms to facilitate structural removals, temporary support of the existing telephone and cable T.V. cables in the existing conduit on the bridge until encast in the new deck concrete, and subsequent inspection of all the Works by the Contract Administrator.

##### E6.3.8.3 Details of Existing Structures

The details and dimensions of the existing structures shown on the Drawings are for assisting the Contractor in establishing methods and limits of removal and for determining the cost of the Work. All available Drawings of the existing bridge structure and modifications are available for viewing with the Contract Administrator. No guarantee for the accuracy of the information is given. No allowance for extras will be given for information on the Drawings that does not represent existing conditions.

##### E6.3.8.4 Protection of Roadways and Walkways

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

##### E6.3.8.5 Concrete Removals

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

For partial removal of concrete, edges shall be sawcut to clean and straight lines.

#### E6.3.8.6 Salvage Items

The Contractor is responsible for removing all salvage items and stockpiling at a location within the City of Winnipeg indicated by the Contract Administrator. The Contractor shall only use methods of removal that will not damage the salvage items.

#### E6.4 Method of Measurement

##### E6.4.1 Structural Removals

Structural Removals, 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.

#### E6.5 Basis of Payment

##### E6.5.1 Structural Removals

Structural Removals, will be paid for at the Contract Lump Sum Price for the "Structural Removals" listed herebelow, measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work included in this Specification.

All structural removal materials not marked for salvage reverts to the Contractor for disposal.

### **E7. STRUCTURAL EXCAVATION**

#### E7.1 Description

This Specification shall cover all operations related to clearing, grubbing, and structural excavation for substructure, abutment Works, approach slab, and approach sidewalk slabs, as herein specified and as indicated on the Drawings.

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

#### E7.2 Materials

##### E7.2.1 General

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

##### E7.2.2 Testing

All excavated materials shall be subject to inspection and testing by the Contract Administrator or by the Testing Laboratory designated by the Contract Administrator. There shall be no charge to The City for any materials taken by the Contract Administrator for testing purposes.

##### E7.2.3 Excavation

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

### E7.3 Equipment

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

### E7.4 Construction Methods

#### E7.4.1 Scope of Work

The Work shall comprise:

- (a) The design, fabrication, erection, and removal of all temporary shoring, temporary slope retention walls, sheet piling, and such temporary protective measures as may be required to construct the Works.
- (b) The excavation of all material required to construct the Works, including clearing and grubbing.
- (c) The off-Site disposal of surplus and unsuitable material.
- (d) Dewatering of all excavations, as required, for the abutment Works, approach slab, and approach sidewalk slabs.

#### E7.4.2 Excavation

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

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

Excavations shall be completed to the elevations required to construct the Works or to such other elevations as may be directed by the Contract Administrator in the field. Excavation sequence shall be done in a "top down" direction, in order to maintain stability.

All material shall be brought to the surface by approved method, and shall be disposed of away from the Site and not into the existing river channel.

Shored excavations shall be dewatered and maintained dewatered so that the material is excavated in its natural state. The bottom of the excavation shall be kept free from excessive moisture or free-flowing water.

#### E7.4.3 Inspection

After each excavation is completed, the Contractor shall notify the Contract Administrator.

#### E7.4.4 Alterations to Site

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

#### E7.4.5 Protection of Existing Riverbanks, Channel, and Embankment Slopes

The Contractor shall not disturb the riverbanks, channel, and embankment slopes outside the excavation limits and shall not dump excavated material into the channel or onto the riverbank.

#### E7.4.6 Excess Material

All excavated material shall become the property of the Contractor and shall be removed from the Site. Excavated material shall not be disposed of in a manner that will obstruct the flow of watercourses. During freezing weather, the excess material shall be disposed of before it freezes.

#### E7.5 Method of Measurement and Payment

##### E7.5.1 Excavation

Excavation for bridge Work will be considered incidental to all portions of the Work requiring excavation. No separate measurement or payment will be made for Work within this section.

All costs for excavation covered in this item shall be included within, but not limited to, the unit prices:

- (a) Abutment Modifications
- (b) Approach Slab, Median Curbs, and Barriers

### **E8. STRUCTURAL BACKFILL**

#### E8.1 Description

This Specification shall cover backfill for abutments, approach slabs and approach sidewalk slabs as specified herein.

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

#### E8.2 Materials

##### E8.2.1 General

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

##### E8.2.2 Handling and Storage of Materials

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

Under no circumstances will stockpiling of backfill materials be allowed on the riverbank.

##### E8.2.3 Testing

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

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

#### E8.2.4 Granular Backfill

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

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

#### E8.2.5 Clay Backfill

Clay backfill for structures shall be of a type accepted by the Contract Administrator.

#### E8.3 Equipment

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

#### E8.4 Construction Methods

##### E8.4.1 Scope of Work

The Work shall comprise of the supply, placement, and compaction of backfill material for abutments, approach slab, and approach sidewalk slabs, as shown on the Drawings.

##### E8.4.2 Backfill Operations

###### 8.4.2.1 General

The Contract Administrator shall be notified at least one (1) working day in advance of any backfilling operations. No backfill shall be placed against any concrete until accepted by the Contract Administrator and in no case before test cylinders show the concrete strength to be at least 20 MPa. All dampproofing and drain installations must also be completed prior to backfilling.

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.

###### 8.4.2.2 Placing of Backfill

All backfill material shall be supplied, placed, and compacted in lifts of 150 mm (maximum) to a minimum of 100% of Standard Proctor Dry Density. Lifts shall be brought up on all sides at the same time.

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

#### E8.5 Quality Control

##### E8.5.1 Inspection

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

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

#### E8.5.2 Access

The Contract Administrator shall be afforded full access for the inspection and control testing of constituent materials both at the Site of the Work and at any plant used for production of the materials to determine whether the material is being supplied and placed in accordance with this Specification.

#### E8.5.3 Materials

All material supplied and placed under this Specification shall be subject to testing and acceptance by the Contract Administrator in accordance with Clauses E:8.2 of this Specification.

#### E8.5.4 Quality of Backfill Material

The Standard Proctor Density for granular and clay 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 a percentage of the applicable Proctor Density, as specified in Clause E:8.4.2.2 of this Specification.

Quality control tests will be used to determine the acceptability of each backfill layer, as placed and compacted by the Contractor before any succeeding layer may be applied.

The field density of the compacted layers shall be verified by Field Density Tests in accordance with ASTM Standard D155560-64, Test for Density of Soil in Place by the Sand-Cone Method, or equivalent as accepted by the Contract Administrator in accordance with B6.

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

Holes made by removal of samples from the layers 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.

#### E8.5.5 Corrective Action

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

#### E8.6 Method of Measurement and Payment

##### E8.6.1 Structural Backfill

The Supply, Placement, and Compaction of Structural Backfill for bridge Work will be considered incidental to all portions of the Work requiring structural backfill. No separate measurement or payment will be made for Work within this section.

All costs for structural backfill covered in this section shall be included within, but not limited to, the following items, and found in the unit prices:

- (a) Abutment Modifications
- (b) Approach Slab, Median Curb, and Barrier
- (c) Approach Sidewalk Slab

## **E9. PRECAST CONCRETE PILES**

### **E9.1 Description**

This Specification shall cover the supply and driving of precast, prestressed hexagonal concrete piles.

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 herein specified and as indicated on the Drawings.

### **E9.2 Materials**

#### **E9.2.1 General**

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

#### **E9.2.2 Handling and Storage of Materials**

The method of handling and storing precast concrete piles shall be such so as to prevent any damage to the pile and to ensure that the design strength will not be affected by deterioration or deformation. The Contractor, in handling or lifting the piles, shall follow the guidelines from the fabricator and, in any case, will not be permitted to drag them along the ground.

Any piles excessively damaged or broken through negligence or improper handling operations shall be immediately removed from the Site and replaced with sound piles by the Contractor, at his own expense.

#### **E9.2.3 Precast Hexagonal Concrete Piles**

The precast concrete piles shall be precast hexagonal concrete piles, conforming to the requirements of CSA Standard CAN3-A23.4-M94 and as detailed on the Drawings.

Pile alignment shall not vary by more than two (2) mm per metre of length, with a maximum variation of twenty-five (25) mm from end-to-end of pile. Pile cross sections shall in no case vary suddenly by more than five (5) mm or gradually by more than ten (10) mm.

The concrete for the precast concrete piles shall conform to the requirements of CSA Standard CAN3-A23.4-M94. The cement shall be Type HS, Sulphate-Resisting Portland Cement, and the maximum size aggregate shall be twenty (20) mm nominal.

The concrete compressive strength of the precast concrete piles shall be 25 MPa minimum at time of stress transfer (distress) and shall be 35 MPa minimum at time of driving.

The prestressing steel for the precast concrete piles shall be 13 mm diameter, seven-wire, low-relaxation strand, conforming to the requirements of CSA Standard G279-M1982, Grade 1860. Minimum ultimate strength of strand shall be 184 kN.

The reinforcing steel for the precast concrete piles shall be deformed steel bars, conforming to the requirements of CSA Standard G30.18-M92, Grade 400. The minimum cover on reinforcing and/or prestressing steel shall be 50 mm.

Piles shall be so proportioned, pretensioned, cast, and cured to be able to resist all loads from handling and driving, as well as maximum design service loads of 800 kN for 406 mm hexagonal piles.

Each pile shall be stamped or marked with the date of manufacture. Lifting loops shall be cast into each pile.

The Contractor shall be responsible for supplying piling of sufficient length to obtain the penetration and bearing value required. For the purpose of determining the lengths of the piles required, the Contractor, at his expense, may drive test piles, make borings, or make such other investigations as may be necessary.

Test piles: test piles supplied and driven by the Contractor for his use in determining the lengths of piles to be supplied may be so located that they may be cut off and become a part of the completed structure, provided that such test piles conform to the requirements for piling as specified in these Specifications.

Test piles that are to become a part of the completed structure shall be driven with the same type of equipment that is to be used for driving foundation piles.

Test piles that are not to be incorporated in the completed structures shall be removed to at least 1m below the surface of the ground, and the remaining hole shall be backfilled with earth or other suitable material.

The heads of concrete 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 material next to the pile head and the top of the cap shall have a timber shock block.

### E9.3 Equipment

Pile driving equipment to be used by the Contractor shall be of such a capacity that the required bearing and penetration shall be obtained without damage being done to the pile.

The equipment shall be capable of driving the piles to practical refusal with a driving energy of at least 40,000 Joules.

Pile driver leads shall be used to support the piles while they are being driven. Leads shall be of sufficient length to be supported firmly on the ground. The use of hanging or swinging leads will not be allowed unless they can be held in a fixed position during the driving operations. Batter piles shall be driven with inclined leads.

The Contractor shall furnish the Contract Administrator with the manufacturer's specifications and catalogue for all mechanical hammers used, showing the data necessary for computing the bearing value of the pile driven. Gravity or drop hammer shall not be used for driving the piles.

### E9.4 Construction Methods

#### E9.4.1 Location and Alignment of Piles

The piles shall be located at the positions shown on the Drawings or as directed by the Contract Administrator. Piles shall be driven vertically unless shown otherwise on the Drawings. Batter piles shall be driven to the batter specified and shall not be jacked or pulled into their final positions.

#### E9.4.2 Preboring

The Contractor shall drive the piles in partial depth augered holes. The diameter of the hole shall be 50 mm larger than the diameter of the pile. The depth of prebore shall be to 3.0 metres.

Preboring will be considered incidental to driving operations.

No prebored holes shall be left open for more than five (5) hours at any time. The Contractor is advised that no more than five adjacent open prebored holes be permitted to exist at any one time.

#### E9.4.3 Driving of Piles

The piles shall be driven to the positions shown on the Drawings and as hereinafter specified. Piles shall not deviate more than 2 percent for battered piles, nor more than 2 percent out-of-plumb for vertical piles. Piles shall not be more than 75 mm off centre, measured at time of cut off.

The method of driving shall be such as not to impair the strength of the pile and shall meet the approval of the Contract Administrator. All piles shall be driven to refusal as end bearing piles. The Contractor will be required to remove any surface and/or shallow depth obstruction(s) to obtain the required penetration of the pile.

Piles covering a large area or in groups, shall be driven working out from the centre of the area or group to ensure that the piles at the boundaries are in their correct final positions.

The piles are to be driven to refusal in the glacial till. They are to be driven until they have a minimum of 3 sets of readings of greater than 12 blows per 25 mm of penetration using a driving energy of 40,000 Joules.

If, during the piling operations, upheaval of pile occurs, the Contractor will be required to redrive the lifted piles down to their original elevations. The Contractor will also be required to excavate material that has boiled up during pile driving operations. The elevation of all piles previously driven or redriven shall be observed to detect uplift. If uplift of 5 mm or more occurs in any pile, that pile shall be redriven to its original elevation and thereafter to the required final driving resistance.

Driving of all piles shall be continuous without intermission until the pile has been driven to final elevation. The tops of the piles shall be maintained at or above a point located 600 mm above cut-off elevation.

Where boulders or other obstructions make it difficult to drive certain piles in the location shown and to the proper bearing strata or depth, the Contractor shall resort to all usual methods to install piles as required, including spudding, jetting, or other feasible means.

If, in the judgement of the Contract Administrator, the Contractor is unable to complete properly any pile or piles driven to replace the original pile in the Contract, they shall be abandoned. Piles abandoned, because of obstructions encountered before reaching the accepted bearing strata, shall be cut off at the cut-off elevation and paid for as outlined hereinafter.

Any piles that are excessively crushed or bent through negligence or carelessness of the Contractor shall be removed or otherwise replaced as directed by the Contract Administrator, at the expense of this Contractor, unless, in the opinion of the Contract Administrator, the damage is so slight that the pile can be repaired properly, which repairs shall be done by this Contractor at his own expense.

#### E9.4.4 Cut Off Piles

After piles have been driven to the required penetration (and, if required, redriven), the Contractor shall mark the required cut-off elevation on each pile. The top of all piles shall be neatly cut-off (true and level) at the cut-off elevation to expose a minimum of 500 mm of pile reinforcement, ready for bending into the cast-in-place concrete as dowels.

#### E9.4.5 Pile Extensions

Extensions or build-ups on the concrete piles shall be avoided but when necessary, and as directed by the Contract Administrator, they shall be made to the satisfaction of the Contract Administrator.

- (a) The strength, method of placing, and the curing of concrete shall be as specified by the Contract Administrator.

- (b) After the required penetration has been attained, the concrete at the head of the pile shall be cut away so as to expose the minimum 600 mm length of the high-tensile steel strand in the pile.
- (c) The concrete shall be entirely removed for this depth, the final cut of the concrete being perpendicular to axis of the pile.
- (d) The ends of the strand shall be unravelled and additional reinforcing in the extension shall be provided as specified by the Contract Administrator.

#### E9.4.6 Pile splicing

Splicing of piles will not be allowed.

#### E9.4.7 Environmental Protection Requirements

Precast concrete pile works shall satisfy the requirements of D25 Environmental Protection Plan.

### E9.5 Quality Control

#### E9.5.1 Inspection

All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator, including all operations, from the selection and production of materials, through to final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given.

#### E9.5.2 Access

The Contract Administrator shall be afforded full-access for the inspection and control testing of the precast piles, both at the Site of work and at any plant used for the fabrication of the precast piles, to determine whether the precast piles are being supplied in accordance with this Specification.

#### E9.5.3 Pile Driving Records

The contract Administrator will keep a record of each and every pile driven. The records shall give the date, time, diameter, length, location, type, total depth of penetration, rate of penetration, number of blows per metre, blows for the last three sets for 25 mm of penetration, steam, air or diesel pressure, and any kind and size of hammer used in driving; any unusual phenomena shall be noted and recorded, especially if they indicate possible damage to the pile.

Energy output of driving equipment at the time of final set shall be carefully recorded, along with the final penetration readings, and reported immediately to the Contract Administrator. The required set per blow will be subject to approval by the Contract Administrator, showing regard to the specific driving equipment and piles permitted.

### E9.6 Method of Measurement

Precast concrete piles shall be measured on a length basis. The length to be paid for shall be the total number of linear metres acceptably driven and left in place in accordance with this Specification and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator. All reinforcing will be considered incidental to this work and no measurement or payment will be made for this work.

The measured length of precast concrete pile extensions will be taken from the top of the precast concrete piles to the cut-off elevation.

### E9.7 Basis of Payment

Precast concrete piles shall be paid for at the Contract Price per linear metre for the "Items of Work" measured as specified herein, which price shall be payment in full for supplying all

material and for performing all operations herein described and all other items incidental to the work included in this Specification.

Items of Work:

Precast Concrete Piles

- (a) Precast Concrete Piles
- (b) Precast Concrete Pile Extensions

## **E10. SUPPLYING AND PLACING REINFORCING STEEL**

### **E10.1 Description**

This Specification shall cover the supply, fabrication, and placement of MMFX 2 Grade 520 reinforcing steel.

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

### **E10.2 Materials**

#### **E10.2.1 General**

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

#### **E10.2.2 Handling and Storage of Materials**

All materials shall be handled in a careful and workmanshiplike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with the requirements of CSA Standard CAN/CSA-A23.1-00, Storage of Materials, except as otherwise specified herein.

#### **E10.2.3 Reinforcing Steel**

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

All reinforcing steel shall be MMFX microcomposite (MMFX 2) rebar meeting the requirements of ASTM A615 Grade 75 and ASTM A1035-04. If, in the opinion of the Contract Administrator, any reinforcing steel provided for the concrete Works exhibit flaws in manufacture or fabrication, such material shall be immediately removed from the Site and replaced with acceptable reinforcing steel.

All reinforcing steel shall be straight and free from paint, oil, millscale, and injurious defects. Rust, surface seams, or surface irregularities will not be cause for rejection, provided that the minimum dimensions, cross-sectional area, and tensile properties of a hand wire-brushed specimen are meeting the requirements of ASTM A615 Grade 75 and ASTM A1035-04.

#### **E10.2.4 Bar Accessories**

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

Bar chairs, bolsters, and bar supports shall be cementitious material. No plastic, PVC, or galvanized bar chairs will be used.

Approved products are as supplied by Con Sys Inc., Box 341, Pinawa, Manitoba, Canada R0E 1L0 (204) 753-2404, or equal as accepted by the Contract Administrator in accordance with B6.

Bar accessories are not included in the Drawings and shall include bar chairs, spacers, clips, wire ties, wire (16 gauge minimum), or other similar devices and are to be acceptable to the Contract Administrator. Wire for tying bars shall be annealed wire. The supplying and installation of bar accessories shall be deemed to be incidental to the supplying and placing of reinforcing steel.

### E10.3 Construction Methods

#### E10.3.1 Fabrication of Reinforcing Steel

##### E10.3.1.1 General

Reinforcing steel shall be fabricated in accordance with CSA Standard CAN/CSA G30.18-M92 to the lengths and shapes as shown on the Drawings.

##### E10.3.1.2 Submissions

At least twenty-one (21) days prior to the scheduled commencement of any fabrication, the qualifications of the contractor, the qualifications of operators, the shop drawings including bar lists, and the mill certificates shall be submitted to the Contract Administrator for his review.

The shop drawings shall consist of three (3) sets of prints and one (1) reproducible sepia set.

#### E10.3.2 Placing of Reinforcing Steel

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

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

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

Place reinforcing bars to provide a clear space between the reinforcing bars as shown on the Drawings to accurately place preformed holes where necessary.

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

### E10.4 Quality Control

#### E10.4.1 Inspection

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

specified Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or 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.

#### E10.4.2 Access

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

#### E10.4.3 Quality Testing

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

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.

#### E10.5 Method of Measurement

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 supplied and placed in accordance with this Specification, as accepted by the Contract Administrator, as computed from the reviewed shop drawings, excluding the mass of bar accessories.

#### E10.6 Basis of Payment

Supplying and Placing Reinforcing Steel shall be paid for at the Contract Unit Price per kilogram for "Supplying and Placing Reinforcing Steel", 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.

### **E11. STRUCTURAL CONCRETE**

#### E11.1 Description

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.

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 Materials

##### E11.2.1 General

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

##### E11.2.2 Handling and Storage of Materials

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

### E11.2.3 Testing

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

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

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

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

### E11.2.4 Aggregates

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.

#### (a) Fine Aggregate

Fine aggregate shall consist of sand having clean, hard, strong, durable, uncoated grains free from injurious amounts of dust, soft or flaking particles, shale, alkali, organic matter, loam, or other deleterious substances.

The fine aggregate shall be well-graded throughout and shall conform to the grading requirements in Table E11.1.

<b>TABLE E11.1 GRADING REQUIREMENTS FOR FINE AGGREGATE</b>	
<b>Canadian Metric Sieve Size (Mm X 10<sup>-3</sup>)</b>	<b>Total Passing Sieve Percentage By Weight</b>
10 000	100%
5 000	95% - 100%
2 500	80% - 100%
1 250	50% - 90%
630	25% - 65%
315	10% - 35%
160	2% - 10%

The fineness modulus of fine aggregate shall not be less than 2.2 nor more than 3.1 unless otherwise approved by the Contract Administrator.

#### (b) Coarse Aggregate-Standard

Standard coarse aggregate shall be used for all concrete for the bridge and approach slabs except for the deck overlay concrete.

Standard coarse aggregate shall consist of natural gravel, crushed stone, or other accepted materials of similar characteristics, having clean, hard, strong, durable, uncoated particles, free from injurious amounts of soft, friable, thin, elongated or laminated pieces, alkali, organic, or other deleterious matter. Coarse aggregate shall be well graded throughout and shall conform to the grading requirements shown in Table E11.2.

<b>TABLE E11.2 GRADING REQUIREMENTS FOR COARSE AGGREGATE - STANDARD</b>									
<b>Nominal Size of Aggregate (mm)</b>	<b>Percent of Total Dry Weight Passing Each Sieve (mm)</b>								
	<b>56</b>	<b>40</b>	<b>28</b>	<b>20</b>	<b>14</b>	<b>10</b>	<b>5</b>	<b>2.5</b>	<b>1.25</b>
40 - 5	100	95-100		35-70	-	10-30	0-5	-	-
20 - 5	-	-	100	85-100	60-90	25-60	0-10	0-5	-
14 - 5	-	-	-	100	90-100	45-75	0-15	0-5	-
10 - 2.5	-	-	-	-	100	85-100	10-30	0-10	0-5

(c) Coarse Aggregate - Granite

Crushed granite aggregate shall be used for the deck overlay concrete.

Coarse aggregate shall be 100 percent crushed, washed granite, low in quartz, clean and free from alkali, organic, or other deleterious matter, shall have two fractured faces, and shall have an absorption not exceeding 3 percent.

The coarse aggregate granite shall be well graded and shall conform to the grading requirements in Table E11.3.

<b>TABLE E11.3 GRADING REQUIREMENTS FOR COARSE AGGREGATE - GRANITE</b>							
<b>Nominal Size of Aggregate (mm)</b>	<b>Percent of Total Dry Weight Passing Each Sieve (mm)</b>						
	<b>28</b>	<b>20</b>	<b>14</b>	<b>10</b>	<b>5</b>	<b>2.5</b>	<b>0.80</b>
20- 5	100	100	-	25-60	0-10	0-5	0-1.5

E11.2.5 Cement

All cement unless hereinafter specifically stated, shall be Type GU Normal Portland Cement, conforming to requirements of CSA Standard CAN/CSA-A3001.

The Contractor shall obtain and furnish to the Contract Administrator a statement signed by an officer or chemist of the cement manufacturer, certifying that the cement furnished does not exceed 0.6 percent alkali equivalent, as measured by the percent of sodium oxide plus 0.658 times the percent of potassium oxide.

Tests for determining alkali content shall be carried out in accordance with ASTM Standard C114-00, Standard Method of Chemical Analysis of Hydraulic Cement.

Cement for use in the deck overlay concrete shall be Type GUSF silica fume cement, consisting of 8% silica fume interground or blended with normal Portland Cement, conforming to the requirements of CSA Standard CAN/CSA-A362-98 and CAN/CSA-A23.1-94. The silica fume

Portland type GUSF cement shall have a specific surface not exceeding 650 m<sup>2</sup>/kg, measured in accordance with ASTM Standard C204-00.

#### E11.2.6 Fly Ash

Use of Class C1 fly ash will be permitted for use in Structural Concrete supplied under this Specification, to a maximum of 25% of cement content. The use of fly ash to reduce cement content is not permitted.

#### E11.2.7 Water

Water used for mixing concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances, and in accordance with CSA Standard CAN3-A266.2M. It shall be equal to potable water in physical and chemical properties. The Contractor shall not use water from shallow, stagnant, or marshy sources.

#### E11.2.8 Admixtures

No admixtures, other than air-entraining agent, water-reducing agent, and superplasticizer, shall be used without the written authorization of the Contract Administrator, unless otherwise specified in these Specifications. It shall be the Contractor's responsibility that any admixture is compatible with all other constituent materials.

##### (a) Air-Entraining Agent

The air-entraining agent shall conform to the requirements of CSA Standard CAN3-A266.1-M78 and shall produce a satisfactory air-void system and an air content within the ranges specified in C.S.A. Standard CAN/CSA-A23.1-00 for each class of concrete.

##### (b) Water-Reducing Agent

The water-reducing agent shall be Type WN and shall conform to the requirements of CSA Standard CAN3-A266.2-M78. An approved product is Master Builders' Poly 997 or equal as approved by the Contract Administrator in accordance with B6.

##### (c) Superplasticizing Agent

If the Contract Administrator authorizes the use of a superplasticizing agent, the superplasticizing shall conform to the requirements of CSA Standard CAN3-A266.5 and CAN3-A266.6, but must be compatible with the air-entraining agent and be included in the mix design for approval. The agent shall be free of chlorides and shall not affect the air-entraining agent's ability to produce a satisfactory air-void system. The sequence of batching the superplasticizing agent in with the other constituent materials shall also accompany the approved mix design for approval.

##### (d) Other Admixtures

No other admixtures will be authorized for use in Portland Cement Concrete, unless authorized in writing by the Contract Administrator.

#### E11.2.9 Polypropylene Fibres

The polypropylene fibres for the deck concrete only, shall consist of 100% virgin polypropylene as supplied by Grace (Microfibre) or Master Builders (Fibre Mesh MD), or equal as accepted by the Contract Administrator in accordance with B6. The dosage shall be designed by the Contractor to meet the requirements for post-cracking residual strength and fibre dispersion in accordance to the Canadian Highway Bridge Design Code, CAN/CSA-S6-00, Section 16, Fibre-Reinforced Structures, Clause 16.6.

#### E11.2.10 Curing Compound

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

Curing compound for approach slabs and structural sidewalks shall be resin-based and white-pigmented.

#### E11.2.11 Flexible Joint Sealant

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

#### E11.2.12 Latex Bonding Agent

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

#### E11.2.13 Form Coating

Form coating shall be "Sternson C.R.A." by Sternson, "SCP Strip Ease" by Specialty Construction Products, or equal as accepted by the Contract Administrator in accordance with B6.

#### E11.2.14 Fibre Joint Filler

Fibre joint filler shall be rot-proof and of the preformed, nonextruding, resilient type made with a bituminous fibre such as Flexcell and shall conform to the requirements of ASTM Standard D1751-99 or equal as accepted by the Contract Administrator in accordance with B6.

#### E11.2.15 Patching Mortar

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.

#### E11.2.16 Bonding Grout

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

- .1 1 part water
- .2 1 part latex bonding agent
- .3 1½ parts Type GUSF Portland cement

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

For sealing vertical joints between adjacent lanes a modified bonding grout, thinned to paint consistency, shall be used. The modified bonding grout shall consist of 1 part water and 1½ parts Type GUSF Portland cement.

For sealing horizontal joints between the overlay and curbs, a ConSeal CS-231 controlled expansion waterstop sealant, as supplied by specially construction products, or equal as accepted by the Contract Administrator in accordance with B6 will be required.

#### E11.2.17 Formwork

Formwork materials shall conform to CSA Standard CAN/CSA-A23.1-00, and American Concrete Publication SP:4, "Formwork for Concrete."

No "stay-in-place" formwork or falsework is permitted.

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.

All other form sheeting shall be Douglas Fir, overlay formline type conforming to CSA Standard O121-M1978. Approved manufacturers are "Evans" and "C-Z".

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

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

Forms for exposed surfaces that do not require a formliner may be either new plywood or steel as authorized by the Contract Administrator.

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.

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.

Stay-in-place forms are not acceptable and will not be accepted unless shown on the Drawings.

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.

#### E11.2.18 Form Liner

Form Liner shall be Dupont-Zemdrain, Type II CPF Liner, or equal as accepted by the Contract Administrator in accordance with B6. This Form Liner shall be used on all exposed substructure and superstructure formed surfaces, except soffit surfaces, or where a normal form finish is specified.

Paper-lined forms shall be used on all soffit surfaces.

#### E11.2.19 Galvanized Dowels

Dowels shall be fabricated in accordance with CSA Standard CAN/CSA-G30.18-M92.

The dowels shall be galvanized in accordance with CSA Standard G164-M92, to a retention of 600 g/m<sup>2</sup>.

#### E11.2.20 Curing Blankets

Curing blankets for wet curing shall be 100 percent polyester, 3 mm thick, curing blankets, white in colour. An approved product is "Mirafi Geotextile P150" or equal as accepted by the Contract Administrator in accordance with B6.

#### E11.2.21 Benchmark

Benchmark plugs as supplied by the City.

#### E11.2.22 Grout

Where grout is used, it shall be Sternson M-bed Standard, Specialty Construction Products CPD Non-Shrink Grout, Sika 212 Non-Shrink Grout, or equal as accepted by the Contract Administrator in accordance with B6. The minimum compressive strength of the grout at 28 days shall be 40 MPa.

#### E11.2.23 Dampproofing

Dampproofing materials shall be applied to all buried surfaces in contact with the soil to within 300 mm of Finish Ground Elevation, with the exception of those surfaces cast directly against the soil or in contact with prefabricated drainage composite. Dampproofing materials shall be mineral colloid emulsified asphalt complying with Canadian General Standards Board Specification No. 37.16-M89. Acceptable product is Bakelite/Flintguard 710-11 Foundation Coating as manufactured by Bakeor, Elsro Fibrated Foundation Coating, Insulmastic 7103 Fibered Waterproofing, or equal as accepted by the Contract Administrator in accordance with B6.

Dampproofing materials shall be applied to the sides of the abutment which became buried by landscape Works.

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

Primer: Asphalt primer, penetrating type conforming to CGSB 37-GP-9Ma. Acceptable product is Bakor Penetrating 910-01 Asphalt Primer as manufactured by Bakor Inc., Elsro Asphalt Primer No. 510, Insulmastic 7501 C/B Roof & Foundation Primer, or equal as accepted by the Contract Administrator in accordance with B6.

#### E11.2.24 Backup Rod

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

#### E11.2.25 Low Density Styrofoam

Low density styrofoam shall be the type specified on the Drawings or as accepted by the Contract Administrator in accordance with B6.

#### E11.2.26 Precompressed Expanding Filler

Precompressed expanding filler shall conform to ASTM D2628-91. An acceptable product is Delastic E-2500, by The D.S. Brown Company, or equal as accepted by the Contract Administrator in accordance with B6.

#### E11.2.27 Miscellaneous Materials

Miscellaneous materials shall be of the type specified on the Drawings or as accepted by the Contract Administrator in accordance with B6.

### E11.3 Concrete Design Requirements

#### E11.3.1 Mix Design Statement

For each type of concrete used, the Contractor shall provide the Contract Administrator with a Mix Design Statement, certifying the constituent materials and mix proportions that will be used in the Portland Cement Concrete. The Contractor shall include, in the certification, the following information:

- (a) List the product name and source of all proposed constituent materials of the concrete including cement, coarse aggregate, fine aggregate, water, water-reducing agent, and air entraining admixture. A statement is required indicating that the constituent materials proposed for each mix design are compatible with each other, thereby providing concrete with good long-term durability capabilities.
- (b) Supply recent records of each mix design for concrete quality control tests including slump, total air content, and 7 and 28 day compressive strengths. The Contractor shall supply reasonable evidence that the mix designs submitted will produce concrete with the specified strength, workability, and yield.

When previously satisfactory strength data on the proposed mix is not available, the Contract Administrator may require the preparation of field trial batches in order that the concrete be tested prior to construction. Such field trial batches shall be carried out in similar conditions and using similar equipment, batching, and mixing procedures as will be used in the actual construction. The number of trial batches required shall be determined by the Contract Administrator and shall depend on the class of concrete materials.

- (c) Supply recent test information on sieve analysis of fine and coarse aggregates in accordance with Standard Test Method A23-2A. Results should be within acceptable limits specified herein.
- (d) Supply recent test information on tests for organic impurities in fine aggregates for concrete, in accordance with CSA Standard Test Method A23.2-7A.
- (e) Supply recent test information on relative density and absorption of coarse aggregate, in accordance with CSA Standard Test Methods A23.2-12A.
- (f) Supply recent test information on petrographic examination of aggregates for concrete, in accordance with CSA Standard Test Methods A23.2-15A. The purpose of the petrographic analysis is to ensure the aggregates provided are of the highest quality for use in the production of concrete and will produce a durable overlay. An acceptable aggregate will have an excellent rating as judged by an experienced petrographer, with a (weighted) petrographic number typically in the range of 100 to 120.
- (g) Supply recent test information on resistance to degradation of large-size coarse aggregate by abrasion and impact in the Los Angeles Machine, in accordance with Standard Test Method A23.2-16A.
- (h) Supply recent test information on potential alkali reactivity of cement aggregate combinations (mortar bar method), in accordance with CSA Standard Test Method A23.2-20A.
- (i) Supply recent information on tests performed on the interground or blended silica fume Portland cement to be used, including the specific surface.
- (j) The Contractor shall submit test data showing that the Contractor's proportioning and mixing equipment, procedures, and concrete mix constituent materials are capable of producing a satisfactory air-void system in the hardened concrete. Prior to Site mobilization, the Contractor shall prepare and cast representative test specimens of each type of concrete using the same proportioning and mixing

equipment and procedures, and the same concrete admixtures as will be employed for the supply and placement of each type of structural concrete.

As a minimum, the air-void system testing program to be carried out by the Contractor prior to Site mobilization must include the following:

- i) Date test specimen cast.
- ii) Air temperature during casting.
- iii) Concrete temperature during placement.
- iv) Air content of the plastic concrete as determined in accordance with CSA Standard Test Method A23.2-4C, "Air Content of Plastic Concrete by the Pressure Method".
- v) Slump of the plastic concrete as determined in accordance with CSA Standard Test Method A23.2-5C, "Slump of Concrete".
- vi) Total air-void content, specific surface, spacing factor, and air-paste ratio of the air-void system in the hardened concrete, as determined in accordance with CSA Standard Test Method A23.2-17C, "Microscopical Determination of Air-Void Content and Parameters of the Air-Void System in Hardened Concrete".
- vii) Density of the hardened concrete.
- viii) Brand and dosage rate of air-entraining and water-reducing admixtures and any other admixtures used in the test specimens.

The test specimen 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.

All testing shall be carried out by a CSA certified concrete testing laboratory.

- k) Determine the water soluble chloride ion content of the hardened concrete in accordance with CSA Standard Test Method A23.2-4B prior to the start of construction.
- (l) Supply any other information deemed applicable by the Contract Administrator.

The cost for batching, casting, and testing trial batch specimens shall be incidental to the Supply and Placement of Structural Concrete. No measurement or separate payment will be made for this Work.

The Mix Design Statement shall be submitted to the Contract Administrator at least twenty-one (21) days prior to the delivery of any concrete to the job Site. Once accepted by the Contract Administrator, all concrete shall be supplied in accordance with this Statement, which shall be called the Job Mix Formula.

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

#### E11.3.2 Concrete Strength and Workability

- (a) Type 1 - Structural Concrete (all concrete except as specified as Type 2)

Proportioning of fine aggregate, coarse aggregate, cement, water, and air-entraining agent shall be such as to yield concrete having the required strength and workability, as follows:

35 MPa Concrete:

- i) Minimum Compressive Strength @ 28 days = 35 Mpa
- ii) Maximum Water/Cement Ratio = 0.40
- iii) Minimum Cement Content = 365 kg/m<sup>3</sup>
- iv) Slump = 75 mm ± 25 mm
- v) Coarse Aggregate Maximum Size = 20 mm Nominal
- vi) Air Content for both Fresh Concrete and Hardened Concrete = 20 mm Aggregate = 5.0% to 8.0%
- vii) Cement = Type GU

The minimum compressive strength of the in-place concrete shall be 20 MPa before it may be subjected to freezing temperatures.

The minimum compressive strength of approach slabs, and approach roadway slabs before opening them to traffic shall be 25 MPa.

(b) Type 2 – High Performance Structural Concrete (for deck overlay)

The constituent materials shall be proportioned and combined in accordance with the approved Job Mix Formula, such as to yield a fibre-reinforced silica fume concrete, meeting the following design and performance requirements:

- i) 50 MPa minimum compressive strength at 56 days
- ii) 20 mm maximum granite coarse aggregate size
- iii) minimum cementitious content (including silica fume) shall be 380 kg/m<sup>3</sup>
- iv) post-cracking residual strength index 0.3
- v) 6.5 ±1% plastic entrained air content
- vi) 0.38 maximum water/cementitious ratio (including silica batch fume)
- vii) mix must be workable with a 70 mm +/- 20 mm slump at discharge
- viii) temperature of concrete mix at discharge shall not exceed 18°C
- ix) slump retention after 45 minutes shall be a minimum of 75% of initial batching slump
- x) minimum specific surface, measured in accordance with Ontario Provincial Standard Specification 1350, shall be 25 mm<sup>-1</sup> in hardened concrete
- xi) Permeability: Maximum of 1000 coulombs as a charge passed in a 6-hour test, in accordance with ASTM C1202, on a sample cured for 28 days

The Contractor is also required to achieve a Performance Index, which is based upon the hardened air content and air voids spacing factor, of not less than 80. Hardened air content and air-void spacing factor shall be determined through core samples tested in accordance with ASTM C457, "Microscopical Determination of Air-Void Content and Parameters of the Air-Void System in Hardened Concrete." The number and location of tests will be determined by the Contract Administrator in the field.

Notwithstanding CSA Standard A23.1, cores taken from deck overlay concrete must achieve design strength as a minimum.

A failure of the approved Job Mix Formula to produce concrete meeting the above-specified requirements will be grounds for the Contract Administrator to immediately reject the Job Mix Formula, and will necessitate the Contractor to provide the Contract Administrator with an updated Mix Design Statement in accordance with Clause E11.3.1. No further concrete placement will be undertaken until a replacement Job Mix Formula is accepted by the Contract Administrator.

#### E11.4.1 General

All structural concrete supplied under this Specification shall be produced using a certified ready-mix concrete plant.

#### E11.4.2 Ready-Mix Concrete Supply

Unless otherwise specified in these Specifications of the Contract, only the use of a certified ready-mixed concrete plant will be permitted in accordance with Standard Specification CW 3310-R9. Concrete shall be proportioned, mixed, and delivered in accordance with the requirements of CSA Standard CAN/CSA-A23.1-00, "Production of Concrete", except that the transporting of ready-mixed concrete in nonagitating equipment is not permitted without the written permission of the Contract Administrator.

Unless otherwise directed by the Contract Administrator, the discharge of ready-mixed concrete shall be completed within 1.5 hours after the introduction of the mixing water to the cement and aggregates.

The Contractor shall maintain all equipment used for handling and transporting the concrete in a clean condition and proper working order.

#### E11.4.3 Deck Overlay Concrete

Deck overlay concrete shall be batched by a certified ready-mix concrete plant.

#### E11.5 Equipment

##### E11.5.1 General

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.

The Contractor shall have sufficient standby equipment available on short notice at all times.

##### E11.5.2 Placing and Finishing Equipment for Deck Overlay Concrete

###### E11.5.2.1 Placing Equipment

Concrete placing methods and equipment shall be such that the concrete is conveyed and deposited at the specified slump, without segregation, and without changing or affecting the other specified qualities of the concrete. Concrete placing methods and equipment shall also meet minimum production levels as specified herein.

Adjacent exposed deck shall be adequately protected during concrete placement.

Equipment for conveying concrete, such as buckets, buggies, belt conveyors, etc., shall be of such design, size and condition to ensure a continuous and adequate supply of concrete of the specified mix and slump, without segregation at the point of deposition, or other detrimental impact on the quality of concrete or finishing product.

Pumping of the fibre-reinforced silica fume concrete will not be permitted unless adequate evidence is provided that the proposed equipment has been successfully used with the design mix previously.

###### E11.5.2.2 Mechanical Screed

The mechanical screed shall be:

- (a) constructed to span the full width of the deck slab being placed
- (b) supported on screed rails positioned above the surface being screeded
- (c) sufficiently strong (truss type) to retain its shape under all working conditions, especially if any Work scaffolds are supported on the same screed rails
- (d) capable of producing the required flatness tolerance as specified in Clause E11.7.6.
- (e) capable to raise and to allow reworking of surfaces.
- (f) Screed surface touching concrete shall not be made of aluminium (magnesium acceptable) and equipment with a mechanism to properly vibrate the screed.

#### E11.5.2.3 Movable Work Bridge

At least two moveable Work bridges will be required (one for finishing and one for curing operations), independent of the mechanical screed machine.

These movable Work bridges shall travel guided on rails supported clear of the finished deck.

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

#### E11.5.2.4 Vibrators

The Contractor shall have sufficient numbers of 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. The Contractor shall have standby vibrators available at all times during the pour.

#### E11.5.2.5 Miscellaneous Equipment

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.

### E11.5.3 Placing and Finishing Equipment for Approach Slab

#### E11.5.3.1 Mechanical Screed

The mechanical screed shall be:

- i) constructed to span the full width of the approach slabs and roadway approach slabs being placed
- ii) supported on screed rails positioned above the surface being screeded
- iii) sufficiently strong to retain its shape under all working conditions, especially if any Work scaffolds are supported on the same screed rails
- iv) capable of producing the required flatness tolerance as specified in Clause E11.7.6.

#### E11.5.3.2 Movable Work Bridge for Structural Approach Slab

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

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

#### E11.5.4 Vibrators

The Contractor shall have sufficient numbers of 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.

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

#### E11.5.5 Miscellaneous Equipment

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.

#### E11.6 Construction Methods

##### E11.6.1 Scope of Work

It is intended that this Specification cover the construction of the following items, as indicated on the Drawings:

- a) West Abutment
- b) East Abutment
- c) Deck and Sidewalk Slab
- d) Curbs and Barriers
- e) Approach Slabs
- f) Deck Overlay

##### E11.6.2 Formliner

Form liners shall be used on all exposed superstructure and substructure surfaces, except soffit surfaces, or where a normal form finish is specified.

The supply and use of the plain formliner finish shall be considered incidental to the Works of this Specification, and no additional payment will be made.

The form liner may be used for a maximum of two (2) applications if the Contractor can prove a clean finish can be achieved, as accepted by the Contract Administrator prior to the liner's second use.

##### E11.6.3 Formwork and Shoring

- (a) The Contractor shall submit detailed shop drawings of the proposed falsework and formwork for supplying all concrete components within the Work to the Contract Administrator at least twenty-one (21) days prior to the date for the first concrete to be placed. Falsework must be designed to carry all loads associated with support of the telephone and cable TV conduits and cables, placement of concrete, hoarding, construction live loads and any other loads that may occur. Shop drawings shall show design loads, type, and number of equipment to be used for placing the concrete, method of construction, method of removal, type and grade of materials, and any further information that may be required by the Contract Administrator.



- (p) Forms shall be constructed and maintained so that the completed Work is within minus 3 mm or plus 6 mm of the dimensions shown on the Drawings.
- (q) Formwork shall be cambered, where necessary to maintain the specified tolerances, to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads.
- (r) Forms shall be sufficiently tight to prevent leakage of grout or cement paste.
- (s) Form panels shall be constructed so that the contact edges are kept flush and aligned.
- (t) Where required by the Contract Administrator, the Contractor shall cast test panels not using less than two panels of representative samples of the forms he proposes for reuse and shall strip them after 48 hours for the Contract Administrator to judge the type of surface produced.
- (u) Where prefabricated panels are used, care shall be taken to ensure that adjacent panels remain flush. Where metal forms are used, all bolts and rivets shall be counter sunk and well ground to provide a smooth, plane surface.
- (v) All form lumber, studding, etc., becomes the property of the Contractor when the Work is finished, and it shall be removed from the concrete and the Site by the Contractor after the concrete is set, free of extra charge, and the entire Site left in a neat and clean condition.
- (w) It shall be permissible to use the forms over again where possible to a maximum of three uses, provided they are thoroughly cleaned and in good condition after being removed from the former portions of the Work. The Contract Administrator shall be the sole judge of their condition and his decision shall be final regarding the use of them again.
- (x) All hardened concrete against which new concrete is to be placed shall be prepared in the following manner:
  - i) Concrete is to be removed to sound concrete or to the limits as shown on the Drawings, whichever is greater. The resulting surface is to be rough with a minimum amplitude of 6 mm and maximum frequency of 15 mm.
  - ii) All existing surfaces and exposed reinforcing steel are to be sandblasted to reveal a clean substrate and kept clean until concrete placement. Sandblasting shall be followed by a high pressure water wash to remove all residue.
  - iii) Immediately prior to placing new concrete, cement slurry bonding grout shall be applied to the entire surface of the existing concrete.

#### E11.6.4 Setting Deck Forms

The bridge deck has an allowable tolerance in camber; and it may be necessary to vary the depth of the deck slab over the support piles, in order to maintain a correct finished grade on the deck.

The Contractor shall adjust forms, maintain uniform slab thickness, and adjust screed heights to plan elevations or to such other elevation as may be set by the Contract Administrator in the field. The screed chairs shall be tack welded to the screed bases at the time that the screeds are adjusted to the required elevations.

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

#### E11.6.5 Setting Deck Joints

The Contractor shall adjust all deck joints to the required elevations as accepted by the Contract Administrator prior to placement of concrete adjacent thereto.

#### E11.6.6 Structural Concrete Other Than Deck Slab Concrete

#### E11.6.6.1 General

The Contract Administrator must be notified at least 24 hours prior to concrete placing so that an adequate inspection may be made of formwork, shoring, reinforcement, deck joints, mechanical screed setup, and related Works. Placement without required prior notification will not be allowed.

#### E11.6.6.2 Placing Structural Concrete

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

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.

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

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.

Form liners shall be cooled immediately prior to placing concrete by spraying with cold water.

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.

Concrete shall be placed as nearly as possible in its final position. Rakes or mechanical vibrators shall not be used to transport concrete.

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.

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.

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.

Concrete shall not be placed during rain or snow unless adequate protection is provided for formwork and concrete surfaces.

Before any concrete is placed in the approach slabs or bridge deck, the Contractor shall demonstrate to the satisfaction of the Contract Administrator before each pour that all necessary adjustments have been made to provide the required camber, crown, slab thickness, and concrete cover. This demonstration may be carried out by means of an attachment securely fastened to the finisher's strike-off machine and moving the machine and the strike-off

across the deck over the reinforcing steel with a minimum 3 mm clearance between the steel and attachment.

### E11.6.6.3 Finishing of Concrete Surfaces

#### E11.6.6.3.1 Type 1 Finish – Exposed Formed Surfaces

Form liner finish shall be applied to all exposed formed surfaces including all exposed concrete surfaces not included in Type 2, Type 3, and Type 4 finishes.

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 under Clause E11.6.6.7 of this Specification. The surface shall be rubbed with a carborundum brick or other abrasive, to achieve a smooth-rubbed finish.

The smooth-rubbed finish shall be produced on the newly hardened concrete surface no later than twenty-four (24) hours following form removal. Surfaces shall be thoroughly wetted and rubbed until uniform colour and texture are produced. No finishing mortar shall be used other than that produced from the concrete by the rubbing process.

#### E11.6.6.3.2 Type 2 Finish – Unformed Surfaces

All unformed concrete surfaces except the approach slab, and deck overlay shall be finished as outlined hereinafter.

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

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 sidewalks 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 be more than 3 mm deep.

#### E11.6.6.3.3 Type 3 Finish - Approach Slab

The top of the approach slab shall be finished using a mechanical screed acceptable to the Contract Administrator.

Screed guides shall be placed and fastened in position to ensure finishing of the concrete to the required profile. Supporting rails, upon which the finishing machine travels, shall be placed

outside the area to be concreted. Provisions for anchorage of supporting rails shall provide for horizontal and vertical stability; positive anchorage may be required by the Contract Administrator. A hold-down device shot into concrete will not be permitted, unless the concrete is to be subsequently resurfaced.

Plans for anchoring support rails shall be submitted to the Contract Administrator for acceptance. The Contract Administrator's written acceptance must be received by the Contractor prior to the installation of any anchorage devices.

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

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

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

After floating, the approach slab shall be given a coarse, transverse scored texture by drawing a steel broom, as accepted by the Contract Administrator, across the surface.

The Contractor shall ensure that sufficient personnel are provided for the finishing of the slab surfaces. In the event that the depositing, vibrating, and screening operations progress faster than the concrete finishing, the Contractor shall reduce the rate of concrete placement or cease the depositing of concrete until the exposed area of unfinished concrete has been satisfactorily finished. The Contract Administrator's judgement in this matter will be final and binding on the Contractor. All loads of concrete that exceed the 1.5 hour discharge time limit during the day, while the finishing operations catch up, will be rejected.

#### E11.6.6.3.4 Type 4 Finish - Surfaces Below Finished Grade

All surfaces below 300 mm below finished grade except underside of footings shall be patched in accordance with Clause E11.6.6.7 of this Specification.

All surfaces below 300 mm below finish grade shall receive dampproofing in accordance with Clause E11.6.12 of this Specification.

#### E11.6.6.4 General Curing

Refer to Clause E11.6.8 for cold weather curing requirements and Clause E11.6.9 for hot weather curing requirements.

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

Freshly finished concrete shall have either a curing compound applied or covered and kept moist by means of wet polyester blankets immediately following finishing operations and shall be maintained at above 10°C for at least seven (7) consecutive days thereafter. Construction joints shall only be covered and kept saturated by means of wet polyester blankets for the curing period.

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

Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping, running water, vibration, and mechanical shock. Concrete shall be protected from freezing until at least 24 hours after the end of the curing period.

Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3°C in one hour or 20°C in 24 hours.

Formed surfaces shall receive, immediately after stripping and patching, the same curing as finished surfaces, with the exception of the bridge deck soffit surfaces.

#### E11.6.6.5 Curing of Approach Slab

After the finishing is completed, the surface shall be promptly covered with a minimum of a single layer of clean, predampened polyester blanket.

Care shall be exercised to ensure that the polyester blanket is well drained and that it is placed as soon as the surface will support it without deformation. The Contractor shall ensure that water from the polyester blankets does not run into areas where concrete placement and finishing operations are underway. If this occurs, concrete placement shall stop until the problem is corrected satisfactory to the Contract Administrator.

Water used for wetting the blankets for the first 72 hours shall be a minimum temperature of 40°C when applied to the blankets. Potable water only shall be used.

Failure to apply wet polyester blankets within 30 minutes after the concrete has been deposited or before the finished surface comes out from under the blankets, shall be cause for rejecting the Work so affected. Concrete in the rejected area shall be removed and replaced at no additional cost to The City.

As soon as the concrete can be walked on without damaging the surface, the polyester blankets shall be covered with a layer of 4 mil thick white polyethylene film. Black insulated tarps will not be allowed.

For the approach slab, the surfaces are to receive a wet polyester blanket cure for at least 72 hours. Warm water, as specified, shall be applied, as necessary, to keep the polyester blankets wet for that period. If the wet cure is removed before seven days, curing compound is to be applied.

Following 72 hours, regular water temperatures may be used to continue the curing with polyester blankets in place.

#### E11.6.6.6 Form Removal

The Contract Administrator must be notified at least 24 hours prior to form removal and give acceptance prior to beginning Work.

All forms shall remain in place and the concrete shall not be loaded for a minimum of seven (7) days after initial concrete placement, unless otherwise accepted by the Contract Administrator or noted otherwise on the Drawings.

The minimum strength of concrete in place for safe removal of soffit forms for horizontal or inclined members as well as vertical forms for abutments shall be 25 MPa, with the added provision that the member shall be of sufficient strength to safely carry its own weight, together with super-imposed construction loads. Bridge deck soffit forms shall remain in place to support construction live loads during the placement of barriers and deck overlay as indicated on the Drawings.

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

#### E11.6.6.7 Patching of Formed Surfaces

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.

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

Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched and then applying patching mortar. A slurry grout consisting of water and cement, shall be well brushed onto the area to be patched. When the slurry grout begins to lose the water sheen, the patching mortar shall be applied. It shall be struck off slightly higher than the surface and left for one hour before final finishing to permit initial shrinkage of the patching mortar, it shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification. The final colour shall match the surrounding concrete.

All objectionable fins, projections, offsets, streaks, or other surface imperfections shall be removed by means acceptable to the Contract Administrator. Cement washes of any kind shall not be used.

Concrete shall be cast against forms which 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 which will impair the texture of concrete surfaces shall not be used.

#### E11.6.7 Deck Overlay Concrete

##### E11.6.7.1 General

The deck overlay shall be constructed using fibre-reinforced silica fume concrete (Type 2) in accordance with the requirements of this Specification.

##### E11.6.7.2 Sandblasting

The concrete surface over which the overlay concrete is to be applied shall be thoroughly sandblasted to remove all laitance, dirt or other deleterious material. The sandblasting operations shall be done prior to the application of the bonding grout or latex bonding agent and the placement of the overlay concrete.

The time interval between the sandblasting and the placing of the overlay concrete shall be kept to a minimum and utmost care shall be taken to keep the sandblasted surfaces clean during the interval. All residue produced by the sandblasting shall be removed from the top of the bridge as the sand-blasting proceeds.

Immediately before proceeding with each pour, the sandblasted surface shall be inspected for dirt and other deleterious materials that may have been deposited after the completion of sandblasting. All such dirt and deleterious material shall be cleaned off in a manner and by procedures satisfactory to the Contract Administrator.

##### E11.6.7.3 Mixing of Deck Overlay Concrete

The deck slab concrete shall be provided using a certified ready-mix concrete plant.

A water-reducing admixture for improving workability will be required. The admixture must be accepted by the Contract Administrator and shall be used in strict accordance with the manufacturer's instructions.

Unless otherwise specified herein, the slump measured in accordance with AASHTO T119 shall be 70 mm  $\pm$  20 mm.

The slump will be measured after the amount of concrete specified in CSA A23.2 has been discharged, in the case of ready-mix concrete.

#### E11.6.7.4 Dry Run of Mechanical Screed Machine

The Contractor is responsible for properly setting the screed rails to ensure compliance with the specified longitudinal and transverse deck grades, without creating potential ponding areas or "bird baths."

Sufficient screed guide rails to provide the required coverage for the entire pour, as approved by the Contract Administrator, shall be set out and adjusted for height the day prior to the pour. The Contract Administrator will then check the deck grades, as follows:

- a) That the screed rail system upon which the mechanical screed machine will travel has been placed on the barriers and on the median curb. Arrangements for positive anchorage of supporting rails shall provide for horizontal and vertical stability.
- b) That the mechanical screed machine and guide rails have been adjusted so that the height of the screed above the existing concrete at each point meets the Contract Administrator's requirements. To confirm the Contractor's adjustment of the machine and guide rails, the mechanical screed machine shall be "dry run," and screed clearance measurements taken at each support point, by the Contract Administrator. Resetting of the machine and/or guide rails shall be done by the Contractor as required by the Contract Administrator.

#### E11.6.7.5 Placing Deck Overlay Concrete

No longitudinal or transverse joints will be allowed unless detailed on the Drawings or authorized in writing by the Contract Administrator. Where transverse and longitudinal joint are allowed, the concrete overlay previously placed shall be sawn to a straight edge and vertical edge before the adjacent concrete overlay is placed.

After the surface has been cleaned and immediately before placing concrete, a thin coating of bonding grout shall be scrubbed into the dry, prepared surface or latex bonding agent shall be sprayed onto the prepared surface in accordance with manufacturer's recommendations. Care shall be exercised to ensure that all parts receive a thorough, even coating and that no excess of grout is permitted to collect in pockets. The rate of progress in applying grout shall be limited so that the grout does not become dry before it is covered with new concrete.

The Contractor shall take every precaution necessary to secure a smooth-riding bridge deck, within the tolerances indicated in "Flatness Tolerances" in Clause E11.7.6 of this Specification.

Concrete shall be placed so as to avoid segregation of constituent materials. The mechanical screed machine shall provide sufficient vibration to properly compact the mix. Excess vibration which may cause segregation shall be avoided. The concrete shall be internally vibrated in advance of the mechanical screed machine.

The temperature of the concrete shall not be less than 10°C, nor more than 18°C, at the time of placing, and shall be maintained below this maximum temperature by the inclusion of ice in the mix in place of a portion of the mix water, as approved by the Contract Administrator, taking care to maintain the design water/cementitious ratio.

The overall combination of labour and equipment for proportioning, mixing, placing, and finishing new concrete shall be of such minimum capability as to meet the following requirements, except when noted otherwise on the Drawings.

<b>TOTAL CONCRETE AREA PER BRIDGE (Square Metre)</b>	<b>MINIMUM REQUIREMENTS (Cubic Metres/Hour)</b>
0 - 275	1.0
276 - 410	1.5
411 - 550	2.0
Over 550	2.5

The mechanical screed machine shall be so designed that, when concrete is mixed and placed at the specified minimum rate, under normal operating conditions, the elapsed time between depositing the concrete and final screeding shall not exceed 10 minutes. Similarly, the placing equipment and operations shall be such that in no case shall the elapsed time between batching of ready-mix concrete and final screeding exceeds 90 minutes.

Placement of the concrete shall be a continuous operation throughout the pour. In the event of equipment breakdown, such that concrete placement is stopped or delayed for a period of 60 minutes or more, further placement shall be discontinued and may resume only after a period of not less than 12 hours. This restriction does not prohibit continuation of placement provided that a gap is left in the lane or pour strip. The gap shall be sufficient in length for the mechanical screed machine to clear the previously placed concrete. The fill-in section shall be placed after a period of not less than 12 hours. The edge of any discontinued overlay concrete shall be sawcut vertically to a depth of 50 mm and then shall be chipped out and thoroughly cleaned before placing further overlay concrete.

The subsequent course shall match the adjacent previously placed course, and shall not be placed until the course initially placed is at least 72 hours old.

Screed guides shall be placed and fastened in position to ensure finishing of concrete to the required profile. Supporting rails upon which the mechanical screed machine travels shall be placed on the barrier and median curb. Provisions for anchorage of supporting rails shall provide for horizontal and vertical stability; positive anchorage may be required by the Contract Administrator. Plans for anchoring support rails shall be submitted to the Contract Administrator for acceptance. The Contract Administrator's written acceptance must be received by the Contractor prior to the installation of any anchorage devices.

No longitudinal or transverse joints will be allowed, unless detailed on the Drawings or authorized in writing by the Contract Administrator. Where transverse and longitudinal joints are allowed, the deck concrete previously placed shall be saw-cut to straightedge and vertical edge before the adjacent concrete lift is placed.

The finished bridge deck grades shown on the Drawings are preliminary only and are subject to revision during construction by the Contract Administrator.

The deck overlay shall have a minimum thickness of 50 mm. Actual deck overlay concrete thickness may be greater. This would be to accommodate field adjustments for camber and deflection.

Fresh concrete 75 mm or more in thickness, shall be vibrated internally in addition to the surface screed vibration.

The vibratory screed of the finishing equipment shall be moved slowly and at a uniform rate, such that screeding shall be completed in no more than two passes. The screed vibrators shall

not be allowed to run except when screeding is actually in progress. The screeded surface shall not be walked on or otherwise damaged.

Hand-finishing with magnesium floats may be required to produce a tight, uniform surface and to work out all surface undulation to meet the surface tolerance specified in this Specification. The Contractor shall ensure that the concrete surface is not overworked, resulting in excessive lost of air entrainment.

The concrete surface produced behind the mechanical screed machine shall be magnesium floated the minimum amount necessary to ensure that the surface is free from open texturing, plucked aggregate or projecting polypropylene fibres and local projections or depressions.

During the concrete finishing operations, the Contractor shall utilize a 3.05 m (10 ft.) straightedge with a 75 mm (3 inch) semicircular shape, as supplied by Bidwell Inc., and as accepted by the Contract Administrator. It shall be used both for flattening the plastic concrete surface and for checking and verifying the surface flatness before commencing curing of the surface. The entire surface shall be checked and any areas not within the surface flatness tolerances specified under Clause E11.7.6 of this Specification shall be corrected using the straight edge. Care shall be taken to preserve the crown and cross section of the roadway.

After verification that the surface meets acceptable limits and after final floating, the top surface shall be given a coarse, transverse scored texture by drawing a steel boom, as accepted by the Contract Administrator, uniformly across the surface.

Upon completion of the straight-edge checking, final floating and texturing of the pour, the joint with any previous pour (or any transverse joints) shall be sealed by the application of the modified bonding grout.

#### E11.6.7.8 Curing Deck Overlay Concrete

Immediately following finishing of concrete, apply fog misting until the concrete has enough strength to support the placement of the predampened blankets. The misting device shall not be used to apply water to the concrete's surface for finishing purposes. The misting device shall not be directed towards the concrete surface. Only a fine coating or sheen should be applied with the misting device. There should be no standing water.

After the joint painting is completed, the surface shall be promptly covered with a single layer of clean, predampened, lightly damp, polyester curing blanket.

Care shall be exercised to ensure that the polyester curing blanket is well drained and that it is placed as soon as the surface will support it without deformation. The Contractor shall ensure that water from the polyester curing blankets does not run into areas where concrete placement and finishing operations are underway. If this occurs, concrete placement shall stop until the problem is corrected to the satisfaction of the Contract Administrator.

The predampened polyester curing blankets shall be a temperature of 20°C,  $\pm 5^\circ\text{C}$ , when applied to the deck overlay.

Failure to apply wet polyester curing blankets within 30 minutes after the deck overlay concrete has been deposited, shall be caused for rejecting the Works so affected; however, if the concrete is revibrated because of failure to meet density requirements within initial vibration, this time will be extended by 15 minutes. Concrete in the rejected area shall be removed and replaced at no additional cost to the City of Winnipeg.

It is intended that the surface receive a wet polyester blanket cure for at least seven (7) days. Water shall be applied as necessary to keep the concrete and polyester curing blankets saturated. The Contractor must ensure the concrete and polyester curing blankets are kept saturated with water for the entire seven (7) days.

As soon as the deck overlay concrete can be walked on without damaging the surface, as approved by the Contract Administrator, the polyester curing blankets shall be covered with a layer of 4-mil polyethylene film and a layer of insulated tarps (during cold weather) in order to maintain the concrete temperature of 10°C.

If, in the opinion of the Contract Administrator, curing has not been maintained sufficiently, the currying period will be extending as directed with no additional payment made.

#### E11.6.7.9 Limitation of Operations

Provisions shall be made to protect the concrete by only casting overlay concrete under good weather conditions. This means that the air temperatures shall be between 5°C and 25°C and the surface moisture evaporation rate is less than 0.75 kg/square metre per hour as determined by CSA A23.1, Appendix D, "Guidelines for Curing and Protection". Also, it shall not be raining and no rain forecast for the duration of each pour. The Contract Administrator's decision on this matter will be final.

#### E11.6.8 Cold Weather Concreting

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° during placing or curing.

The Contract Administrator will advise the Contractor, in writing, as to the degree of heating of water and aggregates.

Supplementary equipment as required below shall be at the job Site if concrete is likely to be placed in cold weather.

Formwork and reinforcing steel shall be heated to at least 5°C before concrete is placed.

Concrete footings shall not be placed on frozen soil or soil which has frozen and thawed. Other concrete members may be placed on subgrades which have been thawed with prior permission from the Contract Administrator.

The temperature of the concrete shall be maintained at not less than 10°C for 7 days or 15°C for 5 days or 20°C for 3 days after placing. The concrete shall be kept above freezing temperature for at least a period of 7 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 as determined from compressive strength tests on specimens cured under the same conditions as the concrete Works in question.

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 placing in the forms shall be within the range specified in CSA Standard CAN/CSA-A23.1-04 for the thickness of the section being placed.

When the mean daily temperature may fall below 5°C, a complete housing of the Work, together with supplementary heat, shall be provided.

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.

When the ambient temperature is below -15°C, the housing shall be constructed so as to allow the concrete to be placed without the housing having to be opened. If the mixing is done outside of the housing, the concrete shall be placed by means of hoppers installed through the housing. The hoppers are to be plugged when not in use.

When the ambient temperature is equal to or above  $-15^{\circ}\text{C}$ , the Contractor will be permitted to open small portions of the housing for a limited time to facilitate the placing of the concrete.

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 housing to the specified  $20^{\circ}\text{C}$  at least 12 hours prior to the start of the concrete placing.

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.

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.

Combustion-type heaters may be used if their exhaust gases are vented outside the enclosure and not allowed to come into contact with concrete surfaces. Fire extinguishers must be readily at hand whenever combustion-type heaters are used.

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, temperatures above and below the concrete within the enclosure, temperatures of 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 all times, and shall be turned over to the Contract Administrator at the end of concreting operations.

#### E11.6.9 Hot Weather Concreting

##### E11.6.9.1 General

The requirements of this section shall be applied during hot weather, i.e., air temperatures above  $25^{\circ}\text{C}$  during placing.

Concrete shall be placed at as low a temperature as possible, preferably below  $15^{\circ}\text{C}$  but not above  $27^{\circ}\text{C}$ . Aggregate stockpiles may be cooled by water sprays and sun shades.

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

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.

Sun shades and wind breaks shall be used as required during placing and finishing.

Work shall be planned so that concrete can be placed as quickly as possible to avoid "cold joints".

The Contract Administrator's acceptance is necessary before the Contractor may use admixtures such as retardants to delay setting, or water-reducing agents to maintain workability and strength, and these must then appear in the Mix Design Statement submitted to the Contract Administrator.

Curing shall follow immediately after the finishing operation.

##### E11.6.9.2 Hot-Weather Curing

When the air temperature is at or above  $25^{\circ}\text{C}$ , curing shall be accomplished by fog misting and by using saturated absorptive fabric, in order to achieve cooling by evaporation. Fog misting is mandatory for deck concrete at all temperatures.

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.

#### E11.6.9.3 Job Preparation

When the air temperature is at or above 25°C, or when there is probability of its rising to 25°C during the placing period, facilities shall be provided for protection of the concrete in place from the effects of hot and/or drying weather conditions. Under severe drying conditions, as defined in Clause E11.6.9.5.1, the formwork, reinforcement, and concreting equipment shall be protected from the direct rays of the sun or cooled by mist fogging and evaporation.

#### E11.6.9.4 Concrete Temperature

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		
1	10	27
1.2	5	25

#### E11.6.9.5 Protection From Drying

Placement of deck and deck overlay concrete will not be permitted when the surface moisture evaporation exceeds 0.75 kg/m<sup>2</sup>/h. Fog misting is mandatory regardless of drying conditions. The Contractor shall use fog misting operations as accepted by the Contract Administrator.

##### E11.6.9.5.1 Surface Moisture Evaporation Rate

The nomograph, Figure D1, Appendix D of CSA Standard CAN/CSA-A23.1-04 shall be used to estimate surface moisture evaporation rates.

#### E11.6.10 Construction Joints

Construction joints shall be located only where shown on the Drawings or as otherwise accepted in writing by the Contract Administrator. Construction joints shall be at right angles to the direction of the main reinforcing steel. All reinforcing steel shall be continuous across the joints.

The face of joints shall be cleaned of all laitance and dirt, after which an epoxy adhesive bonding agent shall be applied. Forms shall be re-tightened and all reinforcing steel shall be thoroughly cleaned at the joint prior to concreting.

Prior to applying the bonding agent, the joints shall be thoroughly cleaned to make them free of all laitance, loose aggregates, form release agents, curing compound, and other surface treatments, roughened to provide minimum amplitude of 5 mm, and primed with material as recommended by the bonding agent manufacturer. No primer or sealant shall be installed until the joint preparation has been accepted by the Contract Administrator. Accepted means of roughening include the removal of laitance and mortar paste by water jet and soft brush when concrete is in hardened state.

#### E11.6.11 Installation of Fibre Joint Filler/Neoprene Compression Seal

Prior to installing the filler or compression seal, the joint sides to which the filler or compression seal is to bond shall be thoroughly cleaned of all laitance including form release agents.

Manufacturer's instructions for installation are to be followed. If ambient temperatures are below minimum recommended installation temperatures, artificial heat shall be applied accordingly.

#### E11.6.12 Application of Dampproofing

Surfaces shall be patched as specified under Clause E11.6.6.7 of this Specification prior to application of dampproofing.

Brush or spray primer on all surfaces, brushing into all corners and allow to dry. Apply two (2) coats of dampproofing allowing the first coat to dry before applying the second coat. Minimum application rate per coat shall be 0.6 litres per square metre.

#### E11.6.13 Benchmarks

- a) The Contractor shall install a benchmark plug(s) supplied by the City at the locations on each structural item shown on the Drawings, and at any other locations as may be directed by the Contract Administrator.
- b) The Contractor shall indent into the exposed concrete a structure identification date at the location on each end of the structure as shown on the Drawings in accordance with the detail shown on the Drawings or as otherwise directed by the Contract Administrator.

#### E11.6.14 Installation of Telephone and Cable T.V. Conduit

The Contractor shall pick-up and install the electrical conduits as described in Specification E13, "Telephone and Cable T.V. Conduits". The conduit shall be held securely in place so as not to become displaced during concrete placement operations. Conduit placement operations shall be performed so as not to damage the conduit or the existing cables.

### E11.7 Quality Control

#### E11.7.1 Inspection

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

#### E11.7.2 Access

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.

#### E11.7.3 Materials

All materials supplied under this Specification shall be subject to testing and acceptance by the Contract Administrator in accordance with Clause E11.2.3 of this Specification.

#### E11.7.4 Concrete Quality

Quality control tests will be used to determine the acceptability of the concrete supplied by the Contractor.

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.

The frequency and number of concrete quality control tests shall be in accordance with the requirements of CSA Standard CAN/CSA-A23.1-04.

An outline of the quality tests is as follows:

Slump tests shall be made in accordance with CSA Standard Test Method CSA-A23.2-5C, "Slump of Concrete". If the measured slump falls outside the limits specified in Clause E11.3.2 of this Specification, a second test shall be made.

In the event of a second failure, the Contract Administrator reserves the right to refuse the use of the batch of concrete represented.

Air content determinations shall be made in accordance with CSA Standard Test Method CSA-A23.2-4C, "Air Content of Plastic Concrete by the Pressure Method". If the measured air content falls outside the limits specified in Clause E11.3.2 of this Specification, a second test shall be made at any time within the specified discharge time limit for the mix. In the event of a second failure, the Contract Administrator reserves the right to reject the batch of concrete represented.

The air-void system shall be proven satisfactory by data from tests performed in accordance with the test method of ASTM C457. The spacing factor, as determined on concrete cylinders moulded in accordance with CSA Standard Test Method CSA-A23.2-3C, 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.

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

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

Compressive strength tests at twenty-eight (28) days shall be the basis for acceptance of all concrete supplied by the Contractor except for the deck overlay concrete where the fifty-six (56) day compressive strength test shall be the basis for acceptance. For each twenty-eight (28) or fifty-six (56) day strength test, the strength of two companion standard-cured test specimens shall be determined in accordance with CSA Standard Test Method CSA-A23.2-9C, "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.

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 E11.3.2 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 CSA-A23.2-9C, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the strength of the specimen.

Notwithstanding CSA A23.2, cores taken from deck overlay must achieve the concrete design strength as a minimum.

#### E11.7.5 Corrective Action

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.

#### E11.7.6 Surface Flatness Requirements

The surface of the deck overlay concrete (fibre-reinforced silica fume concrete) and the approach slab shall be finished to a flatness tolerance as specified herein. The surface flatness of the finished concrete will be determined by measuring the elevation difference between equidistant points spaced 305 mm apart, along straight or curved lines running parallel or perpendicular (radial) to the direction of travel on the bridge deck. An acceptable surface flatness, as measured along any such line on the finished surface, will have the absolute difference between any two consecutive readings (a reading being the difference in elevation between two consecutive points) not exceeding 5 mm.

At each location(s) where the absolute difference of 5 mm is exceeded, further detailed contour survey(s) will be conducted by and at the discretion of the Contract Administrator to determine the extent of the area requiring corrective action, all at the Contractor's expense. Corrective measures shall involve immediate removal of the surface in the areas not meeting the specified surface flatness tolerance and/or acceptable rideability, in the judgement of the Contract Administrator, and replacement of same to a minimum depth of 50 mm, with the perimeter of the area saw-cut to a depth of 25 mm (the cut face to be sloped to key-in the replacement concrete), as directed by the Contract Administrator. If more than 20 percent of the surface is rejected by the Contract Administrator based on the flatness tolerance and/or any other defect, the Contractor shall immediately remove and replace the entire area of the applicable pour.

This criteria will not apply across the crown or at any deck drains, which must be constructed to meet design grades as shown on the Drawings or as directed by the Contract Administrator.

The Contract Administrator will take readings and determine the acceptability for the surface flatness within thirty-six (36) hours after completion of each pour. The Contractor shall remove and replace the curing blankets, as required by the Contract Administrator, to undertake the necessary flatness testing and shall restore same immediately upon completion of the testing in each area to the satisfaction of the Contract Administrator.

#### E11.8 Method of Measurement

The Supply and Placement of Structural Concrete will be paid for on a lump sum basis, as accepted by the Contract Administrator, and no measurement will be made for this Work.

Supply and installation of all the listed materials, concrete design requirements, equipment, construction methods, and quality controls associated with this Specification and Drawings will be considered incidental to the supply and placement of structural concrete, unless noted herein. No measurement or payment shall be made for this Work unless indicated otherwise.

#### E11.9 Basis of Payment

The Supply and Placement of Structural Concrete will be paid for at the Contract Lump Sum Price for the "Items of Work" listed here below, measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work included in this Specification.

Items of Work:

Structural Concrete

- a) Deck Slab and Sidewalks
- b) Abutment Modifications
- c) Median Curb and Barriers
- d) Approach Slab, Median Curb and Barriers
- e) Approach Sidewalk Slab
- f) Deck Slab Overlay

**E12. ALUMINUM PEDESTRIAN HANDRAIL**

E12.1 Description

This Specification shall cover the supply and installation of aluminum pedestrian handrail.

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

E12.2 Materials

E12.2.1 General

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

All materials supplied under this Specification shall be of a type accepted by the Contract Administrator.

E12.2.2 Handling and Storage of Materials

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

E12.2.3 Testing

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

E12.2.4 Material for the Aluminum Pedestrian Handrail

- (a) Extruded Shapes or Drawn Tubing for Rails and Posts: shall conform to CSA Aluminum Alloy and Temper HA.5 SG 11R-T6 (ASTM B221M-83 Alloy 6351-T6), or HA.7 GA 11M-T6 (ASTM B221 M-83 Alloy 6061-T6).
- (b) Aluminum sheet, bar, support pin, angle, and plate shall conform to ASTM B221-M-83 Alloy 5083, ATM B209M-83 Alloy 6061-T6 or Alloy 6351-T6.

- (c) Bolts and cap screws, nuts and lock washers - stainless steel conforming to ASTM A276, Type 316.

#### E12.2.5 Bituminous Paint

Bituminous paint shall be an alkali-resistant coating and conform to CGSB 31-GP-3M. Supply of bituminous paint shall be considered incidental to the supply of aluminum pedestrian handrail.

#### E12.2.6 Handrail Anchorage System

Handrail anchorage system shall be stainless steel Acrow-Richmond Type DGRS-1 anchor insert c/w stainless steel high tensile anchor bolts and washers, all conforming to the requirements and dimensions as shown on the Drawings.

#### E12.2.7 Aluminum Shims

Aluminum shims shall conform to ASTM Standard B221, Alloy 6061-T6, and shall be supplied as required to facilitate the installation of the rail posts as shown on the Drawings. Supply of shims will be considered incidental to the supply of aluminum pedestrian handrail.

#### E12.2.8 Aluminum Filler Alloys for Welded Construction

Aluminum filler alloys for welded construction shall be one of the following: ER4043, ER5183, ER5356, ER5554, ER5556, or ER5654.

#### E12.3 Equipment

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

#### E12.4 Construction Methods

##### E12.4.1 Layout

Before fabrication and/or installation of the aluminum pedestrian handrail, the Contractor shall satisfy himself as to the dimensions of all rail sections required, by field measurements.

##### E12.4.2 Fabrication

###### E12.4.2.1 General

Shop Drawings three (3) prints and one (1) reproducible sepia copy showing fabrication details of the aluminum pedestrian handrail and life preserver enclosure shall be provided to the Contract Administrator for acceptance at least fourteen (14) days prior to scheduled commencement of fabrication.

The fabricator shall fabricate the entire aluminum pedestrian handrail, in sections, to permit the installation of the rail sections in the concrete.

All fabrication shall be carried out in accordance with this Specification and the Drawings.

The punching of identification marks on the members will not be allowed.

Any damage to members during fabrication shall be drawn to the attention of the Contract Administrator in order that the Contract Administrator may accept remedial measures.

Dimensions and fabrication details which control the field matching of parts shall receive very careful attention in order to avoid field adjustment.

Components of the hand railings and enclosures shall be joined by means of bolt, cap screws, and welds as called for on the Drawings.

#### E12.4.2.2 Sample Panel

The Contractor shall be required to supply one completely fabricated sample panel, including at least two posts to the Contract Administrator and receive acceptance of the sample panel from the Contract Administrator prior to proceeding with the fabrication of the remainder. The acceptance sample shall be kept by the Contract Administrator and shall become the standard for acceptance of all aluminum pedestrian handrail.

#### E12.4.2.4 Cutting

Material 13 mm thick or less may be sheared, sawn, or cut with a router. Materials more than 13 mm thick shall be sawn or routed. Cut edges shall be true and smooth and free from excessive burrs or ragged breaks. Re-entrant cuts shall be avoided whenever possible. If used, they shall be filleted by drilling prior to cutting. Flame cutting of aluminum alloys is not permitted.

#### E12.4.2.5 Welding

Welded construction shall conform to the requirements of CSA Standard W59.2-M1991, Welded Aluminum Construction and W47.2-M1987, Certification of Companies for Fusion Welding of Aluminum.

Welding will be done by qualified welders using the Metal Inert Gas (MIG) process. All areas to be welded should be thoroughly cleaned with a suitable solvent followed by wire brushing if surfaces are heavily oxidized. The size of fillet for equal leg fillet welds is defined as the leg length of the largest isosceles right angle triangle which can be inscribed within the fillet weld section. Welds must penetrate into the root corner. All butt welds should have full penetration to ensure maximum strength. Defective welds should be repaired by chipping out the defective area and rewelding. Particular care must be paid to the elimination of craters and cold starts.

Welders and procedure should be qualified as agreed between the Contract Administrator and the fabricator. The minimum requirements for mechanical test results of joints butt welded with Alcan 56S filler alloy shall be 259 MPa for Alcan D45S-H11A and 165 MPa for Alcan B51S-T4 alloy. In addition to the mechanical tests, soundness tests should be made as follows:

**Guided Bend Test:** All bend tests should be fully guided through an angle of 180°. Root, face, and side bend tests in Alcan D54S parent alloy welded in Alcan 56S filler wire require a bend radius of 2T where T is the thickness of the material. For Alcan B51S parent alloy welded with 56S filler wire, a bend radius of 4T is required. Root bend and face bend specimens on material 10 mm thick and less should be 305 mm long and a minimum of 25 mm in width and cut from a plate having a minimum butt weld length of 450 mm. No test piece should be taken within 25 mm of the ends of the weld. Side bend tests should be carried out on material over 10 mm in thickness.

Specimens should be 10 mm in width. Longitudinal edges should be given in 2 mm radius. There should be no crack greater than 3 mm in length. If a crack starts from an edge, the specimen should be disregarded.

**Fracture Test:** The butt-welded joint shall have a notch not exceeding 2 mm in depth sawn on the four sides of the weld bend and the weld broken. Inspection of the fracture should reveal no gas pockets or inclusions greater than 2 mm in diameter and the area lost due to scattered gas, porosity or voids should not exceed 3% of the area under inspection.

#### E12.4.2.6 Bolting

Bolt holes in 10 mm or thinner material may be drilled or punched to finished size. In material thicker than 10 mm, the holes shall be drilled to finished size or subpunched smaller than the normal diameter of the fastener and reamed to size.

The finished diameter of the holes shall be not more than 7 percent greater than the nominal diameter of the fastener, except:

- (a) Slotted holes for expansion purposes shall be provided as required on the Drawings.
- (b) Holes for anchor bolts may be up to 50 percent greater than the nominal bolt diameter with a maximum of 13 mm greater than the nominal bolt diameter.

Holes shall not be drilled in such a manner as to distort the metal, but holes only slightly misaligned may be reamed to render a reasonable fit.

In all bolts, the finished shank shall be long enough to provide full bearing, and washers shall be used under the nuts to give full grip when the nuts are tightened.

#### E12.4.3 Aluminum Pedestrian Handrail Installation

The aluminum pedestrian handrail and life preserver enclosure posts and sections shall be brought on-Site and accurately installed as shown on the Drawings.

The rails shall be set true to the line and grade as shown on the Drawings or as required by the Contract Administrator.

The material shall be carefully handled so that no parts will be bent, broken or otherwise damaged. Hammering which will injure or distort the member is not permitted. The Contractor shall report to the Contract Administrator any corrective measures.

Except where shown on the Drawings, field welding will not be permitted unless acceptable to the Contract Administrator. The rail posts shall be set on aluminum shims, as required, to achieve the correct elevation and grade. Additional aluminum shims shall be installed as required to achieve the correct elevation and grade. The surface of the bottom shim that is in contact with concrete shall be separated with a minimum of two (2) coats of bituminous paint. A minimum 3 mm aluminum shim shall be installed under each post.

#### E12.5 Quality Control

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

#### E12.6 Method of Measurement

The supply and installation of Aluminum Pedestrian Handrail will be paid for on a lump sum basis, as accepted by the Contract Administrator, and no measurement will be made for this Work.

#### E12.7 Basis of Payment

The supply and installation of Aluminum Pedestrian Handrail will be paid for at the Contract Lump Sum Price for the "Aluminum Pedestrian Handrail" 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.

## **E13. TELEPHONE CONDUITS**

### **E13.1 Description**

This Specification shall cover the installation of telephone and cable T.V. conduits, couplings, and all required appurtenances and incidental components, as specified herein. The material is to be picked up from MTS who will be supplying the materials.

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

### **E13.2 Materials**

#### **E13.2.1 General**

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

#### **E13.2.2 Handling and Storage of Materials**

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

#### **E13.2.3 Testing**

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

#### **E13.2.4 Conductors**

All conductors exist and are to be supported and protected. Any conductor damaged shall be repaired at no cost to the City.

#### **E13.2.5 Conduits and Related Materials**

All conduit shall be split conduit supplied by MTS.

Flexible couplings shall be as supplied by MTS.

### **E13.3 Equipment**

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 General**

The Work shall include the removal of all conduits from around existing cables from the manhole west of the bridge to the manhole east of the bridge and the temporary support and protection of the cable and the installation of all conduits, couplings, and all required appurtenances and incidental components from the manhole west of the bridge to the manhole east of the bridge.

#### **E13.4.2 Permits, Codes, and Regulations**

The Contractor shall be responsible to obtain and pay for all permits, inspections, etc., required by the authorities having jurisdiction over this Work, and shall provide a copy of each permit to the Contract Administrator before commencing any Work on the Site.

The Work shall be carried out in accordance with the latest regulations of the Canadian Electrical Code and all applicable Municipal and Provincial Codes and Regulations. In no instance, however, shall the standard established by the Drawings and Specifications be reduced by any of the Codes referred to above.

#### E13.4.3 Removing Existing Conduits

Existing conduits around existing cables etc. shall be removed carefully so as not to damage any cables or other items inside the existing conduits. This removal of existing conduits shall be carried out from the first MTS manhole west of the bridge to the first MTS manhole east of the bridge.

#### E13.4.4 Temporary Support of Existing Cables

All cables and other items inside the existing conduits shall be supported and protected at all times until the new conduit has been placed and cast into the new concrete around the new conduit.

The cables etc. on the bridge shall be carefully exposed and supported prior to removing the existing concrete below. Once exposed the cables shall be supported and raised slightly and held in place until the forms and bottom reinforcing steel for the deck and sidewalk have been placed. Then the new conduits shall be placed around the existing cables etc. and placed in the proposed location on bars chaired off of the formwork and/or reinforcing below. Once the new conduits are secured in their final position the temporary support system may be removed and the concrete cast.

#### E13.4.5 Placing of Conduits

##### E13.4.3.1 General

All conduits shall be placed around the existing cable etc. with the same cables etc. placed in each conduit as per the existing conduit and placed in the new locations as shown on the Drawings. The conduit support system to be placed in concrete shall be firmly anchored in place to prevent movement during pouring of the concrete. Extreme care shall be exercised when pouring concrete to prevent damage to any conduit support system. The open ends of the conduits shall be terminated in the first MTS manhole each way from the bridge.

Upon completion of the conduit system, the Contractor shall ascertain that no obstructions are blocking any conduit. If any obstruction is encountered, it shall be removed by the Contractor at his own expense.

#### E13.5 Quality Control

##### E13.5.1 General

All workmanship and all materials finished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations through to final acceptance of the Work.

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

#### E13.6 Method of Measurement

The installation of Conduit and Flexible Couplings will be paid for on a lump sum basis for all conduit installed in accordance with this Specification, accepted by the Contract Administrator, and no measurement will be made for this Work.

#### E13.7 Basis of Payment

The installation of Conduit, and Flexible Couplings will be paid for at the Contract Lump Sum for "Telephone Conduits", 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.

### **E14. OFFICE FACILITIES**

E14.1 The Contractor shall supply office facilities meeting the following requirements:

- (a) The field office shall be for the exclusive use of the Contract Administrator.
- (b) The building shall be conveniently located near the Site of the Work.
- (c) The building shall have a minimum floor area of 20 square metres, with stairs and a door entrance with a suitable lock.
- (d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16-18°C or 24-25°C.
- (e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three wall outlets.
- (f) The building shall be furnished with one desk, one drafting table 3 m x 1.2 m, one stool, one four drawer legal size filing cabinet, one meeting table, and a minimum of 8 chairs.
- (g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City.
- (h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each Site meeting. The Contract Administrator may request additional cleaning when he deems it necessary.

E14.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E14.3 The office facilities will be provided from the date of the commencement of the Work to the date of Total Performance.

E14.4 All the Contractor's temporary structures in this area shall be stabilized by the Contractor in a manner sufficient to prevent overturning by wind forces as per the National Building Code of Canada and designated by a Professional Engineer registered in the Province of Manitoba.

### **E15. PROTECTION OF EXISTING TREES**

E15.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within the limits of the construction area:

- (a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.
- (b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400mm wood planks, or suitably protected as approved by the Contract Administrator.
- (c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.

- (d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.
- (e) Work on-Site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.

E15.2 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the City Forester or his designate.

E15.3 No separate measurement or payment will be made for the protection of trees.

E15.4 Except as required in clause E15.1(c) and E15.1(e), Elm trees shall not be pruned at any time between April 1 and July 31.

## **E16. TRAFFIC CONTROL**

E16.1 Further to clauses 3.6 and 3.7 of CW 1130-R1:

- (a) Where directed, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planing drop-offs to the satisfaction of the Contract Administrator. No measurement for payment will be made for this work.
- (b) In accordance with the Manual of Temporary Traffic Control, the Contractor ("Agency" in the manual) shall make arrangements with the Traffic Services Section of the City of Winnipeg to place all temporary regulatory signs. The Contractor shall bear all costs associated with the placement of temporary traffic control devices by the Traffic Services Section of the City of Winnipeg in connection with the works undertaken by the Contractor.

## **E17. TRAFFIC MANAGEMENT**

E17.1 Further to clause 3.7 of CW 1130-R1:

E17.1.1 The Contractor shall schedule construction activities to meet the following:

- (a) Hamilton Avenue from Wharton Boulevard to Valley View Place will be closed to all traffic. The Contractor shall sign the street "Road Closed" in accordance with the Manual of Temporary Traffic Control.
- (b) Hamilton Avenue from Vimy Road to Wharton Boulevard and from Valley View Place to Silver Avenue will be closed to through traffic. Local access and bus traffic shall be maintained in at least one lane of each direction. The Contractor shall sign the street "Road Closed Local Access Only" in accordance with the Manual of Temporary Traffic Control.

E17.1.2 Should the Contractor be unable to maintain an existing access to a residence or business, he shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

E17.1.3 Pedestrian and ambulance/emergency vehicle access must be maintained at all times. Pedestrian passage must be maintained in a safe manner acceptable to the Contract Administrator. The pedestrian passage shall have a minimum illumination of 10 foot candles, incandescent 100 or 150 W light bulbs. Fixtures shall include vandal-proof bulb guard.

## **E18. PEDESTRIAN SAFETY**

E18.1 During the project, a chain link fence with gates (1829 mm high) shall be installed around the bridge Site. The Contractor shall be responsible for maintaining the chain link fence in a proper working condition. No measurement for payment shall be made for this work.

## **E19. WATER USED BY CONTRACTOR**

E19.1 Further to clause 3.7 of CW 1120-R1, the Contractor shall pay for all costs associated with obtaining water in accordance with the Waterworks By-law. Sewer charges will not be assessed for water obtained from a hydrant.

## **E20. SURFACE RESTORATIONS**

E20.1 Further to clause 3.3 of CW 1130-R1, when Total Performance is not achieved in the year the Contract is commenced, the Contractor shall temporarily repair any Work commenced and not completed to the satisfaction of the Contract Administrator. The Contractor shall maintain the temporary repairs in a safe condition as determined by the Contract Administrator until permanent repairs are completed. The Contractor shall bear all costs associated with temporary repairs and their maintenance.

## **E21. RECYCLED CONCRETE BASE COURSE MATERIAL**

### DESCRIPTION

E21.1 General

E21.1.1 Further to CW 3110, this specification covers supply and placement of recycled concrete base course material for Full-Depth Partial Slab Patches (Class A, B, C, & D), miscellaneous concrete slabs and sidewalks.

E21.2 Definitions

E21.2.1 Deleterious material – are materials such as vegetation, organic material, wood, glass, plastic, metal, reinforcing steel, building rubble, brick, salvaged asphalt materials, clay, shale, and friable particles.

E21.3 Referenced Standard Construction Specifications

- (a) CW 3110 – Sub-Grade. Sub-Base and Base Course Construction.
- (b) CW 3230 – Full-Depth Patching of Existing Pavement Slabs and Joints.
- (c) CW 3235 – Renewal of Existing Miscellaneous Concrete Slabs.
- (d) CW 3325 – Portland Cement Concrete Sidewalk.

### MATERIALS

E21.4 Recycled Concrete Base Course Material

E21.4.1 Recycled concrete base course material when used for Full-Depth Partial Slab Patches (Class A, B, C, & D), miscellaneous concrete slabs and sidewalks will be considered equal to granular or limestone base course material specified in Section 2.2 of CW 3110.

E21.4.2 Recycled concrete base course material will be approved by the Contract Administrator.

E21.4.3 Recycled concrete base course material will consist of sound durable particles produced by crushing, screening, and grading of recovered concrete materials, free from soft material that would disintegrate through decay or weathering.

E21.4.4 The recycled concrete base course material will be well graded and conform to the following grading requirements:

Recycled Concrete Base Course Material Grading Requirements

CANADIAN METRIC SIEVE SIZE	PERCENT OF TOTAL DRY WEIGHT PASSING EACH SIEVE
20 000	100%
5 000	40% - 70%
2 500	25% - 60%
315	8% - 25%
80	6% - 17%

- E21.4.5 Recycled concrete base course material when subjected to the abrasion test will have a loss of not more than 35% when tested in accordance with grading B of ASTM C131, Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- E21.4.6 The amount of deleterious material will be limited to a maximum of two percent of the total dry weight.

CONSTRUCTION METHODS

- E21.5 Placement of Recycled Concrete Base Course Material
- E21.5.1 Place and compact recycled concrete base course material as a levelling course to a maximum thickness of 50 millimetres.
- E21.5.2 Spread materials uniformly to avoid segregation free of pockets of fine and coarse material.
- E21.5.3 Level and compact to the finished elevation. Compact to 100% Standard Proctor Density for Full-Depth Partial Slab Patches (Class A, B, C, & D) and 90% Standard Proctor Density for miscellaneous concrete slabs and sidewalks.
- E21.5.4 Maintain the finished material until the pavement or sidewalk is placed.

MEASUREMENT AND PAYMENT

- E21.6 Recycled Concrete Base Course Material
- E21.6.1 The supplying, placing and compaction of recycled concrete base course material will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for the "Supplying and Placing Base Course Material" as specified in accordance with CW 3110.
- E21.6.2 No measurement or payment will be made for material placed as a levelling course under miscellaneous concrete slabs and sidewalks where the costs are included in accordance with CW 3235 and CW 3325.
- E21.6.3 No measurement or payment will be made for materials rejected by the Contract Administrator.

**E22. RAISING HYDRANTS**

DESCRIPTION

- E22.1 General
- E22.1.1 This specification covers the raising of existing hydrants.
- E22.1.2 Referenced Standard Construction Specification  
 (a) CW 3210 – Adjustment of Pavement and Boulevard Structures.

CONSTRUCTION METHODS

- E22.2 Raising of Hydrants

- E22.2.1 Raise hydrants at the locations and to the grades as shown on the Drawings or as directed by the Contract Administrator. Hydrants shall be raised by removing the upper hydrant body and inserting the appropriate extension section complete with stem extension. The extension section shall incorporate a break-away traffic flange to be located approximately 50 mm above the ground surface. Adjust the isolation valve box as specified in CW 3210.

#### MEASUREMENT AND PAYMENT

#### E22.3 Raising Hydrants

- E22.3.1 Raising of hydrants will be measured on a unit basis for each adjustment made and paid for at the Contract Unit Price for "Raising of Hydrant". The number to be paid for shall be the total number of adjustments made in accordance with this specification, measured and accepted by the Contract Administrator.
- E22.3.2 Adjustment of isolation valve boxes shall be measured and paid for in accordance with CW 3210.

### **E23. PREPARATION OF EXISTING GROUND**

#### DESCRIPTION

#### E23.1 General

- E23.1.1 This Specification covers the preparation of the existing ground surface prior to embankment construction to facilitate new sidewalk construction.

#### E23.2 Referenced Standard Construction Specifications

- (a) CW 3110 – Sub-grade, Sub-base and Base Course Construction.

#### CONSTRUCTION METHODS

#### E23.3 Preparation of Existing Ground

- E23.3.1 Strip and stockpile existing topsoil to the limits defined by the Contract Administrator in accordance with CW 3110.
- E23.3.2 Before any embankment is placed on original ground having a smooth surface, the existing ground shall be scarified or ploughed so as to permit bonding with the new material.
- E23.3.3 Where the existing ground surface is sloped sufficiently to affect the bond between the old and new materials, the original ground on which the embankment is to be placed shall be ploughed deeply or benched before embankment construction is commenced, as directed by the Contract Administrator.
- E23.3.4 Bench cuts shall consist of excavating horizontal cuts into the slopes of the existing embankment prior to placing widening material thereon. Bench cuts shall be made at vertical intervals of 1.0 m with the base of the first bench being cut approximately 0.5 m above the toe of the existing slope. The base of each bench cut shall extend into the existing slope a minimum width of 2.1 m.
- E23.3.5 Compact the surface where the new embankment material is to be placed to a minimum of 95% Standard Proctor Density. The material shall be compacted at the optimum moisture content, or up to 2% higher than optimum, as directed by the Contract Administrator.
- E23.3.6 Construct embankment in accordance with CW 3110.

#### MEASUREMENT AND PAYMENT

#### E23.4 Preparation of Existing Ground

- E23.4.1 Preparation of the existing ground surface will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Preparation of Existing Ground". the area

to be paid for will be the total number of square metres of existing ground prepared in accordance with this Specification, accepted and measured by the Contract Administrator.

E23.4.2 Payment for bench cuts shall be included in the payment for "Preparation of Existing Ground".

## **E24. SHOP DRAWINGS**

E24.1 Further to General Condition C:6.9, the Contractor shall arrange for the preparation of Shop Drawings required by the Contract or as may reasonably be required by the Contract Administrator.

E24.2 The Contractor shall review all Shop Drawings prior to submitting same to the Contract Administrator. By this review, the Contractor represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data, and that he has checked and coordinated each Shop Drawing with the requirements for the Work and of the Contract. The Contractor's review of each Shop Drawing shall be certified by stamp, date and signature in the manner stipulated by the Contract Administrator.

E24.3 The Contractor shall promptly submit Shop Drawings to the Contract Administrator in an orderly sequence to prevent delay in the Work or in the Work of other contractors. At the time of submission, the Contractor shall notify the Contract Administrator of any deviations in the Shop Drawings from requirements of the Contract. The Contractor shall allow one week for the Contract Administrator's review.

E24.4 The Contract Administrator shall review the Shop Drawings promptly or in accordance with a schedule agreed upon in writing. The Contract Administrator, upon completion of the review, shall communicate either his acceptance or rejection of the Shop Drawings to the Contractor. The Contract Administrator's review and acceptance shall be for conformity to the design concept of the Work and for compliance with the Contract.

E24.5 The acceptance of the Shop Drawings for a component or a subassembly shall not constitute acceptance of the assembly of which it is a part.

E24.6 The review shall not relieve the Contractor of responsibility for errors and omissions in the Shop Drawings or of responsibility for meeting all requirements of the Contract unless a deviation on the Shop Drawings, identified by the Contractor, has been approved by the Contract Administrator.

E24.7 The Contractor shall promptly make any changes in the Shop Drawings which the Contract Administrator may require and which are consistent with the Contract and shall promptly resubmit same to the Contract Administrator for review and acceptance unless otherwise directed by the Contract Administrator. When resubmitting the Shop Drawings, the Contractor shall notify the Contract Administrator of any revisions other than those requested by the Contract Administrator.

E24.8 No Work called for by Shop Drawings shall be undertaken by the Contractor until the Contract Administrator's review is completed and the acceptance of same has been communicated to the Contractor.

E24.9 Each Shop Drawing shall:

- (a) be sheet size ISO A4.
- (b) be submitted as one (1) reproducible transparency and four (4) prints.
- (c) show, in the lower right-hand corner, the following information:
  - (i) the project title
  - (ii) the Bid Opportunity Number or other project number assigned by the Contract Administrator

- (iii) the name of the depicted item exactly as named in the Specifications or on the Drawings
  - (iv) the project series number and the name of the area in which item is used
  - (v) the Specification section number (if applicable)
  - (vi) the option proposed (if applicable)
  - (vii) the drawing date (to be revised for each resubmission)
- (d) be stamped with the seal of a Professional Engineer licensed to practise in the Province of Manitoba, and signed and dated by said Engineer.