



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 305-2005

CONCRETE REPAIRS ON ST. VITAL BRIDGE AND PEDESTRIAN UNDERPASSES

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PART B

BIDDING PROCEDURES

PART B - BIDDING PROCEDURES

B1. PROJECT TITLE

B1.1 CONCRETE REPAIRS ON ST. VITAL BRIDGE AND PEDESTRIAN UNDERPASSES

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, July 5, 2005.

B2.2 Bid Submissions 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. ENQUIRIES

B3.1 All enquiries shall be directed to the Contract Administrator identified in D3.1.

B3.2 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.

B3.3 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.

B3.4 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.

B3.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B3 unless that response or interpretation is provided by the Contract Administrator in writing.

B4. ADDENDA

B4.1 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.

B4.2 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.

B4.2.1 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>.

B4.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Branch internet site for addenda shortly before submitting his Bid.

B4.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 8 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B5. SUBSTITUTES

- B5.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.
- B5.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B5.3 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.
- B5.4 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.
- B5.5 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.
- B5.6 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.
- B5.6.1 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.
- B5.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B5.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative shall 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 B13.
- B5.9 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.

B6. BID SUBMISSION

B6.1 The Bid Submission consists of the following components:

- (a) Form A: Bid;
- (b) Form B: Prices.

B6.2 The Bid Submission shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.

B6.2.1 Samples or other components of the Bid Submission 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 Submission.

B6.3 Bid Submissions submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B6.4 Bid Submissions shall be submitted to:

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

B7. BID

B7.1 The Bidder shall complete Form A: Bid, making all required entries.

B7.2 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.

B7.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B7.2.

B7.3 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.

B7.4 Paragraph 10 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;
- (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.

B7.4.1 The name and official capacity of all individuals signing Form A: Bid shall be printed below such signatures.

B7.4.2 All signatures shall be original.

B7.5 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 Submission and the Contract, when awarded, shall be both joint and several.

B8. PRICES

B8.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B8.2 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.

B8.3 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.

B9. QUALIFICATION

B9.1 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;
- (b) be responsible and not be suspended, debarred or in default of any obligation to the City;
- (c) be financially capable of carrying out the terms of the Contract;
- (d) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract;
- (e) have successfully carried out work, similar in nature, scope and value to the Work;
- (f) employ only Subcontractors who:
 - (i) are responsible and not suspended, debarred or in default of any obligation 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>); and
 - (ii) have successfully carried out work similar in nature, scope and value to the portion of the Work proposed to be subcontracted to them, and are fully capable of performing the Work required to be done in accordance with the terms of the Contract;
- (g) have a written workplace safety and health program in accordance with The Workplace Safety and Health Act (Manitoba).

B9.2 The Bidder shall be prepared to 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.

B9.3 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.

B10. OPENING OF BIDS AND RELEASE OF INFORMATION

B10.1 Bid Submissions 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.

B10.1.1 Bidders or their representatives may attend.

B10.2 After the public opening, the names of the Bidders and their Total Bid Prices as read out (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>.

B10.3 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>.

B10.4 The Bidder is advised that any information contained in any Bid Submission 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.

B11. IRREVOCABLE BID

B11.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 9 of Form A: Bid.

B11.2 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 for the time period specified in Paragraph 9 of Form A: Bid.

B12. WITHDRAWAL OF BIDS

B12.1 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.

B12.1.1 Notwithstanding GC:23.3, 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.

B12.1.2 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 10 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B12.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials shall:

- (a) retain the Bid Submission until after the Submission Deadline has elapsed;
- (b) open the Bid Submission to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 10 of Form A: Bid; and
- (c) if the notice has been given by any one of the persons specified in B12.1.3(b), declare the Bid withdrawn.

B12.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B11.2 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.

B13. EVALUATION OF BIDS

B13.1 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 B9 (pass/fail);
- (c) Total Bid Price;
- (d) economic analysis of any approved alternative pursuant to B5.

B13.2 Further to B13.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid Submission 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 if the interests of the City so require.

B13.3 Further to B13.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid Submission or in other information required to be submitted, that he is responsible and qualified.

B13.4 Further to B13.1(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.

B13.4.1 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.

B14. AWARD OF CONTRACT

B14.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B14.2 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.

B14.2.1 Without limiting the generality of B14.2, 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.

- B14.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid.
- B14.4 Notwithstanding GC:4, the City will issue a Purchase Order to the successful Bidder in lieu of the execution of a Contract.
- B14.5 The Contract, as defined in GC:1.1, in its entirety shall be deemed to be incorporated in and to form a part of the Purchase Order notwithstanding that it is not necessarily attached to or accompany said Purchase Order.

PART C - GENERAL CONDITIONS

C1. GENERAL CONDITIONS

C1.1 The *General Conditions for Construction Contracts* (Revision 2000 11 09) are applicable to the Work of the Contract.

C1.1.1 The *General Conditions for Construction Contracts* 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>.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

- D1.1 In addition to the *General Conditions for Construction Contracts*, these Supplemental Conditions are applicable to the Work of the Contract.
- D1.2 The General Conditions are amended by striking out "The City of Winnipeg Act" wherever it appears in the General Conditions and substituting "The City of Winnipeg Charter".
- D1.3 The General Conditions are amended by striking out "Tender Package" wherever it appears in the General Conditions and substituting "Bid Opportunity".
- D1.4 The General Conditions are amended by striking out "Tender Submission" wherever it appears in the General Conditions and substituting "Bid Submission".
- D1.5 The General Conditions are amended by deleting GC:6.16 and GC:6.17. The City of Winnipeg is now within the jurisdiction of the Manitoba Ombudsman pursuant to The Ombudsman Act.

D2. SCOPE OF WORK

- D2.1 The Work to be done under the Contract shall consist of concrete repair of:
- (a) the southbound curb side traffic barrier of the St. Vital Bridge;
 - (b) the contraction joint of the Canoe Club Pedestrian Underpass; and
 - (c) the contraction joint of the Churchill Drive Pedestrian Underpass.

D3. CONTRACT ADMINISTRATOR

- D3.1 The Contract Administrator is Dillon Consulting Limited, represented by:
- Mr. Robert (Bob) Wiebe
Contract Administrator
200 -895 Waverley Street
Winnipeg, Manitoba R3T 5P4
Telephone No. (204) 453-2301
Facsimile No. (204) 452-4412
- D3.2 At the pre-construction meeting, Bob Wiebe will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D4. CONTRACTOR'S SUPERVISOR

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

D5. NOTICES

- D5.1 Except as provided for in GC:23.2.2, 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 attention of the Chief Financial Officer at the following address or facsimile number:
The City of Winnipeg
Chief Administrative Officer Secretariat
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
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1
Facsimile No.: (204) 947-9155

SUBMISSIONS

D6. INSURANCE

- D6.1 The Contractor shall provide and maintain the following insurance coverage:
- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) all inclusive, with The City of Winnipeg being added as an additional insured, with a cross-liability clause, such liability policy to also contain a contractual liability, an unlicensed motor vehicle liability and a products and completed operations endorsement to remain in place at all times during the performance of the Work and throughout the warranty period; and
 - (b) automobile liability insurance for owned and non-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.
- D6.2 Deductibles shall be borne by the Contractor.
- D6.3 The Contractor shall provide the City Solicitor with a certificate of insurance of each policy, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than seven (7) Calendar Days from notification of the award of Contract.
- D6.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least fifteen (15) Calendar Days prior written notice to the Contract Administrator.

D7. PERFORMANCE SECURITY

- D7.1 If the Contract Price exceeds twenty-five thousand dollars (\$25,000.00), the Contractor shall provide and maintain performance security until the expiration of the warranty period in the form of:
- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; or
 - (b) an irrevocable standby letter of credit issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form attached to these Supplemental Conditions (Form H2: Irrevocable Standby Letter of Credit), in the amount of fifty percent (50%) of the Contract Price; or
 - (c) a certified cheque or draft payable to "The City of Winnipeg", drawn on a bank or other financial institution registered to conduct business in Manitoba, in the amount of fifty percent (50%) of the Contract Price.
- D7.1.1 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.
- D7.2 The Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of Purchase Order and prior to the commencement of any Work on the Site.

SCHEDULE OF WORK

D8. COMMENCEMENT

- D8.1 The Contractor shall not commence any Work until he is in receipt of a Purchase Order from the Award Authority authorizing the commencement of the Work.
- D8.2 The Contractor shall not commence any Work on the Site until:
- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence that the Contractor is 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;
 - (ii) evidence of the workers compensation coverage specified in GC:6.14;
 - (iii) evidence of the insurance specified in D6;
 - (iv) the performance security specified in D7.
 - (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.

D9. SUBSTANTIAL PERFORMANCE

- D9.1 The Contractor shall achieve Substantial Performance by August 26, 2005.
- D9.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D9.3 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.

D10. TOTAL PERFORMANCE

D10.1 The Contractor shall achieve Total Performance by August 26, 2005.

D10.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D10.3 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.

CONTROL OF WORK

D11. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D11.1 Further to GC:6.26, 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).

WARRANTY

D12. WARRANTY

D12.1 Notwithstanding GC:13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to GC:13.2.1 or GC:13.2.2, in which case it shall expire when provided for thereunder.

D13. LAYOUT OF THE WORK

D13.1 The Contract Administrator will provide the basic centrelines and limits of the Works.

D13.2 The Contractor shall be responsible for the true and proper laying out of the Work and for the correctness of the location, levels, dimensions, and alignment of all aspects of the Work. He shall provide all required instruments and competent personnel for performing all layouts.

D13.3 The Contract Administrator shall be notified at least one (1) Working Day prior to any Work being commenced in order to have the option to check and review all elevations and layouts at his discretion.

D13.4 The Contractor shall carefully protect and preserve all benchmarks, stakes, and other items of the basic data supplied by the Contract Administrator. Any such benchmarks or stakes removed or destroyed by the Contractor, without the consent of the Contract Administrator, shall be replaced by the Contract Administrator at the expense of the Contractor.

D14. COOPERATION WITH OTHERS

D14.1 The Contractor's attention is directed to the fact that other Contractors, the personnel of Utilities, and the staff of the City may be working on the approach roadways, adjacent roadways, or rights-of-way. The activities of these agencies may coincide with the Contractor's execution of the Work, and it will be the Contractor's responsibility to cooperate to the fullest extent with other personnel working in the area, and such cooperation is an obligation of the Contractor under the terms of this Contract. For specific coordination of activities at the Site, refer to the Detailed Specifications.

D15. ENVIRONMENTAL PLANNING

D15.1 The Contractor shall conduct his operations in accordance with all current federal, provincial, or other regulations concerning environmental protection and pollution control. It shall be the Contractor's responsibility to familiarize himself with all applicable regulations and to obtain all necessary approvals and permits for his operations.

FORM H1: PERFORMANCE BOND
(See D7)

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. 305-2005

CONCRETE REPAIRS ON ST. VITAL BRIDGE AND PEDESTRIAN UNDERPASSES

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 D7)**

(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. 305-2005

CONCRETE REPAIRS ON ST. VITAL BRIDGE AND PEDESTRIAN UNDERPASSES

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

(Name of Contractor)

(Address of Contractor)

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

_____ Canadian dollars.

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

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

Partial drawings are permitted.

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

(Address)

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

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

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

(Date)

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

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

This credit is subject to the Uniform Customs and Practice for Documentary Credit (1993 Revision), International Chamber of Commerce Publication Number 500.

(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS, STANDARD DETAILS AND DRAWINGS

- E1.1 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.
- E1.1.1 *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>.
- E1.1.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.1.3 Further to GC:2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.
- E1.2 The following Drawings are applicable to the Work:

| <u>Drawing No.</u> | <u>Drawing Name/Title</u> |
|--------------------|--|
| B116-05-01 | St. Vital Bridge Concrete Barrier Repairs - Existing Details & Repairs |
| B116-05-02 | St. Vital Bridge Concrete Barrier Repair - Southbound Curbside Barrier Elevation |
| U216-05-01 | Churchill Dr Pedestrian Underpass Roof and Wall Joint Repairs - Plan and Details |
| U217-05-01 | Canoe Club Pedestrian Underpass Roof and Wall Joint Repairs - Plan and Details |

E2. DETAILED TRAFFIC CONTROL

- E2.1 Description
- The Work covered under this item shall cover specific traffic control requirements.
 - 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.
- E2.2 Notification
- The Contractor shall notify the City of Winnipeg Customer Service at 986-5640, one day in advance of any traffic lane closures.
- E2.3 Construction Methods
- E2.3.1 General
- The Contractor will be responsible for pedestrian and traffic control at the site acceptable to the Contract Administrator.
 - For traffic control in the immediate Work area, the Contractor shall erect and maintain all applicable traffic control devices in accordance with the provision contained in the latest edition of the "Manual of Temporary Traffic Control in Work Areas on City Streets," issued by the City of Winnipeg.
 - The Contractor shall provide and maintain flagmen in accordance with the above-mentioned manual.
 - The Contractor shall take all other safety measures necessary to cope with any peculiar or unusual circumstances that have not been set out in the above-mentioned

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

- (e) Improper signing will be sufficient reason for the Contract Administrator or Inspector to immediately shut down the entire job.
- (f) Barricades supplied and installed by the Contractor and the telephone number(s) at which he can be reached twenty-four (24) hours per day, seven (7) days per week.
- (g) During the hours when the Contractor is not working, equipment and stockpiled materials shall be left in such a location so as not to interfere with or present a hazard to motorists or pedestrians.

E2.3.2 Specific

- (a) St. Vital Bridge Sidewalk
 - (i) Close the sidewalk only at times when repair work is taking place. Signs at each end of the bridge should advise pedestrians to use the other side. Signs shall be placed appropriately at the nearest street crossing locations.
- (b) St. Vital Bridge Lane
 - (i) The curb lane southbound on St. Vital Bridge may be closed except in the time period weekdays from 15:30 to 18:00 hours.
- (c) Pedestrian Underpasses
 - (i) The pedestrian underpasses may not be closed except for short one or two minute periods. Otherwise, pedestrians are to be afforded full access through the underpasses. Work shall be suspended to allow pedestrians to pass through the underpass.

E2.4 Measurement and Payment

- (a) There will be no separate measurement or payment for Traffic Control as this Work will be considered incidental to the remainder of the Work of this Contract.

E3. CONCRETE REPAIRS

E3.1 Description

- (a) This Specification shall cover all operations relating to the repair of designated concrete areas on the St. Vital Bridge, the Churchill Drive Pedestrian Underpass, and the Canoe Club Pedestrian Underpass, as herein specified.
- (b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E3.2 Materials

E3.2.1 General

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

E3.2.2 Handling and Storage of Materials

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

E3.2.3 Testing and Approval

- (a) All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Testing Laboratory designated by the Contract Administrator. There shall be no charge to the Owner for any materials taken by the Contract Administrator for testing purposes.
- (b) All materials shall be approved 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 Specifications detailed herein or are found to be defective in manufacture or have become damaged in transit, storage, or handling operations, then such materials shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E3.2.4 Grout for Pumping

- (a) Grout for pumping shall be Sika Grout 212 HP or equal as approved by the Contract Administrator.

E3.2.5 Concrete Strength and Workability

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

- Minimum Compressive Strength @ 28 days = 35 MPa
- Maximum Water/Cement Ratio = 0.40
- Minimum Cement Content = 365 kg/m³
- Slump = 75 mm ± 25 mm
- Coarse Aggregate Maximum Size = 20 mm Nominal
- Air Content for Hardened Concrete = 20 mm Aggregate = 5.0% or 8.0%
- Cement = Type 10

E3.2.6 Concrete Aggregate

- (a) 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 approved by the Contract Administrator. Changes in the source of aggregate supply during the course of the Contract will not be permitted without notification in writing to and the expressed approval of the Contract Administrator.

(i) 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 substance.
- ◆ Fine aggregate shall be well-graded throughout and shall conform to the following grading requirements:

| <u>Sieve Size</u> | <u>Percent of Total Dry Weight Passing Each Sieve</u> |
|-------------------|---|
| 10 mm | 100% |
| 5 mm | 95% - 100% |
| 2.5 mm | 80% - 100% |
| 1.25 mm | 50% - 90% |
| 630 µm | 25% - 65% |
| 315 µm | 10% - 35% |
| 160 µm | 2% - 10% |
| 80 µm | 0% - 3% |

(ii) Coarse Aggregate (20 mm Nominal)

- ◆ Coarse aggregate shall be clean and free from alkali, organic, or other deleterious matter, shall have an absorption not exceeding 3%, and shall conform to the following gradation requirements:

| <u>Sieve Size</u> | <u>Percent of Total Dry Weight Passing Each Sieve</u> |
|-------------------|---|
| 28 mm | 100% |
| 20 mm | 85% - 100% |
| 14 mm | 60% - 90% |
| 10 mm | 25% - 60% |
| 5 mm | 0% - 10% |
| 2.5 mm | 0% - 5% |

E3.2.7 Cement

- (a) All cement, unless hereinafter specifically stated, shall be Type 10 Portland Cement.

E3.2.8 Water

- (a) Water used for mixing concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances. It shall be equal to potable water in physical and chemical properties.

E3.2.9 Admixtures

- (a) Air-Entraining Agent
 - (i) The air-entraining agent shall conform to the requirements of ASTM Standard C260. It shall produce a satisfactory air void system and an air content within the ranges specified in CSA A23.1 for each class of concrete.
- (b) Water-Reducing Agent
 - (i) Water-reducing agent shall conform to the requirements of ASTM Standard C494.
- (c) Superplasticizing Agent
 - (i) The superplasticizing agent shall conform to the requirements of ASTM Standard C494. The agent shall be free of chlorides and shall not affect the air-entraining agent's ability to produce a satisfactory air-void system.
- (d) Shrinkage Reducing
 - (i) Shrinkage reducing admixture shall conform to the requirements of ASTM Standard C157. An approved product is Tetraguard AS20 by Masterbuilders.

E3.2.10 Bonding Agents

- (a) If a concrete bonding agent is used, the Contractor shall identify the product(s) and submit product information to the Contract Administrator for review.
- (b) Epoxy resin for bonding reinforcing steel into holes in hardened concrete shall be epoxy resin of a type listed in the approved products list, Specification CW 3310 conforming to the requirements of ASTM Standard C881. Type I or Type IV Grade 3 epoxy shall be used for bonding reinforcing steel into hardened concrete. Bonding agents for bonding reinforcing steel into holes in hardened concrete other than epoxy resin may be permitted provided that they develop a minimum pullout resistance of 50 kN within 48 hours after installation.

E3.2.11 Curing Compound

- (a) Curing compound shall be liquid membrane-forming and conform to the requirements of ASTM Standard C309 and the proposed Standard ASTM P198. Rate of application shall be 1.5 times the rate required to meet the requirements of ASTM P198 for the texture of concrete to which the curing compound is being applied.
- (b) Curing compounds shall be resin-based and white-pigmented.

E3.2.12 Reinforcing Steel

- (a) Reinforcing steel shall be epoxy-coated and conform to the requirements of CSA Standard G30.18-Grade 400W.

E3.2.13 Bar Accessories

- (a) Bar accessories shall be of a type approved by the Contract Administrator. They shall be made from a non-rusting material, and shall not stain, blemish, or spall the concreted surface for the life of the concrete.
- (b) Bar accessories shall include bar chairs, spacers, clips, wire ties, wire (18 gauge minimum), or other similar devices that may be approved by the Contract Administrator.

E3.2.14 Form Liner

- (a) Form liner shall be "Hyroform" or equal as accepted by the Contract Administrator.

E3.2.15 Precompressed Foam Joint Filler

- (a) Precompressed foam joint filler shall be compressed to 20% of its expanded width and be a polyurethane foam, impregnated throughout with a latex modified asphalt. Approved products are "Emseal," by Emseal Corporation or "Willseal." Manufacturer's recommended primer and top coat are to be used.

E3.2.16 Field Applied Epoxy-Coating

- (a) Field applied epoxy-coating shall be approved touch-up epoxy-coating material as specified by the manufacturer for touching up the shop coating and field coating existing reinforcing bars.
- (b) Approved touch-up epoxy-coating materials are as follows:
 - (i) 3M Scotchcoat 302, 309, 312, or 313.
 - (ii) Sterling 10686.

E3.2.17 Rail Post Anchor Bolts

- (a) Rail post anchor bolts shall be 250 mm x 16 mm diameter stainless steel; each complete with one stainless steel hex nut, one stainless steel lock washer, one stainless steel flat washer, and one 50 mm diameter galvanized flat washer with 18 mm diameter hole. The anchor bolts shall be threaded for 65 mm and shall be prebent as shown on the Drawings (where applicable). The stainless steel hex head and socket head cap screws shall conform to ASTM A276 type 430 and the dimensional requirements of ANSI B18.3

E3.2.18 Injection Resin Foam

- (a) The injection resin foam shall be a single component, hydrophobic polyurethane complete with an accelerator. The resin shall form a closed cell structure when cured. The resin shall be SPECTON FLEX 1000 or equal as approved by the Contract Administrator.

E3.3 Equipment

- E3.3.1 All equipment shall be of a type accepted by the Contract Administrator and shall be kept in good working order.

E3.4 Construction Methods

E3.4.1 Type 1 Option 1 Concrete Barrier Repairs

- (a) Remove all of the affected deteriorated concrete volume by sawcutting off the top of the barrier.
- (b) Restore all the reinforcing steel that was removed by installing into predrilled holes with an approved bonding grout as follows:
 - (i) Drill holes into adjacent concrete of the diameters and depths shown on the Drawings or to match existing. Drill bits shall have a diameter no larger than 2 mm larger than the nominal dowel or tie bar diameter.
 - (ii) Holes shall be located to the correct depth and alignment as indicated on the Drawings.
 - (iii) Drilling equipment shall be operated so as to ensure that no damage to the concrete results from such drilling operation. Coring of holes is not permitted. In the event that existing reinforcing steel bars are hit during the drilling operations, that hole shall be abandoned and a new hole shall be drilled nearby to the correct depth. All abandoned holes shall be filled with non-shrink grout.
 - (iv) Touch up all cut or damaged surfaces of new or existing exposed reinforcing steel with field-applied epoxy coating.
 - (v) Holes for reinforcing steel shall be blown clean with compressed air. Bonding agent shall be placed in the back of the drilling hole. The reinforcing steel shall be worked back into the holes for complete coverage around the portion of the bar that extends into the hole, such that bonding agent is squeezed from the hole.
 - (vi) Once all reinforcing steel is in position, it shall be inspected and approved by the Contract Administrator before any new concrete is placed. Otherwise, the concrete may be rejected by the Contract Administrator and shall be removed by the Contractor at his own expense.
 - (vii) Reuse existing cleaned traffic barrier rail post anchor bolts or supply new bolts equal to existing.
 - (viii) Place concrete into forms.

E3.4.2 Type 1 Option 2 & Type 2 Concrete Barrier Repairs and Pedestrian Underpass Repairs

- (a) Sawcut perimeter of area to be repaired to a minimum depth of 20 mm. Mechanically remove unsound concrete to the limits indicated on the Drawings or to the depth of unsound concrete, whichever is greater. Remove at least 25 mm of existing concrete facing, even if not delaminated, and continue removal as required to expose sound aggregate. Where reinforcing steel with active corrosion is encountered, comply with the following:
 - (i) If half or greater of the diameter of the reinforcing steel is exposed, chip out behind the reinforcing to a 20 mm minimum depth.
 - (ii) Abrasive blast reinforcing steel and concrete to remove rust and contaminants. Field epoxy-coat all exposed reinforcing.
 - (iii) Splice new reinforcing steel to existing steel where corrosion has depleted the cross section area by 25%, as directed by the Contract Administrator.
- (b) Install a polyurethane injection resin into the outside of the joints in the pedestrian underpasses to form a watertight seal.
- (c) The Contractor is responsible to create a bond between the new mortar/concrete and the existing substrates. This may be done by either the application of a suitable bonding agent or grout, using a self-bonding mortar or concrete, by encapsulating existing reinforcing steel or by installing small stainless steel anchor bolts. The Contract Administrator will check all repaired areas for bond using a hammer

“sounding” method after form removal. Place mortar or concrete by trowelling, pumping, or into forms ensuring that all entrapped air is removed.

E3.4.3 General Curing

- (a) Refer to Clause E4.4.9 for hot weather curing requirements.
- (b) The use of curing compound will not be allowed on concrete areas that are to receive additional concrete or waterproofing.
- (c) Unformed concrete surfaces shall be covered and kept moist by means of wet polyester blankets for two (2) consecutive days immediately following finishing operations or otherwise approved by the Contract Administrator and shall be maintained at above 10°C for at least seven (7) consecutive days thereafter. Construction joints shall only be covered and kept saturated by means of wet polyester curing blankets for the curing period.
- (d) Unformed surfaces shall have curing compound applied immediately after the wet curing period.
- (e) Curing compounds shall be applied at the rate of not less than 4 m²/L. The compound must be applied uniformly and by roller. Spraying of the compound will not be permitted.
- (f) Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping, or running water, vibration, and mechanical shock. Concrete shall be protected from freezing until at least twenty-four hours after the end of the curing period.
- (g) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3° in any one hour period or 20° in any twenty-four hour period.
- (h) Formed surfaces shall receive, immediately after stripping and patching, the same application of curing compound as finished surfaces.
- (i) After completing the finishing of unformed surfaces, where curing compound is not permitted, the surfaces shall be promptly covered with a minimum of a single layer of clean, damp polyester curing blanket and 6 mil polyethylene.
- (j) Care shall be exercised to ensure that the polyester curing blanket is well drained and that it is placed as soon as the surface will support it without deformation. The Contractor shall ensure that water from the polyester curing blankets does not run into areas where concrete placement and finishing operations are underway. If this occurs, concrete placement shall stop until the problem is corrected satisfactory to the Contract Administrator.

E3.4.4 Form Removal

- (a) All forms shall remain in place for a minimum of five (5) days. The Contract Administrator must be notified at least 24 hours prior to any form removal. The Contractor must receive approval from the Contract Administrator prior to beginning work.
- (b) The minimum strength of concrete in place for safe removal of soffit forms for horizontal or inclined members, as well as vertical forms shall be 20 MPa, with the added provisions that the member shall be of sufficient strength to carry safely its own weight, together with superimposed construction loads, and that the forms shall stay in place a minimum of three days unless otherwise approved by the Contract Administrator.
- (c) Field-cured test specimens, representative of the in-place concrete being stripped will be tested, as specified in this Specification, to verify the concrete strength.

E3.4.5 Patching of Formed Surfaces

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

E3.4.6 Cold Weather Concreting

- (a) The requirements of this section shall be applied to all concreting operations during cold weather; i.e., if the mean daily temperature falls below 5°C during placing or curing.
- (b) The Contract Administrator will advise the Contractor, in writing, as to the degree of heating of water and aggregates.
- (c) Supplementary equipment, as required below, shall be at the job site if concrete is likely to be placed in cold weather.
- (d) Formwork and reinforcing steel shall be heated to at least 5°C before concrete is placed.
- (e) The temperature of the concrete shall be maintained at not less than 10°C for seven days or 15°C for five days or 20°C for three days after placing. The concrete shall be kept above freezing temperature for at least a period of seven days. In no case shall the heating be removed until the concrete has reached a minimum compressive strength, which will be specified by the Contract Administrator for work under construction, and as determined from compressive strength tests for specimens secured under the same conditions as the concrete works in question.
- (f) Aggregates shall be heated to a temperature of not less than 20°C and not more than 65°C. Water shall be heated to a temperature between 55°C and 65°C. The temperature of the concrete at the time of placement shall be within the range specified in CSA Standard CAN/CSA-A23.1 for the thickness of the section being placed.
- (g) When the mean daily temperature may fall below 5°C, a complete hoarding of the work, together with supplementary heat, shall be provided.

- (h) When the ambient temperature is below -15°C , the hoarding shall be constructed so as to allow the concrete to be placed without the hoarding having to be opened. If the mixing is done outside of the hoarding, the concrete shall be placed by means of hoppers installed through the hoarding. The hoppers are to be plugged when not in use.
- (i) When the ambient temperature is equal to or above -15°C , the Contractor will be permitted to open small portions of the hoarding for a limited time to facilitate the placing of the concrete.
- (j) Before depositing any of the concrete, the Contractor shall show that enough heating equipment is available to keep the air temperature surrounding the forms within the specified range. This shall be accomplished by bringing the temperature inside of the hoarding to the specified 20°C , at least 12 hours prior to the start of the concrete placing.
- (k) The Contractor shall supply all required heating apparatus and the necessary fuel. When dry heat is used, a means of maintaining atmospheric moisture shall be provided. The relative humidity within the heated enclosure shall be maintained at a minimum of 40 percent during concrete placing and finishing operations. Surface moisture evaporation rates shall not exceed the limits specified in E4.4.3(e). Following finishing operations, exposed concrete surfaces shall be protected from excessive drying by applying curing compound, covering the surfaces with polyethylene, or providing water curing.
- (l) Sufficient standby heating equipment must be available to allow for any sudden drop in outside temperatures and any breakdowns which may occur in the equipment.
- (m) Combustion-type heaters may be used if their exhaust gases are vented outside the enclosures and not allowed to come into contact with concrete surfaces. Fire extinguishers must be readily at hand wherever combustion-type heaters are used.
- (n) The Contractor shall keep a curing record of each concrete pour. The curing record shall include: date and location of the pour, mean daily temperature, hoarding relative humidity, temperatures above and below the concrete surface at several points, and notes regarding the type of heating, enclosure, unusual weather conditions, etc. This record shall be available for inspection by the Contract Administrator at the end of the concrete operations.

E3.4.7 Hot Weather Concreting

- (a) General
 - (i) The requirements of this section shall be applied during hot weather; i.e. air temperatures above 25°C during placing.
 - (ii) Concrete shall be placed at as low a temperature as possible, preferably below 15°C , but not above 22°C . Aggregate stockpiles may be cooled by watersprays and sunshades.
 - (iii) Ice may be substituted for a portion of the mixing water, providing it has melted by the time mixing is completed.
 - (iv) Form and conveying equipment shall be kept as cool as possible before concreting, by shading them from the sun, painting their surfaces white, and/or the use of watersprays.
 - (v) Sunshades and wind breaks shall be used as required during placing and finishing.
 - (vi) Work shall be planned so that concrete can be placed as quickly as possible to avoid "cold joints."
 - (vii) The Contract Administrator's approval is necessary before the Contractor may use admixtures, such as retardants, to delay setting or water-reducing agents

to maintain workability and strength, and these must then appear in the Mix Design Statement submitted to the Contract Administrator.

- (viii) Curing shall follow immediately after the finishing operations.
- (b) Hot-Weather Curing
 - (i) When the air temperature is at or above 25°C, curing shall be accomplished by water spray or by using saturated absorptive fabric, in order to achieve cooling by evaporation. Mass concrete shall be water cured for the basic curing period when the air temperature is at or above 20°C, in order to minimize the temperature rise of the concrete.
- (c) Job Preparation
 - (i) When the air temperature is at or above 25°C, or when there is a probability of 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 E4.4.3(e), the formwork, reinforcement, and concreting equipment shall be protected from the direct rays of the sun or cooled by fogging and evaporation.
- (d) Concrete Temperature
 - (i) The temperature of the concrete as placed shall be as low as practicable and in no case greater than that shown below for the indicated size of the concrete section.

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

E3.4.8 Cleanup

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

E3.5 Measurement and Payment

E3.5.1 St. Vital Bridge - Concrete Barrier Repairs - Type 1

- (a) Concrete Barrier Repairs - Type 1 will be measured on a linear metre basis and paid for at the Contract Unit Price for "St. Vital Bridge - Concrete Barrier Repairs - Type 1." The amount to be paid for shall be the total number of linear metres, repaired in accordance with this Specification and accepted by the Contract Administrator.

E3.5.2 St. Vital Bridge - Concrete Barrier Repairs - Type 2

- (a) Concrete Barrier Repairs - Type 2 will be measured on a square metre basis and paid for at the Contract Unit Price for "St. Vital Bridge - Concrete Barrier Repairs - Type 2." The amount to be paid for shall be the total number of square metres repaired in accordance with this Specification and accepted by the Contract Administrator.

E3.5.3 Roof and Wall Joint Repairs

- (a) Roof and wall joint repairs will not be measured. This work will be paid for at the Contract Lump Sum Price for the "Items of Work" listed herebelow, performed in accordance with this Specification and accepted by the Contract Administrator.

Items of Work:

Roof and Wall Joint Repairs

- (i) Churchill Drive Pedestrian Underpass
- (ii) Canoe Club Pedestrian Underpass