



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 196-2005

ST. JAMES BRIDGE NORTHBOUND PIER 17 CONCRETE REPAIRS

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PART B

BIDDING PROCEDURES

PART B - BIDDING PROCEDURES

B1. PROJECT TITLE

B1.1 ST. JAMES BRIDGE NORTHBOUND PIER 17 CONCRETE REPAIRS

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, May 3, 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. SITE INVESTIGATION

B3.1 Further to GC:3.1, the Bidder may view the Site without making an appointment.

B3.2 The Bidder is advised that prior to tendering, it is his responsibility to make himself fully acquainted with the extent of the Work and the nature of the Site. The Bidder is advised that some work has already been undertaken. See Clause E2.4 for further details.

B3.3 The Bidder agrees that he will make no claim at any time after the Bid Submission is made, where such a claim is based on conditions or information that would have been known to him if he had visited the site or taken reasonable steps to familiarize himself with the extent of the Work and the nature of the Site prior

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.

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- B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.
- B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- B5.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Branch internet site for addenda shortly before submitting his Bid.
- B5.3 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.

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 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 B14.
- 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 SUBMISSION

- B7.1 The Bid Submission consists of the following components:
- (a) Form A: Bid;
 - (b) Form B: Prices.
- B7.2 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.
- B7.2.1 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.
- B7.3 Bid Submissions submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.
- B7.4 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

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 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.
- 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 shall be original.
- 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 Submission 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.
- B9.2** 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;
 - (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);

B10.2 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.

B10.3 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.

B11. OPENING OF BIDS AND RELEASE OF INFORMATION

B11.1 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.

B11.1.1 Bidders or their representatives may attend.

B11.2 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>.

B11.3 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>.

B11.4 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.

B12. IRREVOCABLE BID

B12.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 9 of Form A: Bid.

B12.2 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.

B13. WITHDRAWAL OF BIDS

B13.1 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.

B13.1.1 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.

B13.1.2 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.

- B13.1.3** 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 B13.1.3(b), declare the Bid withdrawn.

B13.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B12.2 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.

B14. EVALUATION OF BIDS

- B14.1** 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.
- B14.2** Further to B14.1(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.
- B14.3** Further to B14.1(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.
- B14.4** Further to B14.1(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.
- B14.4.1** 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. AWARD OF CONTRACT

- B15.1** The City will give notice of the award of the Contract or will give notice that no award will be made.
- B15.2** 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.
- B15.2.1** Without limiting the generality of B15.2, 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.

- B15.3 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.
- B15.4 Notwithstanding GC:4, the City will issue a Purchase Order to the successful Bidder in lieu of the execution of a Contract.
- B15.5 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 completing localized concrete pier repairs at the St. James Bridge Northbound in the City of Winnipeg. All work will be undertaken at Pier 17, which is the first pier immediately south of Wolseley Avenue.
- D2.2 The major components of the Work are as follows:
- (a) Minor concrete removals at existing repair areas (concrete removal at identified locations have been previously undertaken by others);
 - (b) Sandblasting existing concrete and rebar surfaces;
 - (c) Installing galvanic anodes in repair areas;
 - (d) Forming repair areas;
 - (e) Placement and curing of concrete.

D3. CONTRACT ADMINISTRATOR

- D3.1 The Contract Administrator is:
- B.A. Neirinck, P. Eng
Bridge Planning & Operations Engineer
100 Main Street, Winnipeg, Manitoba, R3C 1A4
- Telephone No. (204) 986-7950
Facsimile No. (204) 942-4811

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

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;
- (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.

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- D6.3 The Contractor shall provide the City Solicitor with a certified true copy or 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.
- D8.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the Purchase Order

D9. SUBSTANTIAL PERFORMANCE

- D9.1 The Contractor shall achieve Substantial Performance by June 30, 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 June 30, 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.

D11. LIQUIDATED DAMAGES

- D11.1 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 five hundred dollars (\$500.00) per Calendar Day for each and every Calendar Day following the day fixed herein for Total Performance during which such failure continues.
- D11.2 The amount specified for liquidated damages in D11.1 is based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve Total Performance by the day fixed herein for same.
- D11.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D12. SCHEDULED MAINTENANCE

- D12.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications.
- D12.2 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

D13. JOB MEETINGS

- D13.1 Job meetings will be held at the Site as determined by the Contract Administrator. 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.
- D13.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

D14. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

- D14.1 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

D15. WARRANTY

- D15.1 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.

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. 196-2005

ST. JAMES BRIDGE NORTHBOUND PIER 17 CONCRETE REPAIRS

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.

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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. 196-2005

ST. JAMES BRIDGE NORTHBOUND PIER 17 CONCRETE REPAIRS

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>
B102-05-01	St. James Bridge Northbound Over Assiniboine River Pier 17 Concrete Repairs – Plan & Elevations
B102-05-02	St. James Bridge Northbound Over Assiniboine River Pier 17 Concrete Repairs – Repair Areas

E2. CONCRETE SURFACE REPAIRS

E2.1 Description

This Section shall cover all operations relating to the designated concrete surface repairs for Pier No. 17 located immediately south of Wolseley Avenue.

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 Materials

E2.2.1 General

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

E2.2.2 Handling and Storage of Materials

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.

E2.2.3 Testing and Approval

All materials supplied under this Section 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.

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.

E2.2.4 Concrete Aggregate

The Contractor shall furnish in writing to the Contract Administrator, the location of the sources where aggregate will be obtained, in order that it 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.

(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, load, 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%

(b) Coarse Aggregate (14 mm Nominal)

Coarse aggregate shall consist of natural gravel, crushed stone or other approved materials with 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 and shall conform to the following grading requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>
20 mm	100%
14 mm	90% - 100%
10 mm	45% - 75%
5 mm	0% - 15%
2.5 mm	0% - 5%

E2.2.5 Cement

All cement, unless hereinafter specifically stated, shall be Type 10 Normal Portland Cement.

E2.2.6 Water

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.

E2.2.7 Admixture

The following admixtures shall be provided for concrete specified in this section. Admixtures shall be added in the appropriate proportions to produce concrete having the properties specified herein. Concrete mix designs are the responsibility of the Contractor, and it is the Contractor's responsibility to ensure that each admixture is compatible with all other constituent materials with respect to proper performance of the admixture, as well as with respect to proper performance of the other constituents in the presence of the admixture.

(a) Air-Entraining Agent

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

Water-reducing agent shall conform to the requirements of ASTM Standard C494.

(c) Superplasticizing Agent (High-range water reducer)

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 Agent

Shrinkage reducing admixture shall conform to the requirements of ASTM Standard C157. An approved product is Tetraguard AS20 by Masterbuilders.

E2.2.8 Formliner

Formliner shall be Zemdrain by Dupont, or equal as approved by the Contract Administrator. Formliner shall be used on all formed surfaces.

E2.2.9 Concrete Supply

Unless otherwise specified in these Specifications, only the use of a ready-mix concrete plant will be permitted. Concrete shall be proportioned, mixed, and delivered in accordance with the requirements of CSA Standard CAN3-A23.1, "Production of Concrete," except that the transporting of ready-mixed concrete in non-agitating equipment will not be permitted unless prior written approval is received from the Contract Administrator.

Unless otherwise directed by the Contract Administrator, the discharge of ready-mixed concrete shall be completed within one and a half (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.

E2.2.10 Miscellaneous Materials

The Contractor shall supply all materials, as approved by the Contract Administrator, to ensure the satisfactory completion of the concrete surface repair works.

E2.2.11 Concrete Mix Design for Concrete Repairs

Proportioning shall be such as to yield concrete having the required properties as follows:

35 MPa Concrete

- (a) Specified Compressive Strength @ 28 Days - 35 MPa
- (b) Minimum Cement Content = 365 kg/m³
- (c) Water/Cement ratio = 0.40
- (d) Slump = 80 mm ± 20 mm before addition of superplastizer
- (e) Aggregate: 14 mm Nominal
- (f) Air Content: 5 to 8 percent
- (g) Water reducing agent
- (h) Superplasticizer (high range water reducer)
- (i) Shrinkage reducing admixture

Fly ash is permitted to a maximum of 15% of cement content.

Concrete must be capable of completely filling the forms and working fully around all reinforcing steel without segregation of the aggregate and without producing voids or honeycombing. The workability shall be suitable for the Contractor's approved placement procedures, and bond to the existing concrete.

The Contractor shall submit the proposed mix designs at least two weeks before the commencement of concrete placing operations. Acceptance of any proposed alternate concrete mix design is at the discretion of the Contract Administrator.

E2.2.12 Self-Compacting Concrete

Self-compacting concrete with properties equal or better than the above mix design will be considered an equal. Such concrete must be capable of completely filling the forms and work fully around the reinforcing steel without segregation of the aggregate and without producing voids or honeycombing. Acceptance of any proposed mix design will be at the discretion of the Contract Administrator.

E2.2.13 Concrete for Overhead Soffit Repairs

The Contractor may consider pressure grouting or low velocity spraying as an application method for overhead soffit repairs. Any proposed repair material shall be subject to the approval of the Contract Administrator and must meet or exceed the properties of the ready mix concrete specified above.

E2.3 Equipment

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

E2.4 Construction Methods

E2.4.1 General

Concrete removals in the designated repair areas have already been undertaken. The Contractor should have viewed the site during the Bidding period to satisfy himself as to the extent and quality of Work already performed as well as the condition of the site.

Scaffolding at the site has been rented from and erected by Altered State Scaffolding. Any modifications or additions to the scaffolding to suit the Contractor's operations and safety program shall be undertaken at his expense. Prior to the start of work, the Contractor shall inspect the scaffolding with the Contract Administrator to identify any damage. Any cost for additional damage during the course of his operations will be borne by the Contractor. The Contractor shall arrange to have the scaffolding removed by Altered State Scaffolding when it is no longer required.

The Contractor is advised that the hoarding belongs to the City. At the conclusion of the project, or when it is no longer needed, the Contractor shall dismantle and deliver shall deliver the hoarding material to the City Bridge Yard at 849 Ravelston Avenue. Contact Mike Terleski at 794-8510, to arrange a suitable time and date for delivery.

E2.4.2 Additional Repair Areas

Should additional repair areas or enlargements to existing repair areas be required, the concrete removal only shall be undertaken as extra work on a cost-plus basis in accordance with the General Conditions.

In such cases the perimeter of the new repair areas will be sawcut to a depth of 25mm. Concrete shall be removed to a depth of 20mm beyond the reinforcing steel or to the depth of deterioration unless otherwise approved by the Contract Administrator.

E2.4.3 Preparation

The Contractor is responsible for any minor concrete removals within the identified repair area to ensure a durable substrate prior to sandblasting.

After completion of concrete removals, satisfactory to the Contract Administrator, all resulting concrete and reinforcing steel surfaces shall be thoroughly cleaned by sandblasting. All sandblast materials shall be blown out of the repair area, cleaned up, and removed off and away from the site as approved by the Contract Administrator.

The Contractor shall erect screens or hoardings around the work area as required and as directed by the Contract Administrator to protect adjacent property, vehicles and pedestrians during sandblasting operations.

E2.4.4 Installation of Embedded Galvanic Anodes

Following preparation, install embedded galvanic anodes in accordance with Specification E3, Embedded Galvanic Anodes. This Work is considered incidental to the concrete repairs and no additional measurement or payment will be made.

E2.4.5 Formwork and Shoring

Formwork shall be designed, erected, braced and maintained to safely support all vertical and lateral loads until such loads can be supported by the concrete all in accordance with CSA Standard CAN/CSA S269.3.

As a maximum, the following spacings shall apply, for studding and waling:

20 mm plywood:	studding - 400 mm centre to centre
	walers - 760 mm centre to centre

Forms shall be clean before use. Plywood and other wood surfaces shall be sealed against absorption of moisture from the concrete by a factory-applied liner.

Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be commercially manufactured types. The portion remaining within the concrete shall leave no metal within 50 mm of the surface when the concrete is exposed to view. Spreader cones on ties shall not exceed 25 mm in diameter.

All exposed edges shall be chamfered 25 mm unless otherwise noted on the Drawings.

Slots, recesses, chases, sleeves, inserts, bolts, hangers and other items shall be formed or set in coordination and cooperation with the trade concerned. No openings shall be made in structural members, which are not shown on the structural Drawings without the prior approval of the Contract Administrator.

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

Mud sills of suitable size shall be provided beneath shores, bedded in sand or stone, where they would otherwise bear on soil. The soil below shores must be adequately prepared to avoid settlements during or after concreting. Shores must not be placed on frozen ground.

Brace shores horizontally in two directions and diagonally in the same two vertical planes so that they can safely withstand all dead and moving loads to which they will be subjected.

The loads and lateral pressures outlined in Part 3, Section 102 of "Recommended Practice for Concrete Formwork", (ACI 347) and wind loads as specified by the National Building Code shall be used for design. Additional design considerations concerning factors of safety for formwork elements and allowable settlements outlined in Section 103 of the above reference shall apply.

Formwork shall have sufficient strengths and rigidity so that the resultant finished concrete conforms to the shapes, lines and dimensions of the members shown on the Drawings.

Formwork shall be constructed to permit easy dismantling and stripping and such that removal will not damage the concrete. Provision shall be made in the formwork for shores to remain undisturbed during stripping where required.

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.

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.

Forms shall be sufficiently tight to prevent leakage of grout or cement paste.

Form panels shall be constructed so that the contact edges are kept flush and aligned.

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.

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.

It shall be permissible to use the forms over again where possible to a maximum of 3 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.

E2.4.6 Concrete Placement

Prior to installing forms or placing concrete, provide access for the Contract Administrator to inspect the concrete substrate in the repair area. The Contract Administrator, in his discretion, may require additional concrete removal based on the condition of the substrate.

The existing concrete substrate shall be in a saturated surface-dry condition at the time of concrete placement. If necessary, as determined by the Contract Administrator, the Contractor shall erect screens to shade the freshly placed concrete from direct sunlight or wind in order to prevent excessive rapid drying of the concrete. A hoarding is currently in place.

For localized repairs where forms are not open at the top, the forms shall be vented at their highest point to allow for air to escape during placement of concrete.

Place concrete in repair areas such that the finished surface is flush with the original surface of the concrete.

The Contractor shall use mechanical vibrators or other means as required and accepted by the Contract Administrator to ensure that the concrete is fully consolidated and thoroughly worked around the reinforcement, around embedded items and into the corners of forms, eliminating all air or stone pockets. The use of superplasticized concrete does not remove the requirement for concrete consolidation by vibration or other means.

Cure concrete in accordance with the curing procedures as specified herein.

After curing, provide access to the Contract Administrator for inspection of the repair areas. If any defects such as delaminations are found, the defective area shall be removed and redone to the satisfaction of the Contract Administrator.

Following curing, supply and apply pigmented concrete sealer to all new and existing concrete surfaces in accordance with the requirements of Section E3.

E2.4.7 Testing of Concrete Placement

To approve the Contractor's proposed method of placing pier cap concrete, the Contractor shall cast a test section to test the proposed placement method. The test area shall be of a size acceptable to the Contract Administrator.

E2.4.8 Finishing of Concrete Surfaces

(a) Type 1 Finish - Unformed Surfaces

All unformed concrete surfaces except the bridge deck slab and approach slabs 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 from 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.

Bearing surface seats shall be sloped away from the bridge girder bearing so that water cannot pond against the bearings.

E2.4.9 General Curing

Refer to E3.4.9 for cold weather curing requirements and E3.4.10 for hot weather curing requirements.

The use of curing compound will not be allowed.

Freshly finished concrete be covered and kept moist by means of wet polyester blankets immediately following finishing operations and shall be maintained in that condition at above 10°C for a curing period of at least seven (7) consecutive days thereafter.

Concrete shall be protected during the curing period 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 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.

Surfaces of concrete which are protected by formwork that is left in place for seven (7) days shall not require any additional curing. If forms are removed in less than seven (7) days the concrete shall receive a moist curing as described since the concrete was placed.

E2.4.10 Form Removal

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

The concrete forms shall remain in place a minimum of five (5) days, unless otherwise accepted by the Contract Administrator. The formwork may not be loosened during this period.

The minimum strength of concrete in place for safe removal of soffit forms for horizontal or inclined members 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, and that the forms shall stay in place a minimum of five days unless otherwise accepted by the Contract Administrator.

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.

E2.4.11 Hot Weather Concreting

The requirements of this section shall be applied during hot weather, i.e. air temperatures above 25°C during placing.

Concrete shall be placed at as low a temperature as possible, preferably below 15°C but not above 27°C. Aggregate stockpiles may be cooled by water sprays and sun shades.

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.

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 below the formwork, reinforcement, and concreting equipment shall be protected from the direct rays of the sun or cooled by fogging and evaporation.

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	27
0.3 - 1	10	27
1.2	5	25

Moderate Drying Conditions:

When surface moisture evaporation exceeds 0.75 kg/m²/h, windbreaks shall be erected around the sides of the structural element.

Severe Drying Conditions:

When surface moisture evaporation exceeds 1.0 kg/m²/h, additional measures shall be taken to prevent rapid loss of moisture from the surface of the concrete. Such additional measures shall consist of the following:

- (a) Erecting sunshades over the concrete during finishing and placing operations.
- (b) Lowering the concrete temperature.
- (c) Applying fog spray immediately after placement and before finishing. Care shall be taken to prevent accumulation of water that may reduce the quality of the cement paste.
- (d) Beginning the concrete curing immediately after trowelling.

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

E2.4.12 Cleanup

The Contractor will be required to pick up and remove from the site all debris created by the repair procedures, including those undertaken by others, and restore the site to the satisfaction of the Contract Administrator.

E2.5 Quality Control

E2.5.1 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 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.

E2.5.2 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

E2.5.3 Materials

All materials supplied under this Specification shall be subject to testing and acceptance by the Contract Administrator in accordance with E2.2.3.

E2.5.4 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.

An outline of the quality tests is as follows:

- (a) Slump tests shall be made in accordance with CSA Standard test method CAN/CSA-A23.2-5C, "Slump of Concrete". If the measured slump falls outside the limits specified in E2.2.12 or E3.3.3, a second test shall be made.

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

- (b) Air content determinations shall be made in accordance with CSA Standard test method CAN/CSA-A23.2-4C, "Air Content of Plastic Concrete by the Pressure Method". If the measured air content falls outside the limits specified in E2.2.12 or E3.3.3, a second test shall be made at any time within the specified discharge time limit for the mix.

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

- (c) The air-void system shall be proven satisfactory by data from tests performed in accordance with CSA Test Method CAN/CSA A23.1-17C. The spacing factor, as determined on concrete cylinders moulded in accordance with CSA Standard test method CAN/CSA A23.2-3C, shall be determined prior to the start of construction on cylinders of concrete made with the same materials, mix proportions, and mixing procedures as intended for the project. If deemed necessary by the Contract Administrator to further check the air-void system during construction, testing of cylinders may be from concrete as delivered to the job site and will be carried out by the Contract Administrator. The concrete will be considered to have a satisfactory air-void system when the average of all tests shows a spacing factor not exceeding 230 microns with no single test greater than 260 microns.

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

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

- (f) Compressive strength tests at twenty-eight (28) days shall be the basis for acceptance of all concrete supplied by the Contractor. For each twenty-eight (28) day strength test, the strength of two companion standard-cured test specimens shall be determined in accordance with CSA Standard Test Method CAN/CSA-A23.2-9C, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the average of the strengths of the two specimens. A compressive strength test at seven (7) days shall be taken, the strength of which will be used only as a preliminary indication of the concrete strength, a strength test being the strength of a single standard cured specimen.

- (g) 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 compressive strength as specified in E2.2.12 or E3.3.3 and also to check the adequacy of curing and/or cold weather protection. At least two (2) field-cured test specimens will be taken to verify strength of the in-place concrete. For each field-cured strength test, the strength of a single field-cured test specimen shall be determined in accordance with CSA Standard test method CAN/CSA-A23.2-9C, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the strength of the specimen.

E2.5.5 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 approved manner to the satisfaction of the Contract Administrator.

E2.6 Measurement and Payment

Concrete spall repairs will be measured on a square metre basis and paid for at the Contract Unit Price for each of the "Items of Work" listed herebelow performed in accordance with this Specification and accepted by the Contract Administrator.

Items of Work:

Concrete Spall Repairs

- (a) Vertical Surfaces and Bearing Seats;
- (b) Overhead Soffits.

E3. EMBEDDED GALVANIC ANODES

E3.1 General

E3.1.1 Description

This Section shall cover the installation of embedded galvanic anodes for corrosion mitigation of surface concrete repairs and for corrosion mitigation in mechanically sound concrete.

The Work to be done by the Contractor under this Section 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.

E3.1.2 References

- (a) ACI/ICRI 1999 Concrete Repair Manual
- (b) ACI Guideline No. 222 – Corrosion of Metals in Concrete
- (c) CAN/CSA A23.1 Standard for Repair Mortars, Concrete and Bonding Agents
- (d) CAN/CSA G30.18-M92 (R1998) Billet-Steel Bar for Concrete Reinforcement
- (e) ASTM B418-95a Standard Specification for Cast and Wrought Galvanic Zinc Anodes
- (f) G30.3-M1983 (R1998) Cold-Drawn Steel Wire for Concrete Reinforcement

E3.2 Embedded Anodes for Concrete Surface Repairs

E3.2.1 Materials

Embedded galvanic anodes will be Galvashield® XP by Vector Corrosion Technologies (204) 489-6300. Anodes will be supplied by the City of Winnipeg, for pickup by the Contractor at the City of Winnipeg Bridge Yard, 849 Ravelston Ave. West. Upon completion of the Work, any extra anodes shall be returned to the City, and the Contractor will be required to deliver the extra anodes to the City of Winnipeg Bridge Yard.

Repair mortars, concrete and bonding agents shall be Portland cement-based materials with suitable electrical conductivity, supplied by the Contractor. Non-conductive repair materials such as epoxy, urethane, or magnesium phosphate shall not be permitted.

Deliver, store, and handle all materials in accordance with manufacturer's instructions.

E3.2.2 Construction Methods

(a) Cleaning and Repair of Reinforcing Steel

Clean exposed reinforcing steel of rust, mortar, etc. to provide sufficient electrical connection and mechanical bond.

If significant reduction in the cross section of the reinforcing steel has occurred, replace or install supplemental reinforcement as directed by the Contract Administrator.

Secure loose reinforcing steel by tying tightly to other bars with steel tie wire.

(b) Galvanic Anode Installation

The Contract Administrator will determine the location of all anodes. Galvanic anodes shall be installed around the perimeter of the repair area with an approximate of 600mm. Each repair area will have a minimum of four (4) anodes. In no case shall the distance between anodes exceed 610 mm.

Provide sufficient clearance between anodes and substrate to allow repair material to encase the anodes.

Secure the galvanic anodes as close as possible to the patch edge using the anode tie wires. The tie wires shall be wrapped around the cleaned reinforcing steel and twisted tight to allow little or no free movement.

If the anode is to be tied onto a single bar, or if less than 25 mm of concrete cover is expected, place anode beneath the bar and secure to clean reinforcing steel.

If sufficient concrete cover exists, the anode may be placed at the intersection between two bars and secured to each clean bar.

(c) Electrical Continuity

Confirm electrical connection between anode tie wire and reinforcing steel by measuring DC resistance (ohm, Ω) with a multi-meter.

Confirm electrical continuity of the exposed reinforcing steel within the repair area. If necessary, electrical continuity shall be established with steel tie wire.

Electrical continuity is acceptable if the DC resistance measured with multi-meter is less than 5 Ω .

(d) Concrete Replacement

Following normal concrete repair procedures, complete the repair with the repair material, taking care not to create any air voids within the repair. Refer to Section E3 for concrete surface repair specifications.

E3.3 Measurement and Payment

The installation of embedded galvanic anodes are considered incidental to the Works of Specification E2 and no additional measurement or payment will be made.