



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 138-2006

**SHOAL LAKE AQUEDUCT – ASSET PRESERVATION PROGRAM -
CONSTRUCTION OF MILE 83 OVERFLOW SLUICE GATE CHAMBER**

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PART B - BIDDING PROCEDURES

B1. PROJECT TITLE

B1.1 SHOAL LAKE AQUEDUCT – ASSET PRESERVATION PROGRAM - CONSTRUCTION OF MILE 83 OVERFLOW SLUICE GATE CHAMBER

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, March 28, 2006.

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 Contract Administrator or an authorized representative will be available at the Site from 09:00 to 12:00 on March 21, 2006, to provide Bidders access to the Site.

B3.2 The Bidder is advised that:

(a) The Site is at a remote location and has restricted Site access.

(b) The Site is adjacent to a watercourse requiring environmental protection.

B3.3 The Bidder shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.

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

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

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

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

B5. ADDENDA

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

- B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.
- B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- B5.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Branch internet site for addenda shortly before submitting his Bid.
- B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B6. SUBSTITUTES

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

- B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative 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 B15.
- B6.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B7. BID SUBMISSION

- B7.1 The Bid Submission consists of the following components:
- (a) Form A: Bid;
 - (b) Form B: Prices;
 - (c) Form G1: Bid Bond and Agreement to Bond, or
Form G2: Irrevocable Standby Letter of Credit and Undertaking, or
a certified cheque or draft;
- B7.2 All components of the Bid Submission shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely in ink, to constitute a responsive Bid.
- B7.3 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.
- B7.3.1 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.
- B7.4 Bid Submissions submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.
- B7.5 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 12 of Form A: Bid shall be signed in accordance with the following requirements:

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

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

B8.4.2 All signatures shall be original and shall be witnessed except where a corporate seal has been affixed.

B8.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid 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 Further to B10.1(g), the Bidder shall, within three (3) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

- (a) a valid COR certification number under the Certificate of Recognition (COR) Program - Option 1 administered by the Manitoba Heavy Construction Association's Safety, Health and Environment Program; or
- (b) a valid COR certification number under the Certificate of Recognition (COR) Program administered by the Manitoba Construction Safety Association; or
- (c) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.)

B10.3 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.

B10.4 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B11. BID SECURITY

B11.1 The Bidder shall provide bid security in the form of:

- (a) a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or
- (b) an irrevocable standby letter of credit, in the amount of at least ten percent (10%) of the Total Bid Price, and undertaking issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or
- (c) a certified cheque or draft payable to "The City of Winnipeg", in the amount of at least fifty percent (50%) of the Total Bid Price, drawn on a bank or other financial institution registered to conduct business in Manitoba.

- B11.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.
- B11.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.
- B11.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B11.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.
- B11.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.
- B11.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

- B12.1 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.
- B12.1.1 Bidders or their representatives may attend.
- B12.1.2 Bid Submissions determined by the Manager of Materials, or his designate, to not include the bid security specified in B11 will not be read out.
- B12.2 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>.
- B12.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract Amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- B12.4 The Bidder is advised that any information contained in any Bid 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.

B13. IRREVOCABLE BID

- B13.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.
- B13.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly executed and the performance security furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid.

B14. WITHDRAWAL OF BIDS

- B14.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.
- B14.1.1 Notwithstanding 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.
- B14.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.
- B14.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials 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 12 of Form A: Bid; and
 - (c) if the notice has been given by any one of the persons specified in B14.1.3(b), declare the Bid withdrawn.
- B14.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B13.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B15. EVALUATION OF BIDS

- B15.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Bid Opportunity (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);
 - (c) Total Bid Price;
 - (d) economic analysis of any approved alternative pursuant to B6.
- B15.2 Further to B15.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid 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.
- B15.3 Further to B15.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid Submission or in other information required to be submitted, that he is responsible and qualified.
- B15.4 Further to B15.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B15.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.

B16. AWARD OF CONTRACT

- B16.1 The City will give notice of the award of the Contract by way of a letter of intent, or will give notice that no award will be made.
- B16.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.
- B16.2.1 Without limiting the generality of B16.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
 - (b) the prices are materially in excess of the prices received for similar work in the past;
 - (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
 - (d) only one Bid is received; or
 - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B16.3 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.

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 cast-in-place concrete chamber and installation of one (1) City supplied, and one (1) Contractor supplied fabricated stainless steel sluice gate.
- D2.2 The major components of the Work are as follows:
- (a) Excavation shoring
 - (b) Excavation
 - (c) Demolition of concrete box culvert
 - (d) Construction of cast-in-place chamber
 - (e) Installation of City supplied fabricated stainless steel sluice gate
 - (f) Supply and installation of Contractor supplied fabricated stainless steel sluice gate
 - (g) Miscellaneous Metals
 - (h) Erosion protection and sediment control

D3. DEFINITIONS

- D3.1 When used in this Bid Opportunity:
- (a) "AWWA" means American Waterworks Association
 - (b) "CSA" means Canadian standard Association
 - (c) "NSF" means National Sanitation Foundation
 - (d) "DBPS" means Deacon Booster Pumping Station.
 - (e) "ASTM" means American Society for Testing and Materials; and
 - (f) "CSA" means Canadian Standards Association

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is UMA Engineering Ltd. , represented by:

Marv McDonald, C.E.T.
Senior Project Coordinator
1479 Buffalo Place
Winnipeg, Manitoba R3T 1L7
Telephone No. (204) 284-0580
Facsimile No. (204) 475-3646

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

D5. CONTRACTOR'S SUPERVISOR

D5.1 At the pre-construction meeting, the Contractor shall identify his designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D6. NOTICES

D6.1 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.

D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D6.3, D6.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the address or facsimile number identified in D4.1.

D6.3 All notices of appeal to the Chief Administrative Officer shall be sent to the 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

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

The City of Winnipeg
Corporate Services Department
Legal Services Division
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1
Facsimile No.: (204) 947-9155

D7. FURNISHING OF DOCUMENTS

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

SUBMISSIONS

D8. SAFE WORK PLAN

- D8.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in GC:4.1 for the return of the executed Contract.
- D8.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.

D9. INSURANCE

- D9.1 The Contractor shall provide and maintain the following insurance coverage:
- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) all inclusive, with The City of Winnipeg and UMA Engineering Ltd. 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;

D10. PERFORMANCE SECURITY

- D10.1 The Contractor shall provide and maintain performance security until the expiration of the warranty period in the form of:
- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of 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.
- D10.1.1 Where the performance security is in the form of a certified cheque or draft, it will be deposited by the City. The City will not pay any interest on certified cheques or drafts furnished as performance security.
- D10.2 If the bid security provided in his Bid Submission was not a certified cheque or draft pursuant to B11.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of

intent and prior to the commencement of any Work on the Site but in no event later than the date specified in GC:4.1 for the return of the executed Contract.

D11. SUBCONTRACTOR LIST

D11.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in GC:4.1 for the return of the executed Contract.

D12. DETAILED WORK SCHEDULE

D12.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in GC:4.1 for the return of the executed Contract.

D12.2 The detailed work schedule shall consist of the following:

(a) a Gantt chart for the Work;
acceptable to the Contract Administrator.

D12.3 Further to D12.2(a), the schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path:

- (a) Mobilization
- (b) Excavation Shoring
- (c) Excavation
- (d) Cast-in-place Concrete
- (e) Installation of Water Control Gates
- (f) Backfill and Site Cleanup

D12.4 Further to D12.2(a), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

SCHEDULE OF WORK

D13. COMMENCEMENT

D13.1 The Contractor shall not commence any Work until he is in receipt of a letter of intent from the Award Authority authorizing the commencement of the Work.

D13.2 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) the Safe Work Plan specified in D8;
 - (iv) evidence of the insurance specified in D9;

- (v) the performance security specified in D10;
 - (vi) the Subcontractor list specified in D11;
 - (vii) the detailed work schedule specified in D12; and
- (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D13.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the letter of intent.

D13.4 It is the intent of the City of Winnipeg to have the Works completed prior to the 2006 summer storm season. Notwithstanding, certain Site and atmospheric conditions beyond the Contractor's control may prevent the Works from being completed, including;

- (a) Elevated Boggy River levels over the normal river channel;
- (b) Overland flooding from outside the worksite;

In the event of conditions listed above, Working Days will not be charged.

D14. SCHEDULE RESTRICTIONS

D14.1 The Contractor shall note that the Mile 83 Overflow Structure is an emergency overflow structure. During high Aqueduct flows, in excess of 300 mega litres per day (MLD), the Aqueduct is at increased risk of overflowing inadvertently, such that it would be inadvisable to work downstream of the overflow structure under these conditions. Extended time periods that require the Aqueduct to be operated at flow rates greater than 300 MLD occur rarely (e.g. usually less than 1 percent of the time). In the event of requirement to flow the Aqueduct at rates greater than 300 MLD, the Contractor will be advised and given a maximum five (5) Calendar Days whereby to secure the Works and evacuate the Site. During periods of securing the Site, and delay during high flows, Working Days will not be charged.

D15. WORKING DAYS

D15.1 Further to GC:1.1(gg), the Contract Administrator's determination of whether or not atmospheric and Site conditions are such that a Working Day is deemed to have elapsed may be based at one time on one type of work while at another time a Working Day may be based on another type of work. When more than one type of major work is involved, the quantity of equipment that must be able to work in order to meet the requirements of a Working Day may vary considerably from that specified in the General Conditions.

D15.2 In the event that incidental work is behind schedule which, in the opinion of the Contract Administrator, should have been or could have been carried out by the Contractor in conjunction with or immediately following work of a major type, the City hereby reserves the right to charge Working Days on the incidental work until such time as it is up to schedule.

D15.3 When the major type of work involves restoration of the Site to the condition it was prior to rainfall, Working Days shall not be charged.

D15.4 The Contract Administrator will furnish the Contractor with a daily record for each major type of work showing various information concerning the equipment, the time it worked, could have worked and Working Days charged. This report is to be signed each day by an authorized representative of the Contractor.

D16. SUBSTANTIAL PERFORMANCE

D16.1 The Contractor shall achieve Substantial Performance within twenty-five (25) consecutive Working Days of the commencement of the Work as specified in D13.

D16.2 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.

D16.3 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.

D17. TOTAL PERFORMANCE

D17.1 The Contractor shall achieve Total Performance within thirty-five (35) consecutive Working Days of the commencement of the Work as specified in D13.

D17.2 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.

D17.3 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.

D18. LIQUIDATED DAMAGES

D18.1 If the Contractor fails to achieve Substantial Performance in accordance with the Contract by the day fixed herein for Substantial Performance, the Contractor shall pay the City one thousand five hundred dollars (\$1,500.00) per Working Day for each and every Working Day following the day fixed herein for Substantial Performance during which such failure continues.

D18.2 The amount specified for liquidated damages in D18.1 is based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve Substantial Performance by the day fixed herein for same.

D18.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

CONTROL OF WORK

D19. JOB MEETINGS

D19.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D19.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

D20. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D20.1 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).

FORM H1: PERFORMANCE BOND
(See D10)

KNOW ALL MEN BY THESE PRESENTS THAT

_____ ,
(hereinafter called the "Principal"), and

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

_____ dollars (\$_____.)

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

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

_____ day of _____, 20____, for:

BID OPPORTUNITY NO. 138-2006

SHOAL LAKE AQUEDUCT – ASSET PRESERVATION PROGRAM - CONSTRUCTION OF MILE 83
OVERFLOW SLUICE GATE CHAMBER

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)

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>
	Cover Sheet
D-8898	Construction of Mile 83 Sluice Gate Chamber – Location Plan & General Layout-Plan and Profile
D-8899	Construction of Mile 83 Sluice Gate Chamber – Sluice Gate Chamber General Layout and Miscellaneous Details

E1.3 The following Historical Drawings are provided for informational purposes only:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>
D469	Detail of Overflow and Blowoff Structure at Sta. 4384+00
D470	Detail of Overflow and Blowoff Structure at Sta. 4384+00
D471	Reinforcing Steel for Overflow and Blowoff Structure at Sta. 4384+00

E1.4 The following inspection report and photographs are provided to supplement the Bidder's evaluation of the Site conditions within the Work areas:

- (a) Shoal Lake Aqueduct – Program 2.7 Aqueduct Overflow Inspections – Mile 83 Overflow Structure October 15, 2000.
- (b) Photos – Site conditions September 2, 2005
- (c) Photos – Test Excavation January 6, 2006

E2. SOILS INVESTIGATION REPORT

E2.1 Further to GC:3.1, the Soils Test Hole Logs attached, and as shown on the drawings, are provided to supplement the Bidder's evaluation of the Site conditions within the Work areas. The information is considered accurate at the locations indicated and at the time of the investigation. However, variations in soil conditions may exist between test holes and fluctuations in groundwater levels can be expected seasonally and may occur as a result of construction activities or variations in flow level of the adjacent water course.

E2.2 Any test holes or test pits made by the bidder shall be done in accordance with the requirements of the Water and Waste Department. Bidders shall notify the Contract Administrator prior to proceeding with any subsurface investigations.

GENERAL REQUIREMENTS

E3. OFFICE FACILITIES

- E3.1 The Contractor shall supply office facilities meeting the following requirements:
- (a) The field office shall be conveniently located near the Site of the Work.
 - (b) The building shall have a minimum floor area of 20 square metres, with window area of 3 square metres and a door entrance with suitable lock satisfactory to the Contract Administrator.
 - (c) The building shall be suitable for all-weather use. It shall be capable of maintaining a temperature range between 16°C and 25°C.
 - (d) The building shall be supplied with adequate lighting and 120 Volt power supply.
 - (e) The building shall be furnished with one desk, one meeting table, one drafting table, one filing cabinet and six chairs, all satisfactory to the Contract Administrator.
 - (f) A separate toilet with door lock shall be supplied for the Contract Administrator.
 - (g) The field office shall be cleaned weekly immediately prior to the Job Site Meetings to the satisfaction of the Contract Administrator.
 - (h) The provision of the field office with the aforementioned furnishings and equipment shall also include maintenance and removal of the field office, operating costs and any service installation costs.

E4. CONDITION, PROTECTION OF AND ACCESS TO THE AQUEDUCT AND ADJACENT STRUCTURES

- E4.1 Condition of the Aqueduct
- (a) The Aqueduct is constructed of non-reinforced concrete and in some areas, contains numerous cracks. The Aqueduct, therefore, shall be considered as a fragile structure. All work procedures conducted by the Contractor on and/or near the Aqueduct shall be well planned and executed to ensure that the Aqueduct is not subjected to construction related loads, including excessive vibrations and concentrated or asymmetrical lateral loads during backfill placement.
- E4.2 Protection of the Aqueduct
- (a) Contractors carrying out repair work on the Aqueduct or working in the vicinity of it shall ensure that:
 - (i) Equipment shall only be permitted to cross the Aqueduct at designated reinforced road crossing locations. Contractors are advised that some load restrictions may apply at reinforced crossing locations, depending on the existing cover, Aqueduct section type and equipment ground pressure.
 - (ii) Granular material, construction material, soil or other material shall not be stockpiled on the Aqueduct or within 10 metres of the Aqueduct center-line.
 - (iii) Construction practices shall not subject the Aqueduct arch to asymmetrical loading at any time.
 - (iv) Construction practices or procedures at or near the Aqueduct shall not impart excessive vibration loads on the Aqueduct and/or cause settlement of the subgrade below the Aqueduct.
 - (v) Asymmetrical water pressures shall not be permitted to build up on one side of the Aqueduct arch.
 - (b) It is the Contractors' responsibility to ensure that all work crew members understand and observe the requirements of E4.1 and E4.2. Prior to commencement of on-site work, the

Contractor's superintendent, foreman and heavy equipment operators shall attend an orientation meeting that will outline restrictions for working on and around the Aqueduct. Failure to comply with these restrictions will be grounds for removing the offending personnel from the Site.

E4.3 Security

- (a) The Contractor is required to take measures necessary to secure the Boathouse, and Standard Manholes, when the work areas are vacated during the Work as follows:
 - (i) At the Boathouse, keep the door closed and locked.
 - (ii) At Standard Manholes, install the manhole cover and bolts.

E4.4 Equipment Restrictions

- (a) Only smooth edged excavation buckets, soft excavation or hand excavation shall be used for excavation adjacent to and over the Aqueduct.

E4.5 Aqueduct Crossings

- (a) Aqueduct crossing will be permitted at designated reinforced road crossings at the following locations:
 - (i) Permanent access road (undeveloped) at Mile 82.46, south of the Trans Canada Highway.
- (b) Load restrictions for road crossings on developed roadways shall be limited to the load limitations in place for the road.
- (c) Equipment crossing and load restriction for undeveloped roadways shall be restricted as follows:
 - (i) The Contractor must submit details of the equipment proposed for the crossing, including operating weight, track or wheel dimensions and spacing and developed ground pressure, for review by the Contract Administrator, a minimum of 10 Working Days prior to on site construction activities.
 - (ii) Equipment must not be loaded.
 - (iii) Equipment must cross the Aqueduct in a responsible, careful manner (i.e. slowly).
 - (iv) Crossings shall be constructed and levelled for a sufficient length as to fully support and distribute the weight of the equipment (i.e. entire track length and width) while crossing the Aqueduct. Minimum earth cover restrictions will also be applied.

E4.6 Temporary Aqueduct Bridging Structure

- (a) Temporary Aqueduct bridging structures may be employed at other locations where the Contractor plans to access the work areas via temporary roads. The Contractor shall submit shop drawings for the temporary Aqueduct bridging structure in accordance with CW 1110. Shop Drawings shall be stamped by a Professional Engineer registered in the Province of Manitoba.
- (b) The temporary Aqueduct bridging structure shall be designed and constructed in such a manner so as to prevent any additional loads (live or dead loads) being transmitted to the Aqueduct during construction, launching or operation. In this regard, structures less than 24 metres in total length may require specialized (deep) foundations at the end supports to prevent the imposition of loads to the Aqueduct structure. All temporary bridging structures shall be removed when they are no longer required to facilitate construction.

E5. SITE PREPARATION, MOBILIZATION AND DEMOBILIZATION

E5.1 Description

- (a) This Specification covers Site preparation including mobilization, equipment and fuel compounds and storage areas, field office establishment, adequate Site drainage, demobilization, final Site clean up, and other Contractor related tasks required as a portion of the Works for this Contract.
- (b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E5.2 Access Roads

- (a) The Contractor shall be permitted to access the Aqueduct right-of-way between Mile 82.46 and Mile 83.03 via the GWWD Railway right-of-way, municipal road or via temporary roads.
- (b) The Contractor shall participate in an inspection of access routes proposed for use for this Contract, with representatives of the Contract Administrator, the City of Winnipeg and the Rural Municipality of Reynolds, prior to the commencement and after the completion of the Works. The Contractor shall promptly repair any damage attributed to their construction activities.
- (c) Temporary road construction to access the Aqueduct right-of-way and work area shall only be permitted under the following conditions:
 - (i) Shall not come closer than 10 metres to the Aqueduct centerline.
 - (ii) Utilize only existing cut lines through the forest, if outside of the City right-of-way.
 - (iii) The Contractor is responsible for maintaining these roads during the course of construction. The Contractor shall ensure that no unauthorized personnel or vehicular traffic accesses the Aqueduct right-of-way during the construction period and shall put the necessary safeguards in place to ensure same.
 - (iv) Following completion of the Work, temporary roads shall be left in such condition that there is no vehicle access to the Aqueduct right-of-way.
 - (v) All temporary road construction shall be licensed by Manitoba Conservation and must conform to the applicable regulations. The Contractor shall be responsible for obtaining a work permit from the local office of Manitoba Natural Resources prior to commencement of any Site access or development activities. The permit may include requirements regarding Site access, fire prevention, Site clean-up and other concerns. All Site development activities shall be conducted in accordance with the work permit. A copy of this permit shall be forwarded to the Contract Administrator prior to the commencement of on-site work.
 - (vi) Where access roads block drainage, provide drainage culverts, of sufficient capacity, minimum 450 millimetres in diameter, to adequately convey natural flows across the road. Temporary drainage structures shall be completely removed and the Site restored after the completion of construction.

E5.3 GWWD Railway Crossings

- (a) The City of Winnipeg will develop a GWWD Railway crossing at the Site. The Contractor shall provide crossing timbers conforming to the following;
 - (i) Eight 200 millimetre by 100 millimetre by 6 metre long pressure treated, rough sawn fir timbers

The timbers will be replacement stock for timbers used to install the Site crossing. They shall be delivered to the Site prior to the date of Substantial Performance.

- (b) The City of Winnipeg will install the crossing timbers. Contact the Contract Administrator five (5) Business days prior to requiring crossings for scheduling.
- (c) The Contractor shall maintain the crossings at all times. Tracks shall be kept free of debris.
- (d) If at any time the track crossing becomes blocked or damaged for whatever reason, contact the GWWD office at 986-4118 between the hours of 07:30 and 16:30 Monday to Friday, or McPhillips Control Centre at 986-4781 at any other time to advise them of the problem.

E5.4 Compounds and Field Offices

- (a) The area within the Aqueduct right-of-way shall be used for the establishment of the equipment and fuel compounds, storage areas, and field offices as required to perform the Works associated with this Contract. The Contractor shall be permitted to establish a temporary storage and Site facilities near Mile 82.46, within restrictions outlined in E4 Condition, Protection of and Access to the Aqueduct, and as set out by the Contract Administrator.

E5.5 Site Drainage

- (a) Provision of adequate Site drainage during the entire construction phase shall be the Contractor's responsibility. No extra payment or time extension will be granted as a result of difficulties associated with Site access resulting from poor Site drainage during any part of the construction phase.
- (b) Drainage ditches shall be left operational during the Work of this Contract. Culverts of adequate diameter (450 millimetres minimum) shall be installed where access across a ditch is required, and removed at the completion of this Contract.

E5.6 Final Site Cleanup

- (a) The Contractor shall clean up and remove repair work related surplus materials, tools, equipment, waste, and debris, including but not limited to loose geotextile fabric, wood blocking, waste concrete cores, and concrete wash-out from Ready-mix concrete trucks.

E5.7 Method of Measurement and Basis of Payment

- (a) No measurement will be made for Site preparation, mobilization and demobilization. It will be considered incidental to the price bid for the Construction of Sluice Gate Chamber

E6. ENVIRONMENTAL PROTECTION

E6.1 The Contractor shall be aware that the Shoal Lake Aqueduct is for potable water supply and no contamination by fuel, chemicals, etc. shall be permitted at any time. Fuels or chemicals shall not be stored within 30 metres of the Aqueduct or watercourse.

E6.2 The Contractor shall plan and implement the Work of this Contract strictly in accordance with the requirements of the environmental protection measures as herein specified.

E6.3 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work:

- (a) Federal
 - (i) Canadian Environmental Protection Act (CEPA) c.16
 - (ii) Transportation of Dangerous Goods Act and Regulations c.34
 - (iii) Fisheries Act (R.S., 1985, c. F-14)
- (b) Provincial
 - (i) The Dangerous Goods Handling and Transportation Act D12

- (ii) The Endangered Species Act E111
- (iii) The Environment Act c.E125
- (iv) The Fire Prevention Act F80
- (v) The Manitoba Nuisance Act N120
- (vi) The Public Health Act c.P210
- (vii) The Workplace Safety and Health Act W120
- (a) And current applicable associated regulations.

E6.4 The Contractor is advised that the following environmental protection measures apply to the Work.

- (a) Materials Handling and Storage
 - (i) Construction materials shall not be stored within five (5) metres of the Aqueduct centerline.
- (b) Fuel Handling and Storage
 - (i) The Contractor shall abide by the requirements of Manitoba Environment for handling and storage of fuel products.
 - (ii) All fuel handling and storage facilities shall comply with The Dangerous Goods and Transportation Act Storage and Handling of Petroleum Products Regulation and any local land use permits.
 - (iii) Fuels, lubricants, and other potentially hazardous materials as defined in The Dangerous Goods and Transportation Act shall be stored and handled within the approved storage areas.
 - (iv) The Contractor shall ensure that all fuel storage containers are inspected daily for leaks and spillage.
 - (v) Products transferred from the fuel storage area(s) to specific work sites shall not exceed the daily usage requirement.
 - (vi) When servicing requires the drainage or pumping of fuels, lubricating oils or other fluids from equipment, a groundsheet of suitable material (such as HDPE) and size shall be spread on the ground to catch the fluid in the event of a leak or spill.
 - (vii) Refueling of mobile equipment and vehicles shall take place at least 100 metres from a watercourse.
 - (viii) The area around storage sites and fuel lines shall be distinctly marked and kept clear of snow and debris to allow for routine inspection and leak detection.
 - (ix) A sufficient supply of materials, such as absorbent material and plastic oil booms, to clean up minor spills shall be stored nearby on-site. The Contractor shall ensure that additional material can be made available on short notice.
- (c) Waste Handling and Disposal
 - (i) The construction area shall be kept clean and orderly at all times during and at completion of construction.
 - (ii) At no time during construction shall personal or construction waste be permitted to accumulate for more than one day at any location on the construction Site, other than at a dedicated storage area as may be approved by the Contract Administrator.
 - (iii) Indiscriminate dumping, littering, or abandonment shall not take place.
 - (iv) No on-site burning of waste is permitted.
 - (v) Equipment shall not be cleaned near watercourses; contaminated water from onshore cleaning operations shall not be permitted to enter watercourses.

- (d) Dangerous Goods/Hazardous Waste Handling and Disposal
 - (i) Dangerous goods/hazardous waste are identified by, and shall be handled according to, The Dangerous Goods Handling and Transportation Act and Regulations.
 - (ii) The Contractor shall be familiar with The Dangerous Goods Handling and Transportation Act and Regulations.
- (e) Emergency Spill Response
 - (i) The Contractor shall ensure that due care and caution is taken to prevent spills.
 - (ii) The Contractor shall report all major spills of petroleum products or other hazardous substances with the potential for impacting the environment and threat to human health and safety to the Contract Administrator and Manitoba Environment, immediately after occurrence of the environmental accident, by calling the 24-hour emergency telephone phone number (204) 945-4888.
 - (iii) The Contractor shall designate a qualified supervisor as the on-site emergency response coordinator for the project. The emergency response coordinator shall have the authority to redirect manpower in order to respond in the event of a spill.
 - (iv) The following actions shall be taken by the person in charge of the spilled material or the first person(s) arriving at the scene of a hazardous material accident or the on-site emergency response coordinator:
 - (i) Notify emergency-response coordinator of the accident:
 - ◆ identify exact location and time of accident
 - ◆ indicate injuries, if any
 - ◆ request assistance as required by magnitude of accident (Manitoba Environment 24-hour Spill Response Line (204) 945-4888, Police, Fire Department, Ambulance, company backup)
 - (ii) Assess situation and gather information on the status of the situation, noting:
 - ◆ personnel on Site
 - ◆ cause and effect of spill
 - ◆ estimated extent of damage
 - ◆ amount and type of material involved
 - ◆ proximity to waterways and the Aqueduct
 - (iii) If safe to do so, try to stop the dispersion or flow of spill material:
 - ◆ approach from upwind
 - ◆ stop or reduce leak if safe to do so
 - ◆ dyke spill material with dry, inert sorbent material or dry clay soil or sand
 - ◆ prevent spill material from entering waterways and utilities by dyking
 - ◆ prevent spill material from entering Aqueduct manholes and other openings by covering with rubber spill mats or dyking
 - (iv) Resume any effective action to contain, clean up, or stop the flow of the spilled product.
 - (v) The emergency response coordinator shall ensure that all environmental accidents involving contaminants shall be documented and reported to the Manitoba Environment according to The Dangerous Goods Handling and Transportation Act Environmental Accident Report Regulation 439/87.
- (f) Controlled Products
 - (i) Materials classified as “Controlled Products” under Regulation 52/88, “Workplace Hazardous Materials Information System”, including amendments, are prohibited inside the Aqueduct, unless the material will be directly employed in the Work.

- (ii) Notwithstanding the aforementioned requirement, materials have been tested by an ANSI accredited laboratory and meet the requirements of ANSI/NSF 60, "Standard for Drinking Water Treatment and Chemicals – Health Effects", and ANSI/NSF 61, "Standard for Drinking Water System Components – Health Effects", as specified in the Specifications, shall be permitted inside the Aqueduct.

E7. EROSION PROTECTION AND SEDIMENT CONTROL

E7.1 Description

- (a) The Contactor shall conduct his operations to comply with federal and provincial fisheries and environmental protection legislation, including preventing the loss or destruction of fish habitat, and minimizing the impact of sedimentation, silting or otherwise causing a degradation in water quality.

E7.2 Construction Methods

- (a) Stream Crossings
 - (i) Temporary stream crossings, where required, shall be constructed in accordance with "Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat" (1996).
- (b) Dewatering
 - (i) Discharge from dewatering operations will not be permitted directly into a watercourse. Dewatering discharge shall be directed to a constructed or natural settlement basin to allow for settlement of silts and debris
 - (ii) Discharge points of dewatering pumps and hoses shall be constructed to properly dissipate flow to prevent erosion, by means of discharging onto riprap, a properly anchored geotextile fabric or other means in order to reduce velocity of discharge to less than 0.3 metres per second.
 - (iii) Diversion ditches shall be constructed to minimize flow velocities and erosion by minimizing ditch slopes, and /or use of ditch berming devices or riprap. Outlets to water courses shall be constructed to minimize discharge of silts and sediments by use of silt fencing, brush barriers, riprap and / or sediment basins
- (c) Water Control Dykes
 - (i) Water control dykes will be permitted at the top of bank of the Boggy river, to permit construction and to provide a water-free excavation. Dykes must be completely removed and the area restored prior to the date of Substantial Performance.
- (d) Silt Curtains and Silt Fencing
 - (i) Silt Curtains shall be installed as indicated on the Drawings, and as recommended by the Manufacturer, in the outlet flow channel, where existing ground has been disturbed.
 - (ii) Silt fencing shall be installed at the top of bank, and around all disturbed ground areas adjacent to watercourses.
- (e) Limits of Work Area
 - (i) The Contractor shall keep his work area to an absolute minimum area, to avoid disturbance of ground and vegetation that would increase the risk or severity of erosion.
 - (ii) Areas disturbed by the Contractors operations, including temporary access roads, shall be restored and re-vegetated to a condition equal to those existing prior to construction.
 - (iii) Areas immediately adjacent to water courses, and sloped areas susceptible to erosion shall be protected from erosion upon the completion of construction until the

Site is adequately re-vegetated, by applying a temporary ground cover, such as: straw mulch; slash from clearing and grubbing; or erosion control blankets.

- (f) Site Cleanup
 - (i) Upon completion of Site restoration and re-establishment of vegetation, remove all temporary devices including synthetic silt fences, geotextile fabrics, ditch berms and temporary riprap. Biodegradable products such as straw bales may be broken up and left on Site. Synthetic materials shall be removed from Site and properly disposed of.

E7.3 Method of Measurement and Basis of Payment

- (a) No measurement or payment will be made for Erosion Protection and Sediment Control. It will be considered incidental to price bid for the Construction of Sluice Gate Chamber.

E8. CONSTRUCTION OF SLUICE GATE CHAMBER

E8.1 Description

- (a) This Specification shall cover the installation of reinforcing steel and construction of cast-in-place concrete elements for the drainage siphon repairs. It shall amend and supplement CW 2160

E8.2 Materials

- (a) Formwork, Reinforcing Steel and Concrete
 - (i) As per City of Winnipeg CW 2160.
- (b) Asphalt Impregnated Fibre Board
 - (i) Asphalt impregnated fibre board shall conform to ASTM D1751-83 (Reapproved 1991), Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types), 20 millimetres thick, Sternboard by Sternson Ltd., or Sealtight Fibre Expansion Joint Filler Product No. 3250-121 by W.R. Meadows of Canada Ltd., or approved equal.
- (c) Flexible Joint Sealant
 - (i) Two component, no-sag Polyurethane sealant, Sikaflex 2c or approved equal.
- (d) Rigid Insulation
 - (i) Rigid insulation shall be high density extruded polystyrene insulation CAN/CGSB-S1.20-M87 (Type 4), minimum 40 psi compressive strength, Styrofoam HI40 by Dow Chemicals or approved equal.
 - (ii) Insulation for flexible joint spacers shall be compressible polystyrene insulation of sufficient density to support placement of concrete.

E8.3 Design Requirements

- (a) Cast-in-place Concrete Mix Design
 - (a) Concrete Mix Design as per Table CW 2160.1, Type A mix.

E8.4 Submittals

- (a) Cast-in-place Concrete Mix Design
 - (i) The Contractor shall submit the mix design, stating the constituent materials and mix proportions that will be used to the Contract Administrator prior to the pre-construction meeting for review and acceptance.
- (b) Reinforcing Steel
 - (i) The Contractor shall submit reinforcing steel shop-drawings.

E8.5 Construction Methods

- (a) Cast-in-place concrete as per CW 2160.
- (b) Cold and Adverse Weather Requirements
 - (i) Further to the requirements of CSA A23.1-00, Clause 21.2.3 - Cold-Weather Protection, the Contractor shall provide adequate protection of the concrete materials and finished concrete repairs from inclement weather, rain, snow, wind, and similar adverse conditions.
 - (ii) Whenever ambient air temperature is, or is anticipated to be, 5 degrees Celsius or lower, the Contractor shall provide temperature controlled enclosures prior to, during, and after the concrete placement. Substrate concrete and reinforcing steel shall be maintained at a temperature above 10 degrees Celsius (10° C) minimum prior to placing concrete commencing immediately following excavation. Finished concrete repairs shall be maintained at a temperature of at least 10 degrees Celsius (10°C) until backfilling commences, or for a minimum of three (3) days.
 - (iii) The substrate concrete and cast-in-place concrete material shall be protected from the adverse effects of space heated enclosures, including local overheating and combustion products. Combustion heaters shall be located to the outside of the Aqueduct.
 - (iv) The mix water, aggregates and cement material, shall be heated as necessary when the ambient air temperature is, or is anticipated to be, 5 degrees Celsius or lower at any time during the 24 hours following the application of the concrete. Mix water and concrete material shall be maintained at a temperature between 10 degrees Celsius and 65 degrees Celsius, and free from frozen material.

E8.6 Quality Control

- (a) Materials
 - (i) General

The visual appearance, compressive strength, density, and other characteristics of the concrete material shall be verified by cylinders, or core samples from the placed concrete material, as per CW 2160.
 - (ii) Field-Cured Cylinders for Early Compressive Strength Tests

Early compressive strengths for the concrete material shall be determined by a set of three (3) field cured cylinders cast and tested by the Testing Laboratory designated by the Contract Administrator.

E8.7 Method of Measurement and Basis of Payment

- (a) Construction of Sluice Gate Chamber shall be measured on a lump sum basis. The lump sum price shall include Site access, excavation, shoring, backfill, cast-in-place concrete works, installation of City supplied fabricated stainless steel sluice gate and actuator and miscellaneous metals.

E9. SUPPLY AND INSTALLATION OF FABRICATED SLUICE GATES

E9.1 Description

- (a) This Specification shall cover the supply and installation of fabricated water control sluice gates.
- (b) Install one (1) City supplied fabricated stainless steel sluice gate as specified.
- (c) Supply and Install one (1) Contractor supplied fabricated stainless steel sluice gate as specified below.

E9.2 Materials

- (a) Fabricated Stainless Steel Sluice Gates (City Supplied), 1524 by 1524 millimetre fabricated stainless steel sluice gate, Fontaine Series 20, conforming to AWWA C561.
 - (i) Pedestal mounted gearbox and crank operator
 - (ii) Design head 4 metres
 - (iii) Mass 362 kilograms
 - (iv) Stainless steel expansion anchors, EDPM wall gasket, stem cover and stop collar included
- (b) Fabricated Stainless Steel Sluice Gates (Contractor Supplied), 1524 by 1524 millimetre fabricated stainless steel sluice gate, conforming to AWWA C561.
 - (i) Suitable for flush mount on concrete wall, open top frame.
 - (ii) Frame and Gate components shall be manufactured from ASTM A-240 Type 304 L stainless steel;
 - (iii) Design head 4 metres;
 - (iv) Maximum Leakage – Seating Head - 0.6 litres/minute/metre of perimeter;
 - (v) Maximum Leakage – Unseating Head – As per AWWA C561;
 - (vi) Stainless steel chemical anchors, Hilti HVU or Approved Equal.
 - (vii) EDPM wall gasket

Part	Material
Frame	Stainless Steel ASTM A-240 Type 304L
Slide	Stainless steel ASTM A-240 Type 304L
Guides	Ultra High molecular Weight (UHMW) Polyethylene
Top and Side Seals	Self adjusting UHMWPE ASTM D-4020
Bottom Seal	Neoprene ASTM D2000 Grade 2 BC-510 or Equal
Stem Guides	Stainless steel ASTM A-240 Type 304L
Threaded stem	Stainless steel ASTM A-276, Type 316
Seats	UHMWPE, ASTM D-4020-96
Stem Guide Bushings	Stainless Steel ASTM A276 Type304L
Anchor Bolts and Fasteners	Stainless Steel ASTM F593 or F594 GR2 316
Gate Operator Lift Nut	Bronze ASTM B584 or ASTM B505
Operator and lift	Bevel gearbox and crank operator. Maximum operating effort at crank (all heads) 178 N. 50 millimetre operating nut gear lift with pedestal suitable for operating with an electric portable drill and manual opening.
Pedestal and Gear Housing	Cast Iron ASTM A126, Class B, ASTM A48 Class 30, with High solids Epoxy Paint
Stem Couplings	Stainless steel ASTM A-276 316
Stem cover	Galvanized steel pipe with acrylic window with graduations
Pedestal	Cast iron - ASTM A48 Class 30; or ASTM A126, Class B; or Steel – ASTM A36
Gears	Steel AISI 8620, 4140, or 1117
Gear Housing	Stainless Steel ASTM A276 316, or ASTM A312, or ASTM A376

(viii) Acceptable Manufacturers:

- ◆ Fontaine Series 20,
- ◆ Hydrogate HG561S
- ◆ Or Approved Equal

- (c) Paint exposed metal surfaces with two (2) or more layers (5 mils minimum each coat) of Polyamide Epoxy, Amerlock 400, Tnemec Series 140F Pota-Pox Plus or approved equal. Application as per manufacturer's recommendations.

E9.3 Shop Drawings

(a) Fabricated Sluice Gate (City Supplied)

- (i) The Contract Administrator will provide Shop Drawings and erection drawings to the Contractor.

(b) Fabricated Sluice Gate (Contractor Supplied)

- (i) Submit Shop Drawings as per CW 1110. Shop drawing shall include detailed list of materials and specifications, fabrication details and erection drawings.
- (ii) Provide Affidavit of Compliance, certifying that the gate conforms to the requirements of AWWA C561 and this Specification.

E9.4 Delivery and Shipping

(a) Fabricated Sluice Gate (City Supplied)

- (i) The Contract Administrator will examine the sluice gate assemblies, thimbles, frames, stems, operators and accessories upon delivery and will reject any equipment that is found to be damaged to the extent that, in the Contract Administrator's opinion, it cannot be put to the use for which it was intended. The Contractor shall arrange with the gate supplier to repair any superficially damaged equipment to the satisfaction of the Contract Administrator.
- (ii) Sluice Gate will be available for pickup at a storage facility within the City of Winnipeg. The Contractor is responsible for loading, securing, transporting the gate to the Site, off-loading and storing the gate. Any damage caused by transportation, loading/off-loading storage or installation shall be rectified at the Contractors expense.
- (iii) City supplied gated will be available for pickup by April 17, 2006.

(b) Fabricated Sluice Gate (Contractor Supplied)

- (i) The Contractor shall be responsible for the safe storage, transportation and installation of the gate, in accordance to AWWA C561.

E9.5 Construction Methods

(a) Installation

- (i) Install fabricated sluice gates, wall thimbles, mechanical lift operator, stems, wall brackets and accessories as shown on the drawings and in accordance with the manufacturer's recommendations.
- (ii) Make arrangements to have a qualified field representative of the sluice gate supplier/manufacturer inspect the installation during and after completion and provide a Certificate of Satisfactory Installation to the Contract Administrator.
- (iii) Install City supplied gate on the downstream side of the chamber, to facilitate future installation of the second gate without requirement for coffer dams.

(b) Shop Testing

- (i) The fully assembled gate shall be shop inspected, adjusted and tested for operation and leakage at the design head before shipping.

- (ii) The City will provide copies of leakage tests for all City supplied gates.
- (iii) The Contractor shall provide shop testing data of all Contractor supplied gates.

E9.6 Field Testing

- (a) Perform leakage tests in the Contract Administrator's presence once sluice gates have been installed to ensure compliance with the allowable leakage rate indicated in AWWA C501-92.
- (b) Arrange for a qualified field representative of the sluice gate supplier/manufacturer to be present during field testing.
- (c) Generally, the test for seating head will be performed by closing the gates and flooding the interior of the sluice chamber to its maximum design head.
- (d) Testing for unseating head will be made by closing both gates and dewatering the sluice gate chamber. Check leakage against high river levels and measuring the leakage rate through the gate.
- (e) The Contractor will be responsible to pump river water into the chamber for testing purposes. If a gate fails the field leakage test, the Contractor shall undertake adjustments replacements or other modifications recommended by the sluice gate supplier/manufacturer's field representative and repeat the test. The sequence shall be repeated until the gate passes the allowable leakage rate.

E9.7 Measurement and Payment

- (a) Installation and testing of sluice gates, mechanical lift operator, stems, wall brackets and accessories will not be measured for payment. It shall be include in the price for Construction of Sluice Gate Chamber.

E10. WATER CONTROL AND DEWATERING SYSTEMS

E10.1 Description

- (a) This Specification shall cover the design, installation and operation of water control and dewatering systems for excavations. It shall amend and supplement CW 2030.

E10.2 Design Requirements

- (a) Water Control and Dewatering may be required to complete the drainage siphon repairs. The Contractor shall be responsible for the design, construction and operation of a dewatering system to control ground water and surface run-off so that all repair work activities can be completed under dry conditions.
- (b) Prevent surface run-off from entering excavations. Facilitate re-routing of existing ditches and/or surface run-off around the work Site as per requirements of Section E7 Erosion Protection and Sediment Control. Water control and dewatering systems shall not cause water backup that may cause damage to properties along the course of, or adjacent to the drainage feature.
- (c) Maintain groundwater level a minimum of 300 mm below the bottom of the excavation and prevent damage to the existing structures and GWWD Railway, caused by groundwater pressures, and sloughing, either directly or indirectly. Maintain a firm dry undisturbed subgrade in the bottom of the excavation upon which backfill material may be placed and compacted upon completion of the repair work.
- (d) Prevent destabilization, heaving or shear failure of the sides or bottom of the excavation.

E10.3 Submittals

- (a) The Contractor shall submit a water control and dewatering plan for the Site, addressing the following minimum considerations:

- (i) Proposed method of dewatering and equipment;
 - (ii) Operational considerations to prevent damage to adjacent structures;
 - (iii) relationship between dewatering equipment, the excavation shoring system;
 - (iv) additional design considerations based on the Contractors proposed methodology;
 - (v) any temporary culverts or other drainage structures required to facilitate the repair work;
 - (vi) plans to decommission the dewatering system upon completion of the Work.
- (b) These submittals are required for record purposes only and will not be reviewed for adequacy by the Contract Administrator. Full responsibility for the design, installation, and maintenance of the dewatering system rests with the Contractor.

E10.4 Equipment

- (a) Pumps, hoses and other dewatering equipment required shall be provided in sufficient number and capacity to maintain excavations in a dry condition.

E10.5 Construction Methods

- (a) Install dewatering equipment and dewater to the design requirements.
- (b) Take corrective measures as required to maintain groundwater at a sufficiently low level to meet performance requirements.
- (c) Protect the repair work from damage resulting from dewatering equipment failure by providing standby dewatering equipment, connected directly to electrical generators, engaging automatically in case of power failure.
- (d) Water from dewatering operations shall be handled in accordance to Section E7 Erosion Protection and Sediment Control.

E10.6 Method of Measurement and Basis of Payment

- (a) The Dewatering Systems shall not be measured for payment. Dewatering Systems, including all materials and operations herein described will considered incidental to the price for to Construction of Sluice Gate Chamber.

E11. EXCAVATION SHORING

E11.1 Description

- (a) This Specification covers the design and installation of excavation shoring required for the repair work covered by these Specifications. It shall amend and supplement CW-2030.

E11.2 Definitions

- (a) Excavation Shoring: A temporary structure, such as steel liner plates, steel-sheet piling, soldier piles and lagging, steel rib and lagging, or similar system required to retain earth and water in order to facilitate construction of permanent work.
- (b) Cofferdam: A watertight excavation shoring system enclosing an area within which construction of permanent works can be safely carried out.

E11.3 General

- (a) Unless otherwise shown on plans, Excavation Shoring System is not limited to one or a combination of an Excavation Shoring and a Cofferdam. If surface run-off could be prevented from entering excavations by other means such as ditches, berms, clay dikes and similar, design these systems to meet the requirements of these Specifications.
- (b) The Contractor shall provide and install excavation shoring systems, and dewatering systems prior to commencing excavation.

- (c) The Contractor shall design, install and maintain suitable excavation shoring systems and, where required, cofferdams at the Site. Such works shall meet the performance criteria specified below and also be compatible with dewatering requirements and other requirements to successfully enable execution of the specified Work.

E11.4 Design Requirements

(a) Excavation Shoring

- (i) The excavation shoring/cofferdam shall meet the following performance requirements:
 - ◆ be substantially watertight;
 - ◆ prevent disturbance, destabilization or failure of the sides and/or bottom of the excavation;
 - ◆ resist all loads to which it will be subjected, including vertical and lateral loads from construction equipment, and adjacent railway.
- (b) Design Excavation Shoring System based on recognized geotechnical and structural theories for conditions present. Consider applicable loads and load combinations, including lateral pressures from groundwater, soil, unsymmetrical surcharge loads from construction operations, and frost action on retained soil.
- (c) Bracing to remain fully effective during construction. Coordinate design of excavation shoring system and dewatering system to meet performance requirements specified.
- (d) Piling installation methods must consider the impact of installation on adjacent structures. Damage caused directly by shoring activities, or indirectly by vibration or other installation forces shall be rectified at the Contractors expense. The Contractor shall closely monitor shoring installation, and report any suspected movement or damage immediately to the Contract Administrator. As a minimum, the following requirements shall apply:
- (e) For soldier pile installations, the piles shall be pre-bored.
- (f) Design splices in walers and bracing in accordance with requirements of CAN/CSA-S16.1-M.

E11.5 Submittals

- (a) The Contractor shall submit shop drawings detailing the excavation shoring systems in accordance with CW 1110, prior to the pre-construction meeting. Shoring drawings shall be stamped by a Professional Engineer registered in the Province of Manitoba.
- (b) Submit shop drawings of Excavation Shoring Systems for record purposes. Excavation Shoring Systems and Shoring drawings will not be reviewed for structural adequacy. Full responsibility for the design, installation, and maintenance of Excavation Shoring Systems rests with the Contractor.

E11.6 Construction Methods

- (a) Construction Methods for Excavation Shoring System shall be in accordance with Specification CW 2030.
- (b) Removal of Excavation Shoring Systems
 - (i) The Contract Administrator may direct the Contractor to leave the Excavation Shoring System in place. If so directed, the Contractor will be compensated for the actual substantiated value of the materials directed to be ordered left in place.
 - (ii) If the Contract Administrator requests the Excavation Shoring System to be left in place, the inside, and if necessary the outside, of the Excavation Shoring System shall be backfilled with compacted material as specified and the top of the Excavation Shoring System cut 0.5 m below the specified finished surface. All

grading work over the left-in-place shoring work is to be completed as specified and as if the Excavation Shoring System had not been left in place.

E11.7 Method of Measurement and Basis of Payment

- (a) Excavation Shoring Systems will not be measured for payment. It will be considered incidental to Construction of Sluice Gate Chamber.

E12. METAL FABRICATIONS

E12.1 Description

- (a) General
 - (i) This Specification shall cover the supply, fabrication, transportation, handling, delivery and placement of metal fabrications.

E12.2 Materials

- (a) All materials shall be of a type acceptable to the Contract Administrator, and shall be subject to inspection and testing by the Contractor Administrator.
- (b) Material intended for use in the various assemblies shall be new, straight, clean, with sharply defined profiles.
- (c) Steel Sections and Plates: to CAN/CSA G40.20/G40.21, Grade 300 W, except W, HP and HSS sections, which shall be Grade 350 W.
- (d) Steel Pipe: to ASTM A53/A53M, seamless, galvanized, as specified by item.
- (e) Welding materials: to CSA W59.
- (f) Hot dipped galvanized steel repair material: Galvalloy and Gal-Viz.
- (g) Stud Anchors: to ASTM A108, Grade 1020.
- (h) Aluminum: to CAN/CSA S157 and the Aluminum Association 'Specifications for Aluminum Structures'. Aluminum for plates shall be Type 6061-T651. Aluminium plate shall have an approved raised oval or multi-grip pattern.
- (i) Isolating sleeves shall be "Nylite" – headed sleeve as manufactured by SPAE-Naur of Kitchener, Ontario, or approved equal.
- (j) Anchor bolts and fasteners: ASTM A276, Type 316 stainless steel, of ample section to safely withstand the forces created by operation of the equipment or the load to which they will be subjected.

E12.3 Construction Methods

- (a) Submittals
 - (i) The Contractor shall submit the qualifications of the fabricator and welders to the Contractor Administrator for acceptance.
 - (ii) Submit shop drawings in accordance with CW1110, clearly indicating materials, core thickness, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details and, accessories. Indicate field measurements on shop drawings.
- (b) Fabrication
 - (i) Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured. Assemble work in such a way that no disfigurements will show in the finished work, or impair the strength.
 - (ii) Confirm measurements for all fabrications before fabricating.

- (iii) Cut aluminium plate with edges straight and true, and as far as practical, maintain continuity of the pattern at abutting edges.
 - (iv) Pieces shall be of the sizes indicated on the Drawings and shall not be built up from scrap pieces. Confirm sizes with field measurements.
 - (v) Where possible, fit work and shop assemble, ready for erection.
 - (vi) Angle frames shall be of the same material as the cover plate, and cover plates shall be hinged and be supplied with lifting handles, as shown on the Drawings. Exterior covers shall be supplied with a hasp for a padlock.
 - (vii) Remove and grind smooth burrs, filings, sharp protrusions, and projections from metal fabrications to prevent possible injury. Correct any dangerous or potentially harmful installations as directed by Contract Administrator.
 - (viii) All steel welding shall conform to CSA Standard W.59. Fabricator shall be fully approved by the Canadian Welding Bureau, in conformance with CSA Standard W.47.1. Welding shall be done by currently licensed welders only.
 - (ix) All aluminium welding shall conform to Welding shall be in accordance with the requirements of CSA W59.2. The fabricator shall be fully certified in conformance with CSA Standard W47.2. All welding shall be done in a licensed welding shop, and no field welding will be permitted unless approved in writing, in advance, by the Contract Administrator.
 - (x) Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
 - (xi) All steel shall be hot-dip galvanizing after fabrication, in accordance with CAN/CSAG164, to a minimum net retention of 600 gm/m².
 - (xii) Seal exterior steel fabrications to provide corrosion protection in accordance with CAN3-S16.1.
 - (xiii) Use self-tapping shake-proof flat-headed screws on items requiring assembly by screws.
- (c) Erection
- (i) Do steel welding work in accordance with CSA W59 and aluminium welding work in accordance with CSA W59.2
 - (ii) Erect metalwork in accordance with reviewed shop drawings, square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
 - (iii) Provide suitable means of anchorage acceptable to Contract Administrator such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles where not specifically indicated on the Drawings.
 - (iv) Provide components for building in accordance with shop drawings and schedule.
 - (v) Make field connections with bolts to CAN/CSA-S16, or weld.
 - (vi) Touch-up rivets, bolts and burnt or scratched surfaces that are to receive paint finish, with zinc primer after completion of erection.
 - (vii) Repair damaged galvanized surfaces and field welds with self-fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780, Repair of Damaged Hot Dip Galvanizing Coatings. The general procedure shall be to allow a small amount of the repair alloy to flow then spread by brushing briskly with a wire brush. Brushing shall be sufficient to obtain a bright finish. Repeat process three times to ensure a proper thickness is achieved. Temperatures shall be kept below 177°C (350°F) at all times. All heating of structural steelwork shall be done in the presence of the Contract Administrator.
 - (viii) Install access hatch frames square and level at the locations show on the Drawings. Embed anchors in concrete as shown on the Drawings. Install covers and adjust hardware to proper function.

- (ix) All aluminium surfaces in contact with concrete shall be isolated using alkali resistant bituminous paint meeting the requirements of CGSB 31-GP-3M.
- (x) Install electrochemical isolation gaskets and sleeves to electrically isolate dissimilar metals.

E12.4 Measurement and Payment

- (a) Supply, fabrication, transportation, handling, delivery and placement of metal fabrications will be considered incidental to the Construction of Sluice Gate Chamber.

E13. PATCHING AND CRACK REPAIR

E13.1 Description

- (a) This Specification shall cover the Work of removing, preparing, and patching areas of defective concrete and cracks on the interior surfaces of the existing box culverts.
- (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 of all Work as hereinafter specified.

E13.2 Materials

- (a) General
 - (i) The Contractor shall be responsible for the supply, safe storage, and handling of all materials set forth in this Specification.
 - (ii) Materials required to contain a spill in accordance with manufacturers printed instructions and Material Safety Data Sheet (MSDS) shall be kept near the immediate repair work area at all times.
- (b) Delivery, Storage, and Handling of Materials
 - (i) All material shall be delivered to the work Site, stored, and handled in a careful and workmanlike manner in accordance with manufacturers' printed instructions and recommendations.
 - (ii) Store materials in a manner which will prevent deterioration and contamination. Deteriorated or contaminated materials shall be removed from Site.
- (c) Testing
 - (i) There shall be no charge to the City for any materials taken by the Contract Administrator for testing purposes.
 - (ii) Any materials which, 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 shall be replaced by the Contractor at their own expense.
- (d) Patching Repair Material
 - (i) Patching repair material shall be polymer modified mortar based SikaTop 122 Plus or SikaTop 123 Plus by Sika Canada Inc., Emaco S88-CA by Master Builders Technologies division of Chemrex, or approved equal.
- (e) Epoxy Bonding Adhesive
 - (i) Epoxy bonding adhesive shall be Sikadur 32, Hi Mod by Sika Canada Inc., SCB Concrete 1422 by Master Builders Technologies division of Chemrex, or approved equal.

- (f) Non-Shrink Grout
 - (i) Non-shrink grout shall be cement based Grout 212 by Sika Canada Inc., or Special Grout 110 by Five Star Products Inc., or approved equal.
- (g) Polyurethane Grout
 - (i) Acid Flushing Solution
 - ◆ Acid flushing solution shall be pre-mixed solution of food grade phosphoric acid meeting the requirements of ANSI/NSF 60, "Standard for Drinking Water Treatment and Chemicals -- Health Effects", diluted to a $5\% \pm 0.5\%$ solution, by volume, with potable water prior to delivery to Site. Diluting concentrated (>5%) phosphoric acid solution on Site is prohibited.
 - (ii) Polyurethane Injection Resin
 - ◆ Polyurethane injection resin shall be single-component Diphenylmethane Diisocyanate (MDI) based, water-activated, hydrophobic type Specton Flex F1000 Polyurethane Resin and Accelerator by Specton Construction Chemicals Ltd., Spetec LF/PUR F1000 Flexible Resin and Accelerator by Tecinvest NV, Belgium, or Hydro Active Flex LV and Hydro Active Flex Cat by DeNeeff Construction Chemicals (U.S.) Inc., or approved equal, meeting the requirements of ANSI/NSF 61, "Standard for Drinking Water System Components -- Health Effects" Surface Seal.
 - (iii) Surface Seal
 - ◆ Surface seal material shall be polymer modified mortar SikaTop 122 PLUS or SikaTop 123 PLUS by Sika Canada Inc., epoxy based Sikadur 31 Hi-Mod Gel or Sikadur Injection Gel by Sika Canada Inc., cementitious based Thoro Waterplug by Harris Specialty Chemicals Canada Inc., or approved equal, meeting the requirements of ANSI/NSF 61, "Standard for Drinking Water System Components -- Health Effects".
 - (iv) Injection Packers and Ports
 - ◆ Injection packers and ports shall be as recommended by the manufacturer of the polyurethane injection resin. Injection packers and ports shall be supplied with a removable zerk coupling, or other one-way ball or check valve.
 - (v) Injection Pump Cleaner
 - ◆ Injection pump cleaner shall be as recommended by the manufacturer of the polyurethane injection resin. Injection pump cleaner shall not contain acetone, toluene, MEK, or other flammable petroleum solvents.

E13.3 Submittals

- (a) Product Literature
 - (i) The Contractor shall submit product literature consisting of general product brochure, technical data sheet(s), Material Safety Data Sheet(s), mixing instructions, and installation instructions for the patching repair material to the Contract Administrator prior to the pre-construction meeting.

E13.4 Equipment

- (a) General
 - (i) All equipment, tools, and facilities used shall be suitable for the Work and shall be kept in good working order.
 - (ii) Mechanical chipping hammers shall be limited to maximum lightweight (15-pound) hammers.

(b) Polyurethane Injection Equipment

- (i) Polyurethane injection resin shall be installed using a positive displacement type pump. The polyurethane injection equipment shall be equipped with pail heater(s) suitable for plastic pails capable of maintaining the polyurethane resin and accelerator mixture between 10° and 70° Celsius. A thermometer shall be provided with each pump for monitoring the temperature of the polyurethane resin. All polyurethane injection equipment shall be removed from the Site at the end of the Work.

E13.5 Construction Methods

(a) Concrete Patching

- (i) Provide suitable protective clothing, and gloves for persons working with restoration materials.
- (ii) During installation and curing of restoration materials, if the ambient temperature is expected to go below the manufacturer's recommended minimum temperature provide enclosures and heat as required.
- (iii) Use restoration materials in accordance with manufacturer's printed instructions, and as specified.
- (iv) Continuously check materials and applications for correct use.
- (v) Identify and delineate areas of defective concrete, including but not limited to honeycombed, spalled, and delaminated concrete, by sounding techniques for review by the Contract Administrator. The Contract Administrator shall designate the limits of the defective concrete to be repaired.
- (vi) Remove delaminated, loose, and spalled concrete using lightweight mechanical chipping hammers or other suitable means to sound concrete. Protect reinforcing bars during removal.
- (vii) Cut into sound concrete 50 to 100 mm beyond the areas of delaminated, loose, and spalled concrete, and remove concrete to a depth of 19 mm minimum. Prevent feathering of the patches by providing vertically saw-cut edges.
- (viii) Cut and remove concrete a minimum of 25 mm behind exposed reinforcing bars.
- (ix) Thoroughly clean all surfaces previously chipped of any loose concrete and/or laitance and prepare surface for patching in accordance with printed instructions from the manufacturer of the patching mortar. Use pressure washing to clean and prepare concrete surfaces. Do not damage the structures. Carry out cleaning in accordance with Steel Structures Painting Council, 1982 (SSPC)-SP 13.
- (x) Repair any damage caused by the cleaning.
- (xi) Prime exposed reinforcing bars with epoxy bonding adhesive, in accordance with manufacturer's written instructions.
- (xii) Provide supplementary reinforcing bars where required.
- (xiii) Apply patching material to concrete substrate in accordance with the manufacturer's printed instructions required.
- (xiv) The patch shall be finished to match the profile of the surrounding concrete.
- (xv) Cure patches in accordance with manufacturer's printed instructions.

(b) Polyurethane Injection and Crack Repairs

- (i) General
 - (i) The Contractor shall locate, prepare, acid flush, test for watertightness, and inject with polyurethane injection resin and accelerator mixture non-watertight cracks and joints designated for repair in the repair work area, unless noted otherwise.

- (ii) The Contractor shall be advised that the width of the cracks may vary along the length and through the thickness of the concrete section.
 - (iii) The Contractor shall carry out the injection work in a manner consistent with achieving the objective of a watertight repair.
 - (iv) Once the drill holes for watertightness testing and injection have been installed along cracks and joints, the interior surface of the roof slab, walls, and invert slab shall be kept clean and free of dirt and standing water until the injection work has been completed and acceptable quality control core drilled samples have been obtained.
 - (v) All excess unused polyurethane materials shall be removed from the work area.
- (ii) Drilling Holes for Injection
- (i) Drill holes shall be installed along cracks and joints designated for repair to test the watertightness of the cracks and joints as required to meet the performance requirements for injection where the cracks and joints are found to be non-watertight.
 - (ii) The requirements for installing drill holes for watertightness testing and injection provided below represent acceptable minimum standards of practice.
 - (iii) The drill holes for watertightness testing and injection shall be drilled at an angle between forty-five (45) degrees and thirty (30) degrees from perpendicular to the surface of the concrete and perpendicular to the alignment of the cracks or joints, as indicated on the Drawings.
 - (iv) The drill holes shall intersect the cracks at the midpoint of the concrete section, and intersect the joints at the midpoint between the waterstop and interior concrete surface, except as noted otherwise.
 - (v) The drill holes shall be located on alternate sides of the crack or joint where possible, unless the orientation of the crack or joint is known or has been verified by non-destructive testing techniques or core drilling.
 - (vi) The spacing of the drill holes shall not exceed 300 millimetres, except as noted otherwise. The location and angle of the drill holes shall be adjusted to suit the orientation of the crack or joint and at locations where a crack intersects with the crack or joint.
 - (vii) Measures shall be taken to assist in locating the drill holes at the required distance from the crack or joint and at the required angle, such as using a template, during the Work especially at the commencement of drilling holes for watertightness testing and injection and at the beginning of each subsequent shift.
 - (viii) Measures shall be taken to prevent drilling the holes for watertightness testing and injection too shallow, too deep, and/or damaging the existing waterstop in the joints.
 - (ix) Dust and debris in the drill holes and on the interior surface of the arch and invert slab resulting from the drilling operation, shall be removed by flushing with water prior to installing the injection packers or ports.
 - (x) Install injection packers or ports in the drill holes in accordance with the manufacturer's printed instructions with the zerk coupling, or other one-way ball or check valve, to permit testing for watertightness and acid flushing of the cracks and joints.
- (iii) Acid Flushing of Cracks and Joints
- (i) Flush the cracks and joints with the acid flushing solution at a pressure of 7 MPa (1000 psi), or the resin injection pressure, whichever is greater. The acid flushing solution shall be applied for a sufficient duration to test the watertightness of the cracks and joints. Where the cracks and joints are found

- to be non-watertight, the acid flushing solution shall be permitted to penetrate the full depth and length of the cracks or joints.
- (ii) Following the acid flushing, the cracks and joints shall be flushed with copious quantities of potable water at a pressure of 7 MPa (1000 psi), or the resin injection pressure, whichever is greater, until there is no more evidence of acid flushing solution visible in the flush water.
 - (iii) Where the cracks or joints are determined to be non-watertight, carry out injection work to satisfy the performance requirements of the Specification.
 - (iv) Drill holes located along cracks or joints that are found to be watertight shall be clearly identified by means of a chalk mark on the arch or invert slab alongside the drill hole.
 - (v) The worker who is carrying out the acid flushing operations shall be clearly identified by wearing a reflective safety vest and signs indicating "Acid Flushing".
 - (vi) The portion of the work area where acid flushing is being carried out shall be clearly identified by signs and isolated by placing orange pylons, or other temporary barriers, and signs indicating "Acid Flushing" at either end of the siphon.
- (iv) Application of Surface Seal along Cracks and Joints
- (i) Apply a surface seal along the length of the cracks and joints found to be non-watertight in order to contain the polyurethane injection resin and accelerator mixture during injection.
 - (ii) A smooth trowel or sponge float finish shall be provided on the surface seal to provide a uniform surface free of projections. At locations where the required finish is not provided, re-finish by grinding or other suitable means.
 - (iii) Cure the surface seal in accordance with manufacturer's printed instructions.
- (v) Polyurethane Injection Resin and Accelerator Mixture
- (i) Add accelerator to the polyurethane injection resin at the required dosage to produce a cured polyurethane material meeting the performance requirements, and mix thoroughly in accordance with the manufacturer's printed instructions until a homogeneous mixture is obtained.
 - (ii) Heat the polyurethane injection resin and accelerator materials prior to and during the mixing and injection to a temperature between 30° and 55° Celsius. Injection shall not take place when the polyurethane injection resin and accelerator mixture is less than 30° Celsius or more than 55° Celsius.
- (vi) Injection of Cracks and Joints
- (i) Inject the polyurethane injection resin and accelerator mixture with water, or in a neat form into cracks and joints in a sequential manner, and re-inject as required, to meet the performance requirements.
 - (ii) The procedure suggested below for injection of invert cracks has been found to be effective in meeting the performance requirements during previous repairs, as it permits excess water, dirt, and other residue present in the crack to be vented out through adjacent injection packers or ports. Prior to commencing the injection work along an invert crack, remove the zerk couplings from the injection packers or ports except for the two packers located where the injection work will commence. Commence injection work in the first two packers. Once clean polyurethane resin is vented from the third injection packer, cease injection at the first packer, and install the zerk coupling and commence injection at the third packer. Repeat the process for the fourth and subsequent packers until the full length of the invert crack has been injected.

- (vii) Repair of Isolated Locations of Infiltration
 - (i) Drill holes for injection, acid flush, apply surface seal, and carry out injection work as detailed herein above.
 - (ii) At locations where the infiltration is significant, apply cementitious based surface seal in accordance with manufacturer's printed instructions to minimize the infiltration prior to commencing the injection work.
 - (iii) Carry out multiple injection as required to meet the performance requirement.
- (viii) Removal of Packers and Ports and Patching
 - (i) Following the completion of the injection work, the Contractor shall remove the remaining injection packers and ports, and patch the remaining holes with the patching repair material.

E13.6 Quality Control

- (a) Testing of Repaired Cracks
 - (i) Test grouted cracks in the existing lower box by coring a minimum of 3 (three) 75 millimetres in diameter cores to a depth of 80% of existing wall/slab thickness. Cores will be visually inspected for a depth of penetration. In order to pass the test, observed depth of penetration must exceed 90% of length of cored sample.
 - (ii) Patch core holes by completely filling with non-shrink grout.

E13.6.1 Corrective Action

- (a) The Contractor shall at their own expense, correct such work or replace such materials found to be defective under this Specification and carry out additional quality control testing.

E13.7 Method of Measurement and Basis of Payment

- (a) The Crack Repairs will be measured on a length basis. The amount to be measured shall be the total number of lineal metres of crack repaired, for the items of work listed below, carried out in accordance with the requirements of this Specification.
 - (a) Polyurethane Injection of Cracks and Joints
- (b) Repair of the existing headwall joint repair will no be measured for payment. It shall be included in the price bid for "Construction of Sluice Gate Chamber", including removal of existing repair, cleaning, reinforcing and concrete patching carried out in accordance with the requirements of this Specification.
- (c) The Concrete Patching Repairs will be measured on a volume basis and paid at the Contract Unit Price for "Concrete Patching Repairs". The volume paid will be the total number of litres of repair material applied to the repair, carried out in accordance with the requirements of this Specification. No measurement will be made for waste material, materials mixed in excess of required volume, or materials placed outside the limits set out by the Contract Administrator.