



**THE CITY OF WINNIPEG**

# **BID OPPORTUNITY**

**BID OPPORTUNITY NO. 153-2005**

**WINNIPEG WATER TREATMENT PROGRAM – CONSTRUCTION OF YARD PIPING  
AND VALVE CHAMBERS - CONTRACT 1**

## TABLE OF CONTENTS

### PART A - BID SUBMISSION

|   |   |
|---|---|
| Form A: Bid   | 1 |
| Form B: Prices  | 4 |
| Form G1: Bid Bond and Agreement to Bond                       | 7 |
| Form G2: Irrevocable Standby Letter of Credit and Undertaking | 9 |

### PART B - BIDDING PROCEDURES

|   |   |
|---|---|
| B1. Project Title                               | 1 |
| B2. Submission Deadline                         | 1 |
| B3. Site Investigation                          | 1 |
| B4. Enquiries                                   | 1 |
| B5. Addenda                                     | 1 |
| B6. Substitutes                                 | 2 |
| B7. Bid Submission                              | 3 |
| B8. Bid   | 3 |
| B9. Prices                                      | 4 |
| B10. Qualification                              | 4 |
| B11. Bid Security                               | 5 |
| B12. Opening of Bids and Release of Information | 6 |
| B13. Irrevocable Bid                            | 6 |
| B14. Withdrawal of Bids                         | 7 |
| B15. Evaluation of Bids                         | 7 |
| B16. Award of Contract                          | 8 |

### PART C - GENERAL CONDITIONS

|                        |   |
|------------------------|---|
| C1. General Conditions | 1 |
|------------------------|---|

### PART D - SUPPLEMENTAL CONDITIONS

#### General

|                             |   |
|-----------------------------|---|
| D1. General Conditions      | 1 |
| D2. Scope of Work           | 1 |
| D3. Definitions             | 1 |
| D4. Contract Administrator  | 1 |
| D5. Contractor's Supervisor | 2 |
| D6. Notices                 | 2 |
| D7. Furnishing of Documents | 2 |

#### Submissions

|                             |   |
|-----------------------------|---|
| D8. Safe Work Plan          | 3 |
| D9. Insurance               | 3 |
| D10. Performance Security   | 3 |
| D11. Subcontractor List     | 4 |
| D12. Equipment List         | 4 |
| D13. Detailed Work Schedule | 4 |

#### Schedule of Work

|                              |   |
|------------------------------|---|
| D14. Commencement            | 5 |
| D15. Schedule Restrictions   | 6 |
| D16. Critical Stages         | 7 |
| D17. Substantial Performance | 7 |
| D18. Total Performance       | 8 |
| D19. Liquidated Damages      | 8 |

**Control of Work**

|  |    |
|--|----|
| D20. Job Meetings  | 9  |
| D21. Prime Contractor – The Workplace Safety and Health Act (Manitoba) | 9  |
| D22. Partnering  | 9  |
| D23. Cooperation With Others   | 9  |
| D24. Site Security   | 10 |

**Measurement and Payment**

|   |    |
|---|----|
| D25. Payment Schedule                         | 10 |
| Form H1: Performance Bond                     | 11 |
| Form H2: Irrevocable Standby Letter of Credit | 13 |
| Form J: Subcontractor List                    | 15 |
| Form K: Equipment                             | 16 |

**PART E - SPECIFICATIONS**

**General**

|  |   |
|--|---|
| E1. Applicable Specifications, Standard Details and Drawings | 1 |
| E2. Soils Investigation Report                               | 1 |

**General Requirements**

|  |    |
|--|----|
| E3. Office Facilities  | 2  |
| E4. Condition, Protection of and Access to the Aqueduct                | 2  |
| E5. Environmental Protection   | 4  |
| E6. Construction Sequencing and Aqueduct Operation                     | 6  |
| E7. Construction of Valve Chambers                                     | 8  |
| E8. Butterfly valves, Actuators, Miscellaneous Valves and Fittings     | 9  |
| E9. Supply and Delivery of Prestressed Concrete Pipe and Appurtenances | 11 |
| E10. Installation of Prestressed Concrete Pipe and Appurtenances       | 16 |
| E11. Excavation, Bedding and Backfill                                  | 20 |
| E12. Supply and Installation of Internal Compression Seals             | 21 |

**APPENDICES**

APPENDIX A – TEST HOLE LOGS

APPENDIX B – FORMS

## **PART B - BIDDING PROCEDURES**

### **B1. PROJECT TITLE**

B1.1 WINNIPEG WATER TREATMENT PROGRAM – CONSTRUCTION OF YARD PIPING AND VALVE CHAMBERS - CONTRACT 1

### **B2. SUBMISSION DEADLINE**

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, May 6, 2005.

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

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

### **B3. SITE INVESTIGATION**

B3.1 Further to GC:3.1, the Contract Administrator or an authorized representative will be available at the Site from 10:00 to 12:00 on April 26, 2005 to provide Bidders access to the Site.

B3.2 The Bidder shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

B3.3 Further to GC:3.1 the Bidder is advised that the Deacon Booster Pumping Station and area is a secured, fenced compound. Contact the UMA Projects Site Office and advise that personnel are on Site.

### **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 11 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 13 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.

B9.4 Notwithstanding GC.12.2.3(c), prices for Items No. 1 & 2 on Form B: Prices shall not include the Manitoba Retail Sales Tax (MRST, also known as PST), which shall be extra.

## **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 12 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 12 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 13 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 13 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 and applicable taxes;
  - (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.
- B15.5 Further to B15.1(c), applicable taxes shall include Manitoba Retail Sales Tax (MRST, also known as PST).

**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 construction of large diameter yard piping and construction of three (3) valve chambers
- D2.2 The major components of the Work are as follows:
- (a) Supply of 2100 millimetre diameter AWWA C301 Prestressed Concrete Cylinder pipe, fittings and appurtenances
  - (b) Installation of approximately 250 lineal metres of 2100 millimetre diameter AWWA C301 Prestressed Concrete Cylinder pipe, fittings and appurtenances
  - (c) Installation of Excavation Shoring
  - (d) Construction of three (3) cast-in-place concrete valve chambers and associated works.
  - (e) Construction of the discharge chamber shoring and excavation for the clearwell
  - (f) Installation of seven (7) butterfly valves supplied by others

#### **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 Projects (CM) Ltd., represented by:

Mr. Larry Smith, C.E.T.  
Assistant Construction Manager  
1479 Buffalo Place  
Winnipeg, MB. R3T 1L7  
Telephone No. (204) 284-0580  
Facsimile No. (204) 453-5172

- D4.2 At the pre-construction meeting, Larry Smith 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 City shall provide and maintain the following Project Insurance Coverages:
- (a) Builder's Risk Insurance in the amount of one hundred percent (100%) of the total project cost.
    - (i) The Contractor shall be responsible for deductibles up to \$10,000.
  - (b) Wrap-Up Liability Insurance in an amount of no less than 10 million dollars (\$10,000,000.00)
    - (i) The Contractor shall be responsible for deductibles up to \$10,000.
- D9.1.1 The City of Winnipeg will carry such insurance to cover all parties engaged in the Work in this Contract. Provision of this insurance by the City of Winnipeg is not intended in any way to relieve the Contractor from his obligations under the terms of the Contract. Specifically, losses relating to deductibles for insurance, as well as losses in excess of limits of coverage and any risk of loss that is not covered under the terms of the insurance provided by the City of Winnipeg remains with the Contractor.
- D9.2 The Contractor shall provide and maintain the following insurance coverage at all times during the performance of the Work:
- (a) 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).
    - (i) Deductibles shall be borne by the Contractor;
    - (ii) The Contractor shall not cancel, materially alter, or cause the policy to lapse without providing at least fifteen (15) Calendar Days prior written notice to the Contract Administrator;

### **D10. PERFORMANCE SECURITY**

- D10.1 The Contractor shall provide and maintain performance security until the expiration of the warranty period in the form of:
- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of 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. EQUIPMENT LIST**

D12.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment List) at 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.

## **D13. DETAILED WORK SCHEDULE**

D13.1 The Contractor shall provide the Contract Administrator with a detailed work schedule 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.

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

- (a) a critical path method (C.P.M.) schedule for the Work;
  - (b) a Gantt chart for the Work based on the C.P.M. schedule;
- all acceptable to the Contract Administrator.

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

- (a) Site Preparation and Mobilization
- (b) Clearwell Discharge Chamber Shoring and Excavation
  - (i) Shoring and Excavation (Critical Stage)
  - (ii) Installation of Wall Pieces and Connection to Discharge Chamber Sluice Gate (Critical Stage)
- (c) Cell 1 Treated Water Piping
  - (i) Stage 1 Excavation and Shoring
  - (ii) Stage 2 Excavation and Shoring
  - (iii) Connection to Existing Tee

- (iv) Construction of Valve Chamber
- (v) Pipe Installation
- (d) Cell 1 Raw Water Piping
  - (i) Installation of Shoring and Stage 1 Excavation
  - (ii) Removal of existing pipe
  - (iii) Installation of Chamber Piping
  - (iv) Construction of Valve Chamber
  - (v) Pipe Installation (Stage 1)
  - (vi) Pipe Installation (Stage 2)
  - (vii) Connection to Raw Water Pumping Station (Winter 2006)
- (e) Cell 3 Treated Water Piping
  - (i) Installation of Shoring and Stage 1 Excavation
  - (ii) Removal of Thrust Block and Bulkhead
  - (iii) Connection to Existing Pipe Stub
  - (iv) Construction of Valve Chamber
  - (v) Pipe Installation (Stage 1) (Critical Stage)
  - (vi) Pipe Installation (Stage 2)
- (f) Cell 3 Raw Water Piping (Winter/Spring 2006)
  - (i) Installation of Chamber Piping in the Raw Water Pumping Station (Winter 2006) (Critical Stage)
  - (ii) Installation of Shoring and Excavation at Cell 3 outlet connection.
  - (iii) Removal of existing pipe
  - (iv) Installation of Tee in Existing Line
  - (v) Pipe Installation
  - (vi) Connection to Raw Water Pumping Station
- (g) Clearwell Inlet Pipe (Supply Only)

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

## **SCHEDULE OF WORK**

### **D14. COMMENCEMENT**

D14.1 The Contractor shall not commence any Work until he is in receipt of a letter of intent from the Award Authority authorizing the commencement of the Work.

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

- (a) the Contract Administrator has confirmed receipt and approval of:
  - (i) evidence 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 equipment list specified in D12;
  - (viii) the Detailed Work Schedule specified in D13; and
- (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

## **D15. SCHEDULE RESTRICTIONS**

### **D15.1 Aqueduct, Yard Piping and Reservoir Operations**

- (a) Aqueducts, existing yard piping and reservoir shutdown periods are scheduled based on a number of factors including routine maintenance and repair work along the Aqueduct, water demand, weather, reservoir operation and other factors. The City shall endeavour to make the specified time periods available to the Contractor to schedule his work requiring removal of the Aqueduct and yard piping from service, without limiting the City's control over the operation of the regional water infrastructure to complete other work, maintain adequate water supply and storage of water and maintain the integrity of the infrastructure. The City shall reserve the right to cancel and/or delay these schedule dates at any time, due to any circumstances that could adversely affect the Aqueducts or water supply, including but not limited to high water demand, abnormal weather, failures of related water system components and/or security concerns.
- (b) Operations involving shutdown or excessive risks to the Cell 1 and Cell 3 supply chains cannot occur simultaneously. Works involving the Cell 3 Raw Water or Treated Water lines in the vicinity of existing live pipes cannot commence until works in the vicinity of the Cell 1 supply lines are complete, and the Cell 1 supply lines placed back into service. The Contractor shall allow a minimum of two (2) Working Days between completion of the Cell 1 Raw and Treated Water connections and commencement of Cell 3 Treated Water connection.
- (c) The Cell 1 outlet line will not be taken out of commission prior to August 15, 2005.
- (d) Connection to the Cell 3 Treated Water connection on the east side of the Deacon Booster Pumping Station cannot be undertaken without taking the Deacon Booster Pumping Station and the Ultra-Violet (UV) disinfection facility, within the Booster Pumping Station, off-line. The following schedule restrictions apply;
- (i) The connection to the Cell 3 Treated Water connection point cannot be scheduled prior to October 15, 2005.
  - (ii) The Booster Pumping station and UV facility will be permitted to be taken off line for a period of fourteen (14) calendar days. All works required to place the pumping station back into service must be completed within this time period.
  - (iii) Schedule shall allow for one (1) days time for draining and one (1) days time for recommissioning of the lines, included in the period noted above.
  - (iv) The Contractor shall provide fourteen (14) calendar days notice prior to commencing Cell 3 Treated Water connection, for notifications and operational modifications to be scheduled.
- (e) Connection of the Cell 3 Raw Water line to the existing Cell 3 outlet pipe cannot be scheduled until the conditions outlined in D15.2(c) are met. The Cell 3 Raw Water line must be completed no later than June 1, 2006.
- (f) Portions of the Work involving removal and replacement of existing Aqueduct lines are subject to the following restrictions;

- (i) The Aqueduct will not be taken out of service unless all precast pipe, valves, connectors, fittings and miscellaneous components required to complete the reconnections are on Site, tested, and pre-fitted, to ensure that the pipe can be restored to service within a reasonable timeframe.

#### D15.2 Coordination with Other Contractors

##### (a) Clearwell Discharge Chamber

- (i) Shoring, excavation and construction of the base slab in the discharge chamber will be completed by August 15, 2005 (by others), in order to coordinate placement of discharge chamber wall pieces.
- (ii) Installation of discharge chamber wall pieces as outlined in E6.2(a) must be placed prior to the date set out in D16.1(a)(ii).

##### (b) Cell 3 Treated Water Line

- (i) Complete Stage 1 of Cell 3 Treated Water line, as outlined in E6.2(e)(v) by August 29, 2005, to allow for construction of the clearwell piling for the south wall. All temporary work pads must be removed and the clearwell excavation sideslopes restored prior to this date.

##### (c) Cell 1 and Cell 3 Raw Water Lines

- (i) Cell 1 and Cell 3 Raw Water line cannot be completed until the Raw Water Pumping Station is constructed. Construction of the Raw Water pumping station is tentatively scheduled for February 2006 (to be confirmed).
- (ii) Raw Water Pump Station base slab will be tentatively completed by March 15, 2006, and available for placement of valves and chamber piping.
- (iii) Raw Water Pumping Station piping to be completed by March 22, 2006. Construction of Raw Water Pumping Station walls to a condition to allow restraint of butterfly valve to Cell 3 static head to be tentatively completed by April 15, 2006. (By Others)
- (iv) Remainder of the Cell 1 and Cell 3 Raw Water pipe must be completed by June 1, 2006.

### D16. CRITICAL STAGES

D16.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

##### (a) Clearwell Discharge Chamber

- (i) Delivery of Discharge Chamber Wall Piping by August 15, 2005.
- (ii) Installation of Wall Piping and connection to Discharge Chamber by August 29, 2005.

##### (b) Cell 3 Treated Water Piping

- (i) Pipe Installation (Stage 1) by August 29, 2005.

##### (c) Supply of Clearwell inlet Wall Piping by September 2, 2005.

D16.2 Where Critical Stages cannot be met due to delays beyond the Contractors control, such as delay of material delivery from sources outside of this Bid Opportunity or delay of preceding work by others, the dates for the Critical Stages will be adjusted by an equivalent amount of Calendar Days until such a time as materials or preceding work by others is completed satisfactorily.

### D17. SUBSTANTIAL PERFORMANCE

D17.1 The Contractor shall achieve Substantial Performance by June 1, 2006.

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

D17.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

**D18. TOTAL PERFORMANCE**

D18.1 The Contractor shall achieve Total Performance by June 30, 2006.

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

D18.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

**D19. LIQUIDATED DAMAGES**

D19.1 If the Contractor fails to achieve critical stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:

(a) Clearwell Discharge Chamber Shoring and Excavation

(i) Critical Stage - Delivery of Discharge Chamber Wall Piping two thousand dollars (\$2,000.00);

(ii) Critical Stage - Installation of Wall Piping and Connection to Discharge Chamber two thousand dollars (\$2,000.00);

(b) Cell 3 Treated Water Piping

(i) Critical Stage - Pipe Installation (Stage 1) two thousand dollars (\$2,000.00);

(c) Supply of Clearwell inlet Wall Piping two thousand dollars (\$2,000.00);

(d) Substantial Performance - two thousand dollars (\$2,000.00);

(e) Total Performance – six hundred dollars (\$600.00).

D19.2 The amounts specified for liquidated damages in D19.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

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

## **CONTROL OF WORK**

### **D20. JOB MEETINGS**

- D20.1 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.
- D20.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

### **D21. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)**

- D21.1 Further to GC:6.26, UMA Projects (CM) Ltd. 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).
- D21.2 As Prime Contractor, UMA Projects (CM) Ltd. will administer a Project Health and Safety Management Plan. Compliance with this Plan will be mandatory for all personnel on the construction site and orientation and certification of all staff by the Prime Contractor's Safety Officer will be required.

### **D22. PARTNERING**

- D22.1 In order to effectively and efficiently accomplish the Work of this Contract, The City of Winnipeg, Water and Waste Department is encouraging the formation of a cohesive, mutually beneficial working relationship with the Contractor, his Subcontractors and representatives from the successful bidder for Bid Opportunity 166-2005 Winnipeg Water Treatment Program – Clearwell Construction. This working relationship will endeavour to draw on individual and corporate and community strengths, skills and knowledge to achieve a quality project to the benefit of all participants. The objective of Partnering is to build co-operative relationships, avoid or minimize disputes and actively pursue the attainment of common goals. Success will depend upon teamwork with open and effective communication while adhering to the highest professional standards.
- D22.2 Participation in Partnering will not in any way affect the application or legal obligation of the Contract.
- D22.3 The Partnering Initiation Workshop is typically a one and one-half (1 ½) day session for a project of this magnitude, which would be held in conjunction with the pre-construction meeting. The Partnering Initiation Workshop will be scheduled for a date in the last 2 weeks of June, 2005.
- D22.4 The Partnering Initiation Workshop shall be carried out at no cost to the Contractor nor shall any payment be made for time and travel expenses incurred by the Contractor associated with participation in the Partnering Initiation Workshop. It shall be considered incidental to the Work included in this project.

### **D23. COOPERATION WITH OTHERS**

- D23.1 The Contractor shall note that several other contracts will be underway at the time of construction, including, but not limited to;

- (a) Bid Opportunity 32-2005 Winnipeg Water Treatment Program - Supply of Butterfly Valves for Yard Piping (Awarded)
- (b) Bid Opportunity 70-2005 Winnipeg Water Treatment Program – Bulk Excavation for Clearwell and Water Treatment Plant Sites
- (c) Bid Opportunity 166-2005 Winnipeg Water Treatment Program – Clearwell Construction
- (d) Bid Opportunity 102-2005 Winnipeg Water Treatment Program – Supply of Sluice Gates

D23.2 The Contractor will not have exclusive use of the Site. The Contractor shall coordinate activities with others and minimize disruptions to others, where possible.

D23.3 Where existing site access routes require relocation for installation of Works, the Contractor shall construct suitable, all-weather detours, as required.

D23.4 The Contractor shall note that the Deacon Booster Pumping Station and surrounding compound will be in use during the construction period. The Contractor shall maintain reasonable access to all existing plant, valve chambers, rail, mechanical and electrical facilities at all times. The Contractor shall provide all reasonable assistance to Operations personnel to provide safe, secure access to operational facilities.

#### **D24. SITE SECURITY**

D24.1 Deacon Booster Pumping Station and compound is a fenced, secure site. The construction site and staging areas are fenced, and all access points controlled.

D24.2 Personnel, material and equipment will only be permitted to access the Site via the main entrance gate, located west of Provincial Road 207, as indicated on Plan CM-G001 Rev. 1. This gate will be normally staffed between the hours of 07:00 and 19:00 Monday to Friday. Alternate site access arrangements can be made through the Contract Administrator. Access to the Site through other designated gates, must be approved by the Contract Administrator.

D24.3 Twenty-four hour site security will be present on Site for the duration of the Contract.

#### **MEASUREMENT AND PAYMENT**

##### **D25. PAYMENT SCHEDULE**

D25.1 Further to GC:12, payment for supply Items 1 and 2 on Form B: Prices shall be made upon successful delivery, off-loading and inspection of the items listed therein.

**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. 153-2005

WINNIPEG WATER TREATMENT PROGRAM – CONSTRUCTION OF YARD PIPING AND VALVE CHAMBERS - CONTRACT 1

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)



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

WINNIPEG WATER TREATMENT PROGRAM – CONSTRUCTION OF YARD PIPING AND VALVE  
CHAMBERS - CONTRACT 1

|  |
|--|
| <p>1. Category/type:      Excavation</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>      |
| <p>2. Category/type:      Crane / Lifting</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> |
| <p>3. Category/type:      Compaction</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>      |

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

WINNIPEG WATER TREATMENT PROGRAM – CONSTRUCTION OF YARD PIPING AND VALVE  
CHAMBERS - CONTRACT 1

|  |
|--|
| <b>4. Category/type:</b> Shoring /Piling |
| Make/Model/Year: _____ Serial No.: _____ |
| Registered owner: _____                  |
| Make/Model/Year: _____ Serial No.: _____ |
| Registered owner: _____                  |
| Make/Model/Year: _____ Serial No.: _____ |
| Registered owner: _____                  |
| <b>5. Category/type:</b>                 |
| Make/Model/Year: _____ Serial No.: _____ |
| Registered owner: _____                  |
| Make/Model/Year: _____ Serial No.: _____ |
| Registered owner: _____                  |
| Make/Model/Year: _____ Serial No.: _____ |
| Registered owner: _____                  |
| <b>6. Category/type:</b>                 |
| Make/Model/Year: _____ Serial No.: _____ |
| Registered owner: _____                  |
| Make/Model/Year: _____ Serial No.: _____ |
| Registered owner: _____                  |
| Make/Model/Year: _____ Serial No.: _____ |
| Registered owner: _____                  |

## PART E - SPECIFICATIONS

### GENERAL

#### E1. APPLICABLE SPECIFICATIONS, 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  |
| -                       | Construction Site Layout (For General Information Only)  |
| 1-0601Y-C-C0001-001-00D | Civil -Yard Piping – Site Plan – Plan & Coordinate Geometry  |
| 1-0601Y-C-C0002-001-00D | Civil - Cell 1 Raw Water – Plan & Profile – Valve Chamber to the Raw Water Pumping Station                                 |
| 1-0601Y-C-C0003-001-00D | Civil - Cell 3 Raw Water – Plan & Profile – Existing 2100 Pipe to the Raw Water Pumping Station                            |
| 1-0601Y-C-C0004-001-00D | Civil - Cell 1 & Cell 3 Treated Water – Plan & Profile – Clearwell Discharge Chamber to Existing Treated Water Connections |
| 1-0601Y-C-C0005-001-00D | Yard Piping - Cell 1 Raw Water Valve Chamber – Sections & Details  |
| 1-0601Y-C-C0006-001-00D | Civil - Yard Piping - Cell 1 Treated Water Valve Chamber – Sections & Details  |
| 1-0601Y-C-C0007-001-00D | Civil - Yard Piping - Cell 3 Treated Water Valve Chamber – Sections & Details  |
| 1-0601Y-C-C0008-001-00D | Civil - Miscellaneous Yard Piping Details  |
| 1-0601Y-C-C0009-001-00D | Civil - Miscellaneous Valve Chamber Structural Details   |

#### E2. SOILS INVESTIGATION REPORT

- E2.1 Further to GC:3.1, the following test hole information is provided to assist in the Bidder's evaluation of subsurface conditions and the Bidder shall solely be responsible for any interpretation that they make from this information. Variations in soil conditions may exist between testholes and fluctuations in groundwater levels can be expected seasonally and may occur as a result of construction activities or operation of the Floodway.
- E2.2 Testhole information is considered accurate at the locations drilled and at the time of the investigations. The inclusion of testhole data recorded by others does not represent any guarantees to the accuracy of this data.
- E2.3 Geotechnical information has been compiled from various sources to summarize subsurface conditions within the Work area. Appendix A of these Specifications contains the following testhole logs.

- (a) By UMA Engineering
  - (i) TH's 04-01 to 04-10, 04-12 to 04-24, 04-31, and 04-33 to 04-50 (2004)
  - (ii) TH's 1 to 3 (1996)
- (b) By Others
  - (i) TH's 3 to 6, and R-5 by RM Hardy & Associates Ltd. (1977)
  - (ii) TH's 1 and 2 by Dyregrov Consultants (1993)
  - (iii) TH A13 by KGS Group (1991)
- (c) The figure attached with the testhole logs in Appendix A of these Specifications illustrates the testhole locations in relation to the Work area.

#### E2.4 Reports

- (a) Additional reports and geotechnical information listed as follows are available for viewing at the offices of UMA Engineering Ltd., 1479 Buffalo Place, Winnipeg, Manitoba.
  - (i) The City of Winnipeg Water Treatment Plant Preliminary Design Report – Section 14 Geotechnical Investigation (2005)
  - (ii) Water Impounding Reservoir - Cell #2 and Booster Pumping Station Deacon Manitoba by RM Hardy & Associates Ltd. (1977)
  - (iii) Proposed Venturi Chambers Deacon Reservoir by Dyregrov Consultants (1993)
  - (iv) Deacon Reservoir Expansion Proposed Groundwater Monitoring Program by KGS Group (1993)
  - (v) Shoal Lake Aqueduct Program 5 – Deacon Drainage Improvements by UMA Engineering Ltd. (1996)
  - (vi) Pile Driving records from Deacon Booster Pumping Station by RM Hardy and Associates Ltd. (1979).
- (b) Information in these reports has been provided to assist in the Bidder's evaluation of subsurface conditions and the Bidder shall solely be responsible for any interpretation that they make from this information.

### GENERAL REQUIREMENTS

#### E3. OFFICE FACILITIES

- E3.1 The Contractor will be permitted to erect a site office in a designated area as shown on General Plan CM-G001 Rev. 1.
- E3.2 The Contractor will be permitted to use lay down areas for staging as identified on General Plan CM-G001 Rev. 1

#### E4. CONDITION, PROTECTION OF AND ACCESS TO THE AQUEDUCT

- E4.1 Condition of the Aqueduct and Existing Yard Piping
  - E4.1.1 The Deacon Booster Pumping Station and area contains numerous water conduits of various constructions and vintages. All are critical components of the City of Winnipeg Water Supply and shall be treated with the utmost caution. Work around any of these pipelines 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.
  - E4.1.2 The Shoal Lake Aqueduct, north of the main access road is a cast-in-place reinforced concrete pipe, vintage 1916-1917. The Branch I Aqueduct running east to west, immediately south of the Booster Pumping Station, commencing at the existing main

entrance to the station, is constructed of precast reinforced concrete pipe, vintage 1918-1919. The Branch II Aqueduct, running southerly from the surge tower structure, is constructed of AWWA C301 pre-stressed concrete cylinder pipe vintage 1958-1960. Other existing water transmission lines within the Deacon Booster Pumping Station compound, consist of AWWA C301 pre-stressed concrete cylinder pipe vintage 1970-1995.

#### E4.2 Protection of the Aqueducts and Water Transmission Lines

E4.2.1 Contractors carrying out repair work or working in the vicinity of the Aqueducts and transmission lines shall ensure that:

- (a) Equipment shall only be permitted to cross the pipes at designated locations.
- (b) Granular material, construction material, soil or other material shall not be stockpiled on the Aqueduct or within 5 metres of the Aqueduct centerline.
- (c) Construction practices shall not subject the Aqueduct to asymmetrical loading at any time.
- (d) 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.
- (e) Asymmetrical water pressures shall not be permitted to build up on one side of the Aqueduct arch.
- (f) Further to CW 2030-R6, only smooth edged excavation buckets, soft excavation or hand excavation shall be used for excavation adjacent to and over the pipelines.
- (g) Install watertight bulkheads at all locations where the pipes are exposed, or removed.

E4.2.2 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 Operational Safety Lockouts

- (a) Install Contractor's locks on City installed lock-out devices, on all valve and sluice gates (closed position) prior to commencement of operations involving connection to existing pipelines at the following and other locations designated by the City;
  - (i) Cell 1 Raw and Treated Water Connections
    - ◆ Cell 1 outlet Sluice Gates (3 units)
    - ◆ DRV 308 Butterfly valve
    - ◆ DRV 302 Butterfly valve
  - (ii) Cell 3 Treated Water Connection
    - ◆ DRV 301 Butterfly Valve
    - ◆ DRV 308 Butterfly valve
    - ◆ VC 6 Butterfly valve
    - ◆ DRV 305 Butterfly valve
  - (iii) Cell 3 Raw Water Connection
    - ◆ Cell 3 outlet sluice gate (1 unit)
    - ◆ DRV 301 butterfly valve
    - ◆ DRV 303 butterfly valve

- (b) The City of Winnipeg will provide access to valve locations. The Contractor shall name a primary contact and backup personnel, available on a 24 hour per day basis, with access to lockout keys, in the event on an emergency.

## **E5. ENVIRONMENTAL PROTECTION**

- E5.1 The Contractor shall be aware that the Shoal Lake Aqueduct and Deacon reservoir areas area 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, reservoirs or pipelines.
- E5.2 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.
- E5.3 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work:
- E5.3.1 Federal
- (a) Canadian Environmental Protection Act (CEPA) c.16
  - (b) Transportation of Dangerous Goods Act and Regulations c.34
- E5.3.2 Provincial
- (a) The Dangerous Goods Handling and Transportation Act D12
  - (b) The Endangered Species Act E111
  - (c) The Environment Act c.E125
  - (d) The Fire Prevention Act F80
  - (e) The Manitoba Nuisance Act N120
  - (f) The Public Health Act c.P210
  - (g) The Workplace Safety and Health Act W120
  - (h) And current applicable associated regulations.
- E5.4 The Contractor is advised that the following environmental protection measures apply to the Work.
- E5.4.1 Materials Handling and Storage
- (a) Construction materials shall not be stored within five (5) metres of the Aqueduct centerline.
- E5.4.2 Fuel Handling and Storage
- (a) The Contractor shall abide by the requirements of Manitoba Environment for handling and storage of fuel products.
  - (b) All fuel handling and storage facilities shall comply with The Dangerous Goods and Transportation Act Storage and Handling of Petroleum Products Regulation and any local land use permits.
  - (c) Fuels, lubricants, and other potentially hazardous materials as defined in The Dangerous Goods and Transportation Act shall be stored and handled within the approved storage areas.
  - (d) The Contractor shall ensure that all fuel storage containers are inspected daily for leaks and spillage.
  - (e) Products transferred from the fuel storage area(s) to specific work sites shall not exceed the daily usage requirement.

- (f) 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.
- (g) Refueling of mobile equipment and vehicles shall take place at least 100 metres from a watercourse.
- (h) 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.
- (i) 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.

#### E5.4.3 Waste Handling and Disposal

- (a) The construction area shall be kept clean and orderly at all times during and at completion of construction.
- (b) At no time during construction shall personal or construction waste be permitted to accumulate for more than one day at any location on the construction site, other than at a dedicated storage area as may be approved by the Contract Administrator.
- (c) Indiscriminate dumping, littering, or abandonment shall not take place.
- (d) No on-site burning of waste is permitted.
- (e) Equipment shall not be cleaned near watercourses; contaminated water from onshore cleaning operations shall not be permitted to enter watercourses.

#### E5.4.4 Dangerous Goods/Hazardous Waste Handling and Disposal

- (a) Dangerous goods/hazardous waste are identified by, and shall be handled according to, The Dangerous Goods Handling and Transportation Act and Regulations.
- (b) The Contractor shall be familiar with The Dangerous Goods Handling and Transportation Act and Regulations.

#### E5.4.5 Emergency Spill Response

- (a) The Contractor shall ensure that due care and caution is taken to prevent spills.
- (b) The Contractor shall report all major spills of petroleum products or other hazardous substances with 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.
- (c) The Contractor shall designate a qualified supervisor as the on-site emergency response coordinator for the project. The emergency response coordinator shall have the authority to redirect manpower in order to respond in the event of a spill.
- (d) The following actions shall be taken by the person in charge of the spilled material or the first person(s) arriving at the scene of a hazardous material accident or the on-site emergency response coordinator:
  - (i) Notify emergency-response coordinator of the accident:
    - identify exact location and time of accident
    - indicate injuries, if any
    - request assistance as required by magnitude of accident (Manitoba Environment 24-hour Spill Response Line (204) 945-4888, Police, Fire Department, Ambulance, company 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.
- (e) 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.

#### E5.4.6 Controlled Products

- (a) 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.
- (b) 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.

## E6. CONSTRUCTION SEQUENCING AND AQUEDUCT OPERATION

### E6.1 Description

- (a) This specification shall generally outline construction sequencing, Aqueduct operation, and Aqueduct shutdown criteria.
- (b) Construction sequencing shall take into account operations of the Regional Water infrastructure and operations of other contractors.

### E6.2 Construction Sequencing

The following construction sequences must be incorporated into the Contractor’s schedule and work plan.

- (a) Clearwell Discharge Chamber
- (i) Coordinate activities with clearwell construction contractor.
  - (ii) Installation of the clearwell discharge chamber shoring, excavation and construction of the discharge chamber base slab shall be completed by others. Once base slab is installed and achieved sufficient strength, the Contractor will be permitted to place wall piping to be poured in place in the chamber walls.
  - (iii) Place discharge chamber wall piping and adequately brace to prevent movement during forming and wall pouring operations.
- (b) Cell 1 Treated Water Supply
- (i) Install thrust block on existing 2700 Cell 1 Outlet line tee

- (ii) Stage 1 Excavation (Cell 1 outlet pipe in service)
  - ◆ Install shoring and excavate to Elevation 230.5 metres for Cell 1 outlet connection piping
  - ◆ Install shoring and excavate to Elevation 225.8 metres for Cell 1 Treated Water Valve Chamber.
- (iii) Stage 2 Excavation (Cell 1 outlet pipe dewatered)
  - ◆ Complete excavation and connect to existing Cell 1 Treated water tee. Remove existing external bulkhead and internal welded in place torospherical bulkhead. Schedule bulkhead removal with Cell 1 Raw Water valve chamber construction.
- (c) Cell 1 Treated Water
  - (i) Construct Valve chamber, install valves and piping.
  - (ii) Valve chamber construction to Elevation 230.68 metres, valve installation, valve commissioning valve chamber backfill to elevation 230.68 metres, and piping between the existing Cell 1 Treated Water tee and Valve Chambers to be completed prior to returning Cell 1 Outlet line to service.
- (d) Cell 1 Raw Water Supply
  - (i) Stage 1 Excavation (Cell 1 outlet pipe in service)
    - ◆ Install excavation shoring and excavate to elevation 233.3 metres
  - (ii) Stage 2 Excavation (Cell 1 outlet pipe out of service)
    - ◆ Complete shoring and excavation to elevation 228.92 metres
    - ◆ Remove designated sections of the existing 2700 millimetre Cell 1 outlet pipe by careful cutting and demolition. Take care not to damage existing bell and spigot ends to be reused.
  - (iii) Construct Valve Chamber, install valves and chamber piping and connect to existing Cell 1 outlet pipe.
  - (iv) Chamber construction, chamber piping, connections to existing pipe, backfill to the top of the roof slab, valve commissioning and installation of Raw Water pipe including 45 degree bend and a minimum of two standard pipe outside the chamber must be completed prior to returning Cell 1 Outlet line to service.
  - (v) Install remaining raw water piping and temporary bulkhead as shown on the drawings. Connection to the proposed Raw Water Pumping Station cannot be completed until the Raw Water Pump Station excavation and base slab are completed.
- (e) Cell 3 Treated Water Supply
  - (i) Stage 1 Excavation (Cell 3 Treated Water Stub in service)
    - ◆ Install shoring for Cell 3 Treated Water valve chamber and excavate to elevation 229.8 metres.
  - (ii) Stage 2 Excavation (Cell 3 outlet pipe out of service)
    - ◆ Demolish existing thrust block and remove existing bulkhead. Excavate and install shoring to elevation 225.8
    - ◆ Excavate locally below existing pipe end to foundation level and install temporary pipe support. Complete excavation.
  - (iii) Install 2100 millimetre bell by plain end adaptor flange and weld in place. Install valve and remaining chamber piping.
  - (iv) Construct Valve Chamber, install valves and chamber piping and connect to existing Cell 3 outlet pipe.
  - (v) Install Cell 3 Treated Water piping

- ◆ Stage 1 pipe installation includes a minimum of three standard pipe lengths 18 metres) away from the discharge chamber, including backfill and removal of work pads and temporary structures.
  - ◆ Install piping between the existing Cell 3 Treated Water stub and 45 degree bend north of the valve chamber, including thrust block to be completed prior to placing Cell 3 outlet pipe in service.
  - ◆ Valve chamber construction to Elevation 230.68 metres, valve installation, valve commissioning valve chamber backfill to elevation 230.68 metres, to be completed prior to placing Cell 3 outlet pipe in service.
  - ◆ Removal and relocation of existing Cell 3 outlet pipe bulkhead to be completed prior to placing Cell 3 outlet pipe in service.
- (f) Cell 3 Raw Water Supply (Spring 2006)
- (i) Install Raw Water Pumping station 2100 millimetre inlet piping, valves and pipe couplers when base slab is completed and concrete has attained sufficient strength.
  - (ii) Excavate and install shoring, as required, at proposed Cell 3 outlet pipe tie in location ( exact location to be field confirmed).
  - (iii) Demolish existing pipe taking care not to damage existing bell and spigots. Install new tee, thrust block, and connect to existing piping.
  - (iv) Complete Cell 3 Raw Water piping.

## **E7. CONSTRUCTION OF VALVE CHAMBERS**

### **E7.1 Materials**

- (a) Sub Drain Pipe
  - (i) As per City of Winnipeg, Division 4 Approved Products, complete with geotextile filter sock.
  - (ii) Pipe to be PVC SDR 35 products only.
- (b) Formwork, Reinforcing Steel and Concrete
  - (i) As per City of Winnipeg CW 2160-R6.
- (c) Concrete Mix Design
  - (i) Concrete Mix Design as per Table CW 2160.1, Type A mix.
- (d) Water Stops
  - (i) As indicated on the Drawings.
- (e) Fibre Reinforced Plastic Grating
  - (i) Fibre reinforced plastic grating shall be Fibregrate, as manufactured by Fibregrate Composite Systems, or approved equal.
  - (ii) Grating pattern shall be 50 mm square, colour yellow.
- (f) Rigid Insulation
  - (i) Rigid insulation for below grade applications shall be rigid polystyrene insulation conforming to CAN/ULC S701 Type 4, Styrofoam SM by Dow Chemical, Celfort 300 by Owens Corning, or approved equal.

### **E7.2 Submittals**

- (a) Submit reinforcing steel shop drawings and concrete mix design in accordance to CW 2160.
- (b) Submit fibre reinforced plastic grating design and erection details in accordance to CW 2160.

### E7.3 Construction Methods

- (a) Cast-in-place concrete as per CW 2160.
- (b) Floor Drains
  - (i) Construct Floor drain as detailed on the drawings.
- (c) Pipe, Valves Fittings and Appurtenances
  - (i) As per E8 , E9 and E10.
- (d) Fibre Reinforced Gratings
  - (i) Prepare and install the fibre reinforced plastic grating in accordance with the manufacturer's instructions.
- (e) Subdrain pipe shall be installed in a geotextile wrapped drainage trench as per City of Winnipeg Standard Detail SD-245.

### E7.4 Method of Measurement and Basis of Payment

- (a) Construction of Valve Chambers shall be measured on a lump sum basis, for each valve chamber constructed in accordance to these specifications. The lump sum price shall include excavation, backfill, cast-in-place concrete works, FRP grating, installation of butterfly valves, installation of prestressed concrete chamber piping, supply and installation of miscellaneous valves, appurtenances, miscellaneous metals, couplings, sub drains, interior plumbing, miscellaneous materials and bollards. Chamber piping shall be considered all piping within the chamber, to the outside face of the chamber wall.

## **E8. BUTTERFLY VALVES, ACTUATORS, MISCELLANEOUS VALVES AND FITTINGS**

### E8.1 Supply and Field Testing of 2100 Butterfly Valves

- (a) 2100 Butterfly valves are being supplied under a separate bid opportunity, City of Winnipeg Bid Opportunity 32-2005. Valves are to be supplied, delivered and tested at the City of Winnipeg, 1500 Plessis Road on the following schedule;
  - (i) Three (3) manually actuated 2100 mm valves and one (1) electrically actuated 2100 mm valve for Cell 1 Treated Water Supply - September 21, 2005
  - (ii) One (1) electrically actuated 2100 mm valve for Cell 3 Treated Water Supply – October 19, 2005
  - (iii) Balance of 2100 mm valves for Raw Water Pumping Station – Prior to February, 2006
- (b) Contact for the Valve Supply Contract is;
  - Mr. Rick Pochenco
  - Mueller Flow Control
  - (204) 774-3461
- (c) The Contractor shall attend a delivery inspection, with the Valve Supply Contractor, and Contract Administrator. The Supply Contractor, prior to turning valves over to the Installation Contractor, shall rectify any damage noted during the delivery inspection. Written acceptance of the valves and actuators by a duly completed "Certificate of Equipment Delivery (Form 200)" (Appendix B) shall constitute acceptance for installation from the Installation Contractor.
- (d) The Valve Supply Contractor shall perform hydrostatic leakage testing of the valves, after delivery. Any leakage or defects noted during field-testing shall be repaired by the Supply Contractor, prior to the Installation Contractor taking possession.
- (e) The Installation Contractor may leave the valves in storage at the City facility at 1500 Plessis Road, until required on-site for preassembly and installation.

- (f) Once removed from storage at the City facility, the Contractor shall transport valves to the jobsite. Once delivered to the Site for preassembly and installation, the valves shall remain stored in a secure, on-site storage compound.
- (g) For the purposes of transportation of the valves from the storage facility to the job site, the Contractor shall ensure the following:
  - (i) Valve flange faces are protected from damage by installation of a minimum of 20 mm plywood cover on both faces of each valve.
  - (ii) Valves be handled only by methods approved by the manufacturer, and properly secured to preclude any damage during transport.

## E8.2 Materials

### (a) Bolts

- (i) Bolts for installation of butterfly valves shall be ASTM A307 grade B. Bolt size, type and diameter shall be in accordance to AWWA C207-01, and as indicated on Supplier Shop Drawings (Appendix C).
- (ii) Flange insulator kits shall be Advance Products and Systems or approved equal, including full faced gasket, hole sleeves and washers.

### (b) Flange Gaskets

- (i) 3mm, full faced, cloth inserted SBR rubber gaskets or Nylon inserted neoprene and shall be in accordance to AWWA C207-01. Gaskets shall be one piece construction where possible. Segmented gaskets shall be constructed of a minimum number of segments and joints shall be of dovetailed construction, or other jointing methods approved by the Contract Administrator.

### (c) Blind Flanges

- (i) Steel Blind Flanges shall be AWWA C207-01 Class B.

### (d) Valve Stem Extensions

- (i) Schedule 40 Stainless Steel ASTM A-276 Type 304. Size and length as shown on the drawings.

### (e) Threaded Valves

- (i) Small diameter threaded gate valves (75mm diameter and less) shall be all cast bronze, solid wedge disk, rising stem c/w hand wheel rated for minimum 1.0 MPa non-shock cold water service. Direction of opening shall be counter clockwise and shall be indicated on the hand wheel. Bronze material shall conform to ASTM B62. Acceptable product; Crane, Jenkins, Kennedy, Mueller, or approved equal.

### (f) Threaded Piping, Fittings and Flanges

- (i) Small diameter brass threaded piping, fittings and flanges (75mm diameter and less) shall be cast red brass conforming to ASTM B43 or cast bronze conforming to ASTM B62. Flange dimension and drilling shall be in accordance with ANSI B16.24 - 150#.
- (ii) Small Diameter steel threaded fittings and flanges (75mm diameter and less) shall accordance with ANSI B16.5 - Class 150.
- (iii) Small diameter steel pipe nipples shall be Schedule 80 steel.

## E8.3 Construction Methods

### (a) Installation of Butterfly Valves

- (i) Prior to installation of butterfly valves, the Contractor shall receive installation instructions from the valve supply contractor. Upon completion of installation, Form 201: Certificate of Instruction (Appendix B) shall be completed and submitted to the Contract Administrator.

- (ii) Estimated mass of the 2100 millimetre butterfly valves and actuator is 11,350 kilograms. Actual mass shall be confirmed with the valve supplier for lifting and installation purposes.
  - (iii) Install butterfly valve as shown on the drawings. Valves shall be installed with the valve shaft in the horizontal position. The Supply Contractor is obligated to provide installation supervision, and will complete Form 202: Certificate of Satisfactory Installation (Appendix B) upon successful installation.
  - (iv) Core 125 mm opening in roof slabs directly above actuator operation nut. Valve box and valve stem extensions shall be installed plumb and aligned directly above the valve actuator operation nut.
- (b) Commissioning of Butterfly Valves
- (i) The Contractor shall assist in operation of the butterfly valves for the purpose of commissioning. The Supply Contractor is required to complete Form 203 (Appendix B), indicating a qualified representative has checked the installed equipment, and has found the equipment to be installed and operating in accordance to the specifications.
- (c) Threaded Valves and Fittings
- (i) Install threaded nipples and flanges where indicated. Wrap all threads with a minimum of two wraps of Teflon tape or "pipe dope" containing Teflon. Isolate dissimilar metal flanges with gaskets, insulating bolt sleeves and non metallic washers.
- (d) Valve Chamber Sump Drains
- (i) Install sump drains, traps and cleanouts as indicated on the drawings.
  - (ii) Install gravity sump outlet from Cell 1 Raw Water valve chamber to the clearwell dewatering facility as indicated on the drawings. Terminate drain 1 metre from proposed discharge chamber walls and cap.

#### E8.4 Method of Measurement and Basis of Payment

- (a) Installation of Large Diameter Valves
- (i) Large diameter butterfly valve installation will not be measured for payment. They are to be included in the price bid for "Valve Chamber Construction".
- (b) Supply and Installation of Small Diameter Valves, Fittings, Nipples and Flanges
- (i) Supply and Installation of small diameter valves, fittings, nipples and flanges will not be measured for payment. They are to be included in the price for "Valve Chamber Construction".
- (c) Valve Chamber Sump Drains
- (i) Supply and Installation of valve chamber sump drains will not be measured for payment. They are to be included in the price for "Valve Chamber Construction".

### **E9. SUPPLY AND DELIVERY OF PRESTRESSED CONCRETE PIPE AND APPURTENANCES**

#### E9.1 Description

- (a) This Specification supplements and amends AWWA Specification C301-99, AWWA Manual M9 Concrete Pressure Pipe, and AWWA C304-99 Design of Prestressed Concrete Cylinder Pipe.

#### E9.2 Materials

- (a) Prestressed Concrete Pressure Pipe
- (i) Prestressed concrete pressure pipe shall be embedded-cylinder pipe (ECP).

- (b) Cement
  - (i) Portland Cement shall be Type 50 Sulphate resistant Cement.
  - (ii) External mortar coating shall contain 10 percent silica fume by weight of cement.
  - (iii) Approval in writing is required if the Contractor proposed to use fly ash or pozzolan as a supplementary cementing material in conformance with AWWA Standard C301, Section 4.4.1.
  - (iv) Approval requests should be accompanied by a submission from an independent testing laboratory complete with sampling and testing results of the material conforming to ASTM Standard C311.
- (c) Bell and Spigot Joint Rings
  - (i) All new Bell and Spigot Joint Rings shall be shall be testable, double 'O' ring joints.
  - (ii) Where indicated on the drawings, restrained joints shall be harnessed clamp joints.
  - (iii) For connection to existing 2743 mm pipe joints, standard single gasket joints will be permitted. Existing joint diameter is 2857 millimetres, and joint depth 152 millimetres. 'O' ring size is unknown, and to be determined by the Contractor.
  - (iv) For connection to existing 2133 millimetre pipe, double 'O' ring joints shall be used. Existing joint diameter is 2254 millimetres and bell depth 159 millimetres. Existing primary 'O' ring diameter 19.8 millimetres, secondary 'O' ring diameter 15.1 millimetres.
- (d) Fittings
  - (i) Fittings shall be manufactured using minimum steel thicknesses specified in Table 1, Section 4.7 of AWWA C301-99.
  - (ii) Flanges for fittings shall be AWWA C207-01 minimum Class B Flanges.
  - (iii) Pipe sections passing through valve chamber walls shall be manufactured with a minimum 12 mm thick by 150 mm wide steel thrust ring, located at the midpoint of the chamber walls, of adequate design to resist specified design forces.
  - (iv) The 2100 tee shall be manufactured with a steel thrust flanges for embedment in the chamber thrust block, as detailed on the drawings.
- (e) Pipe Marking
  - (i) Each section of pipe and each fitting shall be plainly marked with a waterproof marking material both inside, on the bell or spigot end, and outside, at the pipe's midspan, the classification, the date of manufacture and marks of identification sufficient to show its proper location in the line by the reference to the laying schedule specified. The point of maximum bevel shall be marked on the end of the spigot on each piece of bevelled pipe. All bends shall be marked on the ends with the angle of deflection. The manufacturer's proposed marking system shall be included with the "Data to be Supplied by Contractor" in E9.4. Colour coded markings shall be required when there is more than one pipe classification.
- (f) Closures
  - (i) Buried pipe closures shall be welded split steel sleeve closures.
  - (ii) The plain steel end of each closure piece shall extend 150mm longer than the required length of the piece to provide an overlap in order to compensate for any correction required when installed.
  - (iii) The Contractor shall be responsible for any interior or exterior mortar coating damage.
  - (iv) Each pipe run shall be designed with a minimum of one (1) closure section. The closure section location will be left to the Contractor, subject to approval of the Contract Administrator, to best suit proposed installation sequencing.

(g) Pipe Couplers

- (i) Pipe couplers to be to the latest revision of AWWA C-219 for bolted, Sleeve Type Couplers for Plain End Pipe. Minimum requirements are:
  - ◆ Minimum sleeve length 250 mm
  - ◆ Minimum centre sleeve thickness 12.7 mm
  - ◆ Couplings capable of accommodating up to 2 degrees deflection
  - ◆ Bolts and nuts to be 316 Stainless Steel.
- (ii) Couplings to be supplied with two di-electric insulating boots
- (iii) Couplings to be fusion bonded epoxy coated to AWWA C213, and meeting the requirements of ANSI/NSF 61 "Standard for Drinking Water System Components – Health Effects"

E9.3 Design Requirements

(a) Pipe Design

- (i) The Contractor shall submit details of the pipe design for approval of the Contract Administrator prior to manufacture. Where pipe runs contains more than one pipe class, pipe marking system shall clearly indicate different pipe classes.
- (ii) All pipe and fittings shall be design and constructed to withstand maximum design head of 241.5 metres, plus transient allowance, at a safety factor of 1.5 working pressure and all external pressures caused by overburden, traffic or other loads to which the pipe might be subjected, all in accordance with the applicable requirements of AWWA Standard C301 and C304.
- (iii) Trench loadings shall be calculated and based on a trench width equal to transition width, a soil weight of 1925 kilograms per cubic metre, a trench bedding factor of 1.5, earth cover as indicated on the drawings (minimum earth cover of 2750 millimetres) and a  $KU = 0.110$  in Marston's formula. Depth of cover requirements shall use the maximum of proposed final grades or original ground grades. Live loading under proposed roadways shall allow for HSS-25 highway loading.
- (iv) The steel cylinder shall be a minimum of 1.6 millimetre thickness (No. 16 gauge) and the minimum thickness of the high tensile reinforcing wire shall be 4.2 millimetres thick (No. 8 gauge). Mortar coating shall be a minimum of 24 millimetres thick measured from the outside of the high tensile wire.

(b) Laying Schedule

- (i) Pipe laying schedule shall incorporate a short pipe length of approximately 1.5 times the diameter, immediately outside of valve chamber piping.
- (ii) The proposed Raw Water Pumping Station design is not finalized. Pipe laying schedule for the Cell 1 and Cell 3 Raw Water piping shall be based on details provided on the drawings. Final pipe design, laying schedules and manufacture for the complete Cell 3 Raw Water line, the Cell 1 Raw Water supply line within the Raw Water Pumping Station and five (5) metres of the pump station wall shall be delayed until the pumping station final design is completed, tentatively scheduled for October, 2005.
- (iii) The Proposed Cell 3 Raw Water connection point has not been accurately field located. Prior to final design and laying schedule completion, the Contractor shall expose the proposed tie in location, in the presence of the Contract Administrator. The Contract Administrator will make arrangements to accurately locate the exposed pipe joints, and provide the coordinate information to the Contractor.

(c) Fitting Design

- (i) The 2100 Cell 1 Raw Water tee shall be designed with a steel thrust flange for embedment in the chamber thrust block. The thrust flange must be designed to resist the ultimate thrust forces indicated on the drawings.

#### E9.4 Data to be Supplied by Contractor

- (a) Sufficient numbers of copies of all drawings and laying schedules as specified in Specification CW1110, Clause 1.5, shall show full details of reinforcement, concrete and joint dimensions for the straight pipe, specials and connections and shall be furnished by the Contractor for the review by the Contract Administrator. No pipe shall be manufactured until the drawings have been entirely approved.
- (b) The data submitted by the Contractor shall include a tabulated laying schedule with reference to the stationing and grade lines shown on the Drawings. This schedule shall show the locations and length of each class of pipe which the Contractor proposes to furnish, and the point of change from one class to the next shall be clearly indicated by station number. The area of steel per linear metre and such other details as are required shall be listed for each of the pipe classes proposed by the Contractor.
- (c) The Contractor shall be responsible for the accurate details, fabrication and fit of the pipe and specials.
- (d) The Contractor shall submit to the Contract Administrator for review, design calculations for the determination of the details of the pipe reinforcement prior to the manufacture of any pipe. The manufacturer of the pipe shall have sufficient data to verify all design strengths.
- (e) The Contractor shall provide complete Record Drawings for the pipe, including revised laying schedules, closure lengths for field trimmed pieces or other modifications required for the pipe installation.

#### E9.5 Delivery of Pipe

- (a) Contractor is required to coordinate manufacture and delivery of the pipe with his sub-contractor (the manufacturer) and to meet project scheduling requirements.
- (b) Delivery of the pipe shall be in accordance with AWWA M9 Manual – Concrete Pressure Pipe.
- (c) Pipe for the proposed Clearwell inlet line shall be provided as detailed on the drawings. This pipe segment is supply only, and shall include gaskets, pipe lubricant, grout diapers (not including grout) and flange bolting materials. The Contractor shall deliver pipe components to the Site no later than the date set out in D19.1(c). The Contractor shall attend a delivery inspection with the clearwell contractor and the Contract Administrator. Any defects noted at the delivery inspection shall be noted and rectified by the Contractor prior to turnover to the clearwell contractor. The Contractor shall attend an installation inspection(s) with the clearwell contractors listed below;
  - (i) After final placement of the pipe segment, prior to the wall section cast into the clearwell wall;
  - (ii) During installation and securing of bulkheads and blind flanges;
  - (iii) During pressure testing of the pipe segment.Any defects or concerns noted during installation inspections shall immediately be brought to the attention of the Contract Administrator.

#### E9.6 Construction Methods

- (a) Pipe Length
  - (i) Standard pipe lengths shall be used, except where special lengths are required by an approved laying schedule.
- (b) Tolerances
  - (i) In addition to the requirements noted in Section 4.5 of AWWA C301-01, the overall length of pipe measured from the end of the spigot to the seat of the bell at any point around the circumference shall not vary more than 3 millimetres +/-.

- (ii) The Contractor shall accurately measure and confirm pipe bell and spigot tolerances, and ensure pipe mating, prior to shipping pipe. The Contractor shall provide a written report of pipe bell and spigot measurements.

#### E9.7 Quality Control

##### (a) Inspection

- (i) The Contractor shall afford the Contract Administrator every facility to access and inspect all plant to be provided, work to be performed, materials to be supplied and equipment or machinery to be installed in accordance with the provisions of GC 5.03.

##### (b) Testing of Pipe and Materials

- (i) The Contractor shall provide access to the Contract Administrator or his appointed representative to conduct plant inspections, in accordance to Section 5.1 of AWWA C301-99. The Contractor shall provide a minimum of 7 calendar days notice of commencement of pipe manufacture, for the purposes of scheduling plant inspections.
- (ii) The Contract Administrator reserves the right to conduct third party quality control testing.
- (iii) The Contractor shall make, conduct, arrange, make available, obtain and provide for all testing as described in Section 5.2 AWWA Standard C301-99. The following reports shall be made available to the Contract Administrator on request:
- (iv) Absorption tests shall be carried out by the Contractor on specimens of the exterior coating of the pipe. These tests shall be carried out in accordance with ASTM Standard C497 Method of Testing Concrete Pipe, Sections or Tile, method A.
  - ◆ Notwithstanding AWWA C301-99 4.6.8.3, no individual absorption test may exceed 10%.
  - ◆ Notwithstanding AWWA C301-99 4.6.8.3, mortar tests shall be conducted on a daily basis for the entire production run.
  - ◆ Every effort shall be taken to limit this absorption to 8% as measured in accordance with the ASTM Standard C497. The City will not accept pipe with an absorption rate in excess of 10. No pipe shall be shipped until the absorption results related to the particular shipment have been obtained and are satisfactory.

##### (c) Testing of Fittings and Special Pipe

- (i) Fittings and special pipe shall be tested in the same manner as pipe except that fittings and special pipe shall be tested for tightness by the dye penetrant method as specified in Section 4.7.2.22 of AWWA Standard C301-99.

##### (d) Affidavit of Compliance

- (i) An affidavit of compliance signed by an officer of the pipe manufacturing company shall be provided stating that the pipe and fittings comply with this Specification, in accordance with Section 6.3 of AWWA C301-99.

#### E9.8 Method Measurement and Basis of Payment

##### (a) Prestressed Concrete Pressure Pipe

- (i) The supply and delivery of prestressed concrete pressure pipe shall be measured and paid on a length basis. The length to be paid for shall be the total number of linear metres of pipe delivered and accepted of each type, class and size of pipe supplied complete with all accessories and appurtenances. Measurement of prestressed concrete pressure pipe shall be made according to the laying length of each pipe. Measurement will be made from the proposed connection points of the existing piping, to the first pipe joint outside of the chamber walls.

(b) Fittings and Specials

- (i) The supply and delivery of fittings and specials shall be measured and paid on a unit basis. The price paid shall be the Contract Unit Price per unit for "Fittings" of each type, class and size, measured as specified herein, which price shall be payment in full for supplying and delivering all fittings, accessories and appurtenances and for performing all operations herein described and all other items incidental to the Work included in this Specification.

**E10. INSTALLATION OF PRESTRESSED CONCRETE PIPE AND APPURTENANCES**

E10.1 Description

- E10.1.1 This Specification shall cover the preparation of the pipe bed, including the supply of bedding materials and the placement of all pipe and accessories including fittings, as specified or shown on the Drawings.

E10.2 Testing Apparatus

- E10.2.1 Provide testing apparatus suitable for testing of double 'O' ring gasket joints

E10.3 Materials

E10.3.1 Paint

- (a) Paint for exposed metal surfaces shall be in accordance to AWWA C213.
- (b) Interior coatings shall comply with ANSI/NSF 61 "Drinking Water System Components – Health Effects"
- (c) Coating shall be two (2) or more layers (5 mils minimum each coat) Polyamide Epoxy, Amerlock 400, Tnemec Series 140F Pota-Pox Plus or approved equal.

E10.4 Construction Methods

E10.4.1 Excavation

- (a) Excavation shall be in accordance with Specification CW2030, "Excavation, Bedding and Backfill". Over-excavated material shall be replaced with compacted, well-graded crushed limestone having a maximum aggregate size of 25mm.

E10.4.2 Installation of Pipe

- (a) All pipe shall be installed on a 150 millimetre thick bed of sand placed in the bottom of the trench prior to the installation of the pipe in accordance with AWWA M9 Manual, Type R5 Bedding. The sand bedding shall be levelled such that it forms a continuous solid bedding for the full length of the pipe except at the midpoint of each pipe and at the joints. A small groove shall be left at the midpoint to facilitate the removal of the sling after the pipe has been laid. Another groove shall be provided at each joint to facilitate placing of a "diaper" band around the joint. Both grooves shall be filled with compacted sand after the removal of the sling and after placing of the diaper band. Compacted sand backfill shall be placed above the pipe to a depth of 200 millimetres above the top of the pipe, for the full trench width. The sand for bedding and backfill shall be supplied by the Contractor and shall conform to the requirements as specified in Specification CW2030, "Excavation, Bedding and Backfill". The Contractor shall ensure that disturbance of the pipe or damage to the pipe coating does not occur during sand bedding and backfilling operations.
- (b) The pipe shall be laid and fitted together so that when complete, the pipe will have a smooth and uniform invert. The trench shall be free of water while the pipe is being installed. The excavation of the trench shall be fully completed a sufficient distance in advance so as not to interfere with the laying of the pipe.

- (c) Prestressed concrete pressure pipe shall be installed utilizing trench methods. Coring, augering or jacking methods shall not be undertaken without approval of the Contract Administrator.
- (d) The exposed end of the pipe shall be fully protected with an approved stopper to prevent foreign matter from entering the pipe. The interior of the pipe shall be kept free of all dirt, concrete or superfluous material as the Work proceeds.

#### E10.4.3 Jointing

- (a) Immediately prior to connecting two lengths of concrete pressure pipe, the spigot end of the pipe shall be thoroughly cleaned. Prior to insertion of the rubber gasket in the spigot groove, the spigot groove shall be lubricated with vegetable soap. The gasket shall then be thoroughly cleaned and then lubricated with a vegetable soap approved by the pipe manufacturer, the consistency of which shall be approximately that of soft No. 2 cup grease. In stretching the gasket, care shall be exercised to maintain a uniform tension or volume of rubber around the whole circumference of the spigot. The bell of the pipe already in place shall be carefully cleaned and lubricated with vegetable soap. The spigot shall then be pushed into the bell and against steel inserts placed between the top of the spigot and the shoulder of the bell to provide a space for inserting the feeler gauge. The entire circumference of the joint shall be gauged to determine that the rubber gasket is in its proper position. If the gasket cannot be felt all around the pipe, the pipe shall be withdrawn and the gasket examined for cuts. If the gasket is undamaged it may be reused, but only after the bell ring and gasket have been lubricated with soap again, as previously specified, before the pipe is re-laid. When it has been determined that the gasket is in its proper position, the steel inserts shall be removed and the pipe pushed completely "home".
- (b) The outer joint of the concrete pipe shall be made using diaper bands approved by the pipe manufacturer and shall be made of burlap or other approved porous material. Diaper bands to hold grout in place shall be used according to the manufacturer's instructions. Immediately before pouring cement grout, the entire joint shall be thoroughly wetted. A cement grout of one part Sulphate-Resistant cement to two parts sand shall be poured between the burlap bag and the pipe, to ensure a thorough sealing of the joint around the portion of the pipe covered by the band. Silt, slush, water or polluted mortar grout shall be carefully forced out by the pouring and removed. The upper portion of the joint shall then be filled with mortar and a bead made around the outside of the top half of the pipe joint with a sufficient amount of additional mortar. The completed joints shall immediately be protected from the air, sun or cold with proper coverings and shall be kept protected for such a period as necessary to secure satisfactory curing of the mortar. No backfilling around joints shall be done until the joints have been fully inspected and approved.
- (c) The inside joint recess of the concrete pipe, sizes 600 millimetres and larger, shall be completely filled with mortar made from one part cement and one part sand so as to provide a smooth continuous flush surface across the joint. The Contractor shall comply with all requirements and regulations of the Workplace, Safety and Health Division concerning air supply for workers performing operations inside the pipe and any associated costs shall be considered incidental to the installation.
- (d) Delay grouting and diapering of short pipe joints immediately outside of chamber, until completion of construction and partial backfill of chamber, to allow maximum differential deflection and settlement prior to final backfill.

#### E10.4.4 Closures

- (a) Plain end wall pieces shall be accurately trimmed after installed, to accommodate plain end by flange valve adaptors. The pipe shall be accurately marked around the circumference, from the face of the butterfly valve flanges, to accommodate the flange by plain end adaptor, plus gap allowance shown on the drawings.

- (b) Buried pipe closures shall be accurately measured, cut and installed. Welded Split Sleeve closures shall be installed by a certified welder.
- (c) Completed field welds shall be inspected by a certified welding inspector, using magna-flux methods or other methods approved by the Contract Administrator. A detailed inspection report including test data shall be submitted to the Contract Administrator within 5 Business Days of completion of testing.

E10.4.5 Connection to Wall Thimbles and Sluice Gates

- (a) Connection to wall thimbles and sluice gates shall be completed by flange connection.

E10.4.6 Frost Conditions

- (a) No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when the Contract Administrator shall deem that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation. Every precaution must be taken to prevent frost from penetrating the ground to depths below the foundations during construction. Any pipe which, in the opinion of the Contract Administrator, shall have been injured through neglect of this provision of the specifications, shall be removed and made good by the Contractor and at the Contractor's expense.
- (b) Heating of the pipe, sand, mortar and gaskets shall commence when the ambient temperature falls below -5 C. The pipe shall be heated throughout with a low heat immediately prior to installation (warm to the touch).
- (c) All mortar for joints shall be heated, and heated sand shall be placed around the pipe for the full height of the specified bedding and initial backfill and to at least 600 millimetres on either side of the joint, all to the satisfaction of the Contract Administrator.

E10.4.7 Thrust Blocks

- (a) Thrust blocks shall be installed at all tees, wyes, elbows, bends, plugs, reducers and crosses and at location shown on the Drawings. Thrust blocks shall consist of concrete as specified in Specification CW2160 and shall be installed as shown on the Drawings. The thrust block shall bear against undisturbed soil and the soil shall be cut smooth and at the proper angle to the pipe. No horizontal struts or braces required for trench bracing shall remain in the concrete thrust block. A bond breaker consisting of 0.20 millimetre (8 mil) polyethylene sheeting shall be installed between fittings, valves or plugs and the concrete of the thrust block to allow future removal of the thrust block without disturbing the fitting, valve or plug. Before any concrete is placed, all thrust block formwork shall be inspected and approved by the Contract Administrator.

E10.4.8 Clay Dikes

- (a) Clay dikes shall be constructed every 200 linear metres, 5 metres on each side of offtake/valve chamber walls, and as directed by the Contract Administrator. Clay dikes shall consist of compacted clay material extending the width of the trench and for a length of 600 millimetres and shall extend from the bottom of the sand bedding, i.e. from undisturbed earth to the top of the sand backfill.

E10.4.9 Connections to Existing Aqueducts

- (a) Connections to existing Aqueducts shall be made at the locations shown on the Drawings.
- (b) Where indicated on the Drawings, connections to the existing pipes shall be supplemented by the installation of an internal compression seal. Installation of this additional seal does not relieve the Contractor from constructing a water-tight joint.

E10.4.10 Removal and Reinstallation of Bulkhead

- (a) Remove the existing Cell 3 outlet stub thrust block and bulkhead as indicated on the drawings. Take care not to damage existing bulkhead. Remove one (1) length of 2100 millimetre pipe. Reinstall bulkhead complete with new gaskets. Pressure test in accordance to this specification. Compact trench behind thrust block with insitu materials, compacted to 95 percent Standard Proctor Maximum Dry Density. Excavate and construct new thrust block as show not he Drawings.

E10.4.11 Flange and Closure Assembly Protection

- (a) All flange and closure assemblies not in valve, meter or offtake chambers shall receive a coat of asphalt on all exposed metal surfaces. The entire flange and closure assembly shall then be coated with a minimum 50 millimetre thickness of sulphate-resistant cement mortar, reinforced with a light wire mesh approved by the Contract Administrator.

E10.4.12 Painting

- (a) All exposed metal surfaces including valves, fittings, anchor bolts, flange bolts etc. where not specified to be copper, brass or galvanized, and all galvanized surfaces exposed by welding connections shall be painted.
- (b) Metal surfaces shall be cleaned thoroughly by wire brushing or abrasive blasting.
- (c) Paint exposed surfaces in accordance to AWWA C213.

E10.4.13 Change in the Laying Schedule

- (a) If the Contractor requests changes in the laying schedule, that is relocation of items such as offtakes, closures, valve chambers or any other alteration of the laying schedule, all costs associated with these changes shall be paid for by the Contractor.

E10.4.14 Demolition, Removal and Abandonment of Existing Pipe and Fittings

- (a) Where indicated, remove designated portions of pipe. Removal methods shall be employed that preclude damage to adjacent pipes and joints that are to remain in place.
- (b) Piping required to be cut and/or demolished to facilitate removal of adjacent pipe shall be a minimum of one complete pipe length away from proposed tie-in points.
- (c) All gaskets from existing pipes shall be carefully salvaged, cleaned and inspected. Due to changes in gasket design, existing gaskets may require re-use when tying to existing pipe spigots.
- (d) All pipe and valves removed shall be salvaged, and returned to a designated City of Winnipeg facility.

E10.5 Quality Control

E10.5.1 Inspection

- (a) The Contractor shall afford the Contract Administrator every facility to access and inspect all plant to be provided, work to be performed, materials to be supplied and equipment or machinery to be installed.

E10.5.2 Line and Grade

- (a) The pipe shall be installed to the line and grade shown on the Drawings and as set in the field by the Contract Administrator. Vertical variance from grade shall not exceed 25 millimetres and horizontal variance from line shall not exceed 100 millimetres. Sharp bends will not be permitted even though the pipe remains within these tolerances. Alignment corrections allowed in main line piping but not at closures.

Tees and bends shall be installed to the grades and at the locations shown on the Drawings or where required to connect to existing pipelines.

#### E10.5.3 Testing

- (a) Further to CW 2125, hydrostatic leakage testing will not be required.
- (b) Testing shall be completed by means of double 'O' ring testable joints. Joint Testing shall be conducted with compressed air, at a test pressure of 1.5 times the maximum operating pressure for the line.
  - (i) Test Procedure
    - ◆ All testing to be conducted in the presence of the Contract Administrator
    - ◆ Initial testing shall be conducted as pipe is laid, after initial haunching is placed. If initial test fails, the Contractor shall disassemble the joint, inspect bell, spigot and 'O' rings, and reassemble joint.
    - ◆ Final testing shall be conducted after pipe is backfilled.
    - ◆ Remove steel plug and 'O' Ring
    - ◆ Connect air supply and slowly pressurize joint cavity to specified test pressure (Maximum 380 KPa). Close off air supply.
    - ◆ Hold test for five (5) minutes. Maximum loss in pressure is thirty five (35) KPa.
    - ◆ On successful pressure test, remove test assembly, reinsert steel plug and 'O' ring. Grout joint and test plug.

#### E10.5.4 Disinfection of Watermains

- (a) Further to CW 2125, disinfection of watermains shall be completed by swabbing as outlined in Section 3.3.16 of CW 2125.

#### E10.6 Method of Measurement

##### E10.6.1 Aqueduct Installation

- (a) Installation of yard piping shall be measured on a length basis. The length to be paid for shall be the total number of linear metres acceptably installed as to each size, class, type of backfill and method of installation of Aqueducts complete with fittings, accessories, appurtenances and all testing requirements, measured horizontally, at grade, above the centreline of the pipe, as computed by measurements made by the Contract Administrator. The length measured and paid will be from the first pipe joint outside of the valve chamber, to the connection points on the existing Aqueducts. Measurement will be from face of bell to face of bell.

##### E10.6.2 Connection to Existing Pipes and Stubs

- (a) Connections to existing pipes will be measure on a unit basis. The price paid for the connection shall be the total number of connections made, in accordance with this specification and shall include all excavations, backfill, removal of existing pipes and bulkheads, patching of concrete where required, provision of new pipe gaskets and testing. Where connections involve installing a tee in an existing line, the price for the connection shall include reconnection both ends of the tee.

### E11. EXCAVATION, BEDDING AND BACKFILL

#### E11.1 Submittals

- E11.1.1 Shop drawings for all excavation shoring shall be prepared and submitted in accordance to CW 1100. All shop drawings shall be sealed by a Professional Engineer, registered in the Province of Manitoba, experience in the design of excavation shoring systems.

## E11.2 Shoring Design

E11.2.1 Excavation shoring shall be designed to accommodate staged excavation, as explained in E6.2. Shoring components, bracing and walers shall be designed to accommodate installation of all pipe and fittings and temporary pipe support structures.

## E11.3 Temporary Pipe Support Structures

E11.3.1 Where excavations are required that undermine existing pipelines, the Contractor shall install a temporary pipe support structure to adequately support existing pipelines during construction.

E11.3.2 For the Cell 3 Treated Water connection, a steel support column, concrete footing and pipe support saddle, suitable for permanent casting into the chamber floor shall be utilized. Upon completion of permanent pipe and valve supports, the temporary support shall be cut off a minimum of 25 millimetres below the finish floor level, and the recess grouted.

## E11.4 Demolition

E11.4.1 Demolish existing Hydro conduit as shown on drawings. Plug ends of open pipes with concrete plug.

E11.4.2 Prior to demolitions, ensure existing Hydro and chlorine feeds have been decommissioned.

## E11.5 Excavation

E11.5.1 The Contractor shall note that bulk excavation to the approximate grades indicated on the Construction Drawings will be completed, by others, prior to construction of this Contract. Additional excavations required for construction staging shall be designed and constructed by the Contractor, and submitted for review by the Contract Administrator. Temporary work pads, sub-cut excavations and ramps shall in no way adversely affect access to existing operational facilities, or hinder other Contractors operations.

E11.5.2 Excess excavation from trenching operations shall be disposed of at the excavation dumpsite immediately west of the Deacon booster Pumping Station compound. The Contractor will be permitted to retain on Site, sufficient excavated material may be retained on Site to backfill all excavations to an elevation of 234.0 metres.

E11.5.3 Granular bedding in the vicinity of existing pipelines shall be dewatered and stabilized prior to undermining pipes to prevent loss of granular pipe foundation.

## E11.6 Measurement and Payment

E11.6.1 Excavation and shoring for pipe installation and valve chambers will not be measured for payment. Costs for excavation and shoring shall be included in the price for installation of pipe and valve chambers.

E11.6.2 Demolition of existing Hydro conduit will be measured and paid on a lump sum basis.

## **E12. SUPPLY AND INSTALLATION OF INTERNAL COMPRESSION SEALS**

### E12.1 General

E12.1.1 Internal compression seals may be required to repair existing joint leaks on the Cell 1 2743 millimetre outlet line. The exact location and number of seals required is unknown. The Contract Administrator will assess the location and number of leaks once the Cell 1 line has been dewatered, as soon as practical after August 15, 2005.

E12.1.2 The Contract Administrator reserves the right to delete all or a portion of this work, dependant on findings during pipe inspections. The Contractor shall not proceed with

procurement or mobilization of the compression seals until written approval is received from the Contract Administrator.

## E12.2 Materials

### E12.2.1 Pipe Joint Seals

- (a) The internal compression seals supplied shall be the AMEX-10/WEKO SEAL as manufactured by Miller Pipeline Corp. of Indianapolis, Indiana.
- (b) The AMEX-10/WEKO SEAL and all components therein shall be certified ANSI/NSF Standard 61 "Drinking Water System Components - Health Effects".

### E12.2.2 EPDM Rubber Material

- (a) EPDM Rubber Derivative Membrane for use as joint liner material shall be manufactured in compliance with ASTM-D3900, D3568 and shall have designation M4AA710A13B13C12Z1Z2Z3 in accordance with ASTM-D2000.
- (b) The EPDM rubber material shall be 366mm in width for all seals.
- (c) The EPDM Rubber Membrane shall be individually sealed in plastic bags and packaged in a manner that will not damage or deform them in transit or storage.
- (d) Manufacturing Process:
  - Extrusion process for belt material.
  - All joints to be transfer moulded.
  - All material specifications must be certified.
  - Material Safety Data Sheet must be provided.

### E12.2.3 Stainless Steel Bands, Shims, and Set Screws

- (a) Stainless steel bands, spacers, shims, and set screws for securing rubber membrane across piping joints shall be Type 303, 304, 316 or Maunell as manufactured in accordance with ASTM-A240-83.

### E12.2.4 Liquid Joint Lubricant

- (a) Liquid joint lubricant to assist in installation of the AMEX-10/WEKO-SEAL and bands shall be a non-toxic vegetable based lubricating gel, Tyton Joint Lubricant or approved equal.

### E12.2.5 Thread Sealing Compound

- (a) Thread Sealing Compound shall be Paste Type with "Teflon".

## E12.3 Manufacturing

### E12.3.1 Bands

- (a) Rolled to the radius of the pipe being renewed. Each band checked on fixed radius gauge.

### E12.3.2 Cleated End

- (a) To be manufactured from the same manufacturer lot number as the band.

### E12.3.3 Welding

- (a) All shop and field welds to be made by certified welders with a minimum of 2 years experience on this alloy (T-304). The welds are to be made with stick or wire of T-308 alloy. All shop welds to be accomplished in a A-1025-Helium/C02 gas atmosphere when using wire.

### E12.3.4 Radius Shims

- (a) Material Specifications 0.48 x 2" x 6" T-304.

- (b) Manufactured by rolling to the radius of the pipe.
- (c) All edges to be deburred.

#### E12.4 Construction Methods

##### E12.4.1 Pipeline Preparation

- (a) Remove deleterious deposits from the pipe walls by hand brushing. Power tools may be required to remove deposits and stubborn or hard scale lamination in the joint area. Whatever method is adopted, the pipe must be as clean as reasonably possible to provide a reasonable working environment for the operators.

##### E12.4.2 Joint Filling

- (a) During pipe cleaning operations the gaps between the joints must be cleared of dust and debris leaving a clean area for "joint filling". The joints are filled to the full depth of the gap and rendered flush with the internal surface of the pipe. The filling material is a quick-setting cement mortar which is mixed as required in the pipe. All surplus material spillage should be removed from the joint area prior to the surface preparation of the seal area.

##### E12.4.3 Surface Preparation of Joint Area

- (a) The area of pipe either side of the joint where the actual "lip seals" make contact with the pipe must be prepared to a finish which will allow the "lip seals" to interface consistently, and to provide a permanent seal.
- (b) All high/low surface imperfections running axially through or part way through the sealing surface must be removed by scraping or grinding. Deep imperfections that grinding will not remove must be properly filled with approved quick setting cement mortar. This material must be rendered smooth and ground if necessary to suit the prepared surface of the joint area.
- (c) The pipe must be premarked with grease chalk to allow the preparation areas and seal position to be clearly defined.
- (d) If required, apply a coat of approved epoxy to the preparation area where the seal will be placed. This epoxy will control pipe porosity and irregularities and provide for an effective bubble test on the completed seal.
- (e) Immediately prior to fitting the seal, the area must be cleaned with a dry brush and coated with liquid joint lubricant, compatible with the composition of the AMEX-10/WEKO-SEAL. The lubricant is hand applied (using a brush) over the prepared area. Care must be taken not to pick up dust deposits from the unprepared surface. The lubricant is purely an aid to fitting the seal, and in no way contributes to its sealing capabilities.

##### E12.4.4 Positioning the Seal

- (a) The seal shall be checked that it is undamaged and that the test unit is tight before fitting the seal in place. The AMEX-10/WEKO-SEAL is placed in position bridging the joint gap, guided by the chalk marks previously referred to. The seal must be positioned accurately on the prepared areas. The test unit in the seal must be located at either 9 o'clock or 3 o'clock positions. The seal must be positioned parallel to the joint gap.

##### E12.4.5 Expanding the Seal into Position

- (a) When positioning the hydraulic expander in line with the retaining band, care must be taken to ensure that the band remains in the groove of the AMEX-10/WEKO-SEAL, and does not become moved or dislodged. Care should also be taken to ensure the expander is positioned correctly on the band.

- (b) A hydraulic expander is used to apply a set pressure to the retaining bands of the AMEX-10/WEKO-SEAL. A radiused locking piece called a "wedge" is fitted between the exposed gap of the expanded band ends. A size of wedge having a slight interference fit between the band ends is selected, the wedge (leading wedge first) is tapped into position, locking in the compression of the AMEX-10/WEKO-SEAL. The radius of the wedge is equal to the radius of the pipe.
- (c) The pressure is released from the expander and the procedure is repeated on the second retaining band of the seal.
- (d) It is essential to repeat this entire operation (i.e. re-expansion) not before 30 minutes have elapsed after the first expansion. This allows for any seal relaxation that may take place and usually a slightly larger wedge may be fitted. The load forces transmitted by the AMEX-10/WEKO-SEAL expander have been determined from the test data and should not be altered.
- (e) Once the expanding procedure is completed, the overlap locking device, if required, for the wedge shall be tightened down to a torque of 15 inch pounds.

## E12.5 Testing

### E12.5.1 Test 1

- (a) The test is applied after each section has been completed and not before 30 minutes have elapsed after final fitting of the seal. A restraining device called a "test band" is fitted over the seal. This is to prevent excessive ballooning that would otherwise occur during the test. The AMEX-10/WEKO-SEAL is pressured to 10 psig through the test valve and maintained with a regulated air supply, while a soap and water solution is applied to the outer edge of the seal to detect any leak.

### E12.5.2 Testing the Seal - Test 2

- (a) In the second test, (5 psig) is introduced through the "valve" in the AMEX-10/WEKO-SEAL. This pressure is sustained while a soap and water test is applied to the outer edge and entire body of the seal.

### E12.5.3 Test "Valve" Assembly

- (a) After the final test of 5 psig, the test "valve" of the AMEX-10/WEKO-SEAL is sealed with a counter sunk hex head completion plug using a non-toxic thread sealing compound on the threads.

## E12.6 Personnel and Equipment

### E12.6.1 Compression seals to be installed by personnel experienced in the installation and testing of internal compression seals.

## E12.7 Method of Measurement and Basis of Payment

### E12.7.1 Mobilization

- (a) Mobilization of Installation Technician shall be paid on a lump sum basis. The price paid shall include return travel, room and board of a factory technician as required.

### E12.7.2 Supply of Internal Compression Seals

- (a) Supply of Internal Compression Seals will be measured on a unit basis. The units measured will be the total number of seals supplied, of each size, including seal, seating bands, an additional test band, wedges and lubricant. The price paid shall include all applicable taxes (excluding GST), freight, brokerage fees and duties. Seals not installed under this contract will become the possession of the City of Winnipeg.

**E12.7.3 Installation of Internal Compression Seals**

- (a) Installation of Internal Compression Seals will be measured on a unit basis. The units measured will be the total number of seals successfully installed and tested of each size. The price paid shall include all cost associated with the installation.