



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 481-2007

**PERIMETER ROAD PUMPING STATION UPGRADES - CONTRACT A -
FORCEMAIN TWINNING**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

- B1.1 PERIMETER ROAD PUMPING STATION UPGRADES - CONTRACT A - FORCEMAIN TWINNING

B2. SUBMISSION DEADLINE

- B2.1 The Submission Deadline is 12:00 noon Winnipeg time, July 24, 2007.
- B2.2 Bids determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.
- B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. SITE INVESTIGATION

- B3.1 Further to C3.1, the Contract Administrator or an authorized representative will be available at the Site, located at 6821 Wilkes Avenue, from 9:00 July 17, 2007 to 12:00 noon on July 17, 2007 and from 9:00 July 18, 2007 to 12:00 noon on July 18, 2007 to provide Bidders access to the Site.
- B3.2 The Bidder is advised that Access to the Perimeter Road Pumping Station and Valve Chamber VC2A is restricted and will not be available outside the times noted above.
- B3.3 The Bidder shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

B4. ENQUIRIES

- B4.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.
- B4.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.
- B4.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator to all Bidders by issuing an addendum.
- B4.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.
- B4.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B4 unless that response or interpretation is provided by the Contract Administrator in writing.

B5. ADDENDA

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

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

B6. SUBSTITUTES

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

B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B15.

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

B7. BID COMPONENTS

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

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

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

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

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

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

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

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

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

B7.8 Bids shall be submitted to:

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

B8. BID

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

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

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

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

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

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

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

- (a) if the Bidder is a sole proprietor carrying on business in his own name, it shall be signed by the Bidder;
- (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
- (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers and the corporate seal, if the corporation has one, 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 should be witnessed, except where a corporate seal has been affixed.

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

B9. PRICES

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

B9.2 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 The Bidder shall include the fixed amount of the Cash Allowance indicated in "Form B Prices" in his Total Bid Price.

B10. QUALIFICATION

B10.1 The Bidder shall:

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

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

B11. BID SECURITY

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

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

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

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

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

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

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

B12.1.1 Bidders or their representatives may attend.

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

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

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

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

B13. IRREVOCABLE BID

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

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

B14. WITHDRAWAL OF BIDS

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

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

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

B15. EVALUATION OF BIDS

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

B16. AWARD OF CONTRACT

- B16.1 The City will give notice of the award of the Contract or will give notice that no award will be made.
- B16.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.
- B16.2.1 Without limiting the generality of B16.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;

- (b) the prices are materially in excess of the prices received for similar work in the past;
- (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
- (d) only one Bid is received; or
- (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.

B16.3 Subject to B16.2, where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid.

B16.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- C0.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

D1.1 In addition to the *General Conditions for Construction*, these Supplemental Conditions are applicable to the Work of the Contract.

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of supply and installation of approximately 1075 metres of 600 millimetre sewerage forcemain and associated works.

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

- (a) Supply and installation of 1075 metres of 600 millimetre forcemain
- (b) Supply and installation of approximately 45 metres of steel casing pipe across PTH 100
- (c) Structural modifications of cast-in-place valve chamber VC2a
- (d) Supply and installation of a 450 millimetre bi-directional knife gate valve
- (e) Supply and installation of a 450 millimetre AWWA C515 gate valve
- (f) Supply and installation of a 600 millimetre bi-directional knife gate valve
- (g) Modification of existing forcemain valve chamber piping
- (h) Replacement of existing 750 mm steel forcemain with AWWA C301 PCC pipe
- (i) Restoration of gravel roadway
- (j) Grading and seeding of disturbed areas
- (k) Cleaning and CCTV inspection of existing concrete forcemain:
 - (i) 140 metres of 600 millimetre diameter pipe
 - (ii) 1060 metres of 750 millimetre diameter pipe
 - (iii) 340 metres of 900 millimetre diameter pipe

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) "ASTM" means American Society for Testing and Materials; and
- (e) "PCCP" means Prestressed Concrete Cylinder Pipe
- (f) "PRPS" means Perimeter Road Pumping Station
- (g) "ASME" means American Society of Mechanical Engineers
- (h) "ANSI" means American National Standards Institute
- (i) "NACE" means National Association of Corrosion Engineers
- (j) "SSPC" means Society for Protective Coatings
- (k) "SPMDD" means Standard Proctor Maximum Dry Density
- (l) "NEMA" means National Electrical Manufacturer's Association
- (m) "IP" means International Protection Rating
- (n) "PCP" means Pest Control Products

D4. CONTRACT ADMINISTRATOR

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

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

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

D5. CONTRACTOR'S SUPERVISOR

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

D6. NOTICES

D6.1 Except as provided for in C23.2.2, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid.

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 following address or facsimile number:

The City of Winnipeg
Chief Administrative Officer Secretariat
Attn: Chief Administrative Officer
Administration Building, 3rd Floor
510 Main Street
Winnipeg MB R3B 1B9
Facsimile No.: (204) 949-1174

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
Attn: City Solicitor
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. AUTHORITY TO CARRY ON BUSINESS

D8.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D9. SAFE WORK PLAN

D9.1 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 C4.1 for the return of the executed Contract.

D9.2 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>.

D10. INSURANCE

D10.1 The Contractor shall provide and maintain the following insurance coverage:

- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) inclusive, with The City of Winnipeg and Manitoba Infrastructure and Transportation and UMA Engineering Ltd. added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;
- (b) automobile liability insurance for owned automobiles used for or in connection with the Work in the amount of at least two million dollars (\$2,000,000.00) at all times during the performance of the Work and until the date of Total Performance;
- (c) an all risks Installation Floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.

D10.2 Deductibles shall be borne by the Contractor.

D10.3 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4.1 for the return of the executed Contract.

D10.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least fifteen (15) Calendar Days prior written notice to the Contract Administrator.

D11. PERFORMANCE SECURITY

D11.1 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.

D11.1.1 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.

D11.2 If the bid security provided in his Bid was not a certified cheque or draft pursuant to B11.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D12. SUBCONTRACTOR LIST

D12.1 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 C4.1 for the return of the executed Contract.

D13. DETAILED WORK SCHEDULE

D13.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 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) Installation of Forcemain Piping
- (b) Casing Installation across PTH 100
- (c) Connection to PRPS
- (d) Modification of piping within PRPS
- (e) Replacement of knife gate valve and tee within VC2a (service shutdown required)
- (f) Structural modifications of VC2a
- (g) Mechanical modifications in VC2a
- (h) Roadway Restoration
- (i) Landscaping
- (j) Inspection of Existing Forcemain

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 of authority to carry on business specified in D8;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the Safe Work Plan specified in D9;
 - (iv) evidence of the insurance specified in D10;
 - (v) the performance security specified in D11;
 - (vi) the Subcontractor list specified in D12;
 - (vii) the detailed work schedule specified in D13; and
 - (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.
- D14.3 The Contractor shall commence the Work on the Site prior to September 30, 2007.
- D14.4 The City intends to award this Contract by August 13, 2007.
- D14.5 If the actual date of award is later than the intended date, the dates specified for Commencement, Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual award dates.

D15. SCHEDULE RESTRICTIONS

- D15.1 Forcemain shutdown periods are scheduled based on a number of factors including routine maintenance and repair work, sewerage flows and weather. The Charleswood Interceptor system has limited capacity to store sewerage and extraneous flows. Shutdowns can only be scheduled during periods where risk of wet weather flows and system infiltration is at a minimum, typically late fall and winter. Furthermore, shutdowns of the Perimeter Road Pumping Station can only be conducted when system flows are an absolute minimum, typically between midnight and 09:00. The City shall endeavour to make the specified time periods available to the Contractor to schedule his Work requiring removal of the forcemains from service, without limiting the City's control over the operation of the forcemains to complete other work, maintain adequate system service 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 system operation, including but not limited to high river levels, abnormal system inflows, abnormal weather, failure of related sewerage system components and/or security concerns.
- D15.2 The Contractor shall provide a minimum of five (5) Working Days notice to the Contract Administrator, in writing, of requiring a shutdown. The City will endeavour to schedule the shutdown as requested, pursuant to D15.1.
- D15.3 Further to D15.1, each PRPS shutdown is limited to a maximum of four (4) hours, measured from the completion of draining the existing 750 mm forcemain between VC2a and PRPS by City forces to turn over of system back to the City of Winnipeg for the restoration of PRPS operation. Shutdowns must be scheduled between the hours of 12:00 AM (midnight) and 09:00. The Contractor shall be limited to a maximum of two (2) such shutdowns in which to complete connections to the PRPS and VC2a. At all times, the Contractor shall be prepared to re-assemble any piping such that PRPS can be placed back in service, within two (2) hours of receiving notification of same.

- D15.4 Work on replacement of the existing steel piping outside the PRPS shall not be scheduled until the proposed 600 millimetre forcemain is installed, tested and commissioned. For emergency standby purposes, however, the materials required to complete this replacement shall be ordered immediately upon receipt of the Letter of Intent.
- D15.5 Work on the assessment of the existing 750 millimetre forcemain shall not be scheduled until the new 600 mm forcemain is installed, tested and commissioned. Assessment of the existing 750 forcemain shall be scheduled between October 15 and March 1.
- D15.6 The City of Winnipeg has secured construction easements on private lands adjacent to the right-of-way, as shown on the Construction Drawings. Access to these lands is restricted until crops can adequately be harvested, unless otherwise approved by the Contract Administrator. Under no circumstances can work on the easements proceed prior to August 1, 2007. Work on private lands must be completed and the easements completely restored prior to March 31, 2008.

D16. WORKING DAYS

- D16.1 Further to C1.1(gg), the Contract Administrator's determination of whether or not atmospheric and Site conditions are such that a Working Day is deemed to have elapsed may be based at one time on one type of work while at another time a Working Day may be based on another type of work. When more than one type of major work is involved, the quantity of equipment that must be able to work in order to meet the requirements of a Working Day may vary considerably from that specified in the General Conditions.
- D16.2 In the event that incidental work is behind schedule which, in the opinion of the Contract Administrator, should have been or could have been carried out by the Contractor in conjunction with or immediately following work of a major type, the City hereby reserves the right to charge Working Days on the incidental work until such time as it is up to schedule.
- D16.3 When the major type of work involves restoration of the site to the condition it was prior to rainfall, Working Days shall not be charged.
- D16.4 The Contract Administrator will furnish the Contractor with a daily record for each major type of work showing various information concerning the equipment, the time it worked, could have worked and Working Days charged. This report is to be signed each day by an authorized representative of the Contractor.

D17. CRITICAL STAGES

- D17.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:
- (a) Completion of Works associated with PRPS shutdown within four (4) hours as described in D15.3.

D18. SUBSTANTIAL PERFORMANCE

- D18.1 The Contractor shall achieve Substantial Performance within sixty (60) consecutive Working Days of the commencement of the Work as specified in D14.
- D18.2 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.
- D18.3 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.

D19. TOTAL PERFORMANCE

- D19.1 The Contractor shall achieve Total Performance within seventy (70) consecutive Working Days of the commencement of the Work as specified in D14.
- D19.2 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.
- D19.3 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.

D20. LIQUIDATED DAMAGES

- D20.1 If the Contractor fails to achieve critical stages, Substantial Performance or Total Performance in accordance with the Contract by the days (or time) 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) Critical Stage - Completion of Works associated with PRPS shutdown within four (4) hours as described in D15.3 - Two Thousand dollars (\$ 2,000.00) per hour;
 - (b) Substantial Performance - One Thousand Five Hundred dollars (\$1500.00) per day;
 - (c) Total Performance – Five Hundred dollars (\$500.00) per day.
- D20.2 The amount specified for liquidated damages in D20.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Critical Stages, Substantial Performance or Total Performance by the time or day fixed herein for same.
- D20.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D21. SCHEDULED MAINTENANCE

- D21.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:
- (a) General Maintenance of Ditch Seeded Areas as specified in E8;
 - (b) General Clean-up Operations as specified in E8;
 - (c) Watering of Ditch Seeded Areas as specified in E8.
- D21.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such time as it takes the Contractor to complete the scheduled maintenance.

CONTROL OF WORK

D22. JOB MEETINGS

- D22.1 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.

- D22.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

D23. COORDINATION WITH OTHERS

D23.1 The Contractor shall not have exclusive use of the Site. A separate Contract - Bid Opportunity 480-2007 Perimeter Road Pumping Station Upgrades – Contract B Building Upgrades will be undertaken during the same time period as this project. This project includes major structural upgrading of the pumping station and deep excavations and shoring in the vicinity of the PRPS will be made. The Bidder shall coordinate site activities with this work.

D23.2 The Contractor shall accommodate work by City Forces or third party Contractors related to ongoing operation and maintenance of the PRPS and sewerage systems. Vehicular access to PRPS must be maintained at all times.

D24. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D24.1 Further to C6.24, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

MEASUREMENT AND PAYMENT

D25. PAYMENT

D25.1 Further to C12, effective January 1, 2007 the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

D26. CASH ALLOWANCE

D26.1 Cash allowances shall cover the net cost to the Contractor of services, products, construction machinery and equipment, freight, unloading, handling, storage, installation and other expenses incurred in construction of provisional work.

D26.2 Provisional work shall not be undertaken unless the Contractor is notified, in writing, by the Contract Administrator.

D26.3 The City reserves the right to delete any or all of the Cash Allowance from the Contract if the work intended to be covered by the Cash Allowance is not required, or if the Works intended are found to be more extensive than the provisional Cash Allowance.

D26.4 Valuation of provisional work will be by the methods outlined in the General Conditions clause C7.4.

WARRANTY

D27. WARRANTY

D27.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

D27.2 Notwithstanding C13.2 or C2.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:

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

FORM H1: PERFORMANCE BOND
(See D11)

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. 481-2007

PERIMETER ROAD PUMPING STATION UPGRADES - CONTRACT A - FORCEMAIN TWINNING

which is by reference made part hereof and is hereinafter referred to as the "Contract".

NOW THEREFORE the condition of the above obligation is such that if the Principal shall:

- (a) carry out and perform the Contract and every part thereof in the manner and within the times set forth in the Contract and in accordance with the terms and conditions specified in the Contract;
- (b) perform the Work in a good, proper, workmanlike manner;
- (c) make all the payments whether to the Obligee or to others as therein provided;
- (d) in every other respect comply with the conditions and perform the covenants contained in the Contract; and
- (e) indemnify and save harmless the Obligee against and from all loss, costs, damages, claims, and demands of every description as set forth in the Contract, and from all penalties, assessments, claims, actions for loss, damages or compensation whether arising under "The Workers Compensation Act", or any other Act or otherwise arising out of or in any way connected with the performance or non-performance of the Contract or any part thereof during the term of the Contract and the warranty period provided for therein;

THEN THIS OBLIGATION SHALL BE VOID, but otherwise shall remain in full force and effect. The Surety shall not, however, be liable for a greater sum than the sum specified above.

AND IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable as Principal, and that nothing of any kind or matter whatsoever that will not discharge the Principal shall operate as a discharge or release of liability of the Surety, any law or usage relating to the liability of Sureties to the contrary notwithstanding.

IN WITNESS WHEREOF the Principal and Surety have signed and sealed this bond the

_____ day of _____, 20____.

SIGNED AND SEALED
in the presence of:

(Witness)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

By: _____ (Seal)
(Attorney-in-Fact)

**FORM H2: IRREVOCABLE STANDBY LETTER OF CREDIT
(PERFORMANCE SECURITY)**
(See D11)

(Date)

The City of Winnipeg
Corporate Services Department
Legal Services Division
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 481-2007

PERIMETER ROAD PUMPING STATION UPGRADES - CONTRACT A - FORCEMAIN
TWINNING

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

(Name of Contractor)

(Address of Contractor)

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

_____ Canadian dollars.

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

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

Partial drawings are permitted.

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

(Address)

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

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

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

(Date)

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

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

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

(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

- E1.1 These Specifications shall apply to the Work.
- E1.2 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.
- E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.2.3 Further to C2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.
- E1.3 The following Drawings are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>
-	Cover Sheet
06081	Forcemain – Plan & Profile – Valve Chamber VC2A to Match Line Sta 1+300
06082	Forcemain – Plan & Profile – Match Line 1+300 to Match Line 1+600
06083	Forcemain – Plan & Profile – Match Line 1+600 to Match Line 1+850
06084	Forcemain – Plan & Profile – Match Line 1+850 to Perimeter Road Pumping Station
06085	Valve Chamber VC2A – Sections & Details
06086	Miscellaneous Details 1
06087	Miscellaneous Details 2
06088	Miscellaneous Details 3

E2. SOILS INVESTIGATION REPORT

- E2.1 Further to C:3.1, the geotechnical report is provided to aid the Contractor's evaluation of the pavement structure and/or existing soil conditions. The geotechnical report is contained in Appendix 'A'.

GENERAL REQUIREMENTS

E3. OFFICE FACILITIES

- E3.1 The Contractor shall supply office facilities for the Contract Administrator meeting the following requirements:
- The field office shall be conveniently located near the Site of the Work;
 - The building shall have a minimum floor area of 20 square metres, with window area of 3 square metres and a door entrance with suitable lock satisfactory to the Contract Administrator.
 - The building shall be suitable for all-weather use. It shall be capable of maintaining a temperature range between 16°C and 25°C;
 - The building shall be supplied with adequate lighting and 120 Volt power supply;

- (e) The building shall be furnished with one desk, one meeting table, one drafting table, one filing cabinet and six chairs, all satisfactory to the Contract Administrator;
- (f) A separate toilet with door lock shall be supplied for the Contract Administrator;
- (g) The field office shall be cleaned weekly immediately prior to the Job Site Meetings to the satisfaction of the Contract Administrator;
- (h) The provision of the field office with the aforementioned furnishings and equipment shall also include maintenance and removal of the field office, operating costs and any service installation costs.

E4. TRAFFIC CONTROL

- E4.1 Further to CW1130 clause 3.7, signage on Provincially designated highways shall be completed in accordance to Manitoba Infrastructure and Transportation Work Zone Traffic Manual available at <http://www.gov.mb.ca/tgs/contracts/workzone/index.html>.
- E4.2 The east and west PTH100 service roads will be permitted to be closed for construction. Access to the service roads shall be signed at the nearest access points on either side of construction as "Road Closed, Local Access Only".

E5. EXCAVATION, BEDDING AND BACKFILL

- E5.1 Definitions
 - E5.1.1 Class 4 Backfill (Modified)
 - (a) Backfill the excavation with suitable excavated material in maximum 300 millimetre thick layers, mechanically compacted to 95 % Standard Proctor Maximum Dry Density, to the bottom of pavement structures.
- E5.2 Submittals
 - E5.2.1 Shop drawings for all excavation shoring shall be prepared and submitted in accordance to CW 2030. All shop drawings shall be sealed by a Professional Engineer, registered in the Province of Manitoba, experience in the design of excavation shoring systems.
- E5.3 Shoring Design
 - E5.3.1 Excavation shoring shall be designed to accommodate installation of all pipe and fittings.
- E5.4 Construction Easements
 - E5.4.1 The City of Winnipeg has secured construction easements in areas shown on the Drawings. The Construction Easement Agreement is in place between August 1, 2007 and March 31, 2008.
 - E5.4.2 The Contractor is granted the right to enter the lands and use as a staging area, to store excavation and backfill material, machinery, equipment and all things involved in the construction and installation of the forcemain.
 - E5.4.3 Following completion of construction and installation of the forcemain, the Contractor shall leave the Temporary Construction Easement Area in a condition at least equal to the condition it was in prior to the said construction.
 - E5.4.4 The successful Contractor will be provided with a copy of the Temporary Easement Agreement prior to Construction.
- E5.5 Excavation
 - E5.5.1 Strip and stockpile topsoil from trench areas for reuse in accordance to CW 3540.

- E5.5.2 Excess excavation from trenching operations shall be disposed of off-site.
- E5.5.3 Granular bedding in the vicinity of existing pipelines structures and valve chambers shall be dewatered and stabilized prior to undermining pipes to prevent loss of granular pipe foundation.
- E5.5.4 Prior to excavation of MTS fibre optic cables, contact Mr. Bob Schenk at 958-1833 a minimum of 48 hours prior to conducting works, or immediately in the event of damage to the cable. Excavation shall be completed by hand digging or soft digging within 1 metre of the cable.
- E5.5.5 Prior to excavation of Manitoba Hydro gas transmission main, contact Manitoba Hydro at 480-1212 to arrange for High Pressure Gas Standby a minimum of 5 days prior to conducting works. Excavations within one metre of all gas mains shall be conducted by hand digging or soft excavation methods.
- E5.6 Backfill
- E5.6.1 Backfill crossing under granular surfaces and existing and proposed pavements between Wilkes Avenue and PRPS shall be completed to CW 2030, Class 2 standards. Granular backfill shall extend to the underside of the proposed pavement structure, as indicated on the drawings.
- E5.6.2 Backfill of trenches under granular service roads (parallel or crossing) shall be completed to Class 4 Backfill (Modified) Standards to the underside of the proposed pavement structure.
- E5.6.3 The remaining trench backfill shall be completed to existing grade to CW 2030, Class 4 standards.
- E5.6.4 Backfill within 1 metre of existing and new concrete structures shall be completed with free draining pit run granular material to CW 2030, Class 3 standards. The top 600 millimetres of the backfill adjacent to concrete structures shall be insitu clay material completed to CW 2030, Class 4 standards unless under pavement or roadways.
- E5.6.5 Backfill under fibre optics and high pressure gas lines shall be completed to CW 2030, Class 2 standards a minimum of 1 metre each side of the crossing utility to 150 mm beneath the utility. Bedding and backfill for fibre optic cables and gas mains shall be completed with clean sand, carefully compacted to 90% SPMDD, to 150 mm above the utility.
- E5.6.6 Backfill over-excavated trench areas where unsuitable pipe foundation material is encountered, or areas behind thrust blocks, as indicated on the Drawings, with well-graded crushed limestone material, having a maximum aggregate size of 20mm, conforming to CW 2030 Type 2 granular material. Place material in maximum 200 mm thick lifts and compact to 100 % SPMDD.
- E5.7 Surface Restoration
- E5.7.1 Permanent pavement restoration of existing service road shall be completed to the sections shown on the Drawings, and in accordance to CW 3110 and CW 3150. Where pipe installation requires removal of the entire road width, 150 mm of 50 mm crushed limestone sub-base material shall be placed to CW 3110 followed by 50 mm of surfacing material to CW 3150. Where excavation for pipe installation underlies a portion of the roadway, compact the sub-grade and place 150 mm of 50 mm crushed limestone sub-base material to CW 3110 and place 50 mm of surfacing material to CW 3150. Where the roadway has been damaged by construction activities, the roadway shall be prepared and 50 mm of surfacing material shall be placed as per CW 3150.

E5.7.2 Non-granular areas within public right-of-ways shall be re-graded. Stockpiled topsoil shall be spread and graded. Re-seed areas in accordance to E6 Seeding and E7 Finish Grading unless otherwise directed by the Contract Administrator.

E5.8 Measurement and Payment

E5.8.1 Excavation, backfill and shoring for pipe installation and valve chambers will not be measured for payment. Costs for excavation, backfill and shoring shall be included in the price for Modification of Valve Chamber, Construction of Pre-Cast Valve Chambers, Main Line Piping – Supply and Install, Replacement of Existing Steel Pipe with AWWA C301 Pipe, Supply and Installation of Steel Casing Pipe.

E5.8.2 Backfill of unsuitable foundation areas with CW 2030 Type 2 Foundation Backfill shall be measured and paid on a weight basis. The units measures and paid will be the total tonnes of Type 2 Foundation Backfill placed, in accordance to this specification, as measured on a government certified weigh scale.

E6. SEEDING

E6.1 Description

- (a) This Special Provision shall amend and supplement City of Winnipeg Standard Construction Specification CW 3520-R6 “Seeding”, and shall cover all aspects of supply and installation of seed, including preparation of finish grade, hydro mulching, and maintenance.

E6.2 Materials

E6.2.1 General

- (a) Provide the Contract Administrator with Certificates of Analysis and mix composition for seed mix. Include supplier’s name and telephone contact information, and percentages of each species and cultivar in the mix.
- (b) Obtain Contract Administrator’s approval for any proposed adjustments to the seed mix species or cultivars prior to seeding.

E6.2.2 Ditch Seed Mix

- (a) Ditch Seed Mix shall be a mixture of the following species and cultivars:
- (i) 20% Creeping Red fescue (*Festuca rubra*);
 - (ii) 20% Mustang Tall fescue (*Festuca arundinacea* ‘Mustang’);
 - (iii) 15% Kentucky bluegrass (*Poa pratensis*), use a mix of a least 2 cultivars from the following list;
 - (iv) 10% Fiesta 3 Perennial ryegrass (*Lolium perenne* ‘Fiesta 3’);
 - (v) 10% Altai Wild ryegrass (*Elymus angustus* ‘Prairieland’);
 - (vi) 10% Victory Chewings fescue (*Festuca commutata* ‘Victory’);
 - (vii) 10% White clover (*Trifolium repens*), and
 - (viii) 5% Timothy (*Phleum pretense*).
- (b) Acceptable cultivars of Kentucky bluegrass include:
- (i) Alpine, A34, Bronco.

E6.2.3 Cover Crop (Nurse Crop)

- (a) Use Annual ryegrass as a cover crop in all seeded areas.

E6.2.4 Herbicides and Insecticides

- (a) Herbicides and insecticides shall be in accordance with CW 3520-R6.

E6.2.5 Hydro Mulch

- (a) Mulch, water and tackifier shall be in accordance with CW 3520-R6.

E6.3 Construction Methods

E6.3.1 Ditch Seed Mix: Seeding and Maintenance

- (a) Seed with a Brillion Seeder, or equal, on soil amendments in areas designated "Ditch Seed Mix".
- (b) Seeding shall conform to CW 3520-R6:
 - (i) Sow Ditch Seed Mix at 2.0 kg/100 square metres, and
 - (ii) Sow cover crop at 0.6 kg/100 square metres.

E6.3.2 Maintenance of Areas Seeded with Ditch Seed Mix

- (a) The Contractor shall water areas as required to obtain optimum soil moisture levels for seed germination and continued growth of grasses. Control watering to prevent seed washouts.
- (b) The Contractor shall mow Ditch Seed Mix areas in October, removing cut material that would smother grasses and legumes.
- (c) Additional mowing, at a height of 100 mm, shall be completed upon the direction of the Contract Administrator, as required to remove extensive weed growth and/or to maintain healthy growth of grasses.

E6.3.3 Chemical Weed Control

- (a) The Contractor shall use chemical weed control, Roundup, 2-4 D or Diacamba, only as required to spot remove weeds in localized areas. Do not treat large areas seeded with clover and Timothy with chemical weed control agents following seeding operations.

E6.3.4 Termination of Maintenance Period

- (a) The maintenance period shall be terminated after the following criteria have been met:
 - (i) The certified seed sowed meets the requirements of CW 3520
 - (ii) Seeded areas are free of debris, including leaves
 - (iii) Seeded areas have firm, uniform and even surfaces
 - (iv) Seeded grasses and legumes show healthy, vigorous growth
 - (v) Seeded areas have less than 10 weeds per 50 square metres
 - (vi) Seeded areas have sufficient growth density that bare spots do not exceed 5% of total surface area
 - (vii) Seeded areas are free of damaging insects

E6.4 Method of Measurement

E6.4.1 Ditch Seed Mix

- (a) Ditch Seed Mix shall be measured on an area basis. The total area to be paid for shall be the number of square metres seeded and maintained in accordance with this Specification and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator.
- (b) No measurement shall be made for seed placed outside the limits of placement unless directed by the Contract Administrator.

- E6.4.2 Nurse or Cover Crop Seeding
- (a) There will be no separate measurement for nurse or cover crop seeding. Seeding of a nurse crop will be incidental to other seeding operations.
- E6.4.3 Herbicides and Insecticides
- (a) There will be no separate measurement for materials, equipment and operations related to the use of herbicides and insecticides.
- E6.5 Basis of Payment
- E6.5.1 Ditch Seed Mix
- (a) Supply, placement and maintenance of ditch seed mix will be paid for at the Contract Unit Price for "Ditch Seed Mix", which price shall be payment in full for supplying all materials and performing all operations herein specified, and all other items incidental to the Work in accordance with this Specification and CW2510.

E7. SOIL PREPARATION AND FINISH GRADING

- E7.1 Description
- (a) This Special Provision shall amend and supplement City of Winnipeg Standard Construction Specification CW 3540 "Topsoil and Finish Grading for Establishment of Turf Areas", and shall cover supply, preparation and placement of soil amendments, including preparation of existing grade, finish grading and fertilizer application.
- E7.2 Materials
- E7.2.1 Site Topsoil
- (a) Stockpiled on-site topsoil shall conform to CW 3540.
- E7.2.2 Fertilizer
- (i) Chemical fertilizers shall have an N-P-K ratio of 1-2-1.
 - (ii) Commercial fertilizer shall meet the requirements of the Canada Fertilizer Act and the Canadian Fertilizer Quality Assurance Program.
 - (iii) Fertilizer shall be in granular or pelletized form, and dry and free-flowing.
- E7.3 Construction Methods
- E7.3.1 Soil Preparation for Ditch Seed Mix
- (a) Cross-cultivate the entire area of soil base (clay) that is to receive soil amendments, to a depth of 150 mm. Redo areas where equipment used for hauling and spreading has re-compacted sub-grade
 - (b) Spread stockpiled site topsoil. Grade to eliminate rough spots and low spots and to maintain positive drainage.
 - (c) Consolidate seedbed to required bulk density using equipment approved by the Contract Administrator. Leave surfaces smooth, uniform and firm against deep foot printing.
 - (d) Spread fertilizer uniformly over the entire area of topsoil to be seeded at a rate to provide 48 kg of actual nitrogen, 96 kg of actual phosphate and 48 kg of actual potassium per hectare.
 - (e) Provide Contract Administrator with a report indicating the fertilizer formulation used, type of fertilizer, rate of application and date of application.
 - (f) Legally dispose of unused fertilizer as hazardous waste.

E7.4 Method of Measurement

E7.4.1 Soil Amendments for Ditch Seed Mix

- (a) Soil amendments for areas designated for Ditch Seed Mix shall be measured on an area basis for the number of square metres of soil base prepared in accordance with the Construction Drawings and this Specification, and accepted by the Contract Administrator, as computed by the Contract Administrator.

E7.5 Basis of Payment

E7.5.1 Soil Amendments for Ditch Seed Mix

- (a) Soil amendments will be paid for at the Contract Unit Price for "Soil Amendments", which price shall be payment in full for supplying all materials and performing all operations herein specified, and all other items incidental to the Work of this Specification.

E8. LONG-TERM SCHEDULED MAINTENANCE OF SEEDED AREAS

E8.1 Description

- E8.1.1 This Specification shall cover the maintenance of seeded areas, following acceptance of the Work by the Contract Administrator.

E8.2 Materials

- E8.2.1 The Contractor shall provide all necessary materials and equipment including: additional soil ameliorates, seed, fertilizers and pesticides, as well as tractors, mowers, hand mowers, trimmers, fertilizer spreaders, water trucks, hoses, water metres and any other items necessary for the maintenance of the areas indicated in this Specification.

E8.3 Personnel

E8.3.1 Provision of Maintenance Personnel

- (a) The Contractor shall provide all necessary personnel for the ongoing maintenance operations.

E8.3.2 Capability of Personnel

- (a) Maintenance personnel should have at least one year of experience in landscape maintenance and should be under the direction of a foreman, in all cases, with not less than five years of experience with similar maintenance operations.

E8.4 Timing

E8.4.1 Long-term Maintenance Period

- (a) Maintain seeded grasses and legumes, for a period of two (2) years from the completion of the Maintenance for Establishment period, as determined by the Contract Administrator. Note: Completion shall not occur after October 30, or before May 15 of any year.

E8.4.2 Maintenance Schedule

- (a) Provide the Contract Administrator a Schedule of Proposed Maintenance Activities for the two-year long-term scheduled maintenance period, based on the requirements outlined herein. The scheduled maintenance period shall not commence until the Contract Administrator has reviewed this maintenance schedule.

E8.4.3 Recording Long-term Maintenance Operations

- (a) The Contractor shall provide a detailed maintenance log, including but not limited to the following:
 - (i) Hours of labour undertaken;
 - (ii) Number of personnel employed, and
 - (iii) Equipment used.
- (b) The log will itemize watering, spraying and any other maintenance work. Contractor shall submit logs monthly at regularly scheduled meetings with the Contract Administrator. Maintenance log will be incidental to the long-term maintenance work

E8.5 Maintenance Methods

E8.5.1 Traffic

- (a) Keep lanes open during work.

E8.5.2 Maintenance of Ditch Seed Mix Areas

- (a) Repair and re-seed dead or bare spots to the satisfaction of the Contract Administrator.
- (b) Eliminate weeds by hand or chemical means. Spot treat localized weedy areas, only, with Roundup, 2-4D or Diacamba.
- (c) Water only as required for seed establishment and seed maintenance in periods of severe drought.
- (d) Mowing
 - (i) Mow grass areas in the late fall, or as directed by the Contract Administrator to remove excessive weed growth.
 - (ii) Remove cuttings.
 - (iii) Mow grass areas to a height of 100 mm.

E8.6 Method of Measurement

- (a) Ditch Seed Mix
 - (i) Two-year general maintenance of Ditch Seed Mix areas including mowing once in the fall or as required to control excessive weed growth, spot weed control, and removal of cuttings, will be measured twice each season, for the six month annual growing season for work completed in each area each year.

E8.6.2 Watering of Seeded Areas

- (a) Watering of seeded areas for the two-year maintenance period will be measured on a per-time basis for watering in each area, as computed by the Contract Administrator. Provide watering logs.

E8.7 Basis of Payment

E8.7.1 General Maintenance of Seeded Areas, and General Clean-Up

- (a) General maintenance and general clean-up will be paid for at the Contract Unit Prices for "General Maintenance of Ditch Seeded Areas" which prices will include supply of all labour, equipment and materials and performing all operations herein described, and all other items incidental to the Work included in this specification.

E8.7.2 Watering of Seeded Areas

- (a) Watering of seeded areas for the two-year maintenance period will be paid for at the Contract Unit Price for "Watering of Ditch Seeded Areas", pro-rated to the percentage of seeded area watered, which price will include supply of all labour, equipment and

materials and performing all operations herein described, and all other items incidental to the Work included in this Specification.

E9. CHEMICAL CONTROL OF VEGETATION

E9.1 Description

E9.1.1 This Specification covers the requirements for the application of herbicides for weed control.

E9.2 General

E9.2.1 Safety Requirements

- (a) Comply with Federal, Provincial, pesticide control regulations. Provide Material Safety Data sheets (MSDS) for all chemicals to be used.
- (b) Obtain Provincial Pesticide Applications License and any other permits and licenses necessary to complete work.
- (c) Comply with label directions on the use of herbicide products.
- (d) Comply with label directions as to ambient temperature ranges for application.

E9.2.2 Delivery and Storage

- (a) Deliver, store and maintain packaged materials with manufacturer's seals and labels intact.
- (b) Prevent damage, adulteration and soiling of material during delivery, handling and storage.
- (c) Store material in accordance with label directions, including those on maximum and minimum storage temperatures.
- (d) Store herbicide products in original containers as supplied by manufacturer and keep sealed until used.
- (e) Store herbicide products in sheltered, well ventilated, controlled access location.
- (f) Do not store herbicides near feeds and food stuffs, agricultural plants, seeds, fungicides, insecticides, fertilizers or other agricultural chemicals.
- (g) Identify storage area as pesticide storage facility for fire protection purposes.
- (h) Post in a prominent place a list of medical and fire department telephone numbers.
- (i) Post in a prominent location on the outside of the storage area a list of products stored. Provide a copy of this list to fire department. Keep list up to date.

E9.3 Materials

E9.3.1 Herbicides

- (a) Select appropriate herbicides to achieve specified control requirement. Refer to Manitoba Guide to Chemical Weed Control.
- (b) Herbicide products used must be registered for such use by Agriculture Canada under Pest Control Products Act.
- (c) Do not use herbicides containing sodium chlorate.

E9.3.2 Adjuvants

- (a) Adjuvants shall be compatible with herbicide product used.

E9.3.3 Spray Equipment

- (a) Tank Spray: Do not use air-blast, mist or fog sprayer. Sprayer unit to meet the following requirements:
 - (i) Sprayer shall have adjustable height boom, hose and handgun for spot treatments, strainers and nozzles to produce spray pattern compatible with job.
 - (ii) Tank shall be equipped with continuous agitation device.
 - (iii) Pressure gauge and regulator shall be capable of maintaining uniform pressure between 100 and 450 kPa.
- (b) Backpack Sprayer:
 - (i) Sprayer shall have hose and handgun for spot treatment.
- (c) Equip spray tank loading pipe with check valve located within one metre of pump or hydrant to prevent siphoning from spray tank resulting in contamination of water source.

E9.4 Construction Methods

E9.4.1 Notice of Spray Operation

- (a) Post areas to be treated with signs placed at each road access and 100m intervals around perimeter.
- (b) Indicate on signs that spray program is being implemented.
- (c) Put signs in place prior to commencement of spray operation and retain in place for 24 hours after spray operation is completed for each particular area.

E9.4.2 Environmental Protection

- (a) Application may continue only when wind velocities range between 2 and 10 km/h.
- (b) Do not spray when air turbulence will prevent uniform application.
- (c) Do not apply herbicides within 65m of wells, rivers, streams, lakes, marshes or other environmentally sensitive areas unless otherwise sanctioned by provincial permit.
- (d) In case of herbicide spill, notify Contract Administrator and Provincial Ministry of Environment verbally immediately and subsequently in writing.
- (e) Do not allow drifting beyond target area. Use mechanical method to minimize herbicide drift.
- (f) When spraying adjacent to desirable vegetation, use sprayer fitted with protective hood suitable to prevent contamination or provide protective covering for such vegetation while spray is in progress.
- (g) Do not apply sterilants to slopes greater than 3 to 1 where killing vegetation would lead to erosion problems.

E9.4.3 Application of Herbicides

- (a) Treat areas as indicated with appropriate herbicides.
- (b) Calibrate equipment to achieve manufacturer's recommended application rates.
- (c) Confine herbicide application to areas as indicated to achieve specified control requirements.
- (d) Space successive passes to provide uniform coverage of treated area.
- (e) Use flagmen or other aids as necessary to indicate successive passes.
- (f) Where roots of desirable vegetation run under treatment area, use contact herbicides.

- (g) Ensure formulation and rate of sterilant will not lead to leaching outside treatment area.
- (h) Retreat areas in accordance with label directions until specified control requirements are achieved.

E9.4.4 Control Requirements

- (a) For weed control, achieve within 30 days of treatment, minimum of 90% kill of target plants without damaging installed plant material.
- (b) For soil sterilization, achieve within 12 months of treatment, 100% kill of vegetation.

E9.4.5 Waste Disposal

- (a) Triple rinse empty herbicide containers with diluent and add rinsate to spray mixture in tank.
- (b) Puncture and crush glass plastic metal containers making them unsuitable for further use.
- (c) Dispose of containers in accordance with provincial requirements.
- (d) Do not rinse or wash spray tanks and equipment on site.

E9.4.6 Report

- (a) Within 7 days of work completion, submit to Contract Administrator a written report containing following information:
 - (i) Full name and PCP Registration number of herbicide products used including adjuvants.
 - (ii) Types and makes of application equipment used.
 - (iii) Total amount of herbicide applied and rate of application expressed in kilograms of active ingredients per square metre and in kilograms of product per square metre.
 - (iv) Dates and times treatment commenced and terminated each day.
 - (v) Summary of daily weather conditions during treatment.
 - (vi) Number of hectares completed each day.
 - (vii) Description of disposal techniques, total number of containers discarded for each chemical, exact location of disposal site.
 - (viii) Names of drivers, mixers and applicators.
 - (ix) Copies of provincial applicator's license and pesticide project application permit.

E9.5 Method of Measurement and Basis of Payment

E9.5.1 Spot Weed Control

- (a) Application of chemical herbicides to control excessive weed growth in sod or seeded areas, in planting beds or around trees, following completion of planting operations will be incidental to the general two-year maintenance requirements.

E10. SUPPLY AND DELIVERY OF PRESTRESSED CONCRETE PIPE AND APPURTENANCES

E10.1 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.

E10.2 Materials

(a) Cement

- (i) Portland Cement shall be CSA A3000 Type HS 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.

(b) Bell and Spigot Joint Rings

- (i) Where indicated on the drawings, restrained joints shall be harnessed clamp joints.
- (ii) For joints to be installed in casing pipe or cored hole, bell and spigot rings shall be epoxy coated to AWWA C210. Coating shall be two (2) or more layers (5 mils dry film thickness minimum each coat) Polyamide Epoxy, Amerlock 400, Tnemec Series 140F Pota-Pox Plus or approved equal in accordance with B6.

(c) 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 D 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.

(d) 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 E10.4. Colour coded markings shall be required when there is more than one pipe classification.

(e) 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.

E10.3 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 designed and constructed to withstand maximum design working pressure of 700 kilopascals, plus the greater of forty percent transient allowance or 275 kPa, 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 pipe outside diameter (O.D.) width plus 1000 millimetres, a soil weight of 1925 kilograms per cubic metre, AWWA Design Manual R4 90 degree bedding, earth cover as indicated on the drawings (minimum earth cover of 2750 millimetres) and a $Ku' = 0.110$ (trench condition) and $Ku' = 0.165$ (embankment condition) in Marston's formula. Depth of cover requirements shall use the maximum of proposed final grades or original ground grades. Live loading under 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 pump station and valve chamber piping.
 - (ii) Minor adjustments to pipe design plans to suit standard pipe lengths, may be allowed on approval of the Contract Administrator.
 - (iii) Pipe closures shall be field measured prior to fabrication.
 - (iv) Laying schedule shall incorporate sufficient person access points to safely facilitate pipe access for joint grouting and inspection.
- (c) Fitting Design
- (i) Fittings shall be designed to accommodate the horizontal and vertical deflections shown on the Drawings. Where combination horizontal and vertical bends are used, fitting orientation shall be clearly marked on the fitting to aide in installed alignment.

E10.4 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.

E10.5 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.

E10.6 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.

E10.7 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 C5.03.
- (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 provided to the Contract Administrator, 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.

E10.8 Method Measurement and Basis of Payment

- (a) Prestressed Concrete Pressure Pipe
 - (i) The supply and delivery of prestressed concrete pressure pipe shall not be measured for payment. It shall be included in the price bid for Main Line Piping - Supply and Install.
- (b) Fittings and Specials
 - (i) The supply and delivery of fittings and specials shall not be measured for payment. They shall be included in the price bid for Supply and Installation of Fittings and Specials.

E11. SUPPLY AND DELIVERY OF POLYVINYL CHLORIDE PIPE

E11.1 Materials

E11.1.1 Polyvinyl Chloride (PVC) Pipe

- (a) Dimension Ratio (DR)
 - (i) PVC pipe shall conform to the latest revision of AWWA C905 and CSA B137.3, with the following dimension ratio (DR)
 - ◆ 600 millimetre DR 25
- (b) Fabricated Fittings
 - (i) Fabricated fittings shall be thermally butt welded segments, with overwrapped reinforcement, conforming with AWWA C905 and CSA B137.3. Where non-standard fittings and bend angles are required, fittings shall be constructed in every way to conform to the nearest CSA certified standard fitting.
- (c) Closures
 - (i) Main line closures shall be fabricated PVC slide collars conforming to AWWA C905 and CSA B137.3. Pipe class to be the same as for mainline piping.
- (d) Joint Restraints
 - (i) PVC fitting joint restraints shall be constructed of ductile iron to ASTM A536 Grade 65-45-12, EBAA Iron Series 2500, Uniflange Series 1360 or Approved Equal in accordance with B6.

E11.1.2 Submittals

- (a) Laying Schedule
 - (i) Submit laying schedule for review by the Contract Administrator. Laying schedule shall show general pipe layout, location of fittings and specials, proposed direction of lay and connection points.
 - (ii) Minor adjustments to pipe design plans to suit standard pipe lengths, may be allowed on approval of the Contract Administrator.
- (b) Fittings
 - (i) Submit details of all fabricated fittings and specials, including details of proposed connections to existing pipelines.

- (c) 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 C905-97.

E11.1.3 Fabrication

E11.1.4 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 C5.03.
- (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 5.3 of AWWA C905-97. 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.
- (c) Dimensional Checks
 - (i) Notwithstanding AWWA C905, Section 5.1.1, dimensional checks shall be carried out for each and every pipe in the production run.

E11.2 Method Measurement and Basis of Payment

- (a) AWWA C905 Pressure Pipe
 - (i) The supply and delivery of AWWA C905 PVC pipe shall not be measured for payment. It shall be included in the price bid for Main Line Piping - Supply and Install.
- (b) Fittings and Specials
 - (i) The supply and delivery of fittings and specials shall not be measured for payment. They shall be included in the price bid for Supply and Installation of Fittings and Specials.

E12. SUPPLY AND DELIVERY OF POLYETHYLENE PIPE

E12.1 Materials

E12.1.1 Polyethylene (PE) Pipe

- (a) Resin Compound
 - (i) Pipe, fittings, and joints shall be made from resins with designation PE 3408 and a minimum cell classification of PE 334434 as specified within ASTM D3350.
 - (ii) The Hydrostatic Design Basis at 23°C (73.4°F) as specified with ASTM D2837 shall be 1,600 psi (11.03 MPa).
- (b) Dimension Ratio (DR)
 - (i) PE pipe shall conform to the latest revision of AWWA C906 and CSA B137, with the following dimension ratio (DR)
 - ◆ 711 millimetre (OD) DR 17

- (c) Fabricated Fittings
 - (i) Fabricated fittings shall be thermally butt welded pipe segments with a wall thickness not less than 25% greater than that of the pipe to which is to be joined conforming with AWWA C906.
- (d) Closures
 - (i) Main line closures shall be butt fused flange adapters conforming to AWWA C906. The flange adapter must be the same DR rating as for mainline piping.

E12.1.2 Submittals

- (a) Laying Schedule
 - (i) Submit laying schedule for review by the Contract Administrator. Laying schedule shall show general pipe layout, location of fittings and specials, proposed direction of lay and connection points.
 - (ii) Minor adjustments to pipe design plans to suit standard pipe lengths, may be allowed on approval of the Contract Administrator.
- (b) Fittings
 - (i) Submit details of all fabricated fittings and specials, including details of proposed connections to existing pipelines.
- (c) 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 C906-99.

E12.1.3 Fabrication

E12.1.4 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 C5.03.
- (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 5.9 of AWWA C906-99. 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.
- (c) Dimensional Checks
 - (i) Notwithstanding AWWA C906-99, Section 5.4.2, dimensional checks shall be carried out for each and every pipe in the production run.

E12.2 Method Measurement and Basis of Payment

- (a) AWWA C906 Pressure Pipe
 - (i) The supply and delivery of AWWA C906 PE pipe shall not be measured for payment. It shall be included in the price bid for Main Line Piping - Supply and Install.

(b) Fittings and Specials

- (i) The supply and delivery of fittings and specials shall not be measured for payment. They shall be included in the price bid for Supply and Installation of Fittings and Specials.

E13. SUPPLY AND INSTALLATION OF FORCEMAIN

E13.1 Description

- E13.1.1 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.

E13.2 Materials

E13.2.1 Acceptable Forcemain Products

- (b) Prestressed Concrete Pressure Pipe conforming to AWWA C301
(c) Polyvinyl Chloride (PVC) conforming to AWWA C905 and CSA B137.3
(d) Polyethylene (PE) conforming to AWWA C906

E13.2.2 Pipe Couplers

- (a) Pipe couplers for pipe connections for AWWA C301 PCC and AWWA C905 PVC piping shall be to the latest revision of AWWA C-219 for bolted, Sleeve Type Couplers for Plain End Pipe. Minimum requirements are:
- ◆ Minimum sleeve length 175 mm
 - ◆ Minimum centre sleeve thickness 10 mm
 - ◆ Couplings capable of accommodating up to 2 degrees deflection
 - ◆ Bolts and nuts to be 316 Stainless Steel.
 - ◆ Design pressure 150 psi
 - ◆ Restrained couplers shall be provided where indicated on the Drawings
- (b) Pipe couplers for Victaulic Style 44 (Shouldered) End Connections to be to the latest revision of AWWA C606 for Grooved and Shouldered Joints. Minimum requirements are:
- ◆ Bolts and nuts to be 316 stainless steel
- (c) Couplings to be fusion bonded epoxy coated to AWWA C210.
- (d) Buried pipe couplers and flange connections shall be protected against corrosion by wrapping with Denso Tape system, consisting of Denso Profiling Mastic, Denso Paste and Densyl Tape, or approved equal in accordance with B6 to AWWA C217.

E13.2.3 Casing Spacers

- (a) Casing spacers shall have steel bands and risers with a fusion bonded coating and 50 mm (2") wide glass reinforced polymer runners and will be designed to centre and restrain the forcemain, Pipeline Seal and Insulator (PSI) C12G-2, Advanced Products and Systems (APS) SI12 or approved equal in accordance with B6.

E13.2.4 Drainage Fabric

- (a) Drainage fabric will be non-woven and meet requirements specified in CW 3120.

E13.2.5 Paint

- (a) Paint for exposed metal surfaces shall be in accordance to AWWA C213.

- (b) Coating shall be two (2) or more layers (5 mils dry film thickness minimum each coat) Polyamide Epoxy, Amerlock 400, Tnemec Series 140F Pota-Pox Plus or approved equal in accordance with B6.

E13.2.6 Grout

- (a) Cement
 - (i) Portland cement shall be CSA A3000 Type HS Sulphate Resistant Cement.
 - (ii) Minimum 28 day strength 20 MPa.
 - (iii) Pumpable consistency.

E13.2.7 Flexible Joint Filler

- (a) Prefabricated loop to fit securely on spigot ring behind gasket groove and against spigot shoulder.
- (b) Sufficient cross-section to protect exposed steel joint ring surfaces and compressibility to allow pipe to be pushed "home" without difficulty.
- (c) Composed of water degradable polyurethane foam with an admixture not less than 63 percent by weight of Portland cement.
- (d) Alva-Tech Flex-Protex or approved equal in accordance with B6.

E13.3 Construction Methods

E13.3.1 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 20mm, conforming to CW 2030 Type 2 granular material.

E13.3.2 Pipe Installation – AWWA C301 Pipe

- (a) Installation of Pipe in a Trench
 - (i) 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.
 - (ii) 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.
 - (iii) 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. Backfill shall be compacted to 90% SPMDD. The Contractor shall ensure that disturbance of the pipe or damage to the pipe coating does not occur during sand bedding and backfilling operations.
 - (iv) Pipe shall be installed utilizing trench methods except where coring is required at the crossings of Wilkes Avenue and of the Perimeter Highway as shown on the Drawings.

- (v) 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.
- (b) Installation of Pipe Using Trenchless Methods
- (i) Provide the locations and sizes of shafts to the Contract Administrator for review before excavating.
 - (ii) Provide shop drawings showing proposed method of installation for sewage forcemain in undercrossings.
 - (iii) Excavate shafts and provide shoring in accordance with CW 2030.
 - (iv) For installation in casing pipe, securely attach casing spacers to the forcemain piping. A minimum of three (3) spacers shall be installed on each joint of pipe at the bell and spigot ends and at the centre.
 - (v) For installation in cored hole, a neat hole shall be cored out for the installation of the forcemain pipe to a maximum of 25 mm larger than the largest pipe outside dimension. "Plugging", "reaming" or other construction methods that displace soil shall not be permitted. Blocking shall be installed on the piping to prevent floatation during the grouting process. The annulus of core hole shall be grouted for the full length of core hole.
 - (vi) Join pipe sections together before inserting into the installation hole. Pull or push the entire length of pipe from the end of the last pipe into installation hole. Installation methods where tension is applied to a pipe section will not be permitted.
 - (vii) Pull back the entire length of pipe already in the installation hole if a length of pipe is to be withdrawn from the installation hole.
 - (viii) Place pipe on compacted bedding in shafts ensuring uniform support under bell and pipe body throughout its full length. Work and compact bedding material under sides of pipe to provide proper haunching. 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. Backfill shall be compacted to 90% SPMDD. The Contractor shall ensure that disturbance of the pipe or damage to the pipe coating does not occur during sand bedding and backfilling operations.
- (c) Jointing
- (i) Immediately prior to connecting two lengths of 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.
 - (ii) 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".

- (iii) 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 diaper 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.
 - (iv) 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.
 - (v) Delay grouting and diapering of short pipe joints immediately outside of chambers, until completion of construction and partial backfill of chamber, to allow maximum differential deflection and settlement prior to final backfill.
 - (vi) For joints to be pushed into position by trenchless methods substitute diaper band by filling the joint with Flex-Protex prior to pushing the pipes together. When the pipes are pushed completely "home" Flex-Protex shall completely fill the gap between the joints.
- (d) Steel Split Ring Closures
- (i) 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.
 - (ii) Buried pipe closures shall be accurately measured, cut and installed. Welded Split Sleeve closures shall be installed by a certified welder.
 - (iii) 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.
- (e) Connections to Chamber Piping
- (i) For AWWA C301 pipe connection to dissimilar chamber piping, connections shall be made by means of steel sleeve typed coupling. Pipe coupling to be protected from corrosion by Denso tape system.
 - (ii) Connections to Perimeter Road Pumping Station shall be made by means of a new Style 44 Victaulic-Ring (shouldered) Coupling. Pipe coupling to be protected from corrosion by Denso tape system.

E13.3.3 Pipe Installation - AWWA C905 PVC

- (a) Installation of Pipe in a Trench
- (i) 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. The sand bedding shall be levelled and compacted to 90% SPMDD, 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. The middle of the trench bedding for a width of one third of the pipe outside diameter, shall remain uncompacted.
- (ii) 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 the pipe bell. Both grooves shall be filled with compacted sand after the removal of the sling.
 - (iii) Sand bedding shall be placed to 50 millimetres above the haunch of the pipe and thoroughly compacted to 90% SPMDD, to provide adequate lateral support of the pipe wall. Sand initial backfill shall then be placed to a depth above the pipe to a depth of 200 millimetres above the top of the pipe, for the full trench width. The Contractor shall ensure that disturbance of the pipe or damage to the pipe does not occur during sand bedding and backfilling operations.
 - (iv) 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.
 - (v) Pipe shall be installed utilizing trench methods except where coring is required at the crossings of Wilkes Avenue and of the Perimeter Highway as shown on the Drawings.
 - (vi) 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.
- (b) Installation of Pipe Using Trenchless Methods
- (i) Provide the locations and sizes of shafts to the Contract Administrator for review before excavating.
 - (ii) Provide shop drawings showing proposed method of installation for sewage forcemain in undercrossings.
 - (iii) Excavate shafts and provide shoring in accordance with CW 2030.
 - (iv) For installation in casing pipe, securely attach casing spacers to the forcemain piping. A minimum of three (3) spacers shall be installed on each joint of pipe at the bell and spigot ends and at the centre. The casing spacer installed at the spigot end shall be placed at the insertion mark to help prevent over insertion.
 - (v) For installation in cored hole, a neat hole shall be cored out for the installation of the forcemain pipe to a maximum of 25 mm larger than the largest pipe outside dimension. "Plugging", "reaming" or other construction methods that displace soil shall not be permitted.
 - (vi) Join pipe sections together before inserting into the installation hole. Pull or push the entire length of pipe from the end of the last pipe into installation hole. Installation methods where tension is applied to a pipe section will not be permitted.
 - (vii) Pull back the entire length of pipe already in the installation hole if a length of pipe is to be withdrawn from the installation hole.
 - (viii) Place pipe on compacted bedding in shafts ensuring uniform support under bell and pipe body throughout its full length. Work and compact bedding material under sides of pipe to provide proper haunching. 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. Backfill shall be compacted to 90% SPMDD. The Contractor shall ensure that disturbance of the pipe or damage to the pipe exterior does not occur during sand bedding and backfilling operations.

- (c) Jointing
 - (i) Pipe shall be joined in accordance to manufacturer's instructions and accepted industry practice. Over-insertion of pipe joints shall not be permitted.
- (d) Connection to Chamber Piping
 - (i) For pipe connection to chamber piping, connections shall be made by means of steel sleeve typed coupling. Pipe coupling to be protected from corrosion by Denso tape system.

E13.3.4 Pipe Installation - AWWA C906 PE

- (a) Installation of Pipe in a Trench
 - (i) 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. The sand bedding shall be levelled and compacted to 90% SPMDD, 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. The middle of the trench bedding for a width of one third of the pipe outside diameter, shall remain uncompacted.
 - (ii) A small groove shall be left at the midpoint to facilitate the removal of the sling after the pipe has been laid. The groove shall be filled with compacted sand after the removal of the sling.
 - (iii) Sand bedding shall be placed to 50 millimetres above the haunch of the pipe and thoroughly compacted to 90% SPMDD, to provide adequate lateral support of the pipe wall. Sand initial backfill shall then be place to a depth above the pipe to a depth of 200 millimetres above the top of the pipe, for the full trench width. The Contractor shall ensure that disturbance of the pipe or damage to the pipe does not occur during sand bedding and backfilling operations.
 - (iv) 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.
 - (v) Pipe shall be installed utilizing trench methods except where coring is required at the crossings of Wilkes Avenue and of the Perimeter Highway as shown on the Drawings.
- (b) Installation of Pipe Using Trenchless Methods
 - (i) Provide the locations and sizes of shafts to the Contract Administrator for review before excavating.
 - (ii) Provide shop drawings showing proposed method of installation for sewage forcemain in undercrossings.
 - (iii) Excavate shafts and provide shoring in accordance with CW 2030
 - (iv) For installation in casing pipe, securely attach casing spacers to the forcemain piping. Spacers shall be installed every 2.4 metres (8').
 - (v) For installation in cored hole, a neat hole shall be cored out for the installation of the forcemain pipe to a maximum of 25 mm larger than the largest pipe outside dimension. "Plugging", "reaming" or other construction methods that displace soil shall not be permitted.
 - (vi) Place pipe on compacted bedding in shafts ensuring uniform support under the pipe throughout its full length. Work can compact bedding material under sides of pipe to provide proper haunching. Compacted sand backfill shall be place above the pipe to a depth of 200 millimetres above the top of the pipe for the full trench width. Backfill shall be compacted to 90% SPMDD. The Contractor shall ensure that disturbance of the pipe or damage to the pipe exterior does not occur during sand bedding and backfilling operations.

- (vii) 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.
- (c) Jointing
 - (i) Pipe and fittings shall be joined using thermal butt fusion in accordance to procedures established by the pipe and fusion equipment manufacturers and as specified in ASTM F2620 for "Heat Fusion Joining of Polyethylene Pipe and Fittings".
 - (ii) Check the temperature and uniformity of temperature over the heating surface of the heating tool with a pyrometer on the first joint of the day and periodically during the day in accordance with Section 6.3 of ASTM Standard Practice F2620 for "Heat Joint of Polyethylene Pipe and Fittings". Select multiple check points to ensure uniform surface temperature.
 - (iii) Use a datalogging device with the hydraulic joining equipment to record fusion parameters of pressure, temperature, and time for each joint.
 - (iv) Fusion shall produce a joint weld with strength equal to or greater than the tensile strength of the pipe itself.
 - (v) Only fusion technicians that have been trained by the pipe or fusion equipment manufacturer and are adequately qualified in the techniques involved shall conduct butt fusion joining.
- (d) Connection to Chamber Piping
 - (i) For pipe connection to chamber piping, connections shall be made by means of a metal backup ring and flange adapter butt fused to the pipe end. The flange connection to be protected from corrosion by Denso tape system.

E13.3.5 Casing End Seal

- (a) Upon completion of pipe installation in casing pipe, fabricate end seals using drainage fabric at each end of the casing pipe. Double-wrap drainage fabric around annulus between casing and forcemain pipes. Overlap both casing and forcemain pipes by a minimum of 0.5 metres each and tuck additional fabric in annulus between casing and forcemain. Attach drainage fabric to casing pipe using Type 316 stainless steel banding material.

E13.3.6 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.

E13.3.7 Thrust Blocks

- (a) Thrust blocks shall be installed at locations shown on the Drawings for AWWA C301 and for AWWA C905 PVC pipe. 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.

E13.3.8 Connections to Existing Pipes

- (a) Connections to existing pipes shall be made at the locations shown on the Drawings.
- (b) AWWA C301 pipe required for replacement of existing steel pipe must be on site prior to excavating in vicinity of PRPS.
- (c) Connections between the existing prestressed concrete cylinder pipe and new prestressed concrete cylinder pipe shall be made by means of a welded joint.
- (d) All pipe joints included in connection sections shall be exposed after recommissioning to inspect for leakage.

E13.3.9 Access and Inspection Manholes

- (a) Upon completion of construction, all access and inspection ports shall be secured closed.
 - (i) For AWWA C301 pipe, access manholes shall be blind flanged closed using Type 304 stainless steel bolts, nuts and hardware. Once closed, a protective coating of 50 millimetres of sulphate resistant grout shall be placed over the flange and bolts.

E13.3.10 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 C210.

E13.3.11 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.

E13.3.12 Removal of Existing Pipe and Fittings

- (a) Where indicated on the Drawings and directed by the Contract Administrator, remove designated portions of pipe. Removal methods shall be employed that preclude damage to adjacent pipes and joints that are to remain in place.

E13.4 Quality Control

E13.4.1 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.

E13.4.2 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.

E13.4.3 Hydrostatic Leakage Testing

- (a) Testing shall be completed in accordance to CW 2125 except as modified below.
- (b) The Contractor shall slowly fill the forcemain with water and ensure all air is expelled from the line. The Contractor is responsible for supplying water for the pressure test. The Contractor may pump water from the lagoon southwest of valve chamber VC2A to fill the forcemain for the pressure test. The Contractor is advised that the lagoon water may contain pathogens and should take appropriate precautions to protect its workers.
- (c) The forcemain will be tested to a pressure of 550 kPa (80 psi).
- (d) Testing of PCCP forcemain shall be completed in accordance with AWWA Manual M9 – Concrete Pressure Pipe.
 - (i) The forcemain shall be pressurized for a minimum of 48 hours prior to testing.
 - (ii) Make-up water shall be based on an allowance of 1 litre per millimeter of pipe diameter per kilometer of pipe per 24 hours test duration.
 - (iii) Test duration shall be 2 to 4 hours, as approved by the Contract Administrator.
- (e) Testing of PE forcemain shall be completed in accordance with the pipe manufacturer and with the requirements detailed in the Plastic Pipe Institute's Handbook of PE Pipe.
 - (i) The test procedure consists of initial expansion, and test phases.
 - (ii) During the initial expansion phase, the test section shall be pressurized to the test pressure, and sufficient make-up water shall be added each hour for three (3) hours to return to test pressure.
 - (iii) The test phase may be one, two or three hours, after which a measured amount of make-up water is added to return to test pressure.
 - (iv) The total test time including initial pressurization, initial expansion, and time at test pressure, must not exceed eight (8) hours. If the pressure test is not completed due to leakage, equipment failure, etc., the test section should be de-pressurized, and allowed to "relax" for at least eight (8) hours before bringing the test section up to test pressure again.
 - (v) Make-up water shall be based on the following allowances for 762mm-diameter pipe:
 - ◆ 1-hour test: 78.2 litres per 100 metres of pipe
 - ◆ 2-hour test: 157.7 litres per 100 metres of pipe
 - ◆ 3-hour test: 238.4 litres per 100 metres of pipe
- (f) Following the pressure test lagoon water must be pumped back into the lagoon and/or into the PRPS.

E13.5 Method of Measurement and Basis of Payment

E13.5.1 Supply and Installation of Forcemain

- (a) Supply and Installation of Forcemain shall be measured and paid 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 listed in Form B Prices "Main Line Piping- Supply and Install". Measurement shall be made horizontally, at grade, above the centreline of the pipe, through all fittings and appurtenances, as computed by measurements made by the Contract Administrator, including all accessories, appurtenances. The length measured and paid will be from the first pipe joint outside of chambers or pumping station and shall include all excavations, backfill, surface restoration, pipe couplers, casing spacers, fabricated end seals and clay dikes. Measurement will be from face of bell to face of bell.

Payment for forcemain will be made on the following payment schedule;

- (i) Thirty percent (30%) payment upon delivery of pipe to the jobsite.
- (ii) Ninety percent (90%) payment upon successful installation of the pipe
- (iii) One hundred percent (100 %) payment upon successful testing and commissioning of the pipe.

- (b) Supply and Installation of Fittings and Specials shall be made on a unit basis. The units measured and paid shall be the total number of fittings and specials installed, of each size, class and type, as listed in Form B Prices "Supply and Install Fittings and Specials".

Payment for fittings and specials will be made on the following payment schedule:

- (i) Thirty percent (30%) payment upon delivery of fittings and specials to the jobsite.
- (ii) Ninety percent (90%) payment upon successful installation of the fittings and specials
- (iii) One hundred percent (100 %) payment upon successful testing and commissioning of the pipe.

E13.5.2 Connection to Existing Piping

- (a) Connections to Existing Piping will be measured and paid 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 bulkheads and couplers and supply and installation of couplers as listed in Form B Prices "Connect to Existing Piping".

E13.5.3 Construction of Thrust Blocks

- (a) Construction of Thrust Blocks will be measured and paid on a unit basis. The number of units measured and paid will be the total number of thrust blocks constructed for each size and deflection as listed in Form B Prices "Construction of Thrust Blocks".

E13.5.4 Testing

- (a) Testing will be measured and paid on a unit basis as listed in Form B Prices "Pressure Test". The price paid shall include all main cleaning, bulkheads, concrete thrust block installation and removal, supply and disposal of water for testing, and testing successfully completed in accordance with this specification.

E13.5.5 Replacement of Existing Steel Pipe with AWWA C301 Pipe

- (a) Replacement of Existing Steel Pipe with AWWA C301 Pipe will be measured and paid on a lump sum basis. The price paid for the replacement of the steel pipe with AWWA C301 pipe shall include all excavations, backfill, removal of existing pipe, supply and installation of AWWA C301 pipe and fittings with restrained joints, supply and installation of new Victaulic Style 44 restrained coupling and welding to existing AWWA C301 pipe.

E14. SUPPLY AND INSTALLATION OF STEEL CASING PIPE

E14.1 Materials

(a) Casing

(a) Casing shall be to AWWA C200, except as modified below:

- (i) Minimum wall thickness for steel pipe casing shall be 12.7 mm (1/2"). The Contractor may select a greater thickness and diameter to accommodate the method of work, but at no additional cost.
- (ii) The casing shall be substantially round. For casing used in any one bore, maximum variation between maximum and minimum outside diameter shall not exceed 5 mm.
- (iii) Casing lengths shall be joined in the field using full circumferential butt welds of bevel end pipe or utilizing an integral, machined press-fit connection method, Permalok or approved equal in accordance with B6.
- (iv) All welding shall be done by qualified welders. Proposed operators may be examined at the site of Work and upon satisfactory completion of test welds, designated by the Contract Administrator, may be permitted to perform welding operations on the project. The Contractor shall furnish to the Contract Administrator upon request records of the welder's certifications.

E14.2 Construction Methods

- (a) Provide the locations and sizes of shafts to the Contract Administrator for review before excavating.
- (b) Excavate shafts and provide shoring in accordance with CW 2030.
- (c) Install the steel casing pipe of the specified diameter at the location, limits, line and grade shown on the Drawings using trenchless methods. Ensure casing pipe is not in tension. Trenchless methods shall produce no upheaval, settlement, cracking, movement, or distortion of the existing roadbed or other infrastructure, nor shall it permit the formation of voids outside of the casing.
- (d) Protect the casing to prevent it from being crushed or damaged under jacking pressures. Should the casing pipe be damaged, the damaged portion, if not in the hole, shall be replaced. If the damaged portion is within the hole, it shall be repaired or replaced as directed by the Contract Administrator.
- (e) Join individual casing pipe lengths with a continuous butt weld or follow manufacturer's instructions for machined connection.

E14.3 Method and Measurement of Payment

- (a) Supply and Installation of Steel Casing Pipe shall be measured and paid on a length basis. The length to be paid for shall be the total number of linear metres acceptably installed as listed in Form B Prices "Steel Casing Pipe - Supply and Install". Measurement shall be made horizontally, at grade, above the centreline of the pipe, as computed by measurements made by the Contract Administrator.

E15. MODIFICATION AND CONSTRUCTION OF VALVE CHAMBERS

E15.1 Materials

(a) Formwork, Reinforcing Steel and Concrete

- (i) As per City of Winnipeg CW 2160.

(b) Concrete Mix Design

- (i) Concrete Mix Design as per Table CW 2160.1, Type A mix.

- (c) Water Stops
 - (i) As indicated on the Drawings.
- (d) 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 in accordance with B6.
- (e) Spray Applied Polyurethane Foam Insulation
 - (i) Polyurethane foam shall be closed cell, less than 1% open cell content to ASTM D-2856.
 - (ii) BASF Walltite CT (Cold temperature grade) or approved equal in accordance with B6.
- (f) Pre-cast Chambers
 - (i) Pre-cast chambers shall be in accordance to ASTM C478 or ASTM C76 Class 3 pipe.
- (g) Utility Structure Delineator
 - (i) Posts shall be made of white tubular durable flexible UV stabilized plastic or poly resin material with a minimum diameter of 50 mm that can be driven into the ground with equipment that does not damage the posts or reflective sheeting or 75 to 100 mm square pressure-treated wood posts.
 - (ii) Each post shall have two 100 mm bands of full circumference orange or yellow high intensity (Type 3) retro-reflective sheeting in accordance with ASTM D4956 and as shown on the Drawings. If wood posts are used, reflective aluminium plates shall be affixed to the posts with galvanized screws.
- (h) Safety Retrieval System Mount
 - (i) Two corner mount sleeves suitable for use with Uni-Hoist (Division of Life Protection Inc.) Model #PR303, including anchor bolts and accessories as recommended by the manufacturer.
- (i) Bollards and Chains
 - (i) 200 mm diameter galvanized pipe
 - (ii) 6 mm galvanize

E15.2 Submittals

- (a) Submit reinforcing steel shop drawings and concrete mix design in accordance to CW 2160.

E15.3 Construction Methods

- (a) Cast-in-place concrete as per CW 2160.
- (b) Pre-Cast Drain Chamber Sump
 - (i) Construct sump as detailed on the drawings.
- (c) Pipe, Valves Fittings and Appurtenances
 - (i) As per E16 , E6 and E13.
- (d) Install Pre-Cast Chambers in accordance with CW 2130 Clause 3.8
- (e) Remove and salvage all electrical equipment including electrical heaters, light switches, lighting fixtures, receptacles, and wiring.
- (f) Remove and salvage all pneumatic equipment including air lines, valves and controls.
- (g) Bring northwest access hatch in valve chamber VC2A to grade as shown on Drawings.

- (h) Re-grade above valve chamber VC2A to a maximum cover of 0.6 meters and install bollards as shown on Drawings.
- (i) Install utility structure delineators as shown on Drawings.
- (j) Apply 50 mm of spray applied polyurethane foam to exterior of pre-cast manhole chambers to 1.5 metres below final grade. Apply 150 mm of spray applied polyurethane foam to underside of manhole cover taking care not to obstruct vent holes.
- (k) Install corner mount sleeves for safety retrieval system on both existing and new access hatches.
- (l) Weld 11 kilogram zinc anode to all metallic pipe connections leaving valve chambers, manholes and structures.

E15.4 Method of Measurement and Basis of Payment

- (a) Construction of Pre-Cast Valve Chambers shall be measured on a lump sum basis, for each pre-cast valve chamber constructed in accordance to these specifications, as listed in Form B Prices "Construction of Pre-Cast Valve Chambers". The lump sum price shall include excavation, backfill, pre-cast and cast-in-place concrete works, installation of chamber piping, supply and installation of miscellaneous valves, appurtenances, miscellaneous metals, couplings, sump and sump cover, interior plumbing, manhole frame and cover and rungs, utility structure delineators and miscellaneous materials. Chamber piping shall be considered all piping within the chamber, to the first joint outside the chamber wall.
- (b) Modification of Valve Chamber shall be measured on a lump sum basis, for each valve chamber modified in accordance to these specifications, as listed in Form B Prices "Modification of Valve Chamber". The lump sum price shall include excavation, backfill, cast-in-place concrete works, removal and salvage of valves and fittings, recoating of existing valves and fittings, supply and installation of chamber piping, large diameter valves miscellaneous valves, appurtenances, miscellaneous metals, couplings, interior plumbing, bollards and chain, and miscellaneous materials. Chamber piping shall be considered all piping within the chamber, to the first joint outside the chamber wall.

E16. SUPPLY AND INSTALLATION OF VALVES AND FITTINGS

E16.1 Materials

- (a) Chamber Pipe
 - (i) Steel Pipe Conforming to AWWA C200
 - ◆ Minimum steel yield strength of 307 MPa (30,000 psi)
 - ◆ Minimum wall thickness 6.3 millimetres (600 and 300 millimetre size)
 - ◆ Paint for exposed steel surfaces shall be in accordance with AWWA C210.
 - ◆ Coating and lining shall be two (2) or more layers (5 mils dry film thickness minimum each coat) Polyamide Epoxy, Amerlock 400, Tnemec Series 140F Pota-Pox Plus or approved equal in accordance with B6.
 - (ii) Ductile Iron Pipe conforming to AWWA C151
 - ◆ Class 54
 - ◆ Cement Lined as per AWWA C104
 - ◆ Coating and lining shall be two (2) or more layers (5 mils dry film thickness minimum each coat) Polyamide Epoxy, Amerlock 400, Tnemec Series 140F Pota-Pox Plus or approved equal in accordance with B6.

- (b) Chamber Fittings
 - (i) Fabricated steel fittings conforming to AWWA C208
 - (ii) Ductile Fittings conforming to AWWA C110
- (c) Bolted Sleeve Couplers
 - (i) Shall be to the latest revision of AWWA C-219 for bolted, Sleeve Type Couplers for Plain End Pipe. Minimum requirements are:
 - ◆ Minimum sleeve length 175 mm
 - ◆ Minimum centre sleeve thickness 10 mm
 - ◆ Couplings capable of accommodating up to 2 degrees deflection
 - ◆ Bolts and nuts to be 316 Stainless Steel.
 - ◆ Design pressure 150 psi
 - ◆ Restrained couplers shall be provided where indicated on the Drawings
- (d) Bolts
 - (i) Bolts shall be ASTM A307 grade B. Bolt size, type and diameter shall be in accordance to AWWA C207-01. Bolt length shall be sufficient to accommodate flanges, gaskets and insulators.
 - (ii) Flange insulator kits shall be Advance Products and Systems or approved equal in accordance with B6, including full faced gasket, hole sleeves and washers.
- (e) Flange Gaskets
 - (i) 3mm, full faced, cloth inserted SBR rubber gaskets or Nylon inserted neoprene in accordance with AWWA C207. 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.
- (f) Blind Flanges
 - (i) Steel Flanges shall be AWWA C207-01 Class D.
 - (ii) Cast and Ductile flanges shall be ASME/ANSI B16.1 Class 125
 - (iii) One blind flange for 450 mm diameter piping shall be supplied. This flange will be available during the shutdown of the existing forcemain and will be used to allow emergency re-instatement of the existing forcemain in place of the existing 450 mm diameter wafer knife gate valve in valve chamber VC2A.
- (g) Valve Stem Extensions
 - (i) Two new valve stem extensions shall be provided to replace existing extensions in valve chamber VC2A. Valve stem extensions shall be Schedule 80 Stainless Steel ASTM A-276 Type 304. Length to suit extension of existing operating nut to within 300 mm of final grade, fitted with a 38 mm top operating nut generally conforming to City of Winnipeg Approved Product drawing AP-002.
- (h) Threaded Valves
 - (i) Small diameter threaded ball valves (75mm diameter and less) shall be all cast bronze two-piece type with chromium plated ball complete with lever handle rated for minimum 1.0 MPa non-shock cold water service. Bronze material shall conform to ASTM B62. Acceptable product; Apollo, Red-White or approved equal in accordance with B6.
- (i) 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.
- (j) Knife Gate Valve
 - (i) Knife Gate Valves shall be wafer type suitable for bi-directional shutoff, all stainless steel ASTM A-276 Type 304 construction with a Nitrile (Buna-N, Hycar, NBR) resilient seat and rated for minimum of 1.0 MPa (150 psi) non-shock cold water service. Acceptable product; Velan 320B, Fabri-Valve Figure C67 (ITT Industries), Rovalve Figure S17 (Tyco Flow Control), DeZurik KBD Bulletin 37.00 or approved equal in accordance with B6.
 - (ii) Knife gate valves shall be supplied with a Schedule 80 Stainless Steel ASTM A-276 Type 304 non-rising stems. Length to suit extension of operating nut to within 300 mm of proposed final grade, fitted with 38 mm square operating nut generally conforming to City of Winnipeg Approved Product drawing AP-002.
 - (iii) 600 mm knife gate valve shall be supplied with actuator to offset valve stem a minimum of 150 mm (6"). Actuator shall accommodate rising stem of knife gate valve and shall have a 50 mm (2") operating nut compatible with the stem extension. The actuator mechanism shall provide a minimum gear reduction of 4:1. The mechanism can consist of a combination of miter and bevel gears or spur gears. Approved product Dynatorque BG4 (4:1 Bevel Gear) with MT1 (1:1 Miter Gear) or approved equal in accordance with B6.
- (k) Gate Valves
 - (i) Gate valve shall be to AWWA C515 Reduced-Wall Resilient-Seated Gate Valves complete with both handwheel and 50 mm (2") black operating nut, counter-clockwise opening (as viewed from top), non-rising stem with flanged ends to ASME/ANSI B16.1 Class 125. Paint internal and external surfaces in accordance to AWWA C550.
 - (ii) Gate valve shall be supplied with Schedule 80 Stainless Steel ASTM A-276 Type 304 stem. Length to suit extension of operating nut to within 300 mm of final grade, fitted with a 38 mm top operating nut generally conforming to City of Winnipeg Approved Product drawing AP-002.
- (l) Paint
 - (a) Paint for exposed metal surfaces shall be in accordance to AWWA C210.
 - (b) Coating shall be two (2) or more layers (5 mils dry film thickness minimum each coat) Polyamide Epoxy, Amerlock 400, Tnemec Series 140F Pota-Pox Plus or approved equal in accordance with B6.

E16.2 Design

- (a) All pipe and fittings shall be designed for an operating pressure of 1.0 MPa (150 psi).

E16.3 Submittals

- (a) Submit shop drawings and data sheets for all valves and pipe specials.
- (b) Submit layout drawings for all chamber piping.

E16.4 Supply and Field Testing of Knife Gate Valves

- (a) The Contractor shall perform hydrostatic leakage testing of the knife gate valves at a suitable facility in the City of Winnipeg. The Contractor shall provide all equipment required for testing including blind flanges, pumps and pressure gages.
- (b) The Contractor shall provide a minimum of five (5) days notice of hydrostatic leakage testing to Contract Administrator.

- (c) The valves shall be tested to 1.0 MPa (150 psi). Any leakage or defects noted during field-testing shall be repaired by the Contractor.
- (d) For the purposes of transportation of the valves from the testing 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 of plywood on both faces of each valve.
 - (ii) Valves are handled only by methods approved by the manufacturer, and properly secured to preclude any damage during transport.

E16.5 Construction Methods

- (a) Removal and Salvage of Existing Valves, Piping and Fittings
 - (i) Where indicated on the Drawings and directed by the Contract Administrator, remove and salvage designated portions of pipe, valves and fittings. Removal methods shall be employed that preclude damage to adjacent pipes and joints that are to remain in place.
 - (ii) All pipe, valves and fittings removed shall be salvaged and returned to a designated City of Winnipeg facility.
- (b) Recoating of Existing Valves and Fittings
 - (i) Where indicated on the Drawings and directed by the Contract Administrator, prepare metal surfaces for recoating by blast cleaning to near-white metal as specified by Joint Surface Preparation Standard NACE No.2/SSPC-SP10. Remove all dust and loose residues from the prepared surfaces and chamber floor. The surface shall be roughened to a degree suitable for the coating system employed. Recoating of existing valves and fittings shall not take place before twinned forcemain has been completed.
 - (ii) Paint prepared surfaces in accordance to AWWA C210.
 - (i) Coating shall be two (2) or more layers (5 mils dry film thickness minimum each coat) Polyamide Epoxy, Amerlock 400, Tnemec Series 140F Pota-Pox Plus or approved equal in accordance with B6.
- (c) Installation of Large Diameter Valves
 - (i) Prior to installation of valves, the Contractor shall receive installation instructions from the valve manufacturer. Upon completion of installation, Form 201: Certificate of Instruction (Appendix B) shall be completed and submitted to the Contract Administrator.
 - (ii) Install valves as shown on the drawings. Valves shall be installed with the valve shaft in the horizontal position. A manufacturer representative shall provide installation supervision, and complete Form 202: Certificate of Satisfactory Installation (Appendix B) upon successful installation.
 - (iii) 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.
- (d) Commissioning of Valves
 - (i) The Contractor shall assist in operation of the valves for the purpose of commissioning. A manufacturer representative 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.
- (e) Threaded Valves and Fittings
 - (i) Where indicated on the Drawings, remove and replace existing threaded steel pipe drains and air blow offs, Work on small diameter threaded fittings on the existing

system shall not be scheduled until the proposed forcemain is installed, tested and commissioned. Carefully remove threaded fittings, inspect threadolets and threaded pipe couplings prior to installation of new pipe. Notify the Contract Administrator if threads or couplers to remain are corroded and are not serviceable.

- (ii) 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. Replacement of existing threaded valves and fittings shall not take place before twinned forcemain has been completed.
- (f) Removal of Flap in Existing Check Valve
 - (i) Remove flap from existing 610 mm Jenkins check valve. Install new nuts, bolts and flange gaskets.
- (g) Provisional Replacement of Pumping Station Wall Piece
 - (i) Upon completion of excavation of Perimeter Road PS connection points, carefully inspect the existing wall pieces and pipe couplers for corrosion or other distress. If, in the opinion of the Contract Administrator, the wall piece condition is not serviceable, the existing wall piece will be repaired. The repair method will depend on the condition of the wall piece.

E16.6 Method of Measurement and Basis of Payment

- (a) Removal and Salvage of Existing Valves Piping and Fittings
 - (i) Removal of existing valves, flap in existing check valve, piping and fittings will not be measured for payment. They are to be included in the price bid for "Modifications of Valve Chambers".
- (b) Recoating of Existing Valves and Fittings
 - (i) Recoating of existing valves and fittings will not be measured for payment. They are to be included in the price bid for "Modifications of Valve Chambers".
- (c) Supply Installation and Commissioning of Large Diameter Valves
 - (i) Large diameter valve supply, testing, installation and commissioning will not be measured for payment. They are to be included in the price bid for "Modification of Valve Chambers".
- (d) Supply and Installation of Small Diameter Valves, Fittings, Nipples and Flanges
 - (i) Supply and Installation of valves, fittings, nipples and flanges will not be measured for payment. They are to be included in the price for "Modification of Valve Chambers".
- (e) Provisional Replacement of Pumping Station Wall Piece
 - (i) Provisional Replacement of Pumping Station Wall Piece shall be measured and paid under E21 Cash Allowance for Repairs.

E17. PROCESS PIPING

E17.1 Materials

- (a) Piping:
 - (i) Black carbon steel, ASTM A106, Grade B or ASTM A53/A53M, Grade B.
 - (ii) 40 millimetre and smaller: Schedule 80.
 - (iii) 50 millimetre and larger: Schedule 40.
- (b) Fittings:
 - (i) 40 millimetre and smaller: threaded: 1.0 MPa malleable iron, ASTM A197 or ASTM A47, dimensions in accordance with ANSI B16.3.

- (ii) 50 millimetre and larger: butt welded, wrought carbon steel butt-welding, ASTM A234/A234M, Grade WPB meeting the requirements of ANSI B16.9, fitting wall thickness to match adjoining pipe: long radius elbows unless shown otherwise.
- (c) Nipples:
 - (i) 40 millimetre and smaller: Sch. 80, threaded, to ASTM A53/A53M, Grade A.
- (d) Unions:
 - (i) 40 millimetre and smaller: threaded malleable iron, ASTM A197 or A47, 1.0 MPa, meeting the requirements of ANSI B16.3.
- (e) Bolts:
 - (i) Bolts shall be ASTM A307 Grade B. Bolt size, type and diameter shall be in accordance to AWWA C207-01. Bolt length shall be sufficient to accommodate flanges, gaskets and insulators.
- (f) Flange Gaskets:
 - (i) 3 millimetre, full faced, cloth inserted SBR rubber gaskets or Nylon inserted neoprene in accordance with AWWA C207. Gaskets shall be one piece construction.
- (g) Flanges:
 - (i) Steel flanges shall be AWWA C207 Class D, working pressure rating 1.0 MPa (150 psi).
- (h) Ball valves:
 - (i) 40 millimetre and smaller: threaded shall be cast bronze two-piece type with chromium plated ball complete with lever handle rate for minimum 1.0 MPa non-shock cold water service. Bronze material to conform to ASTM B62. Acceptable product; Apollow, Red-White or approved equal in accordance with B6.
 - (ii) 50 millimeter and larger: flanged, epoxy coated cast iron, c/w lever handle and rated for 1.0 MPa non-shock cold water service, American Valve or approved equal in accordance B6.
- (i) Check valves:
 - (i) 50 millimeter and larger: flanged end, cast iron body, bronze mounted swing type, solid bronze hinges, stainless steel hinge shaft, rated minimum 1.0 MPa non-shock cold water service, acceptable products Stockham G-931, Crane Cat. No. 373.
- (j) Flowmeter:
 - (i) Portable clamp-on flowmeter shall as a minimum have the following features:
 - (i) Maximum 1200 mm (48") pipe mount
 - (ii) IP67 (NEMA 6) weather proof battery powered
 - (iii) Two 4-20 mA, two 0-10 volt, two pulse and four discrete status outputs
 - (iv) Capability to operate in either transit-time or Doppler mode
 - (v) Bi-directional flow operation
 - (vi) 1 MByte data logger with both site and data logger storage
 - (vii) Integral keypad
 - (viii) 128 x 240 pixel graphic display
 - (ii) Portable clamp-on flowmeter system shall include the following components:
 - (i) One 115vac power NEMA 5 battery charger
 - (ii) Two 6 meter (20 ft) long plenum rated (NEMA 6) transducer cables
 - (iii) One matched pair of transducers
 - (iv) Mounting blocks, straps, chains, spacer bar and couplant

- (iii) Siemens (Controlotron) Sitrans FUP1010 Clamp on Flow Meter with E2 universal transducers.
- (k) Hangers:
 - (i) Clevis Type: Anvil; Figure 260 or approved equal in accordance with B6.
- (l) Paint:
 - (i) Paint for exposed metal surfaces shall be in accordance to AWWA C210.
 - (ii) Coating shall be two (2) or more layers (each coat minimum 5 mils dry film thickness) Polyamide Epoxy, Amerlock 400, Tnemec Series 140 F Pota-Pox Plus, Devoe Bar-Rust 233-H or approved equal in accordance with B6.

E17.2 Submittals

- (a) Submit shop drawings and data sheets for all valves.
- (b) Submit layout drawings for piping.
- (c) Include in shop drawings: plans, elevations, and construction details of following:
- (d) Prefabricated sections with field connection points.
- (e) Pipe hangers and supports.

E17.3 Construction Methods

- (a) Do work in accordance with ASME B31.3, Process Piping
- (b) Accessible locations: screwed, flanged or welded to match piping specification.
- (c) Provide clean machine cut threads.
- (d) Wrap male threads with a minimum of two wraps of Teflon tape or "pipe dope" containing Teflon.
- (e) Perform welding in accordance with ASME B31.1M.
- (f) Welding:
 - (i) Steel pipe shall be accurately measured, cut and installed by a certified welder.
 - (ii) 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.
- (g) Pipe fitting to be executed by certified pipe fitters.
- (h) Maintain clearance around systems, equipment and components and between pipes and structures for O&M for greater of:
 - (i) Observation of operation, inspection, servicing, maintenance.
 - (ii) Disassembly, removal of equipment and components without interrupting operation of other system, equipment, components.
- (i) Flanges: tighten bolts evenly with torque wrench.
- (j) Revisions to location of piping require approval of Contract Administrator.
- (k) Install pipe hangers to manufacturer's recommendations.
- (l) Install valves in accordance with manufacturer's recommendations.
- (m) Painting
 - (i) All exposed metal surfaces including valves, fittings, flange bolts, etc. where not specified to be copper, brass or galvanized, and all galvanized surfaces exposed by welding connections shall be painted.
 - (ii) Metal surfaces shall be cleaned thoroughly by wire brushing or abrasive blasting.

- (iii) Paint exposed surfaces in accordance to AWWA C210.
- (n) Install transducers on 900 mm diameter piping inside PRPS as shown on Drawings.
 - (i) Follow manufacturer's instructions for mounting transducers.
 - (ii) Install transducers in reflect mounting mode at 3 o'clock when viewing pipe in direction of flow.
 - (iii) Mount midway between valve and 90° bend.
 - (iv) Wiring of flow meter will be completed by City forces.

E17.4 Method of Measurement and Basis of Payment

- (a) Process Piping
 - (i) Supply and Installation of Process Piping shall be measured on a lump sum basis. The lump sum price shall include fabrication, welding and installation of steel piping, supply and installation of miscellaneous valves, fittings, unions, flow meter, fittings hangers and appurtenances inside Perimeter Road Pumping Station.

E18. METAL FABRICATIONS

E18.1 Description

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

E18.2 Materials

- (a) All materials shall be of a type acceptable to the Contract Administrator, and shall be subject to inspection and testing by the Contractor Administrator.
- (b) Material intended for use in the various assemblies shall be new, straight, clean, with sharply defined profiles.
- (c) Steel Sections and Plates: to CAN/CSA G40.20/G40.21, Grade 300 W, except W, HP and HSS sections, which shall be Grade 350 W.
- (d) Steel Pipe: to ASTM A53/A53M, seamless, galvanized, as specified by item.
- (e) Welding materials: to CSA W59.
- (f) Hot dipped galvanized steel repair material: Galvalloy and Gal-Viz.
- (g) Stud Anchors: to ASTM A108, Grade 1020.
- (h) Aluminium: to CAN/CSA S157 and the Aluminium Association 'Specifications for Aluminium Structures'. Aluminium for plates shall be Type 6061-T651. Aluminium plate shall have an approved raised oval or multi-grip pattern.
- (i) Isolating sleeves shall be "Nylite" – headed sleeve as manufactured by SPAE-Naur of Kitchener, Ontario, or approved equal in accordance with B6.
- (j) Anchor bolts and fasteners: ASTM A276, Type 316 stainless steel, of ample section to safely withstand the forces created by operation of the equipment or the load to which they will be subjected.

E18.3 Construction Methods

- (a) Submittals
 - (i) The Contractor shall submit the qualifications of the fabricator and welders to the Contractor Administrator for acceptance.
 - (ii) Submit shop drawings in accordance with CW1110, clearly indicating materials, core thickness, finishes, connections, joints, method of anchorage, number of anchors,

supports, reinforcement, details and, accessories. Indicate field measurements on shop drawings.

(b) Fabrication

- (i) Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured. Assemble work in such a way that no disfigurements will show in the finished work, or impair the strength.
- (ii) Confirm measurements for all fabrications before fabricating.
- (iii) Cut aluminium plate with edges straight and true, and as far as practical, maintain continuity of the pattern at abutting edges.
- (iv) Pieces shall be of the sizes indicated on the Drawings and shall not be built up from scrap pieces. Confirm sizes with field measurements.
- (v) Where possible, fit work and shop assemble, ready for erection.
- (vi) Angle frames shall be of the same material as the cover plate, and cover plates shall be hinged and be supplied with lifting handles, as shown on the Drawings. Exterior covers shall be supplied with a hasp for a padlock.
- (vii) Remove and grind smooth burrs, filings, sharp protrusions, and projections from metal fabrications to prevent possible injury. Correct any dangerous or potentially harmful installations as directed by Contract Administrator.
- (viii) All steel welding shall conform to CSA Standard W.59. Fabricator shall be fully approved by the Canadian Welding Bureau, in conformance with CSA Standard W.47.1. Welding shall be done by currently licensed welders only.
- (ix) All aluminium welding shall conform to Welding shall be in accordance with the requirements of CSA W59.2. The fabricator shall be fully certified in conformance with CSA Standard W47.2. All welding shall be done in a licensed welding shop, and no field welding will be permitted unless approved in writing, in advance, by the Contract Administrator.
- (x) Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
- (xi) All steel shall be hot-dip galvanizing after fabrication, in accordance with CAN/CSAG164, to a minimum net retention of 600 gm/m².
- (xii) Seal exterior steel fabrications to provide corrosion protection in accordance with CAN3-S16.1.
- (xiii) Use self-tapping shake-proof flat-headed screws on items requiring assembly by screws.

(c) Erection

- (i) Do steel welding work in accordance with CSA W59 and aluminium welding work in accordance with CSA W59.2
- (ii) Erect metalwork in accordance with reviewed shop drawings, square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- (iii) Provide suitable means of anchorage acceptable to Contract Administrator such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles where not specifically indicated on the Drawings.
- (iv) Provide components for building in accordance with shop drawings and schedule.
- (v) Make field connections with bolts to CAN/CSA-S16, or weld.
- (vi) Touch-up rivets, bolts and burnt or scratched surfaces that are to receive paint finish, with zinc primer after completion of erection.
- (vii) Repair damaged galvanized surfaces and field welds with self-fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780, Repair of Damaged Hot Dip Galvanizing Coatings. The general procedure shall be to allow a small amount of the repair alloy to flow then spread by brushing briskly with a wire

brush. Brushing shall be sufficient to obtain a bright finish. Repeat process three times to ensure a proper thickness is achieved. Temperatures shall be kept below 177°C (350°F) at all times. All heating of structural steelwork shall be done in the presence of the Contract Administrator.

- (viii) Install access hatch frames square and level at the locations show on the Drawings. Embed anchors in concrete as shown on the Drawings. Install covers and adjust hardware to proper function.
- (ix) All aluminium surfaces in contact with concrete shall be isolated using alkali resistant bituminous paint meeting the requirements of CGSB 31-GP-3M.
- (x) Install electrochemical isolation gaskets and sleeves to electrically isolate dissimilar metals.

E18.4 Measurement and Payment

- (a) Supply, fabrication, transportation, handling, delivery and placement of metal fabrications will be considered incidental to the Modification and Construction of Valve Chambers.

E19. INSPECTION OF EXISTING FORCEMAIN

E19.1 Description

- (a) This Specification shall cover the internal video inspection of the existing forcemain and shall amend and supplement Specifications CW-2140 and CW 2145.

E19.2 Scope of Work

- (a) The existing concrete forcemain, as identified below and defined in Appendix C, shall be cleaned and inspected using CCTV methods:
 - (i) 78m of 600mm forcemain between chambers VC2A and VC5
 - (ii) 1110m of 750mm forcemain between Perimeter Road Pump Station and VC2A
 - (iii) 340m of 900mm forcemain between chambers VC2A and VC2B
- (b) All seven (7) buried inspection manholes (BMH), as well as the branch tee fitting located south of BMH-7, shall be excavated and exposed for inspection by the Contract Administrator.

E19.3 Construction Methods

E19.3.1 Coordination of Construction With the Railway Company

- (a) The Contractor is advised that two buried manholes on Wilkes Avenue lies within 1m of CN Rail's Rivers Subdivision, the Company's Main Line, and is proximal to a CN Rail fibre optic cable installed within the Subdivision.
- (b) The Contractor shall be responsible to meet all CN Rail constraints, requirements and safety measures when encroaching on railway right-of-way. Furthermore, CN Rail requirements are applicable to all of the Contractor's personnel and equipment encroaching on railway property.
- (c) The Contractor shall contact Mr. Shane McCartney, P.Eng, Technical Services Engineer, a minimum of seven (7) days prior to commencing any work that encroaches on railway property.
- (d) Railway Flagging Costs
 - (i) If necessary, the CN Rail will provide a Protecting Foreman for the protection of the railway's plant and equipment and the cost of such shall be borne by the Contractor.

E19.3.2 Video Camera Transport Equipment

- (a) Camera transport and cable shall be capable of inspecting a minimum of 300 metres of forcemain from a single access point.

E19.3.3 Access to Forcemain

- (a) Access to the interior of the forcemain is only possible by removing piping within valve chambers, and by removing blind flanges from buried inspection manholes. Typical detail of a buried inspection manhole is provided on Drawings.
- (b) The Contractor will be required to perform all excavation and removals required, as permitted by the Contract Administrator, to expose the buried inspection manholes and branch tee, and otherwise gain access to the forcemain to undertake the cleaning and inspection work.
- (c) Upon completion of inspection, the Contractor shall clean the existing blind flanges and manhole tee, reinstall the blind flange, complete with new gaskets, install one sacrificial zinc anode, and recoat the manhole and tee with a minimum 75 millimetre thick cement mortar coating as detailed on the Drawings. The Contractor shall backfill the excavation and restore surface to original condition in accordance with E6 and E7.
- (d) Install sacrificial zinc anodes on buried forcemain manholes in accordance with CW 2110. Anodes shall be 10.9 kg zinc anodes as approved for use by the City of Winnipeg.

E19.3.4 Sewer and Manhole Measurements

- (a) Manhole measurements shall be as specified in Clause 3.16 of Specification CW 2145, except as modified below:
 - (i) Where access to the forcemain is through a valve or fitting, measurement shall be made to the center of the valve or fitting.
 - (ii) Where access to the forcemain is through an open-ended pipe, measurement shall be made to the end of the pipe.

E19.3.5 Forcemain Cleaning

- (a) Remove all grease deposits to the inside surface of the pipe wall, or as directed by the Contract Administrator.
- (b) At some locations, the Contractor will be required to dewater the pipe for the inspection using sewer flushing and vacuum equipment. The extent of this work may be determined from the information provided in Appendix C.
- (c) Water required for sewer cleaning must be hauled to the worksite.

E19.4 Measurement and Payment

E19.4.1 Forcemain Inspection

- (a) Forcemain Inspection will be measured on a length basis, and paid for at the Contract Unit Price for "Forcemain Cleaning" and "Forcemain Inspection" for the appropriate pipe size being inspected. Length to be paid for will be the length as measured on the surface along the forcemain, from center of access hole to center of access hole, as defined in Clause E19.3.4 of this Specification.
- (b) Exposing of existing buried manholes will be measured on a unit basis and paid at the Contract Unit Price for "Exposure and Closing of Buried Access Manholes". The units to be paid will be the number of buried manholes opened, inspected and closed, including excavation, removal and replacement of existing mortar coatings, visual inspection of blind flanges and manhole tees, removal and replacement of existing blind flange, new flange gasket and bolts, installation of sacrificial zinc anode, backfill and restoration, in accordance to this specification.

E20. FENCING

E20.1 Description

- (a) This Specification supplements and amends City of Winnipeg Specification CW 3550.

E20.2 Construction Methods

- (a) Where forcemain pipe installation crosses fencing, fence fabric shall be rolled back during working hours. Temporary line posts shall be installed and the fencing restored to the satisfaction of the Contract Administrator to maintain a fenced, secure site during non-working hours.
- (b) Upon completion of forcemain installation and surface restoration line posts shall be replaced to original condition and fence fabric shall be reinstalled. In the event that the position of an existing line post conflicts with the alignment of the forcemain piping, the line post will be replaced with two line posts installed on either side of the forcemain piping.

E20.3 Measurement and Payment

- (a) Installation of temporary fencing and replacement of line posts, fence fabric, and gates where forcemain piping crosses existing fencing shall be considered incidental to the Supply and Installation of Forcemain.

E21. CASH ALLOWANCE FOR REPAIRS

E21.1 Description

- (a) The Cash Allowance for Repairs is intended to be used for maintenance and/or emergency repairs determined during the assessment of the existing 750mm forcemain, PRPS wall connections, VC2a or other structures associated with the PRPS forcemains and ancillary structures.
- (b) The City reserves the right to delete any or all of the Cash Allowance from the Contract if the Work intended to be covered by the Cash Allowance is not required, or if the Works intended are found to be more extensive than the provisional Cash Allowance.

E21.2 Construction Methods

- (a) Upon exposure of structures, pipe wall pieces or pipeline appurtenances, the Contractor shall clean the components to be assessed and visually inspect. The Contractor shall notify the Contract Administrator of any defects found. The defects will be reviewed by the Contract Administrator and a repair or replacement plan developed. A Proposed Change Notice will be prepared by the Contract Administrator for pricing by the Contractor by the methods outlined in C7.4.
- (b) In the event on an emergency repair being required on the existing forcemain or related appurtenances, the Contract Administrator or the City of Winnipeg may choose to engage the Contractor to complete or assist in completion of required repairs. The Contractor shall keep a detailed log of all time, equipment and materials required to effect the emergency repair and shall submit to the Contract Administrator on a daily basis.

E21.3 Method of Measurement and Basis of Payment

- (a) Cost of authorized repairs shall be evaluated by the methods outlined in C7.4, and a Change Order prepared by the Contract Administrator. Cost of the Change Order will be paid on the Progress Estimate and deducted from the Cash Allowance for Repairs. If the valuation of the authorized Work exceeds the Value of the Cash Allowance for Repairs, the Contract Value will be adjusted by the shortfall.
- (b) Cost associated with exposure, cleaning and visual inspection of structures, pipe wall pieces or pipeline appurtenances encountered during planned construction activities shall

not be included in the Cash Allowance for Repairs. Cost associated with exposure, cleaning and visual inspection of structures, pipe wall pieces or pipeline appurtenances are to be incidental to the planned work activities.