



**THE CITY OF WINNIPEG**

# **BID OPPORTUNITY**

**BID OPPORTUNITY NO. 587-2012**

**CONSTRUCTION OF FLOOD CONTROL STRUCTURE AT PEMBINA HIGHWAY &  
BEAUJOLAIS COULEE**

AECOM Project No. 60221826

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**APPENDIX A – 2011 TEST HOLE LOGS (6 pages)**

**APPENDIX B – 2009 TEST HOLE LOGS (4 pages)**

## **PART B - BIDDING PROCEDURES**

### **B1. CONTRACT TITLE**

B1.1 CONSTRUCTION OF FLOOD CONTROL STRUCTURE AT PEMBINA HIGHWAY & BEAUJOLAIS COULEE

### **B2. SUBMISSION DEADLINE**

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, August 22, 2012.

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 Bidder may view the Site without making an appointment.

### **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 Division website at <http://www.winnipeg.ca/matmgt/bidopp.asp>

B5.2.2 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website 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 in accordance with B6;
- (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 in accordance with B6, 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/her 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/she 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/her 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.

B6.10 Notwithstanding B6.2 to B6.9, and in accordance with B7.6 deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B15.1(a).

## **B7. BID COMPONENTS**

- B7.1 The Bid shall consist of the following components:
- (a) Form A: Bid;
  - (b) Form B: Prices;
  - (c) Bid Security
    - (i) 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, will be evaluated in accordance with B15.1(a).
- 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 Division  
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/her own name, his/her 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/her 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/her 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/her 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 should be printed below such signatures.
- 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 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

## **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 Division website at <http://www.winnipeg.ca/matmgt/debar.stm>
- 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 five (5) 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 Division website 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.

B11.1.3 The Bidder shall sign the Bid Bond.

B11.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.

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 Division, or in such other office as may be designated by the Manager of Materials.

B12.1.1 Bidders or their representatives may attend.

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 Division website at <http://www.winnipeg.ca/matmgt/default.stm>

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 Division website at <http://www.winnipeg.ca/matmgt/default.stm>

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/her 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/her Bid after the Submission Deadline but before his/her 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, or acceptable deviation there from (pass/fail);
- (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);
- (c) Total Bid Price;
- (d) economic analysis of any approved alternative pursuant to B6.

B15.2 Further to B15.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid 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/her Bid or in other information required to be submitted, that he/she is responsible and qualified.

B15.4 Further to B15.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

B15.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.

B15.4.2 Further to B15.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

## **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** 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, in accordance with B15.

**B16.3.1** Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her 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 Division website at [http://www.winnipeg.ca/matmgt/gen\\_cond.stm](http://www.winnipeg.ca/matmgt/gen_cond.stm)
- 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 construction of a new flood protection structure on the Beaujolais Coulee, connections to the existing 1650 mm concrete culvert, infill of the coulee, landscaping and restoration.

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

- (a) Excavation
- (b) Construction of cast-in-place concrete substructure
- (c) Infill of coulee with clay backfill
- (d) Installation of flap gate and sluice gate
- (e) Installation of PTO-driven vertical pumps and associated piping and appurtenances
- (f) Construction of superstructure
- (g) Supply and installation of electrical services
- (h) Construction of concrete/turfstone approach
- (i) Site grading and landscaping
- (j) Abandonment of existing 350mm discharge piping
- (k) Site Restoration and Cleanup

#### **D3. DEFINITIONS**

D3.1 When used in this Bid Opportunity:

- (a) "AWWA" means American Water Works Association
- (b) "CSA" means Canadian Standards Association
- (c) "ASTM" means American Society for Testing and Materials
- (d) "DFO" means Department of Fisheries and Oceans

#### **D4. CONTRACT ADMINISTRATOR**

D4.1 The Contract Administrator is AECOM Canada Ltd., represented by:

Marvin McDonald, C.E.T.  
Project Manager

Telephone No. (204) 477-5381  
Facsimile No. (204) 284-2040

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.

D4.3 Bids Submissions must be submitted to the address in B7.8.

**D5. CONTRACTOR'S SUPERVISOR**

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

**D6. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE**

D6.1 The Contract, all deliverables produced or developed, and information provided to or acquired by the Contractor are the property of the City and shall not be appropriated for the Contractors own use, or for the use of any third party.

D6.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.

D6.3 The following shall be confidential and shall not be disclosed by the Contractor to the media or any member of the public without the prior written authorization of the Contract Administrator;

- (a) information provided to the Contractor by the City or acquired by the Contractor during the course of the Work;
- (b) the Contract, all deliverables produced or developed; and
- (c) any statement of fact or opinion regarding any aspect of the Contract.

D6.4 A Contractor who violates any provision of D6 may be determined to be in breach of Contract.

**D7. NOTICES**

D7.1 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.

D7.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D7.3, D7.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the facsimile number identified in D4.1.

D7.3 Notwithstanding C21., all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following facsimile number:

The City of Winnipeg  
Chief Financial Officer  
Facsimile No.: 204 949-1174

D7.4 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 facsimile number:

The City of Winnipeg  
Legal Services Department  
Attn: Director of Legal Services  
Facsimile No.: 204 947-9155

**D8. FURNISHING OF DOCUMENTS**

D8.1 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/her at cost.

## **SUBMISSIONS**

### **D9. AUTHORITY TO CARRY ON BUSINESS**

D9.1 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.

### **D10. SAFE WORK PLAN**

D10.1 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.

D10.2 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 Division website at <http://www.winnipeg.ca/matmgt/Safety/default.stm>

### **D11. INSURANCE**

D11.1 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 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) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence.
- (c) all risks course of construction insurance in the amount of one hundred percent (100%) of the total Contract Price, written in the name of the Contractor and The City of Winnipeg, at all times during the performance of the Work and until the date of Total Performance.

D11.2 Deductibles shall be borne by the Contractor.

D11.3 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.

D11.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

### **D12. PERFORMANCE SECURITY**

D12.1 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.

D12.1.1 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.

D12.2 The Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of 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.

### **D13. SUBCONTRACTOR LIST**

D13.1 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.

### **D14. DETAILED WORK SCHEDULE**

D14.1 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.

D14.2 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.

D14.3 Further to D14.2(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) Commencement
- (b) Site Preparation and Excavation
- (c) Construction of Substructure
- (d) Connection to Existing Culvert
- (e) Infill of Coulee
- (f) Installation of Flap Gate
- (g) Installation of Sluice Gate
- (h) Installation of PTO-Driven Vertical Pumps
- (i) Installation of Grated Platforms and Trash Racks
- (j) Construction of Building Superstructure
- (k) Installation of Electrical Services
- (l) Construction of Concrete/Turfstone Approach
- (m) Testing of Gates and Pumps
- (n) Abandonment of Existing 350mm Discharge Piping



- (o) Site Grading and Landscaping
- (p) Site Restoration and Cleanup
- (q) Substantial Performance
- (r) Total Performance

D14.4 Further to D14.2(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**

### **D15. COMMENCEMENT**

D15.1 The Contractor shall not commence any Work until he/she is in receipt of a letter of intent from the Award Authority authorizing the commencement of the Work.

D15.2 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 D9;
  - (ii) evidence of the workers compensation coverage specified in C6.15;
  - (iii) the Safe Work Plan specified in D10;
  - (iv) evidence of the insurance specified in D11;
  - (v) the performance security specified in D12;
  - (vi) the Subcontractor list specified in D13;
  - (vii) the Detailed Work Schedule specified in D14.
- (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D15.3 The Contractor shall commence the Work on the Site no earlier than January 7, 2013 and no later than June 15, 2013.

D15.4 The City intends to award this Contract by September 19, 2012.

D15.4.1 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 dates.

### **D16. CRITICAL STAGES**

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

- (a) If the Contractor commences work on the site prior to March 15, 2013:
  - (i) Construction of the concrete substructure to an elevation of 233.030 m and connections to the existing concrete culvert – March 15, 2013.
  - (ii) The critical stage is based on the Department of Fisheries and Oceans requirement that no in-channel work is to be carried out during the period of April 1, 2013 to June 15, 2013.

### **D17. SUBSTANTIAL PERFORMANCE**

D17.1 The Contractor shall achieve Substantial Performance within 8.5 months following the date of commencement, if work on the site commenced prior to March 31, 2013. The Contractor shall achieve Substantial Performance within 6 months following the date of commencement, if work on the site commenced after March 31, 2013.

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

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

#### **D18. TOTAL PERFORMANCE**

D18.1 The Contractor shall achieve Total Performance within 2 weeks following the date that Substantial Performance is achieved.

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

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

#### **D19. LIQUIDATED DAMAGES**

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

- (a) Critical Stage – two thousand dollars (\$2,000);
- (b) Substantial Performance – one thousand and five hundred dollars (\$1,500);
- (c) Total Performance – five hundred dollars (\$500).

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

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

#### **D20. SCHEDULED MAINTENANCE**

D20.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

- (a) Long Term Scheduled Maintenance of Plant Material and Planting Beds as specified in E37.

D20.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

## **CONTROL OF WORK**

### **D21. JOB MEETINGS**

- D21.1 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.
- D21.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

### **D22. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)**

- D22.1 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**

### **D23. PAYMENT**

- D23.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

## **WARRANTY**

### **D24. WARRANTY**

- D24.1 Notwithstanding C13.2, 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.
- D24.1.1 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.
- D24.2 Notwithstanding C13.2 and D24.1, Manufacturer Warrantees as identified in the Specifications shall commence on the date of Total Performance and expire at the end of the periods identified in the Specifications.

**FORM H1: PERFORMANCE BOND**  
(See D12)

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 for

BID OPPORTUNITY NO. 587-2012

CONSTRUCTION OF FLOOD CONTROL STRUCTURE AT PEMBINA HIGHWAY & BEAUJOLAIS  
COULEE

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 as to Principal if no seal)

\_\_\_\_\_  
(Name of Principal)

Per: \_\_\_\_\_ (Seal)

Per: \_\_\_\_\_

\_\_\_\_\_  
(Name of Surety)

By: \_\_\_\_\_ (Seal)  
(Attorney-in-Fact)

**FORM H2: IRREVOCABLE STANDBY LETTER OF CREDIT  
(PERFORMANCE SECURITY)**  
(See D12)

\_\_\_\_\_  
(Date)

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

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 587-2012

CONSTRUCTION OF FLOOD CONTROL STRUCTURE AT PEMBINA HIGHWAY &  
BEAUJOLAIS COULEE

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 Division website at <http://www.winnipeg.ca/matmgt/Spec/Default.stm>
- 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 are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>
LD-5839	Cover Sheet and List of Project Drawings
LD-5840	Civil - General Plan
LD-5841	Civil - Detailed Site Plan - Layout & Grading
LD-5842	Civil - Flood Control Chamber - Sections & Details 1
LD-5843	Civil - Flood Control Chamber - Sections & Details 2
LD-5844	Civil - Flood Control Chamber - Sections & Details 3
LD-5845	Civil - Flood Control Chamber - Miscellaneous Details 1
LD-5846	Landscaping - Site Plan & Planting Plan
LD-5847	Landscaping - Miscellaneous Details
LD-5848	Architectural - Flood Control Structure - Plan, Details & Schedules
LD-5849	Architectural - Flood Control Structure - Building Elevations
LD-5850	Architectural - Flood Control Structure - Building & Wall Sections
LD-5851	Structural - Flood Control Structure - General Notes & Abbreviations
LD-5852	Structural - Flood Control Structure - Reinforcing Sections & Details 1
LD-5853	Structural - Flood Control Structure - Reinforcing Sections & Details 2
LD-5854	Structural - Flood Control Structure - Winch, Flap Gate & Lifting Device Details
LD-5855	Structural - Flood Control Structure - Superstructure Plans & Details
LD-5856	Structural - Flood Control Structure - Superstructure, Sections & Details
LD-5857	Structural - Flood Control Structure - Details
LD-5858	Electrical - Flood Control Structure - Plan & Schedules

#### E2. SOILS INVESTIGATION REPORT

- E2.1 Further to C3.1, a geotechnical soils investigation has been completed in the vicinity of the proposed Works to determine the character of the subsurface soil to facilitate the design of the Work. The soil test logs from 2011 are included in Appendix A. Soil test logs from 2009 are included in Appendix B.

### GENERAL REQUIREMENTS

#### E3. OFFICE FACILITIES

- E3.1 The Contractor shall supply office facilities meeting the following requirements:
- (a) The field office shall be conveniently located near the Site of the Work.

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

#### **E4. CONSTRUCTION SEQUENCING**

##### **E4.1 Description**

E4.1.1 This specification shall generally outline construction sequencing.

##### **E4.2 General Construction Sequencing for Flood Control Structure Construction**

E4.2.1 Without limiting the Contractor's ability to plan, stage and execute the Works, the following general construction sequences and events shall be planned and incorporated in the project schedule:

- (a) Site Preparation
  - (i) Develop site access roads and lay down areas.
  - (ii) Complete clearing and grubbing.
  - (iii) Install erosion control devices.
- (b) Flood Protection Chamber
  - (i) Excavate to limits of chamber base slab.
  - (ii) Construct concrete base slab.
  - (iii) Assemble cast iron wall thimbles, reinforcing steel and form work for chamber walls.
  - (iv) Pour chamber walls and connect existing pipe to chamber.
  - (v) Construct floor slab, complete with openings and access doors.
  - (vi) Backfill around chamber with clay fill.
  - (vii) Install flap gate and sluice gate.
  - (viii) Install grated platforms and trash racks.
  - (ix) Install pumps, gate operators, and other accessories.
  - (x) Test pumps and gates.
  - (xi) Construct superstructure and install electrical components.
- (c) Approach from Pembina Highway
  - (i) Construct concrete approach from Pembina Highway.
  - (ii) Install turfstone driveway.
- (d) Site Restoration and Cleanup
  - (i) Complete all bank grading, re-vegetation and landscaping.
  - (ii) Remove all temporary erosion protection devices.
  - (iii) Demobilize from site.

## **E5. SHOP DRAWINGS**

### **E5.1 Description**

- (a) This Specification shall revise, amend, and supplement the requirements of CW 1110.
  - (i) The term 'shop drawings' means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data including site erection drawings which are to be provided by the Contractor to illustrate details of a portion of the Work.
  - (ii) The Contractor shall submit specified shop drawings to the Contract Administrator for review. All submissions must be in metric units. Where data is in imperial units, the correct metric equivalent shall also be shown on all submissions for Engineering review.
- (b) Shop Drawings
  - (i) Original drawings are to be prepared by the Contractor, Subcontractor, supplier, distributor, or manufacturer, which illustrate appropriate portion of work; showing fabrication, layout, setting or erection details as specified in appropriate sections.
  - (ii) Shop drawings for the following structural components shall be sealed, signed and dated by a Professional Engineer licensed to practice in the Province of Manitoba.
    - ◆ Reinforcing steel.
    - ◆ Concrete mix designs.
    - ◆ Prefabricated wood trusses.
    - ◆ Metal fabrications.
    - ◆ Structural connection details.
- (c) Contractor's Responsibilities
  - (i) Review shop drawings, product data and samples prior to submission and stamp and sign drawings indicating conformance to the Contract requirements.
  - (ii) Verify:
    - ◆ Field measurements.
    - ◆ Field construction criteria.
    - ◆ Catalogue numbers and similar data.
  - (iii) Coordinate each submission with requirements of work and Contract Documents. Individual shop drawings will not be reviewed until all related drawings are available.
  - (iv) Notify Contract Administrator, in writing at time of submission, of deviations from requirements of Contract Documents.
  - (v) Responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator's review of submission, unless Contract Administrator gives written acceptance of specified deviations.
  - (vi) Responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.
  - (vii) The Contractor shall make all corrections required by the Contract Administrator and shall resubmit the required number of corrected copies of Shop Drawings for review. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the Contract Administrator on previous submission.
  - (viii) After the Contract Administrator has reviewed and return of copies, distribute copies to sub-trades as appropriate.
  - (ix) Maintain one (1) complete set of reviewed shop drawings, filed by Specification Section Number, at the site of the work for use and reference of the Contract Administrator and Subcontractors.

(d) Submission Requirements

- (i) Schedule submissions at least 14 Calendar days before dates reviewed submissions will be needed, and allow for a 14 Calendar day period for review by the Contract Administrator of each individual submission and re-submission, unless noted otherwise in the Contract Documents.
- (ii) Submit five (5) paper prints of shop drawings. The Contractor is advised that the Contract Administrator will retain three (3) copies of all submittals and return two (2) copies to the Contractor.
- (iii) Accompany submissions with transmittal letter, containing:
  - ◆ Date.
  - ◆ Project title and Bid Opportunity number.
  - ◆ Contractor's name and address.
  - ◆ Number of each shop drawing, product data, and sample submitted.
  - ◆ Specification section, title, number and clause.
  - ◆ Drawing number and detail/section number.
  - ◆ Other pertinent data.
- (iv) Submissions shall include:
  - ◆ Date and revision dates.
  - ◆ Project title and Bid Opportunity Number.
  - ◆ Name of: Contractor, Subcontractor, Supplier, Manufacturer, and Separate detailer when pertinent.
  - ◆ Identification of product and material.
  - ◆ Relation to adjacent structure or materials.
  - ◆ Field dimensions, clearly identified as such.
  - ◆ Specification section name, number and clause number or drawing number and detail/section number.
  - ◆ Applicable standards, such as CSA or CGSB numbers.
  - ◆ Contractor's stamp, initialed or signed, certifying review of submission, verification.

(e) Other Considerations

- (i) Fabrication, erection, installation or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent shop drawings and resubmit.
- (ii) Material and equipment delivered to the site of the works will not be paid for at least until pertinent shop drawings have been submitted and reviewed.
- (iii) Incomplete shop drawing information will be considered as stipulated deductions for the purposes of progress payment certificates.
- (iv) No delay or cost claims will be allowed that arise because of delays in submissions, re-submissions, and review of shop drawings.
- (v) If the Contract Administrator requests details or items on shop drawings, which the Contractor believes, require extra payment or contract time, the Contractor shall make any claims forthwith and receive acceptance, as extra work, or rejection, before fabrication proceeds.

E5.2 Measurement and Payment

- (a) Preparation, submission, and revisions of shop drawings shall be incidental to the Work and no separate payment will be made.

## **E6. FLOOD PROTECTION CHAMBER**

### **E6.1 Description**

- (a) This Specification shall cover the construction of a new reinforced concrete flood protection chamber as shown on the Drawings.

### **E6.2 Materials**

- (a) All materials shall conform to the requirements of this Specification and the requirements of the latest edition of the City of Winnipeg Standard Construction Specification.
- (b) Concrete
  - (i) Concrete mix design shall be as indicated in the Construction Notes on the Drawings and in accordance with CW 2160 and E8.
- (c) Reinforcing Steel
  - (i) Reinforcing Steel shall conform to CW 2160 and E9.
- (d) Metal Fabrications
  - (i) Metal Fabrications shall conform to E11.
- (e) Prefabricated Aluminum Access Doors
  - (i) Prefabricated Aluminum Access Doors shall conform to E12.
- (f) Shop Drawings
  - (i) Provide shop drawings in accordance with E5 of this specification.
  - (ii) Submit shop drawings for reinforcing steel a minimum of two (2) weeks prior to the fabrication of any reinforcing steel.
- (g) Grout
  - (i) Grout, if required, shall be Sika Grout 212 or CPD Non Shrink Grout or an approved equal in accordance with B6, mixed and applied in accordance with the manufacturer's instructions and of a consistency suitable for the intended application, as approved by the Contract Administrator.
- (h) Backfill
  - (i) In accordance with CW 2030. Class of backfill to be as shown on the Drawings and as described in E29.
- (i) Bonding Agent
  - (i) The bonding agent, if required, shall be ACRYL-STIX or an approved equal in accordance with B6.
- (j) Foundation Waterproofing
  - (i) Foundation waterproofing shall conform to E10.
- (k) Masonry
  - (i) Masonry shall conform to E13.
- (l) Carpentry
  - (i) Carpentry shall conform to E14.
- (m) Prefabricated Wood Trusses
  - (i) Prefabricated Wood Trusses shall conform to E15.
- (n) Sheet Vapour Barrier
  - (i) Sheet Vapour Barrier shall conform to E16.
- (o) Air Barrier
  - (i) Air Barrier shall conform to E17.
- (p) Board Insulation
  - (i) Board Insulation shall conform to E18.

- (q) Batt and Blanket Insulation
  - (i) Batt and Blanket Insulation shall conform to E19.
- (r) Aluminum Soffit
  - (i) Aluminum Soffit shall conform to E20.
- (s) Metal Roofing System
  - (i) Metal Roofing System shall conform to E21.
- (t) Joint Sealers
  - (i) Joint Sealers shall conform to E22.
- (u) Steel Hollow Metal Doors and Frames
  - (i) Steel Hollow Metal Doors and Frames shall conform to E23.
- (v) Painting
  - (i) Painting shall conform to E24.
- (w) Graffiti Resistant Coating
  - (i) Graffiti Resistant Coating shall conform to E25.
- (x) Electrical Work
  - (i) Electrical Work shall be as indicated in the Construction Notes on the Drawings.

#### E6.3 Construction Methods

- (a) Excavation
  - (i) Place a minimum 75mm thick lean mix concrete slab in the bottom of the excavation to provide a clean working base upon completion of the excavation to the required limits. Allow the concrete to set for twenty-four (24) hours before setting up forms or placing reinforcing steel.
  - (ii) Lean mix concrete shall be well-tamped and screened to give a level working platform for setting up forms and placing reinforcing steel.
- (b) Backfill
  - (i) Place and compact backfill material as indicated on the Drawings in accordance with CW 2030. Do not place backfill material in a frozen state. Supply heating and hoarding in accordance with CW 2160 if required to ensure material does not freeze before compaction is complete.
  - (ii) Notify the Contract Administrator at least one (1) full working day in advance of any backfilling operation. No Backfill shall be placed against concrete until approved by the Contract Administrator and in no case before field cured test cylinders show the concrete strength to be 75% of that specified.
- (c) Grout
  - (i) Mix and apply grout in accordance with the manufacturer's instructions. Consistency to be suitable for the intended application

#### E6.4 Measurement and Payment

- (a) Flood Protection Chamber will be measured on a Unit basis and paid for at the Contract Unit Price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

### **E7. MAINTAINING EXISTING CULVERT FLOWS, FLOW CONTROL, DIVERSIONS AND BYPASS PUMPING**

- E7.1 Maintaining Existing Sewer Flows, Flow Control, Diversions and Bypass Pumping required to complete the Works in the Contract shall be incidental to the Contract as per Clause 4.16.1 of CW 2130.

## **E8. CAST-IN-PLACE CONCRETE**

### **E8.1 Description**

- (a) This Specification shall cover the construction of cast-in-place concrete for the flood protection chamber, which the Contractor shall carry out in accordance with Specification CW 2160 and CSA A23.1, except as amended or supplemented herein

### **E8.2 Materials**

- (a) Structural Concrete Mix Design
  - (i) Provide concrete mixed in accordance with requirements of CAN/CSA-A23.2.
  - (ii) Structural concrete design shall be in accordance with performance specification having the following properties:
    - ◆ Class of Exposure: S-1
    - ◆ Minimum Compressive Strength @ 28 days: 35 MPa
- (b) Lean-Mix Concrete Design
  - (i) Lean-mix concrete design shall be in accordance with performance specification having the following properties:
    - ◆ Cement: Type HS
    - ◆ Minimum Compressive Strength @ 28 days: 15 MPa
- (c) Grout
  - (i) Grout shall be Sika Grout 212 or CPD Non Shrink Grout, or approved equal in accordance with B6.
- (d) Bonding Agent
  - (i) Bonding agent shall be ACRYL-STIX or approved equal in accordance with B6.
- (e) Waterstop
  - (i) Waterstop shall be 152.4mm wide by 9.5mm thick Vinylex ribbed center bulb or approved equal in accordance with B6.

### **E8.3 Construction Methods**

#### **E8.3.1 Construction Method Submission**

- (a) No work shall commence on construction of flood protection chamber until after the Contract Administrator's review of the Contractor's Construction Method submission.
- (b) The contractor shall prepare for the Contract Administrator's review a Construction Method submission detailing:
  - (i) Construction sequence to be followed including all methods to be employed to ensure no damage occurs to existing structures or adjacent properties within or adjacent to excavation.
  - (ii) Proposed method of flood protection chamber construction.
  - (iii) Specialized equipment to be used.
  - (iv) Any design revisions proposed to accommodate the Contractor's proposed construction method.
  - (v) Flow control considerations including details on the Contractor's proposed method of flow control.
  - (vi) The Contractor shall respond to any concerns that may be raised by the Contract Administrator after review of the Construction Method submission.

### **E8.4 Cast-in-Place Concrete Construction**

- (a) Adjust the location of the reinforcing steel adjacent to openings and in location of the waterstop along the center line of wall to frame those openings in accordance with good practice, and maintain the bar spacing intent.

- (b) Do not use welded splices for reinforcing steel.
- (c) Install foundation waterproofing in accordance with E10 of this Specification.

#### E8.5 Measurement and Payment

- (a) Supply and placement of cast-in-place concrete shall be included with Flood Protection Chamber and paid for under the Contract Unit Price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

### **E9. REINFORCING STEEL**

#### E9.1 Description

- (a) This Specification shall cover all reinforcing steel work, in accordance with Specification CW 2160, except as amended or supplemented herein.

#### E9.2 Materials

##### E9.2.1 Reinforcing Steel

- (a) Further to CW 2160 Sentence 2.6 Materials: Reinforcing Steel, all reinforcing steel shall conform to the requirements of CSA G30.18, Grade 400.

##### E9.2.2 Bar Accessories

- (a) Bar accessories shall be of type approved by the Contract Administrator. They shall be made from a non-corroding material, and they shall not stain, blemish, or spall the concrete surface for the life of the concrete. Bar chairs are to be PVC; galvanized bar chairs are not acceptable.
- (b) Bar accessories shall include bar chairs, spacers, clips, wire ties, wire (18 gauge minimum), or other similar devices that may be approved by the Contract Administrator. Bar accessories are not shown on the Contract Drawings. The supply and installation of bar accessories shall be considered incidental to the supply and placing of reinforcing steel.

#### E9.3 Construction Methods

##### E9.3.1 Placing of Reinforcing Steel

- (a) Reinforcing steel shall be placed accurately in the positions shown on the Contract Drawings. Carefully adjust the location of reinforcing steel adjacent to openings to frame those openings in accordance with good practice, and maintain the bar spacing intent.
- (b) Splices in reinforcing steel shall be made only where indicated on the Contract Drawings. Prior approval of the Contract Administrator shall be obtained where, in the opinion of the Contractor, other splices must be made. All splices shall have laps of at least 40 bar diameters. Welded splices shall not be used.
- (c) A minimum of twenty-four (24) hours notice shall be given to the Contract Administrator prior to the pouring of any concrete to allow for inspection of reinforcing steel.

##### E9.3.2 Quality Control

- (a) The Contractor shall provide, without charge, the samples of reinforcing steel required for quality control tests and provide such assistance and use of tools and construction equipment as is required.

##### E9.3.3 Shop Drawings

- (a) The Contractor shall submit shop drawings in accordance with E5 for the Contract Administrator's approval two (2) weeks prior to the fabrication of any reinforcing steel.



**E9.4 Measurement and Payment**

- (a) Supply and placement of reinforcing steel shall be included with Flood Protection Chamber and paid for under the Contract Unit Price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

**E10. FOUNDATION WATERPROOFING**

**E10.1 Description**

- (a) This Specification shall cover the supply and placement of all foundation waterproofing work.

**E10.2 Materials**

- (a) Waterproofing membrane: Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, reinforced with non-woven polyester weighing 180 g/m<sup>2</sup>. Top surface polyethylene film. Bottom surface: thermofusible plastic film. Acceptable material: Soprema Sopralene Flam 180, IKO Aquabarrier TG or Baker Blueskin TG.
- (b) Primes, mastic sealant, and accessories: as recommended by membrane manufacturer, applicable for substrate.
- (c) Protection board: insulating fibreboard to CAN/CSA-A247, Type II, 12 mm thick.

**E10.3 Construction Methods**

**E10.3.1 Quality Assurance**

- (a) Work of this section shall be performed by workers approved and trained by the manufacturer for application of its products. Applicators must have minimum 5 years proven experience. If requested, submit proof of experience, in writing, from manufacturer.

**E10.3.2 Environmental Requirements**

- (a) Maintain air temperature and structural base temperature at installation area above membrane manufacturer's recommendations before, during and 72 hours after installation.
- (b) For applications in freezing weather do not commence application until authorized by membrane manufacturer.
- (c) For enclosed applications ensure adequate forced air circulation during curing period.
- (d) Install membrane on dry substrates, free of snow and ice. Use only dry materials and apply only during weather that will not introduce moisture beneath waterproofing membrane.

**E10.3.3 Warranty**

- (a) Provide written warranty, signed and issued in the name of The City stating that the waterproofing is guaranteed against leaking, loss of adhesion, for a period of five (5) years from the date of completion.

**E10.3.4 Preparation**

- (a) Examine substrates and site conditions to ensure acceptability for application of waterproofing membranes. Notify Contract Administrator, in writing, of unsuitable surfaces or working conditions
- (b) Do not commence application until all other work that will penetrate membrane is complete.
- (c) Clean substrates of all snow, ice, loose particles, oil, grease, dirt, curing compounds, or other foreign matter detrimental to application of primers and waterproofing membranes.

- (d) Ensure concrete surfaces are fully cured and dry using test methods recommended by membrane manufacture.
- (e) Repair defects in concrete surfaces such as spalled or poorly consolidated concrete. Remove sharp protrusions, sharp edges and form lines.
- (f) Patch rough areas with a weld-adhered parge coat to provide smooth surface. Allow to fully cure and dry

#### E10.3.5 Priming

- (a) Apply primer in accordance with manufacturer's instructions at recommended rate of application. Do not apply to frozen or damp surfaces. Apply only when air and surface temperatures are within manufacturer's recommended limits.
- (b) Avoid pooling of primer and allow to cure until tack-free.
- (c) Prime only the area to be covered with membrane in a working day. Re-prime areas not covered with waterproofing within 24 hours of application of primer.

#### E10.3.6 Membrane Application

- (a) Apply membrane in accordance with manufacturer's instructions and with good construction practice to maintain continuity of waterproofing over building elements.
- (b) Place membrane in position without stretching, taking care to avoid trapped air, creases, or fish mouths.
- (c) Ensure membrane is totally bonded to substrate.
- (d) Apply membrane vertically in longest possible lengths to reduce number of end joints.
- (e) Overlap side laps minimum 75 mm and end laps minimum 150 mm. Stagger end laps minimum 300 mm in adjacent rows.
- (f) Seal horizontal and vertical terminations by applying heavy pressure to edges with a roller to ensure positive bond. Apply a continuous bead of mastic sealant to all terminations. Make watertight. Seal daily terminations with mastic sealant.
- (g) Corners:
  - (i) Remove sharp or protruding edges from external corners prior to application of membrane.
  - (ii) Reinforce external corners with cushion strip of membrane minimum 300 mm wide at each corner. Install cushion strip below main membrane.
- (h) Protrusions and Penetrations:
  - (i) Apply two layers of membrane flashing around protrusions and extend at least 150 mm in all directions. Cut and fit membrane neatly and snug fitting, leave no gaps. Seal all terminations with mastic sealant. Flash protrusions with liquid mastic extending 150 mm along pipe or conduit.
  - (ii) Seal with liquid mastic all protrusions or difficult detail areas which do not allow easy installation of membrane. Make watertight.

#### E10.3.7 Inspection and Repair

- (a) Inspect membrane thoroughly before covering and make corrections immediately. (b) Patch and repair misaligned or inadequately lapped seams, tears, punctures, or fishmouths.
- (b) Patch with piece of waterproofing membrane and extend minimum 150 mm in all directions from fault and seal edges with mastic sealant.
- (c) Protection Board
  - (i) Install protection board against all waterproofing membranes to protect against backfilling operations.
  - (ii) Install boards vertically without fasteners or adhesives.

- (iii) Install protection board during backfilling operations to allow backfill materials to hold protection board tight to waterproofing membrane.

#### E10.4 Measurement and Payment

- (a) Supply and placement of Foundation Waterproofing shall be included with Flood Protection Chamber and paid for under the Contract Unit Price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

### **E11. METAL FABRICATIONS**

#### E11.1 Description

- (a) This Specification shall cover the supply fabrication and placement of all metal fabrications.

#### E11.2 Materials

##### E11.2.1 General

- (a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.
- (b) All materials supplied under this specification shall be of a type acceptable to the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.
- (c) All materials shall be supplied, safely stored and handled in a careful and workmanship like manner, to the satisfaction of the Contract Administrator.

E11.2.2 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.

E11.2.3 Steel pipe: to ASTM A 53/A53M, seamless, galvanized, as specified by item.

E11.2.4 Welding materials: to CSA W59.

E11.2.5 Stud Anchors: to ASTM A108, Grade 1020.

E11.2.6 Aluminum: to CAN/CSA S157 and the Aluminum Association 'Specifications for Aluminum Structures'. Aluminum for plates shall be Type 6061-T651. Welding shall be in accordance with the requirements of CSA W59.2-M1991.

##### E11.2.7 Fasteners:

- (a) Anchor bolts and fasteners: 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.
- (b) Quantity and size of the fasteners shall be as recommended by the manufacturer or as shown on the Drawings.
- (c) Provide exposed fastenings of same material, and finish as the metal to which applied unless indicated otherwise.
- (d) Supply all items complete with all anchors and fastenings.

#### E11.3 Construction Methods

##### E11.3.1 Submittals

- (a) Submit the qualifications of the Contractor, qualifications of operators, shop drawings, mill certificates and welding procedures to the Contractor Administrator for acceptance in accordance with E5 Shop Drawings.
- (b) Submit 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.

### E11.3.2 Fabrication

- (a) Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- (b) Use self-tapping shake-proof flat headed screws on items requiring assembly by screws.
- (c) Where possible, fit work and shop assemble, ready for erection.
- (d) Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
- (e) Seal exterior steel fabrications to provide corrosion protection in accordance with CAN3-S16.1.
- (f) 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.
- (g) All aluminum surfaces in contact with concrete shall be isolated using alkali-resistant bituminous paint meeting the requirements of CGSB 31-GP-3M.
- (h) Aluminum plate shall have an approved raised oval or multi-grip pattern with edges straight and true, and shall be cut as far as practical to maintain continuity of the pattern at abutting edges.
- (i) Pieces shall be of the sizes indicated on the Drawings and shall not be built up from scrap pieces.
- (j) 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.

### E11.3.3 Finishes

- (a) All designated steel items supplied under this specification shall be hot-dip galvanizing after fabrication, in accordance with CAN/CSA-G164, to a retention of 600 gm/m<sup>2</sup>.

### E11.3.4 Angle Lintels

- (a) Steel angles: sizes indicated for openings. Provide minimum 150 mm bearing at ends. Hot dip galvanized.

### E11.3.5 Erection

- (a) Do welding work in accordance with CSA W59.
- (b) Erect metalwork in accordance with reviewed shop drawings, square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- (c) Provide suitable means of anchorage acceptable to Contract Administrator such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- (d) Provide components for building in accordance with shop drawings and schedule.
- (e) Make field connections with bolts to CAN/CSA-S16.1, or weld.
- (f) Touch-up rivets, bolts and burnt or scratched surfaces that are to receive paint finish, with zinc primer after completion of erection.
- (g) Touch-up 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. Accepted products are Galvalloy and Gal-Viz.
- (h) Aluminum angle frames shall be anchored into the concrete as shown on the Drawings. Care shall be taken in placing the frames to the exact level, dimension and location required.
- (i) Cover plates shall be hinged and shall be supplied with lifting handles, as shown on the Contract Drawings. Exterior covers shall be supplied with a hasp for a padlock.

#### E11.4 Measurement and Payment

- (a) Metal fabrication shall be included with Flood Protection Chamber and paid for under the Contract Unit Price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification. .

### E12. PREFABRICATED ALUMINUM ACCESS DOORS

#### E12.1 Description

- (a) This Specification shall cover the supply and installation of prefabricated aluminum access doors.

#### E12.2 Materials

##### (a) Standard Floor Doors

- (i) Standard doors, not subject to vehicle loading, shall be Bilco Type K (model K-4), size 914mm x 914mm, or approved equal in accordance with B6. The door shall be single leaf and be pre-assembled by the manufacturer.

##### (b) Floor Doors Subjected to Vehicle Loads

- (i) Doors subjected to vehicle loading shall be Bilco Type JAL-H20 (model JD-4AL H20), size 914mm x 914mm, or approved equal in accordance with B6. The door shall be single leaf and be pre-assembled by the manufacturer.

##### (c) Access Doors on West Wall of Superstructure

- (i) Access doors on west wall of superstructure shall be Bilco Type K (model K-4), size 914mm x 914mm, or approved equal in accordance with B6. The door shall be single leaf and be pre-assembled by the manufacturer. The doors shall have the capability to open to 180° and fold flat against the exterior wall.

#### E12.3 Construction Methods

##### E12.3.1 Inspection

- (a) Verify that the vault access door installation will not disrupt other trades. Verify that the substrate is dry, clean, and free of foreign matter. Report and correct defects prior to any installation.

##### E12.3.2 Installation

- (a) The installer shall check as-built conditions and verify the manufacturer's vault access door details for accuracy to fit the application prior to fabrication. The installer shall comply with the vault access door manufacturer's installation instructions.
- (b) The installer shall furnish mechanical fasteners consistent with the vault access door manufacturer's instructions

##### E12.3.3 Shop Drawings

- (a) The Contractor shall submit shop drawings in accordance with E5 for the Contract Administrator's approval prior to the installation of aluminum access doors.

#### E12.4 Measurement and Payment

- (a) Supply and installation of Prefabricated Aluminum Access Doors shall be included with Flood Protection Chamber and paid for under the Contract Unit Price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

## **E13. MASONRY**

### **E13.1 Description**

- (a) This Specification shall cover the supply and placement of all masonry work.

### **E13.2 Materials**

- (a) Concrete masonry units: to CSA A165 Series (CSA A165.1). Classification H/15/A/M. Provide purpose made shapes for lintels and bond beams.
- (b) Face Veneer: 90 wide split face concrete block, #591 Manitoba Stone Colour
- (c) Mortar Materials: to CSA A179. Type N based on Proportion specifications. Use non-staining mortar for limestone work.
- (d) Masonry connectors: to CSA A370 and CSA S304, galvanized. Block Shear Connector assembly as manufactured by Fero Holdings Ltd. Consisting of connector plate, V-Tie and polyethylene insulation support.
- (e) Masonry reinforcement:
  - (i) Bar reinforcement: to CSA A371 and CSA G30.18, Grade 400.
  - (ii) Wire reinforcement: to CSA A371 and CSA G30.14, ladder type. Prefabricated corners and intersections.
- (f) Masonry flashing: self-adhesive modified bitumen sheet membrane: minimum 1.0 mm thick. Bakelite Blueskin SA, WR Grace Perm-A-Barrier, Soprema Colphene 1500.
- (g) Metal drip edge: brake formed of 24 gauge prefinished steel sheet of same colour as sheet metal roofing, Form drip edge to extend 100 mm under base course, with 6 - 9 mm formed drip at front edge.

### **E13.3 Construction Methods**

#### **E13.3.1 General**

- (a) Do masonry work in accordance with CSA-A371 except where specified otherwise.
- (b) Before commencing masonry work construct mock-up panel for Contract Administrator's review and approval. Construct mock-up panel approximately 1200 x 1200 mm size, on exterior wall of building in location designated by Contract Administrator. Materials and workmanship as specified for finished work. Mock-up panel, if accepted, may become part of the finished work. If not accepted, demolish and construct new panel if requested.
- (c) Lay concrete masonry units in running stretcher bond. Coursing height 200 mm of one block and one joint.
- (d) Lay veneer in running stretcher bond, coursing height 200 mm for three bricks and three joints. Provide soldier coursing as indicated, using solid units at corners. Exposed cores not permitted.
- (e) Supply and install masonry connectors and reinforcement in accordance with CSA A370, CSA A371, CSA A23.1 and CSA S304.1, and as indicated. Coordinate the installation of the truss uplift anchors with truss subcontractor.
- (f) Build masonry plumb, level, and true to line, with vertical joints in alignment. Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.
- (g) Remove chipped, cracked, and otherwise damaged units in exposed masonry and replace with undamaged units.
- (h) Cut out for electrical switches, outlet boxes, and other recessed or built-in objects. Make cuts straight, clean, and free from uneven edges.
- (i) Build in items required to be built into masonry. Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.

- (j) Construct continuous control joints in exterior masonry veneer. Fill joints with joint filler, backer rods and sealant.
- (k) Tool joints with round jointer to provide concave joints where exposed or to receive paint or other thin finish coating. Strike flush joints in concealed spaces.
- (l) Keep masonry cavities free of mortar droppings.
- (m) Provide weep holes over masonry flashings, spaced at maximum 800 mm on centre.
- (n) Build in flashings in masonry in accordance with CAN3-A371. Carry under base course and up backup wall minimum 150 mm and seal stop edge.
- (o) Install metal drip edge over masonry flashings at base courses and angle lintels. Align drip edge straight and even. Overlap joints minimum 20 mm.

#### E13.3.2 Cleaning

- (a) Post construction: clean area of wall designated by Contract Administrator as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured clean masonry as follows:
  - (i) Protect sills, doors, trim and other work.
  - (ii) Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
  - (iii) Scrub with solution of 25 mL trisodium phosphate and 25 mL household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.
  - (iv) Repeat cleaning process as often as necessary to remove mortar and other stains.
  - (v) Use alternative cleaning solutions and methods for difficult to clean stone only after consultation with masonry unit manufacturer.

#### E13.4 Measurement and Payment

- (a) Masonry work shall be included with Flood Protection Chamber and paid for under the Contract Unit Price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

### **E14. CARPENTRY**

#### E14.1 Description

- (a) This Specification shall cover the supply, fabrication, transportation, handling, delivery and placement of all carpentry work.

#### E14.2 Materials

##### E14.2.1 Lumbar Materials

- (a) Except as indicated or specified otherwise lumber shall be softwood, S4S, moisture content not greater than 19% at time of installation, in accordance with CAN/CSA 0141 and NLGA Standard Grading Rules for Canadian Lumber.
- (b) Glued end-jointed (finger-jointed) lumber is not acceptable.
- (c) Framing and board lumber: SPF species, NLGA No.2 grade or better.
  - (i) Identify lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

#### E14.2.2 Panel Material

- (a) Type, grade and thickness indicated in accordance with the following standards. Except as specified otherwise panels shall be minimum 1200 x 2400mm (4' x 8') size, square edge.
- (b) Douglas Fir Plywood (DFP): to CSA 0121, standard construction.
- (c) Canadian Softwood Plywood (CSP): to CSA 0151, standard construction.
- (d) Roof sheathing: plywood, DFP or CSP sheathing grade, T&G edge.
- (e) Interior wall and ceiling panelling: plywood, DFP or CSP, G1S grade, square edge.
  - (i) Identify plywood by grade mark in accordance with applicable CSA standards.

#### E14.2.3 Accessories

- (a) Nails, spikes and staples: to CSA B111 and NBC requirements. Galvanized.
- (b) Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded aluminum of 6063-T6 alloy.
- (c) Surface-applied wood preservative: copper naphthenate or pentachlorophenol base water repellent preservative.

#### E14.3 Construction Methods

##### E14.3.1 General

- (a) Comply with requirements of NBC, Part 9 supplemented by following paragraphs.
- (b) Install members true to line, levels and elevations. Space uniformly.
- (c) Construct continuous members from pieces of longest practical length.
- (d) Install spanning members with "crown-edge" up.

##### E14.3.2 Erection

- (a) Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- (b) Countersink bolts where necessary to provide clearance for other work.
- (c) Install roof sheathing in accordance with requirements of NBC.
- (d) Install furring and blocking as required to space-out and support surface applied fixtures and equipment, wall and ceiling finishes, facings, fascia, soffit, and other work indicated.
- (e) Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work. Except where indicated otherwise, use material at least 38 mm thick.
- (f) Install fascia backing, nailers, and other wood supports as required and secure using galvanized fasteners.

##### E14.3.3 Wood Preservative

- (a) Treat surfaces of rough bucks, nailers, linings to rough openings, fascia backing and other lumber on exterior wall of building material. Treat material with wood preservative, before installation. Wherever possible treat materials after cutting and fitting.
- (b) Apply preservative by dipping, brush or soaking to completely saturate and maintain wet film on surface for minimum three minute soak on lumber and one minute soak on plywood.
- (c) Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.



#### E14.4 Measurement and Payment

- (a) Carpentry work shall be included with Flood Control Chamber and paid for under the Contract Unit Price for "Flood Control Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

### E15. PREFABRICATED WOOD TRUSSES

#### E15.1 Description

- (a) This Specification shall cover the supply, fabrication and placement of all prefabricated wood truss work.

#### E15.2 Materials

##### E15.2.1 Design Criteria

- (a) Design trusses, bracing and bridging in accordance with CAN3-086 for building locality as ascertained by NBC Supplement No. 1, Climatic Information for Building Design in Canada and minimum uniform and minimum concentrated loadings stipulated in NBC commentary.
- (b) All roof trusses are to be prefabricated and designed in accordance with the latest edition of CSA-086. Shop drawings, including connection details, bearing the stamp of a registered professional engineer in the Province of Manitoba, shall be submitted to the Contract Administrator for approval before commencement of fabrication. Timber for roof trusses and rafters shall be structurally graded in accordance with NLGA standard grading rules for Canadian Lumber (latest edition). Material may be No. 2 spruce or equal. Material shall be straight grained and kiln dried.
- (c) Truss manufacturer to design, fabricate and supply complete roof framing system, including lateral bracing, and uplift anchors.
- (d) Limit live load deflections to 1/240th of span.

##### E15.2.2 Lumber

- (a) Lumber: spruce species, fire retardant treated grade, S4S, with maximum moisture content of 19% at time of fabrication and to following standards:
  - (i) CAN/CSA-0141
  - (ii) NLGA, Standard Grading Rules for Canadian Lumber.
- (b) Identify lumber by grade stamp of an agency certified by Canadian Lumber Standards Administration Board.

#### E15.3 Construction Methods

##### E15.3.1 Fabrication

- (a) Verify connectors and other truss connectors shown on drawings.
- (b) Fabricate wood trusses in accordance with reviewed shop drawings.
- (c) Cut truss members to accurate length, angle, and size to assure tight joints for finished trusses.
- (d) Assemble truss members to design configuration.
- (e) Provide for design camber when positioning truss members.
- (f) Connect members using bolts and nuts, metal gussets.
- (g) Design and supply suitable metal hangers for all truss to truss connections.
- (h) Provide all tie-down connectors and other truss connectors shown on drawings.

##### E15.3.2 Inspection

- (a) Verify end bearing lengths comply with Drawings and code requirements.

- (b) Commencement of installation means acceptance of existing conditions.
- (c) Truss supplier shall include in the contract price to provide site inspections and certification that trusses were constructed and erected in accordance with Drawings and code.

#### E15.3.3 Erection

- (a) Erect wood trusses in accordance with reviewed erection drawings.
- (b) Indicated lifting points to be used to hoist trusses into position.
- (c) Exercise care to prevent out-of-place bending of trusses.
- (d) Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing and decking are installed.
- (e) Install permanent bracing in accordance with structural drawings and reviewed shop drawings, prior to application of loads to trusses.
- (f) Restrict construction loads to design loads to prevent overstressing of truss.
- (g) Do not cut or remove any truss material without approval of Contract Administrator.

#### E15.3.4 Shop Drawings

- (a) Submit shop drawings in accordance with E5.
- (b) Each shop, layout and erection drawing submission shall bear signature and stamp of professional engineer registered or licensed in Province of Manitoba.
- (c) Provide truss layout identifying truss mark numbers, location, quantity of each, etc.
- (d) Indicate species, sizes and stress grades of lumber used as truss members. Show pitch, span, camber, configuration and spacing of trusses. Indicate connector types, thickness, sizes, locations and design value. Show bearing details. Indicate design load for each member.
- (e) Submit stress diagram or print-out of computer design indicating design for each truss member. Indicate allowable load and stress increase.
- (f) Indicate arrangement of webs or other members to accommodate ducts and other specialties.
- (g) Show lifting points for storage, handling and erection.
- (h) Show location of lateral bracing for compression members.

#### E15.3.5 Delivery and Storage

- (a) Store trusses on job site in accordance with manufacturer's instructions. Provide bearing supports and bracings. Prevent bending, wrapping and overturning trusses.
- (b) Trusses shall be wrapped with plastic until erected.

#### E15.4 Measurement and Payment

- (a) Supplying and placing of fabricated wood trusses shall be included with Flood Control Chamber and paid for under the Contract Unit Price for "Flood Control Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

### **E16. SHEET VAPOUR BARRIER**

#### E16.1 Description

- (a) This Specification shall cover the supply, fabrication, transportation, handling, delivery and placement of sheet vapour barrier work.

#### E16.2 Materials

- (a) Sheet Vapour Barrier: polyethylene film to CAN/CGSB-51.33, Type 1, 0.15 mm thick.

- (b) Joint sealing tape: air pressure sensitive adhesive tape, type recommended by vapour barrier manufacturer, 50mm wide for lap joints and perimeter seals, 25mm wide elsewhere.
- (c) Sealants: acoustical sealant.
- (d) Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

### E16.3 Construction Methods

#### E16.3.1 General

- (a) Install sheet vapour barrier on warm side of exterior wall, ceiling and floor assemblies as indicated, to form continuous barrier.
- (b) Use sheets of largest practical size to minimize joints.
- (c) Inspect sheets for continuity. Repair punctures and tears with sealing tape before work is concealed.

#### E16.3.2 Exterior Surface Openings

- (a) Cut sheet vapour barrier to form openings and ensure material is lapped and sealed to frame.

#### E16.3.3 Perimeter Seals

- (a) Seal perimeter of sheet vapour barrier as follows:
  - (i) Apply continuous bead of sealant to substrate at perimeter of sheets.
  - (ii) Lap sheet over sealant and press into sealant bead.
  - (iii) Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

#### E16.3.4 Lap Joint Seals

- (a) Seal lap joints of sheet vapour barrier as follows:
  - (i) Attach first sheet to substrate.
  - (ii) Apply continuous bead of sealant over solid backing at joint.
  - (iii) Lap adjoining sheet minimum 150mm and press into sealant bead.
  - (iv) Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

#### E16.3.5 Electrical Boxes

- (a) Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
  - (i) Install moulded box vapour barrier or wrap boxes with polyethylene film sheet providing minimum 300mm perimeter lap flange.
  - (ii) Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

### E16.4 Measurement and Payment

- (a) The supplying and installation of sheet vapour barrier shall be included with flood protection chamber and paid for under the Contract Unit Price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

## E17. AIR BARRIER

### E17.1 Description

- (a) This Specification shall cover the supply, fabrication, transportation, handling, delivery and placement of all air barrier work.

## E17.2 Materials

- (a) Air barrier membrane: SBS modified bitumen sheet membrane fibreglass reinforced, top and bottom surface thermofusible plastic film, minimum 2.5 mm thick. Acceptable material: Soprema Sopraseal 60 F/F, Bakor Blueskin TG, IKO Aquabarrier TG.
- (b) Primers, mastics and sealants: of type recommended by manufacturer, suitable for substrate and application.
- (c) Flashing and stripping membranes: as recommended by air barrier membrane manufacturer.

## E17.3 Construction Methods

### E17.3.1 Environmental Conditions

- (a) Apply primers and membranes in dry weather and only when air and surface temperature are within manufacturer's recommended limits.
- (b) For applications below recommended temperature consult manufacturer and do not proceed until approved by manufacturer or his representative.

### E17.3.2 Preparation

- (a) Clean substrates of snow, ice, loose particles, oil, grease, dirt, curing compounds, or other foreign matter detrimental to installation and bonding of air barrier membrane. Repair defects in masonry surfaces. Remove sharp protrusions and rough edges.

### E17.3.3 Installation

- (a) Prime substrates in accordance with manufacturer's instructions. Apply primers at recommended rate of application.
- (b) Install materials in accordance with manufacturer's instructions using only materials approved for use with their products. Apply with good construction practice to maintain continuity of air barrier membrane over building elements.
- (c) Overlap side and end laps minimum 50 mm. Stagger end laps minimum 300 mm in adjacent rows. Locate end joints minimum 300 mm from internal and external corners.
- (d) Install sheets horizontally between masonry ties penetrating membrane. Overlap horizontal joints minimum 50 mm. Slit membrane at each tie and seal making airtight.
- (e) Place membrane in position without stretching, taking care to avoid trapped air, creases or fishmouths. Ensure full contact and bond to substrates.
- (f) Flash and seal around all penetrations and protrusions such as pipes, conduits, steel angle supports, masonry ties, anchors. Cut and fit membrane neatly and snug fitting, leave no gaps. Make airtight.
- (g) Seal with mastic all difficult detail areas that do not allow easy installation of membrane. Make airtight.
- (h) At rough openings cut air barrier membrane to form opening. Return membrane into opening and seal to rough bucks. Reinforce corners with additional piece of membrane cut and formed to seal corners.
- (i) Overlap and seal air barrier membrane to vapour barriers and waterproofing membranes installed by other trades. Maintain continuity of building air/vapour barrier system over entire building.
- (j) Inspect membrane for defects and poor workmanship before covering and make corrections immediately.
- (k) Patch and repair misaligned or inadequately lapped seams, tears, punctures or fishmouths to the satisfaction of the Contract Administrator.
- (l) Patch cuts, tears, and punctures by bonding an additional layer of air barrier membrane over damaged area. Patch shall extend minimum 150 mm in all directions from fault. Seal and make airtight.

#### E17.4 Measurement and Payment

- (a) The supplying and installation of air barrier membrane shall be paid for under the unit price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

### **E18. BOARD INSULATION**

#### E18.1 Description

- (a) This Specification shall cover the supply and placement of all board insulation work.

#### E18.2 Materials

- (a) Board insulation: expanded polystyrene board to CAN/ULC-S701, Type 3, thickness as indicated on Drawings, ship lapped edges. Acceptable material: Styrofoam Cavitymate or Owens Corning – Celfort 300.
- (b) Fasteners: concrete anchors with flat discs or washers, for attachment of insulation to concrete surfaces

#### E18.3 Construction Methods

##### E18.3.1 Installation

- (a) Install insulation after building substrate materials are cured and dry.
- (b) Install insulation to maintain continuity of thermal protection to building elements and spaces. Fit insulation tight around electrical, plumbing and heating pipes and ducts, around exterior doors and windows and other penetrations and protrusions. Cut and trim insulation neatly to fit spaces.
- (c) Install insulation boards in parallel rows. Butt joints tightly, offset vertical joints. Interlockboards at corners. Use longest pieces possible to reduce number of joints.
- (d) Install insulation boards on outer surface of inner wythe of wall cavity with plastic insulation clips over masonry ties to hold insulation tight to backup wall. Install boards horizontally between masonry ties, with horizontal joints centred on ties.
- (e) Install insulation over foundation waterproofing with concrete anchors complete with nailing discs or washers. Provide a minimum of five (5) anchors per 600 x 1200 mm of insulation board. Provide additional anchors spaced at 300 mm on centre around perimeter of openings, corners and abutments. Ensure concrete anchors are securely seated. Replace loose fasteners or provide additional fastener adjacent to loose fastener.

#### E18.4 Measurement and Payment

- (a) The supplying and installation of board insulation shall be paid for under the unit price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

### **E19. BATT AND BLANKET INSULATION**

#### E19.1 Description

- (a) This Specification shall cover the supply, fabrication, transportation, handling, delivery and placement of all batt and blanket insulation work.

#### E19.2 Materials

- (a) Batt and blanket mineral fibre insulation: to CAN/ULC-S702, Type 1 – no membrane. Thickness indicated on Drawings.

### E19.3 Construction Methods

- (a) Install insulation to maintain continuity of thermal protection to building elements and spaces.
- (b) Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- (c) Fill all voids completely. Cut and trim insulation neatly to fill voids; leave no gaps. Do not compress insulation to fit into spaces.

### E19.4 Measurement and Payment

- (a) The supplying and placing of batt and blanket insulation shall be paid for under the unit price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

## **E20. ALUMINUM SOFFIT**

### E20.1 Description

- (a) This Specification shall cover the supply, fabrication and placement of all aluminum soffit work.

### E20.2 Materials

- (a) Soffit: to CAN/CGSB-93.2, Type B, Class 1, colour to be selected from a standard colour chart, medium gloss, plain pattern surface, flat sheet 'V' crimped for stiffness, vented 0.1 m<sup>2</sup> of opening for every 30 m<sup>2</sup> of building area preformed with elongated slits and small perforations.
- (b) Exposed trim: inside corners, outside corners, starter strip and trim of same material, colour and gloss as soffit, with fastener holes pre-punched.
- (c) Nails: to CSA B111, aluminum alloy, of type recommended by manufacturer.

### E20.3 Construction Methods

- (a) Install soffit in accordance with CAN/CGSB-93.5M, and manufacturer's written instructions
- (b) Install continuous starter strips, inside and outside corners, trim, and flashings.
- (c) Maintain joints true to line, tight fitting, hairline joints.
- (d) Attach components in manner not restricting thermal movement.

### E20.4 Measurement and Payment

- (a) The supplying and placing of aluminium soffit shall be paid for under the unit price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work.

## **E21. METAL ROOFING SYSTEM**

### E21.1 Description

- (a) This Specification shall cover the supply, fabrication and placement of all metal roofing system work.

### E21.2 Materials

#### E21.2.1 Acceptable Material:

- (a) Marquis 450 roof panels as manufactured by VicWest Steel.
- (b) Flynn Standing Seam complete with battens.
- (c) or approved equal in accordance with B6.

#### E21.2.2 Components

- (a) Roof panels:
  - (i) Fabricated from 24 gauge galvanized sheet steel to ASTM A653M, Grade 230, with Z275 zinc coating.
  - (ii) Finish: factory precoated with high molecular polyester coating Colorite HMP, colour to be selected from standard colour chart.
  - (iii) Colour sample to be approved by Contract Administrator.
- (b) Metal flashings, trim, closures exposed to view: prefinished steel sheet of same gauge and finish as roof panels.
- (c) Sheet metal accessory components not exposed to ground level view: galvanized steel sheet, minimum 24 gauge.
- (d) Screws anchors: as recommended by roofing supplier. Use galvanized anchors, with length and size to meet roof system design.
- (e) Deck closures: gauge and profile as recommended by manufacturer.

#### E21.2.3 Waterproof Membrane

- (a) Self-adhesive, modified bitumen sheet, minimum 1 mm (40 mils) thick, non-slip surface. Acceptable material: IKO Armour Gard Ice and Water Protector, W.R. Grace Ice and Water Shield; Domtar Eavesshield; Nordshield Water Stopper; Bakor Eave Guard; BPCO ProGard; EMCO Gripgard.

#### E21.2.4 Fascia, Gutters and Downspouts

- (a) Form fascia and trim of prefinished steel sheet of same material, thickness, finish and colour as roof panels.
- (b) Form gutters and downspouts of prefinished steel sheet of same material, thickness, finish and colour as roof panels, conforming to sizes and profiles indicated.
- (c) Form gutter liner of galvanized steel sheet, minimum 26 gauge, conforming to sizes and profiles indicated on Drawings. Form in longest possible lengths to reduce number of joints. Seal joints against leakage.
- (d) Provide goosenecks, outlets and necessary fastenings.
- (e) For open type downspouts fabricate of prefinished steel sheet with same finish and colour on both sides of sheet. Prefinished sheet steel colour to match colour of clay brick veneer as closely as possible. Submit samples to Contract Administrator for review prior to ordering material
- (f) Gutter hangers, purpose made, concealed type. Spikes and ferrules not permitted.

#### E21.3 Construction Methods

##### E21.3.1 Guarantee

- (a) Provide a written guarantee, signed and issued in the name of The City stating that the entire roofing system is guaranteed against leaking for a period of two (2) years from the date of completion.

##### E21.3.2 Standards

- (a) The materials and installation shall meet the applicable standards of the National Building Code, Underwriters Laboratories of Canada (ULC), the Canadian Standards Association (CSA) and any other applicable codes, standards and by-laws.
- (b) Written confirmation of conformance with these standards shall be provided to The City.

##### E21.3.3 Shop Drawings

- (a) Submit shop drawings in accordance with E5 to the Contract Administrator for review prior to order of materials or commencement of site work.

- (b) Indicate arrangement of prefinished roof sheets, including joints, types and location of supports, fasteners, and any special shapes.

#### E21.3.4 Quality Assurance

- (a) Roofing Contractor must be a member in good standing with the Roofing Contractors Association of Manitoba.
- (b) The contractor is responsible for ensuring that the design, supply and total installation of this project are supervised and executed by fully trained and qualified personnel.
- (c) Installer shall demonstrate at least five years experience in projects similar in scope.

#### E21.3.5 Roof System Design

- (a) Prefinished roof deck supplier to design connections to substructure for maximum 2.0 kPa uplift, based on connections as required. Contractor to submit Contract Administrator sealed shop drawings of anchorage details to the Contract Administrator for review prior to fabrication and installation.
- (b) Roof system fabricator is responsible for complete design and engineering of snow/ice guard system for sheet metal roofing. Guards shall be finished to match roof panels.

#### E21.3.6 Field Quality Control

- (a) Inspection of roof application may be carried out by an independent agency selected by the Contract Administrator.
- (b) Notify inspection agency minimum 48 hrs. prior to commencing roofing operations to arrange inspections. Permit agency full access to all portions of work.
- (c) Note that the last inspection is to be a "final inspection", carried out after all roofing is complete, including installation of equipment and openings, and shall be in the presence of the Contract Administrator and the Contractor.

#### E21.3.7 Waterproof Membrane Installation

- (a) Install self-adhesive membrane in accordance with manufacturer's instructions.
- (b) Roll out sheets and press firmly to substrate. As installation progresses roll with hand roller to ensure positive bond.
- (c) Set first course along eaves. Overlap each succeeding course over lower. Side and end laps minimum 75 mm. Ensure full bond to roof deck and sealed at side and end laps. Avoid excessive bubbles and fish mouths.
- (d) Flash and seal around openings and items penetrating roof deck. Cut and fit membrane neatly and snug fitting, leave no gaps. Seal with mastic sealant. Make water tight.

#### E21.3.8 Metal Roofing

- (a) Install metal roofing system in strict accordance with reviewed shop drawings and manufacturer's instructions.
- (b) Install factory manufactured panels in longest practical lengths with special panels to suit valleys and penetrations.
- (c) Provide a continuous double standard seam, mechanically locking the hold down clips into the seam.
- (d) Provide notched and formed closures, to shed water, at changes in pitch and at peaks, ridges and eaves.

#### E21.3.9 Touch-up and Cleaning

- (a) Touch up minor paint abrasions with touch-up paint provided by roof panel manufacturer to match colour of roof panels.
- (b) Clean roof by dry-wiping.
- (c) Leave job site completely clean.



#### E21.4 Measurement and Payment

- (a) The supplying and placing of metal roofing system shall be paid for under the unit price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work.

### E22. JOINT SEALERS

#### E22.1 Description

- (a) This Specification shall cover the supply and placement of all joint sealer work.

#### E22.2 Materials

##### E22.2.1 Sealant Materials Designations

- (a) Type 1 – Silicones One Part: to CAN/CGSB-19.13. Acceptable material: Dow Corning 795, GE Silpruf, Tremco Spectrum 2.
- (b) Type 2 – Silicones One Part: to CAN/CGSB-19.22-M89 (Mildew resistant). Acceptable material: Dow Corning 786.
- (c) Type 3 – Acrylic Latex One Part: to CGSB 19-GP-5M. Acceptable material: Tremco 100 Latex Caulk, GE Acrylasil Latex Caulk.
- (d) Type 4 – Butyl: to CGSB 19-GP-14M. Acceptable material: Tremco Butyl Sealant.

##### E22.2.2 Accessories

- (a) Preformed Compressible and Non-Compressible back-up materials.
  - (i) High-Density Foam. Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m density, or neoprene foam backer, size as recommended by manufacturer.
  - (ii) Bond Breaker Tape. Polyethylene bond breaker tape that will not bond to sealant.
- (b) Joint cleaner: non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.
- (c) Primer: as recommended by manufacturer.

#### E22.3 Construction Methods

##### E22.3.1 Sealant Selection

- (a) Perimeters of exterior openings where frames meet exterior facade of building: Sealant Type 1.
- (b) Miscellaneous flashing joints and metal cladding: Sealant Type 1.
- (c) Perimeter of washroom fixtures (e.g., sinks, urinals, water closets, vanities, etc.): Sealant Type 2.
- (d) Interior paintable joints: Sealant Type 3.
- (e) Bedding aluminum door sills: Sealant Type 4.

##### E22.3.2 Delivery, Storage, and Handling

- (a) Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

##### E22.3.3 Environmental and Safety Requirements

- (a) Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and

regarding labelling and provision of material safety data sheets acceptable to Labour Canada.

- (b) Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions.

#### E22.3.4 Protection

- (a) Protect installed work of other trades from staining or contamination.

#### E22.3.5 Preparation of Joint Surfaces

- (a) Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- (b) Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter that may impair work.
- (c) Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- (d) Ensure joint surfaces are dry and frost free.
- (e) Prepare surfaces in accordance with manufacturer's directions.

#### E22.3.6 Priming

- (a) Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- (b) Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

#### E22.3.7 Backup Material

- (a) Apply bond breaker tape where required to manufacturer's instructions.
- (b) Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

#### E22.3.8 Mixing

- (a) Mix materials in strict accordance with sealant manufacturer's instructions.

#### E22.3.9 Application

- (a) Sealant
  - (i) Apply sealant in accordance with manufacturer's written instructions.
  - (ii) Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
  - (iii) Apply sealant in continuous beads.
  - (iv) Apply sealant using gun with proper size nozzle.
  - (v) Use sufficient pressure to fill voids and joints solid.
  - (vi) Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
  - (vii) Tool exposed surfaces before skinning begins to give slightly concave shape.
  - (viii) Remove excess compound promptly as work progresses and upon completion.
- (b) Curing
  - (i) Cure sealants in accordance with sealant manufacturer's instructions.
  - (ii) Do not cover up sealants until proper curing has taken place.
- (c) Cleanup
  - (i) Clean adjacent surfaces immediately and leave work neat and clean.

- (ii) Remove excess and droppings, using recommended cleaners as work progresses.
- (iii) Remove masking tape after initial set of sealant.

#### E22.4 Measurement and Payment

- (a) The supplying and placing of joint sealers shall be paid for under the unit price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work.

### **E23. STEEL HOLLOW METAL DOORS AND FRAMES**

#### E23.1 Description

- (a) This Specification shall cover the supply, fabrication and placement of all steel hollow metal doors and frames.

#### E23.2 Materials

##### E23.2.1 Fabrication Standards

- (a) Fabricate doors and frames to Canadian Manufacturing Specification for Steel Doors and Frames, except where specified otherwise.

##### E23.2.2 Steel

- (a) Commercial grade steel to ASTM A568-81, Class 1, hot-dip galvanized to ASTM A527-80, coating designation to ASTM A525-81, ZF75 (A25).

##### E23.2.3 Component Part Thickness

- (a) Door frames: 1.6mm (16 gauge)
- (b) Doors: 1.2 mm (18 gauge)

##### E23.2.4 Door Construction

- (a) Insulated core, welded seam: For exterior use. Reinforced construction. Provide urethane foam insulated cores to R.S.I. of 1.76 (R=10). Laminated by adhesive to face sheets. Reinforced for hardware.

##### E23.2.5 Frame Construction

- (a) Mitred or mechanically jointed and continuously welded on the inside of the profile. Welded joints to be ground to a smooth uniform finish.
- (b) Butt joints of mullions and transoms: accurately cope, securely weld and grind smooth.
- (c) Blank, reinforce, drill and tap for mortised butts and strike. Protect cut-outs in masonry and concrete with mortar guard boxes. Reinforce for surface mounted hardware. Prepare each door for rubber bumpers, two for double door openings.
- (d) Top hinge reinforcement: weld in top hinge reinforcement with 20mm leg to hinge reinforcement, 25mm to frame.
- (e) Insulation: provide foam-in insulation in all exterior frame cavities.
- (f) Door Hardware to be as shown on Drawings.

##### E23.2.6 Frame Anchors

- (a) Frames for installation shall be provided with minimum four steel anchors of suitable design.

##### E23.2.7 Keying

- (a) Keys to match The City's existing "Medeco" system. The City to provide lock number before keying.
- (b) Provide keys in triplicate for every lock.

**E23.2.8 Shop Drawings**

- (a) Submit shop drawings in accordance with E5 Shop Drawings.
- (b) Submit shop drawings clearly indicating each type of door and frame, material, steel core thickness, mortises, reinforcements, location of exposed fasteners, anchors, openings, arrangement of hardware, and finishes.

**E23.3 Construction Methods**

**E23.3.1 General**

- (a) Install doors and frames to CSDFMA Installation Guide.

**E23.3.2 Door Installation**

- (a) Install doors and hardware in accordance with templates and manufacturer's instructions.
- (b) Adjust operable parts for correct function.

**E23.3.3 Frame Installation**

- (a) Set frames plumb, square, level and at correct elevation. Secure anchorages and connections to adjacent construction.
- (b) Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in. Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

**E23.3.4 Painting**

- (a) Paint doors and frames in accordance with E24 Painting in colour approved by Contract Administrator.

**E23.4 Measurement and Payment**

- (a) The supplying and placing of steel hollow metal doors and frames shall be paid for under the unit price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification

**E24. PAINTING**

**E24.1 Description**

- (a) This Specification shall cover the supply and placement of all painting work.

**E24.2 Materials**

**E24.2.1 Paint**

- (a) Only paint materials listed in the MPI Approved Products List (APL) are acceptable for use on the project, except where other products are specified.
- (b) Paint materials for each coating formula to be products of a single manufacturer.
- (c) Colour schedule will be provided by Contract Administrator. Selection of colours will be from manufacturer's full range of colours.

**E24.2.2 Paint Finishes**

- (a) Except for Formula 1 (epoxy) use Master Painters Institute (MPI) finishing formulae as specified below.
- (b) Formula 1: for wood to receive paint finish:
  - (i) MPI EXT 6.4B - Alkyd GR (semi-gloss) finish premium grade.

- (c) Formula 2: for shop primed and unprimed ferrous metal surfaces:
  - (i) MPI EXT 5.1D - Alkyd G5 (semi-gloss) finish premium grade.
- (d) Formula 3: for galvanized and zinc-coated metal apply:
  - (i) MPI EXT 5.3B - Alkyd G5 (semi-gloss) finish premium grade.
- (e) Formula 4: for concrete, walls and ceilings apply:
  - (i) MPI EXT 3.1A - Latex G5 (semi-gloss) finish premium grade.
- (f) Formula 5: for concrete floors apply:
  - (i) MPI EXT 3.2D - Alkyd floor enamel #59 low gloss finish premium grade.  
Sprinkle with clean silica sand to provide slip-resistant surface acceptable to Contract Administrator.

### E24.3 Construction Methods

#### E24.3.1 Standard of Acceptance

- (a) Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface when viewed using final lighting source.
- (b) Ceilings: No defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- (c) Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

#### E24.3.2 Delivery, Storage and Handling

- (a) Deliver and store materials in original containers, sealed with labels intact.
- (b) Indicate on containers or wrappings:
  - (i) Manufacturer's name and address.
  - (ii) Type of paint.
  - (iii) Compliance with applicable standard.
  - (iv) Colour number in accordance with colour schedule provided by Contract Administrator.
- (c) Observe manufacturer's recommendations for storage and handling.

#### E24.3.3 Environmental Requirements

- (a) Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- (b) Ventilation: ventilate area of work by use of approved portable supply and exhaust fans.
- (c) Provide temporary heating where permanent facilities are not available to maintain minimum recommended temperatures.
- (d) Apply paint finish only in areas where dust is no longer being generated by related construction operations such that airborne particles will not affect the quality of the finished surface.
- (e) Apply paint only when surface to be painted is dry, properly cured, and adequately prepared.

#### E24.3.4 Extra Materials

- (a) Submit one 4-litre can of each type and colour of primer and finish coating. Identify colour and paint type in relation to established colour schedule and finish formula.
- (b) Deliver to The City and store where directed.

#### E24.3.5 Protection

- (a) Cover or mask floors, walls, and equipment adjacent to areas being painted to prevent damage and to protect from paint drops and splatters. Use non-staining coverings.
- (b) Protect items that are permanently attached such as Fire Labels on doors, frames, and name plates on equipment.
- (c) Protect factory finished products and equipment.

#### E24.3.6 Cleaning and Surface Preparation

- (a) Clean and prepare surfaces in accordance with MPI Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
  - (i) Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
  - (ii) Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
  - (iii) Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
  - (iv) Allow surfaces to drain completely and allow to dry thoroughly.
- (b) Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.
- (c) Where possible, prime surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
  - (i) Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
  - (ii) Apply wood filler to nail holes and cracks.
- (d) Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted.
- (e) Touch up of shop primers with primer as specified in applicable section. Major touch-up including cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas, shall be by supplier of fabricated material.

#### E24.3.7 Application

- (a) Apply paint in accordance with manufacturer's application instructions unless specified otherwise.
- (b) Apply each coat of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- (c) Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- (d) Sand and dust between each coat to remove visible defects.
- (e) Finish top, bottom, edges and cut-outs of doors after fitting as specified for door surfaces.

#### E24.3.8 Mechanical/Electrical Equipment

- (a) Do not paint exposed conduit, ductwork and hangers, unless otherwise indicated.
- (b) Paint exposed piping. Colour and texture to match adjacent surfaces, except as noted otherwise.
- (c) Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

- (d) Do not paint over nameplates, brass or bronze surfaces or machined surfaces.
- (e) Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

E24.3.9 Restoration

- (a) Clean and reinstall all hardware items that were removed before undertaken painting operations.
- (b) Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

E24.4 Measurement and Payment

- (a) Painting shall be paid for under the unit price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work.

**E25. GRAFFITI RESISTANT COATING**

E25.1 Description

- (a) This Specification shall cover the supply, fabrication, transportation, handling, delivery and placement of all graffiti resistant coating to all exterior masonry veneer.

E25.2 Materials

E25.3 Graffiti-resistant coating: one component, water based, non-sacrificial, clear sealer consisting of blend of polymers, organo silanes, and siloxanes. Acceptable material: Fabrikem Fabrishield Paint Repellent PR Series.

E25.4 Construction Methods

E25.4.1 Sample Application

- (a) Apply graffiti-resistant coating to mock-up panel specified in E13 Masonry.
- (b) Do not proceed with coating work until Contract Administrator has reviewed and accepted sample application.

E25.4.2 Product Data

- (a) Submit manufacturer's product data, specifications and application instructions to Contract Administrator prior to application of coatings.

E25.4.3 Environmental Conditions

- (a) Maintain ambient and structural base temperature at installation area within limits specified by coating manufacturer. Apply coating during dry weather. Do not apply coating to wet or damp surfaces.

E25.4.4 Protection

- (a) Protect plants and vegetation that might be damaged by coating. Protect surfaces not intended to have application of coatings. Provide adequate ventilation or isolation measures to protect against toxic fumes.

E25.4.5 Surface Preparation

- (a) Prepare and clean substrate surfaces in accordance with coating manufacturer's printed instructions.
- (b) Take moisture tests on substrates to receive coating to ensure moisture levels are within limits specified by coating manufacturer.

**E25.4.6 Application**

- (a) Apply coating using low-pressure spraying apparatus, in accordance with manufacturer's instructions at manufacturer's recommended coverage rate:
  - (i) 175 – 225 ft<sup>2</sup>/gal.
- (b) Increase coverage depending on surface porosity, absorption, and surface profile.
- (c) Apply in uniform, even coats to fully wet substrate.
- (d) Allow area to dry completely before applying additional coats.

**E25.5 Measurement and Payment**

- (a) Graffiti resistant coating shall be paid for under the unit price for "Flood Protection Chamber", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification

**E26. CAST IRON SLUICE GATE**

**E26.1 Description**

- (a) This Specification shall cover the supply, installation, and testing of one cast iron sluice gate, complete with wall thimble, mechanical lift operator, stem, stem guides and accessories.

**E26.2 Materials**

- (a) General Design:
  - (i) Specification Standard: AWWA C501
  - (ii) Type: Rising stem with stop nut, flange back with standard bottom closure.
  - (iii) Mounting: Type F wall thimble
  - (iv) Seating Head: Maximum design seating head shall be from invert of the gate to the top of the gate chamber which shall be a minimum of 6.69 meters (21.9 ft).
  - (v) Operator and Lift:
    - ◆ Enclosed gear lift with pedestal
    - ◆ Operator to be finished with a 50 millimetre x 50 millimetre square nut suitable for attachment of an electric portable drill for opening.
    - ◆ Operator shall turn counter clock wise to open.
  - (vi) Stem Cover:
    - ◆ Gear lift to be complete with stem cover with acrylic window with gradations in suitable increments for the entire range of gate operation.



(vii) Stem Guides:

- ◆ Adjustable in both the horizontal and vertical directions.

<b>Part</b>	<b>Material:</b>
Frame, Slide, guides and yoke:	ASTM A48 Cast Iron, Class 30
Seating Faces:	ASTM B21 Naval Bronze, Alloy 482
Wall Thimble:	ASTM A48 Cast Iron, Class 30
Wedges:	ASTM B564 Manganese Bronze, Alloy 865
Wedge Blocks:	ASTM A48 Cast Iron, Class 30
Fasteners & Anchors:	ASTM A276 Type 316 Stainless Steel
Stem:	ASTM A276 Type 304 Stainless Steel
Stem Couplings:	ASTM A276 Type 304 Stainless Steel
Stem Guide:	ASTM A48 Cast iron, Class 30 with Bronze bushings
Operator Pedestal:	ASTM A48 Cast Iron, Class 30 or Steel
Stem cover:	Aluminum or galvanized steel

(b) Shop Drawings

- (i) Submit shop drawings of cast iron sluice gate and wall thimble in accordance with E5.
- (ii) Provide Affidavit of Compliance, certifying that the gate conforms to the requirements of AWWA C501 and this Specification.
- (iii) Submit Operation and Maintenance Manuals for review prior to commissioning gates. Submit 5 copies in suitable D ring binder, and 1 electronic copy in PDF format.

(c) Delivery and Shipping

- (i) The Contract Administrator will examine the sluice gate assembly and wall thimble upon delivery and will reject any equipment that is found to be damaged to the extent that, in the Contract Administrator's opinion, it cannot be put to the use for which it was intended. The Contractor shall arrange with the gate supplier to repair any superficially damaged equipment to the satisfaction of the Contract Administrator.
- (ii) It shall be the responsibility of the Contractor to negotiate any claims for damage with the carrier and to make arrangements to have any rejected equipment replaced as soon as possible at no extra expense to the City.

E26.3 Construction Methods

(a) Installation

- (i) Install the cast iron sluice gate, wall thimble, mechanical lift operator, stem, stem guides and accessories as shown on the drawings and in accordance with the manufacturer's recommendations.
- (ii) The Contractor will not be allowed to form a block-out in the wall for the installation of the wall thimble. The wall thimble shall be set in place prior to constructing any portion of the wall.
- (iii) Make arrangements to have a qualified field representative of the sluice gates supplier/manufacturer inspect the installation during and after completion and provide a Certificate of Satisfactory Installation to the Contract Administrator.

(b) Shop Testing

- (i) The fully assembled gate shall be shop inspected, adjusted and tested for operation and leakage at the design head before shipping.
- (ii) Provide the following information to the Contract Administrator prior to delivery of sluice gate and operator assemblies:
  - ◆ A certified copy of the Chemical and Physical Analysis on all materials used in the manufacture of the sluice gate, wall thimble, stems, operator and accessories or certification that the materials used are in strict accordance with this specification.
  - ◆ Copies of the test reports for Performance and Leakage tests. Included on the report shall be the signature of the official who is responsible for the gate assembly and testing.

(c) Field Testing

- (i) Perform leakage test in the Contract Administrator's presence once sluice gate has been installed to ensure compliance with the allowable leakage rate indicated in the latest edition of AWWA C501.
- (ii) Arrange for a qualified field representative of the sluice gates supplier/manufacturer to be present during field testing.
- (iii) Generally, the tests for seating head will be performed by closing the gates against high river levels in the spring and measuring the leakage rate through the gate.
- (iv) If it is not possible to use high river level, install inflatable plugs in the outfall, fill the chambers with water to the specified head and measure the leakage rate through the gates. Inflatable plugs shall be inflated from, anchored to and removable from the ground surface.
- (v) The tests for the unseating head will be performed by closing the sluice gate and flap gate, filling the chambers between the gates with water to the specified head and measuring the leakage rate through the gate. The flap gate may be braced when closed to eliminate leakage through it during the test. Any damage to the flap gate shall be corrected by the contractor at their expense.
- (vi) The Contractor will be responsible to pump river water or supply water from a hydrant into the chambers for testing purposes.
- (vii) If the gates fail the field leakage tests due to a manufacturing error, the supplier/manufacturer shall be responsible for the cost associated to repeat the tests, and shall undertake all adjustments, replacements or other modifications necessary to facilitate the tests at their own expense. The sequence shall be repeated until the gates pass the allowable leakage rates.

E26.4 Measurement and Payment

- (a) Supply, installation and testing of Cast Iron Sluice Gate shall be paid for under the Contract Unit Price for "Cast Iron Sluice Gate", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

**E27. CAST IRON FLAP GATE**

E27.1 Description

- (a) This Specification shall cover the supply, installation, and testing of one cast iron flap gate, complete with wall thimble, lifting mechanism, and support post.

E27.2 Materials

- (a) General Design:
  - (i) Type: Flange back for mounting on wall thimble
  - (ii) Mounting: Type F wall thimble

- (iii) Seating Head: Maximum design seating head shall be from invert of the gate to the top of the gate chamber which shall be a minimum of 6.69 meters (21.9 ft).
- (iv) Cover: One piece cast iron with lifting eye for manual operation
- (v) Winch: Thern 2W40-BM worm gear hand winch complete with adaptor allowing winch to be driven by 50 millimetre x 50 millimetre drive socket.
- (vi) Seat: One piece cast iron raised surface and inclined to assure positive closure.
- (vii) Links: Complete with grease nipples at pivot pints and adjusting screws to align seating faces.
- (viii) Pivot Lugs: One piece cast iron adjustable in the horizontal plane without removal of cover, complete with grease nipples.

Part	Material:
Cast Iron Pieces:	ASTM A48 Cast Iron, Class 30
Seating Faces:	ASTM B21 Bronze, Alloy 482
Links:	Cast Iron or High Tensile Bronze B584 – C865
Bushings:	Bronze B21, Alloy 482
Hinge Pins:	ASTM A276, Type 316 Stainless Steel or Silicon Bronze B98-CA655
Fasteners:	ASTM A276, Type 316 Stainless Steel

- (b) Shop Drawings
  - (i) Submit shop drawings of cast iron flap gate and wall thimble in accordance with E5.
  - (ii) Submit Operation and Maintenance Manuals for review prior to commissioning gates. Submit 5 copies in suitable D ring binder, and 1 electronic copy in PDF format.
- (c) Delivery and Shipping
  - (i) The Contract Administrator will examine the flap gate assembly and wall thimbles upon delivery and will reject any equipment that is found to be damaged to the extent that, in the Contract Administrator's opinion, it cannot be put to the use for which it was intended. The Contractor shall arrange with the gate supplier to repair any superficially damaged equipment to the satisfaction of the Contract Administrator.
  - (ii) It shall be the responsibility of the Contractor to negotiate any claims for damage with the carrier and to make arrangements to have any rejected equipment replaced as soon as possible at no extra expense to the City.

### E27.3 Construction Methods

- (a) Installation
  - (i) Install the cast iron flap gate and the wall thimble as shown on the drawings and in accordance with the manufacturer's recommendations.
  - (ii) The Contractor will not be allowed to form a block-out in the wall for the installation of the wall thimble. The wall thimble shall be set in place prior to constructing any portion of the wall.
  - (iii) Make arrangements to have a qualified field representative of the flap gate supplier/manufacturer inspect the installation during and after completion and provide a Certificate of Satisfactory Installation to the Contract Administrator.
- (b) Field Testing
  - (i) Perform leakage tests in the Contract Administrator's presence once the flap gate has been installed to ensure compliance with the allowable leakage rate of 1.24 L/min per metre of seated perimeter at any head.
  - (ii) Arrange for a qualified field representative of the flap gate supplier/manufacturer to be present during field testing.

- (iii) The test for seating head will be performed by closing the flap gate and sluice gate, filling the chambers between the gates with water to the specified head and measuring the leakage rate through the gate.
- (iv) The Contractor will be responsible to pump river water or supply water from a hydrant into the chambers for testing purposes.
- (v) If the gates fail the field leakage tests due to a manufacturing error, the supplier/maker shall be responsible for the cost associated to repeat the tests, and shall undertake all adjustments, replacements or other modifications necessary to facilitate the tests at their own expense. The sequence shall be repeated until the gates pass the allowable leakage rates.
- (vi) If the gates fail the field leakage tests due to an installation and handling error, the supplier/maker shall be responsible for the cost associated to repeat the tests, and shall undertake all adjustments, replacements or other modifications.

**E27.4 Measurement and Payment**

- (a) Supply, installation and testing of Cast Iron Flap Gate paid for under the Contract Unit Price for "Cast Iron Flap Gate", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

**E28. PTO-DRIVEN VERTICAL PUMPS**

**E28.1 Description**

- (a) This Specification shall cover the supply, installation, and testing of two pto-driven vertical pumps, extended driveshaft, piping, and all accessories.

**E28.2 Materials**

- (a) General:
  - (i) The pump shall be capable of being PTO driven. The pump shall be suitable for removing irrigation water from the wet well. The pump shall consist of a 406 mm (16") submerged pump, right angle gear drive, appurtenances and ancillary equipment necessary to provide a complete and operable unit.
- (b) Service Conditions:
  - (i) The pump shall be capable of continuously removing irrigation water in the wet well and pumping it at a minimum rate of 0.58 cms (9,200 USGPM) against a head of 8.53 m (28 ft).
- (c) Operating Requirements:
  - (i) The pump shall be specifically selected to meet or exceed, but shall at no point be less than performance conditions (as follows) and requirements as testing in clean water in accordance with current Hydraulic Institute Standards:

Rated Total Dynamic Head (feet)	Rated Flowrate (USGPM)
22	11,000
25	10,200
30	8,600
35	6,200
40	0

- (ii) Pump shall not overload any component of its power supply and shall be free from cavitation, excessive vibration or any other operational problem when operating at any speed at any operating point within the following boundaries on a conventional head/capacity plot:

- ◆ Upper Boundary: Pump characteristic curve at 540 rpm as specified in above section.
  - ◆ Lower Boundary: The horizontal line representing 22 feet total dynamic head.
  - ◆ Left Hand Boundary: The vertical line representing 2,000 USGPM.
- (iii) It shall be the responsibility of the pump Manufacturer for incorporation of all the related equipment specified herein into a complete working unit ready for service to the performance requirements specified herein.
- (d) Environmental Conditions
- (i) The equipment specified in this section shall be suitable for environmental conditions ranging from 0 degrees C to 43 degrees C, rain, snow, hail and intense sunlight.
- (e) Submittals
- (i) Submittals shall include the following information:
    - ◆ Shop drawings of pumps and all associated drive shafts, shaft guards, piping and accessories in accordance with E5.
    - ◆ Exceptions to these specifications along with justification for each exception.
    - ◆ Manufacturer's catalog data confirming conformance to specified requirements.
    - ◆ Overall dimensional data including drawings, sketches and photographs.
    - ◆ Predicted performance curves developed for the specific application. Pump performance curves shall show speed, capacity, pressure, power and efficiency for the specified conditions.
    - ◆ Parts list noting materials of construction.
    - ◆ List of five locations where the Manufacturer has supplied a pump used to pump high viscosity organic solids. The list shall include the name and address of the respective owner and contact person who has knowledge of pump performance.
- (f) Acceptable Products
- (i) The pump shall be a Crisafulli (SRS Crisafulli, Inc., P.O. Box 1051, Glendive, Montana 59330) sludge handling pump or approved equal in accordance with B6 as necessary to provide the specified features.
- (g) Pump and Appurtenances:
- (i) Submerged Pumping Unit:
    - ◆ The submerged pumping unit shall consist of a fabricated 3/8" thick A36 steel centrifugal pump with a 16" minimum discharge mounted on the bottom of the vertical assembly. Pump bearings shall be single seal grease ball bearings with an AFBMA L10 rating of 40,000 hours and shall be totally enclosed in a non-ventilated bearing protection system with extended lube lines that are accessible from above the wet well at all times. The pump shall be marked and identified with a cast metal identification plate that includes the manufacturer's name, manufacturer's location and the pump serial number. The identification plate shall be securely attached to the pump. The pump shall also be marked with manufacturer identification stickers and a sticker indicating correct pump rotation.
    - ◆ Flange connecting the pump end and the pump discharge shall consist of 1/2" thick steel plate flange.
    - ◆ The water pump shall be driven through a right angle gear box. The water pump shall be capable of passing a minimum of 5 1/2 inch solids

without clogging. The pump shall be capable of being rotated in the reverse direction without damage to any component.

- ◆ All rotating parts shall be accurately machined and in as nearly perfect rotational balance as practicable. The mass of the unit and its distribution shall be such that resonance at any operating speed is avoided. In any case, the vibration displacement (peak to peak) as measured at any point on the mounted pump and motor combination shall not exceed 5 mils. The drive shaft to the pump impeller shall be of sufficient size to minimize shaft deflection to 0.002 inches for maximum hydraulic radial loads.

(ii) Gear Drive

- ◆ The pump shall be equipped with a right angle bevel gear drive that is to be extended from the pump to a connection point located as close as possible to the tractor access doors at the west wall of the building. The connection point shall accept PTO input, as shown on the drawings. The gear drive shall be a 1:1 ratio and sized for continuous duty at the performance listed herein.
- ◆ The drive shaft shall be fully protected by a shaft guard. The shaft guard shall fit around the drive shaft and shield the shaft from human contact completely. The shaft guard shall be removable to allow access to the drive shaft for maintenance and inspection.
- ◆ A PTO shaft suitable for connecting the tractor to the PTO connection shall be provided with the pump.

(iii) Painting

- ◆ The pump and all other steel parts and appurtenances shall be painted as specified herein.
- ◆ All rusted iron and steel surfaces shall be cleaned in accordance with SSPC SP 5 (white metal blast cleaning). The prime coating shall consist of one coat of enamel primer coating. Finish coats shall consist of one or more coats in red enamel coating to obtain a total dry film thickness of 4 mm on submerged parts and minimum 4 mm on non-submerged parts. All work shall be done in a manner to provide a finished surface free from excessive runs, drips, ridges, waves, or laps. All coats shall be applied to form a uniform thickness completely covering all corners and crevices. The finish coat shall be allowed one-day minimum cure time before handling.

(iv) Spare Parts

- ◆ Supply one (1) set of all pump bearing protection seals
- ◆ Supply two (2) sets of all pump bearing protection gaskets
- ◆ Supply two (2) sets of all pump bearings

(v) Lubricants

- ◆ The Manufacturer shall provide the pump with its proper supply of correct lubricant for starting, testing and adjustment. The Manufacturer shall provide the name and address of the nearest suppliers of any special lubricants, bearings and parts not available through the Owner's current suppliers.
- ◆ All submerged bearings or fittings requiring lubrication shall be fitted with bearing protection systems complete with lubrication boxes, seals and extended tubes such that they can be lubricated from a location which is always above the water surface.

(vi) Discharge Piping System

- ◆ The discharge piping shall be 16" with a 90 degree flanged elbow, and plain end discharge above grade. Provide 3 tie rod connections each side of discharge head for tie bolts across flanged coupling adapter with

a 90 degree elbow into a ½” baseplate (if required). The center of the discharge elbow shall be orientated 180 degrees away from the drive shaft.

(h) Delivery and Shipping

- (i) The Contract Administrator will examine the flap gate assembly and wall thimbles upon delivery and will reject any equipment that is found to be damaged to the extent that, in the Contract Administrator’s opinion, it cannot be put to the use for which it was intended. The Contractor shall arrange with the gate supplier to repair any superficially damaged equipment to the satisfaction of the Contract Administrator.
- (ii) It shall be the responsibility of the Contractor to negotiate any claims for damage with the carrier and to make arrangements to have any rejected equipment replaced as soon as possible at no extra expense to the City.

**E28.3 Construction Methods**

(a) Installation

- (i) Install the pumps as shown on the drawings and in accordance with the manufacturer’s recommendations.
- (ii) Make arrangements to have a qualified field representative of the pump manufacturer inspect the installation during and after completion and provide a Certificate of Satisfactory Installation to the Contract Administrator.

(b) Field Testing

- (i) Field tests will be performed on each pumping unit immediately after the Contractor has inspected the installation. Field tests will determine the general operational ability of the pumps and check for the following:
  - ◆ Direction of rotation
  - ◆ Noise (bearing, mechanical seal, cavitation, etc)
  - ◆ Vibration
  - ◆ Reasonable drawdown time
- (ii) The Contractor shall fill the upstream channel to an elevation of 228.1 m (approximately to the top of the existing culvert inlet) with water sourced from the storm retention basin located upstream of the channel. The pump shall be activated and run until the channel is completely drawn down. The time to drawdown the channel will be recorded. The test shall be performed separately for each pump.

**E28.4 Measurement and Payment**

- (a) Supply, installation and testing of PTO-Driven Vertical Pumps shall be paid for under the Contract Unit Price for “PTO-Driven Vertical Pumps”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

**E29. SUPPLY AND PLACEMENT OF CLAY FILL**

**E29.1 Description**

- (a) This Specification covers the supply and placement of clay fill on the east embankment of Pembina Highway and shall amend and supplement Standard Specification CW 3170.
- (b) The Work to be done under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work hereinafter specified

## E29.2 Materials

- (a) Clay fill material, as approved by the Contract Administrator, may be used for grading purposes excluding deleterious material such as snow, frozen soil, roots, tree trunks, and rubble.

## E29.3 Construction Methods

- (a) Clay shall be placed and compacted to full width in uniform layers not exceeding 300 mm.
- (b) Clay shall be compacted to 95% SPMDD as determined by ASTM D698.

## E29.4 Measurement and Payment

- (a) Supply and placement of clay fill shall be measured on a volume basis. The volume to be paid for shall be the total number of cubic metres (c.m.) placed, in accordance with this specification as computed from measurements verified by the Contract Administrator. Payment shall be at the Contract Unit Price for "Supply and Placement of Clay Fill"

## **E30. INSTALLATION OF TURFSTONE UNITS**

### E30.1 Description

E30.1.1 This specification shall supplement and amend City of Winnipeg Standard Construction Specification CW 3330 "Installation of Interlocking Paving Stones".

### E30.1.2 Referenced Standard Construction Specifications

- (a) CW 3110- Sub-grade, Sub-base and Base Course Construction
- (b) CW 3310- Portland Cement Concrete Pavement Works
- (c) CW 3330- Installation of Interlocking Paving Stones
- (d) CW 3520-R7- Seeding
- (e) CW 3540-R5- Topsoil and Finish Grading for Establishment of Turf Areas

### E30.1.3 Referenced Standard Detail

- (a) SD-240A- Interlocking Paving Stone Detail

### E30.2 Materials

#### E30.2.1 Turfstone Units

- (a) Turfstone units shall be Barkman Concrete Turfstone Eco Units or approved equal in accordance with B6.
- (b) Turfstone units shall conform to the requirements of CAN3-A231.2, Precast Concrete Pavers.
- (c) Further to CAN3-A231.2.6.1.1, where concrete pavers are shipped for installation before the pavers are twenty-eight (28) days old, the average compressive strength of these pavers at the time of delivery to the work site shall be not less than 40 MPa.

#### E30.2.2 Edge Restraints

- (a) Edge restraints shall be a 200 x 250 poured in place concrete curb. Refer to CW 3310.

#### E30.2.3 Topsoil

- (a) Topsoil shall be in accordance with CW 3540-R5.

#### E30.2.4 Grass Seed Mix

- (a) Grass seed mix shall be in accordance with CW 3520-R7.



E30.2.5 Other Materials

- (a) All other materials, including aggregates for the bedding sand and filler sand shall be in accordance with CW 3330.

E30.3 Construction Methods

E30.3.1 Installation of Turfstone Units

- (a) Install turfstone units in accordance with drawings and CW 3330 and SD-240A.
- (b) Fill turfstone units with topsoil to within 13mm of top of turfstone units and install Grass Seed Mix in accordance with CW 3520-R7.

E30.4 Measurement and Payment

- (a) Supply and installation of turfstone units shall be measured and paid for at the Contract Unit Price per square meter for Turfstone Units, which price shall be payment in full for supplying all materials and performing all operations herein specified.

**E31. INSTALLATION OF GRAVEL PATHWAY**

E31.1 Description

E31.1.1 General

- (a) This specification supplements City of Winnipeg Standard Construction Specification CW 3150 "Gravel Surfacing".
- (b) Referenced Standard Construction Specifications:
  - (i) CW 3110 "Sub-grade, Sub-base and Base Course Construction"
  - (ii) CW 3130 "Supply and Installation of Geotextile Fabrics"

E31.2 Materials

E31.2.1 Granular Surfacing Material

- (a) Granular surfacing material for the base and sub-base course shall be in accordance with CW 3110.

E31.2.2 Geotextile Liner

- (a) Geotextile liner shall be in accordance with CW 3130 "Supply and Installation of Geotextile Fabrics".

E31.3 Construction Methods

E31.3.1 Installation of Gravel Pathway

- (a) Gravel pathway to be constructed as follows: 100 mm sub-base in accordance with sections 3.3 and 3.4 of CW 3110 and 50 mm base in accordance with section 3.2 of CW 3150.

E31.3.2 Installation of Geotextile Liner

- (a) Geotextile liner to be constructed in accordance with CW 3130.

E31.4 Measurement and Payment

E31.4.1 Supply and Installation of Sub-base and Base

- (a) Supply and installation of base and sub-base course shall be measured on an area basis and paid for at the Contract Unit Price per cubic metre for the "Items of Work" listed here below, which price shall be payment in full for supplying all materials and performing all operations herein specified, and all other items included in the work of this specification.

- (b) Items of Work:
  - (i) Sub-base 20mm Down Limestone
  - (ii) Base 6mm Down Limestone

E31.4.2 Supply and Installation of Geotextile Liner

- (a) Supply and installation of geotextile liner shall be measured on an area basis and paid for at the Contract Unit Price per square metre for "Geotextile Liner", which price shall be payment in full for supplying all materials and performing all operations herein specified, and all other items included in the work of this specification.

**E32. WOODEN BOLLARDS**

E32.1 Description

E32.1.1 This specification covers the supply and installation of wooden bollards in areas indicated on the Drawings.

E32.1.2 The Work to be done under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work hereinafter specified.

E32.2 Delivery and Storage

E32.2.1 Store units in a protected location, immediately upon arrival on the site.

E32.2.2 Remove from site any units which have been damaged during transportation and replace.

E32.3 Materials

E32.3.1 Materials for the wooden bollards shall be as specified on the Drawings.

E32.4 Construction Method

E32.4.1 Wooden bollards shall be installed in locations and in the manner indicated on the Drawings.

E32.5 Measurement and Payment

E32.5.1 Bollards will be measured on a per unit basis. Payment shall be at the Contract Unit Price for "Supply and Install Wooden Bollard".

**E33. SODDING**

E33.1 Description

E33.1.1 General

(a) This specification shall amend and supplement City of Winnipeg Standard Construction Specification CW 3510-R9 "Sodding", and shall cover all aspects of sod supply and installation, including preparation of finish grade, watering and rolling, and 30-day maintenance.

(b) Referenced Standard Construction Specifications:

- (i) CW 3510-R9 Sodding
- (ii) CW 3540-R5 Topsoil and Finish Grading

(c) Referenced Standard Details

- (i) SD-243- Sodding Details

### E33.2 Materials

#### E33.2.1 Turf Grass Sod

- (a) Turf grass sod shall conform to CW 3510-R9.
- (b) Sod shall be a mixture of 95% Kentucky bluegrass, using equal proportions of any three Class 2 cultivars, and 5% Creeping Red fescue.
- (c) Topsoil and fine grading shall conform to CW 3540-R5.

#### E33.3 Construction Methods

##### E33.3.1 Installation of Topsoil and Finish Grading, Preparation of Finish Grade, Placement of Sod, Watering and Rolling and 30-Day Maintenance

- (a) Install 75 mm topsoil in accordance CW 3510-R9.
- (b) Finish grading, sod placement, watering and rolling and 30-day maintenance shall conform to CW 3510-R9 and SD-243

#### E33.4 Measurement and Payment

##### E33.4.1 Measure sod (c/w 75 mm imported topsoil) in accordance with CW 3510-R9.

##### E33.4.2 Payment for supply and installation of sod, including 30-day maintenance before acceptance will be in accordance with CW 3510-R9.

##### E33.4.3 Payment shall be in accordance with the following:

- (a) 75% of quantity following supply and placement of sod including topsoil depth as specified in Form B, and
- (b) 25% of quantity following termination of the 30 day maintenance period before acceptance.

### **E34. ESTABLISHMENT OF SEEDED AREAS**

#### E34.1 Description

##### E34.1.1 This specification shall amend and supplement City of Winnipeg Standard Construction Specification CW 3520-R7 "Seeding", and shall cover all aspects of supply and installation of seed, including preparation of finish grade, hydro mulching, and maintenance.

##### E34.1.2 Referenced Standard Construction Specifications

- (a) CW 3520-R7 – Seeding
- (b) CW 3540-R5 – Topsoil and Finish Grading for Establishment of Turf Areas

#### E34.2 Materials

##### E34.2.1 All seed supplied by the Contractor shall be Canada Certified No. 1 or Canada Certified No. 2 and come complete with a Certificate of Analysis verifying that quality standards for Canada Certified No. 1 or Canada Certified No. 2 seed are met. The Contractor shall submit the Certificates of Analysis to the Contract Administrator.

##### E34.2.2 Native Seed Mix

- (a) The seed supplied shall be free of disease and mixed by percentage (%) of weight to meet the following blends:
  - (i) Seed for naturalization area to be local native tall grass prairie seed with specific mixes for each slope, aspect and elevation. Contractor to supply a seed mix list prior to construction. Seed mix to include no greater than 34% of any one species and a minimum of 3 species from:

Western Wheatgrass	Slender Wheatgrass
Green Needlegrass	Canada Wild Rye
Fringed Brome	June Grass
Switch Grass	Big Bluestem
Tickle Grass	

E34.2.3 Fescue Over-seed

(a) The Fescue seed mix shall be a blend of one or more of the following:

Creeping Red fescue (*Festuca rubra*)  
Audubon or Aberdeen Red fescue (*Festuca rubra*);

E34.2.4 Grass Seed Mix in Turfstone

(a) The Grass seed mix shall be the blend 'for general park areas, boulevards, medians and interchange areas' found in CW3520 – SEEDING

E34.2.5 Prior to payment for the seeding operation the Contractor shall provide the Contract Administrator with a copy of an invoice or a shipping bill received from the seed distributor specifying the quantities of each type of seed supplied for the Work Site and the delivery date.

E34.2.6 Any variations to the above referenced seed blends or mixtures shall be approved by the Contract Administrator prior to sowing.

E34.2.7 Herbicides shall be standard commercial products registered for sale and use in Canada under the Pest Control Products Act.

E34.2.8 Insecticides shall be standard commercial products registered for sale and use in Canada under the Pest Control Products Act.

E34.2.9 Topsoil as per CW3540 or as noted on the drawings.

E34.3 Construction Methods

E34.3.1 Where work is to be done in boulevard and median areas adjacent to roadways, the Contractor shall maintain traffic and ensure that protection is afforded to the road user and that the Contractors operations in no way interfere with the safe operation of traffic.

E34.3.2 The Contractor shall supply, erect and maintain all applicable traffic control devices in accordance with the provisions of the latest edition of the Manual of Temporary Traffic Control in Work Areas on City Streets issued by the Public Works Department of the City of Winnipeg.

E34.3.3 To prevent the formation of depressions or water pockets, the Contractor shall smooth out any undulations or irregularities in the topsoil surface resulting from fertilizing, seeding, rolling or other operations.

E34.3.4 The Contractor shall not commence seeding operations until the finished topsoil surface is inspected and approved by the Contract Administrator.

E34.3.5 Seeding

(a) Native Seed Mix: Imported Topsoil

(i) Seed shall be sown on 75mm compacted depth of imported topsoil and at rates suitable to the plant species and mix design. Seeding rates are to be included in seed mix design provided by Contractor.

(b) Fescue Over-seed Mix

(i) Over-seed fescue in designated sod areas 90 days after sod installation, or as instructed by the Contract Administrator, using a slit seeder or drill seeder.

(ii) Over-seed at a rate of 0.60 kg/100 square metres and at rates suitable to the plant species and mix design.

- (c) Grass Seed Mix
  - (i) Seed shall be sown on 40mm compacted depth of imported topsoil in turfstone areas.
  - (ii) Seed at a rate of 1.0 kg/100 square metres.
- (d) The Contractor shall sow the seed into the approved seed bed by using seeding equipment suitable for the area involved and to the satisfaction of the Contract Administrator.
- (e) All seeded areas shall be rolled to form a uniform even surface, level with adjoining curbs, sidewalks or sod.
- (f) Water shall be applied in sufficient quantities to saturate seeded area to a minimum depth of 100 mm. All costs to provide water for seeded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.
- (g) Seeding operations shall be completed within two working days after the commencement of sowing operation. This shall include the application of seed, rolling and watering.
- (h) No seeding shall be done on frozen soil, or when any other conditions unfavourable to successful seed germination exist.
- (i) The contractor is to maintain the seeded area with all required watering, mowing, weed removal etc. to establish a healthy plant community for the duration of the growing season.

#### E34.3.6 Commencement of Maintenance Period

- (a) Immediately after the completion of the final seeding operation, to the satisfaction of the Contract Administrator, the Contractor shall commence and pay for continuous maintenance of the seeded area until the criteria specified for Termination of the Maintenance Period has been met.
- (b) Any deficient, damaged or vandalized areas shall be reseeded by the Contractor within three working days after receiving notification from the Contract Administrator and the area so reseeded, shall be further maintained until it meets the criteria specified in Maintenance of Seeded Area.

#### E34.3.7 Maintenance of Seeded Area

- (a) The Contractor shall water all seeded areas in sufficient quantities and at frequency required to maintain soil under seeded area continuously moist to a minimum depth of 100 mm. Any damage, which may occur through washout of the soil during the maintenance period shall be repaired and maintained until it meets the criteria specified in Clause 9.10. All costs to provide water for seeded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.
- (b) Given the need for weed control, the Contractor shall have in his possession a Pesticide Applicator's License and a Pesticide Use Permit for pesticide applications related to this Specification.
- (c) The Contractor shall apply herbicide with spot spraying when broadleaf weeds start developing in competition with grasses. Apply herbicide in accordance with the City of Winnipeg Weed Control Standards and Procedures, manufacturer's instructions and the Manitoba Agriculture Guide to Crop Protection and Herbicide Recommendations for Landscape Applicators, latest editions and the following criteria:
  - (i) Use 2,4-D Amine or MCPA Amine herbicide for susceptible broadleaf weeds.
  - (ii) Use a mixture containing 2,4-D Amine or MCPA Amine, Mecoprop and Dicamba for 2,4-D resistant plants.
  - (iii) Do not apply to newly seeded areas.
  - (iv) Do not water within one working day after application.

- (v) Apply when winds are less than 20 km/h and air temperature is above 10° (degrees) Celsius.
- (vi) Avoid use of pure Dicamba solutions near trees and shrubs.

E34.3.8 The Contractor shall inform the Contract Administrator immediately of any dangerous occurrence.

E34.3.9 Spring Clean Up

- (a) Where termination of the maintenance period has not been achieved in accordance with this specification prior to the end of a growing season, the Contractor shall complete all operations related to the cleanup of the Work Site in the following spring. This shall include the cleaning and removal of all dead vegetation, leaves, debris, snowmold and any sand or gravel resulting from winter sanding/de-icing operations from turf areas to encourage healthy and uniform grass growth.
- (b) All costs for spring clean up operations, including reseeding of areas damaged over the winter shall be borne by the Contractor if in the previous year, seed was sowed, and the termination of the maintenance period in accordance with Clause 9.10, was not achieved in that same year or where the damage was due to defective seed or maintenance not conforming to this Specification.

E34.3.10 Termination of Maintenance Period

- (a) The Contract Administrator will terminate the maintenance period after the following criteria has been met:
  - (i) The certified seed sowed meets the requirements specified in herein.
  - (ii) The seeded area has been rolled and has a firm, uniform even surface.
  - (iii) The seeded area has established into a healthy, vigorously growing condition.
  - (iv) The seeded area is free of bare and dead spots and without more than ten (10) broadleaf weeds per fifty (50) square metres.
  - (v) The seeded area has sufficient shoot growth density that no surface soil is visible.
  - (vi) Edges of established seeded areas adjacent to shrub and flower beds are well defined.
- (b) When the Contractor considers that the seeded area meets the criteria listed above, he shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying whether the Maintenance Period can be terminated. Any deficient, damaged or vandalized areas may have to be reseeded within three working days after receiving notification from the Contract Administrator and the area so reseeded, shall be further maintained by and at the expense of the Contractor in accordance with Maintenance of Seeded Area herein.
- (c) In situations where the termination of the maintenance period is not granted by the Contract Administrator before the end of a growing season, the maintenance period will commence as described herein.

E34.3.11 Site Clean Up

- (a) During both seeding and maintenance operations, all sidewalks, streets, approaches, driveways and properties near the seeding operations shall be kept clean at all times by the Contractor.
- (b) Upon completion of the project, the Contractor shall immediately remove all excess material and debris from the Work Site.

E34.4 Measurement and Payment

E34.4.1 Seeded areas will be measured on an area basis for each type of seed mix type. The area to be paid for shall be the total number of square metres installed in accordance with this Specification and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator.

E34.4.2 Supply, placement and maintenance of native seed mix with topsoil and finish grading, and fescue over-seed mix will be paid for at the Contract Unit Prices for the "Items of Work" listed here below. Prices 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, CW3510-R9.

Items of Work

Seeding

- (a) Native Seed Mix (c/w 75mm imported topsoil)
- (b) Grass Seed Mix (c/w 40mm imported topsoil)

**E35. TOPSOIL AND PLANTING SOIL**

E35.1 Description

E35.1.1 General

- (a) This specification shall amend and supplement City of Winnipeg Standard Construction Specification CW 3540-R5 "Topsoil and Finish Grading for Establishment of Turf Areas", and shall cover supply, preparation and placement of topsoil and planting soil, including preparation of existing grade, finish grading and fertilizer application.
- (b) Referenced Standard Construction Specifications
  - (i) CW 3540 Topsoil and Finish Grading for Establishment of Turf Areas

E35.2 Materials

E35.2.1 Site Topsoil

- (a) Stockpiled on-site topsoil and imported topsoil shall conform to CW 3540.

E35.2.2 Peatmoss

- (a) Peat moss shall be decomposed plant material, fairly elastic and homogenous, free of colloidal residue, wood, sulphur and iron; containing a minimum of 60% organic material by weight, with moisture content not exceeding 15%. Shredded particles shall not exceed 6 mm in size. Minimum pH value of peat shall be 4.5; maximum 6.0.

E35.2.3 Sand

- (a) Sand shall be hard, granular, sharp sand to CSA A82.56-M1976, well-washed and free of impurities, chemicals and organic matter.

E35.2.4 Bonemeal

- (a) Bonemeal shall be raw, finely ground with a minimum chemical analysis of 3% nitrogen and 20% phosphoric acid.

E35.2.5 Wood Chip Mulch

- (a) Wood chip mulch shall be chipped ash, maple, poplar, birch and other deciduous trees. Mulch shall be chipped to sizes ranging from 50mm to 100mm. Mulch may NOT contain stringy twigs and seed, free of non-organic material, wood preservatives or diseased wood. The mulch shall contain no more than 5% of the following materials in total: soil, sawdust, peatmoss, coniferous wood and needles.
- (b) The Contractor shall supply a wood chip mulch sample to the Contract Administrator for approval prior to installation.

E35.2.6 Fertilizer

- (a) Chemical fertilizers shall have N-P-K compositions as recommended by an agricultural soil-testing laboratory approved by the Contract Administrator provided for each of the following:

- (i) Sod (City Specification) with imported topsoil;
- (ii) Native Seed Mix with imported topsoil;
- (iii) Grass Seed Mix with imported topsoil.

E35.2.7 Chemical Application

- (a) Roundup or similar chemical herbicides approved by Agriculture Canada shall be used only with the approval of the Contract Administrator.

E35.3 Construction Methods

E35.3.1 Imported Topsoil and Finish Grading

- (a) Installation of imported topsoil in areas to receive sod (or turf grass seed), including preparation of existing grade, placing topsoil, applying fertilizer and finish grading shall conform to CW 3540.

E35.3.2 Placing Stockpiled Topsoil

- (a) After grading, load, haul and place previously stockpiled topsoil in locations shown on the Drawings to a uniform depth of 50 mm.

E35.3.3 Conditioning Site Topsoil

- (a) Conditioning of site topsoil shall involve the following operations:
  - (i) Break up site topsoil, cross cultivate, using a disc or harrow to obtain a friable soil base for seeding;
  - (ii) Remove any stones, branches, large roots, debris or other material deleterious to obtaining smooth grass surfaces and good plant growth;
  - (iii) Mix in fertilizer as recommended by soil testing laboratory.
- (b) Install imported or site topsoil to 75 mm compacted depth in areas to be seeded with Grass Seed Mix.

E35.3.4 Planting Soil Mixture for Trees and Shrubs

- (a) Planting soil mixture shall be a mix of 75% topsoil and 20% peatmoss, loose by volume. Incorporate 5% sand, or as required, to improve soil texture. Incorporate bonemeal at 3 kg/cubic metre of planting soil mixture.

E35.3.5 Construction of Planting Beds

- (a) Excavate planting beds to a depth of 300 mm.
- (b) Install planting soil mixture, loosely compacted, 300 mm deep in planting beds with a smooth top surface to match surrounding contours. Level planting soil mixture by hand around existing and newly planted trees and shrubs.
- (c) Install 75 mm wood chip mulch in all beds following planting operations.

E35.4 Method of Measurement

E35.4.1 Imported Topsoil and Fine Grading

- (a) There shall be no separate measurement for work associated with imported topsoil and finish grading as described in this specification.

E35.4.2 Placing Stockpiled Topsoil

- (a) Placing previously stockpiled site topsoil will be measured on a volume basis for the number of cubic metres of topsoil excavated from the stockpile and placed on graded areas as specified on the Drawings, accepted and measured by the Contract Administrator.

E35.4.3 Planting Soil Mixture

- (a) Construction of planting beds, and supply and installation of planting soil mixture shall be measured on an area basis for the number of square metres of 300 mm depth



planting bed constructed, complete with 300 mm depth planting soil mixture (depth is allowing for settlement), all in accordance with the Drawings and this specification, and accepted by the Contract Administrator, as computed by the Contract Administrator.

- (b) There will be no separate measurement for planting soil mixture used in planting individual trees and shrubs that are not planted in beds.

#### E35.4.4 Wood Chip Mulch

- (a) Supply and installation of wood chip mulch shall be measured on an area basis for the number of square metres of 75 mm wood chip mulch installed in planting beds in accordance with the Drawings and this specification, and accepted by the Contract Administrator, as computed by the Contract Administrator.

- (b) There will be no separate measurement for wood chip mulch used in individual trees saucers.

#### E35.5 Basis of Payment

##### E35.5.1 Placing Stockpiled Topsoil

- (a) Placing previously stockpiled site topsoil will be paid for at the Contract Unit Price for "Placing Stockpiled Topsoil", which price shall be payment in full for loading, hauling and placing the material and performing all operations herein specified, and all other items included in the work of this specification.

##### E35.5.2 Conditioning of Site Topsoil

- (a) Conditioning of site topsoil will be paid for at the Contract Unit Price for "Conditioning of Previously Spread Site Topsoil", which price shall be payment in full for supplying all labour, equipment and materials and performing all operations as herein specified, including finish grading, and all other work included in the work of this specification.

##### E35.5.3 Planting Soil Mixture

- (a) Construction of planting beds and supply and installation of planting soil mixture will be paid for at the Contract Unit Price for "Planting Beds with Planting Soil Mixture", which price shall be payment in full for supplying all materials and performing all operations herein specified, and all other items included in the work of this specification.

### E36. TREES AND SHRUBS

#### E36.1 Description

##### E36.1.1 General

- (a) This specification covers the supply and installation of nursery-grown trees and shrubs in areas indicated on the Drawings, including preparation, digging, transport and planting, and maintenance.

##### E36.1.2 Nomenclature

- (a) Nomenclature of specified nursery stock shall conform to the International Code of Nomenclature for Cultivated Plants and shall be in accordance with the approved scientific names given in the latest edition of Standardized Plant Names. The names of varieties not named therein are generally in conformity with the names accepted in the nursery trade.

##### E36.1.3 Source Quality Control

- (a) All nursery stock supplied shall be nursery grown and of species and sizes as indicated on the Drawings. Nursery stock shall be No. 1 Grade material in accordance with the current edition of Landscape Canada's (CNTA) "Guide Specifications for Nursery Stock".

- (b) Any nursery stock dug from native stands, wood lots, orchards, or neglected nurseries, which have not received proper cultural maintenance, shall be designated as "collected plants". Obtain permission of the Contract Administrator to use collected plants.
- (c) The Contractor shall notify Contract Administrator of source of plant material at least seven (7) days in advance of shipment.
- (d) Acceptance of plant material at source does not prevent rejection of same plant material on site prior to or after planting operations.
- (e) Imported plant material must be accompanied with necessary permits and import licenses. Conform to federal and provincial regulations.

#### E36.1.4 Shipment and Pre-Planting Care

- (a) Coordinate shipping of plants and excavation of holes to ensure minimum time lapse between digging and planting.
- (b) Tie branches of trees and shrubs securely and protect plant material against abrasion, exposure and extreme temperature change during transit. Avoid binding of planting stock with rope or wire, which would damage bark, break branches or destroy natural shape of plant. Give full support to root balls, especially of large trees, during lifting.
- (c) Cover plant foliage with tarpaulin, and protect bare roots by means of dampened straw, peat, saw dust or other acceptable material to prevent loss of moisture during transit and storage.
- (d) Remove broken and damaged roots with sharp pruning shears. Make clean cut and cover cuts over 50 mm diameter with wound dressing.
- (e) Keep roots moist and protect from sun and wind. Heel-in trees and shrubs that cannot be planted immediately in shaded areas; water well.

#### E36.1.5 Replacement

- (a) During the first two (2) years following completion of planting operations, remove from site any plants that have died or failed to grow satisfactorily, as determined by the Contract Administrator. As an example, plant material installed in 2012 that has failed to grow satisfactorily and has not been replaced by October 31, 2014, would be required to be replaced in the spring of 2014.

### E36.2 Materials

#### E36.2.1 Water

- (a) Water shall be potable and free of minerals that may be detrimental to plant growth.

#### E36.2.2 Fertilizer

- (a) Fertilizer shall be slow release organic. Fertilizer shall contain N-P-K in ratio as recommended by soil test results from an approved agricultural soil testing laboratory.

#### E36.2.3 Root Ball Burlap

- (a) Root ball burlap shall be 150 g Hessian burlap.

#### E36.2.4 Anti-desiccant

- (a) Anti-desiccant shall be wax-like emulsion to provide film over plant surfaces reducing evaporation but permeable enough to permit transpiration.

#### E36.2.5 Wound Dressing

- (a) Wound dressing shall be horticultural accepted non-toxic, non-hardening emulsion.

#### E36.2.6 Plant Material

- (a) All plant material specified for this project shall be containerized and/or ball and burlap nursery stock. All plants shall be from the Winnipeg area and the Oak-Aspen Forest Eco-region.

- (b) Comply with latest edition of the "Guide Specification for Nursery Stock", produced by Landscape Canada (CNTA), referring to quality, size and development of nursery-grown plant material and root balls.
- (c) Nursery stock shall be No. 1 grade trees, shrubs and vines.
- (d) All plant material shall be measured when branches are in their natural position. Height and spread dimensions specified in the Plant List on the Drawings refer to the main body of the plant, and not from branch tip to root base or from branch tip to branch tip. Where trees are measured by calliper (cal.), reference is made to the diameter of the trunk measured at 300 mm above ground as the tree stands properly planted in the nursery.
- (e) All containerized whips and herbaceous plant material shall have a minimum of one full year's growth. Roots shall be healthy, reaching the sides of the containers, and developed such that the root ball can be kept intact during transplanting. Roots shall not encircle each other to the extent of inhibiting plant growth.
- (f) Any plants designated as nursery stock but dug from native stands, wood lots, orchards, or neglected nurseries that have not received proper cultural maintenance, shall be designated as "collected stock". Material sources are to be approved by Contract Administrator prior to ordering or collecting. The Contractor shall provide all of the necessary nursery certificates to ensure that the plant species comply with this specification.
- (g) All trees shall have one, only, sturdy, reasonably straight and vertical trunk, and a well-balanced crown with fully developed leader, unless designated "multi-stem". All evergreens shall be symmetrically grown and branched from ground level, up.
- (h) Use trees and shrubs with structurally sound, strong fibrous root systems, and free of disease, insects, defects or injuries, including rodent damage, sun scald, frost cracks, abrasions or scars to the bark. Plants must have been root pruned regularly, but not later than one growing season prior to arrival on site.
- (i) All parts of the plants shall be moist and show live, green cambium tissue when cut.
- (j) At least one (1) plant of each variety supplied shall bear a tag showing both the botanical and common name of the plant.
- (k) Additional Plant Material Qualifications:
  - (i) Imported Plant Material
    - ◆ Plant material obtained from areas with milder climatic conditions from those of site acceptable only when moved to site prior to the breaking of buds in their original location and heeled-in in a protected area or placed in cold storage until conditions suitable for planting. Obtain Contract Administrator's approval to use imported plant material.
  - (ii) Cold Storage
    - ◆ Approval required for plant material that has been held in cold storage.
  - (iii) Container-Grown Stock
    - ◆ Acceptable if containers large enough for root development. Trees and shrubs must have grown in container for minimum of one growing season but not longer than two. Root system must be able to hold soil when removed from container. Plants that have become root bound are not acceptable. Container stock must have been fertilized with slow releasing fertilizer.
  - (iv) Balled and Burlapped Plant Material
    - ◆ Deciduous trees in excess of 3 m height must have been dug with large firm ball. Root balls must include 75% of fibrous and feeder root system. This excludes use of native trees grown in light sandy or rocky soil. Secure root balls with burlap, heavy twine and rope. For large trees: wrap ball in double layer of burlap and drum lace with minimum 10 mm

diameter rope. Protect root balls against sudden changes in temperature and exposure to heavy rainfall.

(v) Tree Spade Dug Material

- ◆ Obtain approval of the Contract Administrator for digging plant material with mechanized digging equipment, hydraulic spade or clam-shell type. This type of digging is typically not acceptable for boulevard tree plantings. Dig root balls to satisfy Landscape Canada (CNTA) standards. Lift root ball from hole, place in wire basket designed for purpose, line with burlap. Tie basket to ball with heavy rope. Take care not to injure trunk of tree with wire basket ties or rope.

(vi) Substitutions

- ◆ Substitutions to plant material as indicated on the Plant List will not be permitted unless written approval has been obtained as to type, variety and size prior to award of Contract. Plant substitutions must be of similar species and of equal size to those originally specified.

E36.3 Construction Methods

E36.3.1 Workmanship

- (a) The Contractor shall stake out location of trees, shrubs and planting beds as per the Drawings. Obtain Contract Administrator's approval prior to excavating.
- (b) The Contractor shall obtain clearances from all utilities, with respect to underground lines located in the areas to be excavated, prior to commencing planting operations.
- (c) The Contractor shall apply anti-desiccant in accordance with material manufacturer's instructions.
- (d) The Contractor shall coordinate planting operations; keep the site clean and planting holes drained, and immediately remove soil or debris spilled onto pavement.

E36.3.2 Planting Time

- (a) The Contractor shall plant deciduous plant material during dormant period before buds have broken. Plant material noted for spring planting only must be planted in dormant stage.
- (b) Plant material imported from region with warmer climatic conditions may only be planted in early spring.
- (c) When permission has been obtained to plant deciduous plant material after buds have broken, spray plants with anti-desiccant to slow down transpiration prior to transplanting.
- (d) When permission has been obtained, trees and shrubs growing in containers may be planted throughout growing season.
- (e) Plant only under conditions that are conducive to health and physical conditions of plants.
- (f) The Contractor shall provide the Contract Administrator with a planting schedule at least two weeks prior to planting operations. Extending planting operations over long period using limited crew will not be accepted.

E36.3.3 Excavations

- (a) Shrub beds: excavate to minimum depth of 300 mm, as indicated on the Drawings. Individual shrubs shall be planted in 300 mm deep holes backfilled with planting soil mixture.
- (b) Trees: excavate to depth such that the top of the root ball is even with existing grade, with a surface width of two times the diameter of the root ball. Backfill around trees with planting soil mixture.
- (c) The sides of all tree pits shall be scarified to the depth of one shovel blade.

- (d) Provide drainage for planting holes in heavy soil if natural drainage does not exist. Have method approved.
- (e) Protect the bottoms of excavations against freezing.
- (f) Remove water that enters excavations prior to planting. Ensure source of water is not ground water.

#### E36.3.4 Planting

- (a) Trees shall be placed on undisturbed soil and to a depth equal to that at which they were originally growing at the nursery.
- (b) For shrubs, loosen bottom of planting hole to depth of 150 to 200 mm. Cover bottom of each excavation with minimum of 150 mm of planting soil mixture.
- (c) Plant trees and shrubs vertically, with roots placed straight out in hole. Orient plant material to give best appearance in relation to structures, roads and walkways.
- (d) Place plant material to depth equal to depth they were originally growing in nursery or in locations collected.
- (e) Ball and burlap root balls: loosen burlap and cut away minimum top 1/3 without disturbing root ball. Do not pull burlap or rope from under root ball. With container stock, remove entire container without disturbing root ball. Non-biodegradable wrappings must be removed.
- (f) Tree spade excavated materials:
  - (i) Tree spade planting shall be permitted only by approval of the Contract Administrator.
  - (ii) Dig tree pit by hand or with a backhoe. Place in hole a mixture of 40 L of planting soil and fertilizer mixed with water to soupy consistency. This will be forced up sides of ball as root ball is placed in hole.
  - (iii) Loosen bottom of planting hole to depth of 150 to 200 mm. Cover bottom of each excavation with minimum 150 mm topsoil mixture.
- (g) Tamp planting soil mixture around root system in layers of 150 mm eliminating air voids. Frozen or saturated planting soil is unacceptable. When 2/3 of planting soil has been placed, fill hole with water. After water has been completely penetrated into soil, complete backfilling.
- (h) Excavate 200 mm depth an additional 600 mm beyond planting pits around the perimeter of all tree planting pits, and fill with planting soil mixture.
- (i) Construct 100 mm deep saucers around the outer edge of planting pits to assist with maintenance watering.
- (j) When planting is completed apply slow release organic fertilizer at minimum rate of 12 kg/100 m for shrub beds or 50 g/mm of calliper for trees, or as recommended by the soil analysis. Mix fertilizer thoroughly with top layer of planting soil and water in well.

#### E36.3.5 Pruning

- (a) Prune trees and shrubs after planting, as indicated. Postpone pruning of those trees where heavy bleeding may occur, until in full leaf. Employ clean sharp tools and make cuts flush with main branch, smooth and sloping as to prevent accumulation of water. Remove projecting stumps on trunks or main branches. Remove dead and injured branches and branches that rub causing damage to bark. Trim trees and shrubs without changing their natural shape. Do not damage lead branches or remove smaller twigs along main branches.

#### E36.3.6 Standards

- (a) All roots shall be cleanly cut; split roots are not acceptable.
- (b) Branches and trunks shall be tied and protected; broken or abraded branches or trunks are not acceptable.
- (c) Planting shall be protected from drying conditions; desiccated material not acceptable.

- (d) All plants shall be free of insects and disease: galls, blight and other manifestations of insect infestation or disease not acceptable.

E36.3.7 Wood Chip Mulch

- (a) All planting beds shall be covered with a 75 mm depth of wood chip mulch to the limits shown on the planting details.
- (b) Wood chip mulch shall extend under all tree limbs, but shall not be installed within 150 mm of the tree trunk.
- (c) The saucers of all trees not planted in beds shall be covered with a 75 mm depth of wood chip mulch.

E36.3.8 Maintenance

- (a) Watering
  - (i) Plant material shall be watered once a week for first four weeks following installation, and once every second week, thereafter. Ensure adequate moisture in root zone at freeze-up.
- (b) Weeding
  - (i) Keep mulched tree saucers weed-free by manually removing weeds during the maintenance period.
- (c) Insects and Diseases
  - (i) Spray plants to combat pests and diseases. Use organic chemical insecticides approved by Agriculture Canada.
- (d) Adjustments
  - (i) Make adjustments requested by the Contract Administrator, including straightening trees, tightening guy wires and removing tree stakes.
- (e) Maintenance Period
  - (i) Maintain plant material for a period of two years following acceptance to start maintenance period of planting operations, as determined by the Contract Administrator.

E36.4 Measurement and Payment

E36.4.1 Trees and Shrubs

- (a) Supply and installation of trees and shrubs will be measured on a unit price basis for each tree and shrub listed on the Plant List and paid for at the Contract Unit Price for each species and size shown on the Plant List. The number of trees and shrubs to be paid for will be the total number of trees and shrubs installed in accordance with this specification and accepted by the Contract Administrator, as computed by the Contract Administrator.
- (b) Supply and installation of fertilizer for plant material will be included in payment for the plant material.
- (c) Supply and installation of wood chip mulch for the individual trees not planted in beds will be included in payment for the plant material.

**E37. LONG TERM SCHEDULED MAINTENANCE OF PLANT MATERIAL AND PLANTING BEDS**

E37.1 Description

E37.1.1 General

- (a) This specification covers the maintenance of plant material and planting beds following acceptance of the work by the Contract Administrator.

## E37.2 Materials

E37.2.1 The Contractor shall provide all necessary materials and equipment including: additional topsoil, soil ameliorates, mulches, fertilizers and pesticides, and pruning tools, water trucks, hoses, water metres and any other items necessary for the maintenance of the areas indicated in this specification.

## E37.3 Construction Methods

### E37.3.1 Provision of Maintenance Personnel

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

### E37.3.2 Capability of Personnel

(a) Maintenance personnel should have at least one year of experience in arboriculture/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.

(b) The maintenance foreman shall be familiar with plant identification.

### E37.3.3 Maintenance Period

(a) Maintain plantings 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.

### E37.3.4 Maintenance Schedule

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

### E37.3.5 Recording Maintenance Operations

(a) The Contractor shall provide a detailed maintenance log, including but not limited to the following: hours of labour undertaken, number of personnel employed and equipment used. 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 included in payment for the maintenance work.

### E37.3.6 Traffic

(a) Do not conduct maintenance operations during peak traffic periods (Monday to Friday from 07:00 to 09:00 and from 15:30 to 17:30).

### E37.3.7 Maintenance of Trees, Shrubs, and Planting Beds

(a) Maintain trees, shrubs, vines and planting beds as indicated in Tree and Shrub Specification section E36.3.8.

#### (b) Watering Trees, and Shrubs

(i) Newly planted trees, and shrubs require water to become established; however, watering too often can kill a plant. During the summer, if temperatures are fairly high and there has been no rainfall, water approximately once a week.

(ii) Contractor shall determine the need for watering by taking soil tests weekly with a one-inch auger. Take a test sample from both the planting soil and from the tree root balls by drilling to a minimum depth of 600 mm. The soil shall contain enough moisture to hold together when compressed in the hand, but shall not be muddy.

(iii) Testing shall be undertaken at a minimum of 10 sites per week at a minimum of 10m between sites. The installed plant material and bioengineering shall not

- be allowed to dry out to the detriment of the viability of the plant material. Contractor shall monitor and submit lots to the Contract Administrator monthly. Contractor shall water-in plant material works in late fall during the scheduled maintenance period.
- (iv) Thoroughly soak coniferous trees prior to winter freeze-up.
  - (c) Fertilizing, Pruning and Spraying Deciduous Trees and Shrubs
    - (i) Because of the specialized nature of such operations, employ a qualified local arborist.
  - (d) Pruning Deciduous Trees and Shrubs
    - (i) Prune in accordance with E36.3.5, by thinning out unnecessary limbs or portions of limbs and by cutting back the terminal growth. Cut with pruning shears and with handsaws for limb-wood. When cutting the terminal growth, make the cuts one-quarter inch above the bud or lead twig. Where an entire limb is removed, make the cuts flush with the main stem or trunk.
  - (e) Cultivation
    - (i) Cultivate only as required to reconstruct planting beds or tree saucers, or to remove significant weed growth.
    - (ii) Do not cultivate around plants with a shovel or spade. The tendency is to penetrate too deeply and cause root injury. Cultivate with a hoe or similar tool. When using a hoe never penetrate soil more than 50 mm. Maintain natural elevation of the surrounding area when cultivating. Create a gentle saucer to contain water around the tree root zone.
    - (iii) Avoid pyramiding soil around the base of any plant as this causes water to drain away and will encourage undesirable top root growth.
    - (iv) The boundary between the adjacent sod and soil saucer should be crisp and well formed.
    - (v) Restore wood chip mulch when cultivation completed.
  - (f) Spraying
    - (i) Spray trees and shrubs to control insect pests and diseases. Use horticultural compounds approved by Agriculture Canada, which are specific for the problem to be contained.
  - (g) Straightening
    - (i) Straighten trees as required or as directed by the Contract Administrator.
  - (h) Mulching Wood Chip
    - (i) Add wood chip mulch to planting areas as required to maintain an even fresh surface.
  - (i) Weeding
    - (i) Hand weed and lightly rake a minimum of once per month, or as determined by the Contract Administrator, to remove competition for installed plant material/undesirable plant material. Dispose of undesirable material off-site.
    - (ii) The Contractor shall be responsible for any fines or weed control notices issued for the planting areas. All such notices shall be dealt with by the Contractor in a timely fashion. Copies of any fines and notices shall be provided to the Contract Administrator within five (5) working days of receipt by the Contractor.
  - (j) Dispose of waste material at a recognized solid waste disposal site.

#### E37.4 Method of Measurement

##### E37.4.1 General Maintenance of Trees, Shrubs and Planting Beds

- (a) Trees, Shrubs and Planting Beds
  - (i) Two year general maintenance of trees and shrubs and planting beds including fertilizing, pruning, spraying for insects, disease control, cultivation, care of guy



wires and turnbuckles, straightening, mulching and watering will be measured twice each season, typically in July and October, for a six month annual growing season from April 15 to October 15 each year.

- (b) All measured work will be in accordance with the Drawings and this specification and accepted by the Contract Administrator, as computed by the Contract Administrator.

#### E37.5 Basis of Payment

##### E37.5.1 General Maintenance of Trees, Shrubs and Planting Beds

- (a) General maintenance and general clean-up will be paid for at the Contract Unit Prices for the "Items of Work" listed here below. Prices will include supply of all labour, equipment and materials and performing all operations herein described, and all other items included in the Work of this specification.

##### Items of Work

##### General Maintenance of Landscaping

- (i) General Plant Material and Planting Bed Maintenance

### **E38. PLANT MATERIAL WARRANTY**

#### E38.1 Description

##### E38.1.1 General

- (a) This specification covers the provision of warranty for all plant material itemized on the Plant List:
  - (i) Plant Material shall be under warranty for two full years.

##### E38.1.2 Timing

- (a) Warranty shall commence upon acceptance of installed plant material.

##### E38.1.3 Warranty

- (a) The Contractor hereby warrants that the plant material as itemized on the Plant Lists and on the Drawings will remain free of defects for the maintenance period indicated for each area of the Contract.

##### E38.1.4 End-of-Warranty Inspection

- (a) Contract Administrator reserves the right to extend the Contractor's warranty responsibilities for an additional year, at the end of the designated warranty period for the appropriate area, if at that time plant material leaf development and growth are not sufficient to ensure future survival.

##### E38.1.5 Replacement

- (a) During the warranty period, remove from site any plant material that has died or failed to grow satisfactorily, as determined by the Contract Administrator and replace with healthy plant material of the same species and size.
- (b) Replace plant material in the following spring or fall as directed.
- (c) Extend warranty on replacement plant material for an additional period until the end of the specified warranty period or for one full growing season, whichever is the longer period.
- (d) Continue such replacement and warranty until plant material is acceptable.
- (e) Trees determined by the Contract Administrator to have been damaged by vandalism shall be replaced and such replacement trees will be paid for at the Contract Unit Prices for the species indicated on the Drawings.

**E38.2 Measurement and Payment**

**E38.2.1 Warranty**

- (a) Warranties on plant material will not be measured or paid for.
- (b) Warranties on plant material shall be included in payment for the supply and installation of plant material.

**E39. PROTECTION OF EXISTING DISCHARGE PIPING**

- E39.1 The Contractor shall ensure the protection of the existing 350 mm HDPE discharge pipes and all appurtenances located north of the alignment of the 1650 mm concrete culvert. It is possible that the piping may need to be utilized during a 2013 spring flooding event; therefore it is imperative that the pipe remain in functional condition throughout the duration of the project.
- E39.2 The Contractor shall ensure that the outlet of the discharge pipes located on the east side of Pembina Highway remain open and undisturbed at all times until the flood protection chamber is completed.

**E40. DANGEROUS WORK CONDITIONS**

- E40.1 Further to clause GC 6.26 of the General Conditions, the Contractor shall be aware that underground chambers, manholes, sewers and pumping stations are considered a confined space and shall follow the "Guidelines for confined Entry Work" as published by the Manitoba Workplace Safety and Health Division.
- E40.2 The Contractor shall be aware of the potential hazards that can be encountered in manholes, sewers and pumping stations such as explosive gases, toxic gases and oxygen deficiency.
- E40.3 The air in a confined space must be tested before entry and continuously during the time that personnel are inside the space. Equipment for continuous monitoring of gases must be explosion-proof and equipped with a visible and audible alarm. The principal tests are for oxygen deficiency, explosion range and toxic gases. Testing equipment must be calibrated in accordance with manufacturer's specifications.
- E40.4 Ventilate all confined spaces including underground chambers, tunnels, pipes and shafts as required and approved by the Manitoba Workplace Safety and Health Act (the "Act"). If no ventilation is supplied, a worker must wear a respirator or supplied air to enter the confined space.
- E40.5 Workers must wear a respirator or supplied air at all times when entering a chamber, manhole or sewer where live sewage is present.
- E40.6 Provide a photo ionization detector (PID) on Site at all times to monitor potential hydrocarbon vapours in the confined spaces. The gas detector and safety equipment conforming to the Act shall be made available to the Contract Administrator for his use during inspections.
- E40.7 The Contract Administrator may issue a stop work order to the Contractor if the above guidelines are not being followed. The Contractor shall not resume his operations until the Contract Administrator is satisfied the Contractor is following the appropriate procedures. The Contractor shall have no claim for extra time or costs due to the stop work order for not following these safety guidelines.
- E40.8 The Contractor's attention is drawn to the Province of Manitoba Workplace Safety and Health Act ("the Act"), and the Regulations and Guidelines thereunder pertaining to confined entry work, and in particular the requirements for conducting hazard/risk assessments and providing personal protective equipment (PPE).
- E40.9 Provide supplied air breathing apparatus conforming to the requirements of the Act, Regulation and Guidelines for the use of the Contract Administrator where confined entry is required to allow for inspection of the Work.

## **E41. TRAFFIC AND PEDESTRIAN CONTROL**

### **E41.1 Description**

- (a) The Work covered under this item shall include all items relating to traffic and pedestrian control at the Site.
- (b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

### **E41.2 Notification**

- (a) The Contractor shall notify the City of Winnipeg Customer Service at 986-5640, one day in advance of traffic lane closures.

### **E41.3 Construction Methods**

#### **E41.3.1 General**

- (a) Traffic control shall be carried out in accordance with the latest edition of the "Manual of Temporary Traffic Control in Work Areas on City Streets," issued by the City of Winnipeg and as specified herein.
- (b) At no point shall more than one (1) lane closure be permitted in either direction at any point in time.
- (c) Traffic lane and sidewalk closures shall only be undertaken if necessary and as approved by the Contract Administrator.
- (d) Barricades shall be supplied, installed, and maintained by the Contractor and include the telephone number(s) at which the Contractor can be reached twenty-four (24) hours per day, seven (7) days per week.
- (e) Improper signing will be sufficient reason to immediately shutdown the entire job.

E41.4 Costs for traffic and pedestrian control will not be measured for payment and will be incidental to the Work being done.

## **E42. RED RIVER WATER LEVELS**

E42.1 Normal Red River water levels are as follows.

- (a) Normal Summer Water Level (NSWL) (normally early June to late October) – 223.70 geodetic (approximate)
- (b) Winter Water Level (NWWL) (normally late November to late March) – 221.77 geodetic (approximate)

E42.2 Red River water levels rise considerably in the spring (typically late March) due to ice break-up and snow melt. River crest elevations of 228.00 geodetic or higher are not unusual.

E42.3 River elevation may also increase in the summer due to heavy rainfall in the areas south of Winnipeg. Summer river crests are usually lower and of shorter duration than spring crests.

E42.4 The following web site link <http://winnipeg.ca/waterandwaste/sewage/riverlevels/pastYears.stm> lists historic Red River levels month by month back to 1999. The elevations shown are in imperial measurement and are referenced to "James Avenue Datum" which is elevation 221.76 geodetic. Red River levels at the location of this river crossing will be approximately 300 millimetres higher than the elevations listed at James Avenue Datum outside of NSWL and NWWL.

## **E43. WATERWAYS PROTECTION**

### **E43.1 Description**

- (a) All work adjacent to or crossing waterways including creeks and ditches draining in waterways is regulated by the Federal Department of Fisheries and Oceans (DFO).
- (b) Complete works in accordance to DFO guidelines/regulations.

### **E43.2 Materials**

- (a) Silt Fencing
  - (i) Silt fencing to be woven polypropylene synthetic fibre fabric with UV stabilizers and reinforcing mesh as per Armtec Heavy Duty or approved equal, in accordance with B6.
  - (ii) The fabric shall be inert to commonly encountered soil chemicals, hydrocarbons, mildew and bacteria.
  - (iii) Wood posts shall be minimum 50 mm x 50 mm (2" x 2") by 1.5 m in length.

### **E43.3 Construction Methods**

#### **E43.3.1 General**

- (a) Complete erosion control works to be in accordance with current DFO and Manitoba Environment guidelines.
- (b) The following mitigation measures must be adhered to protect fish habitat:
  - (i) No in-channel construction activity shall be permitted during the time period of April 1 – June 15, as per the following Department of Fisheries and Oceans Operational Statement:
    - ◆ Os\_eo21\_e – Timing Windows
  - (ii) Use sediment and erosion control measures to prevent soil laden run off and silt from affecting downstream areas of the watercourse. Halt construction during periods of heavy rain or run off.
  - (iii) Monitor the work site to evaluate the effectiveness of erosion control measures and the physical stability of the creek bed and banks. Any problems are to be rectified immediately.
  - (iv) Conduct the cleaning, fuelling, and servicing of equipment a minimum of 100 m from any watercourse. Equipment operating near any watercourse should be free of external grease, oil, mud, or fluid leaks.
  - (v) Take necessary precautions to ensure deleterious substances, including silt, does not enter any watercourse. The deposit of deleterious substances into water frequented by fish is prohibited under the Fisheries Act.
  - (vi) Remove excess material from the excavation and place where it will not erode into any watercourse. Dispose all spoil materials above the high water mark and located such that they do not re-enter any watercourses.

#### **E43.3.2 Silt Fence Installation**

- (a) Install silt fences as per Manufacturer's recommendations.
- (b) Excavate trench to place bottom of fabric a minimum of 150 mm below existing grade and backfill with compacted soil to prevent sediment flow underneath the silt fence.
- (c) Install all supporting posts on the down slope side of the fencing. Post to extend a minimum of 0.75 m below ground or until fabric reach the bottom of the trench.
- (d) Maintain silt fences throughout construction and until placement of erosion control blanket. Complete reseeding of embankment as soon as weather conditions permit upon completion of construction.

**E43.4 Measurement and Payment**

- (a) Silt fencing will be measured in lineal meters. The length to be paid for shall be the total number of metres of silt fence installed in accordance with this Specification as computed from measurements verified by the Contract Administrator. Payment shall be at the Contract Unit Price for "Supply and Placement of Silt Fence".

**E44. PROTECTION OF EXISTING TREES**

E44.1 The Contractor shall take the following precautionary steps to avoid damage from his construction activities to existing boulevard trees within and adjacent to the limits of construction:

- (a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of any tree.
- (b) Mature tree trunks shall be strapped with 25 x 150 x 2400 (1" x 6" x 8") wood planks. Smaller trees shall be similarly protected using appropriately sized wood planks.
  - (i) Excavations shall be carried out in such a manner so as to minimize damage to existing root systems. Roots over 50mm in diameter which must be cut to facilitate an excavation shall be neatly pruned with a saw prior to excavation and coated with an appropriate wound dressing to prevent infection.
  - (ii) Work on Site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to tree branches does occur, the Contractor shall neatly prune the damaged branch.
- (c) American elm trees are not to be pruned between April 1<sup>st</sup> and August 1<sup>st</sup> and Siberian elm trees between April 1<sup>st</sup> and July 1<sup>st</sup> of any year under provisions of The Dutch Elm Disease Act.

E44.2 All damages to existing trees caused by the Contractor's construction activities shall be repaired to the requirements and satisfaction of the City of Winnipeg, Public Works Department, Urban Forestry Branch.

E44.3 No separate measurement or payment will be made for protection of trees. It shall be considered incidental to the Contract Work.