



**THE CITY OF WINNIPEG**

# **BID OPPORTUNITY**

**BID OPPORTUNITY NO. 450-2009**

**MARION STREET CROSSING OF DUGALD DRAIN REPLACEMENT**

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## **PART B - BIDDING PROCEDURES**

### **B1. CONTRACT TITLE**

B1.1 Marion Street Crossing of Dugald Drain Replacement

### **B2. SUBMISSION DEADLINE**

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, July 23, 2009.

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. ENQUIRIES**

B3.1 All enquiries shall be directed to the Contract Administrator identified in D3.1.

B3.2 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.

B3.3 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.

B3.4 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.

B3.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B3 unless that response or interpretation is provided by the Contract Administrator in writing.

### **B4. ADDENDA**

B4.1 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.

B4.2 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.

B4.2.1 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>

B4.2.2 The Bidder is responsible for ensuring that he 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.

B4.3 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.

### **B5. SUBSTITUTES**

B5.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.

- B5.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B5.3 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.
- B5.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;
  - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
  - (c) identify any anticipated cost or time savings that may be associated with the substitute;
  - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;
  - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.
- B5.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.
- B5.6 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.
- B5.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely responsible for disseminating information regarding the approval to any person or persons he wishes to inform.
- B5.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B5.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B14.
- B5.9 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.
- B5.10 Notwithstanding B5.2 to B5.9, in accordance with B6.6, deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B14.1(a).

## **B6. BID COMPONENTS**

- B6.1 The Bid shall consist of the following components:
- (a) Form A: Bid;
  - (b) Form B: Prices, hard copy;

- (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.
  
- B6.2 Further to B6.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B5.
  
- B6.3 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.
  
- B6.4 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.
  
- B6.4.1 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.
  
- B6.4.2 A hard copy of Form B: Prices must be submitted with the Bid. If there is any discrepancy between the Adobe PDF version of Form B: Prices and the Microsoft Excel version of Form B: Prices, the PDF version shall take precedence.
  
- B6.5 Bidders are advised not to include any information/literature except as requested in accordance with B6.1.
  
- B6.6 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 B14.1(a).
  
- B6.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.
  
- B6.8 Bids shall be submitted to:  
The City of Winnipeg  
Corporate Finance Department  
Materials Management Division  
185 King Street, Main Floor  
Winnipeg MB R3B 1J1
  
- B7. BID**
  
- B7.1 The Bidder shall complete Form A: Bid, making all required entries.
  
- B7.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:
  - (a) if the Bidder is a sole proprietor carrying on business in his own name, his name shall be inserted;
  - (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
  - (c) if the Bidder is a corporation, the full name of the corporation shall be inserted; or
  - (d) if the Bidder is carrying on business under a name other than his own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.
  
- B7.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B7.2.
  
- B7.3 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.

- B7.4 Paragraph 12 of Form A: Bid shall be signed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his own name, it shall be signed by the Bidder;
  - (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
  - (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers and the corporate seal, if the corporation has one, shall be affixed; or
  - (d) if the Bidder is carrying on business under a name other than his own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B7.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.

B7.5 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.

## **B8. PRICES**

B8.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B8.1.1 For the convenience of Bidders, and pursuant to B6.4.2 and B14.4.3, an electronic spreadsheet Form B: Prices in Microsoft Excel (.xls) format is available along with the Adobe PDF documents for this Bid Opportunity on the Bid Opportunities page at the Materials Management Division website at <http://www.winnipeg.ca/matmgt>

B8.2 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.

B8.3 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.

B8.4 Prices from Non-Resident Bidders are subject to a Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

## **B9. QUALIFICATION**

B9.1 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.

B9.2 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>

B9.3 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);
- B9.4 Further to B9.3(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>)
- B9.5 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.
- B9.6 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.

## **B10. BID SECURITY**

- B10.1 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.
- B10.1.1 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.
- B10.1.2 All signatures on bid securities shall be original.
- B10.1.3 The Bidder shall sign the Bid Bond.
- B10.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.
- B10.2 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.

- B10.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B10.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.
- B10.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.
- B10.3 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.

## **B11. OPENING OF BIDS AND RELEASE OF INFORMATION**

- B11.1 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.
- B11.1.1 Bidders or their representatives may attend.
- B11.1.2 Bids determined by the Manager of Materials, or his designate, to not include the bid security specified in B10 will not be read out.
- B11.2 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>
- B11.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract Amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt>
- B11.4 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.

## **B12. IRREVOCABLE BID**

- B12.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.
- B12.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work 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.

## **B13. WITHDRAWAL OF BIDS**

- B13.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.
- B13.1.1 Notwithstanding 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.
- B13.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

- B13.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials 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 B13.1.3(b), declare the Bid withdrawn.

B13.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B12.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

## **B14. EVALUATION OF BIDS**

B14.1 Award of the Contract shall be based on the following bid evaluation criteria:

- (a) compliance by the Bidder with the requirements of the Bid Opportunity, or acceptable deviation therefrom (pass/fail);
- (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B9 (pass/fail);
- (c) Total Bid Price;
- (d) economic analysis of any approved alternative pursuant to B5.

B14.2 Further to B14.1(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.

B14.3 Further to B14.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid or in other information required to be submitted, that he is responsible and qualified.

B14.4 Further to B14.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

B14.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.

B14.4.2 Further to B14.1(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.

B14.4.3 The electronic Form B: Prices and the formulas imbedded in that spreadsheet are only provided for the convenience of Bidders. The City makes no representations or warranties as to the correctness of the imbedded formulas. It is the Bidder's responsibility to ensure the extensions of the unit prices and the sum of Total Bid Price performed as a function of the formulas within the electronic Form B: Prices are correct.

## **B15. AWARD OF CONTRACT**

B15.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

- B15.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.
- B15.2.1 Without limiting the generality of B15.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
  - (b) the prices are materially in excess of the prices received for similar work in the past;
  - (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
  - (d) only one Bid is received; or
  - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B15.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B14.
- B15.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his Bid upon written request to the Contract Administrator.

## **PART C - GENERAL CONDITIONS**

### **C0. GENERAL CONDITIONS**

- C0.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management 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:

- (a) Box Culvert replacement and associated works.
  - (i) Marion Street at Dugald Drain

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

- (a) Box Culvert replacement and associated works.
  - (i) Watermain renewal and catch basin installation
  - (ii) Pavement removal;
  - (iii) Supply and installation of erosion control measures and temporary water diversion;
  - (iv) Excavation;
  - (v) Removal of existing box culvert structure (except floor);
  - (vi) Installation of precast concrete box culvert and backfilling. (box culvert supplied F.O.B. site by others);
  - (vii) Supply and placement and compaction of subbase and base course material;
  - (viii) Construct 230 mm plain dowelled and reinforced concrete pavement;
  - (ix) Construct integral 180 mm barrier curb;
  - (x) Construct 100 mm concrete sidewalk;
  - (xi) Asphalt overlay (average thickness 50 mm);
  - (xii) Supply and placement of imported clay borrow for side slopes;
  - (xiii) Supply and installation of chain link fencing;
  - (xiv) Supply and placement of riprap;
  - (xv) Boulevard grading and sodding; and
  - (xvi) Supply and installation of guardrail.

#### **D3. CONTRACT ADMINISTRATOR**

D3.1 The Contract Administrator is AECOM, represented by:

James Kennedy, P.Eng.  
Transportation Engineer  
99 Commerce Drive Winnipeg MB R3P 0Y7

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

D3.2 At the pre-construction meeting, James Kennedy, P.Eng. will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

#### **D4. CONTRACTOR'S SUPERVISOR**

- D4.1 At the pre-construction meeting, the Contractor shall identify his designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.
- D4.2 At least two (2) business days prior to the commencement of any Work on the site, the Contractor shall provide the Contract Administrator with a phone number where the supervisor identified in D4.1 or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

#### **D5. NOTICES**

- D5.1 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.
- D5.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D5.3, D5.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the address or facsimile number identified in D3.1.
- D5.3 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 address or facsimile number:  
The City of Winnipeg  
Chief Financial Officer  
Administration Building, 3rd Floor  
510 Main Street  
Winnipeg MB R3B 1B9  
Facsimile No.: (204) 949-1174
- D5.4 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following address or facsimile number:  
The City of Winnipeg  
Internal Services Department  
Legal Services Division  
Attn: City Solicitor  
185 King Street, 3rd Floor  
Winnipeg MB R3B 1J1  
Facsimile No.: (204) 947-9155

#### **D6. FURNISHING OF DOCUMENTS**

- D6.1 Upon award of the Contract, the Contractor will be provided with five (5) complete sets of the Bid Opportunity. If the Contractor requires additional sets of the Bid Opportunity, they will be supplied to him at cost.

#### **SUBMISSIONS**

#### **D7. AUTHORITY TO CARRY ON BUSINESS**

- D7.1 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.

#### **D8. SAFE WORK PLAN**

- D8.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.
- D8.2 The Safe Work Plan shall 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>

#### **D9. INSURANCE**

- D9.1 The Contractor shall provide and maintain the following insurance coverage:
- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) 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, broad form property damage cover and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;
  - (b) automobile liability insurance for owned automobiles used for or in connection with the Work in the amount of at least two million dollars (\$2,000,000.00) at all times during the performance of the Work and until the date of Total Performance;
  - (c) an all risks Installation Floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.
- D9.2 Deductibles shall be borne by the Contractor.
- D9.3 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 the C4.1 for the return of the executed Contract.
- D9.4 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.

#### **D10. PERFORMANCE SECURITY**

- D10.1 The Contractor shall provide and maintain performance security until the expiration of the warranty period in the form of:
- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; or
  - (b) an irrevocable standby letter of credit issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form attached to these Supplemental Conditions (Form H2: Irrevocable Standby Letter of Credit), in the amount of fifty percent (50%) of the Contract Price; or
  - (c) a certified cheque or draft payable to "The City of Winnipeg", drawn on a bank or other financial institution registered to conduct business in Manitoba, in the amount of fifty percent (50%) of the Contract Price.
- D10.1.1 Where the performance security is in the form of a certified cheque or draft, it will be deposited by the City. The City will not pay any interest on certified cheques or drafts furnished as performance security.

D10.2 If the bid security provided in his Bid was not a certified cheque or draft pursuant to B10.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site and in no event later than the date specified in the C4.1 for the return of the executed Contract.

#### **D11. SUBCONTRACTOR LIST**

D11.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at or prior to a pre-construction meeting, or 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 the C4.1 for the return of the executed Contract.

#### **D12. DETAILED WORK SCHEDULE**

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

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

- (a) a Gantt chart for the Work based on the C.P.M. schedule; and acceptable to the Contract Administrator.

D12.3 Further to D12.2(a), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

### **SCHEDULE OF WORK**

#### **D13. COMMENCEMENT**

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

D13.2 The Contractor shall not commence any Work on the Site until:

- (a) the Contract Administrator has confirmed receipt and approval of:
  - (i) evidence of authority to carry on business specified in D7;
  - (ii) evidence of the workers compensation coverage specified in C6.15;
  - (iii) the twenty-four (24) hour emergency response phone number specified in D4.2.
  - (iv) the Safe Work Plan specified in D8;
  - (v) evidence of the insurance specified in D9;
  - (vi) the performance security specified in D10;
  - (vii) the subcontractor list specified in D11;
  - (viii) the detailed work schedule specified in D12.
- (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D13.3 The Contractor shall not commence the Work on the Site before August 10, 2009, and shall commence the Work on Site no later than August 17, 2009, as directed by the Contract Administrator and weather permitting.

D13.4 The City intends to award this Contract by August 10, 2009.

D13.4.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

#### **D14. WORKING DAYS**

D14.1 Further to C1.1(gg);

D14.1.1 The Contract Administrator will determine daily if a Working Day has elapsed and will record his assessment. On a weekly basis the Contract Administrator will provide the Contractor with a record of the Working Days assessed for the preceding week. The Contractor shall sign each report signifying that he agrees with the Contract Administrator's determination of the Working Days assessed for the report period.

D14.1.2 Work done to restore the Site to a condition suitable for Work, shall not be considered "work" as defined in the definition of a Working Day.

D14.1.3 When the Work includes two or more major types of Work that can be performed under different atmospheric conditions, the Contract Administrator shall consider all major types of Work in determining whether the Contractor was able to work in assessing Working Days.

#### **D15. RESTRICTED WORK HOURS**

D15.1 Further to clause 3.10 of CW 1130, the Contractor shall require written permission forty-eight (48) hours in advance from the Contract Administrator for any work to be performed between 2000 hours and 0700 hours, or on Saturdays, Sundays, Statutory Holidays and or Civic Holidays.

D15.2 In accordance with the Manual of Temporary Traffic Control, Sections 2.03, 2.04, 2.05 and 2.06, should the Traffic Management Branch of the Public Works Department require that work on Regional streets be carried out at night or on Sundays or on public holidays, where permitted by the City of Winnipeg Police Department, or that work be restricted or suspended during peak traffic hours, no additional compensation will be considered to meet these requirements.

#### **D16. WORK BY OTHERS**

D16.1 Work by others on or near the Site will include but not necessarily be limited to:

- (a) Manitoba Hydro – relocation of guide wire pole;
- (b) MTS – relocation of conduit;
- (c) City of Winnipeg Traffic Services – traffic signage and line painting;
- (d) City of Winnipeg Traffic Signals – relocation of tie line;
- (e) City of Winnipeg Geomatics Branch – various Works on survey monuments; and
- (f) Manitoba Hydro Gas Division – possible relocation / rock wrapping of gas line.

D16.2 The Contract Administrator will attempt to arrange and coordinate Work to be performed by others so that such Work does not interfere with the Work and Schedule of the Contractor. Where Work by others interferes, as determined by the Contract Administrator, with the Contractor's planned Work, the Contractor shall modify his plans and do other Work. Unless the Contract Administrator determines that there was no opportunity for the Contractor to do a similar amount of Work no consideration will be made to extending the Contract time.

D16.3 City of Winnipeg Bid Opportunity 449-2009 is for the supply and delivery of the precast concrete box culvert F.O.B. site. The Contractor shall be responsible for coordinating delivery of material with the successful Bidder of Bid Opportunity 449-2009.

## **D17. SEQUENCE OF WORK**

D17.1 Further to C6.1, the sequence of work shall be as follows:

- (a) Watermain renewal and catchbasin installation;
- (b) Construct temporary water diversion and temporary erosion control;
- (c) Pavement removal, excavation and removal of top and sides of existing box culvert from September 3 to 8, 2009 during closure of Marion Street;
- (d) Installation of box culvert below roadway during closure of Marion Street from September 3 to 8, 2009;
- (e) Backfilling culvert and temporarily asphalt paving to open Marion Street for traffic on September 8, 2009;
- (f) Installation of remaining box culvert sections and end sections;
- (g) Installation of riprap;
- (h) Installation of 230 mm plain dowelled concrete pavement (with reinforcing steel above pipe) with asphalt overlay (50 mm thick);
- (i) Construction of barrier curbs;
- (j) Construction of sidewalk;
- (k) Installation of guardrail;
- (l) Installation of chain link fence; and
- (m) Landscaping.

## **D18. CRITICAL STAGES**

D18.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

- (a) Marion Street can be closed to traffic at 10:00 a.m. on September 3, 2009 but must be returned to service in at least one lane in each direction by 6:00 a.m. on September 8, 2009.

D18.2 When the Contractor considers the Work associated with this critical stage to be completed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Completion. 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 re-inspected.

D18.3 The date on which this critical stage Work has been accepted by the Contract Administrator as being completed to the requirements of the Contract is the date on which completion of this critical stage has been achieved.

## **D19. SUBSTANTIAL PERFORMANCE**

D19.1 The Contractor shall achieve Critical Stages and Substantial Performance within forty-five (45) consecutive Working Days of the commencement of the Work as specified in D13.

D19.2 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 re-inspected.

D19.3 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.

## **D20. TOTAL PERFORMANCE**

- D20.1 The Contractor shall achieve Total Performance within fifty (50) consecutive Working Days of the commencement of the Work as specified in D13.
- D20.2 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 re-inspected.
- D20.3 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.

## **D21. LIQUIDATED DAMAGES**

- D21.1 If the Contractor fails to achieve Critical Stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:
- (a) Reopen Marion Street by 6:00 a.m. on September 8, 2009 – Two thousand dollars (\$2,000);
  - (b) Substantial Performance – Three thousand dollars (\$3,000);
  - (c) Total Performance – One thousand dollars (\$1,000).
- D21.2 The amounts specified for liquidated damages in D21.1 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.
- D21.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

## **D22. SCHEDULED MAINTENANCE**

- D22.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:
- (a) Reflective crack maintenance during two year warranty period as specified in CW3250-R7; and
  - (b) Sod Maintenance as specified in CW3510-R9.
- D22.2 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**

### **D23. JOB MEETINGS**

- D23.1 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.

D23.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

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

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

**WARRANTY**

**D25. WARRANTY**

D25.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

D25.2 Notwithstanding C13.2 or D25.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:

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

D25.2.1 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.

**FORM H1: PERFORMANCE BOND**  
(See D10)

KNOW ALL MEN BY THESE PRESENTS THAT

\_\_\_\_\_ ,  
(hereinafter called the "Principal"), and

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

\_\_\_\_\_ dollars (\$\_\_\_\_\_)

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

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

BID OPPORTUNITY NO. 450-2009

Marion Street Crossing of Dugald Drain Replacement  
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 D10)

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

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

RE: PERFORMANCE SECURITY – BID OPPORTUNITY NO. 450-2009

Marion Street Crossing of Dugald Drain Replacement

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)

**FORM J: SUBCONTRACTOR LIST**  
(See D11)

Marion Street Crossing of Dugald Drain Replacement

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
<i>SURFACE WORKS:</i>		
Supply of Materials:		
Concrete		
Asphalt		
Base Course & Sub-Base		
Landscaping		
Guardrail		
Chain Link Fence		
Installation/Placement:		
Concrete		
Asphalt		
Base		
Chain Link Fence		
Guardrail		
Landscaping		
<i>UNDERGROUND WORKS:</i>		
Supply of Materials:		
Watermain Pipes		
Watermain Valves		
Catchbasin		
Installation/Placement:		
Precast concrete box culvert		
Watermain Renewal		
Catchbasin Placement		
<i>OTHERS:</i>		

## 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>	<u>Drawing (Original) Sheet Size</u>
00	Cover Sheet and Drawing List	A1
01	Horizontal and vertical Alignment, Horizontal and Vertical Control, Geometric Layout	A1
02	Cross Sections & Details	A1
03	Temporary Works	A1
04	Aluminum Balanced Barrier Approach Guardrail Details I	A1
05	Aluminum Balanced Barrier Approach Guardrail Details II	A1
06	Watermain Renewal	A1

E1.4 Record drawings of the existing box culvert to be demolished can be viewed at the office of the Contract Administrator listed in D3.

#### E2. GEOTECHNICAL REPORT

E2.1 Further to C3.1, the geotechnical report is provided to aid the Contractor's evaluation of the pavement structure and/or existing soil conditions. The geotechnical report is contained in Appendix 'A'.

#### E3. OFFICE FACILITIES

E3.1 The Contractor shall supply office facilities meeting the following requirements:

- (a) The field office shall be for the exclusive use of the Contract Administrator.
- (b) The building shall be conveniently located near the site of the Work.
- (c) The building shall have a minimum floor area of 25 square metres with two windows for cross ventilation and a door entrance with a suitable lock.
- (d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16-18°C or 24-25°C.

- (e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three wall outlets.
- (f) The building shall be furnished with one desk, one drafting table, table 3m X 1.2m, one stool, one four drawer legal size filing cabinet, and a minimum of 6 chairs.
- (g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City.
- (h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each site meeting. The Contract Administrator may request additional cleaning when he deems it necessary.

E3.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E3.3 The office facilities will be provided from the date of the commencement of the Work to the date the Contract is completed.

#### **E4. PROTECTION OF EXISTING TREES**

E4.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within the limits of the construction area:

- (a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.
- (b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400mm wood planks, or suitably protected as approved by the Contract Administrator.
- (c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.
- (d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.
- (e) Work on-site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.

E4.2 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the City Forester or his designate.

E4.3 No separate measurement or payment will be made for the protection of trees.

E4.4 Except as required in clause E4.1(c) and E4.1(e), Elm trees shall not be pruned at any time between April 1 and July 31.

#### **E5. TRAFFIC CONTROL**

E5.1 Further to clauses 3.6 and 3.7 of CW 1130-R1:

- (a) Where directed, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planning drop-offs to the satisfaction of the Contract Administrator. Payment shall be in accordance with CW3410.

- (b) In accordance with the Manual of Temporary Traffic Control, the Contractor ("Agency" in the manual) shall make arrangements with the Traffic Services Section of the City of Winnipeg to place all temporary regulatory signs. The Contractor shall bear all costs associated with the placement of temporary traffic control devices by the Traffic Services Section of the City of Winnipeg in connection with the works undertaken by the Contractor.

## **E6. TRAFFIC MANAGEMENT**

E6.1 Further to clause 3.7 of CW 1130-R1:

- E6.1.1 Maintain a minimum of one lane of traffic eastbound and one lane of traffic westbound at all times during construction except for from 10:00 a.m. on September 3 to 6:00 a.m. on September 8, 2009 when the Contractor may shut Marion Street to traffic at the site. During this time the Contractor shall sign the road "Road Closed" in accordance with the Manual of Temporary Traffic Control;
- E6.1.2 Intersecting street and private approach (i.e. Nicolas Avenue) access shall be maintained at all times.
- E6.1.3 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.
- E6.1.4 Pedestrian and ambulance/emergency vehicle access must be maintained at all times except as noted in E6.1.1 above.

## **E7. PEDESTRIAN SAFETY**

- E7.1 During the project, when Marion Street is closed to traffic, a temporary snow fence shall be installed across both sidewalks at both ends of the site. The Contractor shall be responsible for maintaining the snow fence in a proper working condition. No measurement for payment shall be made for this work.

## **E8. WATER USED BY CONTRACTOR**

- E8.1 Further to clause 3.7 of CW 1120-R1, the Contractor shall pay for all costs associated with obtaining water in accordance with the Waterworks By-law. Sewer charges will not be assessed for water obtained from a hydrant.

## **E9. SURFACE RESTORATIONS**

- E9.1 Further to clause 3.3 of CW 1130-R1, when Total Performance is not achieved in the year the Contract is commenced, the Contractor shall temporarily repair any Work commenced and not completed to the satisfaction of the Contract Administrator. The Contractor shall maintain the temporary repairs in a safe condition as determined by the Contract Administrator until permanent repairs are completed. The Contractor shall bear all costs associated with temporary repairs and their maintenance.

## **E10. RECYCLED CONCRETE BASE COURSE MATERIAL**

### DESCRIPTION

E10.1 General

- E10.1.1 Further to CW 3110, this specification covers supply and placement of recycled concrete base course material for Full-Depth Partial Slab Patches (Class A, B, C, & D), miscellaneous concrete slabs and sidewalks.

E10.2 Definitions

E10.2.1 Deleterious material – are materials such as vegetation, organic material, wood, glass, plastic, metal, reinforcing steel, building rubble, brick, salvaged asphalt materials, clay, shale, and friable particles.

E10.3 Referenced Standard Construction Specifications

- (a) CW 3110 – Sub-Grade. Sub-Base and Base Course Construction.
- (b) CW 3230 – Full-Depth Patching of Existing Pavement Slabs and Joints.
- (c) CW 3235 – Renewal of Existing Miscellaneous Concrete Slabs.
- (d) CW 3325 – Portland Cement Concrete Sidewalk.

MATERIALS

E10.4 Recycled Concrete Base Course Material

E10.4.1 Recycled concrete base course material when used for Full-Depth Partial Slab Patches (Class A, B, C, & D), miscellaneous concrete slabs and sidewalks will be considered equal to granular or limestone base course material specified in Section 2.2 of CW 3110.

E10.4.2 Recycled concrete base course material will be approved by the Contract Administrator.

E10.4.3 Recycled concrete base course material will consist of sound durable particles produced by crushing, screening, and grading of recovered concrete materials, free from soft material that would disintegrate through decay or weathering.

E10.4.4 The recycled concrete base course material will be well graded and conform to the following grading requirements:

Recycled Concrete Base Course Material Grading Requirements

CANADIAN METRIC SIEVE SIZE	PERCENT OF TOTAL DRY WEIGHT PASSING EACH SIEVE
20 000	100%
5 000	40% - 70%
2 500	25% - 60%
315	8% - 25%
80	6% - 17%

E10.4.5 Recycled concrete base course material when subjected to the abrasion test will have a loss of not more than 35% when tested in accordance with grading B of ASTM C131, Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

E10.4.6 The amount of deleterious material will be limited to a maximum of two percent of the total dry weight.

CONSTRUCTION METHODS

E10.5 Placement of Recycled Concrete Base Course Material

E10.5.1 Place and compact recycled concrete base course material as a levelling course to a maximum thickness of 50 millimetres.

E10.5.2 Spread materials uniformly to avoid segregation free of pockets of fine and coarse material.

E10.5.3 Level and compact to the finished elevation. Compact to 100% Standard Proctor Density for Full-Depth Partial Slab Patches (Class A, B, C, & D) and 90% Standard Proctor Density for miscellaneous concrete slabs and sidewalks.

E10.5.4 Maintain the finished material until the pavement or sidewalk is placed.

## MEASUREMENT AND PAYMENT

### E10.6 Recycled Concrete Base Course Material

- E10.6.1 The supplying, placing and compaction of recycled concrete base course material will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for the "Supplying and Placing Base Course Material" as specified in accordance with CW 3110.
- E10.6.2 No measurement or payment will be made for material placed as a levelling course under miscellaneous concrete slabs and sidewalks where the costs are included in accordance with CW 3235 and CW 3325.
- E10.6.3 No measurement or payment will be made for materials rejected by the Contract Administrator.

## E11. INSTALLATION OF CULVERTS

### DESCRIPTION

#### E11.1 General

- E11.1.1 This specification shall cover installation of precast concrete box culverts.
- E11.1.2 Referenced Standard Construction Specifications
- (a) CW 2030 – Excavation Bedding and Backfill
- E11.1.3 Referenced Standard Detail
- (a) SD 002 – Standard Trench and Excavation Backfill Classes.

### MATERIALS

#### E11.2 Bedding and Backfill

- E11.2.1 Bedding and initial backfill material shall be as specified in CW 2030, or as shown on the Drawings.

### CONSTRUCTION METHODS

#### E11.3 Bedding and Backfill

- E11.3.1 The backfilling for culverts shall be as shown on the Drawings.
- E11.3.2 The following revisions for bedding and initial backfill apply:
- (a) Backfill shall be so placed and mechanically compacted that the fill rises equally and simultaneously on both sides, including handwork next to the box. Layers shall be placed with equipment running parallel to the structure.
  - (b) When the fill on both sides of the box approaches the top of the culvert, the same techniques of spreading shallow layers and compacting thoroughly shall be followed as the backfill covers the culvert. Light tamping equipment shall be used for the initial layers over the culvert.
  - (c) No traffic of any sort shall be permitted over the structure until cover of a minimum depth of 300 mm is properly compacted in place. If the Contractor requires crossings by heavy construction equipment, a minimum of 0.6 m of compacted cover over a length of at least 7.3 m of the structure shall be provided at no extra cost to the City.
  - (d) All compaction equipment used shall be subject to the approval of the Contract Administrator.
  - (e) The Contractor shall refer to E12 for special requirements when working near the feedermain.

#### E11.4 Box Culvert

- E11.4.1 The Contractor shall supply all necessary equipment for unloading and storing of the box culvert and end sections. The Contractor shall be responsible for the security and replacement of all components should they become lost or stolen once they have been received.
- E11.4.2 All components shall be handled in a careful and workmanlike manner. The components shall be stored on timber blocks or built up platforms. Smaller sized components such as miscellaneous hardware shall be stored separately in suitable bins or containers.
- E11.4.3 The Contractor shall unload the materials as expeditiously as possible.
- E11.4.4 The culvert shall be assembled in accordance with instructions provided by the culvert manufacturer.
- E11.4.5 The box culvert and end sections will be delivered to the site by the successful Bidder of Bid Opportunity 449-2009. The Contractor shall notify the supplier of the material a minimum of two (2) days in advance of his intended delivery date.
- E11.5 Connections
- E11.5.1 One section of pipe shall be delivered with a hole precut into it suitable to accept a 375 mm diameter PVC sewer pipe. The Contractor shall ensure that this section of pipe gets installed in the proper location.

#### MEASUREMENT AND PAYMENT

- E11.6 Box Culverts
- E11.6.1 Installation of precast concrete box culverts shall be measured on a length basis and paid for at the Contract Unit Price for "Precast Concrete Box Culvert – Install". The length to be paid for shall be the total number of metres acceptably installed complete with all necessary hardware, measured horizontally at grade, above the centreline of the pipe, as measured by the Contract Administrator.
- E11.6.2 Installation of precast concrete box culvert end sections shall be measured on a unit basis and paid for at the Contract Unit Price for "Precast Concrete Box Culvert End Sections – Install". The number to be paid for shall be the total number of sections acceptably installed complete with all necessary hardware, as measured by the Contract Administrator.
- E11.6.3 Payment for excavation, bedding, temporary supports, grout and backfill shall be included in the price per metre of precast concrete box culvert installed.
- E11.6.4 The connection of the 375 mm PVC sewer pipe to the proposed box culvert (hole precut by others) will not be paid for directly. The price for this shall be included in the price paid for the box culvert installation.

#### **E12. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO THE MARION STREET FEEDERMAIN**

- E12.1 Description
- E12.1.1 This Section details operating constraints for all work to be carried out in close proximity to the Marion Street Feedermain. Close proximity shall be deemed to be any construction activity within a 5 m offset from the centreline of the feedermain.
- E12.2 General Considerations for Work in Close Proximity to the Marion Street Feedermain
- E12.2.1 The Marion Street Feedermain is a critical component of the City of Winnipeg Regional Water Supply System and work in close proximity to the pipeline shall be undertaken with an abundance of caution. The pipe cannot be taken out of service to facilitate construction and inadvertent damage caused to the pipe would likely have catastrophic consequences.

Work around the Feedermain shall be planned and implemented to minimize the time period that work is carried out in close proximity to the pipe and to ensure that the pipeline is not subjected to excessive construction related loads, including excessive vibrations and/or concentrated or asymmetrical lateral loads during backfill placement.

E12.2.2 The Marion Street Feedermain is constructed in an inverted siphon configuration under the existing culverts, with vertical bends and thrust blocks immediately west and east of the site. The pipeline is composed of prestressed concrete cylinder SP-5, class R pipe (PCCP) immediately below, west east of the proposed site. The Marion Street Feedermain was manufactured and installed in 1962.

PCCP pipe has limited ability to withstand increased earth and live loading. Therefore, every precaution must be undertaken to ensure that applied loading during all phases of construction is within accepted loading parameters.

E12.2.3 Record Drawings D-0942 are provided in Appendix B for reference.

### E12.3 Submittals

E12.3.1 Submit proposed construction equipment specifications to the Contract Administrator for review seven (7) days prior to construction. Submittal shall include;

- (a) Equipment operating weight and dimensions including wheel or track base, track length or axle spacing, track widths or wheel configurations
- (b) Payload weights
- (c) Load distributions in the intended operating configuration

E12.3.2 Submit a Construction Method Statement with proposed construction plan including haul routes, excavation equipment locations, loading positioning and base construction sequencing to the Contract Administrator for review seven (7) days prior to construction. Do not commence construction until the Construction Method Statement has been reviewed and accepted by the Contract Administrator.

### E12.4 Protection of the Marion Street Feedermain During Construction

E12.4.1 There is approximately 4.57m (15') of existing cover on the pipe at this location as the Feedermain bends below the existing box culvert. The cover will be reduced to approximately 1.0m (3.3') on each side of the box culvert during construction, based on Record Drawings. Final clearance will between the top of the feedermain and the bottom of the new box culvert will be approximately 1.7m (5.6').

E12.4.2 Contractors carrying out repair work or working in close proximity to the Feedermain shall meet the following conditions and technical requirements:

- (a) Pre-work, Planning and General Execution
  - (i) No work shall commence at the site until the Construction Method Statement has been accepted and the Feedermain location has been clearly delineated in the field.
  - (ii) Work shall only be carried out with equipment that has been reviewed and quantified in terms of its loading implications by the Contract Administrator.
  - (iii) No construction equipment will be permitted to cross the Feedermain where there is less than 2 metres of cover, during construction. The feedermain shall be adequately marked to ensure no equipment operates within 2.5m of the centerline of the feedermain.
  - (iv) For construction work activities either longitudinally or transverse to the alignment of the Feedermain, work only with equipment and in the manner stipulated in the accepted Construction Method Statement and the supplemental requirements noted herein.
  - (v) Granular material, construction material, soil or other material shall not stockpiled on the pipelines or within 5 metres of the pipe centerline.

- (vi) Stage construction such that the Feedermain is not subjected to significant asymmetrical loading at any time.
  - (vii) Where work is in close proximity to the Feedermain, utilize construction practices and procedures that do not impart excessive vibration loads on the Feedermain or that would cause settlement of the subgrade below the Feedermain.
- (b) Excavation and Demolition
- (i) Existing concrete must be saw cut and removed within 3m of the centerline of the feedermain. No concrete breakers are permitted within 3m of the centerline of the feedermain. Hand operated breakers may be used at with the approval of the Contract Administrator.
  - (ii) Excavation within 1.5 metres vertically of the feedermain, or below the invert of the box culvert, shall utilize only smooth edged excavation buckets, soft excavation or hand excavation techniques.
  - (iii) Where there is less than 2.5 m of cover over the feedermain, offset backhoe or excavation equipment from feedermain, a minimum of 2.5 m from feedermain centerline, to carry out excavation.
- (c) Foundation Preparation
- (i) Excavate over and adjacent to the Feedermain to the lines and grades shown on the drawings. The contractor shall note that the subgrade adjacent to and over the Feedermain may be soft and wet, and unsuitable for base construction. Where directed by the Contract Administrator, remove unsuitable foundation material and replace with CW 2030 Type 2 material compacted to 95% SMPDD, with small vibratory plate tampers.
- (d) Backfill
- (i) Backfill compaction to a depth of 2.0 metres over the Feedermain and adjacent to the culvert shall be limited to light weight plate compaction equipment. Compaction of backfill above this level shall be completed with static compaction methods and only with equipment that are well within the rated loading superimposed loading capacity of the Feedermain. Compaction with smaller vibratory equipment such as hand held plate packers or smaller walk behind roller equipment may be permitted subject to review and approval by the Contract Administrator.

E12.4.3 The Contractor shall ensure that all work crew members understand and observe the requirements of this specification. Prior to commencement of on-site work, the Contractor shall jointly conduct an orientation meeting with the Contractor Administrator with all superintendents, foremen and heavy equipment operators to make all workers on site are fully cognizant of the limitations of altered loading on the Feedermain, the ramifications of inadvertent damage to the pipelines, the constraints associated with work in close proximity to the Feedermain and the specific details of the Construction Method Statement in instances where a Construction Method Statement is in effect.

E12.4.4 Employees of the Contractor or any Subcontractor that fail to comply with the conditions for working in close proximity to the Feedermain shall be promptly removed from the Site.

#### MEASUREMENT AND PAYMENT

E12.4.5 Operating constraints for work in close proximity to the Marion Street Feedermain shall be incidental to the installation of the culvert as covered in E11

**E13. SILT FENCE**

**DESCRIPTION**

E13.1.1 This specification covers the erection of temporary silt fencing, which shall be installed and maintained at the locations shown on the Drawings, to control runoff and minimize the release of detrimental silt loadings to watercourses. The scope of work included in this specification is as follows:

- (a) Supply and Install temporary silt fencing at locations as indicated, in accordance with the Drawings provided, prior to undertaking any other activities on the site where silt fencing is required.
- (b) Maintain the silt fencing in serviceable condition throughout the entire duration of activities at the site where silt fencing is required, including final restoration and cleanup of the construction site.
- (c) Remove the sediment trapped by silt fencing.
- (d) Remove the silt fencing and restore the area where the fencing was installed, without further disturbing the area and without releasing any deleterious substances to the adjacent watercourse.

**MATERIALS**

E13.1.2 Fence Posts

- (a) Posts for the temporary silt fence shall be constructed of wood or steel.
- (b) Wooden posts for the temporary silt fence shall be untreated fir or pine, minimum 34 mm x 40 mm in section and have a minimum length of 1.2 m. One end of the post shall be pointed.
- (c) Steel posts for the temporary silt fence shall have a "U", "T", "L" or other cross sectional shape that can resist failure by lateral loads will be accepted. Steel posts shall have a minimum mass per length of 1.1 kg/m and a minimum length of 1.2 m. One end of the steel posts shall be pointed and the other end shall be capped with an orange or red plastic safety cap which fits snugly to the steel post. The Contractor shall submit to the Contract Administrator for review a sample of the capped steel post prior to installation.

E13.1.3 Filter Fabric

- (a) Filter Fabric Shall be a woven geotextile material specifically designed for a silt fence applications, meeting the following minimum requirements:

<b>Property</b>	<b>Test Method</b>	<b>Value</b>
Grab Tensile Strength	ASTM D 4632	0.55 kN
Grab Tensile Elongation	ASTM D 4632	15%
Mullen Burst	ASTM D 3786	2060 kPa
Puncture	ASTM D 4833	0.285 kN
Trapezoid Tear	ASTM D 4533	0.285 kN
UV Resistance	ASTM D 4355	80% @ 500 hrs
Apparent Opening Size (AOS)	ASTM D 4751	0.60 mm
Flow Rate	ASTM D 4491	405 l/min/m <sup>2</sup>

- (b) Acceptable Product: "Amoco 2130 Silt Fence Fabric" or approved equal.

E13.1.4 Wire Mesh

- (a) Wire mesh shall be galvanized or plain metal with wire gauge=3.0 mm, wire spacing @ 150 mm o/c.

E13.1.5 Fencing Material Fasteners

- (a) Staples or wire ties of sufficient strength and spacing to withstand a 530N (120lbf) pull test at any point on the wire mesh.

## E13.2 Construction Methods

E13.2.1 Ensure that no deleterious substances are discharged into the adjacent watercourse at any time during construction activities

### E13.2.2 Silt Fence Installation

- (a) Excavate 150 x 150 anchor trench along alignment of silt fence as indicated. Install fence posts as indicated. Ensure that fence posts are firmly driven into undisturbed soil, or are completely and firmly backfilled if installed via auger methods. Attach wire mesh as support backing for silt fence filter fabric with fasteners. Attach silt fence filter fabric on top of wire mesh in similar fashion. Overlap any fence seams (wire mesh or filter fabric) by 450 mm minimum. Ensure that wire mesh and filter fabric are installed on the upslope side of the post and are fully laid in anchor trench as shown.
- (b) Install and compact impermeable excavated materials into anchor trench and slope as indicated. Compact to 95% of maximum dry density (ASTM D-698).
- (c) Nails shall be used to fasten the silt fence fabric to wooden posts; tie wire or locking plastic fasteners shall be used to fasten the silt fence fabric to steel posts; in accordance with the manufacturer's recommendations. Maximum spacing of fasteners shall be 200 mm along the length of the steel post.
- (d) The maximum spacing between the posts shall be 2.5 m.

### E13.2.3 Silt Fence Maintenance

- (a) Inspect silt fence daily, prior to starting any other construction activities. If fence posts are found loose or not upright, repair in accordance with installation procedure as specified in E12.3.2. If silt fence is found to be loose or torn, repair or replace as necessary to comply with E12.3.2.
- (b) If silt deposition at the fence is 300 mm or more in depth, carefully remove and dispose of silt offsite without disturbing silt fence.

### E13.2.4 Sediment Removal During Construction

- (a) During construction the Contractor shall remove sediment from the silt fences when the sediment reaches 300mm, or replace, or supplement the device as directed by the Contract Administrator.
- (b) Excavated sediment shall be disposed of within the designated disposal area, or as directed by the Contract Administrator.
- (c) Sediment removal shall occur within 24 hours of discovery or as soon as field conditions allow access and no sediment removal shall be performed without authorization from the Contract Administrator.

### E13.2.5 Silt Fence Removal

- (a) Following completion of all site construction activities (including final restoration and cleanup), remove all fence posts, wire mesh, fabric and fasteners from site.
- (b) Restore areas disturbed, without releasing any deleterious substances to the adjacent watercourse.

## E13.3 Method of Measurement and Basis of Payment

E13.3.1 Silt fence will be measured on a length basis and paid for at the Contract Unit Price for "Silt Fence". The amount to be paid for shall be the total number of lineal metres of silt fence installed and removed in accordance with this specification, accepted and measured by the Contract Administrator. No measurement or payment shall be made for sediment removal or silt fence maintenance during or after construction.

## **E14. TEMPORARY COFFER DAMS AND PUMPING**

### DESCRIPTION

- E14.1.1 The work performed under this specification shall include:
- (a) Supply and mobilization of all supervision, labour, materials, plant, and equipment necessary to install, maintain, and remove the temporary upstream and downstream coffer dams required to isolate the culvert installation site and the pumping of the water in the ditch from above the upstream coffer dam to new catchbasin or below the downstream coffer dam.
  - (b) The upstream temporary coffer dam materials shall consist of competent clay or granular materials with a synthetic membrane core.
  - (c) The downstream temporary coffer dam materials, if required, shall consist of sand bags and ploy membrane.
  - (d) Surface restoration of the upstream coffer dams footprint, including placement of 100 mm of topsoil and sodding.
- E14.1.2 This Specification shall amend and supplement the City of Winnipeg Standard Specifications CW 3170.

### MATERIALS

- E14.1.3 Fills for clay dykes shall be medium to highly plastic inorganic clay with plasticity index of between 35 and 60 percent. Clay fill shall not contain materials such as debris, organic material, or other materials considered unsuitable by the Contract Administrator. The Contractor shall identify his source of clay fill to the Contract Administrator and supply representative samples of the clay fill to the Contract Administrator at least ten business days prior to commencement of construction. The Contract Administrator shall perform the necessary testing to determine compliance with this Specification.
- E14.1.4 Well-graded granular materials may be used for temporary coffer dam construction if an impervious liner is used to prevent hydraulic piping or percolation through the dike.
- E14.2 Construction Methods
- E14.2.1 Stripping and Dike Sub-Grade Excavation
- (a) All topsoil in areas below the upstream coffer dam and other clay fills shall be stripped in accordance with CW 3170. Reuse of stripped and excavated soils shall be subject to approval by the Contract Administrator. Material to be reused shall be stockpiled as agreed by the Contract Administrator. All unsuitable materials shall be removed from the site.
- E14.2.2 Preparation of Upstream Cofferd Dam Sub Grade
- (a) All exposed upstream coffer dam subgrade soils shall be prepared in accordance with CW 3170 and compacted to 95 percent of standard Proctor maximum dry density.
- E14.2.3 Placement and Compaction of Clay Fills
- (a) Clay fills for the upstream coffer dam shall be placed, in layers not exceeding 150 mm in accordance with CW 3170. Compaction shall be to 95 percent of standard Proctor maximum dry density.
- E14.2.4 Fine Grading
- (a) The top of the upstream coffer dam shall be built to an elevation 1.0 m above existing ditch invert.
- E14.2.5 Equipment
- (a) Equipment for utilized for construction of the dyke shall be of a size suitable to site conditions and the proximity of homes and other private property.

- (b) Equipment for pumping shall be of a size which will pump at a maximum rate of 0.03 m<sup>3</sup>/second (1cfs or 450 USgpm) of water into the catchbasin. Additional flows may be pumped downstream of the culvert providing proper erosion control techniques are implemented.
- (c) It shall be expected that rainfall events may cause the temporary clay dike to be overtopped and the flows to pass through the site.

#### E14.3 Measurement and Payment

- E14.3.1 No measurement will be made and payment will be based on the Contract Lump Sum unit price for "Temporary Cofferdams and Pumping". One third of the Contract Lump Sum unit price will be progressed once the temporary coffer dams are in place and the pumping equipment is in place and energized and all has been found acceptable to the Contract Administrator. One third of the Contract Lump Sum price will be progressed once the pumping is no longer required. The final one third of the Contract Lump Sum price will be progressed once the coffer dams and pumping equipment have been removed from the site and the area under the upstream coffer dam has been fully restored and sodded.

### E15. STRAW WATTLE

#### DESCRIPTION

- E15.1.1 This specification shall cover the supply and installation of straw wattles.

#### MATERIALS

- E15.1.2 Straw Wattles
  - (a) The 300 mm diameter straw roll shall consist of straw or wood fibre that has been compressed and placed onto a biodegradable poly or plastic netting. Stenlog is an approved product. Submit proposed straw wattle data sheet for review and acceptance at least five (5) Working Days prior to installation.
  - (b) Wooden stakes shall be provided to secure the straw wattles. These wooden stakes shall have a minimum 50 mm x 50 mm cross section, a minimum length of 600 mm and be pointed at one end.

#### CONSTRUCTION METHODS

- E15.2 Straw Wattles
  - E15.2.1 Install 300 mm Stenlog or other straw wattle sediment control material in accordance with the manufacturer's specifications around all rip rap areas, drainage inlets and outlets, and catch basins within seeded or sodded areas.
  - E15.2.2 Install straw wattles so that no gaps exist between the soil and the bottom of the wattle, and the ends of adjacent wattles are overlapped 150 mm minimum to prevent water and sediment passing. Achieve a tight seal between the wattle segments.
  - E15.2.3 Dog leg terminal ends of straw wattle up the slope to prevent channelling of sedimentation.
  - E15.2.4 Use 600 mm wooden stakes to fasten straw wattle to the soil. Place stakes on each side of the straw wattle, lying across the natural fibre twine, spaced 1200 mm on centre. Leave 30 to 50 mm of wood stake exposed above the wattle.
  - E15.2.5 Avoid damage to wattles. Damaged areas of wattles should be cut and tied off, then treated as terminal ends.

#### MEASUREMENT AND PAYMENT

- E15.3 Straw Wattle
  - E15.3.1 Straw wattle will be measured on a unit basis for the number of wattles installed in accordance with the Drawings and this specification, and accepted by the Contract

Administrator, as computed by the Contract Administrator. Straw wattle will be paid for at the Contract Unit Price for "Straw Wattle", 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.

## **E16. STRUCTURAL REMOVALS**

### DESCRIPTION

E16.1 This Specification shall cover structural removal works, including all necessary demolition, removal, transporting, dismantlement, and disposal of applicable materials.

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

E16.2 Equipment

E16.2.1 All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

### CONSTRUCTION METHODS

E16.3 Scope of Work

E16.3.1 The Work under this Specification shall include the following items, to the limits as shown on the Contract Drawings or as otherwise directed by the Contract Administrator:

- (a) Culvert Removals - Removal and disposal of the top and sides of the existing box culvert as shown on the Drawings, including head walls, embedments, attachments, waterproofing items, other removal and disposal of miscellaneous buried structures will be considered for removal upon acceptance of the Contract Administrator. The existing floor is to be left in place.
- (b) Steel Guardrail – Removal and disposal of steel guardrail from the structure.
- (c) Chain Link Fence – Removal and disposal of chain link fence on the south side of Marion Street.
- (d) Miscellaneous Timber – Removal and disposal of miscellaneous timber north of the existing structure.
- (e) Cleaning – Clean existing culvert floor to the satisfaction of the Contract Administrator to allow for installation of the proposed box culvert.

E16.3.2 The Contractor shall visit the site to become familiar with the existing conditions and scope of work prior to bid submission. No allowance for extras will be made for any structural removals, not foreseen by the Contractor, required to complete the scope of work.

E16.3.3 Record drawings of the existing box culvert to be demolished can be viewed at the office of the Contract Administrator listed in D3.

E16.4 General

E16.4.1 Explosives

- (a) The use of explosives is prohibited.

E16.4.2 Protection of Existing Structures and Services

- (a) The Contractor shall prevent movement, settlement, or damage of adjacent structures, services, utilities, paving, trees, landscaping or adjacent grades. The Contractor shall provide bracing, shoring, and underpinning as required and shall have this work certified by a Professional Engineer registered to practice in the Province of Manitoba employed by the General Contractor. If safety of the

structure being removed, adjacent structures or services, appears to be endangered, the Contractor shall cease operations and notify the Contract Administrator immediately.

- (b) The location of underground structures as shown is based on the best information available. No guarantee is given that all existing utilities are shown or that the given locations are exact. The Contractor shall confirm the existence and exact location of all services with each individual utility before proceeding with any removal works. The Contractor shall coordinate the removal works and required protection if necessary with each individual utility company prior to any excavation or removals being carried out.

#### E16.4.3 Safety Precautions

- (a) The Contractor shall provide adequate measures to secure the safety of workmen and the public. The safety precautions shall comply with all Provincial Statutes applicable to the work. The Contractor shall provide all other protective measures as may be required by any law in force in Manitoba and the Canada Labour Code.

#### E16.4.4 Structure Removal Schedule and Procedures

- (a) At least five (5) working days prior to the scheduled commencement of any demolition and removal work, the Contractor shall submit to the Contract Administrator details of the proposed equipment, schedule, and methods of removal for each type of demolition or removal for review and acceptance. No demolition and removal works shall commence without prior acceptance of the Contract Administrator.

#### E16.4.5 Structural Removal Methods

- (a) Structural removals shall be deemed to include all the items of work as listed under E16.3.1, "Scope of Work", of this specification and to the limits as shown on the Contract Drawings or otherwise directed by the Contract Administrator.
- (b) In no case will the Contractor be permitted to use removal equipment, or other equipment or methods which may cause damage to any remaining structural elements or to any new construction. In the event that any element is damaged, the Contractor shall repair such element at his own expense to the satisfaction of the Contract Administrator.

#### E16.4.6 Disposal

- (a) All removed material shall become the responsibility of the Contractor.
- (b) The Contractor shall promptly haul all removed materials indicated for disposal, off and away from the site. No storage of any materials on-site will be allowed without written approval of the Contract Administrator.
- (c) It shall be the Contractor's responsibility to find suitable disposal areas away from the site.

#### E16.4.7 Protection of Roadways and Walkways

- (a) The Contractor shall be fully responsible for ensuring the public safety in all areas, and will be held responsible for any loss or damage caused due to neglect by the Contractor or his employees.

### MEASURE AND PAYMENT

- E16.4.8 Structural Removals, including cleaning the existing culvert floor, as defined in this specification, will be paid for on a lump sum basis as accepted by the Contract Administrator and no measurement will be made for this work. Structural Removals will be paid for at the Contract Lump Sum Price for the "Structural Removals," which price shall be

payment in full for supplying all materials and performing all operations herein described and all other items incidental to the work included in this specification.

**E17. REMOVAL OF EXISTING PIPES**

DESCRIPTION

E17.1 This Specification shall amend and supplement Specification CW 2130 and DW 3210.

CONSTRUCTION METHODS

E17.2 Removal of existing pipes shall consist of existing catchbasin or curb inlet leads which are to be removed in order to facilitate the installation of new catchbasin or catch pits.

MEASUREMENT AND PAYMENT

The removal of existing pipes by excavating, removing and disposing of existing pipe will be measured on a length basis. The length to be paid for shall be the total number of linear metres of pipe removed from the specified area measured horizontally at grade. Removal of existing pipes will be paid for at the Contract Unit Price per linear metre for "Removal of Existing Pipes", operations required to complete the work as specified.

# **APPENDIX 'A'**

# **GEOTECHNICAL REPORT**

## Memorandum

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Date: May 8, 2009  
To: James Kennedy  
From: Faris Khalil  
Subject: **Marion Street Crossing of Dugald Drain Replacement  
Geotechnical Recommendations**  
Project No: 0265 410 00 (4.6.1)  
Distribution: Kris Matusiewicz, Ken Skafffeld

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### 1. INTRODUCTION

This memo presents a summary of the geotechnical investigation performed for the above referenced project and provides geotechnical recommendations for the design and construction of culvert alternatives to replace the existing single cell reinforced concrete box culvert. The drain requires replacement because it is in poor shape and has inadequate length for future widening of Marion Street. The structure, built in 1918, has internal dimensions of approximately 2.6 m high by 3.2 m wide and runs at a skew to Marion Street.

### 2. GEOTECHNICAL INVESTIGATION

Three test holes were drilled on March 12, 2009 at the locations shown on the Test Hole Location Plan, Figure 01 in Appendix A. Test holes TH 09-01 and TH 09-02 were advanced to a depth of 12.2 and 18.3 m below the road shoulder surface, respectively. TH 09-03 was advanced to a depth of 3.0 m below the road shoulder.

Drilling was carried out by Paddock Drilling Ltd. using an Akcer SS Nodwell drill rig equipped with 125 mm diameter solid stem auger. Disturbed soil samples from the auger cuttings were collected at regular intervals in each test hole. Relatively undisturbed (Shelby tube) samples were collected from TH 09-02. All soils observed during drilling were logged and visually classified on-site by AECOM personnel.

Soil samples recovered during drilling were transported to AECOM's Materials Testing Laboratory in Winnipeg for further visual examination and testing. Laboratory testing consisted of determination of moisture contents and Atterberg limits. Undrained shear strengths and unit weights were determined on Shelby tube samples.

A detailed test hole log has been prepared for each test hole to record the description and the relative position of the various soil strata, location of samples obtained, field and laboratory test results, and other pertinent information. The test hole logs are provided in Appendix A.

### **3. SUBSURFACE CONDITIONS**

In descending order, the general soil profile is as follows:

- Gravel Fill
- Glacio-Lacustrine Clay
- Glacial Till

These soils are described as follows:

#### **Gravel Fill**

Gravel fill 0.2 to 0.6 m thick was encountered at ground surface in TH 09-01 and TH 09-03. The fill consists of a mix of gravel, some clay, some cobbles, trace silt and trace sand. Trace organics and wood debris was also encountered in TH 09-01.

#### **Glacio-Lacustrine Clay**

Highly plastic glacio-lacustrine silty clay was encountered beneath the fill. In TH 09-02 the clay extends to a depth of about 18.0 m below the existing grade or to elevation 212.9 m. The other two test holes were terminated within the clay unit. The clay is generally soft to firm, moist and grey in colour. Silt and sulphate inclusions were observed in the clay. Moisture contents range from 21 to 54 percent. The clay is classified as highly plastic based on an average liquid limit and plasticity index of 101 and 70 percent, respectively. Bulk unit weights of the clay range from 16.9 to 17.1 kN/m<sup>3</sup>. Undrained shear strengths, of the clay within the influence zone of the foundation (i.e. between the elevations of 224 to 228 m), range from 24.7 to 38.3 kPa (based on Unconfined Compression testing).

#### **Glacial Till**

Glacial till was encountered beneath the clay in TH 09-02 at a depth of 18.0 m below ground surface or at elevation 212.9 m. The till consists of sandy clay, with some gravel and trace silt. The till is very stiff to hard (auger refusal) and the moisture content is 9 percent.

#### **Groundwater Conditions**

No seepage or sloughing was observed in any of the test holes. No piezometers were installed in any of the test holes and no water levels were read upon completion of the test holes.

### **4. CULVERT ALTERNATIVES**

It is our understanding that the following alternatives have been identified for the proposed replacement to the existing box culvert. Also, that the existing floor of the box culvert will be left in place for either of these alternatives:

#### **Alternative 1: Two Precast Concrete Pipe Culverts**

#### **Alternative 2: Precast Concrete Box Culvert**

Wherever applicable, in this document, the requirements for each culvert type will be discussed.

## **5. DESIGN AND CONSTRUCTION CONSIDERATION**

### **5.1. TEMPORARY WATER DIVERSION**

A diversion is required to temporarily reroute the drain and to allow the culvert placement work to be carried out in the dry. The hydraulic design of this diversion is beyond the scope of our investigation, although ideally this work would be carried out during low flow conditions. Temporary diversions should use a sufficiently sized channel or culverts to maintain base flow.

A cofferdam will be required to isolate the work area from the drain. Cofferdams should be designed to handle anticipated changes in water levels during the construction period. The most economical means for a cofferdam is a conventional earth fill consisting of locally available silty clay.

Seepage control measures such as pumping and clay seal on the upstream side may be required if seepage occur below the cofferdam. However, difficulties in maintaining a stable base may be encountered if the differential pressure developed from pumping becomes excessive. For this reason, alternatives for constructing the culvert in both dry and wet conditions are provided.

### **5.2. EXCAVATION**

The method of excavation and support of excavation sidewalls are the responsibility of the contractor and subject to applicable Occupational Health and Safety requirements of Manitoba Labour regarding excavation and trench safety; which can be found in the Workplace Safety and Health Regulations and Guidelines for Excavation Work. The information provided below is for use by the owner and engineer and should not be interpreted to mean that AECOM is assuming responsibility for the contractor's actions or site safety. The following guidelines regarding excavation slopes are intended only to provide guidance for construction supervision. The stability of the excavation slopes should be monitored regularly by knowledgeable geotechnical personnel.

It is expected that slopes cut not steeper than 1H: 1V would perform satisfactorily within the clay for excavations not exceeding 3 m deep for a brief construction period (1 month). Flatter slopes would be required in wet soil or fill material. Benching and placement of gravel buttresses or sand bags may be required to control localized caving and provide support for the excavation slopes. If this technique is employed, it would be necessary to provide extra width at the base of the excavation for drainage provision and buttressing. Surcharge loading, including the excavation spoil should be kept to a minimum distance equal to the excavation depth away from cut slope crest.

### **5.3. FOUNDATION PREPARATION AND BEDDING**

The floor slab of the existing culvert could be used to serve as foundation for the new culvert crossing, if the proposed invert allows. Alternatively, the slab could be removed and foundation bedding is provided as recommended below.

An allowable bearing capacity of 60 kPa can be used on the undisturbed clay. A minimum of 600 mm thick bedding should be provided underneath the new culvert. If the existing slab is preserved, the bedding underneath the additional culvert length on each side should be as thick as the concrete slab or 600 mm whichever is greater. The sub-cut prepared to receive the bedding should be compacted to 95 percent Standard Proctor maximum dry density and should be approved by qualified geotechnical personnel. Over-excavation within the sub-cut may be required if soft area is encountered. Care should be taken to ensure that the floor slab is not undermined during excavation. If the excavation cannot be completely dewatered,

the over excavation should be backfilled to the required grade using clean coarse granular material. A non-woven geotextile (City of Winnipeg Specification CW 3120 – Table 1) is recommended at the bottom of the bedding material to serve as separator and protect against loss of fines.

The culvert bedding material should consist of compactable granular material conforming to Type 3 material as per City of Winnipeg Specifications CW 2030-Table 1. Cohesive soil or material containing large amounts of fine sand and/or silt should not be used, because erosion of the bedding material may result. The material should be placed in layers not greater than 200 mm thick and compacted to 98% of Standard Proctor maximum dry density. The upper 200 mm of bedding directly underneath the culvert barrels should be composed of relatively loose material and should be shaped to the approximate contour of the bottom portion of the culvert. Alternatively, the bedding can be shaped to a shallow V-shape. Shaping the bedding affords a more uniform support. The shaped portion need not extend across the entire bottom, but must be wide enough to permit the efficient compaction of the backfill under the remaining haunches of the culvert.

Erosion protection is recommended at the inlet and outlet of the new culvert.

#### **5.4. BACKFILL MATERIAL, PLACEMENT AND COMPACTION**

The selection, placement and compaction of the envelope of earth surrounding the culvert is important for the performance and integrity of the structure. Culvert backfill should extend one diameter on either side and from the invert to an elevation 600 mm over the culvert. In case of multiple installations adequate room between the culverts should be provided to enable the placement and compaction of the backfill.

Backfill should consist of well graded granular material conforming to Type 1 material as per City of Winnipeg Specification CW 2030 – Table 1. The backfill should be free from large or frozen lumps, wood or other unsuitable material and should be placed and compacted in an unfrozen condition. Fill material under haunches and around the structure should be placed in layers 150 to 300 mm thick to permit thorough compaction. Each layer must be compacted to a minimum of 95% of Standard Proctor maximum dry density before adding the next.

Backfilling and compacting under the haunches are important steps in the backfill sequence. The material under the haunches must be in firm and intimate contact with the entire bottom surface of the culvert. The area under pipe haunches is more difficult to fill and compact and should receive adequate attention. Pre-shaping the bedding material to match the culvert curvature may assist in this regard. Care must be taken to assure that voids and soft spots do not occur under the haunches. Manual placing and compaction must be used to build up the backfill in this area.

Backfilling should be done equally on each side in a manner that will prevent any deformation or displacement of the culvert. Generally, no more than a one layer difference in elevation on each side should be allowed. These compacted layers must extend at least one-half to one diameter on each side of the structure. The 300 mm layer of backfill directly above the culvert should be compacted without vibration. Backfill in the area immediately next to the culvert should be compacted by hand-operated methods.

To minimize the possibility of uncompacted fill or voids left next to the structure, all equipment should run parallel to the length of the culvert, mounding or dumping of backfill material against the pipe should not be allowed until such time as the elevation of the backfill reaches a point that is at 3/4 of the diameter of the pipe. A clay seal should be provided at each culvert end to protect against piping erosion and loss of fines. The clay seal should extend for a distance twice the culvert diameter along the culvert axis. The seal should be built up to 600 mm over the culvert. The clay seal should not extend below the road.

## 6. CLOSURE

The findings and recommendations of this memorandum were based on the results of field and laboratory investigations, combined with an interpolation of soil and groundwater conditions between the test hole locations. If conditions are encountered that appear to be different from those shown by the test holes drilled at this site and described in this report, or if the assumptions stated herein are not in keeping with the design, this office should be notified in order that the recommendations can be reviewed and adjusted, if necessary.

Soil conditions, by their nature, can be highly variable across a site. The placement of fill and prior construction activities on a site can contribute to the variability especially near surface soil conditions. A contingency should be included in the construction budget to allow for the possibility of variation in soil conditions, which may result in modification of the design and construction procedures.

If we can be of further assistance, please contact Faris Khalil at (204) 284 0580, directly.

Respectfully Submitted,

**UMA Engineering Ltd.**



Faris Khalil, M.Sc. P.Eng.  
Senior Geotechnical Engineer

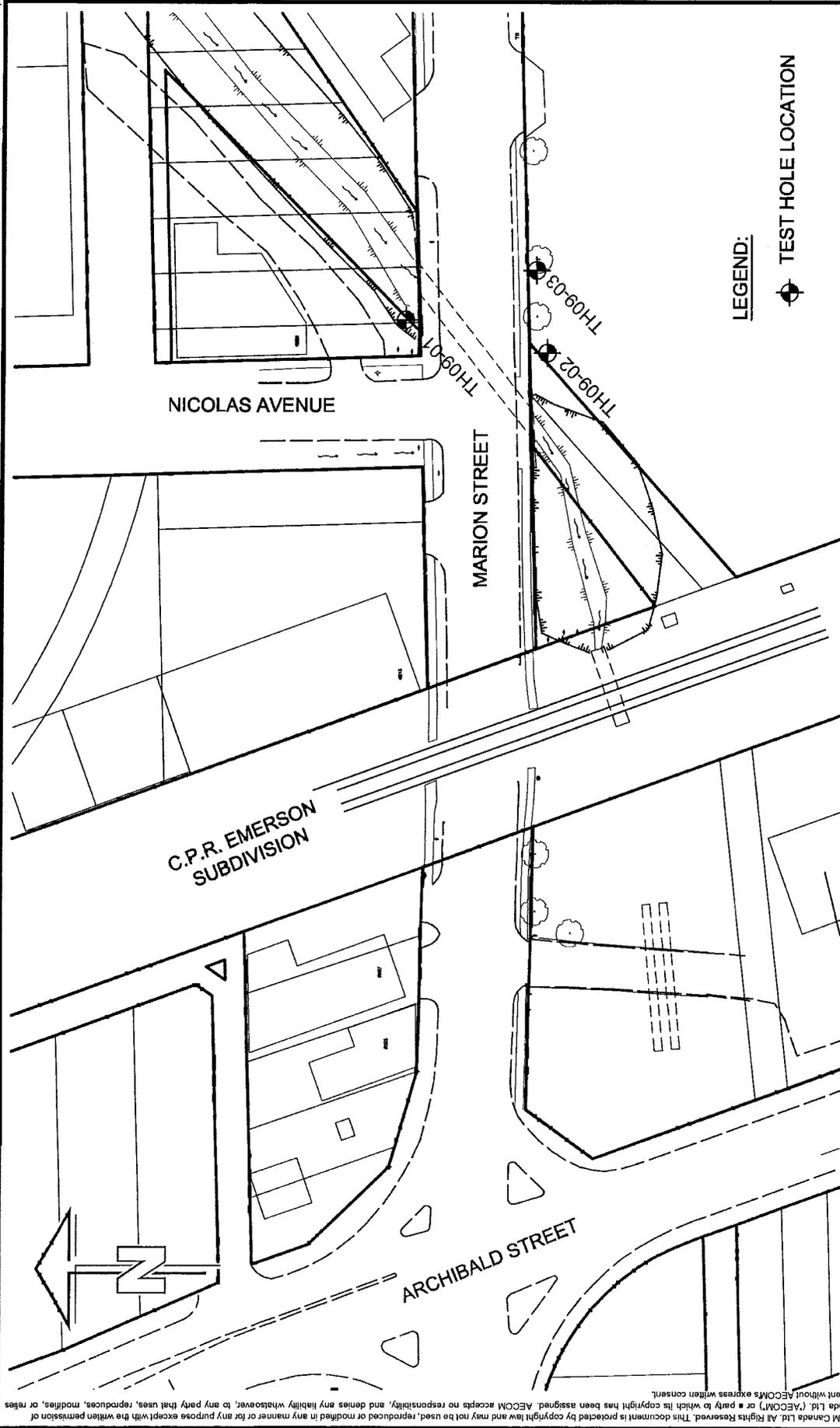
**Reviewed by:**



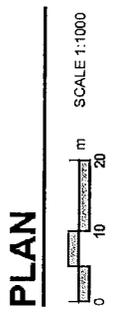
Ken Skafffeld, P.Eng.  
Senior Geotechnical Engineer

**APPENDIX A**

**Test Hole Location Plan  
Test Hole Logs**



City of Winnipeg  
 Marion Street Crossing  
 of Dugald Drain Replacement  
**Test Hole Location Plan**



**AECOM**

**Figure - 01**

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**AECOM Canada Ltd.**

**GENERAL STATEMENT**

**NORMAL VARIABILITY OF SUBSURFACE CONDITIONS**

The scope of the investigation presented herein is limited to an investigation of the subsurface conditions as to suitability for the proposed project. This report has been prepared to aid in the evaluation of the site and to assist the engineer in the design of the facilities. Our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of earth work, foundations and similar. In the event of any changes in the basic design or location of the structures as outlined in this report or plan, we should be given the opportunity to review the changes and to modify or reaffirm in writing the conclusions and recommendations of this report.

The analysis and recommendations presented in this report are based on the data obtained from the borings and test pit excavations made at the locations indicated on the site plans and from other information discussed herein. This report is based on the assumption that the subsurface conditions everywhere are not significantly different from those disclosed by the borings and excavations. However, variations in soil conditions may exist between the excavations and, also, general groundwater levels and conditions may fluctuate from time to time. The nature and extent of the variations may not become evident until construction. If subsurface conditions differ from those encountered in the exploratory borings and excavations, are observed or encountered during construction, or appear to be present beneath or beyond excavations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

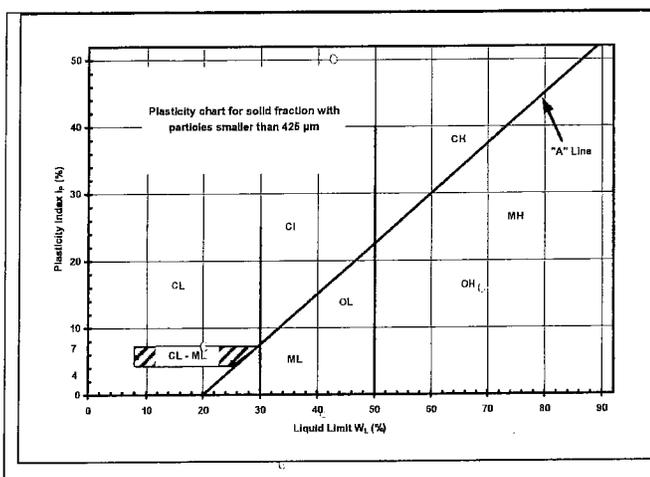
Since it is possible for conditions to vary from those assumed in the analysis and upon which our conclusions and recommendations are based, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modification of the design and construction procedures.

In order to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated, we recommend that all construction operations dealing with earth work and the foundations be observed by an experienced soils engineer. We can be retained to provide these services for you during construction. In addition, we can be retained to review the plans and specifications that have been prepared to check for substantial conformance with the conclusions and recommendations contained in our report.

## EXPLANATION OF FIELD & LABORATORY TEST DATA

		Description	UMA Log Symbols	USCS Classification	Laboratory Classification Criteria				
					Fines (%)	Grading	Plasticity	Notes	
COARSE GRAINED SOILS	GRAVELS (More than 50% of coarse fraction of gravel size)	CLEAN GRAVELS (Little or no fines)	Well graded gravels, sandy gravels, with little or no fines		GW	0-5	$C_u > 4$ $1 < C_c < 3$	Dual symbols if 5-12% fines. Dual symbols if above "A" line and $4 < W_p < 7$  $C_u = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$	
			Poorly graded gravels, sandy gravels, with little or no fines		GP	0-5	Not satisfying GW requirements		
		DIRTY GRAVELS (With some fines)	Silty gravels, silty sandy gravels		GM	> 12			Atterberg limits below "A" line or $W_p < 4$
			Clayey gravels, clayey sandy gravels		GC	> 12			Atterberg limits above "A" line or $W_p < 7$
	SANDS (More than 50% of coarse fraction of sand size)	CLEAN SANDS (Little or no fines)	Well graded sands, gravelly sands, with little or no fines		SW	0-5	$C_u > 6$ $1 < C_c < 3$		
			Poorly graded sands, gravelly sands, with little or no fines		SP	0-5	Not satisfying SW requirements		
		DIRTY SANDS (With some fines)	Silty sands, sand-silt mixtures		SM	> 12			Atterberg limits below "A" line or $W_p < 4$
			Clayey sands, sand-clay mixtures		SC	> 12			Atterberg limits above "A" line or $W_p < 7$
FINE GRAINED SOILS	SILTS (Below 'A' line negligible organic content)	$W_L < 50$	Inorganic silts, silty or clayey fine sands, with slight plasticity		ML		Classification is Based upon Plasticity Chart		
		$W_L > 50$	Inorganic silts of high plasticity		MH				
	CLAYS (Above 'A' line negligible organic content)	$W_L < 30$	Inorganic clays, silty clays, sandy clays of low plasticity, lean clays		CL				
		$30 < W_L < 50$	Inorganic clays and silty clays of medium plasticity		CI				
		$W_L > 50$	Inorganic clays of high plasticity, fat clays		CH				
	ORGANIC SILTS & CLAYS (Below 'A' line)	$W_L < 50$	Organic silts and organic silty clays of low plasticity		OL				
		$W_L > 50$	Organic clays of high plasticity		OH				
	HIGHLY ORGANIC SOILS		Peat and other highly organic soils		Pt	Von Post Classification Limit		Strong colour or odour, and often fibrous texture	
	Asphalt		Till			<div style="border-left: 1px solid black; padding-left: 10px;"> <h1 style="margin: 0;">AECOM</h1> </div>			
	Concrete		Bedrock (Undifferentiated)						
	Fill		Bedrock (Limestone)						

When the above classification terms are used in this report or test hole logs, the designated fractions may be visually estimated and not measured.



FRACTION		SEIVE SIZE (mm)		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS	
		Passing	Retained	Percent	Identifier
Gravel	Coarse	76	19	35-50	and
	Fine	19	4.75		
Sand	Coarse	4.75	2.00	20-35	"y" or "ey" *
	Medium	2.00	0.425		
	Fine	0.425	0.075	10-20	some
Silt (non-plastic) or Clay (plastic)		< 0.075 mm		1-10	trace
* for example: gravelly, sandy clayey, silty					
Definition of Oversize Material					
COBBLES: 76mm to 300mm diameter					
BOULDERS: >300mm diameter					

### LEGEND OF SYMBOLS

Laboratory and field tests are identified as follows:

- $q_u$  - undrained shear strength (kPa) derived from unconfined compression testing.
- $T_v$  - undrained shear strength (kPa) measured using a torvane
- $pp$  - undrained shear strength (kPa) measured using a pocket penetrometer.
- $L_v$  - undrained shear strength (kPa) measured using a lab vane.
- $F_v$  - undrained shear strength (kPa) measured using a field vane.
- $\gamma$  - bulk unit weight ( $\text{kN/m}^3$ ).
- SPT - Standard Penetration Test. Recorded as number of blows (N) from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 51 mm O.D. Raymond type sampler 0.30 m into the soil.
- DPPT - Drive Point Pentrometer Test. Recorded as number of blows from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 50 mm drive point 0.30 m into the soil.
- $w$  - moisture content ( $W_L, W_P$ )

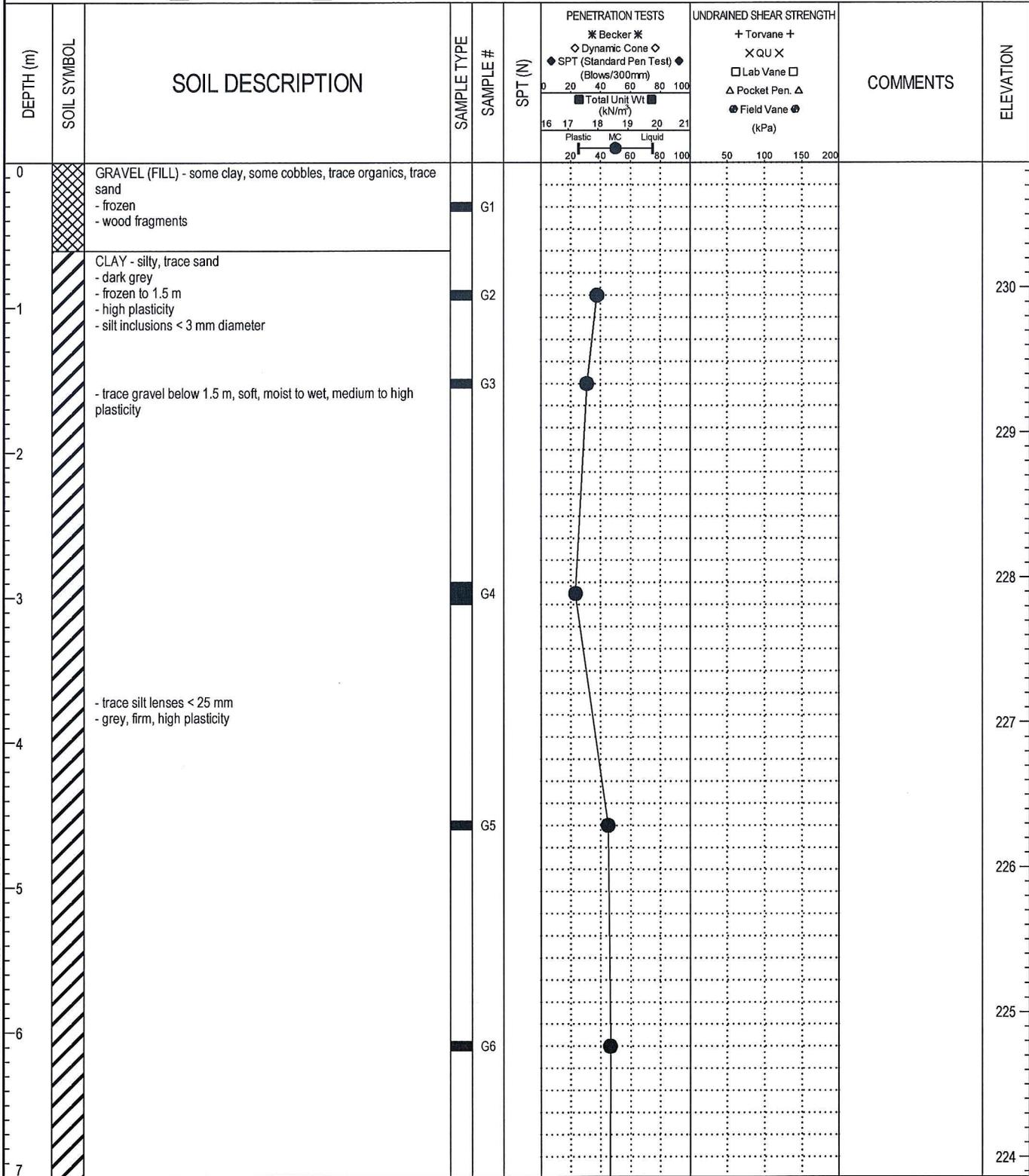
The undrained shear strength ( $S_u$ ) of a cohesive soil can be related to its consistency as follows:

$S_u$ (kPa)	CONSISTENCY
<12	very soft
12 – 25	soft
25 – 50	medium or firm
50 – 100	stiff
100 – 200	very stiff
200	hard

The resistance (N) of a non-cohesive soil can be related to compactness condition as follows

N – BLOWS/0.30 m	COMPACTNESS
0 - 4	very loose
4 - 10	loose
10 - 30	compact
30 - 50	dense
50	very dense

PROJECT: Marion Street Crossing with Dugald Drain	CLIENT: City of Winnipeg	TESTHOLE NO: TH-09-01
LOCATION: Marion Street (North Side) 10 m West of the existing culvert - coordinates UTM 14U 0636756 - 5527249		PROJECT NO.: 0265-410-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS, Nodwell, 125 mm SSA	ELEVATION (m): 230.86
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	



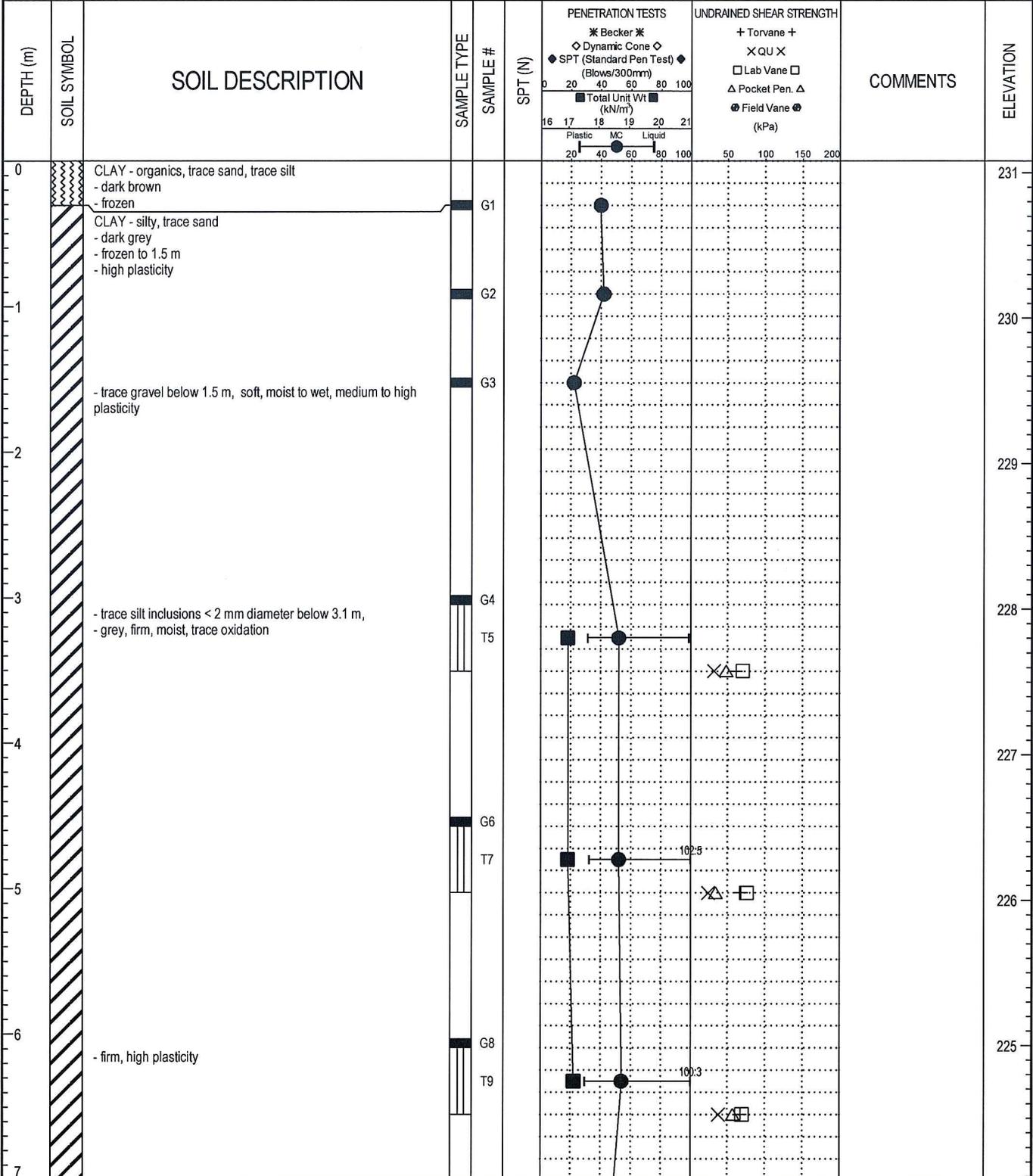
LOG OF TEST HOLE 0265-410-00 BORE HOLE LOGS.GPJ UMA WINN.GDT 5/7/09

AECOM

LOGGED BY: Alex Knop	COMPLETION DEPTH: 12.19 m
REVIEWED BY: Kris Matusiewicz	COMPLETION DATE: 3/12/09
PROJECT ENGINEER: Farris Khalil	Page 1 of 2



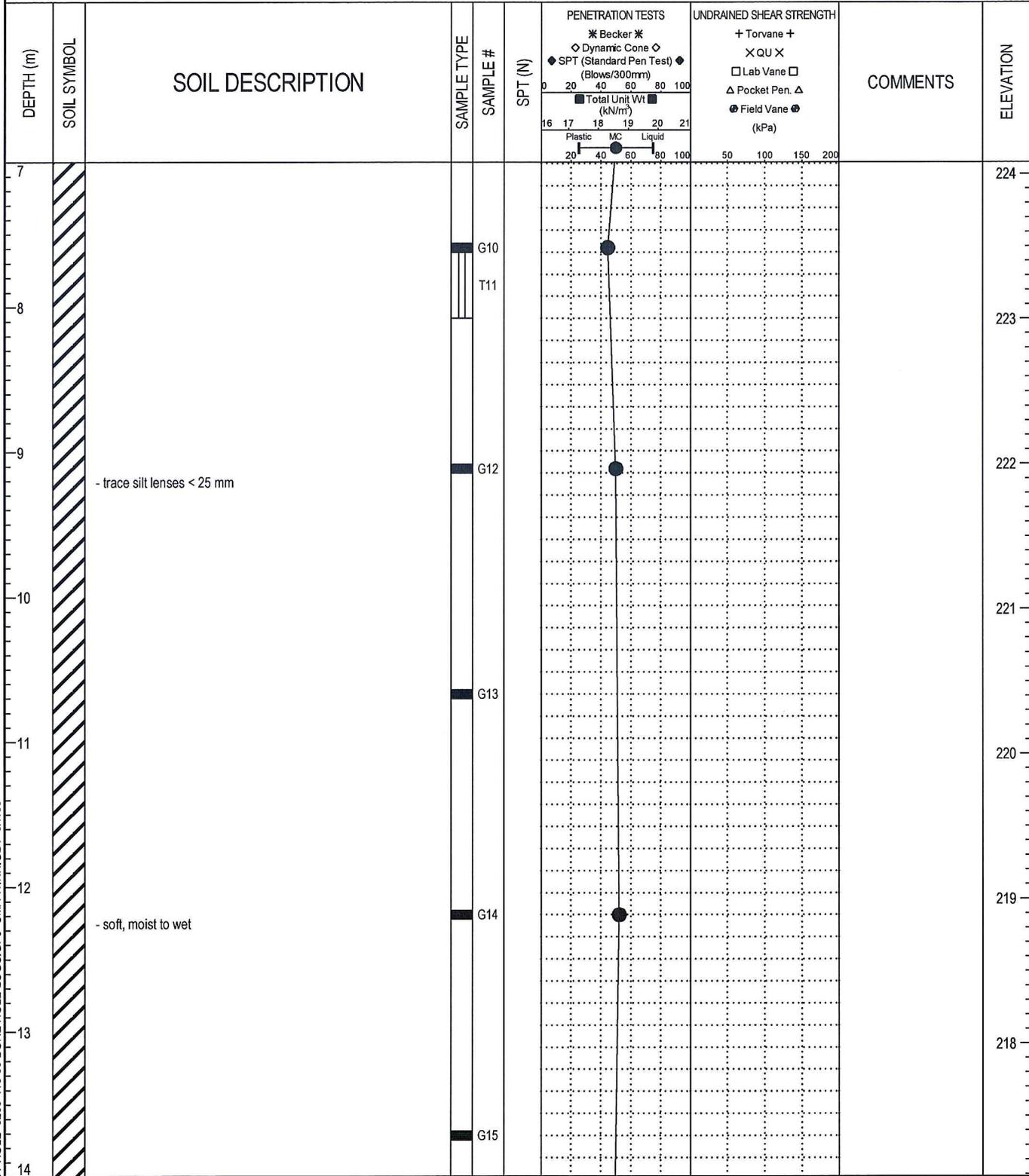
PROJECT: Marion Street Crossing with Dugald Drain	CLIENT: City of Winnipeg	TESTHOLE NO: TH-09-02
LOCATION: Marion Street (South Side) 15 m East of the existing culvert - coordinates UTM 14U 0636750 - 5527223		PROJECT NO.: 0265-410-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS, Nodwell, 125 mm SSA	ELEVATION (m): 231.08
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	



LOG OF TEST HOLE 0265-410-00 BORE HOLE LOGS.GPJ UMA WINN.GDT 5/7/09

<b>AECOM</b>	LOGGED BY: Alex Knop	COMPLETION DEPTH: 18.29 m
	REVIEWED BY: Kris Matusiewicz	COMPLETION DATE: 3/12/09
	PROJECT ENGINEER: Farris Khalil	Page 1 of 3

PROJECT: Marion Street Crossing with Dugald Drain	CLIENT: City of Winnipeg	TESTHOLE NO: TH-09-02
LOCATION: Marion Street (South Side) 15 m East of the existing culvert - coordinates UTM 14U 0636750 - 5527223		PROJECT NO.: 0265-410-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS, Nodwell, 125 mm SSA	ELEVATION (m): 231.08
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

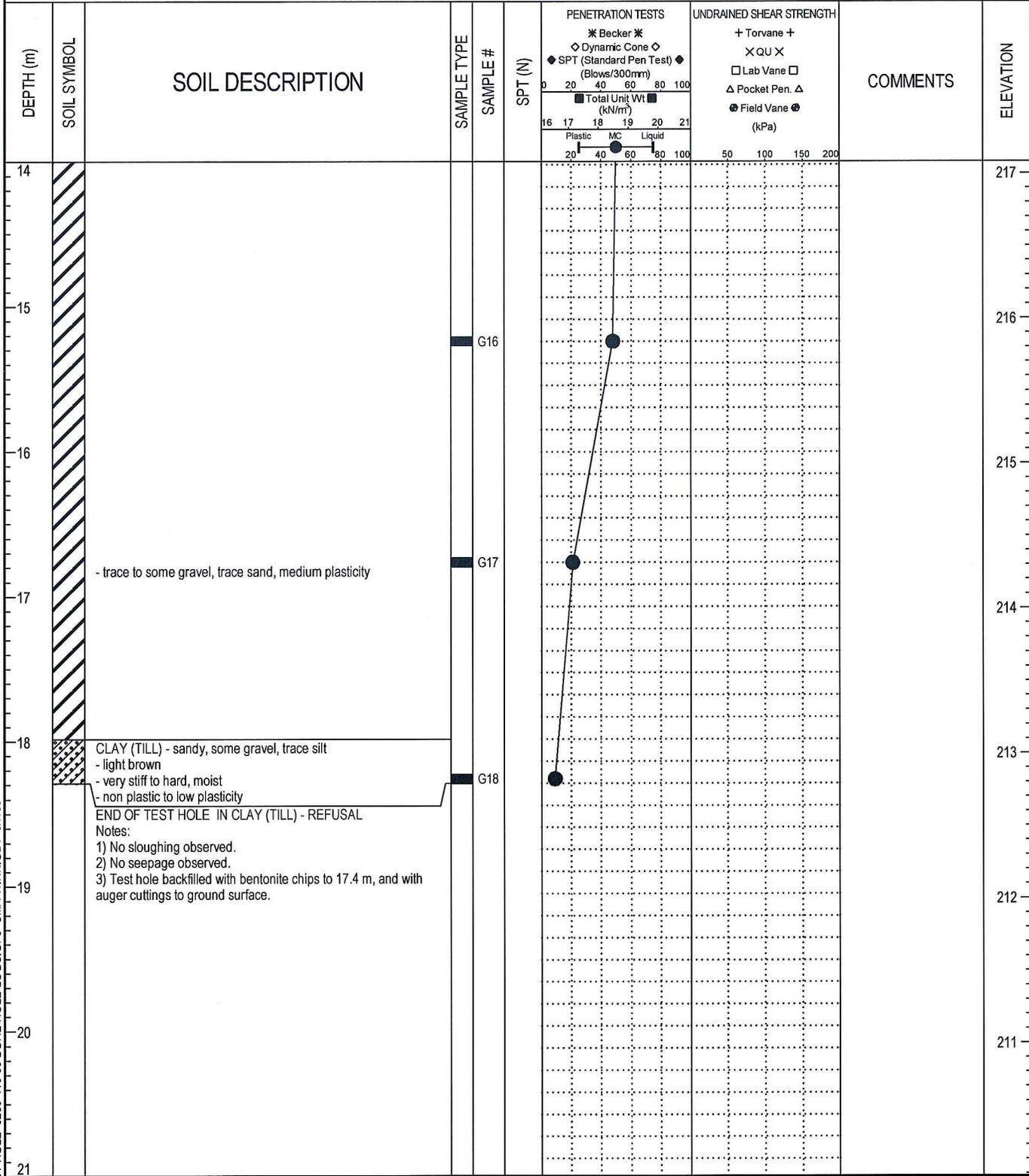


LOG OF TEST HOLE 0265-410-00 BORE HOLE LOGS.GPJ UMA WINN.GDT 5/7/09

AECOM

LOGGED BY: Alex Knop	COMPLETION DEPTH: 18.29 m
REVIEWED BY: Kris Matusiewicz	COMPLETION DATE: 3/12/09
PROJECT ENGINEER: Farris Khalil	Page 2 of 3

PROJECT: Marion Street Crossing with Dugald Drain	CLIENT: City of Winnipeg	TESTHOLE NO: TH-09-02
LOCATION: Marion Street (South Side) 15 m East of the existing culvert - coordinates UTM 14U 0636750 - 5527223		PROJECT NO.: 0265-410-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS, Nodwell, 125 mm SSA	ELEVATION (m): 231.08
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	



LOG OF TEST HOLE 0265-410-00 BORE HOLE LOGS.GPJ UMA WINN.GDT 5/7/09

AECOM

LOGGED BY: Alex Knop	COMPLETION DEPTH: 18.29 m
REVIEWED BY: Kris Matusiewicz	COMPLETION DATE: 3/12/09
PROJECT ENGINEER: Farris Khalil	Page 3 of 3

PROJECT: Marion Street Crossing with Dugald Drain	CLIENT: City of Winnipeg	TESTHOLE NO: TH-09-03
LOCATION: Marion Street (South Side) 25 m East of the existing culvert - coordinates UTM 14U 0636765 - 5527225	PROJECT NO.: 0265-410-00	
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS, Nodwell, 125 mm SSA	ELEVATION (m): 231.08
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH (kPa)	COMMENTS	ELEVATION
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) Total Unit Wt (kN/m³)	+ Torvane + X QU X □ Lab Vane □ △ Pocket Pen. △ ● Field Vane ●			
0		GRAVEL (FILL), some clay, trace sand, trace silt - mottled dark grey and light brown - frozen		G1						231
0.5		CLAY - silty, trace sand - dark grey - frozen to 1.5 m - high plasticity - trace silt inclusions < 3 mm diameter		G2						230
1.5		- soft to firm, moist		G3						229
2.5		- trace gravel, light brown, soft, moist to wet, medium plasticity		G4						228
3.05		- light brown with grey inclusions, trace oxidation		G5						227
		END OF TEST HOLE IN CLAY Notes: 1) No sloughing observed. 2) No seepage observed. 3) Test hole backfilled with auger cuttings.								

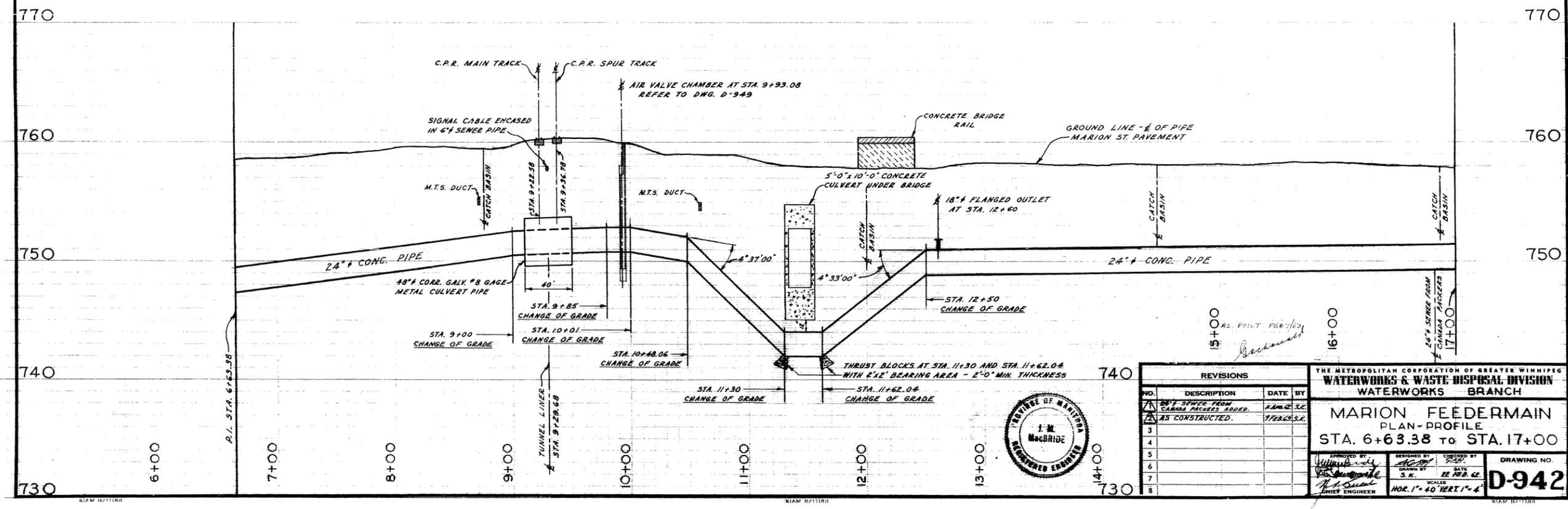
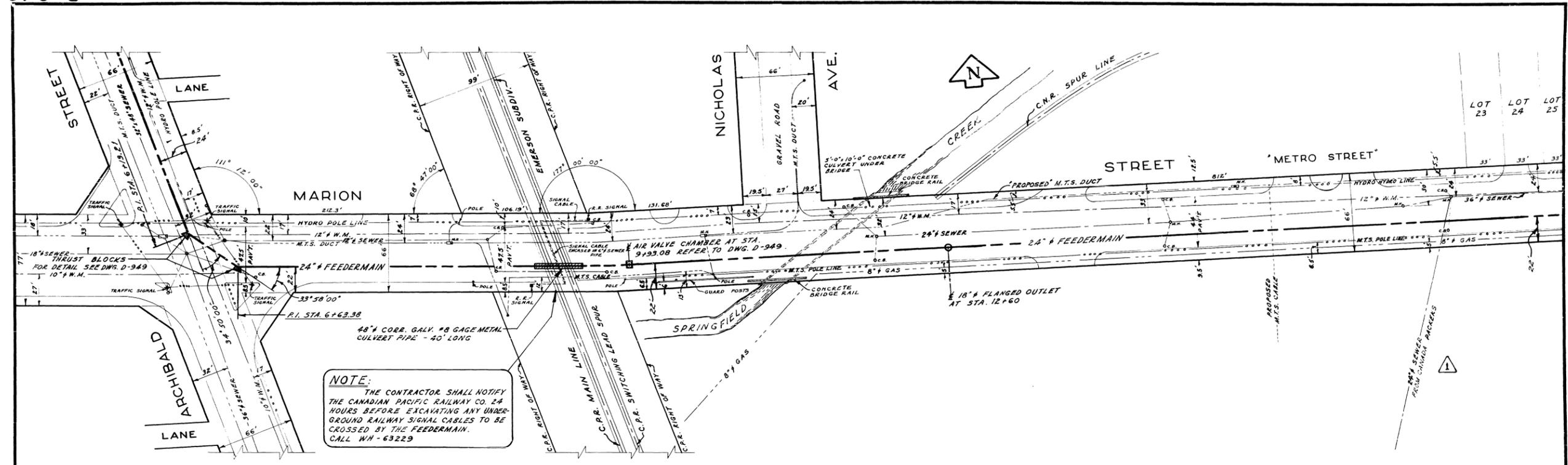
LOG OF TEST HOLE 0265-410-00 BORE HOLE LOGS.GPJ UMA WINN.GDT 5/7/09

AECOM

LOGGED BY: Alex Knop	COMPLETION DEPTH: 3.05 m
REVIEWED BY: Kris Matusiewicz	COMPLETION DATE: 3/12/09
PROJECT ENGINEER: Farris Khalil	Page 1 of 1

# **APPENDIX 'B'**

## **FEEDERMAIN RECORDS**



REVISIONS		
NO.	DESCRIPTION	DATE BY
1	AS CONSTRUCTED.	7/26/63 S.R.
2		
3		
4		
5		
6		
7		
8		

THE METROPOLITAN CORPORATION OF GREATER WINNIPEG <b>WATERWORKS &amp; WASTE DISPOSAL DIVISION</b> WATERWORKS BRANCH			
<b>MARION FEEDERMAIN</b> PLAN - PROFILE STA. 6+63.38 TO STA. 17+00			
APPROVED BY:  J. MacBRIDE CHIEF ENGINEER	DESIGNED BY:  S.K. ENGINEER	CHECKED BY:  R.E. J.B. SUPERVISOR	DRAWING NO. <b>D-942</b> SCALE: HOR. 1" = 40' VERT. 1" = 4'

