THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 589-2008

PANET ROAD CROSSING OF DUGALD ROAD DRAIN REPLACEMENT

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 PANET ROAD CROSSING OF DUGALD ROAD DRAIN REPLACEMENT

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, September 5, 2008.

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 internet site at http://www.winnipeg.ca/matmgt.

B4.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Division internet 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.

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, may result in the Bid being determined to be non-responsive.

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;

(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;

(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 internet 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 internet site 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 internet site 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 internet site 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 internet site 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 (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 internet site at 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) Drain Replacement and Associated Roadworks
  (i) Panet Road at Dugald Road

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

(a) Drain Replacement and Associated Roadworks
  (i) Removal of existing structure
  (ii) Installation of erosion control
  (iii) Installation of culverts and catchbasin (with required protection for Feedermain) and backfill
  (iv) Excavation and subgrade compaction
  (v) Placement of separation/reinforcement geotextile fabric
  (vi) Placement and compaction of subbase and base course material
  (vii) Construct 230 mm Plain Dowelled and 230 mm Reinforced Concrete Pavement
  (viii) Construct integral 180 mm modified barrier curb
  (ix) Mill and asphalt overlay (average thickness 50 mm) to tie-in existing pavements
  (x) Placement of imported clay borrow for side slopes
  (xi) Installation of chain link fencing
  (xii) Boulevard grading and sodding

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is UMA Engineering Ltd., represented by:

James Kennedy, P.Eng.
Project Engineer, Transportation
1479 Buffalo Place, Winnipeg, MB R3T 1L7

Telephone No. (204) 284-0580
Facsimile No. (204) 475-3646

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

The City of Winnipeg
Chief 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 internet site 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 critical path method (C.P.M.) schedule for the Work;

(b) a Gantt chart for the Work based on the C.P.M. schedule; and

(c) a daily manpower schedule for the Work

all acceptable to the Contract Administrator.

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

(a) Bridge Demolition

(b) Culvert Installation

(c) Roadworks

(d) Landscaping

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

D12.5 Further to D12.2(c), the daily manpower schedule shall list the daily number of individuals on the Site for each trade.

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; and

(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 commence the Work on the Site within seven (7) Working Days of receipt of the letter of intent.

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) City of Winnipeg Traffic Services – new signage;

(b) City of Winnipeg Geomatics Branch – various work on survey monuments

(c) Manitoba Hydro Gas Division – possible lowering and rock wrapping of gas line.

D17. SUBSTANTIAL PERFORMANCE

D17.1 The Contractor shall achieve Substantial Performance within twenty (20) consecutive Working Days of the commencement of the Work as specified in D13.

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

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

D18. TOTAL PERFORMANCE

D18.1 The Contractor shall achieve Total Performance within twenty-five (25) consecutive Working Days of the commencement of the Work as specified in D13.

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

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

D19. LIQUIDATED DAMAGES

D19.1 If the Contractor fails to achieve 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) Substantial Performance – One thousand dollars ($1,000.00);

(b) Total Performance – Five hundred dollars ($500.00).

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

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

D20. SCHEDULED MAINTENANCE

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

(a) Reflective crack maintenance during two year maintenance warranty as specified in CW3250-R6;

(b) Sod maintenance as specified in CW3510-R9.

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

CONTROL OF WORK

D21. JOB MEETINGS

D21.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor

respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

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

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

D22.1 Further to C6.24, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

D23. COOPERATION WITH OTHERS

D23.1 The Contractor's attention is directed to the fact that other Contractors, the personnel of Utilities, and the staff of the City may be working on the approach roadways, adjacent roadways, or rights of way. The activities of these agencies may coincide with the Contractor's execution of the Work, and it will be the Contractor's responsibility to cooperate to the fullest extent with other personnel working in the area, and such cooperation is an obligation of the Contractor under the terms of the Contract.

D24. ENVIRONMENTAL PLANNING

D24.1 The Contractor shall conduct his operations in accordance with all current federal, provincial, or other regulations concerning environmental protection and pollution control. It shall be the Contractor's responsibility to familiarize himself with all applicable regulations and to obtain all necessary approvals and permits for his operations.

D25. CLEAN UP

D25.1 The Contractor shall maintain the Sites of Work in a tidy condition and free from the accumulation of waste and debris.

D26. TEMPORARY STRUCTURES

D26.1 The location of all Contractors temporary structures shall be subject to the approval of the Contract Administrator. Temporary structures erected by the Contractor shall remain his property and shall be removed from the Site immediately upon completion of the Work or as directed by the Contract Administrator.

WARRANTY

D27. WARRANTY

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

D27.2 Notwithstanding C13.2 or D27.1, 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.

D27.2.1 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. 589-2008

PANET ROAD CROSSING OF DUGALD ROAD 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. 589-2008

PANET ROAD CROSSING OF DUGALD ROAD 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)

PANET ROAD CROSSING OF DUGALD ROAD DRAIN REPLACEMENT

Portion of the Work	Name	Address
SURFACE WORKS:		
Supply of Materials:		
Concrete		
Asphalt		
Base Course & Sub-Base		
Sod		
Chain Link Fence		
Separation / Reinforcement Geotextile Fabric		
Installation/Placement:		
Concrete		
Asphalt		
Base		
Chain Link Fence		
Sod		
UNDERGROUND WORKS:		
Supply of Materials:		
Circular CSP		
Catch Basin		
Installation/Placement:		
Culverts		
Catchbasin		
OTHERS:		

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 internet site at http://www.winnipeg.ca/matmgt.

E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.

E1.2.3 Further to C2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.

E1.3 The following are applicable to the Work:

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
C376-08-01	COVER SHEET AND LOCATION PLAN	A1
C376-08-02	BRIDGE DEMOLITION AND REMOVAL	A1
C376-08-03	HORIZONTAL ALIGNMENT, SECTION, HORIZONTAL AND VERTICAL CONTROL	A1
C376-08-04	CROSS SECTIONS AND DETAILS	A1

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. PROTECTION OF EXISTING TREES

E3.1 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 2400 mm 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.

E3.2 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.

E3.3 No separate measurement or payment will be made for the protection of trees.

E3.4 Except as required in clause E3.1(c) and E3.1(e), Elm trees shall not be pruned at any time between April 1 and July 31.

E4. TRAFFIC CONTROL

E4.1 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. No measurement for payment will be made for this work.

(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.

E5. TRAFFIC MANAGEMENT

E5.1 Further to clause 3.7 of CW 1130-R1:

E5.1.1 The Contractor shall schedule construction activities to meet the following;

(a) Panet Road south of Dugald Road will be closed to all traffic. The Contractor shall sign the street "Road Closed" in accordance with the Manual of Temporary Traffic Control.

(b) Maintain a minimum of one lane in each direction on Dugald Road at all times.

(c) The Contractor shall sign Panet Road at Dawson Road (north leg of Panet Road) as "Road Closed Local Access Only" in accordance with the Manual of Temporary Traffic Control.

(d) Intersecting street and private approach access shall be maintained at all times.

E6. WATER USED BY CONTRACTOR

E6.1 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.

E7. SURFACE RESTORATIONS

E7.1 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.

E8. INSTALLATION OF CULVERTS

DESCRIPTION

E8.1 General

E8.1.1 This specification shall amend and supplement City of Winnipeg Standard Construction Specification CW 3610-R3 “Installation of Culverts”, and shall cover installation of culverts.

E8.1.2 Referenced Standard Construction Specifications

(a) CW 2030 – Excavation Bedding and Backfill

(b) CW 3610- Installation of Culverts

E8.1.3 Referenced Standard Detail

(a) SD 002 – Standard Trench and Excavation Backfill Classes.

MATERIALS

E8.2 Bedding and Backfill

E8.2.1 Bedding and initial backfill material shall be as specified in CW 2030, or as shown on the Drawings.

E8.3 Arch Culvert

E10.3.1 The City of Winnipeg will supply the following materials which will be delivered to the Site:

(a) 35 m of Armtec galvanized Helcor Pipe (68 mm x 13 mm corrugation) 1880 x 1260 mm arch pipe (3.5 mm thick) supplied as 5 x 6m, 1 x 5 m lengths c/w 5 x 10c wide couplers.

(b) 2 – 1880 x 1260 mm galvanized pipe arch end sections c/w threaded rod bar connection to fit above CSP. Sides of end sections are 2.8 mm thick, bottom is 3.5 mm thick.

E10.3.2 The Contractor is responsible to coordinate directly with Armtec for delivery. Ron Martel for Armtec Limited is the contact person and can be reached at ph: (204) 957-7787.

E10.3.3 Sufficient notice to Armtec and the Contract Administrator, in written form, is considered a minimum of 72 hours prior to the day that the Contractor deems they will need the materials.

CONSTRUCTION METHODS

E8.4 Bevelled Ends

E8.4.1 Further to CW 3610, all CSP culvert ends shall be bevelled as shown on the Drawings.

E8.5 Bedding and Backfill

E8.5.1 The backfilling for culverts shall be Type 2 or shown on the Drawings.

E8.5.2 The following revisions for bedding and initial backfill apply:

(a) Manual placing and compaction of material shall be used to build up the backfill to encompass the lower part of the pipe. The Type 3 backfill, shall be taken up to 200 mm along the culvert invert and then hand excavated to place the 150 mm thick loose bedding lift under the culvert. Backfill material shall be placed under the haunches by shovel and compacted firmly by power compaction (“jumping jack”) equipment. Valleys of the corrugations and the area immediately next to the pipe must be compacted by hand operated methods. At no time shall heavy compaction equipment be brought closer than 1 m from the CSP.

(b) Backfill shall be so placed and mechanically compacted that the fill rises equally and simultaneously on both sides, including handwork next to the pipe. Layers shall be placed with equipment running parallel to the structure.

(c) When the fill on both sides of the pipe approaches the crown of the pipe, the same techniques of spreading shallow layers and compacting thoroughly shall be followed as the backfill covers the pipe. Light tamping equipment shall be used for the initial layers over the pipe.

(d) No distortion of the structure greater than 2% of the span or rise shall be allowed.

(e) 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.

(f) All compaction equipment used shall be subject to the approval of the Contract Administrator.

(g) The Contractor shall refer to E9 for special requirements when working near the feedermain.

E8.6 Arch Culvert

E8.6.1 The Contractor shall supply all necessary equipment for unloading and storing of the arch culvert and end sections. The Contractor shall be responsible for the security and replacement of and components should they become lost or stolen once they have been received.

E8.6.2 All components shall be handled in a careful and workmanlike manner. The components shall be stored or timber blocks or built up platforms. Smaller sized components such as miscellaneous hardware shall be stored separately in suitable bins or containers.

E8.6.3 The Contractor shall unload the materials as expeditiously as possible.

E8.6.4 The culvert shall be assembled in accordance with instructions provided by the culvert manufacturer, Armtec.

MEASUREMENT AND PAYMENT

E8.7 Bevelled Ends on Culverts

E8.7.1 The installation of bevelled ends shall be measured and paid for based on a unit basis, based on the number of units installed in accordance with the specifications and accepted by Contract Administrator and the Contract. Unit price for “Galvanized Pipe Arch End Sections – Install”.

E8.8 Culverts

E8.8.1 The installation of culverts will be measured and paid for in accordance with CW 3610.

E9. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO FEEDERMAINS

DESCRIPTION

E9.1.1 This Section details operating constraints for all work to be carried out in close proximity to Feedermains. Close proximity shall be deemed to be any construction activity within a 5 m offset from the centreline of the feedermain.

E9.2 General Considerations for Work in Close Proximity to Feedermains

E9.2.1 Feedermains are 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.

E9.2.2 The Feedermain is constructed of Prestressed Concrete Cylinder Pipe conforming to AWWA Standard C301.

AWWA C301 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.

E9.3 Submittals

E9.3.1 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

E9.3.2 Submit a Construction Method Statement with proposed construction plan including haul routes, excavation equipment locations, excavation and shoring plan, 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.

E9.4 Protection of Feedermains During Construction

E9.4.1 The main section affected by construction is at the southwest corner of the intersection of Panet Road at Dugald Road. There is approximately 2.7 of existing cover on the feedermain under Dugald Road, which will be reduced to approximately 2.1 metres during roadway construction. There is only 0.6 metres of vertical separation between the bottom of the proposed arch culvert and the top of the feedermain.

E9.4.2 The Contractor shall verify pipeline location and obvert elevation under the Dugald Ditch, prior to construction.

E9.4.3 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 locations 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) For transverse crossings of the Feedermain in support of pavement construction activities, designate crossing locations and confine equipment crossing the pipe(s) to these locations. Reduce equipment speeds to levels that minimize the impacts of impact loading.

(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) Subgrade, subbase and base construction shall be kept in a rut free condition at all times. Construction equipment is prohibited from crossing pipelines if the grade is insufficient to support the equipment without rutting.

(vi) Granular material, construction material, soil or other material shall not stockpiled on the pipelines or within 5 metres of the pipe centerline.

(vii) Stage construction such that the Feedermain is not subjected to significant asymmetrical loading at any time.

(viii) Where work is in 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) Shoring

(i) Shoring for installation of the arch culvert shall not impart any lateral or vertical load on the feedermain

(ii) Shoring piles shall not be any closer to the outside of the feedermain than 300 mm clear. The feedermain shall be exposed to confirm exact location prior to installing any shoring

(iii) Where piles are installed adjacent to the feedermain, they shall be pre-bored past feedermain invert. Where sheet piles are installed, a guide rail shall be used adjacent to the feedermain to prevent lateral displacements.

(c) Excavation

(i) Where there is less than 1.6 metres of earth cover over the Feedermain and further excavation is required either adjacent to or over the feedermain, utilize only smooth edged excavation buckets, soft excavation or hand excavation techniques.

(ii) 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.

(iii) For excavation within 1 metre of the feedermain, employ hand excavation or “soft” excavation techniques such as hydro-excavation.

(d) Feedermain Embedment

(i) Haunching and embedment material adjacent to the feedermain shall be removed and replaced to a depth of 150mm above pipe invert with CW 2030 Type 3 granular material, compacted to 95% SPMDD.

(ii) Excavation and backfill shall proceed such that there is no more than 300 mm differential elevation across the pipe.

(e) Feedermain Insulation

(i) Install 2 layers of 50 mm thick Styrofoam HI 40 insulation over the feedermain as shown on the drawings. Insulation width over the feedermain shall be 2.5 m, centred on the pipe, and extend to 600 mm beyond the width of the culvert on both sides.

(f) Subgrade Construction

(i) Subgrade compaction over feedermains shall be limited to static compaction methods and only with equipment that is approved as per E9.3.

(ii) Stage work activities to minimize the time period that unprotected subgrade is exposed to the environment and protect the subgrade against the impacts of adverse weather if subbase/ base course construction activities are not sequential with excavation.

(g) Subbase and Base Course Construction

(i) Culvert foundation material shall be carefully placed in lifts and compacted as shown on drawings. Only light weight vibratory plate compactors with a maximum operating weight of 300 kilograms will be permitted over the feedermain.

(ii) Subbase or base course materials shall not be dumped directly on pipelines but shall be carefully bladed in-place.

(iii) Subbase compaction within 3 metres of the feedermain shall be either carried out by static methods without vibration or with smaller approved equipment such as hand held plate packers or smaller roller equipment.

E9.4.4 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.

E9.4.5 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

E9.5 Except for the insulation to be added over the existing feedermain, all works shall be incidental to the installation of the culvert as covered in E8. INSTALLATION OF CULVERTS.

E9.6 Insulate Feedermain

E9.6.1 The supply and installation of the insulation over the existing feedermain below the culvert shall be measured and paid for based on the measured plan area in square meters installed in accordance with the specifications and accepted by the Contract Administrator and based on the unit price for “Insulate Feedermain”. This unit price shall be payment in full for supplying all materials and for performing all operations herein described and of other items incidental to the work included in the specification.

E10. SILT FENCE

DESCRIPTION

E10.1.1 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

E10.1.2 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 be 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.

E10.1.3 Filter Fabric

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

Property	Test Method	Value
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/m²

(b) Acceptable Product: “Amoco 2130 Silt Fence Fabric” or approved equal.

E10.1.4 Wire Mesh

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

E10.1.5 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.

E10.2 Construction Methods

E10.2.1 Ensure that no deleterious substances are discharged into the adjacent watercourse at any time during construction activities

E10.2.2 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.

E10.2.3 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.

E10.2.4 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.

E10.2.5 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.

E10.3 Method of Measurement and Basis of Payment

E10.3.1 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.

E11. EROSION CONTROL BLANKET (ECB)

DESCRIPTION

E11.1.1 This Specification covers the supply, installation, and maintenance of erosion control blanket to be installed on areas shown on the Drawings and as directed by the Contract Administrator.

MATERIALS

E11.1.2 Type 1 Erosion Control Blanket

(a) Erosion Control Blanket shall be a machine-produced mat of 70% agricultural straw and 30% coconut blanket with a functional longevity of up to 24 months. Suitable products include SC 150 Extended Term manufactured by North American Green, or approved equivalent.

(b) The blanket shall be of consistent thickness with the straw and coconut evenly distributed over the entire area of the mat. The blanket shall be covered on the top side with heavyweight photodegradable polypropylene netting having ultraviolet additives to delay breakdown and a maximum 1.59 x 1.59 cm mesh and on the bottom side with a lightweight photodegradable polypropylene netting with a maximum 1.27 x 1.27 cm mesh. The blanket shall be sewn together on 3.81 cm centres (maximum) with degradable thread.

(c) Type 1 ECB shall have the following properties:

(i) Matrix 70% Straw Fibre (0.19 kg/m^2) and 30% Coconut Fibre (0.08 kg/m^2).
(ii) Netting top side heavyweight photodegradable with UV additives (1.47 kg/100 m^2)
(iii) Bottom side lightweight photodegradable minimum netting weight (0.73 kg/100 m^2)
(iv) Degradable thread

E11.1.3 Type 2 Erosion Control Blanket

(a) Erosion Control Blanket shall be a machine-produced mat of 100% coconut fibre with a functional longevity of up to 36 months. Suitable products include LANDLOK C2 manufactured by Propex Geosynthetics, or approved equivalent.

(b) The blanket shall be of consistent thickness with the fibre evenly distributed over the entire area of the mat. The blanket shall be covered on the top and bottom sides with UV stabilized polypropylene netting with mesh openings approximately 16 x 16 mm. The blanket shall be sewn together on 51mm centres (maximum) with UV stabilized polypropylene thread.

(c) Type 2 ECB shall have the following properties:

(i) Matrix 100% Coconut Fibre (0.298 kg/m^2).
(ii) Thickness 7.6mm
(iii) UV stabilized polypropylene thread.

E11.1.4 Type 3 Turf Reinforcement Mat (TRM)

(a) Type 3 Turf Reinforcement Mat shall be a machine-produced of polypropylene monofilament yarns forming a pyramid matrix. The TRM shall have a functional longevity of at least 24 months. Suitable products include LANDLOK 300 manufactured by Propex Geosynthetics, or approved equivalent.

(b) Type 3 TRM shall have the following properties:

(i) Matrix 100% polypropylene monofilament yarns.
(ii) Thickness 7.6mm
(iii) UV stabilized polypropylene

E11.2 Submittals

E11.2.1 The Contractor shall submit all manufacturers' product specifications and recommended installation methods for the proposed erosion control blankets and associated materials to the contract administrator a minimum of 14 days before construction

E11.3 Construction Methods

E11.3.1 The Contractor shall supply all ECB/TRM materials required and store them on site. The installation and maintenance of all ECM/TRM will be as directed by the Contract Administrator. The installation will be required only if the outer coffer dam upstream of the culvert is going to be over topped.

E11.3.2 Actual alignment and location of the ECB / TRM may be adjusted in the field by the Contract Administrator.

E11.3.3 Erosion Control Blanket – Drainage Channel Installation

(a) In general excavate a trench 15 cm deep by 15 cm wide at the upstream end of the drainage channel and leave 30 cm of ECB beyond the upslope portion of the trench. Anchor blanket with 20 cm long staples in trench as shown on the Drawings. Staples shall be a minimum of 30 cm apart. Backfill trench with soil and compact. Apply seed to compacted soil. Fold remaining portion of blanket over sodded soil and secure with staples spaced 30 cm (minimum) apart across width of blanket.

(b) Starting with the blanket on bottom of drainage channel, roll blanket out in direction of water flow. Securely fasten blanket against soil surface with staples. There shall be a minimum of 0.8 staples per square metre. Place blankets end over end in the downstream direction and secure overlaps with a double row of staples, staggered 10 cm (minimum) apart. There shall be a minimum 10 to 15 cm overlap between blankets in the downstream direction.

(c) Repeat with blankets along the side slopes of the drainage channel. The overlap between adjacent blankets in the channel side slope direction shall be 5 to 12.5 cm (depending of blanket type). At the top of the side slope the full length edge of the blanket shall be anchored into a 15 cm deep by 15 cm wide anchor trench with staples spaced 30 cm apart (minimum). The anchor trench shall be backfilled and compacted upon completion of stapling.

(d) Secure downstream edges of ECB / TRM as per manufacturer's specifications and detail drawings.

E11.4 Maintenance

E11.4.1 The areas covered with ECB / TRM shall be regularly inspected especially after severe rainfall or storm events, to check for blanket separation or breakage.

E11.4.2 Any damaged or poorly performing areas as the result of storm events shall be replaced/repaired immediately. Re-grading of the slope by hand methods may be required in the event of rill or gully erosion.

E11.4.3 Damaged areas may require re-sodding. Those areas requiring re-sodding as directed by the Contract Administrator will be not be re-measured and no additional payment will be made for this work.

E11.4.4 No re-measurement or payment will be made for those areas damaged and requiring re-sodding and reinstallation due to faulty installation of the erosion control blanket.

E11.4.5 Should the Contract Administrator determine that the Contractor has not maintained the erosion control blankets properly or has damaged the blankets from construction activities resulting in sediment releases beyond the work area, the Contractor shall retrieve all sediment that has left the construction area, to the fullest extent possible, at his own cost. As a minimum, the Contractor shall remove all deltas and sediment deposited in drainage ways and re-grade and/or reseed the areas where sediment removal results in exposed soil. The removal and restoration shall take place within 5 working days of discovery unless precluded by legal, regulatory, or physical access restraints. If precluded, removal and restoration must take place within 5 working days of obtaining access. The Contractor is responsible for contacting all local, regional, provincial, and federal authorities before working in surface waters and for obtaining applicable permits. The Contractor's restoration work to restore property outside of the designated work area shall be at his own cost.

E11.5 Measurement and Payment

E11.5.1 Erosion Control Blanket and related work specified herein will be measured on an area basis and paid for at the Contract Unit Price for either "Erosion Control Blanket Type 1 or Type 3". The area to be paid for supply shall be the quantity shown in FORM B: PRICES. The area to be paid for installation shall be the total number of square metres of ground covered (i.e., overlap at joints shall be considered a single layer), performed in accordance with this specification, accepted and measured by the Contract Administrator.

E11.5.2 Maintenance is considered incidental to the installation of erosion control blanket and no separate measurement or payment will be made.

E12. TEMPORARY COFFER DAMS AND PUMPING

DESCRIPTION

E12.1.1 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 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 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.

E12.1.2 This Specification shall amend and supplement the City of Winnipeg Standard Specifications CW 3170.

MATERIALS

E12.1.3 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.

E12.1.4 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.

E12.2 Construction Methods

E12.2.1 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 clauses 9.2 (a) and (b) of 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.

E12.2.2 Preparation of Upstream Coffer Dam Sub Grade

(a) All exposed upstream coffer dam subgrade soils shall be prepared in accordance with clause 9.5 of CW 3170 and compacted to 95 percent of standard Proctor maximum dry density.

E12.2.3 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 clauses 9.6 to 10.5 of CW 3170. Compaction shall be to 95 percent of standard Proctor maximum dry density.

E12.2.4 Fine Grading

(a) The top of the upstream coffer dam shall be built to an elevation 1.0 m above existing ditch invert and covered with temporary plastic sheeting or Type 1 Erosion Control Blanket.

E12.2.5 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 capable of pumping up to 0.2 m^3/second of water.

E12.3 Measurement and Payment

E12.3.1 No measurement will be made and payment will be based on the Contract Lump Sum unit price for “Temporary Coffer Dams 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.

E13. STRAW WATTLE

DESCRIPTION

E13.1.1 This specification shall cover the supply and installation of straw wattles.

MATERIALS

E13.1.2 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

E13.2 Straw Wattles

E13.2.1 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.

E13.2.2 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.

E13.2.3 Dog leg terminal ends of straw wattle up the slope to prevent channelling of sedimentation.

E13.2.4 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.

E13.2.5 Avoid damage to wattles. Damaged areas of wattles should be cut and tied off, then treated as terminal ends.

MEASUREMENT AND PAYMENT

E13.3 Straw Wattle

E13.3.1 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.

E14. STRUCTURAL REMOVALS

DESCRIPTION

E14.1.1 This Specification shall cover structural removal works, including all necessary demolition, removal, transporting, dismantlement, and disposal of applicable materials. Timber stringers are to be salvaged and transported to the City Bridge Yard.

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.

E14.2 Equipment

E14.2.1 All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

CONSTRUCTION METHODS

E14.3 Scope of Work

E14.3.1 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) Deck Removals - Removal and disposal of the bridge deck, to the limits shown on the Drawings, including asphalt pavement, embedments, attachments, waterproofing items, other removal and disposal of miscellaneous buried structures will be considered for removal upon acceptance of the Contract Administrator.

(b) Timber Removals – Removal and disposal of all superstructure and substructure timber works, to the limits shown on the Drawings except for stringers.

(c) Timber Pile Removal – Removal and disposal of timber piles to a minimum of 1.0 m below proposed grade and as required to facilitate construction.

(d) Steel Guardrail – Removal and disposal of steel guardrail from the structure.

(e) Timber Salvage – Removal, salvage, and transportation to 849 Ravelstone, and off loading into neat piles on blocking as directed by Mike Terleski. Call Mike Terleski at 794-8510 to arrange time for delivery to the City bridge yard.

E14.3.2 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.

E14.4 General

E14.4.1 Explosives

(a) The use of explosives is prohibited.

E14.4.2 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.

E14.4.3 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.

E14.4.4 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.

E14.4.5 Structural Removal Methods

(a) Structural removals shall be deemed to include all the items of work as listed under E14.3.1, "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.

E14.4.6 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.

E14.4.7 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

E14.5.1 Structural Removals, including salvaging of stringers and removal of timber piles to below excavation limits, 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.

APPENDIX ‘A’

GEOTECHNICAL REPORT

UMA Engineering Ltd.
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T 204.284.0580 F 204.475.3646 www.uma.aecom.com

UMA | AECOM

Memorandum

Date:	May 8, 2008
To:	Mike Lau
From:	Faris Khalil
Subject:	**Panet Road Crossing of Dugald Drain Replacement Geotechnical Recommendations**
Project No:	0265 407 00 (4.6.1)

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 timber bridge. The bridge replacement is required due to deterioration and to improve the intersection geometry to accommodate truck turning movement.

The Water and Waste Department has been working on replacing the existing Dugald Drain with a buried culvert. Currently the drain from Lagimodiere Blvd. to Holden Street is a buried culvert. The drain from Holden Street to Panet Road is to be replaced with buried CSP culvert of 1880 mm span x 1260 m rise x 2.8 mm thick plate. The new culvert at the existing timber bridge would be required to tie to the proposed CSP culvert in the future.

2. GEOTECHNICAL INVESTIGATION

Five test holes were drilled on March 13, 2008 at the locations shown on the Test Hole Location Plan, Figure 01 in Appendix A. TH 08-01, 08-02 and 08-03 were shallow holes and were advanced to a depth of 6.7, 3.0 and 3.7 m below the road shoulder surface, respectively. TH 08-04 was advanced to a depth of 17.1 m below the road shoulder to enable piezometer installation in the till layer. TH 08-05 was drilled through the existing pavement to a depth of 1.2 m.

Drilling was carried out by Paddock Drilling Ltd. using an Akcer MP5 drill rig equipped with 125 mm diameter solid stem and 85 mm inner diameter hollow stem augers. 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's 08-01 and 08-04. All soils observed during drilling were logged and visually classified on site by UMA personnel. Standpipe piezometers equipped with Casagrande tips were installed in TH's 08-03 and 08-04 to facilitate groundwater measurement in a shallow silt layer and in the till, respectively. Piezometer construction details are shown on the test hole logs in Appendix A.

Soil samples recovered during drilling were transported to UMA'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. Shear strength testing consisted of unconfined compression tests and Lab vane, Torvane and pocket penetrometer measurements.

Profile of the laboratory test results is shown on Figure 02.

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.

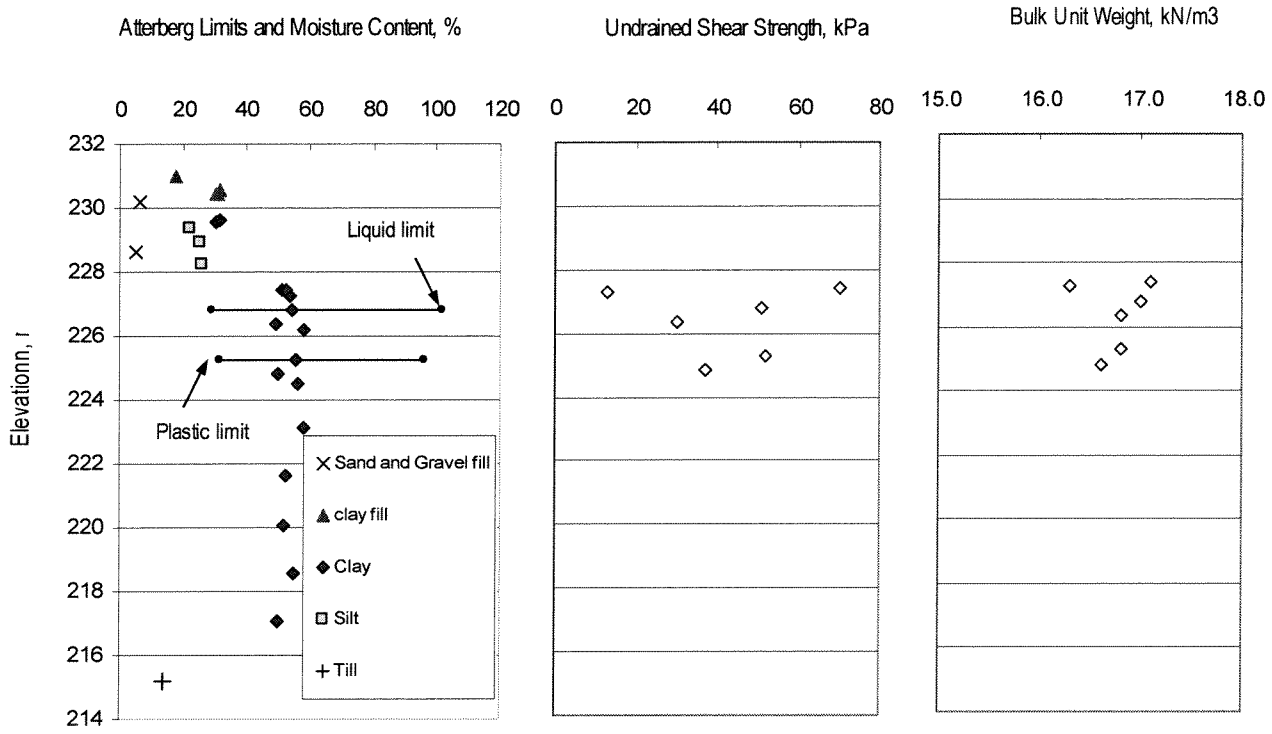

Figure 02: Laboratory Test Results

3. SUBSURFACE CONDITIONS

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

- Sand and Gravel Fill
- Clay Fill
- Glacio-Lacustrine Clay
- Glacial Till

These soils are described as follows:

Sand and Gravel Fill

Sand and Gravel fill was encountered at ground surface in all test holes except TH 08-05. The thickness of the fill was about 500 mm in TH's 08-02 to 08-04. In TH 08-01 the sand and gravel fill extends to a depth of 3.2 m below the road shoulder surface. The fill consists of dry to moist, poorly graded mix of medium grained sand to coarsely grained gravel. The thick granular fill encountered in TH 08-01 is likely the granular material used previously to backfill above and around the existing Feedermain.

Clay Fill

Clay fill, about 1 m thick, was encountered beneath the sand and gravel fill in TH's 08-02, 08-03 and 08-04. The clay is dark brown to black, silty, and contains traces of sand and gravel. At the time of drilling the clay fill was frozen.

Glacio-Lucstrine Clay

Highly plastic glacio-lacustrine silty clay was encountered beneath the fill. In TH 08-04 the clay extends to a depth of 16.1 m below the existing ground or to elevation 215.9 m. The rest of the test holes were terminated within the clay unit. The clay is generally firm to stiff, moist and brown/grey in colour. Silt and sulphate inclusions were observed in the clay. Moisture contents range from 30 to 58 percent with an average of 51 percent. The clay is classified as highly plastic based on an average liquid limit and plasticity index of 100 and 70 percent, respectively. Moisture contents fall closer to plastic limit. Undrained shear strengths, as measured from unconfined compression tests, range from 13 to 70 kPa. Bulk unit weights of the clay range from 16.3 to 17.1 kN/m^3.

Silt layers of thickness up to 0.7 m were encountered within the clay layer at depths from 2.4 to 3.6 m below the ground surface or at elevation from 229.4 to 228.3 m. The silt was soft, moist and non-plastic. Moisture contents range from 22 to 26 percent.

Glacial Till

Glacial till was encountered beneath the clay in TH 08-04 at a depth of 16.1 m below ground surface or at elevation 215.9 m. The till consists of silt with trace amounts of clay, sand and gravel. The compactness of till is loose and moisture content is 14 percent.

Groundwater Conditions

Seepage and sloughing were observed at the contact of granular fill and clay unit in TH 08-01. No seepage or sloughing was observed from the till or the silt layers. Groundwater levels (GWL's) were measured in the piezometers at 1 and 28 days after installation. The highest GWL's in the till was measured at 8.4 m below ground surface or at elevation 223.6 in TH 08-04. One day after installation, the GWL in the silt layer in TH08-03 was 1.4 m below ground surface or at elevation 230.4 m. During the second monitoring event, piezometer in TH 08-03 was blocked with frozen water, therefore no GWL's measurement was collected. It is important to recognize that groundwater levels may not have stabilized over the observation period and could vary seasonally or as a result of construction activities.

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4. CULVERT ALTERNATIVES

It is our understanding that the following alternatives have been identified for the proposed culvert type:

Corrugated Steel Pipe (CSP)

The easy installation of this type would be an advantage. Adequate cover thickness will be required. Depending on the hydraulic analysis, single or twin culverts may be used.

Precast Concrete Culvert

This type of culvert is also easy to install. Hydraulic analysis will determine the required dimension and shape.

Cast–in-Place Concrete Culvert

This type offers the flexibility to suite site constraints in terms of cover thickness, however the construction related requirements and the longer construction period make this alternative less desirable.

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

5. DESIGN AND CONSTRUCTION CONSIDERATION

5.1. TEMPORARY WATER DIVERSION

The existing drain is about 2.5 in depth and the excavation for the new culvert will extend to about 1 m below the existing drain invert. 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 below the cofferdam and from the shallow silt layer should be expected. The seepage can be controlled by pumping from the base of the excavation using conventional construction equipment and/or by increasing the seepage path between the upstream and downstream sides of the cofferdam with a clay seal, e.g. placing additional clay in the upstream zone as required. 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 Regulations of Manitoba Labour regarding excavation and trench safety standards. The means, methods and sequencing of construction operations and site safety are also the responsibility of the contractor. The information provided below is for use by the owner and engineer and should not be interpreted to mean that UMA 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 a brief construction period. Flatter slopes would be required in wet silt 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 and road traffic, should be kept to a minimum of one-half of the excavation depth away from slope crest.

Depending on the required excavation width, shoring may be required on the north side because of the limited distance between the existing drain and Dugald Road. The difference in levels between the road top and the excavation bottom is expected to be less than 4 m deep. Cantilevered shoring in Winnipeg clays is limited to depths of about 4 m. Beyond this depth, the shoring will generally require the use of raker, bracing, or tie-back. An active earth pressure for clay (Ka) value of 0.45 can be used for design purposes. Traffic surcharge shall be accounted for in the shoring design.

5.3. FOUNDATION PREPARATION AND BEDDING

The invert of the existing drain is approximately at elevation 229.5 m. The proposed culvert base is expected to be within the soft silt layer overlying the silty clay. In this regard, removal of the silt layer to expose the underlying silty clay is recommended (about elevation 228.3 m). Over-excavation within the clay layer may be required if soft clay is encountered. An allowable bearing capacity of 75 kPa can be used for design purposes. Foundation preparation shall be approved by qualified geotechnical personnel. Piles of the existing bridge shall be cut off to a distance of at least 0.3 m below the underside of the culvert bedding. If the excavation can be maintained in a dry state, the sub-cut can be backfilled with clay fill placed in layers not exceeding 200 mm in thickness and compacted to 95% of Standard Proctor maximum dry density. If the excavation cannot be completely dewatered, the sub-cut should be backfilled to the required grade using clean coarse granular material or rock fill. A non-woven geotextile is recommended at the bottom and top of the sub-cut backfill material to serve as separator and protect against loss of fines.

Culvert bedding material should consist of 600 mm thick compactable granular material such as Type 3 material as per City of Winnipeg Specifications CW 2030-Table 1. Cohesive soil or material containing large amounts of sand and fine silt should not be used, because erosion of the bedding material may result. The material shall be placed in layers not greater than 200 mm thick and compacted to 95% of Standard Proctor maximum dry density. In the case of CSP culvert being used, the upper 200 mm layer of bedding directly underneath the culvert barrels should be composed of relatively loose material so that corrugation can seat into the bedding. For pipe culverts, the bedding 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 structure.

5.4. THE BACKFILL MATERIAL, PLACEMENT AND COMPACTION

The selection, placement and compaction of the envelope of earth surrounding the culvert is important for the performance and structural integrity of the structure, especially CSP culverts. The structure backfill should extend one diameter on either side of the structure, and from the invert to an elevation over the pipe of 600 mm. In case of multiple installation an adequate room between the culverts shall be provided to enable the placement and compaction of the backfill. A minimum spacing of 1 m shall be provided, however the

requirements for economical equipments should be considered in determining the space between the culverts.

Backfill shall consist of well graded granular material such as Type 1 material as per City of Winnipeg Specification CW 2030 – Table 1. The backfill shall be free from large or frozen lumps, wood or other unsuitable material and shall 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 structure. The area under the pipe haunches are 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 shall be compacted without vibration. Backfill in the area immediately next to the culvert and in the corrugation valleys of CSP should be compacted by hand-operated methods. Heavy compaction equipment may approach as close as 1 m unless changes in dimension or plumb of the structure are observed in which case a greater offset will be required.

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 structure 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 structure. 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 at a slope of 1H:1V or steeper, if required, to ensure that the clay seal does not extend below the road.

6. CLOSURE

The findings and recommendations of this report 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.

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

Respectfully Submitted,

UMA Engineering Ltd.

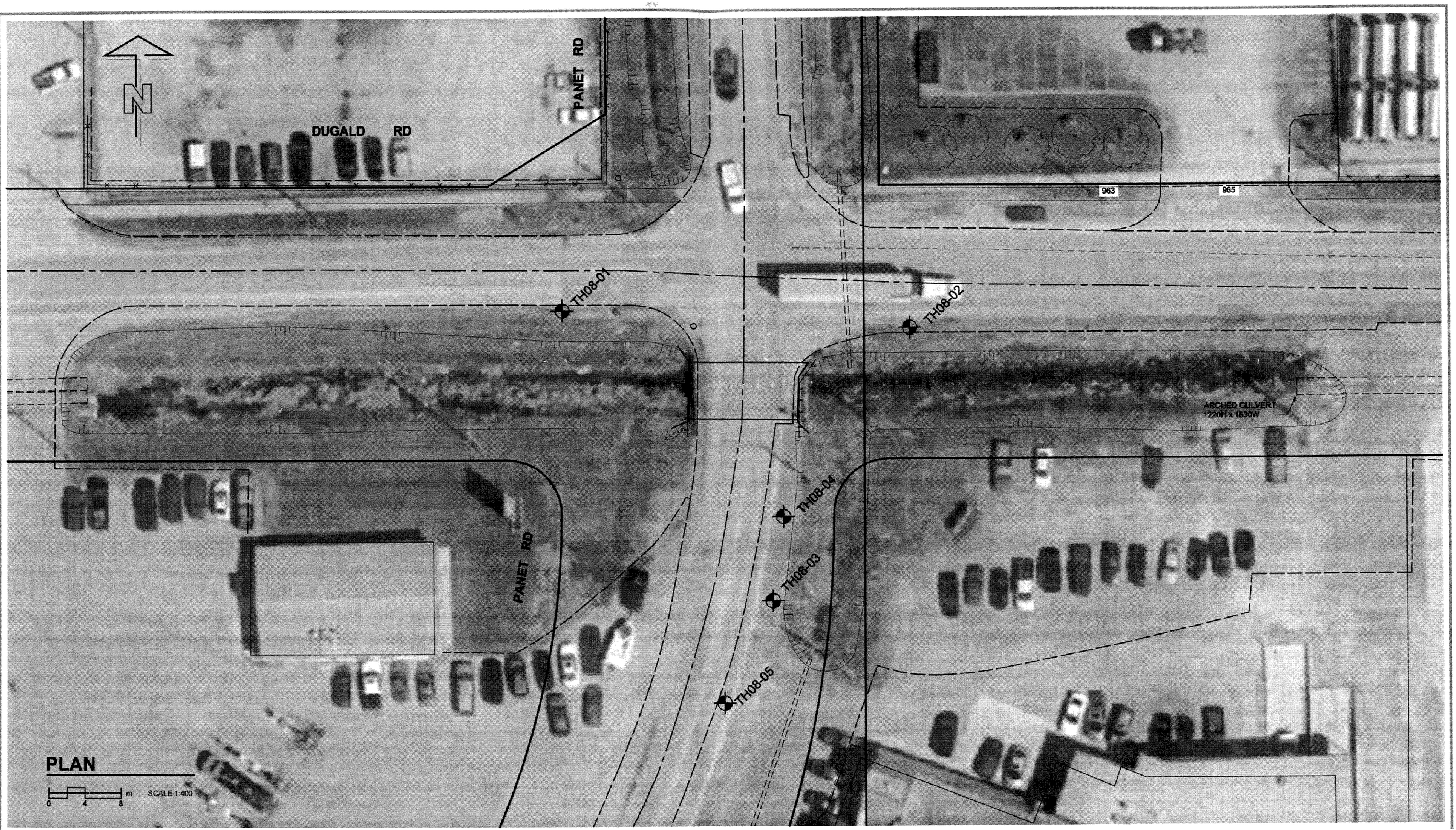
Faris Khalil, M.Sc., P.Eng.
Senior Geotechnical Engineer
Earth and Environmental

Reviewed by:

Jeff Tallin, M.Sc., P.Eng.
Senior Geotechnical Engineer
Earth and Environmental

APPENDIX A

Test Hole Location Plan
Test Hole Logs



City of Winnipeg
Panet Road Crossing of Dugald Road Drain Replacement

Test Hole Location Plan

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Figure - 01

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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 ground water 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 different 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 $4<W_P<7$ $C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} x D_{60}}$
			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 ORGAINIC SOILS			Peat and other highly organic soils		Pt	Von Post Classification Limit		Strong colour or odour, and often fibrous texture	

	Asphalt		Till		
	Concrete		Bedrock (Undifferentiated)		
	Fill		Bedrock (Limestone)		

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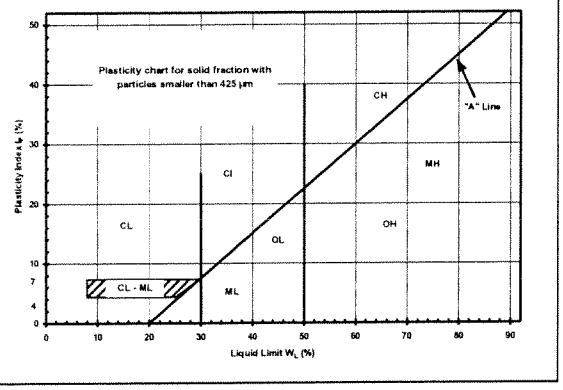
When the above classification terms are used in this report or test hole logs, the designated fractions may be visually estimated and not measured.



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.

γ - bulk unit weight (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 (Su) of a cohesive soil can be related to its consistency as follows:

Su (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: Panet Road Crossing of Dugald Drain Replacement	CLIENT: City of Winnipeg	TESTHOLE NO: **TH-08-01**
LOCATION: East bound lane of Dugald Rd., west of Panet Rd., E 637966.792 N 5527718.052		PROJECT NO.: 0265-40700-0302
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker MP5, 125mm SSA, 85mm ID HSA	ELEVATION (m): 231.54

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ☒ SPLIT SPOON ▤ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	△ Pocket Pen. (Su) △ (kPa) 50 100 150 200 ■ Total Unit Wt ■ (kN/m³) 17 19 21 23 PLASTIC M.C. LIQUID 20 40 60 80	× QU (Su) × (kPa) 50 100 150 200 + Torvane (Su) + (kPa) 50 100 150 200 □ Lab Vane (Su) □ (kPa) 50 100 150 200	COMMENTS	ELEVATION (m)
0		SAND AND GRAVEL (Fill) - trace cobbles - light brown - compact, dry to moist - poorly graded, sub angular - medium grained sand to coarse grained gravel - maximum size 50 mm						231
1				G1				
		- some cobbles						230
2								
								229
				G2				
3								
		CLAY - silty - mottled brown and grey - firm, moist - high plasticity						228
4				T3				
								227
				T4				
5								

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LOGGED BY: R. Belbas	COMPLETION DEPTH: 6.71 m
REVIEWED BY: F. Khalil	COMPLETION DATE: 3/31/08
PROJECT ENGINEER: Faris Khalil	Page 1 of 2

LOG OF TESTHOLE (OLD) TH-08-01 TO TH-08-05.GPJ UMA.GDT 4/30/08

PROJECT: Panet Road Crossing of Dugald Drain Replacement	CLIENT: City of Winnipeg	TESTHOLE NO: **TH-08-01**
LOCATION: East bound lane of Dugald Rd., west of Panet Rd., E 637966.792 N 5527718.052		PROJECT NO.: 0265-40700-0302
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker MP5, 125mm SSA, 85mm ID HSA	ELEVATION (m): 231.54

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ☒ SPLIT SPOON ▤ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	△ Pocket Pen. (Su) △ (kPa) 50 100 150 200 / ■ Total Unit Wt ■ (kN/m³) 17 19 21 23 / PLASTIC M.C. LIQUID 20 40 60 80	× QU (Su) × (kPa) 50 100 150 200 / + Torvane (Su) + (kPa) 50 100 150 200 / □ Lab Vane (Su) □ (kPa) 50 100 150 200	COMMENTS	ELEVATION (m)
5								226
6		- grey below 6.1 m		T5				225
		END OF TEST HOLE AT 6.7 m IN CLAY Notes: 1. Seepage at 3 m from sand and gravel fill. 2. Sloughing up to 1.5 m from sand and gravel fill. 3. Switched to hollow stem augers at 3.7 m. 4. Test hole backfilled with bentonite chips to ground surface.						224
7								
8								223
9								
10								222

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LOGGED BY: R. Belbas	COMPLETION DEPTH: 6.71 m
REVIEWED BY: F. Khalil	COMPLETION DATE: 3/31/08
PROJECT ENGINEER: Faris Khalil	Page 2 of 2

LOG OF TESTHOLE (OLD) TH-08-01 TO TH-08-05.GPJ UMA.GDT 4/30/08

PROJECT: Panet Road Crossing of Dugald Drain Replacement	CLIENT: City of Winnipeg	TESTHOLE NO: **TH-08-02**
LOCATION: Shoulder of east bound lane of Dugald Rd., east of Panet Rd., E 638005.226 N 5527716.105		PROJECT NO.: 0265-40700-0302
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker MP5, 125mm SSA	ELEVATION (m): 231.832

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	+ Torvane (Su) + (kPa) 50 100 150 200 / △ Pocket Pen. (Su) △ (kPa) 50 100 150 200 / PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	ELEVATION (m)
0		SAND AND GRAVEL (Fill 600mm) - light brown - compact, dry to moist - poorly graded, sub angular - medium grained sand to coarse grained gravel					
		CLAY (Fill) - silty, trace sand, trace gravel - dark brown to black - frozen, fissured					231
1				G6			
		CLAY - silty, trace sand - dark brown - frozen					230
2		- stiff, moist, high plasticity below 2.1 m		G7	△		
		SILT - trace clay, trace sand - light brown, soft, moist, low plasticity		G8			
		CLAY - silty, dark brown, firm, moist, high plasticity					229
3		SILT - trace clay, light brown, soft, moist, low plasticity					
		END OF TEST HOLE AT 3.0 m IN SILT Notes: 1. No seepage observed. 2. No sloughing observed. 3. Test hole backfilled with bentonite chips to ground surface.					228
4							
							227
5							

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LOGGED BY: R. Belbas	COMPLETION DEPTH: 3.05 m
REVIEWED BY: F. Khalil	COMPLETION DATE: 3/31/08
PROJECT ENGINEER: Faris Khalil	Page 1 of 1

LOG OF TESTHOLE (OLD) TH-08-01 TO TH-08-05.GPJ UMA.GDT 4/30/08

PROJECT: Panet Road Crossing of Dugald Drain Replacement	CLIENT: City of Winnipeg	TESTHOLE NO: **TH-08-03**
LOCATION: Shoulder of north bound lane of Panet Rd., south of Dugald Rd., E 637989.969 N 5527685.918		PROJECT NO.: 0265-40700-0302
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker MP5, 125mm SSA	ELEVATION (m): 231.912

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	+ Torvane (Su) + (kPa) 50 100 150 200 / △ Pocket Pen. (Su) △ (kPa) 50 100 150 200 / PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	ELEVATION (m)
0	SAND AND GRAVEL (Fill 460mm) - light brown - compact, dry to moist - poorly graded, sub angular - medium grained sand to coarse grained gravel					
	CLAY (Fill) - silty, trace sand, trace gravel - dark brown to black - frozen, fissured		G9			
1			G10			231
	CLAY - silty, trace sand - dark brown - frozen to 1.8 m - stiff, moist, high plasticity below 1.8 m					
2			G11			230
3	SILT - trace clay, trace sand - light brown, soft, moist, low plasticity					229
	CLAY - silty, dark brown, firm, moist, high plasticity					
	SILT - trace clay, light brown, soft, moist, low plasticity		G12			
4	END OF TEST HOLE AT 3.7 m IN SILT Notes: 1. No seepage observed. 2. No sloughing observed. 3. Installed 25 mm standpipe piezometer. Casagrande tip at 3.7 m in silt, top of pipe at elev. 231.777 m. Test hole backfilled with sand to 3.4 m and bentonite chips to 0.6 m covered with a flush mount lid. Top of standpipe 0.185 m below grade.					228
5						227

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LOGGED BY: R. Belbas	COMPLETION DEPTH: 3.66 m
REVIEWED BY: F. Khalil	COMPLETION DATE: 3/31/08
PROJECT ENGINEER: Faris Khalil	Page 1 of 1

LOG OF TESTHOLE (OLD) TH-08-01 TO TH-08-05.GPJ UMA.GDT 4/30/08

PROJECT: Panet Road Crossing of Dugald Drain Replacement	CLIENT: City of Winnipeg	TESTHOLE NO: **TH-08-04**
LOCATION: Shoulder of north bound lane of Panet Rd., south of Dugald Rd., E 637991.165 N 5527695.241		PROJECT NO.: 0265-40700-0302
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker MP5, 125mm SSA	ELEVATION (m): 231.98

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	ELEVATION (m)
0	SAND AND GRAVEL (Fill 300mm) - light brown - compact, dry to moist - poorly graded, angular - medium grained sand to coarse grained gravel				
	CLAY (Fill) - silty, trace sand, trace gravel - dark brown to black - frozen, fractured				
1			G13		231
	CLAY - silty - mottled brown and grey - frozen to 1.8 m - stiff below, moist, high plasticity below 1.8 m				
2			T14		230
3	SILT - trace clay - light brown - soft, moist, low plasticity		G15		229
	CLAY - silty, trace sand, trace silt inclusions (dia. < 5 mm), trace oxide inclusions (dia. < 5 mm), trace sulphide inclusions (dia. < 5 mm) - mottled brown and grey - stiff, moist - high plasticity				
4			T16		228
	- firm below 4.4 m		G17		
5			T18		

△ Pocket Pen. (Su) △ (kPa) 50 100 150 200
■ Total Unit Wt ■ (kN/m³) 17 19 21 23
PLASTIC M.C. LIQUID 20 40 60 80
× QU (Su) × (kPa) 50 100 150 200
+ Torvane (Su) + (kPa) 50 100 150 200
□ Lab Vane (Su) □ (kPa) 50 100 150 200

101.8

UMA | AECOM

LOGGED BY: R. Belbas	COMPLETION DEPTH: 17.07 m
REVIEWED BY: F. Khalil	COMPLETION DATE: 3/31/08
PROJECT ENGINEER: Faris Khalil	Page 1 of 4

LOG OF TESTHOLE (OLD) TH-08-01 TO TH-08-05 GPJ UMA.GDT 4/30/08

PROJECT: Panet Road Crossing of Dugald Drain Replacement	CLIENT: City of Winnipeg	TESTHOLE NO: **TH-08-04**
LOCATION: Shoulder of north bound lane of Panet Rd., south of Dugald Rd., E 637991.165 N 5527695.241		PROJECT NO.: 0265-40700-0302
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker MP5, 125mm SSA	ELEVATION (m): 231.98

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SLOTTED PIEZOMETER	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	△ Pocket Pen. (Su) △ (kPa) 50 100 150 200 / ■ Total Unit Wt ■ (kN/m³) 17 19 21 23 / PLASTIC M.C. LIQUID 20 40 60 80	× QU (Su) × (kPa) 50 100 150 200 / + Torvane (Su) + (kPa) 50 100 150 200 / □ Lab Vane (Su) □ (kPa) 50 100 150 200	COMMENTS	ELEVATION (m)
5			- grey, soft below 5.2 m						
					G19				
6									226
					T20				
7									225
					G21				
8									224
					G22				
9									223
10									

LOG OF TESTHOLE (OLD) TH-08-01 TO TH-08-05.GPJ UMA.GDT 4/30/08

UMA | AECOM

LOGGED BY: R. Belbas	COMPLETION DEPTH: 17.07 m
REVIEWED BY: F. Khalil	COMPLETION DATE: 3/31/08
PROJECT ENGINEER: Faris Khalil	Page 2 of 4

PROJECT: Panet Road Crossing of Dugald Drain Replacement	CLIENT: City of Winnipeg	TESTHOLE NO: **TH-08-04**
LOCATION: Shoulder of north bound lane of Panet Rd., south of Dugald Rd., E 637991.165 N 5527695.241		PROJECT NO.: 0265-40700-0302
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker MP5, 125mm SSA	ELEVATION (m): 231.98

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SLOTTED PIEZOMETER	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	△ Pocket Pen. (Su) △ (kPa) 50 100 150 200 / ■ Total Unit Wt ■ (kN/m³) 17 19 21 23 / PLASTIC M.C. LIQUID 20 40 60 80	× QU (Su) × (kPa) 50 100 150 200 / + Torvane (Su) + (kPa) 50 100 150 200 / □ Lab Vane (Su) □ (kPa) 50 100 150 200	COMMENTS	ELEVATION (m)
10									
					G23		+		
11									221
12			- trace sand below 11.9 m		G24		+		220
13									219
					G25		+		
14									218
15									

UMA | AECOM

LOGGED BY: R. Belbas | COMPLETION DEPTH: 17.07 m

REVIEWED BY: F. Khalil | COMPLETION DATE: 3/31/08

PROJECT ENGINEER: Faris Khalil | Page 3 of 4

LOG OF TESTHOLE (OLD) TH-08-01 TO TH-08-05.GPJ UMA.GDT 4/30/08

PROJECT: Panet Road Crossing of Dugald Drain Replacement	CLIENT: City of Winnipeg	TESTHOLE NO: **TH-08-04**
LOCATION: Shoulder of north bound lane of Panet Rd., south of Dugald Rd., E 637991.165 N 5527695.241		PROJECT NO.: 0265-40700-0302
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker MP5, 125mm SSA	ELEVATION (m): 231.98

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	ELEVATION (m)
15			G26		
16	SILT (Till) - trace clay, trace sand, trace gravel - grey, loose, moist, low plasticity				216
	- light brown below 15.5 m		G27		
17	- trace cobbles below 16.8 m				215
	END OF TEST HOLE AT 17.1 m IN SILT TILL Notes: 1. No seepage observed. 2. No sloughing observed. 3. Installed 25 mm standpipe piezometer. Casagrande tip at 17.1 m in silt till, top of pipe at elev. 231.918 m. Test hole backfilled with sand to 16.2 m and bentonite chips to 0.3 m covered with a flush mount lid. Top of standpipe 0.055 m below grade.				
18					214
19					213
20					

△ Pocket Pen. (Su) △ (kPa): 50 100 150 200

■ Total Unit Wt ■ (kN/m³): 17 19 21 23

PLASTIC M.C. LIQUID: 20 40 60 80

× QU (Su) × (kPa): 50 100 150 200

+ Torvane (Su) + (kPa): 50 100 150 200

□ Lab Vane (Su) □ (kPa): 50 100 150 200

UMA | AECOM

LOGGED BY: R. Belbas	COMPLETION DEPTH: 17.07 m
REVIEWED BY: F. Khalil	COMPLETION DATE: 3/31/08
PROJECT ENGINEER: Faris Khalil	Page 4 of 4

LOG OF TESTHOLE (OLD) TH-08-01 TO TH-08-05.GPJ UMA.GDT 4/30/08

PROJECT: Panet Road Crossing of Dugald Drain Replacement	CLIENT: City of Winnipeg	TESTHOLE NO: **TH-08-05**
LOCATION: North bound lane of Panet Rd., south of Dugald Rd., E 637984.600 N 5527674.609		PROJECT NO.: 0265-40700-0302
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker MP5, 125mm SSA	ELEVATION (m): 231.966

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	ELEVATION (m)
0		ASPHALT (125 mm)				
		SAND AND GRAVEL (Fill) - light brown - compact, dry to moist - poorly graded, sub angular - medium grained sand to coarse grained gravel				
		CLAY (Fill) - silty, trace sand, trace gravel - dark brown to black - frozen, fissured		C28		
1						231
2						230
3						229
4						228
5						227

UMA | AECOM

LOGGED BY: R. Belbas	COMPLETION DEPTH: 1.52 m
REVIEWED BY: F. Khalil	COMPLETION DATE: 3/31/08
PROJECT ENGINEER: Faris Khalil	Page 1 of 1

LOG OF TESTHOLE (OLD) TH-08-01 TO TH-08-05.GPJ UMA.GDT 4/30/08

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