THE CITY OF WINNIPEG

TENDER

TENDER NO. 404-2021

TRANSCONA DEEP POND SLOPE STABILIZATION AND ASSOCIATED ROADWORKS

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 Transcona Deep Pond Slope Stabilization and Associated Roadworks

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, July 21, 2021.

B2.2 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. SITE INVESTIGATION

B3.1 Further to C3.1, a Site meeting will be held at 10:00 AM Winnipeg time, July 15, 2021 to provide Bidders access to the Site. Bidders shall meet in the public parking lot located off Transcona Boulevard on the east side of the Site.

B3.2 The Bidder is advised that outside the scheduled site meeting as per B3.1, their access to the site will be limited to Transcona Boulevard eastbound lanes roadway and south sidewalk.

B3.3 The Bidder shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.

B4.2 If the Bidder finds errors, discrepancies or omissions in the Tender, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.

B4.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Tender will be provided by the Contract Administrator to all Bidders by issuing an addendum.

B4.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Tender will be provided by the Contract Administrator only to the Bidder who made the enquiry.

B4.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B4 unless that response or interpretation is provided by the Contract Administrator in writing.

B4.6 Any enquiries concerning submitting through MERX should be addressed to:
MERX Customer Support
Phone: 1-800-964-6379
Email: merx@merx.com

B5. CONFIDENTIALITY

B5.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:

(a) was known to the Bidder before receipt hereof; or

(b) becomes publicly known other than through the Bidder; or

(c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

B5.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Tender to the media or any member of the public without the prior written authorization of the Contract Administrator.

B6. ADDENDA

B6.1 The Contract Administrator may, at any time prior to the Submission deadline, issue addenda correcting errors, discrepancies or omissions in the Tender, or clarifying the meaning or intent of any provision therein.

B6.2 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.

B6.3 Addenda will be available on the MERX website at www.merx.com.

B6.4 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the MERX website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B6.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid/Proposal. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B6.6 Notwithstanding B4, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D4.

B7. SUBSTITUTES

B7.1 The Work is based on the Plant, Materials and methods specified in the Tender.

B7.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B7.3 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.

B7.4 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.

B7.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an "approved equal" or as an "approved alternative", or may refuse to grant approval of the substitute.

B7.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.

B7.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.

B7.7 If the Contract Administrator approves a substitute as an "approved equal", any Bidder may use the approved equal in place of the specified item.

B7.8 If the Contract Administrator approves a substitute as an "approved alternative", any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B18.

B7.9 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.

B8. BID COMPONENTS

B8.1 The Bid shall consist of the following components:

(a) Form A: Bid;

(b) Form B: Prices;

(c) Form G1: Bid Bond and Agreement to Bond.

B8.2 Further to B8.1, the Bidder should include written correspondence from the Contract Administrator approving a substitute in accordance with B7.

B8.3 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.

B8.4 The Bid shall be submitted electronically through MERX at www.merx.com.

B8.4.1 Bids will **only** be accepted electronically through MERX.

B8.5 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B18.1(a).

B9. BID

B9.1 The Bidder shall complete Form A: Bid/Proposal, making all required entries.

B9.2 Paragraph 2 of Form A: Bid/Proposal shall be completed in accordance with the following requirements:

(a) if the Bidder is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;

(b) if the Bidder is a partnership, the full name of the partnership shall be inserted;

(c) if the Bidder is a corporation, the full name of the corporation shall be inserted;

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

B9.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B9.2.

B9.3 In Paragraph 3 of Form A: Bid/Proposal, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B9.4 Paragraph 13 of Form A: Bid/Proposal shall be signed in accordance with the following requirements:

(a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;

(b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;

(c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;

(d) if the Bidder is carrying on business under a name other than his/her own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B9.4.1 The name and official capacity of all individuals signing Form A: Bid/Proposal should be entered below such signatures.

B9.5 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.

B10. PRICES

B10.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B10.1.1 Prices stated on Form B: Prices shall not include any costs which may be incurred by the Contractor with respect to any applicable funding agreement obligations as outlined in D30. Any such costs shall be determined in accordance with D30.

B10.2 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.

B10.3 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.

B10.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B10.5 The Bidder shall enter the Total Bid Price from Form B: Prices into the Total Bid Price field in MERX.

B10.5.1 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

B11. DISCLOSURE

B11.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.

B11.2 The Persons are:

(a) N/A

B12. CONFLICT OF INTEREST AND GOOD FAITH

B12.1 Further to C3.2, Bidders, by responding to this Tender, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.

B12.2 Conflict of Interest means any situation or circumstance where a Bidder or employee of the Bidder proposed for the Work has:

(a) other commitments;

(b) relationships;

(c) financial interests; or

(d) involvement in ongoing litigation;

that could or would be seen to:

(i) exercise an improper influence over the objective, unbiased and impartial exercise of the independent judgment of the City with respect to the evaluation of Bids or award of the Contract; or

(ii) compromise, impair or be incompatible with the effective performance of a Bidder's obligations under the Contract;

(e) has contractual or other obligations to the City that could or would be seen to have been compromised or impaired as a result of its participation in the Tender process or the Work; or

(f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the Tender process) of strategic and/or material relevance to the Tender process or to the Work that is not available to other bidders and that could or would be seen to give that Bidder an unfair competitive advantage.

B12.3 In connection with its Bid, each entity identified in B12.2 shall:

(a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Work;

(b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the Tender process, promptly disclose a detailed description of the Conflict of Interest to the City in a written statement to the Contract Administrator; and

(c) provide the City with the proposed means to avoid or mitigate, to the greatest extent practicable, any perceived, potential or actual Conflict of Interest and shall submit any additional information to the City that the City considers necessary to properly assess the perceived, potential or actual Conflict of Interest.

B12.4 Without limiting B12.3, the City may, in its sole discretion, waive any and all perceived, potential or actual Conflicts of Interest. The City's waiver may be based upon such terms and conditions as the City, in its sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately avoided or mitigated, including requiring the Bidder to put into place such policies, procedures, measures and other safeguards as may be required by and be acceptable to the City, in its sole discretion, to avoid or mitigate the impact of such Conflict of Interest.

B12.5 Without limiting B12.3, and in addition to all contractual or other rights or rights at law or in equity or legislation that may be available to the City, the City may, in its sole discretion:

(a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of its employees proposed for the Work;

(b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in its sole discretion, determines cannot be avoided or mitigated;

(c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B12.4 to avoid or mitigate a Conflict of Interest; and

(d) disqualify a Bidder if the Bidder, or one of its employees proposed for the Work, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.

B12.6 The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in its sole discretion.

B13. QUALIFICATION

B13.1 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.

B13.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

(a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at https://www.winnipeg.ca/matmgt/Templates/files/debar.pdf

B13.3 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);

B13.4 Further to B13.3(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) Written confirmation of a safety and health certification meeting SAFE Work Manitoba's SAFE Work Certified Standard (e.g., COR™ and SECOR™) in the form of:

(i) a copy of their valid Manitoba COR certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Certificate of Recognition (COR) Program administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or

(ii) a copy of their valid Manitoba SECOR™ certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Small Employer Certificate of Recognition Program (SECOR™) administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or

(b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/.

B13.5 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.

B13.6 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.

B14. BID SECURITY

B14.1 The Bidder shall include in its Bid Submission bid security in the form of a digital 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 Form G1: Bid Bond and Agreement to Bond, available on The City of Winnipeg, Corporate Finance, Materials Management Division website at https://www.winnipeg.ca/MatMgt/templates/files/eBidsecurity.pdf.

B14.2 Bid security shall be submitted in a digital format meeting the following criteria:

(a) The version submitted by the Bidder must have valid digital signatures and seals;

(b) The version submitted by the Bidder must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.

(c) The version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.

(d) The verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.

(e) The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B14.2(a).

B14.3 Bonds failing the verification process will not be considered to be valid and the bid shall be determined to be non-responsive in accordance with B18.1(a).

B14.4 Bonds passing the verification process will be treated as original and authentic.

B14.4.1 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.

B14.5 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 formed with the successful Bidder and the contract securities are furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B14.6 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 Tender.

B15. OPENING OF BIDS AND RELEASE OF INFORMATION

B15.1 Bids will not be opened publicly.

B15.2 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 MERX website at www.merx.com.

B15.3 After award of Contract, the name(s) of the successful Bidder(s) and their Contract amount(s) will be available on the MERX website at www.merx.com.

B15.4 The Bidder is advised that any information contained in any Bid may be released if required by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law or by City policy or procedures (which may include access by members of City Council).

B15.4.1 To the extent permitted, the City shall treat as confidential information, those aspects of a Bid Submission identified by the Bidder as such in accordance with and by reference to Part 2, Section 17 or Section 18 or Section 26 of The Freedom of Information and Protection of Privacy Act (Manitoba), as amended.

B16. IRREVOCABLE BID

B16.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B16.2 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 formed and the contract securities have been 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/Proposal.

B17. WITHDRAWAL OF BIDS

B17.1 A Bidder may withdraw his/her Bid without penalty prior to the Submission Deadline.

B18. EVALUATION OF BIDS

B18.1 Award of the Contract shall be based on the following bid evaluation criteria:

(a) compliance by the Bidder with the requirements of the Tender, or acceptable deviation therefrom (pass/fail);

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B13 (pass/fail);

(c) Total Bid Price;

(d) economic analysis of any approved alternative pursuant to B7.

B18.2 Further to B18.1(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.

B18.3 Further to B18.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is qualified.

B18.4 Further to B18.1(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.

B18.4.1 Further to B18.1(a), in the event that a unit price is not provided on Form B: Prices, the City may determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

B18.4.2 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

B19. AWARD OF CONTRACT

B19.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B19.2 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 qualified, and the Bids are determined to be responsive.

B19.2.1 Without limiting the generality of B19.2, 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.

B19.3 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D30 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.

B19.4 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B18.

B19.4.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

C0.1 The *General Conditions for Construction* (Revision 2020-01-31) are applicable to the Work of the Contract.

C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm

C0.2 A reference in the Tender 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. FORM OF CONTRACT DOCUMENTS

D2.1 Notwithstanding C4.1(c) and C4.4, the Contract Documents will be provided to the Contractor electronically and there will be no requirement for execution and return to the City by the Contractor. Accordingly, the provisions under C4.4(a) and C4.4(b) are no longer applicable.

D3. SCOPE OF WORK

D3.1 The Work to be done under the Contract shall generally, albeit not in its entirety, consist of:

(a) Transcona Pond Slope Stabilization
  (i) Environmental Protection Measures
  (ii) Slope Regrading
  (iii) Rockfill Columns
  (iv) Clay Toe Berm
  (v) Rockfill Trench
  (vi) Interceptor Drains
  (vii) Drainage Swales

(b) Transcona Boulevard Roadworks
  (i) Traffic Management
  (ii) Pavement Removals and Rehabilitation
  (iii) Sidewalk Rehabilitation

(c) Naturalization and Landscaping Works
  (i) Transcona Pond Slope Naturalization
  (ii) Transcona Boulevard Topsoil and Sodding

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is KGS Group, represented by:

Bruno Pierre Arpin, P. Eng.
Senior Project Manager

Telephone No. 204 896-1209
Email Address barpin@kgsgroup.com

D4.2 At the pre-construction meeting, Bruno Pierre Arpin, P. Eng. will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D5. CONTRACTOR'S SUPERVISOR

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

D5.2 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 D5.1 or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

D6. NOTICES

D6.1 Except as provided for in C22.4, 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/Proposal.

D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D6.3 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D4.

D6.3 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

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

D7. FURNISHING OF DOCUMENTS

D7.1 Upon award of the Contract, the Contractor will be provided with 'issued for construction' Contract Documents electronically, including Drawings in PDF formal only.

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

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

D9. SAFE WORK PLAN

D9.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D9.2 The Safe Work Plan shall be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/safety/default.stm

D9.3 Notwithstanding B13.4 at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D10. INSURANCE

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

(a) commercial general liability insurance, in the amount of at least three million dollars ($3,000,000.00) inclusive, with the City and Manitoba Hydro, if required by contract, added as additional insureds, 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 covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than $2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence;

(c) 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.

(d) An all risks property insurance policy to cover all machinery, equipment and tools that may be owned, rented, leased or borrowed to be used in conjunction with the scope of the work.

(e) Contractors pollution liability insurance in the amount of at least one million dollars ($1,000,000) per occurrence and one million dollars ($1,000,000) aggregate insuring against claims for:

(i) Bodily Injury

(ii) Property damage including diminution in value: and Natural Resource Damages

(iii) Clean-Up costs

(iv) Transported cargo and non-owned disposal sites.

(v) Sudden and gradual pollution conditions including further disruption of pre-existing conditions arising from the Contractors operations and completed operations.

(vi) Such policy will name the City as an additional insured and remain in place for a minimum of twelve (12) months following Total Performance.

D10.2 Deductibles shall be borne by the Contractor.

D10.3 The Contractor shall require any sub-contractors hired to perform slope stability Work to maintain, at its own expense and cost, evidence of insurance set out under D10.1.

D10.4 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 Documents, as applicable.

D10.5 The Contractor and subcontractor(s) 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.

D10.6 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D11. CONTRACT SECURITY

D11.1 The Contractor shall provide and maintain the performance bond and the labour and material payment bond 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; and

(b) a labour and material payment bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H2: Labour and Material Payment Bond), in an amount equal to fifty percent (50%) of the Contract Price.

D11.1.1 Where the contract security is a performance bond, it may be submitted in hard copy or digital format. If submitted in digital format the contract security must meet the following criteria:

(a) the version submitted by the Contractor must have valid digital signatures and seals;

(b) the version submitted by the Contractor must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.

(c) the version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.

(d) the verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.

(e) the results of the verification must provide a clear, immediate and printable indication of pass or fail regarding D11.1(b).

D11.1.2 Digital bonds failing the verification process will not be considered to be valid and may be determined to be an event of default in accordance with C18.1. If a digital bond fails the verification process, the Contractor may provide a replacement bond (in hard copy or digital format) within seven (7) Calendar Days of the City's request or within such greater period of time as the City in its discretion, exercised reasonably, allows.

D11.1.3 Digital bonds passing the verification process will be treated as original and authentic.

D11.2 The Contractor shall provide the City Solicitor with the required performance and labour and material payment bonds within seven (7) Calendar Days of notification of the award of the Contract by way of an award letter and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D11.3 The Contractor shall, as soon as practicable after entering into a contract with a Subcontractor:

(a) give the Subcontractor written notice of the existence of the labour and material payment bond in D11.1(b); and

(b) post a notice of the bond and/or a copy of that bond in a conspicuous location at the Site of the Work.

D12. SUBCONTRACTOR LIST

D12.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at 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 Documents, if applicable.

D13. EQUIPMENT LIST

D13.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment List) at 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 Documents, if applicable.

D14. DETAILED WORK SCHEDULE

D14.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Conditions for the return of the executed Contract Documents, as applicable.

D14.2 The detailed work schedule shall consist of the following:

(a) a critical path method (C.P.M.) schedule for the Work;

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

(c) a daily resources schedule for the Work

all acceptable to the Contract Administrator.

D14.3 Further to D14.2(a), the C.P.M. schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path:

D14.4 Further to D14.2(b), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

D14.5 Further to D14.2(c), the daily resources schedule shall list the daily number of individuals on the Site for each trade and sub-contractor.

SCHEDULE OF WORK

D15. COMMENCEMENT

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

D15.2 The Contractor shall not commence any Work on the Site until:

(a) the Contract Administrator has confirmed receipt and approval of:

(i) evidence of authority to carry on business specified in D8;

(ii) evidence of the workers compensation coverage specified in C6.15;

(iii) the twenty-four (24) hour emergency response phone number specified in D5.2.

(iv) the Safe Work Plan specified in D9;

(v) evidence of the insurance specified in D10;

(vi) the contract security specified in D11;

(vii) the subcontractor list specified in D12;

(viii) the equipment list specified in D13;

(ix) the detailed work schedule specified in D14; and

(x) The Environmental Protection Plan specified in E13.

(b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D15.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the award letter.

D15.4 The City intends to award this Contract by August 18, 2021.

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 Naturalist Services for Pond Slope Naturalization, willow planting, and native grass seeding;

(b) Manitoba Hydro:

(i) Temporary relocations, permanent removals, and new installations along and within the entire site.

D17. SEQUENCE OF WORK

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

D17.1.1 The Work shall be divided into three stages as described in D3. Stages are further subdivided into major items of work.

D17.1.2 The sequence of Work shall adhere to Drawings CG-05.

D18. CRITICAL STAGES

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

(a) Completion of D3.1(a) by September 30, 2021.

(b) Completion of D3.1(b) by October 31, 2021.

(i) This Work shall not commence until the work in D3.1(a) has been completed.

D19. SUBSTANTIAL PERFORMANCE

D19.1 The Contractor shall achieve Substantial Performance by June 23, 2022.

D19.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.

D19.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

D20. TOTAL PERFORMANCE

D20.1 The Contractor shall achieve Total Performance by June 30, 2022.

D20.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.

D20.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

D21. LIQUIDATED DAMAGES

D21.1 If the Contractor fails to achieve Critical Stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the

City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:

(a) Critical Stage D18.1(a) – one thousand five hundred dollars ($1,500.00);

(b) Critical Stage D18.1(b) – one thousand five hundred dollars ($1,500.00);

(c) Substantial Performance – one thousand five hundred dollars ($1,500.00);

(d) Total Performance – seven hundred fifty dollars ($750.00);

D21.2 The amounts specified for liquidated damages in D21.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

D21.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D22. COVID-19 SCHEDULE DELAYS

D22.1 The City acknowledges that the schedule for this Contract may be impacted by the COVID-19 pandemic. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the health and safety of workers and the public, directives from health authorities and various levels of government and in close consultation with the Contract Administrator.

D22.2 If the Contractor is delayed in the performance of the Work by reason of the COVID-19 pandemic, the Work schedule may be adjusted by a period of time equal to the time lost due to such delay and costs related to such delay will be determined as identified herein.

D22.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether COVID-19 will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to COVID-19, including but not limited to evidence related to availability of staff, availability of Material or work by others.

D22.4 For any delay related to COVID-19 and identified after Work has commenced, the Contractor shall within seven (7) Calendar Days of becoming aware of the anticipated delay declare the additional delay and shall provide sufficient evidence as indicated in D22.3. Failure to provide this notice will result in no additional time delays being considered by the City.

D22.5 The Work schedule, including the durations identified in D18 to D20 where applicable, will be adjusted to reflect delays accepted by the Contract Administrator. No additional payment will be made for adjustment of schedules except where seasonal work, not previously identified in the Contract, is carried over to the following construction season.

D22.6 Where Work not previously identified is being carried over solely as a result of delays related to COVID-19, as confirmed by the Contract Administrator, the cost of temporary works to maintain the Work in a safe manner until Work recommences, will be considered by the Contract Administrator. Where the Work is carried over only partially due to COVID-19, a partial consideration of the cost of temporary works will be considered by the Contract Administrator.

D22.7 Any time or cost implications as a result of COVID-19 and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

D23. SCHEDULED MAINTENANCE

D23.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

(a) Maintenance of Sod as specified in CW 3510;

(b) Maintenance of Trees as specified in E28 Tree Planting;

(c) Reflective Crack Maintenance during two (2) year maintenance warranty period as specified in CW 3250.

D23.2 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

D24. JOB MEETINGS

D24.1 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.

D24.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D25. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D25.1 Further to C6.26, 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).

D26. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D26.1 Further to B13.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B13.4.

D27. LAYOUT OF THE WORKS

D27.1 Contractor shall be responsible for the following:

(a) All Part (a) and (c) Work as defined in D3 Scope of Work.

D27.2 Further to C6 and CW 1130 Clause 3.15, the Contract Administrator will provide the following:

(a) All other survey layout unless otherwise specified herein.

MEASUREMENT AND PAYMENT

D28. PAYMENT

D28.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D29. WARRANTY

D29.1 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.

D29.2 Notwithstanding C13.2 or D29.1, 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.

D29.2.1 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.

THIRD PARTY AGREEMENTS

D30. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D30.1 In the event that funding for the Work of the Contract is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, the following terms and conditions shall apply, as required by the applicable funding agreements.

D30.2 Further to D30.1, in the event that the obligations in D30 apply, actual costs legitimately incurred by the Contractor as a direct result of these obligations ("Funding Costs") shall be determined by the actual cost to the Contractor and not by the valuation method(s) outlined in C7.4. In all other respects Funding Costs will be processed in accordance with Changes in Work under C7.

D30.3 For the purposes of D30:

(a) **"Government of Canada"** includes the authorized officials, auditors, and representatives of the Government of Canada; and

(b) **"Government of Manitoba"** includes the authorized officials, auditors, and representatives of the Government of Manitoba.

D30.4 Modified Insurance Requirements

D30.4.1 If not already required under the insurance requirements identified in D10, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars ($2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and its Ministers, officers, employees, and agents shall be added as additional insureds.

D30.4.2 If not already required under the insurance requirements identified in D10, the Contractor will be required to provide builders' risk insurance (including boiler and machinery insurance, as applicable) providing all risks coverage at full replacement cost, or such lower level of insurance that the City may identify on a case-by-case basis, such as an installation floater.

D30.4.3 The Contractor shall obtain and maintain third party liability insurance with minimum coverage of two million dollars ($2,000,000.00) per occurrence on all licensed vehicles operated at the Site. In the event that this requirement conflicts with another licensed vehicle insurance requirement in this Contract, then the requirement that provides the higher level of insurance shall apply.

D30.4.4 Further to D10.4, insurers shall provide satisfactory Certificates of Insurance to the Government of Manitoba prior to commencement of Work as written evidence of the insurance required. The Certificates of Insurance must provide for a minimum of thirty (30) days' prior written notice to the Government of Manitoba in case of insurance cancellation.

D30.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D30.5 Indemnification by Contractor

D30.5.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for Construction, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers, servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.

D30.6 Records Retention and Audits

D30.6.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.

D30.6.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for Construction, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total Performance, all records, documents, and contracts referred to in D30.6.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.

D30.7 Other Obligations

D30.7.1 The Contractor consents to the City providing a copy of the Contract Documents to the Government of Manitoba and/or the Government of Canada upon request from either entity.

D30.7.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.

D30.7.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.

D30.7.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.

D30.7.5 The Contractor represents and warrants that no current or former public servant or public office holder, to whom the Value and Ethics Code for the Public Sector, the Policy on Conflict of Interest and Post Employment, or the Conflict of Interest Act applies, shall derive direct benefit from this Contract, including any employment, payments, or gifts, unless the provision or receipt of such benefits is in compliance with such codes and the legislation.

D30.7.6 The Contractor represents and warrants that no member of the House of Commons or of the Senate of Canada or of the Legislative Assembly of Manitoba is a shareholder, director or officer of the Contractor or of a Subcontractor, and that no such member is entitled to any benefits arising from this Contract or from a contract with the Contractor or a Subcontractor concerning the Work.

FORM H1: PERFORMANCE BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 404-2021

Transcona Deep Pond Slope Stabilization and Associated Roadworks
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: LABOUR AND MATERIAL PAYMENT BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
his/its heirs, executors, administrators, successors or assigns (hereinafter called the "Principal"), and

_____ ,
his/its heirs, executors, administrators, successors or assigns (hereinafter called the "Surety"), are held and firmly bound unto **THE CITY OF WINNIPEG** (hereinafter called the "Obligee"), for the use and benefit of claimants as herein below defined, in the amount of

_____

_____ dollars ($_____.____)

of lawful money of Canada, for the payment whereof we, the Principal and the Surety jointly and severally bind ourselves firmly by these presents.

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

TENDER NO. 404-2021

Transcona Deep Pond Slope Stabilization and Associated Roadworks

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 promptly make payment to all claimants as hereinafter defined, for all labour, service and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void, otherwise it shall remain in full force and effect subject, however, to the following conditions:

(a) A claimant is defined as one having a direct contract with the Principal for labour, service and material, or any of them, used or reasonably required for use in the performance of the contract, labour, service and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment (but excluding rent of equipment where the rent pursuant to an agreement is to be applied towards the purchase price thereof) directly applicable to the Contract;

(b) The above-named Principal and Surety hereby jointly and severally agree with the Obligee that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant’s work, labour or service was done or performed, or materials were furnished by such claimant, may sue on this bond, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon;

(c) No suit or action shall be commenced hereunder by any claimant

  (i) unless claimant shall have given written notice to the Principal and the Surety above-named, within one hundred and twenty (120) days after such claimant did or performed the last of the work, labour or service, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work, labour or service was done or performed. Such notice shall be served by mailing the same by registered mail to the Principal, and Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the Province of Manitoba;

(ii) after the expiration of one (1) year following the date on which Principal ceased work on said Contract; including work performed under the guarantees provided in the Contract;

(iii) other than in a court of competent jurisdiction in the Province of Manitoba.

(d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.

(e) The Surety shall not be liable for a greater sum than the specified penalty of this bond.

The Principal and Surety hereby agree that The Guarantors' Liability Act (Manitoba) shall apply to this Bond.

IN TESTIMONY WHEREOF, the Principal has hereunto set its hand affixed its seal, and the Surety has caused these presents to be sealed and with its corporate seal duly attested by the authorized signature of its signing authority this

_____ 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 J: SUBCONTRACTOR LIST
(See D12)

Transcona Deep Pond Slope Stabilization and Associated Roadworks

Portion of the Work	Name	Address

FORM K: EQUIPMENT
(See D13)

Transcona Deep Pond Slope Stabilization and Associated Roadworks

1. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

2. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

3. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

FORM K: EQUIPMENT
(See D13)

Transcona Deep Pond Slope Stabilization and Associated Roadworks

4. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

5. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

6. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

E1.2 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.

E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/Spec/Default.stm

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

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

E1.3 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B7. In every instance where a brand name or design specification is used, the City will also consider approved equals and/or approved alternatives in accordance with B7.

E1.4 The following are applicable to the Work:

City Drawing No.	Drawing Name/Title
GENERAL	
P-3548 -01	Cover Sheet
P-3548 -02	Drawing List
P-3548 -03	General Layout and Major Work Items
SLOPE STABILIZATION WORKS	
P-3548 -04	Existing Conditions and Test Hole Locations
P-3548 -05	Rockfill Columns Plan, Sections and Details (Sheet 1 of 2)
P-3548 -06	Rockfill Columns Plan, Sections and Details (Sheet 2 of 2)
P-3548 -07	Final Arrangement
P-3548 -08	Construction Sequencing Schematics
P-3548 -09	Erosion Control Measures
ROAD AND SIDEWALK WORKS	
P-3548 -10	Roadway Repairs
LANDSCAPE WORKS	
P-3548 -11	Planting Plan
P-3548 -12	Landscape Details

NOTE: These drawing numbers and names/titles are subject to change, and currently serve the function of place holders until City of Winnipeg designated drawing numbers are received.

E2. GEOTECHNICAL SUMMARY

E2.1 Further to C3.1, geotechnical test holes have been drilled in the vicinity of the proposed Works to determine the character of the subsurface soil to facilitate the design of the Work. The information is considered accurate at the locations indicated and at the time of investigation. However, considerable variations in the soil conditions may exist between test holes and fluctuations in ground water levels can be expected seasonally. The test hole logs are included in Appendix 'A'.

E2.2 The Contractor is responsible for any interpretation they place on the supplied information and are expected to make such additional investigation of the soil as they feel necessary to satisfy themselves.

E2.3 Any test borings or test excavations made by the Contractor shall be done in accordance with the requirements of the appropriate authority of the City of Winnipeg. The Contractor shall notify the Contract Administrator prior to starting any soil boring or test excavation.

E3. POND LEVEL INFORMATION

E3.1 The Transcona Pond is a regulated body of water by the City of Winnipeg. Water levels can fluctuate greatly even on a daily basis and no guarantees are made that the water level will be at the levels indicated on the Drawings. Note that actual pond levels encountered at the site during construction will vary depending on several factors that may influence the pond level at any given point in time. The nature and extent of variations may not become evident until construction commences.

E4. PAVEMENT CORE REPORT

E4.1 Further to C3.1, the pavement core report is provided to aid the Contractor's evaluation of the existing pavement structures. The Pavement Core Report is included as part of Appendix 'A'.

E5. SHOP DRAWINGS

E5.1 Description

(a) This Specification shall revise, amend and supplement the requirements of CW 1110.

(i) The term 'shop drawings' means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, including Site erection drawings which are to be provided by the Contractor to illustrate details of a portion of the Work.

(ii) The Contractor shall submit specified shop drawings to the Contract Administrator for review. All submissions must be in metric units. Where data is in imperial units, the correct metric equivalent shall also be shown on all submissions for Contract Administrator review.

(iii) Provision of Shop Drawings will be considered incidental to the price for supply and delivery of equipment and materials.

(b) Shop Drawings

(i) Original drawings are to be prepared by Contractor, Subcontractor, Supplier, Distributor, or Manufacturer, which illustrate appropriate portion of Work; showing fabrication, layout, setting or erection details as specified in appropriate sections.

(ii) Shop drawings for the following structural components shall bear the seal of a registered Engineer in the Province of Manitoba.

- Reinforcing steel.
- Metal Fabrications.

(c) Contractor's Responsibilities

(i) Review shop drawings, product data and samples prior to submission and stamp and sign drawings indicating conformance to the Contract requirements.

(ii) Verify:

- Field Measurements
- Field Construction Criteria
- Catalogue numbers and similar data

(iii) Coordinate each submission with requirements of Work and Contract Documents. Individual shop drawings will not be reviewed until all related drawings are available.

(iv) Notify Contract Administrator, in writing at time of submission, of deviations from requirements of Contract Documents.

(v) Responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator's review of submission, unless Contract Administrator gives written acceptance of specified deviations.

(vi) Responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.

(vii) The Contractor shall make any corrections required by the Contract Administrator and shall resubmit the required number of corrected copies of Shop Drawings. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the Contract Administrator on previous submission.

(viii) After Contract Administrator's review and return of copies, distribute copies to subtrades as appropriate.

(ix) Maintain one (1) complete set of reviewed shop drawings, filed by Specification Section Number, at the Site of the Work for use and reference of the Contract Administrator and Subcontractors.

(d) Submission Requirements

(i) Schedule submissions at least 14 Calendar Days before dates reviewed submissions will be needed, and allow for a 10 Calendar Day period for review by the Contract Administrator of each individual submission and re-submission, unless noted otherwise in the Contract Documents.

(ii) Submit one original print and one digital PDF copy of shop drawings. The Contractor is advised that the Contract Administrator will retain the original copy and return one digital PDF copy to the Contractor.

(iii) Accompany submissions with transmittal letter, containing:

- Date
- Project title and Tender number
- Contractor's name and address
- Number of each shop drawing, product data and sample submitted.
- Specification Section, Title, Number and Clause
- Drawing Number and Detail/Section Number
- Other pertinent data

(e) Submission shall include.

(i) Date and revision dates

(ii) Project title and Tender number

(iii) Name of:

- Contractor
- Subcontractor
- Supplier
- Manufacturer
- Separate detailer when pertinent

(iv) Identification of product material

(v) Relation to adjacent structure or materials

(i) Field dimensions clearly identified as such.

(ii) Specification section name, number and clause number or drawing number and detail/section number.

(iii) Applicable standards, such as CSA or CGSB numbers.

(iv) Contractor's stamp, initialed or signed, certifying review of submission, verification of field measurements and compliance with Contract Documents.

(f) Other Considerations

(i) Fabrication, erection, installation or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent shop drawings and resubmit.

(ii) Material and equipment delivered to the Site of the Works will not be paid for at least until pertinent shop drawings have been submitted and reviewed.

(iii) Incomplete shop drawing information will be considered as stipulated deductions for the purposes of progress payment certificates.

(iv) No delay or cost claims will be allowed that arise because of delays in submissions, re-submissions and review of shop drawings.

E6. WATER OBTAINED FROM THE CITY

E6.1 Further to clause 3.7 of CW 1120, the Contractor shall pay for all costs, including sewer charges, associated with obtaining water from the City in accordance with the Waterworks and Sewer By-laws.

E7. VERIFICATION OF WEIGHTS

E7.1 All Material which is paid for on a weight basis shall be weighed on a scale certified by Consumer & Corporate Affairs, Canada.

(a) All weight tickets shall have the gross weight and the time and date of weighing printed by an approved electro/mechanical printer coupled to the scale.

(b) The tare weight and net weight may either be hand written or machine printed. All weights, scales and procedures shall be subject to inspection and verification by the Contract Administrator. Such inspection and verification may include, but shall not be limited to:

(a) checking Contractor's scales for Consumer & Corporate Affairs certification seals;

(b) observing weighing procedures;

(c) random checking of either gross or tare weights by having such trucks or truck/trailer(s) combinations as the Contract Administrator shall select weighed at the nearest available certified scale; and

(d) checking tare weights shown on delivery tickets against a current tare.

E7.2 The Contractor shall ensure that each truck or truck/trailer(s) combination delivering Material which is paid for on a weight basis displays a tare weight not more than one (1) month old.

(a) The tare shall be obtained by weighing the truck or truck/trailer(s) combination on a certified scale and shall show:

(a) upon which scale the truck or truck/trailer(s) combination was weighed;

(b) the mechanically printed tare weight;

(c) the license number(s) of the truck and trailer(s); and

(d) the time and date of weighing.

E8. TRUCK WEIGHT LIMITS

E8.1 The City shall not pay for any portion of Material which results in the vehicle exceeding the maximum gross vehicle weight allowed under *The City of Winnipeg Traffic By-Law,* unless such vehicle is operating under special permit.

GENERAL REQUIREMENTS

E9. OFFICE FACILITIES

E9.1 Contractor shall supply one (1) office facility to be located at a Site specified by the Contract Administrator.

E9.2 The Contractor shall relocate the office facility during construction to an alternate Site upon request of the Contract Administrator up to one (1) time. Relocation of the office facility will be considered incidental to Supply of Office Facilities, and no separate payment for relocation will be made.

E9.3 The Contractor shall supply office facilities meeting the following requirements:

(a) The field office shall be for the exclusive use of the Contract Administrator and City staff and will be used for weekly site meetings.

(b) The building shall be conveniently located near the site of the Work.

(c) The building shall have a minimum floor area of 25 square metres, height of 2.4m with two windows for cross-ventilation and a door entrance with a suitable lock.

(d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16-18^{o}C or 24-25^{o}C.

(e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three wall outlets.

(f) The building shall be furnished with two desks, one drafting table, table 3m x 1.2m, one stool, one four drawer legal size filing cabinet, and a minimum of 8 chairs.

(g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City.

(h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each site meeting. The Contract Administrator may request additional cleaning when he/she deems it necessary.

E9.4 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E9.5 The office facilities will be provided from the date of the commencement of the Work to the date of Critical Stage (b) as defined in D18 Critical Stages.

E10. TRAFFIC CONTROL

E10.1 Further to clauses 3.6, 3.7 and 3.8 of CW 1130:

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

(b) In accordance with the Manual of Temporary Traffic Control on City Streets (MTTC), the Contractor ("Construction Agency" in the manual) shall be responsible for placing, maintaining and removing the appropriate temporary traffic control devices as specified by the MTTC or by the Traffic Management Branch of the City of Winnipeg Public Works Department. The Contractor shall bear all costs associated with the placement of temporary traffic control devices by their own forces or Subcontractor.

E10.2 Notwithstanding E10.1, in accordance with the MTTC, the Contract Administrator shall make arrangements with the **Traffic Services Branch of the City of Winnipeg** to place, maintain,

and remove all **regulatory signs** and traffic control devices authorized and/or required by the Traffic Management Branch in the following situations:

(a) Parking restrictions,

(b) Stopping restrictions,

(c) Turn restrictions,

(d) Diamond lane removal,

(e) Full or directional closures on a Regional Street,

(f) Traffic routed across a median,

(g) Full or directional closure of a non-regional street where there is a requirement for regulatory signs (turn restrictions, bus stop relocations, etc.) to implement the closure.

(h) Approved Designated Construction Zones with a temporary posted speed limit reduction. Traffic Services will be responsible for placing all of the advance signs and 'Construction Ends' (TC-4) signs. The Contractor is still responsible for all other temporary traffic control including but not limited to barricades, barrels and tall cones.

E10.2.1 An exception to E10.2 is the 'KEEP RIGHT/KEEP LEFT' sign (RB-25 / RB-25L) which shall be supplied, installed, and maintained by the Contractor at their own expense.

E10.2.2 Further to E10.2, where the Contract Administrator has determined that the services of the Traffic Services Branch are required, the City shall bear the costs associated with the placement of temporary traffic control devices by the Traffic Services Branch of the City of Winnipeg in connection with the works undertaken by the Contractor.

E11. TRAFFIC MANAGEMENT

E11.1 Further to close 3.7 of CW 1130:

E11.1.1 The Contractor shall schedule construction activities to meet the following:

(a) Transcona Boulevard: Maintain at least one eastbound lane and both westbound lanes along this street during construction.

(b) Transcona Boulevard: Maintain local access and/or bus, when possible, as determined by the Contract Administrator. The road shall be closed to traffic only with the approval of the Contract Administrator.

E11.1.2 Pedestrian and ambulance/emergency vehicle access must be maintained at all times.

E12. PEDESTRIAN SAFETY

E12.1 The Contractor shall be responsible for developing a Pedestrian Safety Plan approved by the Contract Administrator.

E12.2 Works Part (a) and (c) as defined in D3 Scope of Work will not require any pedestrian safety measures. All works shall be within the fencing boundary of the Transcona Pond, away from all pedestrian pathways and crossings.

E12.3 D3 Scope of Work Part (b) Works Pedestrian Traffic Staging

(a) Throughout this stage construction period, pedestrians shall be allowed to use the multi-use path North of Transcona Boulevard. These construction works will require that the South pedestrian sidewalk be closed to all users. As a result, the Contractor shall be responsible for implementing two (2) temporary pedestrian crosswalks, one West of the construction site, and the other East of the construction site at suitable locations (i.e., closest adjacent intersections) if possible.

(b) The Contractor shall provide signage, temporary curb ramps, and traffic control at all pedestrian crossings that are consistent with the requirements of the City of Winnipeg *Manual of Temporary Traffic Control on City Streets.*

(c) The removal of temporary pathways and crossings is considered incidental to the Work.

E13. ENVIRONMENTAL PROTECTION PLAN

E13.1 The Contractor shall plan and implement the Work of this Contract strictly in accordance with the requirements of the Environmental Protection Plan, as herein specified, and the Fisheries Act Authorization. The Contractor shall be responsible for all costs associated with the Environmental Protection Plan is incidental to the Work and no separate measurement or payment will be made.

E13.2 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work and are available for viewing at the office of the Contract Administrator.

(a) Federal
  (i) Canadian Environmental Assessment Act (CEAA) c.37
  (ii) Transportation of Dangerous Goods Act and Regulations c.34
  (iii) The Fisheries Act
  (iv) Canadian Navigable Waters Act

(b) Provincial
  (i) The Dangerous Goods Handling and Transportation Act D12
  (ii) The Endangered Species and Ecosystems Act E111
  (iii) The Environment Act c.E125
  (iv) The Fire Prevention Act F80
  (v) The Manitoba Heritage Resources Act H39.1
  (vi) The Manitoba Noxious Weeds Act N110
  (vii) The Manitoba Nuisance Act N120
  (viii) The Public Health Act c.P210
  (ix) The Workplace Safety and Health Act W210
  (x) And current applicable associated regulations.

(c) Municipal
  (i) The City of Winnipeg By-law No. 2480/79 and all amendments up to and including 7969/2000
  (ii) The City of Winnipeg By-law No. 1573/77 and all amendments up to and including 7670/2000
  (iii) The City of Winnipeg By-law No. 1/2008
  (iv) And any other applicable Acts, Regulations, and By-Laws.

E13.3 The Contractor is advised that the following environmental protection measures apply to the Work.

(a) Materials Handling and Storage
  (i) Construction materials shall not be deposited or stored on Pond slopes of banks unless written acceptance from the Contract Administrator is received in advance.
  (ii) Construction materials and debris shall be prevented from entering any nearby watercourse. If materials and/or debris inadvertently enter the watercourse, the Contract shall be required to remove the material and restore the watercourse to its original condition.

(b) Fuel Handling and Storage
  (i) The Contractor shall obtain all necessary permits from Manitoba Conservation and Climate for the handling and storage of fuel products and shall provide copies to the Contract Administrator.

(ii) All fuel handling and storage facilities shall comply with The Dangerous Goods and Transportation Act Storage and Handling of Petroleum Products Regulation and any local land use permits.

(iii) Fuels, lubricants, and other potentially hazardous materials as defined in The Dangerous Goods and Transportation Act shall be stored and handled within the approved storage areas.

(iv) In accordance with Section 2.5 (Construction: General Guidelines) of the Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat, (DFO and DNR, 1996), the Contractor shall ensure that any temporary fuel storage areas established for construction of the project are contained by an impermeable dike and are located a minimum distance of 100 metres away from the high-water line of the pond. Dikes shall be designed, constructed, and maintained to retain not less than 100% of the capacity of the total number of containers or 110% of the largest container, whichever is greatest. The dikes shall be constructed of clay or similar impervious material. If this type of material is not available, the dike shall be constructed of locally available material and lined with high density polyethylene (HDPE). Furthermore, the fuel storage area(s) shall be secured by a barrier such as a high fence and gate to prevent vandalism.

(v) The Contractor shall ensure that all fuel storage containers are inspected daily for leaks and spillage.

(vi) Products transferred from the fuel storage area(s) to specific Work Sites shall not exceed the daily usage requirement.

(vii) When servicing requires the drainage or pumping of fuels, lubricating oils or other fluids from equipment, a groundsheet of suitable material (such as HDPE) and size shall be spread on the ground to catch the fluid in the event of a leak or spill.

(viii) Refuelling of mobile equipment and vehicles shall take place at least 100 metres from a watercourse.

(ix) The area around storage Sites and fuel lines shall be distinctly marked and kept clear of snow and debris to allow for routine inspection and leak detection.

(x) A sufficient supply of materials, such as absorbent material and plastic oil booms, to clean up minor spills shall be stored nearby on-site. The Contractor shall ensure that additional material can be made available on short notice.

(c) Waste Handling and Disposal

(i) The construction area shall be kept clean and orderly at all times during and at completion of construction.

(ii) At no time during construction shall personal or construction waste be permitted to accumulate for more than one day at any location on the construction Site, other than at a dedicated storage area as may be approved by the Contract Administrator.

(iii) All resulting debris shall be deposited at a Waste Disposal Ground operating under the authority of Manitoba Regulation #150/91.

(iv) Indiscriminate dumping, littering, or abandonment shall not take place.

(v) No on-site burning of waste is permitted.

(vi) Waste storage areas shall not be located so as to block natural drainage.

(vii) Run-off from a waste storage area shall not be allowed to cause siltation of a watercourse.

(viii) Waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.

(ix) Equipment shall not be cleaned near watercourses; contaminated water from onshore cleaning operations shall not be permitted to enter watercourses.

(d) Dangerous Goods/Hazardous Waste Handling and Disposal

(i) Dangerous goods/hazardous wastes are identified by, and shall be handled according to, The Dangerous Goods Handling and Transportation Act and Regulations.

(ii) The Contractor shall be familiar with The Dangerous Goods Handling and Transportation Act and Regulations.

(iii) The Contractor shall have on-site staff that is trained and certified in the handling of the dangerous/hazardous goods, when said dangerous/hazardous goods are being utilized on-site for the performance of the Work.

(iv) Different waste streams shall not be mixed.

(v) Disposal of dangerous goods/hazardous wastes shall be at approved hazardous waste facilities.

(vi) Liquid hydrocarbons shall not be stored or disposed of in earthen pits on-site.

(vii) Used oils shall be stored in appropriate drums, or tankage until shipment to waste oil recycling centres, incinerators, or secure disposal facilities approved for such wastes.

(viii) Used oil filters shall be drained, placed in suitable storage containers, and buried or incinerated at approved hazardous waste treatment and disposal facilities.

(ix) Dangerous goods/hazardous waste storage areas shall be located at least 100 metres away from the high-water line and be diked.

(x) Dangerous goods/hazardous waste storage areas shall not be located so as to block natural drainage.

(xi) Run-off from a dangerous goods/hazardous waste storage area shall not be allowed to cause siltation of a watercourse.

(xii) Dangerous goods/hazardous waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.

(e) Emergency Response

(i) The Contractor shall ensure that due care and caution is taken to prevent spills.

(ii) The Contractor shall report all major spills of petroleum products or other hazardous substances with significant impact on the environment and threat to human health and safety (as defined in Table 1 below) to Manitoba Conservation and Climate, immediately after occurrence of the environmental accident, by calling the 24-hour emergency phone number (204) 945-4888. The Contract Administrator shall also be notified.

(iii) The Contractor shall designate a qualified supervisor as the on-site emergency response co-ordinator for the project. The emergency response co-ordinator shall have the authority to redirect resources in order to respond in the event of a spill.

(iv) The following actions shall be taken by the person in charge of the spilled material or the first person(s) arriving at the scene of a hazardous material accident or the on-site emergency response co-ordinator:

- Notify emergency-response co-ordinator of the accident:
  - identify exact location and time of accident.
  - indicate injuries, if any
  - request assistance as required by magnitude of accident (Manitoba Conservation and Climate 24-hour Spill Response Line (204) 945-4888, Police, Fire Department, Ambulance, company backup)
- Attend to public safety:
  - stop traffic, roadblock/cordon off the immediate danger area.
  - eliminate ignition sources.
  - initiate evacuation procedures if necessary
- Assess situation and gather information on the status of the situation, noting:
  - personnel on-site
  - cause and effect of spill
  - estimated extent of damage.
  - amount and type of material involved.
  - proximity to waterways, sewers, and manholes
- If safe to do so, try to stop the dispersion or flow of spill material:
  - approach from upwind

- stop or reduce leak if safe to do so.
- dike spill material with dry, inert sorbet material or dry clay soil or sand
- prevent spill material from entering waterways and utilities by diking.
- prevent spill material from entering manholes and other openings by covering with rubber spill mats or diking.

- Resume any effective action to contain, clean up, or stop the flow of the spilled product.

(v) The emergency response co-ordinator shall ensure that all environmental accidents involving contaminants shall be documented and reported to Manitoba Conservation and Climate according to The Dangerous Goods Handling and Transportation Act Environmental Accident Report Regulation 439/87.

(vi) When dangerous goods are used on-site, materials for containment and clean-up of spill material (e.g., absorbent materials, plastic oil booms, and oversized recovery drums) shall be available on-site.

(vii) Minor spills of such substances that may be contained on land with no significant impact on the environment may be responded to with in-house resources without formal notification to Manitoba Conservation and Climate.

(viii) City emergency response, 9-1-1, shall be used if other means are not available.

(ix) The on-site emergency response coordinator shall contact The Canadian Coast Guard, Selkirk (204) 785-6030, if the spill material reaches and is on or in the Red or Assiniboine Rivers.

Table 1 Spills that must be reported to the Manitoba Conservation and Climate as Environmental Accidents

Classification		Hazard	Reportable Quantity/Level
1		Explosives	All
2.1		Compressed Gas (flammable)	100 L*
2.2		Compressed Gas	100 L*
2.3		Compressed Gas (toxic)	All
2.4		Compressed Gas (corrosive)	All
3		Flammable Liquids	100 L
4		Flammable Solids	1 kg
5.1	PG** I & II	Oxidizer	1 kg or 1 L
	PG III	Oxidizer	50 kg or 50 L
5.2		Organic Peroxide	1 kg or 1 L
6.1	PG I	Acute Toxic	1 kg or 1 L
	PG II & III	Acute Toxic	5 kg or 5 L
6.2		Infectious	All
7		Radioactive	Any discharge or radiation level exceeding 10 mSv/h at the package surface and 200 uSv/h at 1 m from the package surface
8		Corrosive	5 kg or 5 L
9.1		Miscellaneous	50 kg (except PCB mixtures)
9.1		PCB Mixtures	500 g
9.2		Aquatic Toxic	1 kg or 1 L
9.3		Wastes (Chronic Toxic)	5 kg or 5 L

* Container capacity (refers to container water capacity)
** PG = Packing Group(s)

(f) Vegetation

(i) Vegetation shall not be disturbed without written permission of the Contract Administrator. The Contractor shall protect plants or trees which may be at risk of accidental damage. Such measures may include protective fencing or signage and shall be approved in advance by the Contract Administrator.

(ii) The Contractor shall submit a Tree Preservation and Protection Plan to the Contract Administrator for approval prior to commencement of construction activities. The Tree Preservation and Protection Report shall be prepared by an arborist with International Society of Arboriculture (ISA) Certified Arborist designation, and the Report shall include the information listed below:

- Details of any associated significant vegetation worthy of protection in accordance with the Ecologically Significant Land Strategy, including tree species, their location, size, and condition;
- Recommendations for tree protection in accordance with tree protection specifications outlined herein;
- Details of tree preservation and protection measures (before, during and after construction) for all trees that are to be preserved under the scope of this project;
- Details of all trees proposed for removal;
- Details of tree pruning (crown and roots), as applicable;
- Schedule for site inspection and status reporting to the Contract Administrator via an ISA Certified Arborist throughout construction.

(iii) Trees damaged as a result of this project shall be assessed by the City of Winnipeg Urban Forestry Branch to identify remedial pruning, if applicable. Remedial pruning shall be performed at the cost of the Contractor by an ISA Certified Arborist in accordance with the most current edition of the American National Standards Institute (ANSI) A300 and the most current edition of the companion publication "Best Management Practices – Tree Pruning".

(iv) No pruning work is permitted on elm trees for the period April 1st to July 31st in accordance with the Manitoba Forest Health Protection Act and Regulations unless deemed a safety hazard by the Contract Administrator.

(v) The Contractor shall provide compensation for damaged trees determined to be non-viable viable by the Urban Forestry Branch in accordance with the City of Winnipeg Tree Removal Guidelines.

(vi) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400 millimetre wood planks, or suitably protected as directed by the Contract Administrator.

(vii) A Tree Protection Zone (TPZ) shall be established for all trees to be preserved and protected and whose TPZ intersects with the Construction Area.

- No activity is permitted inside the TPZ, including any traffic, construction excavation, change of grade, or disposal/storage of materials, chemicals.:
- No accumulation of water or other substances as a result of activities associated with construction is permitted within the TPZ.
- No parking of vehicles or equipment
- TPZ Setback Distance:

Trunk Diameter (DBH)	Minimum Protection Distances Required
<10.1 cm	2.0m
10.1 – 40.0 cm	2.4m
40.1 – 50.0 cm	3.0m
50.1 – 60.0 cm	3.6m
60.1 – 70.0 cm	4.2m
70.1 – 80.0 cm	4.8m
80.1 – 90.0 cm	5.4m
90.1 – 100.0 cm	6.0m
>100.0 cm	6.0 cm for each 1.0 cm of trunk diameter

(viii) A physical TPZ barrier shall be constructed prior to the commencement of any disturbance on the Site by erecting a barrier as described below:

- The Contractor shall obtain approval from the Contract Administrator for placement and installation of barriers prior to commencing any construction activities.
- Barriers are to remain in place and be fully functional throughout the duration of the project until all work is completed to the satisfaction of the Contract Administrator.
- Where the TPZ is interrupted by an impervious surface, the TPZ barrier will be installed at the edge of the hard surface area.
- Materials for the TPZ Barrier shall meet the following specifications:
  - 6' (1.8 m) high metal construction fencing, or
  - Frame to consist of 50X100mm (2X4") wood posts set 450mm deep at each of the 4 corners of the TPZ. Max spacing of 2 m apart. 50X100mm rails (2X4") wood rails on top and bottom. Where surface is impervious, wood posts and frame shall be anchored or held in place by other means to prevent the barrier from being moved and to the satisfaction of the Contract Administrator.
  - Orange plastic web snow fence securely fastened to the outside of the frame to act as a barrier.
  - Where fill or excavation material must be stored within 1 m of the outside of the TPZ, a barrier of ¾" thick plywood must be securely installed along the outside of the orange plastic web snow fencing and must be long enough to accommodate the full extent or fill or excavated material to ensure that no material enters the TPZ.
  - The fence must be with a minimum of 1.2 m to a maximum height of 1.8 m. Adjustments may be made where height interferes with the normal branching habit of the tree and as accepted by the Contract Administrator.
  - A "Tree Protection Zone" sign must be mounted on any side facing foot and vehicular traffic, including construction traffic. The sign shall be produced in colour and be 45X60cm in size and made of white coroplast.

(ix) Pruning of Tree Branches

- Branch pruning shall be performed to avoid anticipated conflicts between tree branches with construction activities or structures and is to be performed by an ISA Certified Arborist with the written consent of the Contract Administrator.
- The Contractor shall be responsible for the cost of any precautionary branch pruning.
- Branch pruning shall be done in accordance with the American National Standards Institute (ANSI) A300 current edition and the companion publication "Best Management Practices – Tree Pruning" current edition.
- No Pruning work is permitted on elm trees for the period April 1st to July 31st as directed in the Manitoba Forest Health Protection Act and Regulations unless deemed a safety hazard by the Contract Administrator.
  - All elm debris, including branches and logs, shall be chipped on site or transported directly to Brady Road Resource Management Facility for disposal in accordance with The Forest Health Protection Act and Regulations.
  - The City of Winnipeg is an Emerald Ash Borer Regulated Area under the authority of the Canadian Food Inspection Agency. The movement of any ash materials, including logs, branches, woodchips, ash nursery stock/trees, and all species of wood out of Winnipeg is prohibited. Ash debris, including branches and logs, shall be chipped on site or transported directly to Brady Road Resource Management Facility for disposal.

(x) Pruning of Tree Roots

- Root pruning shall be performed to avoid anticipated conflicts between tree roots and construction activities or structures and is to be performed by an ISA Certified Arborist and with the written consent of the Contract Administrator.

- The Contractor shall be responsible for the cost of any precautionary root pruning.
- All exposed or surface roots greater than 40mm diameter at risk of being damaged or damaged at the edge of the TPZ shall be cut cleanly with a pruning saw or chain saw. Severing or crushing roots by excavator or another mechanical device is not acceptable.

(xi) Exceptions to the TPZ Barrier shall only be made as approved by the Contract Administrator and may include:

- TPZ Barrier may be temporarily modified upon approval of the Contract Administrator to allow for necessary access where no other access route is available or where the work extends inside the TPZ.
- Where work must be performed inside the TPZ Barrier use best practices to minimize harm to existing trees and tree roots and shall be consistent with the American National Standards Institute (ANSI) A300 Standard for Management of Trees and Shrubs During Site Planning, Site Development, and Construction current edition and the companion publication "Best Management Practices – Managing Trees During Construction" current edition.
- If excavation is the only means of completing the work, the Contractor shall use best practice to minimize harm to existing trees and tree roots. If deemed necessary by the Contract Administrator, the Contractor shall engage an ISA Certified Arborist to be on site to minimize risk to the public, workers, and tree(s).

(xii) Herbicides and pesticides shall not be used adjacent to any surface watercourses.

(xiii) All landowners adjacent to the area of application of herbicides or pesticides shall be notified at least 2 days prior to the Work.

(xiv) Trees or shrubs shall not be felled into watercourses.

(xv) Areas where vegetation is removed during clearing, construction, and decommissioning activities, shall be revegetated as soon as possible in accordance with the landscaping plans forming part of the contract, or as directed by the Contract Administrator.

(g) Landscape Works

(i) All disturbed areas are to be restored as indicated on the construction drawings.

(h) Pond Protection

(i) The ice surface and pond shall be cleared of construction materials prior to ice break up. The Contractor shall cleanup and remove all items and materials that will have an adverse impact on the pond, including but not limited to: soil, excess rockfill, snow fence, construction debris, etc. Channel protection shall be considered incidental to the Work and no measurement or payment will be made for this item.

(a) Erosion and Sediment Control

(i) Implementation of erosion and sediment control measures shall be in compliance with contract documents and regulatory approvals in order to prevent the entry of sediment in waterbodies. Suitable temporary erosion control measures (e.g., silt fences, straw waddles) shall be installed where required to ensure disturbed areas are not subject to erosion prior to the establishment of vegetation. These measures are to be inspected regularly to ensure that they are functioning properly until vegetation is re-established, and necessary repairs or adjustments will be made if damage is discovered or if these measures are not effective in controlling erosion and sedimentation.

(ii) Prior to mobilization to the site, the Contractor shall submit a detailed Erosion and Sediment Control Plan outlining the types and locations of all temporary erosion and sediment control measures during construction. The Erosion and Sediment Control Plan shall include any proposed alternatives to the erosion control measures illustrated on the Construction Drawings. Any Alternatives shall be subject to the approval of the Contract Administrator.

(b) Heritage Resource Protection Plan

(i) A Heritage Resources Protection Plan will be developed prior to construction, and it will specifically deal with potential effects to heritage resources. It will outline measures to mitigate effects to cultural and heritage resource. If heritage resources, or objects thought to be heritage resources, are discovered during site preparation and construction the Historic Resources Branch (of the Manitoba Sport, Culture and Heritage Department) will be informed immediately. The Contractor will cease construction activities in the immediate vicinity of the heritage resources, protective barriers will be placed around heritage resource sites and heritage resources discovered will be left in their original position until an Archaeologist is contacted and prescribes instruction.

E13.4 No separate measurement or payment will be made for the E13 Environmental Protection Plan and shall be considered incidental to the Work.

E14. SURFACE RESTORATIONS

E14.1 Further to clause 3.3 of CW 1130, 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.

E15. SITE DEVELOPMENT AND RESTORATION

E15.1 Description

E15.1.1 This Specification shall cover all aspects of the Site Development and Restoration Work, including but not limited to mobilization and demobilization, erection, maintenance and removal of safety fencing, development, maintenance, and restoration of access ramp and rockfill column work bench, sacrificial berm, traffic management, traffic control and signage, sediment control Works, snow clearing, flow control, temporary cofferdams, sacrificial berms, de-watering outfall pipes, pedestrian safety and temporary pedestrian corridors, removal of protection and pruning as required of existing trees, maintenance of site fencing, removal of fallen trees and debris, office facilities, general access development (including rockfill column work bench excavation and original grade restoration using clay backfill, to be compacted to minimum 95% SPMDD), and Site Restoration. Existing fencing along the top of pond, adjacent to the sidewalk, may require removal and reinstallation and will be considered incidental to Site Development and Restoration and no separate payment will be made for the Work.

E15.1.2 The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E15.1.3 The Tender quantities listed on Form B: Prices include estimated quantities for all items required to revegetate the footprint of the works according to the Landscape Drawings (e.g., quantities for topsoil, seeding, sodding, natural grasses, plantings, etc.). All revegetation quantities required to restore areas adjacent to the footprint of the works as a function of the Contractor's chosen means and methods are beyond the quantities listed on Form B: Prices and revegetation of those additional areas will be considered incidental to Site Development and Restoration. Areas adjacent to the footprint of the works that are disturbed by the Contractor must be restored in a manner consistent with the Landscape Drawings for revegetating the footprint of the works. No additional payment will be made for additional revegetation of areas that are adjacent to the works and have been disturbed by the Contractor as a function of the Contractor's chosen means and methods.

E15.1.4 Access and subsequent construction works shall include the protection of all existing infrastructure and services at the Site throughout the period of construction.

E15.1.5 The inclusion of a payment item for the Work under this Specification shall not release or reduce the responsibilities of the Contractor under any other specification in this Contract.

E15.2 Materials

E15.2.1 Equipment

(a) All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

E15.3 Construction Methods

E15.3.1 Mobilization shall include, but not be limited to:

(a) All activities and associated costs for transportation of the Contractor's personnel, equipment, and operating supplies to the site, and/or sites, and/or between sites;

(b) Establishment of offices, buildings, other necessary general facilities and equipment parking/staging areas for the Contractor's operations at the site or sites;

(c) Premiums paid for performance and payment bonds including coinsurance and reinsurance agreements as applicable;

(d) General cleanup and housekeeping needed maintain a neat and orderly project site and/or sites;

(e) Other job-related items.

(f) Access to the site, equipment parking, and staging areas are limited to that shown on the drawings or as approved by the Contract Administrator.

E15.3.2 Demobilization shall include, but not be limited to:

(a) All activities and costs for transportation of personnel, equipment, and supplies not used in the project from the site, and/or sites, and/or between sites;

(b) Disassembly, removal, and site cleanup and restoration of offices, buildings, and other facilities assembled on the site and/or sites;

(c) Repair of access roads, temporary haul roads, and equipment parking areas leaving the project site in the same or better condition than at the start of the project;

(d) General cleanup and housekeeping needed to restore a neat and orderly project site.

(e) Access to the site, equipment parking

(f) Access to the site, equipment parking, and staging areas are limited to that shown on the drawings or as approved by the Contract Administrator.

E15.3.3 Site and Construction Access

(a) The Contractor shall be responsible to plan and develop suitable site access that is limited to the footprints illustrated on construction drawings for temporary access ramps, rockfill column work bench, rockfill trenches, interceptor drain, passive rockfill drains, geomembrane lined swales, outfall swales, and the clay toe berm working area. The development of site access includes but is not limited to, tree removal, temporary bridging over structures, temporary removal and reinstallation of fencing. Prior to commencing construction, the Contractor shall submit their site access plan to the Contract Administrator for approval.

(b) Any alternative access points to those illustrated on the Construction Drawings will be subject to the approval of the Contract Administrator and must be proposed by the Contractor in their site access plan.

(c) All construction access ramps shall be excavated from the upper bank area and working down to the working bench for the columns and clay toe berm along pond shoreline. The ramps shall be constructed by excavating to the necessary ramp grade. Detailed construction access ramp drawings are to be submitted to the Contract

Administrator for approval a minimum seven (7) days prior to any construction activity on Site.

(d) The Contractor shall be responsible to not damage any pipes that the access ramp and rockfill working bench cross. Caution must be exercised around any sinkholes and other anomalies and the Contractor must soft dig to confirm the locations of the pipes. The Contractor must only traverse the pipes at designated crossings.

(e) It is the responsibility of the Contractor to confirm the abandonment of the 500 mm pipe and any action required in the development of the site access ramp and rockfill working bench. Contractor is responsible for removing the 500 mm pipe if site access ramp is impeded.

E15.3.4 Safety Fence

(a) The Contractor shall erect and maintain for the duration of the project, safety fencing to restrict access to any open and unsupervised excavation and open-water hazard.

(b) Appropriate signs shall be erected to warn all recreational users of the pond that an open water hazard may exist. Sufficient signage will be present to effectively provide warning from any potential angle of approach to an open water hazard.

(c) Fence construction shall consist of Dupont Number L70 orange plastic safety fence or approved equal with a mesh spacing of 45 mm and a minimum height of 1.2 metres supported by steel posts driven into the ground. The steel posts shall be sized and capable of maintaining the snow fence material upright, regardless of conditions. Steel posts only in the ground, but wood posts required on ice. Upon completion of the work, all fence materials shall be removed and disposed off-site.

E15.4 General Requirements

E15.4.1 Existing Site Fencing

(a) Existing fencing along the top of pond, adjacent to the sidewalk, may require removal and reinstallation and will be considered incidental to Site Development and Restoration and no separate measurement or payment will be made for the Work.

E15.4.2 Snow and Ice Removal

(a) Snow cover shall be cleared from the pond slope prior to the placement of the clay toe berm and from along excavation and drilling areas. The methodology to clear the snow shall be subject to the approval of the Contract Administrator. The Contractor will also be responsible for all snow clearing on the upper bank area for equipment access.

(b) Ice at the shoreline of the pond shall be broken and cleared before the placement of the clay toe berm below ice level. Care shall be taken to ensure that the ice is removed, and does not become trapped below rock fill riprap placement.

(c) If the Contractor obstructs snow clearing activities for open roadways and pathways, then the Contractor must provide the necessary snow clearing.

E15.4.3 De-Watering Outfall Pipe

(a) The Contractor must comply with all measures to avoid causing harm to fish and fish habitat as outlined in regulatory provisions including the requirements stated in any DFO guidelines, regulations or permits. Contractor shall submit a De-Watering Outfall Pipe plan to the Contract Administrator, including the type of pumping equipment to be used, prior to commencement of de-watering works.

(b) Contractor shall provide 24-hour monitoring of all de-watering pumping works.

(c) Contractor shall monitor the turbidity of the water. Upon turbid water and/or when the pump begins to take in sediment, the contractor shall stop pumping operations. All sediment shall then be pumped into a holding tank or tank truck and disposed of off site.

(d) Contractor shall make every reasonable effort to control sediment and dissipate water velocity in accordance with DFO guidelines.

(e) The Contractor shall ensure the pumping system is sized properly and adjustments may be required to suit local conditions. The contractor shall be required to supply and operate at least (1) 100mm diameter flood pump. Primary pumps shall be critically silenced when used in residential settings where excessive noise levels would create a disturbance. A back-up pump should be readily available on-site in case of pump failure. Pumping operations shall follow in accordance with DFO guidelines, regulations, and permits.

(f) De-watering outfall pipes will be considered incidental to Site Development and Restoration specified herein. No separate measurement or payment is to be made.

E15.4.4 Diversions of Flows

(a) Flows such as snowmelt, rainfall, a water main break, or any other flow travelling through the outfalls or storm drains shall be diverted during construction. The cost of the flow diversion is considered incidental to Site Development and Restoration.

E15.4.5 Temporary Pedestrian Corridors

(a) The Contractor shall provide and maintain passage of pedestrians throughout the project area consistent with the requirements of E12 Pedestrian Safety.

E15.4.6 Environmental Regulations

(a) The Contractor shall adhere to all relevant Federal and Provincial environmental regulations.

(b) The Contractor shall plan to Work in accordance with the current environmental regulations of “Manitoba Stream Crossing Guidelines for Protection of Fish and Fish Habitat”, Fisheries and Oceans, and Manitoba Natural Resources.

(c) The Contractor shall supply, in writing, prior to commencement of Work on-site, a detailed plan for sediment control on this project.

(d) The Contractor shall ensure that sufficient supplies of suitable spill kits are on-site to cleanup minor spills, should they occur. The Contractor shall supply the name, address and phone number of a local supplier, where additional kits are available on short notice.

E15.4.7 Removal of Debris Deposited in Pond

(a) Elevated water levels may result in debris being deposited on the pond slope. Debris that does not conflict with the Contractors operations may be left in place. Debris that conflicts with the Contractor’s operations shall either be either relocated on site, or removed from site and disposed. Relocation of deposited debris shall be subject to approval by the Contract Administrator.

E15.4.8 General Site Clean Up and Restoration

(a) The Site shall be restored to a condition at least equivalent to its original condition prior to initiation of the work as approved by the Contract Administrator. This may include, but is not necessarily limited to, landscape and grading repairs of any areas disturbed by the Contractor both within and outside of the approved work area. Site Restoration shall also include the removal of the Contract Administrator’s trailer.

E15.4.9 Revegetation of Temporary Work Areas

(a) Further to E15.1.3, laydown areas or similar temporary work areas shall be revegetated in a manner that is equal to or better than the original conditions prior to construction, as determined by the Contract Administrator. Revegetation of temporary work areas shall be considered incidental to Site Development and Restoration. No separate payment shall be made to revegetate these temporary work areas.

E15.5 Method of Measurement

Site Development and Restoration will be paid for on a lump sum basis. The Work to be paid for shall be the total Work constructed in accordance with this Specification and accepted by the Contract Administrator. No measurement will be made for this Work.

E15.5.1 Basis of Payment

(a) Site Development and Restoration will be paid for at the Contract Lump Sum Price for "Site Development and Restoration", which 20% of the Site Development and Restoration unit price will be paid on the first progress payment following commencement of the Work and to the satisfaction of the Contract Administrator.

(b) Site Development and Restoration will be paid for at the Contract Lump Sum Price for "Site Development and Restoration", which 20% of the Site Development and Restoration unit price will be paid subsequent to the completion of the Work and restoration and clean-up of the Site including supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification to the satisfaction of the Contract Administrator.

(c) The remaining 60% of the Site Development and Restoration unit price will be paid for interim progress payments, prorated to the value of work completed and approved by the Contract Administrator.

E16. TREE REMOVAL

E16.1 Description

E16.1.1 This specification shall cover the removal of existing trees, stumps, roots, logs, brush, rubbish, and all other surface litter within the full limits of the works that may be required, and disposal of the same in a manner hereinafter specified.

E16.1.2 The Work to be done by the Contractor under this specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E16.2 Materials

E16.2.1 Existing Trees to be Removed.

E16.2.2 The existing trees to be removed may include, but not limited to ash, elm, cottonwood, basswood, oak, pine, maple, spruce, etc., all of which may be cut with standard chain saw equipment.

(a) all elm debris, including branches and logs, shall be chipped on site or transported directly to Brady Road Resource Management Facility for disposal in accordance with The Forest Health Protection Act and Regulations.

(b) The City of Winnipeg is an Emerald Ash Borer Regulated Area under the authority of the Canadian Food Inspection Agency. The movement of any ash materials, including logs, branches, woodchips, ash nursery stock/trees, and all species of wood out of Winnipeg is prohibited. Ash debris, including branches and logs, shall be chipped on site or transported directly to Brady Road Resource Management Facility for disposal.

E16.3 Construction Methods

E16.3.1 Prior to commencement of the Work the Contract Administrator shall identify on site all trees for removal as identified in the contract documents or as required in order to facilitate construction, for the review and approval by the Contract Administrator.

E16.3.2 The Contractor shall remove only trees designated to be removed, and grub out all stumps and roots greater than 100 mm diameter. Trees are to be felled so as to land within the limits of the Works. The Contractor shall load and haul all trees, stumps, roots, logs, brush, rubbish and all other surface litter from the Site and dispose of these materials at an approved disposal Site, acceptable to the Contract Administrator.

E16.3.3 The Contractor shall take all precautions to prevent damage to structures, adjacent property and to trees and shrubs. In the event of damage, the Contractor will be held

liable, and shall be required to provide appropriate restoration at his cost, to the satisfaction of the Contract Administrator.

E16.3.4 Any trees damaged during construction activities shall be examined by a bonded tree care professional and pruned as required. Damaged trees which are not viable shall be replaced by the Contractor at the Contractor's own cost.

E16.4 Measurement and Payment

E16.4.1 The removal of existing trees shrubs and brush within the excavation footprint of the Works shall be considered incidental to Site Development and Restoration and no separate measurement or payment will be made.

E17. PROTECTION OF EXISTING TREES

E17.1 Further to E13 Environmental Protection Plan, 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) All trees shall have a 3 m radius protective zone calculated from the circumference at the base of the trunk which will remain free of digging, trenching, grade changes, stock piling of materials and soil compaction, unless otherwise agreed to by the City and Contract Administrator throughout the duration of the Contract. Protective fencing around these areas is required.

(b) Trees within and immediately adjacent to proposed construction and those identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400mm wood planks, or suitably protected as approved by the Contract Administrator. Do not use nails or other fasteners that penetrate the tree trunk. The width and length of strapping may be reduced to suit the tree being 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) where 1 inch diameter equals 1 foot measured from the outside edge of the trunk of the tree at 6 inches above grade. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation. They must be properly trimmed with sharp tools to prevent crushing or being pulled by construction equipment. No paint is required. All exposed roots must be mulched until the excavated area is filled with clean earth to avoid exposure to sunlight and desiccation.

(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.

E17.2 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/her designate.

E17.3 No separate measurement or payment will be made for the protection of trees.

E17.4 Elm trees shall not be pruned at any time between April 1 and July 31.

E18. SILT FENCE

E18.1 Description

(a) This specification covers the erection of temporary silt fencing, which shall be installed and maintained at the locations shown on the drawings or as directed by the Contract Administrator, to control runoff and minimize the release of detrimental silt loading to watercourses.

(b) The scope of Work included in this specification is as follows:

(i) Supply and install temporary silt fencing at the locations as indicated on the Drawings or as directed by the Contract Administrator, immediately upon completion of the riprap placement and prior to undertaking any other activities on the Site where silt fencing is required.

(ii) 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.

(iii) 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.

E18.2 Materials

(a) Fence Posts

(i) Fence posts shall be 100 mm diameter untreated wood posts or 50 mm diameter steel.

(b) Filter Fabric

(i) Filter Fabric Shall be a woven geotextile material specifically designed for a silt fence application, 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 4786	2060 kPa
Puncture	ASTM D 4833	0.285 kN
Trapezoid Tear	ASTM D 4533	0.285 kN
UV Resistance	ASTM D 435	5 80 % @ 500 hrs
Apparent Opening Size (AOS)	ASTM D 4751	0.60 mm
Flow Rate	ASTM D 4491	405 l/min/m2

Acceptable Product: “Amoco 2130 Silt Fence Fabric” or approved equal in accordance with B7.

(c) Wire Mesh

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

(d) Fencing Material Fasteners

(i) Staples or wire ties of sufficient strength and spacing to withstand 500 N (100 lbf) pull test at any point on the wire mesh.

E18.3 Construction Methods

(a) Ensure that no deleterious substances are discharged into the adjacent watercourse at any time during construction activities.

(b) Silt Fence Installation

(i) Excavate 150 x 150 anchor trench along alignment of silt fence as indicated.

(ii) 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. 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.

(iii) Install and compact impermeable excavated materials into anchor trench and slope as indicated. Compact to 95% of maximum dry density (ASTM D-698).

(c) Silt Fence Maintenance

(i) Inspect silt fence daily, prior to starting any other construction activities. If fence posts are found loose or not upright, repair in accordance with the installation procedure. If silt fence is found to be loose or torn, repair or replace as necessary to comply with the installation procedure.

(ii) If silt deposition at the fence is 300 mm or more in depth, carefully remove and dispose of silt offsite without disturbing silt fence.

(d) Silt Fence Removal

(i) The silt fence shall remain in place until new vegetation growth has established on the bank, as determined by the Contract Administrator.

(ii) Upon authorization of the Contract Administrator, remove all fence posts, wire mesh, fabric, and fasteners from Site.

(iii) Restore areas disturbed in accordance with E15 without releasing any deleterious substances to the adjacent watercourse.

E18.4 Measurement and Payment

(a) The supply, placement, and removal of silt fence shall be measured on a length basis and paid for at the Contract Unit Price per lineal metre for "Silt Fence". The length to be paid for shall be the total number of metres supplied and placed in accordance with this Specification, accepted and measured by the Contract Administrator. Payment of silt fence shall be in accordance with the following payment schedule:

(i) Sixty percent (60%) of the Contract Unit Price per lineal metre for "Silt Fence" shall be paid following supply and installation.

(ii) Forty percent (40%) of the Contract Unit Price per lineal metre for "Silt Fence" shall be paid following final removal.

E18.5 Scheduled maintenance and removal of accumulated sediment from the silt fence is considered incidental to the Work and no separate measurement or payment will be made.

E19. STRAW WATTLES

E19.1 Description

E19.1.1 This Specification covers the erection of temporary straw wattles, which shall be installed and maintained at the locations shown on the Drawings to control runoff and minimize the release of detrimental silt loading to the watercourse.

E19.1.2 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.

E19.2 Materials

E19.2.1 The Contractor shall be responsible for the supply, safe storage and handling of all materials as shown on the Drawings.

E19.2.2 Straw Wattles shall be 300 mm (12") biodegradable Straw Wattles.

E19.3 Equipment

E19.3.1 All equipment, implements, tools and facilities used shall be of a size and type as required to complete the Work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

E19.4 Construction Methods

E19.4.1 Installation

(a) Install the straw wattles at the locations illustrated on the Construction Drawings or as directed by the Contract Administrator.

(b) Straw wattles are to be installed in accordance with the details on the Construction Drawings and manufacturer's installation instructions.

E19.4.2 Maintenance

(a) The Contractor shall ensure that the integrity of the straw wattle is maintained until natural vegetation is re-established at the site. Any section of straw wattle that is found to be damaged or otherwise no longer be providing effective erosion and sediment control, as determined by the Contract Administrator, shall immediately be restored to the satisfaction of the Contract Administrator at no additional cost to the City.

(b) If sediment deposition at the base of the log is 150 mm or more in depth, the Contractor shall carefully remove and dispose of the sediment build up off-site without disturbing the straw wattle system.

E19.4.3 Removal

(a) The straw wattle erosion control shall remain in place until new vegetation growth has established on the pond slope, as determined by the Contract Administrator.

(b) Upon authorization of the Contract Administrator, the Contractor shall remove all straw wattles, posts and netting from the site.

(c) The Contractor shall take care not to release sediment or deleterious substances into the adjacent watercourse as part of straw wattle removal, as determined by the Contract Administrator.

E19.5 Measurement and Payment

E19.5.1 The supply, placement, and removal of straw wattles shall be measured on a length basis and paid for at the Contract Unit Price per lineal metre for "Straw Wattle". The length to be paid for shall be the total number of metres supplied and placed in accordance with this Specification, accepted and measured by the Contract Administrator. Payment of Straw Wattle shall be in accordance with the following payment schedule:

(a) Sixty percent (60%) of the Contract Unit Price per lineal metre for "Straw Wattle" shall be paid following supply and installation.

(b) Forty percent (40%) of the Contract Unit Price per lineal metre for "Straw Wattle" shall be paid following final removal.

E19.6 Removal of accumulated sediment from the straw wattle is considered incidental to the Work and no separate measurement or payment will be made for removal of accumulated sediment.

GEOTECHNICAL

E20. ROCKFILL COLUMN

E20.1 Description

(a) This Specification shall cover the installation of the rockfill columns, including shaft drilling, sleeving, cuttings removal, supply, placement and compaction of rockfill and clay cap backfill, and provisions for handling groundwater infiltration.

(b) The Work to be done by the Contractor under this specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified. The Contractor shall ensure that his operations can be completed in accordance with the Drawings and based on the Contractor's equipment, staging, and sequencing plans, as approved by the Contract Administrator.

E20.2 Materials

(a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

(b) Rockfill Backfill

(i) The rockfill material for use as backfill shall consist of a clean, free draining, sound, dense, durable, crushed rock. The material shall be free from organics, roots, silts, sand, clay, snow, ice or any other material that would detract from the strength and drainage characteristics of clean rockfill.

(ii) Individual particles shall be shaped such that no dimension is greater than two times the smallest dimension. Flat, elongated, or platy particle shapes will not be accepted.

(iii) Should the Contractor choose to use limestone, it shall be durable white crystalline limestone that has proven freeze-thaw durability based on the material requirements given below. Softer buff to yellow dolomite or dolostone will not be accepted.

(iv) Where rockfill has become contaminated with silt, clay, snow, ice or other deleterious material due to the Contractor's method of operation, negligence, failure to backfill in a timely manner, etc. the material shall be classified as rejected backfill and shall be weighed prior to disposal for deduction from the total weight of rockfill measured for payment. The Contractor shall be responsible for the removal of all contaminated rockfill.

(v) The rockfill material shall meet the following requirements:

Parameter	Test Method	Specified Limit
Bulk Specific Gravity	ASTM C127	2.6 minimum
Absorption	ASTM C127	2.5% maximum
LA Abrasion Loss	ASTM C535	32% maximum
Soundness	ASTM C88	13% maximum
Gradation	ASTM D5519	See below

(vi) The rockfill shall be well-graded, having a full range and even distribution of sizes and shall conform to the following gradation:

Canadian Metric Sieve Size [millimetres]	Percent of Total Dry Weight Passing Each Sieve
150	100%
75	40 – 70%
25	0 – 5%

(c) Clay Cap

(i) The impervious clay cap at the top of the rockfill columns shall consist of a high plasticity clay material, with a liquid limit in excess of 50%. The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials, and may be salvaged from the on-site excavation, as approved by the Contract Administrator. Frozen material will not be accepted.

E20.3 Equipment

(a) All equipment, implements, tools and facilities used shall be of a size and type as required to complete the Work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

(b) The Contractor shall use vibratory equipment that can be directly inserted into the rockfill column to densify the rockfill backfill throughout the entire depth of the rockfill column.

E20.4 Submittals

(a) The Contractor shall submit the following to the Contract Administrator, in accordance with this Specification:

(i) The Contractor shall submit their proposed construction methodology for rockfill columns, including equipment capabilities and sequencing requirements to the Contract Administrator a minimum of seven (7) days prior to the start of construction. The Contractor shall demonstrate that the rockfill columns can be constructed successfully based on the proposed methodology. The Contractor will not begin installation of the rockfill columns other than those utilized for rockfill column compaction tests until the Contract Administrator has reviewed the construction methodology, equipment capabilities and sequencing requirements and has provided written approval to proceed.

(ii) The Contractor shall submit the names of the proposed supplier(s) and location of quarry sites for supply of rockfill backfill to be utilized on the project a minimum of seven (7) days prior to the production. The Contractor shall be responsible for demonstrating that the material is of adequate quality and volume to meet the material specifications and project requirements.

E20.5 Testing and Approval

(a) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator. There shall be no charge for any materials taken by the Contract Administrator for testing purposes.

(b) The Contract Administrator will visit proposed quarry Sites for inspection of the proposed rockfill material and quarry faces a minimum of seven (7) days prior to supply and placement of rockfill riprap.

(c) No supply and placement of the column rockfill will be permitted prior to the Contract Administrator reviewing the source.

(d) The procedures for preparation of all rockfill samples for use in material inspection and testing shall be subject to review and acceptance by the Contract Administrator for individual tests. The samples may be obtained from crushed and processed material at the sizing necessary for specific tests if the material is deemed to be representative of the rockfill backfill that will be used, subject to the acceptance of the Contract Administrator.

(e) The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.

E20.6 Construction Methods

(a) Construction Sequencing

(i) The Contractor shall complete the backfilling of each rockfill column prior to commencing the excavation of the adjacent rockfill column.

(b) Excavation

(i) The excavation shall be supervised at all times, and open shafts shall be adequately guarded or covered for safety.

(ii) The rockfill column shafts shall be excavated by drill rig augers to a minimum of 0.6 metres into the dense, competent till layer and as approved by the Contract Administrator.

(iii) The Contractor shall not commence drilling until the rockfill to backfill the shaft is onsite. The construction of the rockfill columns shall be a continuous operation with backfilling immediately following excavation.

(iv) The excavations shall be permitted to be left open overnight for any length of time as placement of rockfill shall follow excavation immediately.

(v) Any deleterious or sloughed material shall be removed from the rockfill column shaft prior to backfilling.

(vi) The Contractor shall be responsible to contain and direct any displaced surface water or groundwater such that it will not affect other construction work, cause sediment to enter any water course, or cause excessive erosion of the native pond slope soils. The control of surface water and groundwater shall be the responsibility of the Contractor and shall be considered incidental to the Work.

(vii) Excavated material shall be assessed for the use of the clay toe berm. Material deemed acceptable for the clay toe berm by the Contract Administrator shall be placed near the bottom of the pond slope in the footprint of the Work for immediate use, or where advised by the Contract Administrator. Excess excavated material shall be disposed of offsite immediately after excavation. Stockpiling of excavated material on the pond slope area will not be permitted.

(viii) It shall be the responsibility of the Contractor to dispose of all material designated as unsuitable backfill by the Consultant off site, in a location determined by the Contractor. The unsuitable backfill shall become the property of the Contractor.

(ix) It shall be the responsibility of the Contractor to stockpile the material designated by the Contract Administrator as suitable clay toe berm material in an offsite location designated by the Contractor. Suitable clay toe berm material shall not be stockpiled on site.

(x) No additional payment will be made for disposing of the unsuitable material and stockpiling the excess material off site as this will be considered incidental to the unit price for "Rockfill Column Shaft Drilling."

(c) Backfilling and Compaction

(i) The Contractor shall monitor the supply rate of the rockfill material to ensure that backfilling operations are not delayed.

(ii) Stockpiling of rockfill material on the pond slope is not permitted except at locations where rockfill columns are installed and subject to the approval of the Contract Administrator.

(iii) Excavated rockfill columns shafts shall be backfilled immediately following excavation. No hole shall remain without backfill overnight, or for a period beyond two (2) hours.

(iv) Compacting of rockfill shall be by vibro-compaction through the full depth of the rockfill and capable of a minimum 10% increase in relative rockfill density. Compacting with a vibrating plate compactor, drop hammer, backhoe bucket, or other similar approaches shall not be accepted. Compacting with a vibratory lance mounted on a crane or excavator shall be accepted. Vibro-compaction shall be completed over the entire length of the rockfill columns as shown on the Drawings. Rockfill compaction will be considered incidental to the Supply and Placement of Rockfill Column Rockfill, and no separate payment for compaction will be made.

(d) Rockfill Column Sleeving

(i) If sloughing or squeezing of the excavated shaft requires sleeving, then shafts shall be sleeved immediately (subject to approval of the Contract Administrator) after excavation to advance and maintain an open hole during the excavating, backfilling and compacting procedures. The Contractor shall only be paid for sleeving approved by the Contract Administrator. If the Contractor uses sleeves that do not extend from ground surface to the bottom of the hole, a pro-rated payment for the sleeve will be made based upon the actual length of the sleeve used.

(ii) The sleeves shall be a length suitable to extend from ground surface down to a minimum of 0.6 metres into the underlying competent till material, as approved by the Contract Administrator.

(e) Clay Cap

(i) The impervious clay cap shall be placed in lifts not exceeding 200 millimetres, and compacted to a minimum of 95% of the Standard Proctor Maximum Dry Density (SPMDD).

(ii) Care shall be taken to ensure that an effective seal results between the wall of the shaft excavation and the clay material placed to protect against water infiltration into the shaft, as approved by the Contract Administrator.

(iii) The impervious clay cap at the top of the rockfill columns shall consist of a high plasticity clay material, with a liquid limit in excess of 50%.

(iv) The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials, and may be salvaged from the on-site excavation, as approved by the Contract Administrator. Frozen material will not be accepted.

E20.7 Measurement and Payment

(a) Rockfill Column Shaft Drilling

(i) The drilling of shafts for the rockfill columns will be measured on a length basis. The length to be paid for shall be the total number of vertical metres of shaft drilled in the native soil, measured from the ground surface at the base of the respective work platform at the time of the rockfill column installation carried out in accordance with this specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator. No additional payment will be made for hauling of excavated material from the site, as this is considered incidental to the Work.

(ii) Drilling of the rockfill column shafts will be paid for at the Contract Unit Price for "Rockfill Column Drilling", measured as specified herein, 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.

(b) Sleeving

(i) Sleeving of the rockfill columns will be measured on a unit basis. The Contractor shall be paid for the total number of sleeves used in accordance with this specification, as measured by the Contract Administrator. Only the sleeved holes that are approved by the Contract Administrator will be paid for. Where the sleeving does not extend to the bottom of the rockfill columns, the sleeving will be measured on a pro-rated basis as the proportion of the column depth.

(ii) Sleeving of the rockfill column shafts will be paid for at the Contract Unit Price for "Rockfill Column Sleeving", measured as specified herein, 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.

(c) Rockfill Backfill

(i) The supply, placement and compaction of the Rockfill Backfill will be measured on a weight basis. The weight to be paid for shall be the total number of metric tonnes of Rockfill Backfill material, supplied and placed in accordance with this specification, acceptable to the Contract Administrator, as measured on a certified weigh scale. The Contractor shall provide the weight tickets to the Contract Administrator for the material supplied to the Site at the time of delivery. No payment will be made for any weigh tickets that are not supplied at the time of delivery.

(ii) The supply, placement and compaction of the Rockfill Backfill in the Rockfill Columns will be paid for at the Contract Unit Price for "Rockfill Column Rockfill", measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described, and all other items incidental to the Work included in this Specification.

(d) Clay Cap

(i) The placement and compaction of the clay cap material shall be measured on a volume basis. The volume to be paid shall be the total number of cubic meters placed in accordance with this Specification and computed from measured area, multiplied by the fixed depth.

(ii) The placement and compaction of the Clay Cap will be paid for at the Contract Unit Price for "Rockfill Column Clay Cap", measured as specified herein, which price shall

be payment in full for performing all operations and providing all other items incidental to the Work included in this Specification.

E21. ROCKFILL TRENCH

E21.1 Description

(a) This Specification shall cover the installation of the rockfill trench, including the excavation and disposal of waste material, the supply, placement and compaction of rockfill, the supply, placement and compaction of clay cap, and provisions for handling groundwater infiltration.

(b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E21.2 Materials

(a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

(b) Excavated Material

(i) Excavated material is anticipated to consist of in-situ overburden soils and may include, but not necessarily be limited to: organic topsoil, clay, silt, sand, gravel, fill, etc., all of which may be excavated with standard hydraulic excavation equipment.

(c) Rockfill

(i) The rockfill material used to backfill the rockfill trench shall consist of a clean free draining, sound, dense, durable, crushed rock. The material shall be free from organics, roots, silts, sand, clay, snow, ice or any other material that would detract from the strength and drainage characteristics of clean rockfill.

(ii) Individual particles shall be shaped such that no dimension is greater than two times the smallest dimension. Flat, elongated, or platy particle shapes will not be accepted.

(iii) Should the Contractor choose to use limestone, it shall be durable white crystalline limestone. Softer buff to yellow dolomite or dolostone will not be accepted.

(iv) The rockfill material shall meet the following requirements:

Parameter	Test Method	Specified Limit
Bulk Specific Gravity	ASTM C127	2.6 minimum
Absorption	ASTM C127	2.5 % maximum
LA Abrasion Loss	ASTM C131	32% maximum
Soundness	ASTM C88	13% maximum
Gradation	ASTM D5519	See below

(v) The rockfill shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation:

Canadian Metric Sieve Size (millimeters)	Percent of Total Dry Weight Passing Each Sieve
150	100%
75	40-70%
25	0-5%

(d) Clay Cap

(i) The impervious clay cap at the top of the rockfill shear key shall consist of a high plasticity clay material, with a liquid limit in excess of 50%.

(ii) The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials, and may be salvaged from the on-site excavation, as approved by the Contract Administrator. Frozen material will not be accepted.

(e) Re-use of temporary surfacing material

(i) The Contractor may use rockfill material for temporary surfacing of access ramps or working platforms.

(ii) Salvage of this material will be permitted for use as Rockfill, subject to the salvaged material meeting the requirements of this specification at the time of installation into the rockfill trench excavation.

(ii) Any salvaged temporary surfacing material that is not used as rockfill will not be measured or paid, and shall be incidental to E15. The Contract Administrator may reduce the quantity of salvaged rockfill to account for material waste during the salvaging process.

E21.3 Equipment

(a) All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

(b) The Contractor shall use vibratory equipment that can densify the rockfill backfill throughout the entire depth of the rockfill trench.

E21.4 Submittals

(a) The Contractor shall submit the proposed supplier(s) and location of quarry Sites for supply of the trench rockfill.

E21.5 Quarry Sites

(a) Contractors supplying trench rockfill shall be responsible for demonstrating that the material is of adequate quality and volume to meet the material specifications contained herein.

(b) Rock samples shall be submitted to the Contract Administrator for approval a minimum of five (5) days prior to their use. No rockfill will be permitted without providing the source and supplier. Inspection of the source will be performed by the Contract Administrator prior to written acceptance.

E21.6 Testing and Approval

(a) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator. There shall be no charge for any materials taken by the Contract Administrator for testing purposes.

(b) The Contract Administrator will visit proposed quarry Sites for inspection of the proposed rockfill material and quarry faces a minimum of fourteen (14) days prior to supply and placement of trench rockfill.

(c) No supply and placement of trench rockfill will be permitted prior to the Contract Administrator reviewing the source.

(d) The procedures for preparation of all rockfill samples for use in material inspection and testing shall be subject to review and acceptance by the Contract Administrator for individual tests. The samples may be obtained from crushed and processed material at the sizing necessary for specific tests if the material is deemed to be representative of the rockfill backfill that will be used, subject to the acceptance of the Contract Administrator.

(e) The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.

E21.7 Construction Methods

(a) The excavation shall be supervised at all times, and open excavations shall be adequately guarded or covered for safety, and shall be the sole responsibility of the Contractor.

(b) The rockfill trench shall then be excavated and backfilled to achieve the depth as illustrated on the Drawings.

(c) Excavation shall not commence until sufficient rockfill is on site to backfill the excavation.

(d) Any deleterious or sloughed material shall be removed from the excavation prior to backfilling.

(e) Discharge of water contained within the excavation from displacement of the rockfill during backfill will be acceptable. The Contractor shall be responsible to contain and direct any displaced water such that it will not affect other construction work or cause excessive erosion of the existing pond slope soils. The control of the water shall be considered incidental to the work.

(f) The construction of the rockfill trench shall be a continuous operation with backfilling immediately following excavation.

(g) The Contractor shall not excavate more than 2 metres ahead of the backfill placement as measured at the bottom of the excavation.

(h) Excavated material shall be assessed for the use of the clay toe berm. Material deemed acceptable for the clay toe berm by the Contract Administrator shall be placed near the bottom of the pond slope in the footprint of the Work for immediate use, or where advised by the Contract Administrator. Excess excavated material shall be disposed of offsite immediately after excavation. Stockpiling of excavated material on the pond slope area will not be permitted.

(i) The Contractor shall take all precautions necessary to maintain the excavation geometry to the neat lines shown on the Drawings. If necessary, the excavation shall be completed in stages to prevent sloughing of the side slopes and trench sidewalls. Such precautions will be considered incidental to the excavation and will not be paid for separately.

(j) Compacting of rockfill shall be by way of a plate compactor or equivalent capable of increasing the rockfill density a minimum of 10% versus the uncompacted material. Compaction shall be completed over the entire length of the trench as shown on the Drawings. Rockfill compaction will be considered incidental to the Supply and Placement of Trench Rockfill and no separate measurement or payment for compaction will be made.

(k) The Contractor shall monitor the supply rate of the rockfill material to ensure that the backfilling operations are not delayed.

(l) Stockpiling of rockfill material will not be permitted on the pond slope except at locations where existing trench rockfill is in place, subject to the approval of the Contract Administrator.

(m) Where crushed limestone has become contaminated with silt, clay, snow, ice or other deleterious material due to the Contractor's method of operation, negligence, failure to backfill in a timely manner, etc. the material shall be classified as rejected backfill and shall be weighed prior to disposal for deduction from the total weight of crushed limestone measured for payment.

(n) After placement of the rockfill to the dimensions shown on the Drawings, the impervious clay cap shall be placed in layers not exceeding 150 millimetres, and compacted to a minimum of 95% of the Standard Proctor Maximum Dry Density. The clay cap shall be located within undisturbed soil surrounding the excavation. Care shall be taken to ensure that an effective seal results between the wall of the excavation and the clay material placed, to protect against water infiltration into the excavation, as approved by the Contract Administrator.

E21.8 Measurement and Payment

(a) Trench Excavation

(i) The excavation for the rockfill trench will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Rockfill Trench Excavation". The volume to be paid for shall be the total number of cubic metres of excavation completed, measured from the original ground surface prior to rockfill shear key construction as carried out in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator.

(b) Rockfill

(i) The supply, placement and compaction of the Rockfill will be measured on a weight basis and paid for at the Contract Unit Price per metric tonne for "Rockfill Trench Rockfill". The weight to be paid for shall be the total number of metric tonnes of Rockfill supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as measured on a certified weigh scale. The Contractor shall provide the weigh tickets to the Contract Administrator for the material supplied to the Site at the time of delivery. No payment will be made for any weigh tickets that are not supplied at the time of delivery.

(c) Clay Cap

(i) The Clay Cap will be measured on a volume basis using before and after placement neat-line geometries and paid for at the Contract Unit Price per cubic metre for "Rockfill Trench Clay Cap". The volume to be paid for shall be the total number of cubic metres of clay cap placed in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

E22. CLAY TOE BERM

E22.1 Description

(a) This Specification shall cover the installation of the clay toe berm, including the placement of a sacrificial berm, subgrade preparation, and placement of the clay toe berm material.

(b) The Work to be done by the Contractor under this specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

(c) Outfall flow must be maintained and must not be impeded. The purpose of the sacrificial berm is to allow the Contractor to work in the dry (without impeding the outfall flow). Should temporary pumping be required, As outlined in E15.4.3 Dewatering Outfall Pipe, Contractor will be required to submit a De-Watering Outfall Pipe plan incidental to Site Development and Restoration.

E22.2 Materials

(a) The sacrificial clay berm material shall be a high plasticity clay (CH) material accepted by the Contract Administrator before its use. The clay material shall be compacted using bucket packing methods in order to ensure that water cannot seep through the sacrificial berm during the project's construction period to allow the clay toe berm to be constructed in the dry.

(b) Clay toeberm material shall be a high plasticity clay (CH) material with a liquid limit of at least 50% and a plasticity index above 30%. All clay toe berm material shall be compacted using a sheepsfoot compactor to 95% of its SPMDD.

(c) Clay toe berm material shall be placed in lifts no greater than 200 mm between compactions. No lift shall be covered until at least 90% of density tests for that entire lift have passed the specified compaction noted above.

E22.3 Equipment

(a) All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

(b) The Contractor shall use bucket compaction or other equivalent methods accepted by the Contract Administrator to densify the sacrificial berm.

(c) The Contractor shall use a padfoot compactor to densify the clay clay berm material to its specified compaction as noted above.

E22.4 Testing and Approval

(a) Clay toe berm material shall be tested by an approved tester using a nuclear densometer gauge. Clay material shall be tested every 25 linear meters for each lift of material placement.

(b) A CCIL certified material testing laboratory shall complete Atterberg and Standard Proctor tests on the clay material, and have the results approved by the Contract Administrator prior to commencing the construction of the clay toe berm.

E22.5 Construction Methods

(a) Sacrificial Berm

(i) A sacrificial clay berm shall be placed and compacted to create a separation between the Pond and the clay toe berm working area.

(ii) Water in the clay toe berm working area will then be pumped from the working side of the sacrificial berm into the Pond to allow construction of the clay toe berm to be completed in the dry.

(b) Subgrade preparation

(i) The Contractor shall scrape 150 mm beneath the clay toe berm to create a dry and clean clay surface before the commencement of the clay toe berm.

(ii) The subgrade clay material shall be proof rolled by the Contractor using a padfoot compactor and approved by the Contract Administrator before placing any clay toe berm material.

(c) Clay Toe Berm

(i) The Contractor shall place the clay toe berm material in lifts no greater than that specified in sections above.

(ii) Nuclear densometer tests shall be completed and approved by the Contract Administrator prior to placing subsequent clay lifts.

(d) Removal of Sacrificial Berm

(i) Once the clay toe berm has been built up to an elevation above that of the normal operating water levels of the Pond, the Contractor shall remove the sacrificial clay berm.

(ii) If the sacrificial berm material is accepted by the Contract Administrator to be used for the clay toe berm, the Contractor shall use this material to complete the construction of the clay toe berm up to its designed elevation.

(iii) Following completion of the work in the dry, the Contractor is to restore the pond bottom to its original condition by removing the sacrificial berm in its entirety.

(e) Re-use of sacrificial berm material

(i) Salvage of this material will be permitted for further use as sacrificial berm material if the Contractor constructs the sacrificial berm in finite stages, subject to the salvaged material meeting the requirements of this specification at the time of installation.

E22.6 Measurement and Payment

(a) All works associated with the placement, maintenance, and removal of the sacrificial berm are considered incidental to the Site Development and Restoration and no separate measurement or payment will be made.

(b) Subgrade Excavation

(i) The clay toe berm excavation will be measured on a volume basis and the volume to paid for at the Contract Unit Price per cubic metre for “Clay Toe Berm Subgrade Excavation”. The volume to be paid for shall be the total number of cubic metres of subgrade excavation completed, measured from the ground surface in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

(c) Subgrade Preparation

(i) The clay toe berm placement will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Clay Toe Berm Subgrade Preparation". The volume to be paid for shall be the total number of square metres of subgrade preparation completed in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

(d) Clay Placement

(i) The clay toe berm placement will be measured in cubic metres of clay placed and compacted and paid for at the Contract Unit Price per cubic metre for "Clay Toe Berm Clay Placement". The volume to be paid for shall be the total number of cubic metres of clay placed in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

E23. INTERCEPTOR DRAIN

E23.1 Description

(a) This Specification shall cover the installation of the interceptor drain, including the excavation of in-situ materials, placement of the free draining rockfill material, and placement of the clay cap.

(b) The Work to be done by the Contractor under this specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E23.2 Materials

(a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

(b) Excavated Material

(i) Excavated material is anticipated to consist of in-situ overburden soils and may include, but not necessarily be limited to: organic topsoil, clay, silt, sand, gravel, fill, etc., all of which may be excavated with standard hydraulic excavation equipment.

(c) Rockfill

(i) The rockfill material used to backfill the interceptor drain shall consist of a clean free draining, sound, dense, durable, crushed rock. The material shall be free from organics, roots, silts, sand, clay, snow, ice or any other material that would detract from the strength and drainage characteristics of clean rockfill.

(ii) Individual particles shall be shaped such that no dimension is greater than two times the smallest dimension. Flat, elongated, or platy particle shapes will not be accepted.

(iii) Should the Contractor choose to use limestone, it shall be durable white crystalline limestone. Softer buff to yellow dolomite or dolostone will not be accepted.

(iv) The rockfill material shall meet the following requirements:

Parameter	Test Method	Specified Limit
Bulk Specific Gravity	ASTM C127	2.6 minimum
Absorption	ASTM C127	2.5 % maximum
LA Abrasion Loss	ASTM C131	32% maximum
Soundness	ASTM C88	13% maximum
Gradation	ASTM D5519	See below

(v) The rockfill shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation:

Canadian Metric Sieve Size (millimeters)	Percent of Total Dry Weight Passing Each Sieve
150	100%
75	40-70%

25	0-5%

(d) Clay Cap

(i) The impervious clay cap at the top of the interceptor drain shall consist of a high plasticity clay (CH) material, with a liquid limit in excess of 50%.

(ii) The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials, and may be salvaged from the on-site excavation, as approved by the Contract Administrator. Frozen material will not be accepted.

(e) Interceptor Drain Geotextile

(i) Interceptor Drain Geotextile shall be "Separation/Filtration Geotextile Fabric" as specified in Table CW 3130.2 of City of Winnipeg Specification CW 3130 – (R5).

E23.3 Equipment

(a) All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

(b) The Contractor shall use vibratory equipment that can densify the rockfill backfill throughout the entire depth of the interceptor drain.

E23.4 Submittals

(a) The Contractor shall submit the proposed supplier(s) and location of quarry Sites for supply of the interceptor drain rockfill.

E23.5 Quarry Sites

(a) Contractors supplying interceptor drain rockfill shall be responsible for demonstrating that the material is of adequate quality and volume to meet the material specifications contained herein.

(b) Rock samples shall be submitted to the Contract Administrator for approval a minimum of five (5) days prior to their use. No rockfill will be permitted without providing the source and supplier. Inspection of the source will be performed by the Contract Administrator prior to written acceptance.

E23.6 Testing and Approval

(a) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator. There shall be no charge for any materials taken by the Contract Administrator for testing purposes.

(b) The Contract Administrator will visit proposed quarry Sites for inspection of the proposed rockfill material and quarry faces a minimum of fourteen (14) days prior to supply and placement of shear key rockfill.

(c) No supply and placement of rockfill will be permitted prior to the Contract Administrator reviewing the source.

(d) The procedures for preparation of all rockfill samples for use in material inspection and testing shall be subject to review and acceptance by the Contract Administrator for individual tests. The samples may be obtained from crushed and processed material at the sizing necessary for specific tests if the material is deemed to be representative of the rockfill backfill that will be used, subject to the acceptance of the Contract Administrator.

(e) The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.

E23.7 Construction Methods

(a) Excavation

(i) The excavation shall be supervised at all times, and open excavations shall be adequately guarded or covered for safety, and shall be the sole responsibility of the Contractor.

(ii) The interceptor drain shall then be excavated and backfilled to achieve the depth as illustrated on the Drawings.

(iii) Excavation shall not commence until sufficient rockfill is on Site to backfill the excavation.

(iv) Any deleterious or sloughed material shall be removed from the excavation prior to backfilling.

(v) Discharge of water contained within the excavation from displacement of the rockfill during backfill will be acceptable. The Contractor shall be responsible to contain and direct any displaced water such that it will not affect other construction work or cause excessive erosion of the existing pond slope soils. The control of the water shall be considered incidental to the work.

(vi) The construction of the interceptor drain shall be a continuous operation with backfilling immediately following excavation.

(vii) The Contractor shall not excavate more than 2 metres ahead of the backfill placement as measured at the bottom of the excavation.

(viii) Excavated material shall be assessed for the use of the clay toe berm. Material deemed acceptable for the clay toe berm by the Contract Administrator shall be placed near the bottom of the pond slope in the footprint of the Work for immediate use, or where advised by the Contract Administrator. Excess excavated material shall be disposed of offsite immediately after excavation. Stockpiling of excavated material on the pond slope area will not be permitted.

(ix) The Contractor shall take all precautions necessary to maintain the excavation geometry to the neat lines shown on the Drawings. If necessary, the excavation shall be completed in stages and allowed to freeze, to prevent sloughing of the side slopes and interceptor drain sidewalls. Such precautions will be considered incidental to the excavation and will not be paid for separately.

(b) Geotextile

(i) Non-woven geotextile shall be placed as a separator between rockfill and surrounding soil including clay cap, as shown on the drawings.

(ii) Handle, store and install non-woven geotextile in accordance with the manufacturer's recommended procedures and this specification.

(iii) Commence installation of geotextile after material has been approved and the preparation of the sub-grade has been inspected by the Contract Administrator.

(iv) Sub-grade shall be clean and smooth and free of sharp edges, fines, loose or foreign materials, oil, grease, and other materials that may damage the geotextile.

(v) All roughened surfaces that can damage the geotextile shall be repaired as specified to offer a smooth sub-grade.

(vi) Unroll geotextile fabric as smooth as possible on the installed prepared surface.

(vii) Install geotextile fabric in the longest continuous practical length, free from tension, stress, wrinkles and creases.

(viii) Cut or fold geotextile fabric to conform to curves.

(ix) Overlap joints a minimum of 600 millimetres. Install pins as required to hold geotextile fabric in place.

(x) Install geotextile fabric in accordance with this specification and procedures recommended by the manufacturer.

(xi) Construction equipment shall not drive on the geotextile fabric.

(xii) Remove and replace geotextile fabric that is improperly installed or damaged as directed by the Contract Administrator.

(c) Rockfill

(i) The rockfill shall be gently placed onto the geotextile, and in such a manner that the larger stones are uniformly distributed, the smaller rocks serve to fill the spaces between the larger stones, and that excessive segregation of the various stone sizes does not occur.

(ii) The rockfill stone shall not be dropped onto the geotextile fabric or otherwise placed that will tear or damage the underlying geotextile.

(iii) Placement of rockfill shall begin at the downstream limit of the drain and proceed upstream (or upslope).

(iv) Sufficient placing and levelling shall be done to produce a firmly bedded neat and uniform surface conforming to the thickness, shape, and dimensions shown on the Drawings.

(v) Compacting of rockfill shall be by way of a plate compactor capable of increasing the rockfill density a minimum of 10% versus the uncompacted material. Compaction shall be completed over the entire length of the interceptor drain as shown on the Drawings. Rockfill compaction will be considered incidental to the Supply and Placement of Interceptor Drain Rockfill and no separate measurement or payment for compaction will be made.

(vi) The Contractor shall monitor the supply rate of the rockfill material to ensure that the backfilling operations are not delayed.

(vii) Stockpiling of rockfill material will not be permitted on the pond slope except at locations where existing trench rockfill is in place, subject to the approval of the Contract Administrator.

(viii) Where crushed limestone has become contaminated with silt, clay, snow, ice or other deleterious material due to the Contractor's method of operation, negligence, failure to backfill in a timely manner, etc. the material shall be classified as rejected backfill and shall be weighed prior to disposal for deduction from the total weight of crushed limestone measured for payment.

(d) Clay Cap

(i) After placement of the rockfill and geotextile to the dimensions shown on the Drawings, the impervious clay cap shall be placed in layers not exceeding 150 millimetres, and compacted to a minimum of 95% of the Standard Proctor Maximum Dry Density. The clay cap shall be located within undisturbed soil surrounding the excavation. Care shall be taken to ensure that an effective seal results between the wall of the excavation and the clay material placed, to protect against water infiltration into the excavation, as approved by the Contract Administrator.

E23.8 Measurement and Payment

(a) Interceptor Drain Excavation

(i) The excavation for the rockfill trench will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Interceptor Drain Excavation". The volume to be paid for shall be the total number of cubic metres of excavation completed, measured from the original ground surface prior to interceptor drain construction as carried out in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator.

(b) Interceptor Drain Geotextile

(i) Supply and installation of the non-woven geotextile will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Interceptor Drain Non-Woven Geotextile". The area to be paid for shall be the total number of square metres of geotextile supplied and installed in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator. Only material placed within the designated sub-grade limits will be included in the payment for "Interceptor Drain Geotextile". No measurement or payment will be made for geotextile fabric removed and replaced due to improper installation or damaged materials.

(c) Interceptor Drain Rockfill

(i) The supply, placement and compaction of the Rockfill will be measured on a weight basis and paid for at the Contract Unit Price per metric tonne for "Interceptor Drain Rockfill". The weight to be paid for shall be the total number of metric tonnes of rockfill supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as measured on a certified weigh scale. The Contractor shall provide the weigh tickets to the Contract Administrator for the material supplied to the Site at the time of delivery. No payment will be made for any weigh tickets that are not supplied at the time of delivery.

(d) Interceptor Drain Clay Cap

(i) The Clay Cap will be measured on a volume basis using before and after placement neat-line geometries and paid for at the Contract Unit Price per cubic metre for "Interceptor Drain Clay Cap". The volume to be paid for shall be the total number of cubic metres of clay cap placed in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

E24. PASSIVE ROCKFILL DRAIN

E24.1 Description

(a) This Specification shall cover the installation of the passive rockfill drain, including the excavation of in-situ materials, the supply, placement and installation of the geomembrane and geotextile, placement of the free draining rockfill material, and placement of the clay cap.

(b) The Work to be done by the Contractor under this specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E24.2 Materials

(a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

(b) Excavated Material

(i) Excavated material is anticipated to consist of in-situ overburden soils and may include, but not necessarily be limited to organic topsoil, clay, silt, sand, gravel, fill, etc., all of which may be excavated with standard hydraulic excavation equipment.

(c) Geotextile

(i) Passive Rockfill Drain Geotextile shall be "Separation/Filtration Geotextile Fabric" as specified in Table CW 3130.2 of City of Winnipeg Specification CW 3130 – (R5).

(a) Impermeable Geomembrane

(i) Impermeable geomembrane will meet or exceed the following requirements:

Property	Test Method	Units	Minimum Values	
			SI	ENG
Specific Weight	ASTM D-792	gm / cc	1.2	
Unit Weight	ASTM D-751	kg/m / lb/ft	1.4	0.29
Thickness, Type 1	ASTM D-412	mm / in	1.14 +10/-20%	0.045 +10/-20%
Tensile Strength, Die C	ASTM D-412	MPa / psi	9.0	1,305
Ultimate Elongation, Die C	ASTM D412	%	300	
Tear Resistance, Die C	ASTM D-624	kN/m / lbf/in	26.27	150
Puncture Resistance	ASTM D-4833	N / lb	110.8	28
Shore A Durometer	ASTM D-2240		65 – 10	
Resistance to Ozone: 7 days/100 @ 37.8 °C (150 °F) 50% ext.	ASTM D-1149		No Cracks	
Multiaxial Elongation	ASTM D-5617	%	100	
Oven Aging @ 116 °C (240 °F) for 670 hours:	ASTM D-573	-	-	
Tensile Strength Die C	ASTM D-412	MPa / psi	8.3	1,205
Ultimate Elongation, Die C	ASTM D-412	%	200	

Tear Resistance, Die C	ASTM D-624	kN/m / lbf/in	21.9	125
Xenon Arc for 5040 (kJ/m².nm) @ 340 nm @ 80 °C	ASTM G-155/G-151	---	---	---
Visual Inspection-7X No cracks or crazing bent loop @10% strain	ASTM D-518		Pass	
Brittleness Point	ASTM D-2137	°C / °F	-45	-49
Water Resistance Weight after immersion 166 hours @ 70 °C (158 °F)	ASTM D-471	%	+8.2, -2	
Water Vapor Permeability (max)	ASTM E-96	perm-mils	2.0	
Linear Dimensional Change (max)	ASTM D-1204	%	± 1.0	
Chronic Toxicity Screening	EPA/600/4-89/001 ASTM E-729	Method 1000	Pass	

(d) Rockfill

(i) The rockfill material used for backfill shall consist of a clean free draining, sound, dense, durable, crushed rock. The material shall be free from organics, roots, silts, sand, clay, snow, ice or any other material that would detract from the strength and drainage characteristics of clean rockfill.

(ii) Individual particles shall be shaped such that no dimension is greater than two times the smallest dimension. Flat, elongated, or platy particle shapes will not be accepted.

(iii) Should the Contractor choose to use limestone, it shall be durable white crystalline limestone. Softer buff to yellow dolomite or dolostone will not be accepted.

(iv) The rockfill material shall meet the following requirements:

Parameter	Test Method	Specified Limit
Bulk Specific Gravity	ASTM C127	2.6 minimum
Absorption	ASTM C127	2.5 % maximum
LA Abrasion Loss	ASTM C131	32% maximum
Soundness	ASTM C88	13% maximum
Gradation	ASTM D5519	See below

(v) The rockfill shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation:

Canadian Metric Sieve Size (millimeters)	Percent of Total Dry Weight Passing Each Sieve
150	100%
75	40-70%
25	0-5%

(e) Clay Cap

(i) The impervious clay cap at the top of the passive rockfill drain shall consist of a high plasticity clay (CH) material, with a liquid limit in excess of 50%.

(ii) The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials, and may be salvaged from the on-site excavation, as approved by the Contract Administrator. Frozen material will not be accepted.

E24.3 Equipment

(a) All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

(b) The Contractor shall use vibratory equipment that can densify the rockfill backfill throughout the entire depth of the passive rockfill drain.

E24.4 Submittals

(a) The Contractor shall submit the proposed supplier(s) and location of quarry Sites for supply of the rockfill.

E24.5 Quarry Sites

(a) Contractors supplying rockfill shall be responsible for demonstrating that the material is of adequate quality and volume to meet the material specifications contained herein.

(b) Rock samples shall be submitted to the Contract Administrator for approval a minimum of five (5) days prior to their use. No rockfill will be permitted without providing the source and supplier. Inspection of the source will be performed by the Contract Administrator prior to written acceptance.

E24.6 Testing and Approval

(a) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator. There shall be no charge for any materials taken by the Contract Administrator for testing purposes.

(b) The Contract Administrator will visit proposed quarry Sites for inspection of the proposed rockfill material and quarry faces a minimum of fourteen (14) days prior to supply and placement of rockfill.

(c) No supply and placement of rockfill will be permitted prior to the Contract Administrator reviewing the source.

(d) The procedures for preparation of all rockfill samples for use in material inspection and testing shall be subject to review and acceptance by the Contract Administrator for individual tests. The samples may be obtained from crushed and processed material at the sizing necessary for specific tests if the material is deemed to be representative of the rockfill backfill that will be used, subject to the acceptance of the Contract Administrator.

(e) The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.

E24.7 Construction Methods

(a) Excavation

(i) The excavation shall be supervised at all times, and open excavations shall be adequately guarded or covered for safety, and shall be the sole responsibility of the Contractor.

(ii) The passive rockfill drain shall then be excavated and backfilled to achieve the depth as illustrated on the Drawings.

(iii) Any deleterious or sloughed material shall be removed from the excavation prior to backfilling.

(iv) Discharge of water contained within the excavation from displacement of the rockfill during backfill will be acceptable. The Contractor shall be responsible to contain and direct any displaced water such that it will not affect other construction work or cause excessive erosion of the existing pond slope soils. The control of the water shall be considered incidental to the work.

(v) The construction of the passive rockfill drain shall be a continuous operation with backfilling immediately following excavation.

(vi) The Contractor shall not excavate more than 2 metres ahead of the backfill placement as measured at the bottom of the excavation.

(vii) Excavated material shall be assessed for the use of the clay toe berm. Material deemed acceptable for the clay toe berm by the Contract Administrator shall be placed near the bottom of the pond slope in the footprint of the Work for immediate use, or where advised by the Contract Administrator. Excess excavated material shall be disposed of offsite immediately after excavation. Stockpiling of excavated material on the pond slope area will not be permitted.

(viii) The Contractor shall take all precautions necessary to maintain the excavation geometry to the neat lines shown on the Drawings. If necessary, the excavation shall be completed in stages and allowed to freeze, to prevent sloughing of the side slopes and passive rockfill drain sidewalls. Such precautions will be considered incidental to the excavation and will not be paid for separately.

(b) Geotextile

(i) Non-woven geotextile shall be placed as a separator between rockfill and surrounding soil including clay cap, as shown on the drawings.

(ii) Commence installation of second layer geotextile fabric after completion of geomembrane installation in accordance with (c) Impermeable Geomembrane. Second layer of geotextile to wrap around impermeable geomembrane, first layer of geotextile, and Passive Rockfill Drain Rockfill.

(iii) Handle, store and install geotextile in accordance with the manufacturer's recommended procedures.

(iv) Commence installation of geotextile fabric after material has been approved and the preparation of the sub-grade has been inspected by the Contract Administrator.

(v) Sub-grade shall be clean and smooth and free of sharp edges, fines, loose or foreign materials, oil, grease, and other materials that may damage the geotextile.

(vi) All roughened surfaces that can damage the geotextile shall be repaired as specified to offer a smooth sub-grade.

(vii) Unroll geotextile fabric as smooth as possible on the installed prepared surface.

(viii) Install geotextile fabric in the longest continuous practical length, free from tension, stress, wrinkles and creases.

(ix) Cut or fold geotextile fabric to conform to curves.

(x) Overlap joints a minimum of 600 millimetres. Install pins as required to hold geotextile fabric in place.

(xi) Install geotextile fabric in accordance with this specification and procedures recommended by the manufacturer.

(xii) Construction equipment shall not drive on the geotextile fabric.

(xiii) Remove and replace geotextile fabric that is improperly installed or damaged as directed by the Contract Administrator.

(c) Impermeable Geomembrane

(i) Handle, store and install impermeable geomembrane in accordance with the manufacturer's recommended procedures.

(ii) Commence installation of impermeable geomembrane fabric after completion of geotextile installation.

(iii) limits of the drainage swale sub-grade as shown on the Drawings and as directed by the Contract Administrator.

(iv) Install upstream limit of geomembrane in anchor trench as shown on the Drawings and backfill with insitu material, compacted to 98% Standard Proctor Density.

(v) Unroll geomembrane fabric as smooth as possible on the prepared surface in the direction of the flow.

(vi) Install geomembrane fabric in the longest continuous practical length, free from tension, stress, wrinkles and creases. The Contractor shall order the geomembrane such that there are no joints. The geomembrane shall be ordered in a roll to provide a continuous single roll to accommodate the entire length of each drainage swale.

(vii) Cut or fold geomembrane fabric to conform to curves. All cuts shall ensure the upstream lap is placed over the downstream lap.

(viii) Install pins to hold geomembrane fabric in place. Pins shall be isolated to the upper edges of the in-place geomembrane. No pins shall be allowed in the invert of the drainage swale, such that the geomembrane would leak.

(ix) Construction equipment shall not drive on the geotextile fabric.

(x) Place second layer geotextile over top of geomembrane in accordance with (b) Geotextile.

(xi) Remove and replace geomembrane fabric that is improperly installed or damaged as directed by the Contract Administrator.

(d) Rockfill

(i) The rockfill shall be gently placed onto the geotextile, and in such a manner that the larger stones are uniformly distributed, the smaller rocks serve to fill the spaces between the larger stones, and that excessive segregation of the various stone sizes does not occur.

(ii) The rockfill stone shall not be dropped onto the geotextile fabric or otherwise placed that will tear or damage the underlying geotextile.

(iii) Placement of rockfill shall begin at the downstream limit of the drain and proceed upstream (or upslope).

(iv) Sufficient placing and levelling shall be done to produce a firmly bedded neat and uniform surface conforming to the thickness, shape, and dimensions shown on the Drawings.

(v) Compacting of rockfill shall be by way of a plate compactor capable of increasing the rockfill density a minimum of 10% versus the uncompacted material. Compaction shall be completed over the entire length of the interceptor drain as shown on the Drawings. Rockfill compaction will be considered incidental to the Supply and Placement of Passive Rockfill Drain Rockfill and no separate measurement or payment for compaction will be made.

(vi) The Contractor shall monitor the supply rate of the rockfill material to ensure that the backfilling operations are not delayed.

(vii) Stockpiling of rockfill material will not be permitted on the pond slope except at locations where existing trench rockfill is in place, subject to the approval of the Contract Administrator.

(viii) Where crushed limestone has become contaminated with silt, clay, snow, ice or other deleterious material due to the Contractor's method of operation, negligence, failure to backfill in a timely manner, etc. the material shall be classified as rejected backfill and shall be weighed prior to disposal for deduction from the total weight of crushed limestone measured for payment.

(e) Clay Cap

(i) After placement of the geotextile, geomembrane, and rockfill to the dimensions shown on the Drawings, the impervious clay cap shall be placed in layers not exceeding 150 millimetres, and compacted to a minimum of 95% of the Standard Proctor Maximum Dry Density. The clay cap shall be located within undisturbed soil surrounding the excavation. Care shall be taken to ensure that an effective seal results between the wall of the excavation and the clay material placed, to protect against water infiltration into the excavation, as approved by the Contract Administrator.

E24.8 Measurement and Payment

(a) Excavation

(i) The excavation for the rockfill trench will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Passive Rockfill Drain Excavation". The volume to be paid for shall be the total number of cubic metres of excavation completed, measured from the original ground surface prior to passive rockfill drain construction as carried out in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator.

(b) Geotextile

(i) Supply and installation of the non-woven geotextile will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Passive Rockfill Drain Non-Woven Geotextile". The area to be paid for shall be the total number of square metres of geotextile supplied and installed in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator. Only material placed within the designated sub-grade limits will be included in the payment for "Passive Rockfill Drain Non-Woven Geotextile". No measurement or payment will be made for

geotextile fabric removed and replaced due to improper installation or damaged materials.

(c) Geomembrane

(i) Supply and installation of the impermeable membrane will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Passive Rockfill Drain Geomembrane". The area to be paid for shall be the total number of square metres of impermeable membrane supplied and installed in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator. Only material placed within the designated limits will be included in the payment for "Passive Rockfill Drain Geomembrane". No measurement or payment will be made for impermeable membrane removed and replaced due to improper installation or damaged materials.

(d) Rockfill

(i) The supply, placement and compaction of the Rockfill will be measured on a weight basis and paid for at the Contract Unit Price per metric tonne for "Passive Rockfill Drain Rockfill". The weight to be paid for shall be the total number of metric tonnes of rockfill supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as measured on a certified weigh scale. The Contractor shall provide the weigh tickets to the Contract Administrator for the material supplied to the Site at the time of delivery. No payment will be made for any weigh tickets that are not supplied at the time of delivery.

(e) Clay Cap

(i) The Clay Cap will be measured on a volume basis using before and after placement neat-line geometries and paid for at the Contract Unit Price per cubic metre for "Passive Rockfill Drain Clay Cap". The volume to be paid for shall be the total number of cubic metres of clay cap placed in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

E25. GEOMEMBRANE LINED SWALE

E25.1 Description

(a) This Specification shall cover the installation of the geomembrane lined swales, including the excavation and disposal of waste material, the supply, placement and compaction of riprap armouring, the supply, placement and installation of the geomembrane and geotextile.

(b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E25.2 Materials

E25.2.1 The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

E25.2.2 Native Materials to be Excavated.

(a) The materials covered in this specification consist of the in-situ overburden soils, and may include but not necessarily be limited to organic topsoil, clay, silt, sand, gravel, fill, rubble, roots, riprap, concrete blocks, etc., all of which may be excavated with standard hydraulic excavation equipment.

E25.2.3 Geotextiles

(a) Geotextile will meet or exceed the following requirements:

Tested Property	Test Method	Unit English (Metric)	Value English (Metric)

Tensile Strength (Grab)	ASTM D 4632	lbs (N)	300 (1335)
Elongation	ASTM D 4632	%	50
CBR Puncture	ASTM D 6241	lbs (N)	825 (3671)
Trapezoid Tear	ASTM D 4533	lbs (N)	115 (511)
U.V. Resistance	ASTM D 4355	%/hrs	70/500
Apparent Opening Size (AOS)*	ASTM D 4751	U.S. Sieve (mm)	100 (0.150)
Permittivity	ASTM D 4491	sec-1	1.0
Water Flows	ASTM D 4491	gpm/ft2 (l/min/m2)	75 (3055)

E25.2.4 Impermeable Geomembrane

(a) Impermeable geomembrane will meet or exceed the following requirements:

Property	Test Method	Units	Minimum Values	
			SI	ENG
Specific Weight	ASTM D-792	gm / cc	1.2	
Unit Weight	ASTM D-751	kg/m / lb/ft	1.4	0.29
Thickness, Type 1	ASTM D-412	mm / in	1.14 +10/-20%	0.045 +10/-20%
Tensile Strength, Die C	ASTM D-412	MPa / psi	9.0	1,305
Ultimate Elongation, Die C	ASTM D412	%	300	
Tear Resistance, Die C	ASTM D-624	kN/m / lbf/in	26.27	150
Puncture Resistance	ASTM D-4833	N / lb	110.8	28
Shore A Durometer	ASTM D-2240		65 – 10	
Resistance to Ozone: 7 days/100 @ 37.8 °C (150 °F) 50% ext.	ASTM D-1149		No Cracks	
Multiaxial Elongation	ASTM D-5617	%	100	
Oven Aging @ 116 °C (240 °F) for 670 hours:	ASTM D-573	-	-	
Tensile Strength Die C	ASTM D-412	MPa / psi	8.3	1,205
Ultimate Elongation, Die C	ASTM D-412	%	200	
Tear Resistance, Die C	ASTM D-624	kN/m / lbf/in	21.9	125
Xenon Arc for 5040 (kJ/m².nm) @ 340 nm @ 80 °C	ASTM G-155/G-151	---	---	---
Visual Inspection-7X No cracks or crazing bent loop @10% strain	ASTM D-518		Pass	
Brittleness Point	ASTM D-2137	°C / °F	-45	-49
Water Resistance Weight after immersion 166 hours @ 70 °C (158 °F)	ASTM D-471	%	+8.2, -2	
Water Vapor Permeability (max)	ASTM E-96	perm-mils	2.0	
Linear Dimensional Change (max)	ASTM D-1204	%	± 1.0	
Chronic Toxicity Screening	EPA/600/4-89/001 ASTM E-729	Method 1000	Pass	

E25.2.5 Rockfill

(a) The Contractor shall supply clean field stone, quarried rock, or quarried limestone, which is dense, durable, sound, resistant to the action of water and frost, and suitable in all respects for the purpose intended. Stone riprap shall be free from sod, roots, organic material and debris prior to placement and shall contain less than 2% fines. Individual pieces of stone shall be free of defects such as seams or cracks that would cause rapid or excessive deterioration or degradation.

(b) Quarried limestone shall have a maximum Los Angeles Abrasion Loss of 32% (ASTM C535) and a maximum Magnesium Sulphate Soundness Loss of 13% (ASTM C88). Representative sample limestone, from the intended source, crushed to maximum 75 mm aggregate size, shall be supplied by the Contractor to the Contract Administrator for approval a minimum of two weeks prior to its use.

(c) The stone rockfill shall be well graded having a full range and even distribution of sizes and shall conform to the following gradations:

Canadian Metric Sieve Size (millimeters)	Percent of Total Dry Weight Passing Each Sieve
150	100%
75	40-70%

25	0-5%

E25.3 Equipment

(a) All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

E25.4 Submittals

(a) The Contractor shall submit the proposed supplier(s) and location of quarry Sites for supply of the rockfill.

E25.5 Quarry Sites

(a) Contractors supplying rockfill shall be responsible for demonstrating that the material is of adequate quality and volume to meet the material specifications contained herein.

(b) Rock samples shall be submitted to the Contract Administrator for approval a minimum of five (5) days prior to their use. No rockfill will be permitted without providing the source and supplier. Inspection of the source will be performed by the Contract Administrator prior to written acceptance.

E25.6 Testing and Approvals

(a) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator. There shall be no charge for any materials taken by the Contract Administrator for testing purposes.

(b) The Contract Administrator will visit proposed quarry Sites for inspection of the proposed rockfill material and quarry faces a minimum of fourteen (14) days prior to supply and placement of riprap.

(c) No supply and placement of rockfill will be permitted prior to the Contract Administrator reviewing the source.

(d) The procedures for preparation of all rockfill samples for use in material inspection and testing shall be subject to review and acceptance by the Contract Administrator for individual tests. The samples may be obtained from crushed and processed material at the sizing necessary for specific tests if the material is deemed to be representative of the riprap that will be used, subject to the acceptance of the Contract Administrator.

(e) The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.

E25.7 Construction Methods

E25.7.1 Excavation

(a) The excavation shall be completed to the depth and extent as shown on the Drawings.

(b) Any deleterious material shall be removed from the excavation prior to placement of geomembrane.

(c) Excavated material shall be removed from the Pond slope area immediately upon excavation and disposed of offsite to a location approved by the Contract Administrator. Stockpiling of excavated material on the Pond slope area will not be permitted.

E25.7.2 Geotextile

(a) Handle, store and install geotextile in accordance with the manufacturer's recommended procedures.

(b) Commence installation of geotextile fabric after material has been approved and the preparation of the sub-grade has been inspected by the Contract Administrator.

(c) Sub-grade shall be clean and smooth and free of sharp edges, fines, loose or foreign materials, oil, grease, and other materials that may damage the geotextile.

(d) All roughened surfaces that can damage the geotextile shall be repaired as specified to offer a smooth sub-grade.

(e) Commence installation of second layer geotextile fabric after completion of geomembrane installation in accordance with E25.7.3.

(f) Unroll geotextile fabric as smooth as possible on the installed prepared surface.

(g) Install upstream limit of geotextile in anchor trench as shown on the Drawings and backfill with insitu material, compacted to 98% Standard Proctor Density.

(h) Install geotextile fabric in the longest continuous practical length, free from tension, stress, wrinkles and creases.

(i) Cut or fold geotextile fabric to conform to curves.

(j) Overlap joints a minimum of 600 millimetres. Install pins as required to hold geotextile fabric in place.

(k) Install geotextile fabric in accordance with this specification and procedures recommended by the manufacturer.

(l) Install geotextile fabric in the longest continuous practical length, free from tension, stress, wrinkles and creases. The Contractor shall order the geotextile such that there are no joints per swale. The geotextile shall be ordered in a roll to provide a continuous single roll to accommodate the entire length of each drainage swale.

(m) Install pins to hold geotextile fabric in place. Pins shall be isolated to the upper edges of the in-place geotextile and underlying geomembrane. No pins shall be allowed in the invert of the drainage swale, such that the geomembrane would leak.

(n) Construction equipment shall not drive on the geotextile fabric.

(o) Remove and replace geotextile fabric that is improperly installed or damaged as directed by the Contract Administrator.

E25.7.3 Impermeable Geomembrane

(a) Handle, store and install impermeable geomembrane in accordance with the manufacturer's recommended procedures.

(b) Commence installation of impermeable geomembrane fabric after completion of geotextile installation.

(c) limits of the drainage swale sub-grade as shown on the Drawings and as directed by the Contract Administrator.

(d) Install upstream limit of geomembrane in anchor trench as shown on the Drawings and backfill with insitu material, compacted to 98% Standard Proctor Density.

(e) Unroll geomembrane fabric as smooth as possible on the prepared surface in the direction of the flow.

(f) Install geomembrane fabric in the longest continuous practical length, free from tension, stress, wrinkles and creases. The Contractor shall order the geomembrane such that there are no joints. The geomembrane shall be ordered in a roll to provide a continuous single roll to accommodate the entire length of each drainage swale.

(g) Cut or fold geomembrane fabric to conform to curves. All cuts shall ensure the upstream lap is placed over the downstream lap.

(h) Install pins to hold geomembrane fabric in place. Pins shall be isolated to the upper edges of the in-place geomembrane. No pins shall be allowed in the invert of the drainage swale, such that the geomembrane would leak.

(i) Construction equipment shall not drive on the geotextile fabric.

(j) Place second layer geotextile over top of geomembrane in accordance with E25.7.2.

(k) Remove and replace geomembrane fabric that is improperly installed or damaged as directed by the Contract Administrator.

E25.7.4 Swale Rockfill

(a) The swale rockfill shall be gently placed onto the geotextile, and in such a manner that the larger stones are uniformly distributed, the smaller rocks serve to fill the spaces between the larger stones, and that excessive segregation of the various stone sizes does not occur.

(b) The rockfill stone shall not be dropped onto the geotextile fabric or otherwise placed that will tear or damage the underlying geotextile.

(c) Placement of swale rockfill shall begin at the downstream limit of the drainage swales and proceed upstream (or upslope).

(d) Sufficient placing and levelling shall be done to produce a firmly bedded neat and uniform surface conforming to the thickness, shape, and dimensions shown on the Drawings.

E25.8 Measurement and Payment

(a) Excavation

(i) The excavation for the drainage swale will be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Geomembrane Lined Swale Excavation". The volume to be paid for shall be the total number of cubic metres of excavation completed, measured from the original ground surface prior to drainage swale construction as carried out in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator.

(b) Geotextile

(i) Supply and installation of the geotextile will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Geomembrane Lined Swale Geotextile". The area to be paid for shall be the total number of square metres of geotextile supplied and installed in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator. Only material placed within the designated sub-grade limits will be included in the payment for "Geomembrane Lined Swale Geotextile". No measurement or payment will be made for geotextile fabric removed and replaced due to improper installation or damaged materials.

(c) Geomembrane

(i) Supply and installation of the impermeable membrane will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Geomembrane Lined Swale Geomembrane". The area to be paid for shall be the total number of square metres of impermeable membrane supplied and installed in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator. Only material placed within the designated limits will be included in the payment for "Geomembrane Lined Swale Geomembrane". No measurement or payment will be made for impermeable membrane removed and replaced due to improper installation or damaged materials.

(d) Rockfill

(i) The supply, placement and compaction of the Rockfill will be measured on a weight basis and paid for at the Contract Unit Price per metric tonne for "Geomembrane Lined Swale Rockfill". The weight to be paid for shall be the total number of metric tonnes of rockfill supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as measured on a certified weigh scale. The Contractor shall provide the weigh tickets to the Contract Administrator for the material supplied to the Site at the time of delivery. No payment will be made for any weigh tickets that are not supplied at the time of delivery.

E26. OUTFALL SWALE

E26.1 Description

(a) Further to CW 3615 - Riprap, this specification shall cover the installation of the outfall swales, including the excavation and disposal of waste material, the supply, placement and compaction of rockfill armouring, the supply, placement and installation of the geomembrane and geotextile.

(b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E26.2 Materials

E26.2.1 The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

E26.2.2 Native Materials to be Excavated.

(a) The materials covered in this specification consist of the in-situ overburden soils, and may include but not necessarily be limited to organic topsoil, clay, silt, sand, gravel, fill, rubble, roots, riprap, concrete blocks, etc., all of which may be excavated with standard hydraulic excavation equipment.

E26.2.3 Geotextiles

(a) Geotextile used for the drainage swales will meet or exceed the following requirements:

Tested Property	Test Method	Unit English (Metric)	Value English (Metric)
Tensile Strength (Grab)	ASTM D 4632	lbs (N)	300 (1335)
Elongation	ASTM D 4632	%	50
CBR Puncture	ASTM D 6241	lbs (N)	825 (3671)
Trapezoid Tear	ASTM D 4533	lbs (N)	115 (511)
U.V. Resistance	ASTM D 4355	%/hrs	70/500
Apparent Opening Size (AOS)*	ASTM D 4751	U.S. Sieve (mm)	100 (0.150)
Permittivity	ASTM D 4491	sec-1	1.0
Water Flows	ASTM D 4491	gpm/ft2 (l/min/m2)	75 (3055)

E26.2.4 Impermeable Geomembrane

(a) Impermeable geomembrane will meet or exceed the following requirements:

Property	**Test Method**	**Units**	**Minimum Values**	
			SI	**ENG**
Specific Weight	ASTM D-792	gm / cc	1.2	
Unit Weight	ASTM D-751	kg/m / lb/ft	1.4	0.29
Thickness, Type 1	ASTM D-412	mm / in	1.14 +10/-20%	0.045 +10/-20%
Tensile Strength, Die C	ASTM D-412	MPa / psi	9.0	1,305
Ultimate Elongation, Die C	ASTM D412	%	300	
Tear Resistance, Die C	ASTM D-624	kN/m / lbf/in	26.27	150
Puncture Resistance	ASTM D-4833	N / lb	110.8	28
Shore A Durometer	ASTM D-2240		65 – 10	
Resistance to Ozone: 7 days/100 @ 37.8 °C (150 °F) 50% ext.	ASTM D-1149		No Cracks	
Multiaxial Elongation	ASTM D-5617	%	100	
Oven Aging @ 116 °C (240 °F) for 670 hours:	ASTM D-573	-	-	
Tensile Strength Die C	ASTM D-412	MPa / psi	8.3	1,205
Ultimate Elongation, Die C	ASTM D-412	%	200	

Tear Resistance, Die C	ASTM D-624	kN/m / lbf/in	21.9	125
Xenon Arc for 5040 (kJ/m².nm) @ 340 nm @ 80 °C	ASTM G-155/G-151	---	---	---
Visual Inspection-7X No cracks or crazing bent loop @10% strain	ASTM D-518		Pass	
Brittleness Point	ASTM D-2137	°C / °F	-45	-49
Water Resistance Weight after immersion 166 hours @ 70 °C (158 °F)	ASTM D-471	%	+8.2, -2	
Water Vapor Permeability (max)	ASTM E-96	perm-mils	2.0	
Linear Dimensional Change (max)	ASTM D-1204	%	± 1.0	
Chronic Toxicity Screening	EPA/600/4-89/001 ASTM E-729	Method 1000	Pass	

E26.2.5 Outfall Swale Rockfill

(a) The material for use as rockfill shall consist of a clean free draining, sound, dense, durable, crushed rock. The material shall be free from organics, roots, silts, sand, clay, snow, ice or any other material that would detract from the strength and drainage characteristics of clean rockfill.

(b) Individual particles shall be shaped such that no dimension is greater than two times the smallest dimension. Flat, elongated, or platy particle shapes will not be accepted.

(c) The rockfill shall be durable, comprised of either limestone, granite, or other quality dense rock. Should the Contractor choose to use limestone, it shall be durable white crystalline limestone. Softer buff to yellow dolomite or dolostone will not be accepted.

(d) Should the Contractor choose to use limestone, it shall be durable white crystalline limestone. Softer buff to yellow dolomite or dolostone will not be accepted.

(i) The riprap shall meet the following requirements:

Parameter	Test Method	Specified Limit
Bulk Specific Gravity	ASTM C127	2.6 minimum
Absorption	ASTM C127	2.5 % maximum
LA Abrasion Loss	ASTM C131	32% maximum
Soundness	ASTM C88	13% maximum
Gradation	ASTM D5519	See below

(ii) The rockfill shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation: the stones shall range in size from 100 mm to 350 mm in diameter with at least seventy-five (75%) percent ranging from 200 mm to 300 mm in diameter.

E26.3 Equipment

(a) All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

E26.4 Submittals

(a) The Contractor shall submit the proposed supplier(s) and location of quarry Sites for supply of the rockfill.

E26.5 Quarry Sites

(a) Contractors supplying rockfill shall be responsible for demonstrating that the material is of adequate quality and volume to meet the material specifications contained herein.

(b) Rock samples shall be submitted to the Contract Administrator for approval a minimum of five (5) days prior to their use. No rockfill will be permitted without providing the source and supplier. Inspection of the source will be performed by the Contract Administrator prior to written acceptance.

E26.6 Testing and Approvals

(a) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract

Administrator. There shall be no charge for any materials taken by the Contract Administrator for testing purposes.

(b) The Contract Administrator will visit proposed quarry Sites for inspection of the proposed rockfill material and quarry faces a minimum of fourteen (14) days prior to supply and placement of rockfill.

(c) No supply and placement of rockfill will be permitted prior to the Contract Administrator reviewing the source.

(d) The procedures for preparation of all rockfill samples for use in material inspection and testing shall be subject to review and acceptance by the Contract Administrator for individual tests. The samples may be obtained from crushed and processed material at the sizing necessary for specific tests if the material is deemed to be representative of the rockfill backfill that will be used, subject to the acceptance of the Contract Administrator.

(e) The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.

E26.7 Construction Methods

E26.7.1 Excavation

(a) The excavation shall be completed to the depth and extent as shown on the Drawings.

(b) Any deleterious material shall be removed from the excavation prior to placement of geomembrane.

(c) Excavated material shall be removed from the Pond slope area immediately upon excavation and disposed of offsite to a location approved by the Contract Administrator. Stockpiling of excavated material on the Pond slope area will not be permitted.

E26.7.2 Geotextile

(a) Handle, store and install geotextile in accordance with the manufacturer's recommended procedures.

(b) Commence installation of geotextile fabric after material has been approved and the preparation of the sub-grade has been inspected by the Contract Administrator.

(c) Sub-grade shall be clean and smooth and free of sharp edges, fines, loose or foreign materials, oil, grease, and other materials that may damage the geotextile.

(d) All roughened surfaces that can damage the geotextile shall be repaired as specified to offer a smooth sub-grade.

(e) Commence installation of second layer geotextile fabric after completion of geomembrane installation in accordance with E26.7.3.

(f) Unroll geotextile fabric as smooth as possible on the installed prepared surface.

(g) Install upstream limit of geotextile in anchor trench as shown on the Drawings and backfill with insitu material, compacted to 98% Standard Proctor Density.

(h) Install geotextile fabric in the longest continuous practical length, free from tension, stress, wrinkles and creases.

(i) Cut or fold geotextile fabric to conform to curves.

(j) Overlap joints a minimum of 600 millimetres. Install pins as required to hold geotextile fabric in place.

(k) Install geotextile fabric in accordance with this specification and procedures recommended by the manufacturer.

(l) Install geotextile fabric in the longest continuous practical length, free from tension, stress, wrinkles and creases. The Contractor shall order the geotextile such that there are no joints per swale. The geotextile shall be ordered in a roll to provide a continuous single roll to accommodate the entire length of each drainage swale.

(m) Install pins to hold geotextile fabric in place. Pins shall be isolated to the upper edges of the in-place geotextile and underlying geomembrane. No pins shall be allowed in the invert of the drainage swale, such that the geomembrane would leak.

(n) Construction equipment shall not drive on the geotextile fabric.

(o) Remove and replace geotextile fabric that is improperly installed or damaged as directed by the Contract Administrator.

E26.7.3 Impermeable Geomembrane

(a) Handle, store and install impermeable geomembrane in accordance with the manufacturer's recommended procedures.

(b) Commence installation of impermeable geomembrane fabric after completion of geotextile installation.

(c) limits of the drainage swale sub-grade as shown on the Drawings and as directed by the Contract Administrator.

(d) Install upstream limit of geomembrane in anchor trench as shown on the Drawings and backfill with insitu material, compacted to 98% Standard Proctor Density.

(e) Unroll geomembrane fabric as smooth as possible on the prepared surface in the direction of the flow.

(f) Install geomembrane fabric in the longest continuous practical length, free from tension, stress, wrinkles and creases. The Contractor shall order the geomembrane such that there are no joints. The geomembrane shall be ordered in a roll to provide a continuous single roll to accommodate the entire length of each drainage swale.

(g) Cut or fold geomembrane fabric to conform to curves. All cuts shall ensure the upstream lap is placed over the downstream lap.

(h) Install pins to hold geomembrane fabric in place. Pins shall be isolated to the upper edges of the in-place geomembrane. No pins shall be allowed in the invert of the drainage swale, such that the geomembrane would leak.

(i) Construction equipment shall not drive on the geotextile fabric.

(j) Place second layer geotextile over top of geomembrane in accordance with E26.7.2.

(k) Remove and replace geomembrane fabric that is improperly installed or damaged as directed by the Contract Administrator.

E26.7.4 Outfall Rockfill

(a) The outfall rockfill shall be gently placed onto the geotextile, and in such a manner that the larger stones are uniformly distributed, the smaller rocks serve to fill the spaces between the larger stones, and that excessive segregation of the various stone sizes does not occur.

(b) The rockfill stone shall not be dropped onto the geotextile fabric or otherwise placed that will tear or damage the underlying geomembrane.

(c) Placement of outfall rockfill shall begin at the downstream limit of the outfall swales and proceed upstream (or upslope).

(d) Sufficient placing and levelling shall be done to produce a firmly bedded neat and uniform surface conforming to the thickness, shape, and dimensions shown on the Drawings.

E26.8 Measurement and Payment

(a) Excavation

(i) The excavation for the outfall swale as carried out in accordance with this Specification, acceptable to the Contract Administrator will be considered incidental to the placement of the Outfall Swale Geotextile and Outfall Swale Geomembrane. No separate measurement or payment will be made.

(b) Geotextile

(i) Supply and installation of the geotextile will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Outfall Swale Geotextile". The area to be paid for shall be the total number of square metres of geotextile supplied and installed in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator. Only material placed within the designated sub-grade limits will be included in the payment for "Outfall Swale Geotextile". No measurement or payment will be made for geotextile fabric removed and replaced due to improper installation or damaged materials.

(c) Geomembrane

(i) Supply and installation of the impermeable membrane will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Outfall Swale Geomembrane". The area to be paid for shall be the total number of square metres of impermeable membrane supplied and installed in accordance with this Specification, acceptable to the Contract Administrator, and as computed from measurements made by the Contract Administrator. Only material placed within the designated limits will be included in the payment for "Outfall Swale Geomembrane". No measurement or payment will be made for impermeable membrane removed and replaced due to improper installation or damaged materials.

(d) Rockfill

(i) The supply, placement and compaction of the Rockfill will be measured on a weight basis and paid for at the Contract Unit Price per metric tonne for "Outfall Swale Rockfill". The weight to be paid for shall be the total number of metric tonnes of rockfill supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as measured on a certified weigh scale. The Contractor shall provide the weigh tickets to the Contract Administrator for the material supplied to the Site at the time of delivery. No payment will be made for any weigh tickets that are not supplied at the time of delivery.

E27. TENSION CRACK SEALING

E27.1 Description

(a) This Specification shall cover pond slope regrading works including common excavations for tension crack sealing and offloading as well as the placement and compaction of suitable fill materials for tension crack sealing and promoting positive surface drainage towards the pond.

(b) The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

(c) Referenced Standard Construction Specifications

(i) CW 3170 – Earthwork and Grading.

E27.2 Materials

E27.2.1 Native Material to be Excavated.

(a) The materials covered in this specification consist of the in-situ overburden soils, and may include but not necessarily be limited to organic topsoil, clay, silt, sand, gravel, fill, rubble, roots, riprap, concrete blocks, etc., all of which may be excavated with standard hydraulic excavation equipment.

E27.2.2 Clay Fill

(a) Clay fill used to seal tension cracks or otherwise build back excavations to promote positive drainage shall be as specified in CW3170. Suitable high plasticity clay (CH) salvaged from rockfill, working bench, and site access ramp construction shall also be acceptable.

(b) The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials, and may be salvaged from the on-site excavation, as approved by the Contract Administrator.

(c) Frozen material will not be accepted.

E27.3 Construction Methods

E27.3.1 Tension Crack Sealing

(a) The limits of the tension crack sealing will be laid out in the field by the Contract Administrator.

(b) All materials from tension crack excavation shall be removed from the pond area immediately upon excavation and disposed of offsite. Stockpiling of excavated materials on the pond area will not be permitted.

(c) The excavation within the limits of the existing tension cracks shall be infilled with clay backfill material.

(d) The clay backfill material shall be pushed and kneaded into place to ensure that the entire excavated volume is entirely filled with clay, and that no void spaces remain.

(e) The clay backfill shall be compacted to a minimum of 95% of the SPMDD or as approved by the Contract Administrator.

(f) Clay backfill for placement within the excavated tension crack shall not be stockpiled on the pond slope.

E27.4 Measurement and Payment

E27.4.1 Tension Crack Sealing

(a) Tension crack sealing will be measured and paid for on a length basis. The length to be paid for shall be the total number of lineal metres of "Tension Crack Sealing", completed in accordance with this Specification, as measured in the field and accepted by the Contract Administrator.

LANDSCAPING

E28. TREE PLANTING

E28.1 General

E28.1.1 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 other things necessary for and incidental to the satisfactory performance and completion of all Work as shown on the Drawings and as hereinafter specified, including, but not necessarily confined to the following:

(a) Supply and installation of topsoil, mulch, trees and all other miscellaneous materials, as listed in this specification and indicated on the drawings.

E28.1.2 Reference

(a) Install trees in accordance with the Canadian Standards for Nursery Stock Current Edition, published by the Canadian Nursery Trades Association, except where specified otherwise.

E28.1.3 Source Quality Control

(a) All plant material shall be randomly inspected at the source upon request of the Contract Administrator.

(b) Trees are to be grown in nurseries under proper cultural practices as recommended by the Canadian Nursery Trades Association.

(c) Only those trees that have been grown for at least the four (4) previous years in local Manitoba nurseries located in an Agriculture Canada Plant Hardiness Zone designation of 2(a or b) or 3(a or b) and within a 250 kilometre radius of Winnipeg, will be accepted. Trees that have grown in plant hardiness zones 1 and 4 or greater will be rejected.

E28.1.4 Maintenance

(a) The Contractor shall be responsible for the maintenance of the trees for a period of two (2) year from the date of Total Performance. Any areas planted after September 15th, the maintenance period will commence on May 15th of the following year, or such date as mutually agreed upon by all parties.

(b) Water to ensure soil moisture conditions for optimum growth and health of plant material. Ensure watering techniques do not cause erosion.

(c) Reform damaged watering saucers.

(d) Remove weeds bi-monthly.

(e) Replace or re-spread damaged, missing or disturbed mulch.

(f) For non-mulched areas, cultivate monthly to keep top layer of soil friable.

(g) If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Contract Administrator prior to application.

(h) Apply fertilizer as directed by manufacturer's specifications.

(i) Remove dead, broken or hazardous branches from plant material.

(j) Keep trunk protection and tree supports in proper repair and adjustment.

(k) Remove trunk protection, tree supports and level watering saucers at end of warranty period.

(l) Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

(m) Submit monthly written reports to Contract Administrator identifying:

(i) Maintenance work carried out.

(ii) Development and condition of plant material.

(iii) Preventative or corrective measures required which are outside Contractor's responsibility.

E28.1.5 Warranty

(a) The Contractor shall, at his/her expense, warrant the Work against any and all defects or deficiencies resulting from insect infestation, disease and mechanical damage due to improper handling, installation or maintenance, for a period of two (2) year from the date of the Total Performance. Nursery stock damaged by vandalism or reasons beyond the control of the Contractor shall be replaced by the client.

(b) End-of-Warranty inspection will be conducted by the Contract Administrator.

(c) The Contract Administrator reserves the right to request material replacement or extend the Contractor's Maintenance responsibilities for an additional one (1) year if, at the end of the Warranty Period, leaf development and growth are not sufficient to ensure future survival of the plant material.

E28.1.6 Replacements

(a) During the Maintenance Period, the Contractor shall remove from Site any plant material that has died or failed to grow satisfactorily as determined by the Contract Administrator and replace as per Specifications within a maximum ten (10) day period from notification.

(b) Defective plants shall be replaced within three (3) days of notification to the Contractor.

(c) The Contractor shall extend Maintenance and Warranty on replacement tree for a period equal to the original Maintenance and Warranty Periods.

(d) The Contractor shall continue such replacement, Maintenance and Warranty until tree is acceptable.

E28.2 Materials

E28.2.1 Planting Soil

(a) Planting Soil shall consist of black top soil, a fertile friable natural loam containing by volume not less than 4% and no more than 25% of organic matter for clay loams, and not less than 2% and no more than 25% for sandy loams, with an acidity value ranging from pH 6.0 to 8.0 and capable of sustaining vigorous plant growth. Topsoil is to be free of any mixture of subsoil, clay lumps and free of stones and other extraneous matter. It is not to contain couch or crab grass rhizomes.

E28.2.2 Mulch

(a) Enviro Mulch shall be Charcoal Black Colour, free of leaves, branches and other extraneous matter. The recommended mulch shall consist of chips not less than 15mm not larger than 75mm in size and not more than 20mm thick.

(b) Contact for Enviro Mulch:
St. Boniface Pallet Company
220 Panet Road
Winnipeg. MB R2J 0S3

Telephone No. (204) 233-0383
Facsimile No. (204) 233-6633
Email: info@stbpallet.com

E28.2.3 Miscellaneous Materials

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

(b) Stakes shall be metal T-Bar, steel, 40x40x5x2440mm.

(c) ArborTie flat woven polyester guying

(d) Fertilizer shall be a slow-release formulation of low nitrogen and high phosphorus e.g., 10-50-12. Apply quantities at rates stated by product manufacturer.

(e) Root Ball Burlap shall be 150 g Hessian burlap, biodegradable.

(f) Wire Baskets shall be horticultural accepted product designed to carry the weight and to contain a burlap-covered root ball. Minimum diameter basket size is to conform to the same minimum diameter of the tree root ball for the respective minimum tree caliper sizes.

E28.2.4 Plant Material

(a) All nursery stock supplied shall be Canadian Prairie nursery grown, and of species and sizes indicated in the plant list on the drawings. Its quality shall be in accordance with the "Guide Specification for Nursery Stock of the Canadian Nursery Trades Association".

(b) Any nursery stock dug from native stands, wood lots, orchards, or neglected nurseries and which have not received proper cultural maintenance as advocated by the Canadian Nursery Trades Association shall be designated as "collected plants". The use of "collected plants" will not be permitted unless specified below.

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

(d) Plants larger than specified may be used if approved by the Contract Administrator. The use of such plants shall not increase the Contract price.

(e) Plants shall be free of disease, insect infestation, rodent damage, or environmental stress.

(f) Trees

(i) Trees are to be characteristically developed for their species and structurally sound, well branched, healthy and vigorous and densely foliated when in leaf. The tree is to have a healthy, well developed, fibrous root system which may be verified through a testing procedure that destructively samples one or more randomly selected root balls.

(ii) Trees are to have been root pruned regularly, but not later than one growing season prior to arrival on Site. The Contractor may be required to furnish documentation to the client on their root-pruning program. Trees in excess of 75mm caliper are to have been half root pruned during each of two successive growing seasons, the latter at least, one growing season prior to arrival on Site.

(iii) All parts of the trees, especially the lower branches, are to be moist and show live, green cambium tissue when cut.

(iv) Trees are to have only one, sturdy, reasonably straight and vertical trunk, and a well-balanced crown with fully developed leader.

(v) Trees are to be free of disease, insect infestation, rodent damage, sun scald, frost cracks, abrasions, unhealed scars, scars exceeding 5cm in diameter, major forks or crooks in the trunk, broken branches, or angled leaders. Trees having the above defects will not be accepted by the Contract Administrator.

(vi) Trees having a leader which has developed at a sharp angle to the trunk as a result of pruning or trunk damage will not be accepted.

(vii) Trees exhibiting suppressed, weakly developed branches due to competition from other closely spaced trees in the nursery will not be accepted. Trees exhibiting dead branches will not be accepted.

(viii) Any tree that has come out of dormant stage and is too far advanced will not be accepted unless prior approval obtained. Approval is required for any tree which has been held in cold storage.

(ix) Balled and burlapped trees in excess of a 3m height must have been dug with large firm ball. Roots in root balls must be comprised of 75% fibrous and feeder root systems. Secure root balls with burlap, heavy twine and rope. For trees 75mm or more in caliper, wrap ball in double layer of burlap and drum lace with minimum 10mm diameter rope. Protect root balls against sudden changes in temperature and exposure to heavy rainfall.

(x) Tree spade dug trees are to be dug with mechanized digging equipment with hydraulic spade. Lift root ball from hole, place in wire basket designed for purpose and lined with burlap. Tie basket to ball with heavy rope. Take care not to injure trunk of tree with wire basket ties or rope.

(xi) Use of collected or native trees is not permitted.

E28.2.5 Tree Quantity and Size

(a) Trees are to be planted at the quantities and caliper listed on the Plant Lists which are shown on the drawings. Any variation from the specified quantity is to be clearly identified on the Schedule of Prices. Any variations to species, size or caliper of specified trees will require a request for approval from the Contract Administrator.

(b) Any changes in planting locations will be determined on-site by the Contract Administrator.

(c) The Contractor shall supply trees as indicated in the Schedule of Prices and PLANT LISTS.

(d) Trees are to conform to the measurements specified in the on drawing PLANT LISTS, except those trees larger than specified may be used if approved by the Contract Administrator.

(e) Trees are to be measured when the branches are in their normal position. Height dimensions specified are to refer to the main body of the tree and not from branch tip to root base. Where trees have been measured by caliper or diameter, reference is to be made to the diameter of the trunk measured 15cm above the ground as the tree stands in the nursery prior to lifting. Caliper of tree shall be appropriately designed on a permanently fixed tag on one of the branches.

E28.2.6 Shipment and Pre-Planting Care

(a) Coordinate shipping of trees and excavation of holes to ensure minimum time lapse between digging and planting.

(b) Tie branches of trees securely, and protect trees against abrasion, exposure and extreme temperature change during transit. Avoid binding of trees with rope or wire which would damage bark, break branches or destroy natural shape of tree. Give full support to root ball of trees during lifting.

(c) Cover tree foliage with tarpaulin, and protect bare roots by means of dampened straw, peat moss, saw dust or other acceptable material to prevent loss of moisture during transit and storage.

(d) Remove broken and damaged roots with sharp pruning shears. Make clean cuts, and cover cuts over 10mm diameter with a tree wound dressing.

(e) Keep roots moist and protected from sun and wind. Heel-in trees which cannot be planted immediately in shaded areas and water well.

E28.3 Construction Methods

E28.3.1 Workmanship

(a) All areas and locations provided for planting shall be staked out or painted on Site by the Contractor according to layout shown on the Drawings. Excavation shall not proceed until the layout has been inspected and approved by the Contract Administrator. Excavation shall not be undertaken until all underground utilities have been located and protected.

(b) Coordinate operations. Keep Site clean and planting holes drained. Immediately remove soil or debris spilled onto street pavement, grass or sidewalk.

E28.3.2 Planting Time

(a) Plant deciduous trees during dormant period before buds have broken. Trees noted for spring planting only, must be planted in dormant period.

(b) Plant only under conditions that are conducive to health and physical conditions of trees.

(c) Provide planting schedule to Contract Administrator. Extending planting operations over long period using limited crew will not be accepted.

(d) The Contractor must obtain all above and below ground clearances from all the utilities as well as the appropriate District Operations Branch in a timely manner so as not to jeopardize the schedule of the complete tree planting Contract.

E28.3.3 Excavation

(a) Tree Pit to be dug with backhoe.

(b) Excavate tree pits as indicated by stakes or paint marks.

(c) Protect bottom of excavations against freezing.

(d) Remove water which enters excavations prior to planting. Ensure source of water is not ground water and notify Contract Administrator.

(e) Tree pit depth shall be such that the top of the root ball is even with the existing grade, and the root flare to be at or slightly above the finished grade.

(f) Upon excavation of the planting bed, the excavation shall be backfilled with a topsoil mixture to a depth to permit adequate installation and stabilization of the plant material. Topsoil shall be placed in accordance with City of Winnipeg Standard Construction Specification CW 3540 to a 300 mm depth.

E28.3.4 Installation

(a) Planting shall be done during periods of suitable weather conditions and in accordance with locally accepted practice.

(b) Trees are to be planted within forty-eight (48) hours of excavation from the nursery.

(c) No tree pit is to be left open at the end of the Contractor's Work Day. Planting program is to be planned to ensure that all approved trees delivered to the Site at designated planting locations are installed and thoroughly watered the same day as delivery.

(d) With balled and burlapped root balls and root balls in wire baskets, burlap shall be loosened and cut away from the top 1/3 without disturbing root ball. Wire shall be cut away and removed from the top 1/3 of the root ball. Burlap or rope shall not be pulled from under root ball. Non-biodegradable wrapping shall be removed.

(e) After inserting the tree and tamping the root system with topsoil in layer of 150mm, water shall be poured in until the pit is thoroughly soaked. Filling of the hole shall then be completed, and the fill-in soil shall be packed firmly around the roots, leaving a concave surface for convenient watering. After filling, the planting shall be watered at frequent intervals.

(f) Each tree is to have an earth saucer at its base having a diameter as large as the excavation with a 10cm lip formed at the perimeter of the saucer to retain water.

(g) All nursery stock shall be set plumb in the centre of pits and at levels as shown on the planting details after settlement has taken place.

(h) Each tree must be planted such that the trunk flare is visible at the top of the root ball. Trees where the trunk flare is not visible shall be considered a deficiency and payment for the planting will not be received until the deficiency is addressed. Do not cover the top of the root ball with soil.

(i) Nursery stock shall be faced to give the best appearance or relationship to adjacent structure and to the approval of the City of Winnipeg representative. Trees shall be placed equal to depth they were originally growing in nursery.

E28.3.5 Supply and Installation of Mulch

(a) Contractor to supply and install mulch in tree pit, planters and in areas as indicated in the Drawings.

(b) Mulch supplied shall cover entire planting area to a consistent depth of 50mm - 100mm and must not be placed within 8cm (3in.) of the trunks of trees.

(c) Mulch to be removed and disposed of when native seeding occurs.

E28.3.6 Fertilizing

(a) When planting is completed, give surface of planting saucer dressing of fertilizer meeting the requirements of Specification. Mix fertilizer thoroughly with top layer of planting soil and water in well.

E28.3.7 Trunk Protection

(a) Install trunk protection on trees as indicated.

(b) Install trunk protection prior to installation of tree supports when used.

E28.3.8 Pruning

(a) The Contractor shall provide a licensed Manitoba Certified Arborist for each work crew or work site.

(b) Employ clean sharp tools and make cuts flush with branch collars. Remove dead and injured branches.

E28.3.9 Watering

(a) Trees are to be watered during the planting procedure as described previously, and once a week thereafter, or more frequently if required, during the growing season.

(b) A complete record is to be kept of each series of waterings for all planted trees noting: 1) location, and 2) date of watering. This record shall be sent bi-weekly to the Contract Administrator.

(c) Apply 40 litres of water per 25mm caliper per application using deep root feeder or low/pressure nozzle and hose. The water stream must not gouge out a hole in the soil and mulch.

E28.4 Measurement and Payment

E28.4.1 Installation of trees shall be measured on a per unit basis. The amount to be paid for shall be the total number of trees supplied and installed in accordance with this Specification and the Construction Drawings, and as acceptable to the Contract Administrator.

E28.5 Basis of Payment

E28.5.1 Payment for Installation of trees shall be paid for at the Contract Unit Prices for the "Items of Work" listed below. This price shall be payment in full for supplying all labour, equipment and materials, and performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

Item of Work:

(a) Trees

(b) Two-year Plant Maintenance

E29. NATURALIZATION

E29.1 General

E29.1.1 The work to be done by the Contractor under this Specification shall include the supply, installation, labour, equipment, tools and all other things necessary for and incidental to the satisfactory performance and completion of all work shown in the drawings and as hereinafter specified, including, but not necessarily confined to the following:

(a) Site preparation (growth media preparation)

(b) Weed control (by City of Winnipeg)

(c) Erosion control (by City of Winnipeg)

(d) Supply and install topsoil.

(e) Native grass seeding and establishment (by City of Winnipeg)

E29.1.2 The Contractor shall ensure coordination with other site works.

E29.1.3 The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification. All materials shall be subject to inspection and testing by the Contract Administrator. There shall be no charge to the City for any materials taken by the Contract Administrator for inspection and testing purposes.

E29.1.4 Submittals

(a) Detailed work schedule

(b) Weed Control Plan (by City of Winnipeg)

(c) Erosion Control Plan (by City of Winnipeg)

(d) Native seeding establishment plan (by City of Winnipeg)

(e) Herbicide applicator's license (by City of Winnipeg)

(f) Monthly written report of plant material condition during establishment period (by City of Winnipeg)

(g) Soil analysis report from accredited soil testing lab. Testing parameters to be supplied by the Contract Administrator.

E29.2 Materials

E29.2.1 Topsoil

(a) Topsoil shall consist of 60% organic matter, 30% Topsoil (clay textured), and 10% sand. Soil shall be free of roots and stones over 30 mm in diameter or subsoil clay lumps over 30 mm in diameter.

(b) Salinity ratings shall be less than 1.0 mmhos/cm. The pH range shall be between 6.5 and 7.5.

(c) Topsoil shall be free of residual chemical properties originating from past herbicide applications or other forms of contamination which can potentially negatively affect the growth and successful establishment of planted material as specified.

(d) Topsoil shall not contain the roots of quack grass (*Elymus repens*), smooth brome (*Bromus inermus*), Canada thistle (*Cirsium arvense*), sweet clover (*Melilotus officinale*, *M. alba*), dandelion (*Taraxascum officinale*) roots or other noxious weeds.

E29.2.2 Topsoil Testing

(a) The Contractor shall inform the Contract Administrator of the proposed topsoil source. The Contract Administrator reserves the right to reject topsoil not conforming to the requirements of this Specification.

(b) The Contractor will submit soil samples for review and approval by the Contract Administrator. Topsoil will be subject to tests for nitrate, phosphate, potassium, sulphate, pH, E.C. (salinity) and volume of organic matter by a testing laboratory designated by the Contract Administrator.

E29.2.3 Erosion Control

(a) Common oat seed to be used in cover crop seeding.

(b) Erosion control blanket shall be made of 100% coconut fibre with double photodegradable netting, or approved alternative.

(c) Erosion control wattles shall be Curlex Sediment Logs, or approved alternative.

E29.2.4 Native Seed

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

(b) Two seed mixes will be used as shown in Tables 1 and 2.

(c) The Contractor will purchase seed mixes supplied by The Contract Administrator, pick up and deliver them to the work site. The Contractor must supply all equipment and labour required to transport seed.

(d) Storage for seed shall be in cool dry location. The Contractor shall provide secure, weather and rodent proof storage for the seed prior to planting.

(e) Any seed lost or damaged while stored shall be replaced by The Contractor and will be considered incidental to the contract.

Table 1. Upper slope native grass seed mix for use at the Transcona Pond.

Species	Drill Seeding Rate (PLS lb/acre)
Side-oats grama	0.50
Green needle grass	1.50
Western wheatgrass	0.75
Little blue stem	0.75
Blue grama	0.70
Northern wheatgrass	0.40
Canada wild rye	0.30
Awned wheatgrass	0.20
Slender wheatgrass	0.30
Big blue stem	2.00
Switch grass	0.20
Nodding Brome	1.50
Purple Prairie Clover	0.60
Oats	3.00
Total	**12.70**

Table 2. Lower slope native grass seed mix for use at the Transcona Pond.

Species	Drill Seeding Rate (PLS lb/acre)
Green needle grass	0.40
Western wheatgrass	0.60
Northern wheatgrass	0.60
Little blue stem	0.50
Big blue stem	1.40
Virginia Wildrye	1.20
Rough hairgrass	0.1
Nodding brome	0.7
Fowl Bluegrass	0.50
Switch grass	1.50
Canada wild rye	0.60
Slender wheatgrass	0.60
Oats	3.00
Total	**11.70**

E29.3 Construction Methods

E29.3.1 Growth Media Preparation

E29.3.2 Subsoil

(a) The subsoil shall be graded in accordance with Specifications, the Construction Drawings.

(b) The subsoil grade on seeded areas shall be disked (fractured) to a minimum depth of 250 mm prior to topsoil placement to the satisfaction of the Contract Administrator.

E29.3.3 Topsoil

(a) Prior to any topsoil placement, the Contract Administration shall conduct on-site field inspection.

(b) 150 mm of Topsoil shall be spread across the seeding area. Topsoil shall be placed in a manner as to avoid compaction of disked subsoils.

(c) Once placed, topsoil shall be incorporated evenly into disked subsoils to a maximum depth of 200mm.

(i) The Contractor shall take care not to bury topsoil when incorporating into disked subsoils.

(d) Spring topsoil placement, incorporation and seedbed grooming/conditioning must be completed no later than June 8. Topsoil placement after June 8 shall be at the direction of the Contract Administrator.

E29.3.4 Fine Grading

(a) Topsoil and Finish Grading shall be as shown on the drawings.

(b) The Contractor shall fine grade Topsoil, to eliminate rough spots, ruts or other similar low areas to ensure positive drainage and to facilitate consistent seed placement and seed rate during planting.

(c) The incorporated Topsoil shall be rolled or harrow/packed in order to consolidate soil material and leave the surface smooth, firm and level to the satisfaction of the Contract Administrator.

(d) All seeded areas are to be free of woody debris and rocks. The Contract Administrator shall advise the Contractor of any debris clean-up requirements.

E29.3.5 Erosion Control

(a) Cover crops shall be seeded for erosion control purposes during the pre-native planting preparation period (Year 1). Cover crop shall be employed at all times prior to permanent cover planting to minimize the exposure of soils to erosion. Weed control activities during this period must take into account the management of the cover crop (i.e., timing and type of treatment).

(i) Common oats to be seeded immediately after topsoil placement and seedbed preparation at the discretion of the Contract Administrator.

(ii) Cover crop will be seeded at a rate of 35-40lbs/acre or at the direction of the Contract Administrator.

(iii) Erosion control crop must be managed to prevent excessive built-up of plant stock (trash) which could interfere with proper native seeding depth and seed-soil-contact.

(iv) Rutting or damage caused during cover crop management period shall be repaired at the Contractor's cost to the satisfaction of the Contract Administrator.

(b) The Contractor shall evaluate the project site for potential soil erosion risks during the life of The Project and take appropriate mitigation measures to ensure soils are not eroded.

(c) If soil erosion occurs, bringing fine grading of the site out of line with the specification, the Contractor shall repair the fine grading to the approval of the Contract Administrator at the expense of the Contractor.

(d) Erosion control blanket or approved alternative shall be installed as per manufacturers' specification, as shown on the drawings, following seeding activities. Maintenance, removal, and disposal of erosion control blanket, as

required by the Contractors permanent establishment plan, is considered incidental to Native Grass Seeding.

E29.3.6 Weed Control

(a) Properly timed weed control shall be undertaken in the seeded areas to facilitate grass seedling establishment.

(b) The fresh Topsoil shall be prepared for native grass seeding by removing weeds through mechanical and chemical controls. Prior to seeding perennial cover the Contractor must maintain the site by controlling weeds through at least one growing season. The Contractor must also have demonstrated control of perennial weeds prior to seeding perennial cover.

(c) Products, timing and rates will be supplied by a certified herbicide applicator with experience in weed control in native revegetation projects.

(d) Weed control prescriptions shall be reviewed by The Contract Administrator prior to any weed control work.

(e) Herbicide is to be applied in accordance with the manufacturer's instructions and the Manitoba Agriculture Guide to Crop Protection and Herbicide Recommendations for Landscape Applicators, latest editions.

(f) Glyphosate cannot be used at any time following Native Seeding.

(g) The Contractor shall not spray broad-leaf herbicide in areas seeded to native grass cover prior to native seedlings reaching the 2-3 leaf stage. Determination of 2-3 leaf stage shall be by the Contract Administrator. No herbicide application shall be undertaken without consent of the Contract Administrator.

(h) Weed control techniques must eliminate spray drift to protect adjacent non-target plantings, flowers in flower patches, adjacent habitat and adjacent property.

(i) The Contractor shall undertake all reasonable and permissible means of restricting seed-rain of invasive or otherwise problematic weed species from areas immediately adjacent The Project for the duration of The Project.

E29.3.7 Seeding

(a) Prior to seeding permanent native grass cover, the seeding area shall be free of 1^{o} and 2^{o} noxious perennial grassy and broadleaf weeds listed in the Manitoba Noxious Weed Act C.C.S.M. c. N110.

(b) Prior to seeding permanent native grass cover seeding areas shall be free of weedy perennial species that may not be listed as noxious weeds, but which will become invasive within the planting over time, including but not limited to, Quackgrass, Smooth brome, Sweet clover and Dandelion.

(c) Annual weeds including green and yellow foxtail (*Setaria* spp.), Barnyard grass (*Echinochloa crus galli*) if present to be controlled to within levels that will not compromise short term or long-term native grass stand establishment. Post native grass planting control of these species, and species with similar tendencies in native plantings, shall be at the direction of the Contract Administrator.

(d) Seeding to be undertaken between May 20 and June 15 unless otherwise specified by The Contract Administrator.

(e) Where site conditions allow, seeding shall be undertaken using a Truax brand two or three box native seed drill with seed box agitators, on-row packers and depth bands, capable of uniformly applying the specified mixes to a depth of 5.0-12.0mm (0.25” – 0.5”).

(f) The Contract Administrator shall supply all seeding rates for Native Seed Mixes and shall be provided on a bulk seeds per 1/10 square meter (approximately / ft^2) basis.

(g) Any broad-cast seeding shall be at the direction of The Contract Administrator. Broadcast seeding requires the same seedbed conditions outlined in site preparation.

(h) Broadcast seeding is preceded by 1 or more harrow passes and is then followed by a 2nd harrow pass once seed has been spread at a broadcast rate specified by The Contract Administrator.

(i) An industrial fertilizer applicator may be used for broadcast seeding to facilitate consistency of seed flow. A manual broadcast seeder may be used for small areas requiring manual seeding.

(j) Contour seeding must be employed to discourage down slope erosion on sloped areas.

(k) While on-site, seed requiring short-term storage shall be stored by the Contractor and in communication with the contract administrator, in a secure, dry and rodent-free environment either at or below ambient outdoor temperatures.

(l) Following seeding, The Contractor shall return to the Contract Administrator the shipment tags from each bag of seed planted on site.

E29.4 Commencement of Maintenance Period

(a) Immediately after the completion of the final seeding operation, to the satisfaction of the Contract Administrator, the Contractor shall commence and pay for continuous maintenance of the seeded area until the criteria specified for Termination of the Maintenance Period has been met.

(b) Any deficient, damaged or vandalized areas shall be reseeded by the Contractor within three working days after receiving notification from the Contract Administrator and the area so reseeded, shall be further maintained until it meets the criteria specified in Maintenance of Seeded Area.

E29.5 Maintenance of Seeded Area

(a) The Contractor shall water all seeded areas in sufficient quantities and at frequency required to maintain soil under seeded area continuously moist to a minimum depth of 100 mm. Any damage, which may occur through washout of the soil during the maintenance period shall be repaired and maintained until it meets the criteria specified in B4.6. All costs to provide water for seeded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.

(b) The Contractor shall apply herbicide with spot spraying when broadleaf weeds start developing in competition with grasses. Apply herbicide in accordance with the City of Winnipeg Weed Control Standards and Procedures, manufacturer's instructions and the Manitoba Agriculture Guide to Crop Protection and Herbicide Recommendations for Landscape Applicators, latest editions and the following criteria:

(i) Use 2,4-D Amine or MCPA Amine herbicide for susceptible broadleaf weeds.

(ii) Use a mixture containing 2,4-D Amine or MCPA Amine, Mecoprop and Dicamba for 2,4-D resistant plants.

(iii) Do not apply to newly seeded areas.

(iv) Do not water within one working day after application.

(v) Apply when winds are less than 20 km/h and air temperature is above 10° (degrees) Celsius.

(vi) Avoid use of pure Dicamba solutions near trees and shrubs.

E29.6 Termination of Maintenance Period

(a) The Contract Administrator will terminate the maintenance period after the following criteria has been met:

(i) The certified seed sowed meets the requirements specified in herein.

(ii) The seeded area has a firm, uniform and even surface.

(iii) The seeded area has established into a healthy, vigorously growing condition.

(iv) The seeded area is free of bare and dead spots and without more than ten (10) broadleaf weeds per fifty (50) square metres.

(v) The seeded area has sufficient shoot growth density that no surface soil is visible.

E29.7 Method of Measurement

E29.7.1 Supply, placement and establishment of naturalization will be measured on an area basis. The area to be paid for shall be the total number of square meters installed in accordance with this specification and accepted by Contract Administrator.

(a) Quantities of units are based on the proposed design drawings as supplied by the Contract Administrator.

E29.8 Basis of Payment

(a) Placement of topsoil and related Work specified herein will be measured on an area basis and paid for at the Contract Unit Price per square meter for "Site Preparation". The area to be paid for shall be the total number of square meters of topsoil in accordance with this Specification, accepted and measured by the Contract Administrator upon completion of installation.

E30. WILLOW PLANTING

E30.1 General

E30.1.1 The work to be done by the Contractor under this Specification shall include the supply, installation, labour, equipment, tools and all other things necessary for and incidental to the satisfactory performance and completion of all work as shown on the Drawings and hereinafter specified, including, but not necessarily confined to the following:

(a) Supply and install dormant woody cuttings (by City of Winnipeg)

E30.1.2 Related Sections

(a) Section E29 Naturalization.

E30.1.3 Supply and Handling of Materials

(a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification. All materials shall be subject to inspection and testing by the Contract Administrator. There shall be no charge to the client for any materials taken by the Contract Administrator for inspection and testing purposes.

E30.1.4 Definitions

(a) Woody cutting: Cuttings are portions of live branches or stems of certain species which, when planted appropriately, will establish as a new individual plant. Woody cuttings are collected while plants are dormant (not actively growing), typically from late October – early March.

(b) Donor Site: A naturally occurring site where propagules are harvested for the revegetation of a disturbed site.

(c) Stinger: A long narrow metal probe pushed into the ground to create a planting hole for installation of woody cuttings within the revegetation zone.

E30.1.5 Source Quality Control

(a) Source(s) for woody cuttings must be within the hardiness Zone 3a.

(b) Proposed source(s) for cutting collection shall be submitted to, and approved by the Contract Administrator prior to harvesting plant material.

E30.2 Materials

E30.2.1 Topsoil

(a) As per Section E29 Naturalization.

E30.2.2 Woody Cuttings

(a) Woody cuttings shall be as shown on the drawings.

(b) Woody cuttings shall be sourced or harvested from site conditions that best match the local and regional project site conditions in the lower bank revegetation zone.

(c) The Contractor shall identify the proposed location of the donor site for approval by the Contract Administrator prior to undertaking the work. Request for approval must be submitted 48 hours in advance.

(d) Woody cuttings must be free of diseases and deformity.

(e) Approval of woody cuttings harvested and used for planting shall be at the discretion of the Contract Administrator. The Contract Administrator reserves the right to reject material.

(f) Woody cuttings must be sourced and installed while in a dormant state.

(g) Woody cuttings shall be cut to a length of no less than 1500mm for sandbar willow (*Salix exigua*).

(h) Woody cuttings shall be approximately 20 – 30mm in diameter at the lower end (bottom) of the cutting.

(i) Cut ends of woody cuttings must be sealed with pruning paint immediately following removal from the Donor Site.

E30.2.3 Pre-planting care and handling of Woody Cuttings

(a) Woody cuttings shall be stored no longer than one week.

(b) Store in temperatures of roughly 0 to 3°C in moist conditions until the time of installation in order to maintain dormancy and prevent desiccation of plant material.

(c) Stored cuttings must not be exposed to extreme weather conditions.

(d) Store cuttings in a secure location to prevent damage by animals.

(e) The Contractor should take provisions to ensure there is no damage to the material during handling and storage.

(f) Soak woody cuttings in water for a minimum of 24 hours and no longer than 5 days prior to planting.

E30.3 Execution

E30.3.1 Workmanship

(a) Areas and locations for planting shall be staked out or painted on Site by the Contractor as per the Drawings. Planting shall not proceed until the layout has been reviewed and approved by the Contract Administrator.

(b) Coordinate operations. Keep Site clean and planting holes drained. Remove soil or debris spilled onto adjacent spaces.

E30.3.2 Planting Time

(a) Install dormant woody within 10 days of completion of riprap placement, or during an alternative time window as approved by the Contract Administrator.

E30.3.3 Site Preparation for Woody Cuttings

(a) Woody cuttings will be placed into prepared ‘Divots’ as shown on the Drawing.

(b) Divots will be arranged along the top of the newly placed riprap and along the lower clay toe berm as shown in the Drawing.

(c) The Divot shall be created using a ‘Stinger’, auger, or water jet tool capable of creating a 1370mm (4.5 feet) deep X 100mm (4 inches) wide hole into which woody

cuttings will be placed. Alternative methods and equipment must be approved by the Contract Administrator prior to commencement of work.

(d) Divots must be spaced at the intervals and within the planting areas as shown in the Drawing.

E30.3.4 Woody Cutting Installation

(a) Install woody cuttings within one week of harvesting. If a delay between harvesting and installation occurs, ensure storage and handling as described in E29 Naturalization and E30 Willow Planting.

(b) Immediately prior to cutting placement into the Divot, make a fresh cut at the bottom (larger) end of the cutting. Make the cut at roughly a 45° angle. Do not respray this fresh cut at the bottom of the cuttings with pruning paint.

(c) Place two (2) Cuttings, bottom end first, into each Divot. Ensure that willow cuttings are at least 1370mm (roughly 5 feet) into the Divot. This may require minor tamping or twisting to settle the Cuttings to an appropriate depth. The Contractor shall not damage any parts of individual Cuttings including bark during installation.

(d) Backfill Topsoil into the Divot after cuttings have been placed in the Divot. Topsoil should be friable (not clumpy) and easily placed evenly throughout into the Divot with no air voids. Shaking the installed Willow Cuttings can help settle topsoil to appropriate depths and minimize voids.

(e) Leave 100mm – 150mm of the cutting showing above grade. Trim off any material exceeding 150mm above grade and reseal with pruning paint. Do not apply pruning paint to the sides of the cutting except where the bark has been slightly damaged.

(f) Significantly damaged woody cuttings must be discarded and replaced with material in acceptable condition.

(g) Do not damage exposed ends of woody cuttings following installation.

E30.3.5 Watering

(a) During establishment, Woody Cuttings are to be watered in the event of prolonged drought conditions.

(b) Any watering required during extreme drought conditions shall be recorded by The Contractor, sent bi-weekly to the Contract Administrator.

E30.3.6 Maintenance

(a) The Contractor shall be responsible for the maintenance of woody plantings for a period of one (1) calendar year following planting reviewed and accepted by Contract Administrator.

(b) Remove weeds as per overall weed control strategy.

E30.3.7 Acceptance

(a) A minimum of 75% of planted woody cuttings show healthy normal growth within one (1) calendar years following installation.

(b) Weed control has been undertaken throughout the riprap revegetation area in accordance with the Contractors approved Weed Control Plan.

E30.3.8 Warranty

(a) The Contractor shall, at his/her expense, warranty the Work against any and all defects or deficiencies resulting from mechanical damage due to improper handling, installation or maintenance, for a period of one (1) calendar year.

(b) Plant material damaged by vandalism or reasons beyond the control of the Contractor shall be replaced by the client.

(c) End-of-Warranty inspection will be conducted by the Contract Administrator one (1) calendar years after final acceptance (during active growing season).

E30.3.9 Replacements

(a) During the Warranty Period, the Contractor shall remove from Site any plant material that has died or failed to grow satisfactorily as determined by the Contract Administrator and replace as per Specifications within the next appropriate planting window.

E30.3.10 Measurement and Payment

(a) As stated in E29 Naturalization, the City of Winnipeg Naturalist Services will be responsible for willow planting. While the Contractor is responsible for Site Preparation (growth media preparation) and Supply and Install Topsoil, no separate measurement or payment will be made to the Contractor for the Willow Planting as outlined herein.

APPENDIX 'A'

GEOTECHNICAL SUMMARY

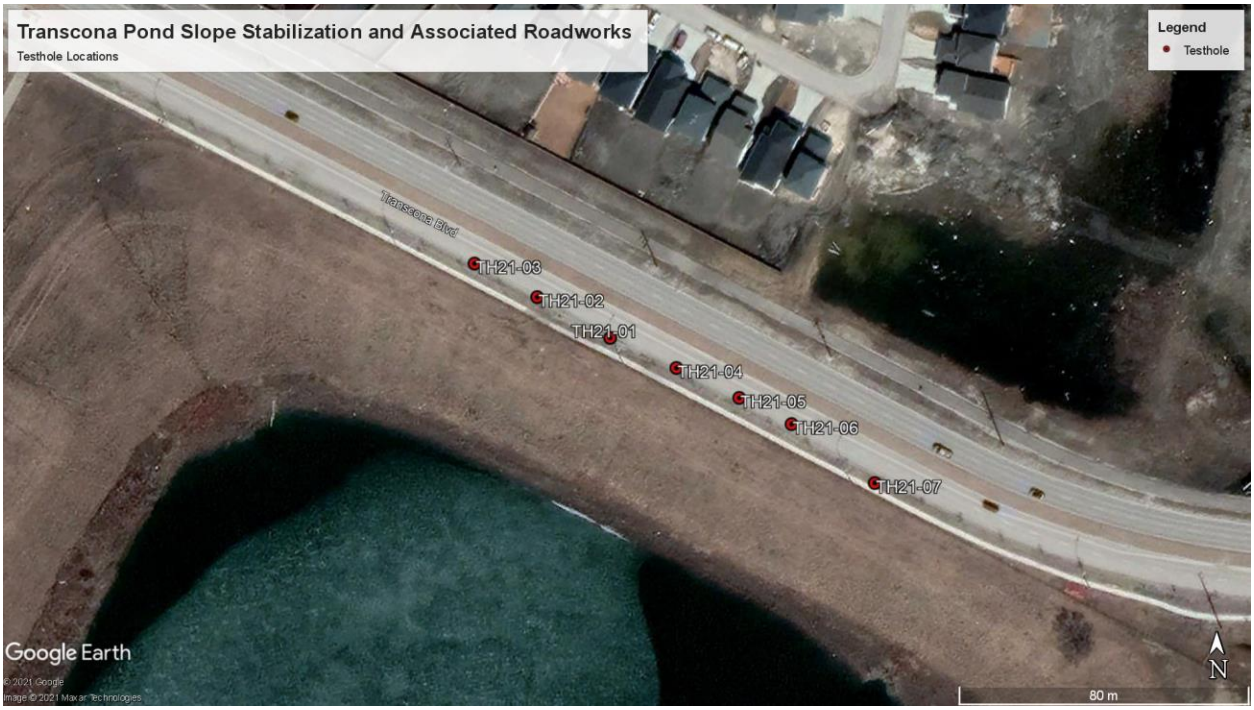
APPENDIX 'A' - GEOTECHNICAL SUMMARY

TABLE OF CONTENTS

The geotechnical summary is provided to aid in the Contractor's evaluation of the existing pavement structure and/or soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. However, variations in pavement structure and/or soil conditions may exist between test holes and fluctuations in groundwater levels can be expected seasonally and may occur as a result of construction activities. The nature and extent of variations may not become evident until construction commences.

Geotechnical Report for 2021 Preliminary Design Investigations (Shallow Test Holes for Roadworks)

Test Hole Locations



Summary of Core Samples

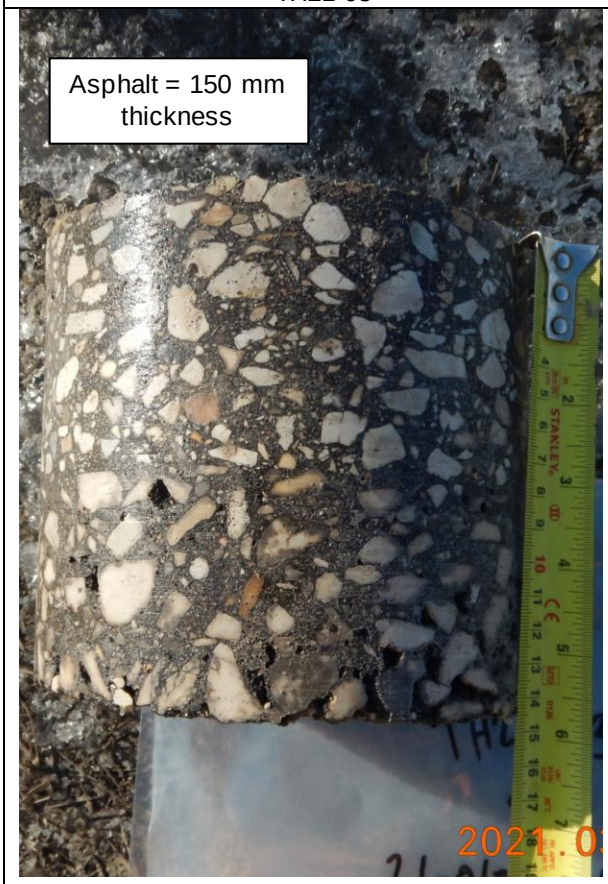
City of Winnipeg - Public Works
Transcona Deep Pond Slope Stabilization and Associated Roadworks
Detailed Design Geotechnical Investigations

Test Hole No	Location	Pavement Surface		Subgrade Description	Sample Location (m)	MC (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	PL	LL	PI
TH21-01	South lane of Transcona Blvd., 340m east of Chelston Gate.	Asphalt	152	Pavement Structure	0.1	N/A							
				Gravel Base (GW)	0.5	6.6							
				Clay Fill	0.8	31.4	0.1	9	19.4	71.5	23	71	48
					1.1	31.9							
					1.4	36.1							
TH21-02	South lane of Transcona Blvd., 315m east of Chelston Gate.	Asphalt	152	Pavement Structure	0.1	N/A							
				Gravel Base (GW)	0.4	5.9							
				Clay Fill	0.8	42.9							
					1.1	36.8							
					1.4	32.3							
					1.7	35.3							
				Clay (CH)	2.2	40.5							
					2.9	53.5							
					3.7	48							
TH21-03	South lane of Transcona Blvd., 300m east of Chelston Gate.	Asphalt	152	Pavement Structure	0.1	N/A							
				Gravel Base (GW)	0.5	10.5							
				Clay Fill	1.1	37	0.8	2.3	22.5	74.4	28	87	59
					1.4	35.5							
				Sand Fill	1.6	8.3							
TH21-04	South lane of Transcona Blvd., 360m east of Chelston Gate.	Asphalt	152	Pavement Structure	0.1	N/A							
				Gravel Base (GW)	0.3	3.8							
TH21-05	South lane of Transcona Blvd., 380m east of Chelston Gate.	Asphalt	152	Pavement Structure	0.1	N/A							
				Gravel Base (GW)	0.6	7.4							
				Clay Fill	1.1	30	0.6	1.6	43.3	54.5	21	72	51
					1.4	30.3							
					1.7	28.9							
					2	42.6							
					2.6	47.9							
					3.2	46							
TH21-06	South lane of Transcona	Asphalt	152	Pavement Structure	0.1	N/A							

	Blvd., 380m east of Chelston Gate.			Gravel Base (GW)	0.6	4.6							
				Clay Fill	1.2	29.6							
					1.4	33.5							
					1.6	33.4							
				Sand Fill	2	10.4							
				Clay (CH)	2.6	44.7							
					3.5	45.9							
TH21-07	South lane of Transcona Blvd., 425m east of Chelston Gate.	Asphalt	152	Pavement Structure	0.1								
				Gravel Base (GW)	0.5								
				Clay Fill	1.1								
					1.4								
					1.7								
				Clay (CH)	2								
					2.3								
					2.6								
					3.5								

Pavement Core Photos

Transcona Boulevard	
TH21-01	TH21-02
	

Transcona Boulevard	
TH21-03	TH21-04
	

Transcona Boulevard	
TH21-05	TH21-06
	

Transcona Boulevard	
TH21-07	
	

Geotechnical Report for Previous (pre-2021) Investigations

Test Hole Locations

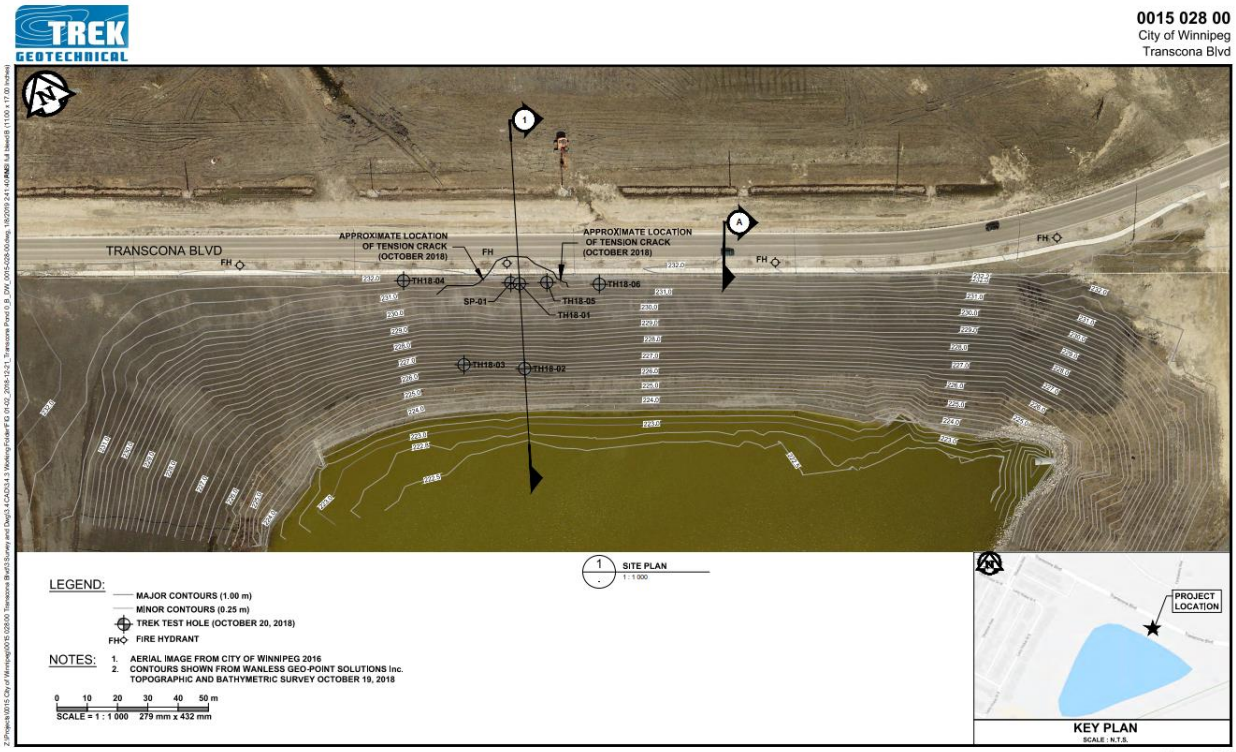
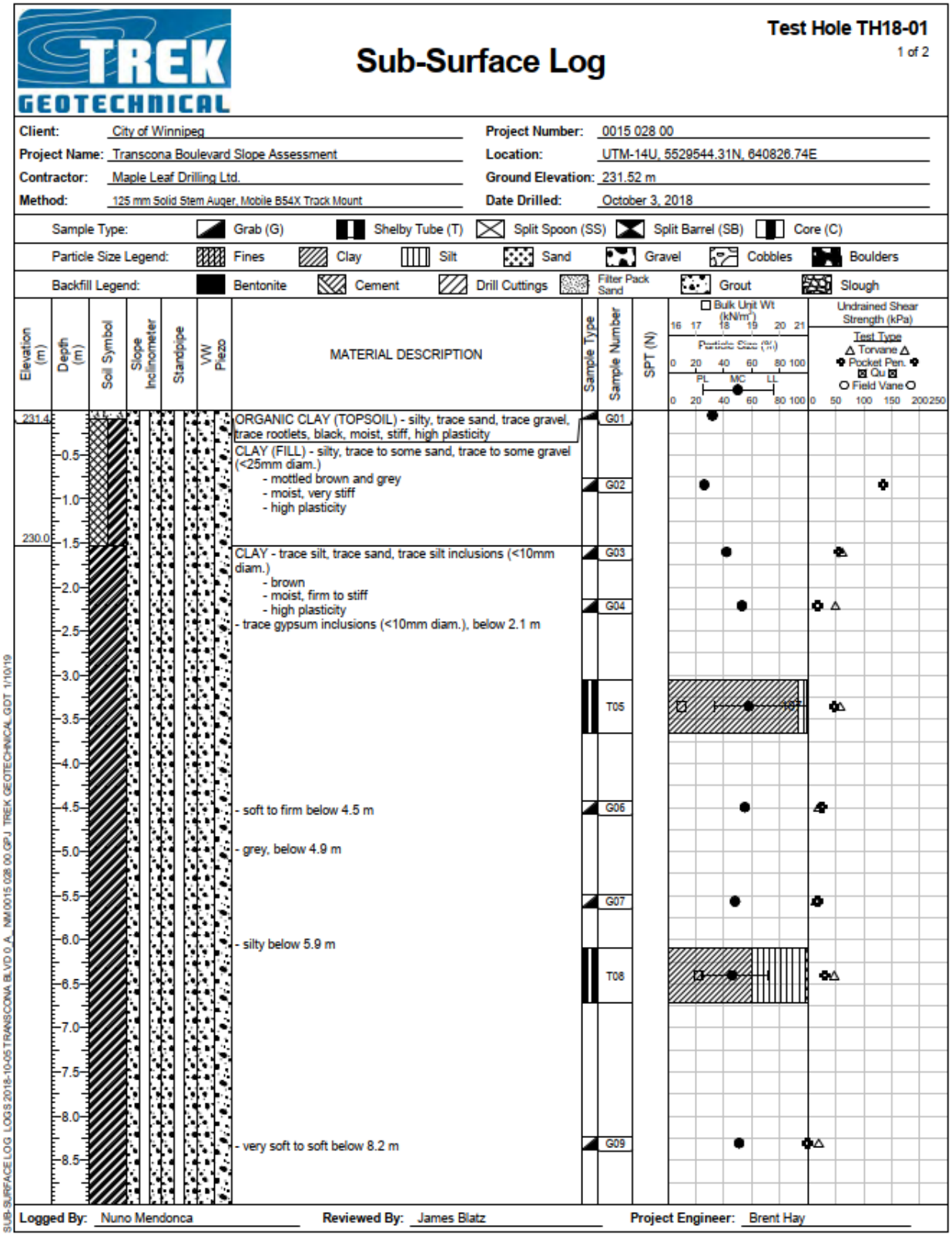


Figure 01
SITE PLAN

Template Version: eC20200911 - Const Road Works

Test Hole Log for TH18-01 (Trek)



Template Version: eC20200911 - Const Road Works

TREK GEOTECHNICAL

Sub-Surface Log

Test Hole TH18-01
2 of 2

Elevation (m)	Depth (m)	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)
	9.5				
	10.0				
	10.5	- very soft below 10.5 m	T10		15.9
	11.0			G11	
	11.5				
	12.0			G12	
	12.5				
	13.0				
	13.5			G13	
	14.0				
	14.5				
216.4	15.0	SILT (TILL) - some clay, some sand, trace gravel - light grey - moist, loose to compact		G14	
	15.5				
	16.0			G15	
214.6	16.5				

Soil Symbol | Slope Inclinometer | Standpipe | VW Piezo

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
0 20 40 60 80 100

Undrained Shear Strength (kPa)
Test Type
△ Torvane △
✤ Pocket Pen. ✤
⊠ Qu ⊠
○ Field Vane ○
0 50 100 150 200 250

END OF TEST HOLE AT 16.9 m IN SILT (TILL)
Notes:
1) Power auger refusal at 16.9 m in silt (till).
2) Seepage observed below 10.6 m. Sloughing observed below 16.6 m.
3) Test hole open to 16.6 m immediately after drilling.
4) Slope Inclinometer (SI-01) installed to 16.9 m.
5) Standpipe SP-01 and vibrating wire (VW-01) installed in a companion hole located 3.0 m east of test hole. SP-01 installed in silt(till) at 16.6 m. VW-01 tip installed in clay at 9.6 m.
6) Water level shown measured in SP-01 on October 10, 2018.

Logged By: Nuno Mendonca **Reviewed By:** James Blatz **Project Engineer:** Brent Hay

SUB-SURFACE LOG LOGS 2018-10-05 TRANSCONA BLVD 0 A NM 0015 028 00.GPJ TREK GEOTECHNICAL.GDT 1/10/19

Template Version: eC20200911 - Const Road Works

Test Hole Log for TH18-02 (Trek)

TREK GEOTECHNICAL

Sub-Surface Log

Test Hole TH18-02
1 of 2

Client:	City of Winnipeg	**Project Number:**	0015 028 00
Project Name:	Transcona Boulevard Slope Assessment	**Location:**	UTM-14U, 5529518.41N, 640815.10E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	226.31 m
Method:	125 mm Solid Stem Auger, Mobile B54X Track Mount	**Date Drilled:**	October 4, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Backfill Legend: Bentonite | Cement | Drill Cuttings | Filter Pack Sand | Grout | Slough

Elevation (m)	Depth (m)	Material Description	Sample Type	Sample Number	SPT (N)
226.2	0.0	ORGANIC CLAY (TOPSOIL) - silty, trace sand, trace gravel, trace rootlets, black, moist, firm, high plasticity	G	G16	
			G	G17	
	0.5	CLAY - silty, trace silt inclusions (<5mm diam.) - mottled brown and grey - moist, soft to firm - high plasticity			
	1.0				
	1.5	- grey below 1.5 m	G	G18	
	2.0				
	2.5	- trace to some inclusions (<20mm diam.) below 2.3 m			
	3.0		T	T19	
	3.5				
	4.0				
	4.5		G	G20	
	5.0				
	5.5	- very soft below 5.3 m	G	G21	
	6.0				
	6.5		T	T22	
	7.0				
	7.5		G	G23	
	8.0				
	8.5				
217.5	8.8	- clay/silt (till) transition layer below 8.8 m	G	G24	

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: Torvane | Pocket Pen. | Qu | Field Vane

Logged By: Nuno Mendonca **Reviewed By:** James Blatz **Project Engineer:** Brent Hay

SUB-SURFACE LOG LOGS 2018-10-05 TRANSCONA BLVD 0 A_NM 0015 028 00.GPJ TREK GEOTECHNICAL.GDT 1/10/19

Template Version: eC20200911 - Const Road Works

TREK GEOTECHNICAL

Sub-Surface Log

Test Hole TH18-02
2 of 2

Elevation (m)	Depth (m)	Soil Symbol	Slope Inclinometer	VW Piezo	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21	Particle Size (%) 0 20 40 60 80 100 PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type △ Torvane △ ✥ Pocket Pen. ✥ ⊠ Qu ⊠ ○ Field Vane ○ 0 50 100 150 200 250
217.0											
	9.5				SILT (TILL) - sandy, some gravel (<30mm diam.), trace to some clay - light grey - moist to wet, loose to compact		G25				
215.8	10.0						G26				
	10.5				END OF TEST HOLE AT 10.5 m IN SILT (TILL)						

Notes:
1) Power auger refusal at 10.5 m in silt (till).
2) Seepage observed below 4.4 m. Sloughing observed below 10.3 m.
3) Test hole open to 10.3 m immediately after drilling.
4) Slope Inclinometer (SI-02) installed to 9.8 m and vibrating wire (VW-02) tip installed in clay at 4.7 m.

Logged By: Nuno Mendonca **Reviewed By:** James Blatz **Project Engineer:** Brent Hay

SUB-SURFACE LOG LOGS 2018-10-05 TRANSCONA BLVD 0 A_ NM 0015 028 00.GPJ TREK GEOTECHNICAL.GDT 1/10/19

Template Version: eC20200911 - Const Road Works

Test Hole Log for TH18-03 (Trek)

TREK GEOTECHNICAL

Sub-Surface Log

Test Hole TH18-03
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015 028 00
Project Name:	Transcona Boulevard Slope Assessment	**Location:**	UTM-14U, 5529528.35N, 640798.57E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	226.54 m
Method:	125 mm Solid Stem Auger, Mobile B54X Track Mount	**Date Drilled:**	October 4, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21	Particle Size (%) 0 20 40 60 80 100	PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) 0 50 100 150 200 250
226.4	0		ORGANIC CLAY (TOPSOIL) - silty, trace sand, trace gravel, trace rootlets, mottled brown and black, moist, stiff, high plasticity		G27					
					G28					
	0.5		CLAY - silty, trace silt inclusions (<10mm diam.) - mottled brown and grey - moist, very stiff - high plasticity							
	1.0									
	1.5		- grey, soft to firm below 1.5 m		G29					
	2.0									
	2.5									
	3.0				G30					
	3.5									
	4.0									
222.0	4.5				G31					

Test Type: Torvane | Pocket Pen. | Qu | Field Vane

END OF TEST HOLE AT 4.6 m IN CLAY

Notes:
1) No seepage or sloughing observed.
2) Test hole dry and open to 4.6 m immediately after drilling.
3) Test hole backfilled with bentonite chips and auger cuttings to surface.

Logged By: Nuno Mendonca **Reviewed By:** James Blatz **Project Engineer:** Brent Hay

SUB-SURFACE LOG LOGS 2018-10-05 TRANSCONA BLVD 0 A_ NM 0015 028 00.GPJ TREK GEOTECHNICAL.GDT 1/10/19

Template Version: eC20200911 - Const Road Works

Test Hole Log for TH18-04 (Trek)

TREK GEOTECHNICAL

Sub-Surface Log

Test Hole TH18-04
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015 028 00
Project Name:	Transcona Boulevard Slope Assessment	**Location:**	UTM-14U, 5529561.96N, 640792.78E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	231.81 m
Method:	125 mm Solid Stem Auger, Mobile B54X Track Mount	**Date Drilled:**	October 4, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)
231.7	0		ORGANIC CLAY (TOPSOIL) - silty, trace sand, trace gravel, trace rootlets, mottled brown and black, moist, stiff, high plasticity	G	G32	
				G	G33	
	0.5		CLAY (FILL) - silty, trace to some sand, trace gravel (<25mm diam.) - mottled brown and grey - moist, very stiff - high plasticity			
230.6	1.0					
	1.5		CLAY - silty, trace sand - mottled brown and grey - moist, stiff - high plasticity	G	G34	
	2.0					
			- firm to stiff below 2.1 m	G	G35	
	2.5					
228.8	3.0		- soft to firm below 2.9 m	G	G36	

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: Torvane, Pocket Pen., Qu, Field Vane

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No seepage or sloughing observed.
2) Test hole dry and open to 3.1 m immediately after drilling.
3) Test hole backfilled with bentonite chips and auger cuttings to surface.

Logged By: Nuno Mendonca **Reviewed By:** James Blatz **Project Engineer:** Brent Hay

SUB-SURFACE LOG LOGS 2018-10-05 TRANSCONA BLVD 0 A_NM 0015 028 00.GPJ TREK GEOTECHNICAL.GDT 1/10/19

Template Version: eC20200911 - Const Road Works

Test Hole Log for TH18-05 (Trek)

TREK GEOTECHNICAL

Sub-Surface Log

Test Hole TH18-05
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015 028 00
Project Name:	Transcona Boulevard Slope Assessment	**Location:**	UTM-14U, 5529540.74N, 640835.07E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	231.54 m
Method:	125 mm Solid Stem Auger, Mobile B54X Track Mount	**Date Drilled:**	October 4, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Backfill Legend: Bentonite | Cement | Drill Cuttings | Filter Pack Sand | Grout | Slough

Elevation (m)	Depth (m)	Soil Symbol	Standpipe	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)
231.4	0			ORGANIC CLAY (TOPSOIL) - silty, trace sand, trace gravel, trace rootlets, mottled brown and black, moist, soft, high plasticity	G	G37	
					G	G38	
	0.5			CLAY (FILL) - silty, some organics, trace to some sand, trace to some gravel (<25mm diam.) - mottled brown and grey - moist, very stiff - high plasticity			
230.2	1.0						
	1.5			CLAY - silty - mottled brown and grey - moist, stiff - high plasticity	G	G39	
	2.0				G	G40	
	2.5						
228.5	3.0			- firm below 2.9 m	G	G41	

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
0 20 40 60 80 100

Undrained Shear Strength (kPa)
Test Type: Torvane, Pocket Pen., Qu, Field Vane
0 50 100 150 200 250

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No seepage or sloughing observed.
2) Test hole dry and open to 3.1 m immediately after drilling.
3) Standpipe SP-02 installed in clay to 3.1 m depth.
4) Water level shown measured in SP-02 on October 31, 2018.

Logged By: Nuno Mendonca **Reviewed By:** James Blatz **Project Engineer:** Brent Hay

SUB-SURFACE LOG LOGS 2018-10-05 TRANSCONA BLVD 0 A_NM 0015 028 00.GPJ TREK GEOTECHNICAL.GDT 1/10/19

Template Version: eC20200911 - Const Road Works

Test Hole Log for TH18-06 (Trek)

TREK GEOTECHNICAL

Sub-Surface Log

Test Hole TH18-06
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015 028 00
Project Name:	Transcona Boulevard Slope Assessment	**Location:**	UTM-14U, 5529532.63N, 640850.34E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	231.46 m
Method:	125 mm Solid Stem Auger, Mobile B54X Track Mount	**Date Drilled:**	October 4, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)
231.4	0.0		ORGANIC CLAY (TOPSOIL) - silty, trace sand, trace gravel, trace rootlets, mottled brown and black, moist, stiff, high plasticity		G42	
					G43	
	0.5		CLAY (FILL) - silty, some organics, trace to some sand, trace to some gravel (<25mm diam.) - mottled brown and grey - moist, very stiff - high plasticity			
	1.0					
229.8	1.5		- stiff below 1.4 m		G44	
			CLAY - silty, trace sand - mottled brown and grey - moist, firm - high plasticity		G45	
	2.0					
	2.5					
228.4	3.0		- firm to soft below 2.9 m		G46	

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: Torvane, Pocket Pen., Qu, Field Vane

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No seepage or sloughing observed.
2) Test hole dry and open to 3.1 m immediately after drilling.
3) Test hole backfilled with bentonite chips and auger cuttings to surface.

Logged By: Nuno Mendonca **Reviewed By:** James Blatz **Project Engineer:** Brent Hay

SUB-SURFACE LOG LOGS 2018-10-05 TRANSCONA BLVD 0_A_NM 0015 028 00.GPJ TREK_GEOTECHNICAL.GDT 1/10/19

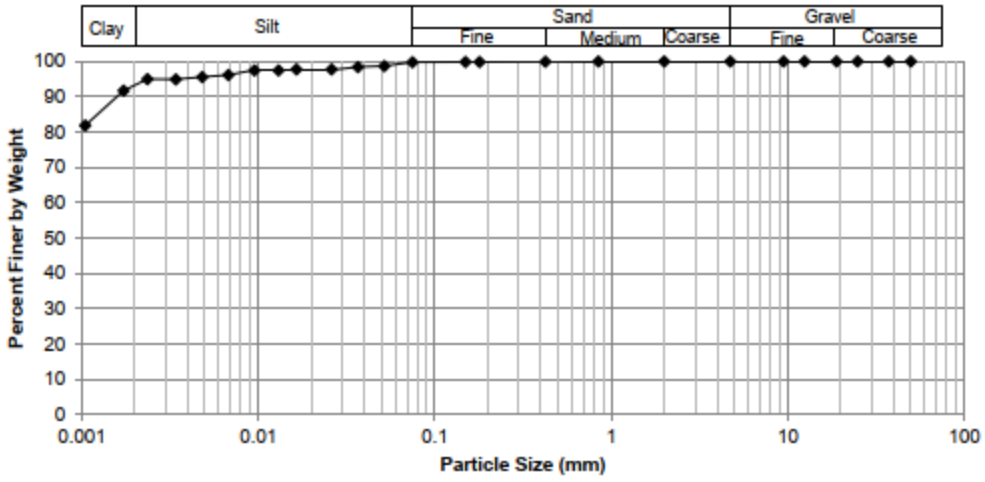
Particle Size Analysis for TH18-01 (Trek)

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0015-028-00
Client	City of Winnipeg
Project	Transcona Blvd.
Test Hole	TH18-01
Sample #	T05
Depth (m)	3.0 - 3.7
Sample Date	10-Oct-18
Test Date	25-Oct-18
Technician	KG

Gravel	0.0%
Sand	0.2%
Silt	6.6%
Clay	93.3%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	99.84
37.5	100.00	2.00	100.00	0.0520	98.70
25.0	100.00	0.850	100.00	0.0368	98.39
19.0	100.00	0.425	99.98	0.0261	97.76
12.5	100.00	0.180	99.90	0.0165	97.76
9.50	100.00	0.150	99.90	0.0131	97.45
4.75	100.00	0.075	99.84	0.0095	97.45
				0.0068	96.20
				0.0048	95.57
				0.0034	94.95
				0.0024	95.02
				0.0017	91.73
				0.0010	81.89

TREK GEOTECHNICAL
www.trekgeotechnical.ca
1712 St. James Street
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Tel: 204.975.9433 Fax: 204.975.9435

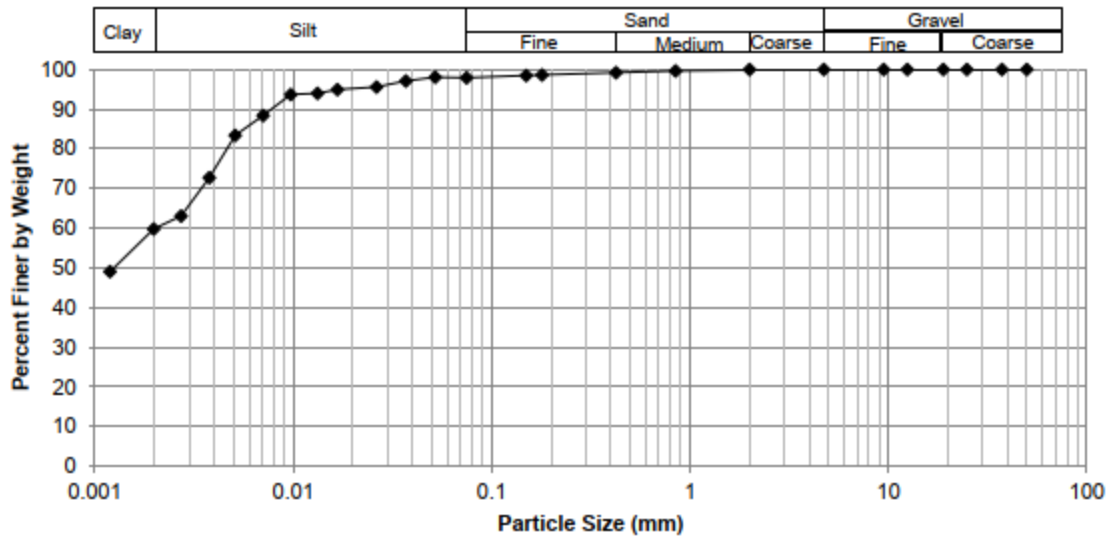
Grain Size Analysis (Hydrometer Method)
ASTM D422

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	0015-028-00
Client	City of Winnipeg
Project	Transcona Blvd.
Test Hole	TH18-01
Sample #	T08
Depth (m)	6.1 - 6.7
Sample Date	10-Oct-18
Test Date	25-Oct-18
Technician	KG

Gravel	0.0%
Sand	2.1%
Silt	38.0%
Clay	59.9%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	97.90
37.5	100.00	2.00	100.00	0.0521	98.08
25.0	100.00	0.850	99.64	0.0370	97.14
19.0	100.00	0.425	99.25	0.0264	95.57
12.5	100.00	0.180	98.65	0.0168	94.95
9.50	100.00	0.150	98.51	0.0133	94.01
4.75	100.00	0.075	97.90	0.0097	93.70
				0.0071	88.38
				0.0051	83.38
				0.0038	72.75
				0.0027	63.13
				0.0020	59.84
				0.0012	49.06

Atterberg Analysis for TH18-01 (Trek)

TREK GEOTECHNICAL
www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

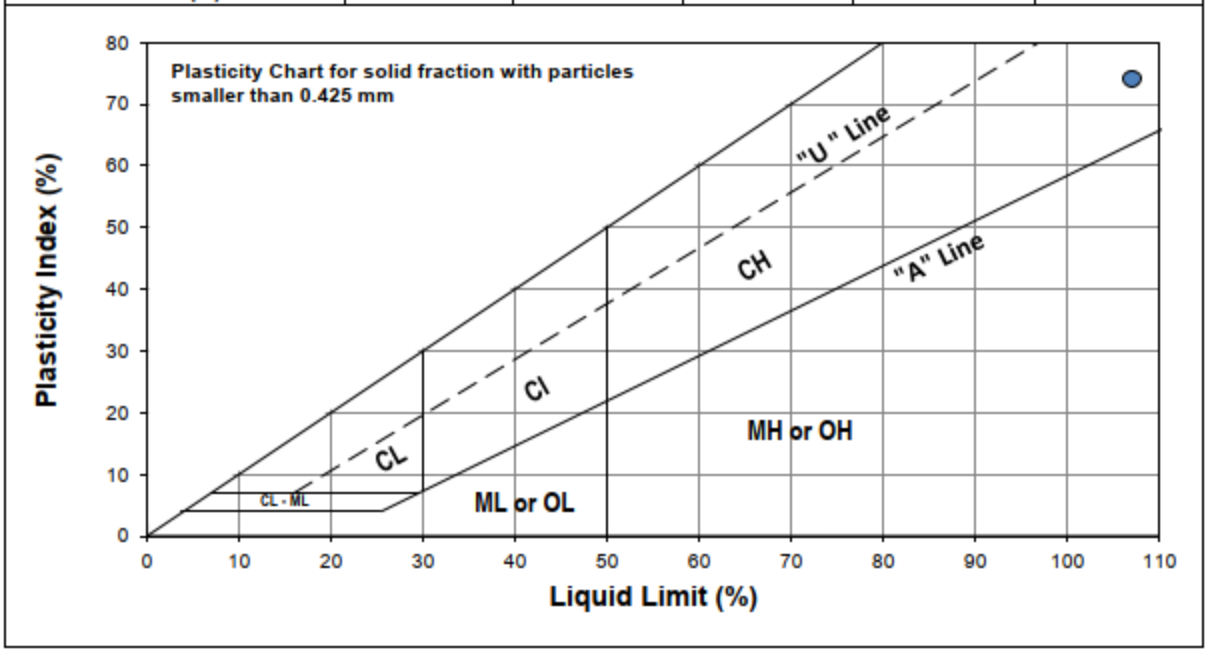
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	0015-028-00
Client	City of Winnipeg
Project	Transcona Blvd.
Test Hole	TH18-01
Sample #	T05
Depth (m)	3.0 - 3.7
Sample Date	10-Oct-18
Test Date	25-Oct-18
Technician	KG

Liquid Limit	107
Plastic Limit	33
Plasticity Index	74

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	26	34		
Mass Wet Soil + Tare (g)	27.164	26.921	30.736		
Mass Dry Soil + Tare (g)	20.427	20.194	22.811		
Mass Tare (g)	14.288	13.919	15.186		
Mass Water (g)	6.737	6.727	7.925		
Mass Dry Soil (g)	6.139	6.275	7.625		
Moisture Content (%)	109.741	107.203	103.934		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	21.565	20.805			
Mass Wet Soil + Tare (g)	19.692	19.190			
Mass Dry Soil + Tare (g)	14.072	14.222			
Mass Water (g)	1.873	1.615			
Mass Dry Soil (g)	5.620	4.968			
Moisture Content (%)	33.327	32.508			

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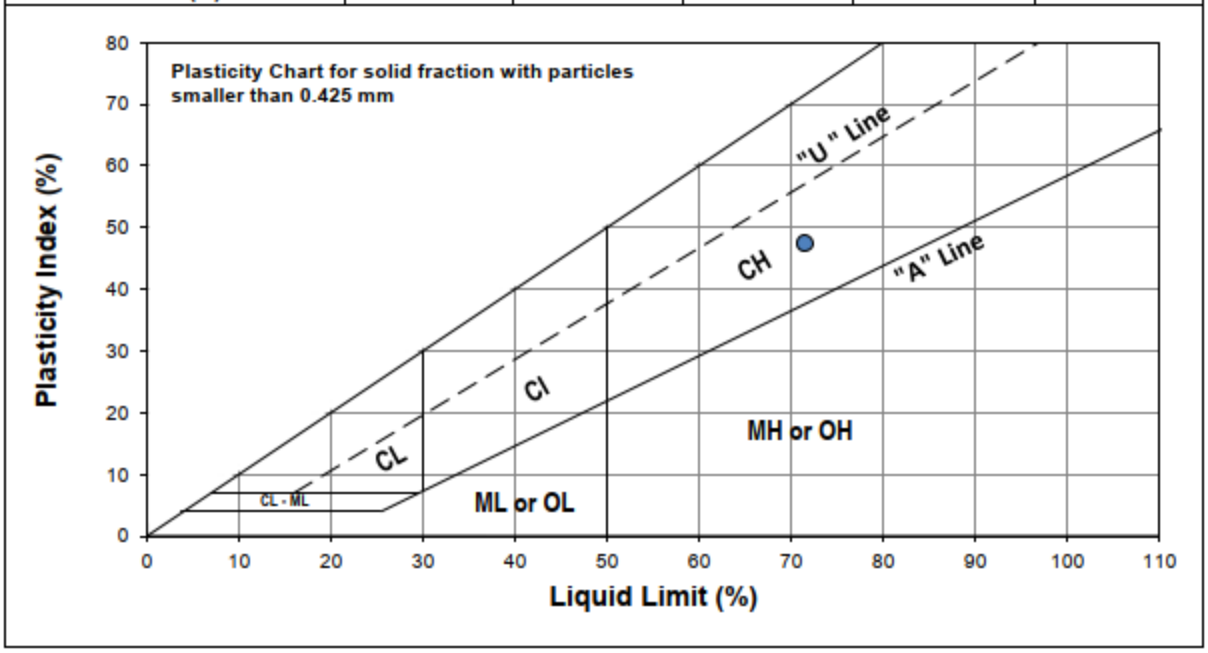
Atterberg Limits
ASTM D4318-10e1

Project No.	0015-028-00
Client	City of Winnipeg
Project	Transcona Blvd.
Test Hole	TH18-01
Sample #	T08
Depth (m)	6.1 - 6.7
Sample Date	10-Oct-18
Test Date	25-Oct-18
Technician	KG

Liquid Limit	71
Plastic Limit	24
Plasticity Index	47

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	25	32		
Mass Wet Soil + Tare (g)	29.291	27.976	28.360		
Mass Dry Soil + Tare (g)	22.820	22.247	22.521		
Mass Tare (g)	13.957	14.228	14.213		
Mass Water (g)	6.471	5.729	5.839		
Mass Dry Soil (g)	8.863	8.019	8.308		
Moisture Content (%)	73.011	71.443	70.282		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	20.330	20.794			
Mass Wet Soil + Tare (g)	19.149	19.520			
Mass Dry Soil + Tare (g)	14.173	14.281			
Mass Water (g)	1.181	1.274			
Mass Dry Soil (g)	4.976	5.239			
Moisture Content (%)	23.734	24.318			

Geotechnical Report for Previous (pre-2021) Investigations

Test Hole Locations

Test Hole Log for TH09-01 (KGS Group)

KGS GROUP

SUMMARY LOG

HOLE NO. TH09-01

SHEET 1 of 2

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT RAVELSTON FPS - OUTFALL REPLACEMENT
SITE RAVELSTON DEEP WATER POND
LOCATION UPPER BANK
DRILLING METHOD Solid Stem, F350

JOB NO. 09-0107-15
GROUND ELEV. 228.51 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 19-Oct-09
UTM (m) N 5,529,406
E 640,990

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	R.Q.D. %
228.5	0	0		TOPSOIL - Damp, with rootlets.				S1		
228				CLAY - Brown, damp, firm, high plasticity, some sand, with gravel (5-10 mm), trace rootlets, silt inclusions (1-5 mm).				S2		
	1							S3		
								S4		
227		5		- Trace oxidation below 1.52 m.				S5		
	2							S6		
226								S7		
	3	10		- Trace gravel (1-2 mm) below 3.05 m.				S8		
225										
	4							S9		
224		15		- Stiff below 4.57 m.				S10		
	5									
223				- Potential cobble at 5.33 m.				S11		
	6	20								
222				- Grey, moist, soft, trace gravel (2-10 mm), trace cobbles (15-20 mm) below 6.40 m.				S12		
	7			- Water entering hole at 7.01 m.				S13		
221		25								
	8					8.2		S14		
220								S15		
	9	30								
219								S16		

Cu TORVANE (kPa) ◆ 20 40 60 80
PL MC LL
% 20 40 60 80

SAMPLE TYPE Auger Grab

CONTRACTOR Paddock Drilling Ltd.
INSPECTOR D. GARBER
APPROVED _____ DATE 12/7/09

KGS GROUP

SUMMARY LOG

HOLE NO. TH09-01

SHEET 2 of 2

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	R.Q.D. %	Cu TORVANE (kPa) ◆ 20 40 60 80 / PL MC LL / % 20 40 60 80
218.1				TILL - Tan, wet, trace cobbles (15-20 mm).				S17			
218	11	35									
217								S18			
216.3	12	40		END OF HOLE AT 12.19 m.				S19			
216				Notes: 1. Pneumatic installed to a depth of 8.23 m below grade, serial number 032864.							
215	13	45									
214	14										
213	15	50									
212	16										
211	17	55									
210	18	60									
209	19										
208	20	65									
207	21	70									

SAMPLE TYPE Auger Grab

CONTRACTOR Paddock Drilling Ltd. INSPECTOR D. GARBER APPROVED _____ DATE 12/7/09

SPT & TORVANE 3 P:\PROJECTS\2009\09-0107-1\DESIGN\FIELD\LOGS\JUPITER BANK.GPJ

Test Hole Log for TH09-02 (KGS Group)

KGS GROUP

SUMMARY LOG

HOLE NO. TH09-02

SHEET 1 of 1

CLIENT	CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT	RAVELSTON FPS - OUTFALL REPLACEMENT
SITE	RAVELSTON DEEP WATER POND
LOCATION	LOWER BANK
DRILLING METHOD	Solid Stem, F350

JOB NO.	09-0107-15
GROUND ELEV.	224.62 m
TOP OF PVC ELEV.	225.71 m
WATER ELEV.	217.76 m
DATE DRILLED	19-Oct-09
UTM (m)	N 5,529,414
	E 640,964

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	R.Q.D. %	Cu TORVANE (kPa) ◆ 20 40 60 80
224.6				TOPSOIL - Damp, with rootlets, trace gravel (2-10 mm), trace cobbles (10-20 mm).							PL MC LL % 20 40 60 80
224	1	5		CLAY - Brown, damp, soft, high plasticity, trace gravel (2-10 mm), cobbles (10-25 mm), silt inclusions (1-5 mm). - Firm below 0.76 m.				S1			
								S2			
223	2							S3			
				- Moist below 2.13 m.							
222	3	10						S4			
221								S5			
	4							S6			
220		15									
	5							S7			
219								S8			
	6	20						S9			
218											
217.6 ▼	7			TILL - Tan, moist, trace cobbles (15-20 mm).				S10			
217.0 217		25		END OF HOLE AT 7.62 m.							
	8			Notes: 1. Installed standpipe to a depth of 8.46 m. 2. Water level monitored on October 23, 2009.		8.5					
216											
	9	30									
215											

SAMPLE TYPE Auger Grab

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR D. GARBER

APPROVED _____ DATE 12/7/09