THE CITY OF WINNIPEG

TENDER

TENDER NO. 129-2020

ST. VITAL PARK ASPHALT ROADWAY RENEWALS AND ASSOCIATED WORKS

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 St. Vital Park Asphalt Roadway Renewals and Associated Works

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, May 6, 2020.

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. ENQUIRIES

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

B3.2 If the Bidder finds errors, discrepancies or omissions in the 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.

B3.3 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.

B3.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Tender will be provided by the Contract Administrator only to the Bidder who made the enquiry.

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

B3.6 Any enquiries concerning submitting through MERX should be addressed to:
MERX Customer Support
Phone: 1-800-964-6379
Email: merx@merx.com

B4. CONFIDENTIALITY

B4.1 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.

B4.2 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.

B5. ADDENDA

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

B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.

B5.3 Addenda will be available on the MERX website at www.merx.com.

B5.4 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.

B5.5 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.

B5.6 Notwithstanding B3, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D3.

B6. SUBSTITUTES

B6.1 The Work is based on the Plant, Materials and methods specified in the Tender.

B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.

B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:

(a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;

(b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;

(c) identify any anticipated cost or time savings that may be associated with the substitute;

(d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;

(e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.

B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.

B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.

B6.6.1 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.

B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.

B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B17.

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

B7. BID COMPONENTS

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

(a) Form A: Bid;

(b) Form B: Prices;

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

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

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

B7.4 The Bid shall be submitted electronically through MERX at www.merx.com.

B7.4.1 Bids will **only** be accepted electronically through MERX.

B7.5 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B17.1(a).

B8. BID

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

B8.2 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.

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

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

B8.4 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.

B8.4.1 The name and official capacity of all individuals signing Form A: Bid/Proposal should be entered below such signatures.

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

B9. PRICES

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

B9.1.1 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 D28. Any such costs shall be determined in accordance with D28.

B9.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.

B9.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B9.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B9.5 The Bidder shall enter the Total Bid Price from Form B: Prices into the Total Bid Price field in MERX.

B9.5.1 Bidders are advised that the calculation indicated in B17.4 will prevail over the Total Bid Price entered in MERX.

B10. DISCLOSURE

B10.1 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.

B10.2 The Persons are:

(a) N/A

B11. CONFLICT OF INTEREST AND GOOD FAITH

B11.1 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.

B11.2 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.

B11.3 In connection with its Bid, each entity identified in B11.2 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.

B11.4 Without limiting B11.3, 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.

B11.5 Without limiting B11.3, 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 B11.4 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.

B11.6 The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in its sole discretion.

B12. QUALIFICATION

B12.1 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.

B12.2 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

B12.3 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);

B12.4 Further to B12.3(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/.)

B12.5 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.

B12.6 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.

B13. BID SECURITY

B13.1 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.

B13.2 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 B13.2(a).

B13.3 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 B17.1(a).

B13.4 Bonds passing the verification process will be treated as original and authentic.

B13.4.1 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.

B13.5 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.

B13.6 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.

B14. OPENING OF BIDS AND RELEASE OF INFORMATION

B14.1 Bids will not be opened publicly.

B14.2 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.

B14.3 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.

B14.4 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).

B14.4.1 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.

B15. IRREVOCABLE BID

B15.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B15.2 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.

B16. WITHDRAWAL OF BIDS

B16.1 A Bidder may withdraw his/her Bid without penalty prior to the Submission Deadline.

B17. EVALUATION OF BIDS

B17.1 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 B12 (pass/fail);

(c) Total Bid Price;

(d) economic analysis of any approved alternative pursuant to B6.

B17.2 Further to B17.1(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.

B17.3 Further to B17.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does ot demonstrate, in his/her Bid or in other information required to be submitted, that he/she is qualified.

B17.4 Further to B17.1(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.

B17.4.1 Further to B17.1(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.

B17.4.2 Bidders are advised that the calculation indicated in B17.4 will prevail over the Total Bid Price entered in MERX.

B18. AWARD OF CONTRACT

B18.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B18.2 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.

B18.2.1 Without limiting the generality of B18.2, 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.

B18.3 The Work of this Contract is contingent upon Council approval of sufficient funding in the 2020 Capital Budget. If the Capital Budget approved by Council does not include sufficient funding for the Work, the City will have no obligation to award a Contract.

B18.4 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 D28 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.

B18.5 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 B17.

B18.5.1 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. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of:

(a) Concrete Approach Widening and Associated Works

(i) St. Vital Park south exit approach from park gate to River Road

(b) Asphalt Reconstruction and Associated Works

(i) Toboggan Slide Road from St. Vital Park Road to St. Vital Park Road

(ii) St. Vital Park Road from River Drive intersection (east) to River Drive intersection (west)

(iii) St. Vital Park Road from 80m east of parking lot exit to 130m south of Center Road

(c) Asphalt Removal, Mill and Fill and Associated Works

(i) St. Vital Park Road form River Drive intersection (west) to Lake Road intersection

(ii) Lake Road from Center Road to St. Vital Park Road

(iii) St. Vital Park Road from 130m South of Center Road to Park Entrance/Exit

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

(a) Concrete Approach Widening and Associated Works

(i) Removal of asphalt as required;
(ii) Removal of curb and sidewalk;
(iii) Removal of park gate and posts;
(iv) Excavation;
(v) Compaction of sub-grade;
(vi) Adjustment of existing pavement and boulevard structures;
(vii) Placement of geotextile fabric;
(viii) Placement of sub-base material;
(ix) Placement of base course material;
(x) Construction of 200 mm reinforced concrete pavement;
(xi) Construction of barrier curb;
(xii) Construction of curb ramp;
(xiii) Construction of 100 mm concrete sidewalk;
(xiv) Construction of new 100 mm concrete bus platform;
(xv) Curb renewal as required;
(xvi) Sidewalk renewal as required;
(xvii) Installation of detectable warning surface tiles;
(xviii) Asphalt patching as required;
(xix) Boulevard restoration and sod.

(b) Asphalt Reconstruction and Associated Works

(i) Removal of existing asphalt pavement;
(ii) Excavation;

(iii) Compaction of sub-grade;
(iv) Adjustment of existing pavement and boulevard structures;
(v) Placement of geotextile fabric;
(vi) Placement of sub-base material;
(vii) Placement of base course material;
(viii) Renewal of existing asphalt pathway as required;
(ix) Placement of asphalt pavement (100 mm – Type 1A);
(x) Placement of asphalt pavement at tie-ins as required;
(xi) Boulevard grading as required;
(xii) Installation of corrugated steel pipe culverts;
(xiii) Installation of culvert end markers;
(xiv) Placement of limestone surface material;
(xv) Boulevard restoration and sod.

(c) Asphalt Removal, Replacement and Associated Works
(i) Removal of existing asphalt pavement;
(ii) Excavation;
(iii) Compaction of existing sub-base material;
(iv) Adjustment of existing pavement and boulevard structures;
(v) Placement of base course material;
(vi) Renewal of existing asphalt pathway as required;
(vii) Placement of asphalt pavement (100 mm – Type 1A);
(viii) Placement of asphalt pavement at tie-ins as required;
(ix) Boulevard grading as required;
(x) Installation of corrugated steel pipe culverts;
(xi) Installation of culvert end markers;
(xii) Placement of limestone surface material;
(xiii) Boulevard restoration and sod.

(d) Asphalt Mill & Fill and Associated Works
(i) Planing of approximately 25 mm of existing asphalt pavement;
(ii) Placement of pavement repair fabric;
(iii) Placement of asphalt overlay (100 mm – Type 1A);
(iv) Boulevard grading as required;
(v) Removal and installation of corrugated steel pipe culverts;
(vi) Installation of culvert end markers;
(vii) Placement of limestone surface material;
(viii) Boulevard restoration and sod.

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is:

Cory Humbert, C.E.T.
Technologist 3
City of Winnipeg

Telephone No. 204 226 2303
Email Address chumbert@winnipeg.ca

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

D4. CONTRACTOR'S SUPERVISOR

D4.1 At the pre-construction meeting, the Contractor shall identify his/her designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D4.2 At least two (2) Business Days prior to the commencement of any Work on the site, the Contractor shall provide the Contract Administrator with a phone number where the supervisor identified in D4.1 or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

D5. NOTICES

D5.1 Except as provided for in 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.

D5.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D5.3 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D3.

D5.3 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

D6. FURNISHING OF DOCUMENTS

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

SUBMISSIONS

D7. AUTHORITY TO CARRY ON BUSINESS

D7.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D8. SAFE WORK PLAN

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

D8.2 The Safe Work Plan shall be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/safety/default.stm

D8.3 Notwithstanding B12.4 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.

D9. INSURANCE

D9.1 The Contractor shall provide and maintain the following insurance coverage:

(a) commercial general liability insurance, in the amount of at least two million dollars ($2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability, broad form property damage cover and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;

(b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than $2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence;

(c) an all risks Installation Floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.

D9.2 Deductibles shall be borne by the Contractor.

D9.3 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in the C4.1 for the return of the executed Contract Documents, as applicable.

D9.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D10. CONTRACT SECURITY

D10.1 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.

D10.2 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.

D10.3 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 D10.1(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.

D11. SUBCONTRACTOR LIST

D11.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at or prior to a pre-construction meeting, or at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the C4.1 for the return of the executed Contract Documents, if applicable.

D12. DETAILED WORK SCHEDULE

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

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

(a) a Gantt chart for the Work, acceptable to the Contract Administrator.

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

SCHEDULE OF WORK

D13. COMMENCEMENT

D13.1 The Contractor shall not commence any Work until he/she is in receipt of an award letter from the Award Authority authorizing the commencement of the Work.

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

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

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

D13.3 The Contractor shall not commence the Work on the Site before June 15, 2020, and shall commence the Work on Site no later than June 29, 2020, as directed by the Contract Administrator and weather permitting.

D13.4 The City intends to award this Contract by May 29, 2020.

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

D14. WORKING DAYS

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

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

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

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

D15. RESTRICTED WORK HOURS

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

D16. WORK BY OTHERS

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

(a) City of Winnipeg Traffic Services Branch;

(b) City of Winnipeg Geomatics Branch;

(c) City of Winnipeg Parks and Open Space Division.

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 two phases . Each Phase shall be subdivided into stages. Stages are further subdivided into major items of work.

D17.1.2 **Phase I** – Toboggan Slide Road, St. Vital Park Road and Lake Road

(a) **Stage I** – Toboggan Slide Road - Reconstruction

(i) Removal of existing asphalt pavement;
(ii) Excavation;
(iii) Removal of existing culverts;
(iv) Installation of corrugated steel pipe culvert;
(v) Installation of culvert end markers;
(vi) Compaction of sub-grade;
(vii) Placement of separation geotextile fabric;
(viii) Placement of limestone sub-base material;
(ix) Placement of limestone base course material;
(x) Placing topsoil and finish grading;
(xi) Placement of scratch asphalt pavement(50mm – Type 1A);
(xii) Placement of final lift asphalt pavement(50mm – Type 1A);
(xiii) Placement of asphalt at tie-ins as required;
(xiv) Placement of limestone surface material; and

(xv) Placement of sod.

(b) **Stage II** – St. Vital Park Road – Reconstruction
- (i) Removal of existing asphalt pavement;
- (ii) Excavation;
- (iii) Removal of existing culverts;
- (iv) Installation of corrugated steel pipe culvert;
- (v) Installation of culvert end markers;
- (vi) Compaction of sub-grade;
- (vii) Placement of separation geotextile fabric;
- (viii) Placement of limestone sub-base material;
- (ix) Placement of limestone base course material;
- (x) Placing topsoil and finish grading;
- (xi) Placement of scratch asphalt pavement(50mm – Type 1A);
- (xii) Placement of final lift asphalt pavement(50mm – Type 1A);
- (xiii) Placement of asphalt at tie-ins as required;
- (xiv) Placement of limestone surface material; and
- (xv) Placement of sod.

(c) **Stage III** – Lake Road – Mill and Fill
- (i) Tree Removal and pruning;
- (ii) Installation of CSP pipe culvert;
- (iii) Installation of culvert end markers;
- (iv) Ditch Grading;
- (v) Planing of 25mm of existing asphalt pavement;
- (vi) Renewal of existing asphalt pathway as required;
- (vii) Placing topsoil and finish grading;
- (viii) Placement of scratch asphalt overlay(40mm - Type 1A asphalt);
- (ix) Installation of pavement fabric repair;
- (x) Placement of final lift asphalt pavement – (40mm – Type 1A asphalt);
- (xi) Placement of limestone surface material; and
- (xii) Placement of sod.

(d) **Stage IV** – St. Vital Park Road Asphalt Ditch Removal and Mill and Fill
- (i) Tree Removal and pruning;
- (ii) Asphalt ditch pavement removal;
- (iii) Ditch Grading;
- (iv) Planing of 25mm of existing asphalt pavement;
- (v) Renewal of existing asphalt pathway as required;
- (vi) Placing topsoil and finish grading;
- (vii) Placement of scratch asphalt overlay(40mm - Type 1A asphalt);
- (viii) Installation of pavement fabric repair;
- (ix) Placement of final lift asphalt pavement – (40mm – Type 1A asphalt);
- (x) Placement of limestone surface material; and
- (xi) Placement of sod.

(e) Placing the topsoil and finished grading of all boulevard and median areas shall be completed prior to commencing construction of the asphaltic concrete overlay.

D17.1.3 Immediately following the completion of the asphaltic concrete works of Phase I, the Contractor shall clean up the Site and remove all plant, surplus material, waste and debris, other than that left by the City or other Contractors.

D17.1.4 **Phase II** – St. Vital Park Drive and St. Vital Park Exit

(a) **Stage I** – St. Vital Park Exit – Concrete Widening
- (i) Removal of existing concrete park gates;
- (ii) Removal of existing barrier curb;
- (iii) Excavation;
- (iv) Compaction of existing sub-grade;
- (v) Placement of geotextile fabric;
- (vi) Placement of sub-base material;
- (vii) Placement of base course material;
- (viii) Construction of 200mm concrete pavement(reinforced);
- (ix) Construction of curb ramp;
- (x) Construction of barrier curb;
- (xi) Construction of integral modified barrier curb;
- (xii) Renewal of existing curb as required;
- (xiii) Removal of existing sidewalk;
- (xiv) Construction of concrete sidewalk;
- (xv) Installation of detectable warning surface tiles;
- (xvi) Placing topsoil and finish grading;
- (xvii) Construction of asphalt overlay(average thickness 70 mm); and
- (xviii) Placement of sod.

(b) Placing the topsoil and finished grading of all boulevard and median areas shall be completed prior to commencing construction of the asphaltic concrete overlay.

(c) **Stage II** – St. Vital Park Road - Reconstruction
- (i) Tree Removal and pruning
- (ii) Removal of existing asphalt pavement;
- (iii) Excavation;
- (iv) Compaction of sub-grade;
- (v) Placement of separation geotextile fabric;
- (vi) Placement of limestone sub-base material;
- (vii) Placement of limestone base course material;
- (viii) Ditch Grading;
- (ix) Boulevard grading;
- (x) Placement of scratch asphalt pavement(50mm – Type 1A);
- (xi) Placement of final lift asphalt pavement(50mm – Type 1A);
- (xii) Placement of asphalt at tie-ins as required;
- (xiii) Placement of limestone surface material; and
- (xiv) Placement of sod.

(b) **Stage III** – St. Vital Park Road Mill and Fill
- (i) Tree Removal and pruning;
- (ii) Ditch Grading;
- (iii) Planing of 25mm of existing asphalt pavement;
- (iv) Placing topsoil and finish grading;
- (v) Placement of scratch asphalt overlay(40mm - Type 1A asphalt);

(vi) Installation of pavement fabric repair;

(vii) Placement of final lift asphalt pavement – (40mm – Type 1A asphalt);

(viii) Placement of limestone surface material; and

(ix) Placement of sod.

(c) Placing the topsoil and finished grading of all boulevard and median areas shall be completed prior to commencing construction of the asphaltic concrete overlay, including the scratch course.

D17.2.2 Immediately following the completion of the asphaltic concrete works of Phase I, the Contractor shall clean up the Site and remove all plant, surplus material, waste and debris, other than that left by the City or other Contractors.

(a) No construction Works in Phase II shall commence prior to Phase I completion.

(b) Traffic on Center Road must be maintained at all times.

D18. SUBSTANTIAL PERFORMANCE

D18.1 The Contractor shall achieve Substantial Performance within Fifty (50) consecutive Working Days of the commencement of the Work as specified in D13.

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

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

D19. TOTAL PERFORMANCE

D19.1 The Contractor shall achieve Total Performance within Fifty-five (55) consecutive Working Days of the commencement of the Work as specified in D13.

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

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

D20. LIQUIDATED DAMAGES

D20.1 If the Contractor fails to achieve Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:

(a) Substantial Performance – Three thousand dollars ($3,000.00);

(b) Total Performance – One thousand dollars ($1,000.00).

D20.2 The amounts specified for liquidated damages in D20.1 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.

D20.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D21. SCHEDULED MAINTENANCE

D21.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

(a) Sod Maintenance as specified in CW 3510-R9;

(b) Reflective Crack Maintenance as specified in CW 3250-R7.

D21.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

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 and 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. If the Contractor declares that 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 D19 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.

CONTROL OF WORK

D23. JOB MEETINGS

D23.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

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

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

D24.1 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).

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

D25.1 Further to B12.4, 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 B12.4.

MEASUREMENT AND PAYMENT

D26. PAYMENT

D26.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D27. WARRANTY

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

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

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

D27.2.1 In such case the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

THIRD PARTY AGREEMENTS

D28. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D28.1 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.

D28.2 Further to D28.1, in the event that the obligations in D28 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.

D28.3 For the purposes of D28:

(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.

D28.4 Modified Insurance Requirements

D28.4.1 If not already required under the insurance requirements identified in D9, 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.

D28.4.2 If not already required under the insurance requirements identified in D9, 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.

D28.4.3 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.

D28.4.4 Further to D9.3, 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.

D28.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D28.5 Indemnification By Contractor

D28.5.1 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.

D28.6 Records Retention and Audits

D28.6.1 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.

D28.6.2 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 D28.6.1 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.

D28.7 Other Obligations

D28.7.1 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.

D28.7.2 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.

D28.7.3 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.

D28.7.4 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.

FORM H1: PERFORMANCE BOND
(See D10)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 129-2020

St. Vital Park Asphalt Roadway Renewals and Associated Works
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 D10)

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. 129-2020

St. Vital Park Asphalt Roadway Renewals and Associated Works

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 D11)

St. Vital Park Asphalt Roadway Renewals and Associated Works

Portion of the Work	Name	Address
SURFACE WORKS:		
Supply of Materials:		
Geotextile Fabric		
Mirafi RS380i High-tenacity Polypropylene Woven Geotextile		
Sub-Base Material – Class “B”		
Base Course Material - Class “B”		
Surface Material - Limestone		
Concrete		
Asphalt		
Topsoil, Salt Tolerant Seed and Sod		
Corrugated Steel Pipe Culverts		
Culvert End Markers		
Installation and Placement:		
Geotextile Fabric		
Mirafi RS380i High-tenacity Polypropylene Woven Geotextile		
Sub-base Material - Class “B”		
Base Course Material - Class “B”		
Surface Material - Limestone		
Concrete		
Asphalt		
Topsoil, Salt Tolerant Seed and Sod		
Corrugated Steel Pipe Culverts		
Culvert End Markers		

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 B6. 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 B6.

E1.4 The following are applicable to the Work:

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
	Cover Sheet	A1
SE-20-99	St. Vital Park Exit – Concrete Widening	A1
SE-20-100	Toboggan Slide Road – Reconstruction 1+00 to 1+80	A1
SE-20-101	Toboggan Slide Road – Reconstruction 1+80 to 2+54	A1
SE-20-102	St. Vital Park Road – Reconstruction 1+00 to 2+20	A1
SE-20-103	St. Vital Park Road – Reconstruction 2+20 to 3+40	A1
SE-20-104	St. Vital Park Road – Reconstruction 3+40 to 4+60	A1
SE-20-105	St. Vital Park Road – Reconstruction 4+60 to 5+80	A1
SE-20-106	St. Vital Park Road – Reconstruction 5+80 to 7+00	A1
SE-20-107	St. Vital Park Road – Reconstruction/Mill & Fill 7+00 to 8+20	A1
SE-20-108	St. Vital Park Road – Mill & Fill 8+20 to 9+40	A1
SE-20-109	St. Vital Park Road – Mill & Fill 9+40 to 10+60	A1
SE-20-110	St. Vital Park Road – Mill & Fill 10+60 to 11+43	A1
SE-20-111	St. Vital Park Road – Reconstruction 1+33 to 2+30	A1
SE-20-112	St. Vital Park Road – Reconstruction/Mill & Fill 2+30 to 3+60	A1
SE-20-113	St. Vital Park Road – Mill & Fill 3+60 to 4+80	A1
SE-20-114	St. Vital Park Road – Mill & Fill 4+80 to 5+78	A1
SE-20-115	Lake Road – Mill & Fill 1+48 to 2+30	A1
SE-20-116	Lake Road – Mill & Fill 2+30 to 3+30	A1
SE-20-117	Lake Road – Mill & Fill 3+30 to 3+84	A1
SE-20-118	Traffic Staging – Phase I	A1
SE-20-119	Traffic Staging – Phase II	A1
		A1

E2. MOBILIZATION AND DEMOBILIZATION PAYMENT

DESCRIPTION

E2.1 This Specification shall cover all operations relating to the mobilization and demobilization of the Contractor to the project location(s).

E2.2 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 Works as hereinafter specified.

E2.3 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.

SCOPE OF WORK

E2.4 Further to C12 of the General Conditions, where Mobilization and Demobilization is included as a bid item, it shall consist of the following, as applicable:

(a) Mobilization shall include, but not be limited to:
   (i) 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;
   (ii) Establishment of offices, buildings, other necessary general facilities and equipment parking/staging areas for the Contractor's operations at the site or sites;
   (iii) Premiums paid for performance and payment bonds including coinsurance and reinsurance agreements as applicable;
   (iv) General cleanup and housekeeping needed maintain a neat and orderly project site and/or sites;
   (v) Other job related items.

(b) Demobilization shall include, but not be limited to:
   (i) 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;
   (ii) Disassembly, removal, and site cleanup and restoration of offices, buildings, and other facilities assembled on the site and/or sites;
   (iii) 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;
   (iv) General cleanup and housekeeping needed to restore a neat and orderly project site.

E2.5 Access to the site, equipment parking, and staging areas are limited to that shown on the drawings or as approved by the Contract Administrator.

MEASUREMENT AND PAYMENT

E2.6 The lump-sum price for the Mobilization and Demobilization bid item shall not exceed five percent (5.00%) of the total bid price for the Contract.

E2.6.1 Further to B9, B17, C12 and E2.6, should the lump sum price exceed 5% of the Total Bid Price the lump sum price will be reduced to 5% of the Total Bid Price, the Total Bid Price will be determined using the reduced lump sum price and payment will be based on the reduced lump sum price.

E2.7 Payment for Mobilization:

(a) 60% of the lump-sum price will be paid to the contractor for Mobilization on the first Progress Estimate for the Contract.

E2.8 Payment for Demobilization:

(a) The remaining 40% of the lump-sum price will be paid upon:

(i) Restoration of the site and/or sites to the satisfaction of the Contract Administrator;

(ii) Distribution of the Declaration of Total Performance.

E2.9 Mobilization and Demobilization will be paid only once (to a maximum of 100%), regardless of the number of times the Contractor mobilizes to the site and/or sites.

E3. GEOTECHNICAL REPORT

E3.1 Further to C3.1, the geotechnical report is provided to aid the Contractor's evaluation of the pavement structure and/or existing soil conditions. The geotechnical report is contained in Appendix 'A'.

E4. PROTECTION OF EXISTING TREES

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

(a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.

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

(c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.

(d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.

(e) Work on-site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.

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

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

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

E5. TRAFFIC CONTROL

E5.1 Further to clauses 3.6, 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.

E5.2 Notwithstanding E5.1, 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.

E5.2.1 An exception to E5.2 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.

E5.2.2 Further to E5.2, 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.

E6. TRAFFIC MANAGEMENT

E6.1 Further to clause 3.7 of CW 1130:

E6.1.1 Contractor to refer to the applicable drawings for traffic staging within St. Vital Park.

E6.1.2 Toboggan Slide Road Reconstruction, St Vital Park Drive Reconstruction St. Vital Road Asphalt Ditch Removal and Lake Road Mill and Fill– Phase I

(i) Contractor responsible for maintaining all construction signage, barricades and traffic control within the area under construction, including advance warning construction signage at extremities of project area.

(ii) Alterations to the Traffic Staging shown herein must be presented and approved by the Contract Administrator at least 48 hours prior to implementing change.

(iii) Toboggan Slide Road shall be closed for construction from St. Vital Park Exit to St. Vital Park Road.

(iv) St. Vital Park Road shall be closed for road reconstruction from River Drive to River Drive.

(v) St. Vital Park Road Asphalt Ditch Removal shall be reduced to one lane form River Drive to Center Road.

(vi) Lake Road shall be closed for construction from Center Road to St. Vital Park Road.

(vii) Access to River Drive, St. Vital Park Road (remaining section) and Center Road shall be maintained at all times.

E6.1.3 St. Vital Park Exit – Concrete Widening, St Vital Park Drive Reconstruction and St Vital Park Drive Asphalt Mill and Fill – Phase II

(i) Contractor responsible for maintaining all construction signage, barricades and traffic control within the area under construction, including advance warning construction signage at extremities of project area.

(ii) Alterations to the Traffic Staging shown herein must be presented and approved by the Contract Administrator at least 48 hours prior to implementing change.

(iii) River Road at St Vital Park Exit shall remain fully open in both directions (Northbound/Southbound) during the morning peak period (07:00 – 09:00) and the afternoon peak period (15:00 – 18:00).

(iv) Maintain one lane of one-way traffic westbound at St. Vital Park Exit onto River Road at all times.

(v) St Vital Park Drive shall be close for construction from River Drive to Center Road and 95m East of parking lot to Center Road.

(vi) During mill and fill operations on St Vital Park Road from Center Road to Toboggan Slide Road one way traffic shall be maintained at all times.

E6.1.4 Flag persons may be necessary to maintain the flow of traffic during certain work operations.

E6.1.5 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he/she shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

E6.1.6 Pedestrian access must be maintained at all times.

E6.1.7 Ambulance/emergency vehicle access must be maintained at all times.

E7. WATER OBTAINED FROM THE CITY

E7.1 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.

E8. SURFACE RESTORATIONS

E8.1 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.

E9. INFRASTRUCTURE SIGNS

E9.1 The Contractor shall obtain infrastructure signs from the Traffic Services Sign Shop at 421 Osborne Street. The Contractor shall mount each sign securely to a rigid backing material approved by the Contract Administrator. The Contractor shall fasten each sign to a suitable support and erect and maintain one sign at each street as directed by the Contract Administrator. When the Contract Administrator considers the Work on the street complete, the Contractor shall remove and dispose of the signs and supports. No measurement for payment will be made for performing all operations herein described and all other items incidental to the work described

E10. SUPPLY AND INSTALLATION OF PAVEMENT REPAIR FABRIC

DESCRIPTION

E10.1 General

E10.1.1 This specification covers the supply and installation of pavement repair fabrics for reinforcement of asphalt layers, distribution of loads, and reducing reflective cracking distresses.

E10.2 Definitions

E10.2.1 Pavement Repair Fabric composed of fiberglass strands coated with an elastomeric polymer and formed into a grid structure.

E10.2.2 Minimum Average Roll Value (MARV) is Property value calculated as typical minus two standard deviations. It shall yield a 97.7 percent degree of confidence that any sample taken during quality assurance testing will exceed the value reported.

E10.2.3 Apertures are the open spaces formed between the interconnected network of longitudinal and transverse ribs of a fabric.

E10.2.4 Type A Pavement Repair Fabric will be used for full width asphalt reinforcement by allowing asphalt particles to penetrate through the fabric to achieve high interlock and effective bonding of the two asphalt lifts.

E10.2.5 Type B Pavement Repair Fabric is high strength fabric in the cross-machine direction and will be used for localized repair reinforcement (i.e. at joints and cracks) to minimizes both thermal and stress related reflective cracking.

E10.3 Referenced Standard Construction Specifications

E10.3.1 CW 3110 – Sub-Grade, Sub-Base and Base Course Construction

E10.3.2 CW 3410 – Asphaltic Concrete Pavement Works

E10.3.3 Approved Products for Surface Works

MATERIALS

E10.4 Approved Products

E10.4.1 Use only those materials listed as Approved Products for Surface Works. The Approved Products are available at the City of Winnipeg, Corporate Finance, Material Management Internet site at:

https://www.winnipeg.ca/finance/findata/matmgt/std_const_spec/current/Docs/Approved_Products_Surface_Works.pdf .

E10.5 Material Identification

E10.5.1 Pavement Repair Fabric shall be labelled in accordance with ASTM D4873/D4873M, and must clearly show the manufacturer name, product style number and roll number. Products without proper identification or labelling, mislabelling, or misrepresentation of materials shall be rejected.

E10.6 Storage and Handling

E10.6.1 Pavement Repair Fabric rolls shall be elevated off the ground and adequately covered to protect them from site construction damage, precipitation, any contamination of dirt or dust and any other deleterious materials.

E10.6.2 Pavement Repair Fabric rolls shall be protected from extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, excess temperatures, and any other environmental conditions that may damage the physical properties of the fabric.

E10.6.3 Store and handle the Pavement Repair Fabric in accordance with the manufacturer's recommendations. Manufacturer's data sheets shall include preparation instructions and recommendations as well as storage and handling requirements and recommendations.

E10.7 Certification

E10.7.1 The Contractor shall provide Manufacturer's Mill Certificate and MARV Roll Data to the Contract Administrator prior to installation. The Certification shall state that the Pavement Repair Fabric meets MARV requirements as evaluated under the Manufacturer's quality control program. The Certification shall be attested to by a person having legal authority to bind the Manufacturer. The Pavement Repair Fabric shall be annually tested by accredited a third party testing facility.

E10.7.2 The Contractor shall provide a letter to the Contract Administrator stating the product name, manufacturer, style number, and other pertinent information to fully describe the Pavement Repair Fabric.

E10.7.3 All testing and data shall be in accordance with approved ASTM standards. Data reported in accordance with other standards will not be accepted.

E10.8 Pavement Repair Fabric Properties

E10.8.1 Pavement Repair Fabric shall consist of a high strength, fiberglass grid custom knitted and coated with an elastomeric polymer and self-adhesive glue with square or rectangular opening configurations.

E10.8.2 The axis with the least strength will be taken as the ultimate strength of the fabric for any given property.

E10.8.3 Type A Pavement Repair Fabric shall meet the requirements in Table CW 3140.1.

Table CW 3140.1 – Type A Pavement Repair Fabric Property Requirements

Physical Property	Machine Direction	Cross-Machine Direction	Test Method
Tensile Strength, Minimum	100 kN/m	100 kN/m	ASTM D 6637
Tensile Strength @ 2% Strain, Minimum	80 kN/m	80 kN/m	ASTM D 6637
Secant Stiffness EA at 2% Strain	4,000 kN/m	4,000 kN/m	ASTM D 6637
Elongation at Break, Maximum	3%		ASTM D 6637
Coating Softening Point, Minimum	150 °C		ASTM D 36
Coating Melting Point, Minimum	350 °C		ASTM D 276
Glass Melting Point, Minimum	820 °C		ASTM D 338
Mass/Unit Area, Minimum	420 g/m^2		ASTM D 5261

E10.8.4 Type B Pavement Repair Fabric shall meet the requirements in Table CW 3140.2.

Table CW 3140.2 – Type B Pavement Repair Fabric Property Requirements

Physical Property	Machine Direction	Cross-Machine Direction	Test Method
Tensile Strength, Minimum	100 kN/m	200 kN/m	ASTM D 6637
Tensile Strength @ 2% Strain, Minimum	80 kN/m	160 kN/m	ASTM D 6637
Secant Stiffness EA at 2% Strain	4,000 kN/m	8,000 kN/m	ASTM D 6637
Elongation at Break, Maximum	3%		ASTM D 6637
Coating Softening Point, Minimum	150 °C		ASTM D 36
Coating Melting Point, Minimum	350 °C		ASTM D 276
Glass Melting Point, Minimum	820 °C		ASTM D 338
Mass/Unit Area, Minimum	420 g/m^2		ASTM D 5261

E10.8.5 All physical property requirements are Minimum Average Roll Values (MARV) determined in accordance with ASTM 4759. Values not labelled as MARV will not be accepted.

E10.8.6 Aperture sizes shall be as follows:

(i) Between 10 mm and 14 mm for pavement repair fabric immediately below or within Type 1A asphalt layer.

(ii) Between 19 mm and 25.4 mm for pavement repair fabric immediately below or within Type III asphalt layer.

E10.8.7 If the fabric has a rectangular aperture size, the smaller dimension shall be used to establish the suitable Pavement Repair Fabric.

CONSTRUCTION METHODS

E10.9 Pavement Repair Fabric shall not be placed when weather conditions, in the opinion of the Contract Administrator, are not suitable for installation, including heavy rainfall, extreme cold or frost conditions, or extreme heat.

E10.10 Make all repairs as required prior to placement of Pavement Repair Fabric. Seal cracks and fill holes using a method that provides a proper level surface. Receiving surface shall be smooth, with the existing cracks pretreated.

E10.11 Surfaces shall be mechanically cleaned by sweeping and vacuuming and be free of oil, vegetation, sand, dirt, water, gravel, and other contaminants prior to placement of Pavement Repair Fabric.

E10.12 Pavement Repair Fabric placement should not be undertaken if rain is likely to fall prior to covering the fabric with an asphalt mat overlay. Pavement Repair Fabric that is placed and will not adhere due to moisture shall be removed and replaced at the Contractor's expense.

E10.13 Pavement Repair Fabric shall be laid out by mechanical means or by hand using sufficient pressure to eliminate ripples. Remove any ripples by pulling the fabric tight. Cutting of the fabric may permitted on tight radii to prevent ripples.

E10.14 Transverse joints shall be overlapped 75 mm or as recommended by the manufacturer, whichever is greater. Longitudinal joints shall be overlapped 37.5 mm or as recommended by the manufacturer, whichever is greater.

E10.15 Prior to the asphalt topping placement, the fabric shall be inspected by the Contract Administrator for damage during installation. Damaged fabric shall be removed and replaced at the Contractor's expense.

E10.16 Activate self-adhesive glue by rolling with a rubber coated drum roller or a pneumatic tire roller. In no instance shall steel-wheeled or vibratory rollers be used. Rolling shall continue until the adhesive is activated and the fabric is bonded to the leveling course.

E10.17 Roller tires shall be kept clean to the satisfaction of the Contract Administrator.

E10.18 If bonding of the fabric is not readily achieved, it shall be removed and replaced at the Contractor's expense.

E10.19 Pavement Repair Fabric shall be laid and rolled over ironworks (e.g., manhole covers). Once the fabric has been rolled, those portions covering the ironworks shall be removed by cutting the fabric with a utility knife or other methods approved by the Contract Administrator.

E10.20 Protect the Pavement Repair Fabric until placement of the finished asphalt topping.

E10.21 Where a tack coat or emulsified asphalt is specified, the approved tack coat/emulsion and dose should be used as recommended by the manufacturer in conjunction with the Pavement Repair Fabric. Tack coat or emulsified asphalts shall not be diluted. Unless otherwise recommended by the manufacturer, apply tack coat or emulsified asphalt at the rate of 0.35 liters per square meter of surface area.

E10.22 Where tack coat or emulsified asphalt is placed prior to the fabric, it must fully cure prior to placement of the fabric. Where tack coat or emulsified asphalt is placed after the fabric, it must fully cure prior to construction traffic, including paving, travelling on the surface.

E10.23 Prevent spattering of tack coat or emulsified asphalt when placed adjacent to curbs, gutters, structures and other adjacent surfaces. Clean any surfaces where it has been contaminated by the tack coat or emulsified asphalt.

E10.24 Leveling course or overlay layer shall be a minimum thickness of 40 mm. Place and compact asphalt over the Pavement Repair Fabric in accordance with CW 3410.

QUALITY ASSURANCE TESTING

E10.25 The Contract Administrator shall test the adhesion for pavement repair fabric in field during construction is as follows:

E10.25.1 Place approximately 1 m^2 of fabric on a prepared surface that is representative of the project conditions.

E10.25.2 Activate self-adhesive glue by rolling with a rubber-tired roller or by applying adequate pressure to fully activate the pressure-sensitive adhesive.

E10.25.3 Use a calibrated spring balance by inserting the hook of the balance under the centre of the fabric and pulling upward until the fabric starts to pull away from the surface.

E10.25.4 A 9 kg pull is required without pulling the grid free or creating ripples in the fabric.

E10.26 The minimum frequency shall be one test, then test every 2000 square metres.

MEASUREMENT AND PAYMENT

E10.27 Supply and installation of Pavement Repair Fabric will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Supply and Install Pavement Repair Fabric". The area to be paid for will be the total number of square metres of Pavement Repair Fabric, supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

E10.28 Only material placed within the designated limits will be included in the payment for "Supply and Install Pavement Repair Fabric".

E10.29 No measurement or payment will be made for Pavement Repair Fabric removed and replaced due to improper installation or damaged materials.

E10.30 No measurement or payment will be made for transverse and longitudinal overlap.

E11. SALT TOLERANT GRASS SEEDING

DESCRIPTION

E11.1 Further to CW 3520 and CW3540, this specification shall cover sub-grade preparation and the supply and placement of Salt Tolerant Grass Seed.

MATERIALS

E11.2 Salt Tolerant Grass Seed

E11.2.1 Salt Tolerant Grass Seed for regional and collector boulevards, medians and interchange areas shall be a mixture composed of:

(a) Seventy percent (70%) Fults or Nuttals Alkaligrass (Puccinellia spp.), twenty percent (20%) Audubon or Aberdeen Creeping Red Fescue and ten percent (10%) Perennial Ryegrass.

EQUIPMENT

E11.3 Scarification equipment shall be suitable for the area being scarified, shall be capable of scarifying the sub-grade to the specified depth and shall be accepted by the Contract Administrator. For confined areas a toothed bucket may be acceptable. For larger areas tilling equipment may be required.

CONSTRUCTION METHODS

E11.4 Preparation of Existing Grade

E11.4.1 Prior to placing topsoil, in areas to be seeded greater in width than 600mm, prepare the existing sub-grade by scarifying to a minimum depth of 75mm and to a maximum depth of 100mm to the satisfaction of the Contract Administrator.

E11.4.2 Scarification shall consist of breaking up and loosening the sub-grade. No scarification shall occur within the edge of a tree canopy (or drip line).

E11.5 Salt Tolerant Grass Seeding

E11.5.1 Salt Tolerant Grass Seed shall be sown at a rate of 2.2 kilograms per 100 square meters.

MEASUREMENT AND PAYMENT

E11.6 Supply, placement and maintenance of Salt Tolerant Grass Seed will be paid for at the Contract Unit Price per square metre for "Salt Tolerant Grass Seeding", measured as specified herein, which price shall be payment in full for supplying all materials and for completing all operations herein described and all other items incidental to the work included in this Specification. Payment for Salt Tolerant Grass Seeding shall be in accordance with the following:

(a) Sixty five (65%) percent of quantity following supply and placement.

(b) Remaining thirty five (35%) percent of quantity following termination of the Maintenance Period.

E12. SUPPLY AND INSTALLATION OF POST BOLLARDS

DESCRIPTION

E12.1 Provide all labour, materials, methods, equipment and accessories for the supply and installation of post bollards.

REFERENCES

E12.2 Canadian Standards Association (CSA International)

(a) CSA O141 Softwood Lumber.

(b) CSA O80, Wood Preservation.

(c) CSA O80.20, fire-retardant treatment of lumber by pressure processes.

E12.3 Referenced Standard Details: SCD-105B Post Bollard. See Appendix 'C'

MATERIALS

E12.4 Post Bollard

(a) Pressure treated timber c/w sloped top to City of Winnipeg detail SCD-105B.

(b) Material to be rough pressure treated wood, Alkaline Copper Quaternary (ACQ), moisture content 19% or less in accordance with following standards: CAN/CSA-O141; NLGA Standard Grading Rules for Canadian Lumber; Forest Stewardship Council (FSC) certified.

(c) Preservative for above ground use: to CSA-O80 Series, ACQ-C treatment, clear finish. Minimum net retention: 4.0 kg/m3.

(d) Preservative for ground contact: to CSA-O80 Series, ACQ-C treatment, clear finish. Minimum net retention: 6.4 kg/m3.

CONSTRUCTION METHODS

E12.5 Review and confirm post bollard locations and orientation with Contract Administrator prior to installation.

E12.6 Install Post Bollards to specifications detailed in SCD-105B Post Bollard.

E12.7 The grade of the post must be averaged over irregularities in the grade at the site in order to ensure a smooth and uniform grade.

E12.8 Set post vertical and backfill with limestone in lifts and tamp thoroughly each lift. Ensure posts are plumb.

E12.9 Construct all work as indicated on the Drawings using adequate fastening methods to ensure solid durable finished work suitable for the purpose intended.

E12.10 Re-treat pressure treated wood surfaces exposed by cutting, trimming or boring with liberal brush application of clear preservative and fire retardant before installation. Ensure that damaged areas such as abrasions, nail and spike holes, area thoroughly saturated with field treatment solutions as per CSA-O80 and CSA-O80.20.

E12.11 Handle and use treated and stained wood in a manner which will avoid damage or field fabrication causing alteration in original treatment.

MEASUREMENT AND PAYMENT

E12.12 Post Bollards will be measured on a unit basis and paid for at the Contract Unit Price per unit as "Supply and Installation of Post Bollard" in accordance with this specification and accepted by the Contract Administrator.

E13. SUPPLY AND INSTALLATION OF GEOTEXTILE FABRICS

E13.1 This Specification shall amend Standard Construction Specification CW 3130-R5 – Supply and Installation of Geotextile Fabrics.

E13.2 Geotextile Fabric shall be Mirafi RS380i High Tenacity Polypropylene Woven Geotextile or approved equal.

E13.2.1 Source:

Manufacturer - Tencate Geosynthetics

Supplier:

Corix Water Products Limited
1835 Hekla Avenue
Winnipeg, MB R2R 0K3
Attention: Dan Gilkes
Phone: 204-632-0331
Fax: 204-632-0391
Email: dan.gilkes@corix.com

E13.2.2 Substitutions

(a) Further to B6, for an alternate product to be considered, the application must contain each of the following :

(i) Mechanical properties matching or exceeding the specified product. Product submittals based solely on mechanical/index properties will not be considered;

(ii) Full-scale performance testing of the proposed product conducted by an independent testing agency that quantifies the structural benefit of the geosynthetic. The benefit shall be quantified as per AASHTO R50-09 in terms of Traffic Benefit Ratio (TBR) and Base Course Reduction (BCR);

(iii) AASHTO NTPEP GTX Audit Certification for the submitted product; and,

(iv) A 500mm x 500mm product sample.

E13.2.3 Sub-grade Strength Analysis

(a) Further to Clause 3.5 of CW 3130, a CBR value of 2.0 is to be used to calculate the overlap of Geotextile Fabric.

APPENDIX ‘A’

GEOTECHNICAL REPORT

APPENDIX 'A' - GEOTECHNICAL REPORT

GEOTECHNICAL REPORTS FOR:
Toboggan Slide Road – Asphalt Reconstruction
St. Vital Park Road – Asphalt Reconstruction

PAVEMENT CORES FOR:
St. Vital Park Road – Asphalt Mill and Fill
Lake Road – Asphalt Mill and Fill

The geotechnical report 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.

TREK GEOTECHNICAL

Quality Engineering | Valued Relationships

City of Winnipeg

2020 Local Streets Renewal – St. Vital Park Road

Prepared for:

Cory Humbert, C.E.T.
Technologist III
City of Winnipeg,
Public Works Department
106-1155 Pacific Ave
Winnipeg, MB R3E 3P1

Project Number:
1000 049 04 401

Date:
January 30, 2020
Final Report

www.trekgeotechnical.ca
1712 St. James Street | Winnipeg, Manitoba R3H 0L3 | Tel 1.204.975.9433 | Fax 1.204.975.9435

TREK GEOTECHNICAL Quality Engineering | Valued Relationships

January 30, 2020 Our File No. 1000 049 04 401

Cory Humbert, C.E.T.
City of Winnipeg,
Public Works Department
106-1155 Pacific Ave
Winnipeg, MB R3E 3P1

RE: Road Investigation Report for
2020 Local Streets Renewal – St. Vital Park Road

TREK Geotechnical Inc. is pleased to submit our report for the road investigations for the 2020 Local Streets Renewal – St. Vital Park Road.

Please contact the undersigned if you have any questions. Thank you for the opportunity to serve you on this assignment.

Sincerely,

TREK Geotechnical Inc.
Per:

Nelson John Ferreira, Ph.D., P. Eng.
Geotechnical Engineer, Principal
Tel: 204.975.9433 ext. 103

cc: Angela Fidler-Kliewer C.Tech. (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	AFK	January 30, 2020	Final Report

Authorization Signatures

Prepared By:

Angela Fidler-Kliewer, C. Tech
Manager of Laboratory and Field Services

PROVINCE OF MANITOBA
N. J. FERREIRA
Member
22892
REGISTERED PROFESSIONAL ENGINEER

ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
TREK GEOTECHNICAL INC.
No. 4877 Date: Jan. 30, 2020

Reviewed By:

Nelson John Ferreira, Ph.D., P.Eng.
Geotechnical Engineer

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Appendix B Summary Table and Lab Testing Results

Appendix C Photographs of Pavement Core Samples

Appendix D Summary Table & Photographs of Additional Pavement Core Samples

1.0 Introduction

This report summarizes the results of the road investigation completed for the 2020 Street Renewal – St. Vital Park Road project 20-R-03. The test holes were completed within St. Vital Park along the main road (St. Vital Park Road). The information collected describes the pavement structure of the existing road as well as the soil stratigraphy beneath the pavement structure at the test hole locations.

2.0 Road Investigation and Laboratory Program

The investigation included coring of pavement at 23 locations followed by drilling of test holes at 13 of the 23 locations. City of Winnipeg selected the investigation locations as shown on Figure 01. The road investigation was conducted between January 7, 2020 and January 13, 2020. The pavement structure (asphalt and/or concrete) was cored by Harsimran Singh of TREK Geotechnical Inc. (TREK) using a portable coring press equipped with a hollow 150 mm diameter diamond core drill bit. Thirteen test holes were drilled to a depth of 3.0 m below road surface by Maple Leaf Drilling Ltd. using a truck mounted drill rig equipped with 125 mm diameter solid stem augers. The sub-surface conditions were observed during drilling and visually classified by Nuno Mendonca of TREK. Other pertinent information such as groundwater and drilling conditions were also recorded during the drilling investigation. Disturbed (auger cuttings) samples and bulk samples retrieved during the sub-surface investigation were transported to TREK's material testing laboratory for further testing along with core samples for further logging at TREK's laboratory.

Core and test hole locations noted on the summary tables and test hole logs are based on UTM coordinates obtained using a hand-held GPS and their location relative to the nearest station, and measured distance from the edge of pavement or other permanent features.

The laboratory testing program consisted of moisture content determination on all samples, as well as Atterberg limits, and grain size analysis (mechanical sieve and hydrometer methods) on select samples between 0.5 and 1.0 m below pavement. Laboratory testing results are included on the test hole logs in Appendix A, while a summary table and individual test results are in Appendix B. Photographs of the asphalt pavement cores are included in Appendix C. A summary table and photos of the additional asphalt pavement cores are included in Appendix D.

3.0 Closure

The information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The findings of this report were based on information provided (field investigation, laboratory testing, geometries). Soil conditions are natural deposits that can be highly variable across a site. If sub-surface conditions are different than the conditions previously encountered on-site or those presented here, we should be notified to adjust our findings if necessary.

All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and you are not

already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

This report has been prepared by TREK Geotechnical Inc. (the Consultant) for the exclusive use of City of Winnipeg (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be used or relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

Figures

TREK GEOTECHNICAL

1000 049 04 - 401
CITY OF WINNIPEG
ST. VITAL PARK ROAD

0 50 100 150 m
SCALE = 1 : 2 500 (279 mm x 432 mm)

LEGEND:
- TEST HOLE (TREK, 2020)
- PAVEMENT CORE (TREK, 2020)

NOTES:
1. AERIAL IMAGE FROM GOOGLE EARTH (2019)
2. TEST HOLE & PAVEMENT CORE LOCATIONS OBTAINED USING HAND HELD GPS UNIT.

Figure 01
TEST HOLE & PAVEMENT CORE LOCATION PLAN

ANSI full bleed B (11.00 x 17.00 Inches)

Z:\Projects\1000 Soils Lab\Lab Projects\1000 Lab Projects\1000-049 City of Winnipeg\1000 049 04 2020 Local Street-St. Vital Park Road\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder\20.01.23 TH LOCATIONS - ST VITAL PARK.dwg, 1/29/2020 11:31:19 AM

Appendix A

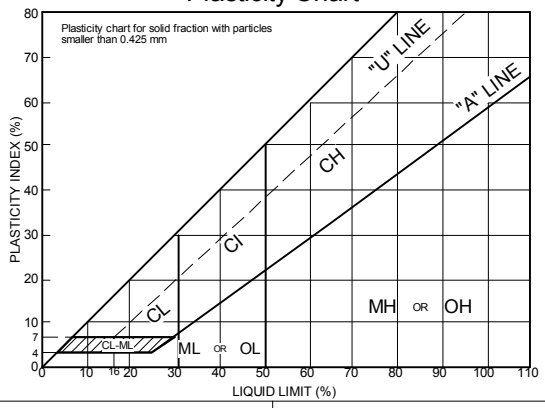
Test Hole Logs

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

1. Classifications are based on the United Soil Classification System and include consistency, moisture, and color. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate.
2. Descriptions on these test hole logs apply only at the specific test hole locations and at the time the test holes were drilled. Variability of soil and groundwater conditions may exist between test hole locations.
3. When the following classification terms are used in this report or test hole logs, the primary and secondary soil fractions may be visually estimated.

Major Divisions			USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	Clean gravel (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols*
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 / Atterberg limits above "A" line or P.I. greater than 7 / Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 / Atterberg limits above "A" line or P.I. greater than 7 / Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and Clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt		Peat and other highly organic soils	Von Post Classification Limit: Strong colour or odour, and often fibrous texture



Particle Size	Material	ASTM Sieve sizes	mm
	Sand		
	Coarse	#10 to #4	2.00 to 4.75
	Medium	#40 to #10	0.425 to 2.00
	Fine	#200 to #40	0.075 to 0.425
	Silt or Clay	< #200	< 0.075

Particle Size	Material	ASTM Sieve Sizes	mm
	Boulders	> 12 in.	> 300
	Cobbles	3 in. to 12 in.	75 to 300
	Gravel		
	Coarse	3/4 in. to 3 in.	19 to 75
	Fine	#4 to 3/4 in.	4.75 to 19

* Borderline classifications used for soils possessing characteristics of two groups are designated by combinations of groups symbols. For example; GW-GC, well-graded gravel-sand mixture with clay binder.

Other Symbol Types

	Asphalt		Bedrock (undifferentiated)		Cobbles
	Concrete		Limestone Bedrock		Boulders and Cobbles
	Fill		Cemented Shale		Silt Till
			Non-Cemented Shale		Clay Till

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)
PL - Plastic Limit (%)
PI - Plasticity Index (%)
MC - Moisture Content (%)
SPT - Standard Penetration Test
RQD - Rock Quality Designation
Qu - Unconfined Compression
Su - Undrained Shear Strength
VW - Vibrating Wire Piezometer
SI - Slope Inclinometer

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

TERM	EXAMPLES	PERCENTAGE
and	and CLAY	35 to 50 percent
"y" or "ey"	clayey, silty	20 to 35 percent
some	some silt	10 to 20 percent
trace	trace gravel	1 to 10 percent

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

The Standard Penetration Test blow count (N) of a non-cohesive soil can be related to compactness condition as follows:

Descriptive Terms	SPT (N) (Blows/300 mm)
Very loose	< 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	> 50

The Standard Penetration Test blow count (N) of a cohesive soil can be related to its consistency as follows:

Descriptive Terms	SPT (N) (Blows/300 mm)
Very soft	< 2
Soft	2 to 4
Firm	4 to 8
Stiff	8 to 15
Very stiff	15 to 30
Hard	> 30

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

Descriptive Terms	Undrained Shear Strength (kPa)
Very soft	< 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very stiff	100 to 200
Hard	> 200

Sub-Surface Log

Test Hole TH20-01
1 of 1

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521366, E-633991
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		ASPHALT - 75 mm thick				
		SAND AND GRAVEL (FILL) - silty - brown - frozen, moist and compact when thawed - well graded sand to gravel (<25 mm diam.) - sub-rounded to angular		G01		
0.5		SILT AND CLAY- trace organics - black - frozen to 1.4 m depth, moist and stiff when thawed - high plasticity		G02		
				G03		
1.0		- no organics, brown below 1.0 m		G04		
				G05		
1.5						
2.0				G06		
2.5						
3.0				G07		

END OF TEST HOLE AT 3.0 m IN SILT AND CLAY
1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 0+30, 1.2 m South of the North edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-02
1 of 1

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521328, E-633901
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT - 85 mm thick		
		SILT AND CLAY - trace to some sand, trace gravel (<10 mm diam.), trace organics - brown - frozen to 1.1 m depth, moist and firm when thawed - high plasticity		G79
0.5		- no gravel below 0.5 m		G80
				G81
1.0		- no organics, stiff below 0.9 m		G82
		- very stiff below 1.3 m		G83
1.5				
				G84
2.0				
2.5		- firm to stiff below 2.4 m		G85
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.0 m IN SILT AND CLAY
1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
5) Test hole located at C.O.W. STA 1+23, 4.0 m South of the North edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-03
1 of 1

TREK GEOTECHNICAL

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521322, E-633800
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	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
		ASPHALT - 70 mm thick				
		SILT AND CLAY - trace sand, trace gravel (<20 mm diam.) - dark brown - frozen to 0.9 m depth, moist and soft to firm when thawed - high plasticity		G86	●	
0.5				G88	●	
				G89	●	
1.0		- stiff to very stiff below 0.9 m		G90	●	△ ✤
				G91	●	△ ✤
1.5		SILT - some clay to clayey, trace to some sand - brown - moist, firm to stiff - low to intermediate plasticity		G92	●	△ ✤
2.0						
2.5						
3.0				G93	●	△ ✤

END OF TEST HOLE AT 3.0 m IN SILT
1) No seepage observed.
2) Sloughing in silt layer observed below 2.7 m depth.
3) Test hole open to 2.7 m immediately after drilling.
4) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
5) Test hole located at C.O.W. STA 2+30, 1.4 m North of the South edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-04
1 of 1

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521345, E-633702
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Material Description	Sample Type	Sample Number
0	ASPHALT - 75 mm thick		
	SAND AND GRAVEL (FILL) - silty, brown, frozen, moist and compact when thawed, well graded sand to gravel (<25 mm diam.), sub-rounded to angular	G	G08
	SILT AND CLAY - trace sand, trace to some organics - dark brown - frozen to 1.1 m depth, moist and stiff when thawed - high plasticity	G	G09
0.5		G	G10
1.0		G	G11
	- trace organics below 1.2 m	G	G12
1.5	CLAY - silty - dark brown - moist, firm to stiff - high plasticity	G	G13
2.0			
	SILT - some clay to clayey, some sand - dark brown - moist, soft to firm - low to intermediate plasticity	G	G14
2.5			
3.0		G	G15

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✿ Pocket Pen. ✿ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.0 m IN SILT
1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 3+30, 1.2 m South of the North edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-05
1 of 1

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521389, E-633612
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
0		ASPHALT - 50 mm thick		
		SAND AND GRAVEL (FILL) - some silt, brown, frozen, moist and compact when thawed, well graded sand to gravel (<25 mm diam.), sub-rounded to angular		G16
		SILT AND CLAY - trace sand, trace organics - dark grey - frozen to 1.2 m depth, moist and firm to stiff when thawed - high plasticity		G17
0.5				G18
				G19
		- no organics, dark brown below 0.9 m		
1.0				G20
1.5		- stiff to very still below 1.5 m		G21
2.0				
2.5				
3.0				G22

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ | ✿ Pocket Pen. ✿ | ☒ Qu ☒ | ○ Field Vane ○

END OF TEST HOLE AT 3.0 m IN SILT AND CLAY
1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 4+40, 4.0 m South of the North edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-06
1 of 1

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521436, E-633512
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
0		ASPHALT - 70 mm thick		
		SAND AND GRAVEL (FILL) - some silt, brown, frozen, moist and compact when thawed, well graded sand to gravel (<25 mm diam.), sub-rounded to angular		
		SILT AND CLAY - trace sand - dark brown - frozen to 0.9 m depth, moist and stiff when thawed - high plasticity	G	G23
0.5			G	G24
			G	G25
1.0			G	G26
		- firm to stiff below 1.4 m	G	G27
1.5			G	G28
2.0				
2.5				
3.0			G	G29

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 3.0 m IN SILT AND CLAY
1) No seepage or sloughing observed.
2) Test hole open to 1.8 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 5+46, 4.0 m North of the South edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-07
1 of 1

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521445, E633424
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	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
		ASPHALT - 80 mm thick				
		SILT AND CLAY - trace sand - dark brown - frozen to 1.1 m depth, moist and soft to firm when thawed - high plasticity		G30		
0.5				G31		
				G32		
1.0		- very stiff below 0.9 m		G33		
				G34		
1.5				G35		
2.0		- stiff below 2.0 m				
2.5						
				G36		
3.0		END OF TEST HOLE AT 3.0 m IN SILT AND CLAY				

1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 6+40, 4.0 m North of the South edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-08
1 of 1

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521005, E-633621
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT - 80 mm thick		
		SAND AND GRAVEL (FILL) - some silt, brown, frozen, moist and compact when thawed, well graded sand to gravel (<25 mm diam.), sub-rounded to angular		G37
		SILT AND CLAY - trace to some sand, trace gravel (<20 mm diam.) - dark grey - frozen to 1.1 m depth, moist and soft to firm when thawed - high plasticity		G38
0.5				G39
		- stiff to very stiff below 1.0 m		
1.0				G40
				G41
1.5				
		CLAY - silty, trace silt inclusions (<20 mm diam.) - brown - moist, very stiff - high plasticity		
2.0				G42
2.5				
				G43
3.0				

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 3.0 m IN CLAY
1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 14+00, 4.0 m South of the North edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-09

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521048, E-633709
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT - 60 mm thick		
		SAND AND GRAVEL (FILL) - some silt, brown, frozen, moist and compact when thawed, well graded sand to gravel (<25 mm diam.), sub-rounded to angular	G	G44
		SILT AND CLAY - trace sand - dark grey - frozen to 1.1 m depth, moist and soft to firm when thawed - intermediate to high plasticity	G	G45
0.5			G	G46
1.0			G	G47
			G	G48
1.5		CLAY - silty, trace silt inclusions (<20 mm diam.) - brown - moist, very stiff - high plasticity	G	G49
2.0				
2.5				
3.0			G	G50

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 3.0 m IN CLAY

1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 14+80, 1.0 m East of the West edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-10
1 of 1

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521111, E-633789
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	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
		ASPHALT - 70 mm thick				
		SAND AND GRAVEL (FILL) - some silt, brown, frozen, moist and compact when thawed, well graded sand to gravel (<10 mm diam.), sub-rounded to angular		G51		
		SILT AND CLAY - some sand, trace organics - dark grey - frozen to 1.1 m depth, moist and firm to stiff when thawed - high plasticity				
0.5				G52	●	✤
				G53	●	✤
		- no organics below 0.9 m				
1.0				G54	●	✤
				G55	●	✤ △
1.5		CLAY - silty, trace silt inclusions (<20 mm diam.) - brown - moist, very stiff - high plasticity				
2.0				G56	●	✤ △
2.5						
3.0				G57	●	✤

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 15+80, 0.8 m West of the East edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-11
1 of 1

TREK GEOTECHNICAL

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521324, E-633928
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT - 155 mm thick		
		SILT AND CLAY - trace sand - dark brown - frozen to 1.1 m depth, moist and soft to firm when thawed - high plasticity		G72
0.5				G73
				G74
1.0		- stiff below 0.9 m		G75
		CLAY - silty, trace silt inclusions (<20 mm diam.) - brown - moist, very stiff - high plasticity		G76
1.5				
2.0				G77
2.5				
3.0				G78

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 3.0 m IN CLAY
1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 19+50, 2.0 m West of the East edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-12

Client: City of Winnipeg
Project Number: 1000-049-04-401
Project Name: 2020 Local Street - St. Vital Park Road
Location: UTM N-5521257, E-633989
Contractor: Maple Leaf Drilling Ltd.
Ground Elevation: Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount
Date Drilled: January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT - 80 mm thick		
		SILT AND CLAY - trace sand, trace gravel (<20 mm diam.) - dark grey - frozen, moist and firm to stiff when thawed - high plasticity		G65
0.5				G66
		CLAY - silty - brown - frozen to 1.1 m depth, moist and stiff when thawed - high plasticity		G67
1.0				G68
		SILT - trace clay, trace sand - light brown - moist, soft - no to low plasticity		G69
1.5		CLAY - silty - brown - moist, stiff to very stiff - high plasticity		G70
2.0				
2.5				
3.0				G71

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 3.0 m CLAY
1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 18+70, 4.0 m East of the West edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Sub-Surface Log

Test Hole TH20-13
1 of 1

TREK GEOTECHNICAL

Client:	City of Winnipeg	**Project Number:**	1000-049-04-401
Project Name:	2020 Local Street - St. Vital Park Road	**Location:**	UTM N-5521210, E-634005
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	January 13, 2020

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

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT - 165 mm thick				
		SAND AND GRAVEL (FILL) - some silt, brown, frozen, moist and compact when thawed, well graded sand to gravel (<25 mm diam.), sub rounded to angular		G58		
0.5		SILT AND CLAY - trace sand - dark grey - frozen to 0.8 m depth, moist and firm to stiff when thawed - high plasticity		G59		
				G60		
1.0				G61		
				G62		
1.5		SILT - trace to some clay, trace sand - light brown - moist, soft - low plasticity		G63		
2.0						
		CLAY - silty, trace silt inclusions (<10 mm diam.) - mottled brown and grey - moist, stiff - high plasticity		G64		
2.5						
3.0						

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing observed.
2) Test hole open to 3.0 m immediately after drilling.
3) Test hole backfilled with auger cuttings, granular fill and cold patch asphalt.
4) Test hole located at C.O.W. STA 18+46, 3.0 m North of the South edge of road.

Logged By: Nuno Mendonca **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-01-14_ST VITAL PARK_1000-049-04_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 1/23/20

Appendix B

Summary Table and Lab Testing Results

2020 Local Street Renewal - St. Vital Park Road
Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH20-01	UTM : 5521366 N, 633991 E Located at C.O.W. STA 0+30, 1.2 m South of the North edge of road.	Asphalt	75	Concrete	N/A	Sand and Gravel	0.1	0.3	6							
						Silt and Clay	0.5	0.6	32	51	48	1	0	22	69	47
						Silt and Clay	0.8	0.9	34							
						Silt and Clay	1.1	1.2	30							
						Silt and Clay	1.4	1.5	32							
						Silt and Clay	2.0	2.1	32							
						Silt and Clay	2.9	3.0	33							
TH20-02	UTM : 5521328 N, 633901 E Located at C.O.W. STA 1+23, 4.0 m South of the North edge of road.	Asphalt	85	Concrete	N/A	Silt and Clay	0.2	0.3	32							
						Silt and Clay	0.5	0.6	32							
						Silt and Clay	0.8	0.9	30							
						Silt and Clay	1.1	1.2	29							
						Silt and Clay	1.4	1.5	28							
						Silt and Clay	1.8	2.0	26							
						Silt and Clay	2.6	2.7	27							
TH20-03	UTM : 5521322 N, 633800 E Located at C.O.W. STA 2+30, 1.4 m North of the South edge of road.	Asphalt	70	Concrete	N/A	Silt and Clay	0.1	0.3	34							
						Silt and Clay	0.5	0.6	35							
						Silt and Clay	0.8	0.9	34							
						Silt and Clay	1.1	1.2	33							
						Silt and Clay	1.4	1.5	32							
						Silt	1.7	1.8	27							
						Silt	2.9	3.0	30							
TH20-04	UTM : 5521345 N, 633702 E Located at C.O.W. STA 3+30, 1.2 m South of the North edge of road	Asphalt	75	Concrete	N/A	Sand and Gravel	0.1	0.2	8							
						Silt and Clay	0.3	0.5	40							
						Silt and Clay	0.6	0.8	40							
						Silt and Clay	0.9	1.1	37							
						Silt and Clay	1.2	1.4	35							
						Clay	1.5	1.7	36							
						Silt	2.1	2.3	29							
						Silt	2.9	3.0	27							

2020 Local Street Renewal - St. Vital Park Road
Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH20-05	UTM : 5521389 N, 633612 E Located at C.O.W. STA 4+40, 4.0 m South of the North edge of pavement.	Asphalt	50	Concrete	N/A	Sand and Gravel	0.1	0.2	16							
						Silt and Clay	0.2	0.3	36							
						Silt and Clay	0.5	0.6	39	60	39	1	0	26	80	54
						Silt and Clay	0.8	0.9	37							
						Silt and Clay	1.1	1.2	31							
						Silt and Clay	1.5	1.7	30							
						Silt and Clay	2.9	3.0	30							
TH20-06	UTM : 5521436 N, 633512 E Located at C.O.W. STA 5+46, 4.0 m North of the South edge of road.	Asphalt	70	Concrete	N/A	Silt and Clay	0.2	0.3	37							
						Silt and Clay	0.5	0.6	35							
						Silt and Clay	0.8	0.9	35							
						Silt and Clay	1.1	1.2	33							
						Silt and Clay	1.4	1.5	33							
						Silt and Clay	1.7	1.8	34							
						Silt and Clay	2.9	3.0	34							
TH20-07	UTM : 5521445 N, 633424 E Located at C.O.W. STA 6+40, 4.0 m North of the South edge of road.	Asphalt	80	Concrete	N/A	Silt and Clay	0.1	0.3	33							
						Silt and Clay	0.5	0.6	31	51	49	0	0	23	72	49
						Silt and Clay	0.8	0.9	34							
						Silt and Clay	1.1	1.2	32							
						Silt and Clay	1.4	1.5	33							
						Silt and Clay	1.7	1.8	34							
						Silt and Clay	2.9	3.0	37							
TH20-08	UTM : 5521005 N, 633621 E Located at C.O.W. STA 14+00, 4.0 m South of the North edge of road.	Asphalt	80	Concrete	N/A	Sand and Gravel	0.1	0.2	9							
						Silt and Clay	0.5	0.6	32							
						Silt and Clay	0.8	0.9	33							
						Silt and Clay	1.1	1.2	32							
						Silt and Clay	1.4	1.5	32							
						Clay	2.1	2.3	32							
						Clay	2.9	3.0	31							

2020 Local Street Renewal - St. Vital Park Road
Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH20-09	UTM : 5521048 N, 633709 E Located at C.O.W. STA 14+80, 1.0 m East of the West edge of road.	Asphalt	60	Concrete	N/A	Sand and Gravel	0.1	0.3	18							
						Silt and Clay	0.5	0.6	33							
						Silt and Clay	0.8	0.9	34							
						Silt and Clay	1.1	1.2	36							
						Silt and Clay	1.4	1.5	34							
						Clay	2.0	2.1	35							
						Clay	2.9	3.0	30							
TH20-10	UTM : 5521111 N, 633789 E Located at C.O.W. STA 15+80, 0.8 m West of the East edge of road.	Asphalt	70	Concrete	N/A	Sand and Gravel	0.1	0.2	15		23	70	7			
						Silt and Clay	0.5	0.6	35							
						Silt and Clay	0.8	0.9	36							
						Silt and Clay	1.1	1.2	37							
						Silt and Clay	1.4	1.5	36							
						Clay	2.1	2.3	33							
						Clay	2.9	3.0	35							
TH20-11	UTM : 5521324 N, 633928 E Located at C.O.W. STA 19+50, 2.0 m West of the East edge of road.	Asphalt	155	Concrete	N/A	Silt and Clay	0.2	0.3	38							
						Silt and Clay	0.5	0.6	36							
						Silt and Clay	0.8	0.9	35							
						Silt and Clay	1.1	1.2	33							
						Clay	1.4	1.5	31							
						Clay	2.0	2.1	32							
						Clay	2.9	3.0	32							
TH20-12	UTM : 5521257 N, 633989 E Located at C.O.W. STA 18+70, 4.0 m East of the West edge of road.	Asphalt	80	Concrete	N/A	Silt and Clay	0.1	0.2	32							
						Silt and Clay	0.5	0.6	32							
						Clay	0.8	0.9	30							
						Clay	1.1	1.2	33							
						Silt	1.4	1.5	25							
						Clay	1.7	1.8	36							
						Clay	2.9	3.0	44							

2020 Local Street Renewal - St. Vital Park Road
Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH20-13	UTM : 5521210 N, 634005 E Located at C.O.W. STA 18+40, 3.0 m North of the South edge of road.	Asphalt	165	Concrete	N/A	Sand and Gravel	0.2	0.3	5							
						Silt and Clay	0.5	0.6	30							
						Silt and Clay	0.8	0.9	30							
						Silt and Clay	1.1	1.2	32							
						Silt and Clay	1.4	1.5	29							
						Silt	1.5	1.7	23							
						Clay	2.3	2.4	40							

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Test Hole	TH20-01	TH20-01	TH20-01	TH20-01	TH20-01	TH20-01
Depth (m)	0.1 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	2.0 - 2.1
Sample #	G01	G02	G03	G04	G05	G06
Tare ID	F102	AC25	A9	C11	AC12	K20
Mass of tare	8.6	6.7	8.1	8.3	6.7	8.6
Mass wet + tare	153.7	117.1	296.6	202.2	233.7	289.8
Mass dry + tare	145.8	90.5	223.3	157.3	178.8	221.9
Mass water	7.9	26.6	73.3	44.9	54.9	67.9
Mass dry soil	137.2	83.8	215.2	149.0	172.1	213.3
Moisture %	5.8%	31.7%	34.1%	30.1%	31.9%	31.8%

Test Hole	TH20-01	TH20-02	TH20-02	TH20-02	TH20-02	TH20-02
Depth (m)	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G07	G79	G80	G81	G82	G83
Tare ID	W09	E24	F86	Z126	AA08	F64
Mass of tare	8.6	8.6	8.3	8.6	6.8	8.6
Mass wet + tare	394.9	180.3	175.7	223.8	214.9	341.3
Mass dry + tare	298.9	138.5	134.7	174.4	167.7	269.3
Mass water	96.0	41.8	41.0	49.4	47.2	72.0
Mass dry soil	290.3	129.9	126.4	165.8	160.9	260.7
Moisture %	33.1%	32.2%	32.4%	29.8%	29.3%	27.6%

Test Hole	TH20-02	TH20-02	TH20-03	TH20-03	TH20-03	TH20-03
Depth (m)	1.8 - 2.0	2.6 - 2.7	0.1 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G84	G85	G86	G88	G89	G90
Tare ID	F152	E28	W90	C13	D42	K26
Mass of tare	8.4	8.4	8.5	8.4	8.6	8.5
Mass wet + tare	348.6	335.5	144.1	153.9	188.2	235.3
Mass dry + tare	278.1	266.4	110.0	116.0	142.6	178.9
Mass water	70.5	69.1	34.1	37.9	45.6	56.4
Mass dry soil	269.7	258.0	101.5	107.6	134.0	170.4
Moisture %	26.1%	26.8%	33.6%	35.2%	34.0%	33.1%

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Test Hole	TH20-03	TH20-03	TH20-03	TH20-04	TH20-04	TH20-04
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.9 - 3.0	0.1 - 0.2	0.3 - 0.5	0.6 - 0.8
Sample #	G91	G92	G93	G08	G09	G10
Tare ID	Z13	F2	N28	AB74	F56	N110
Mass of tare	8.7	8.4	8.3	6.8	8.5	8.5
Mass wet + tare	346.0	350.1	368.5	200.9	287.1	262.9
Mass dry + tare	264.9	278.6	285.2	186.0	207.6	190.5
Mass water	81.1	71.5	83.3	14.9	79.5	72.4
Mass dry soil	256.2	270.2	276.9	179.2	199.1	182.0
Moisture %	31.7%	26.5%	30.1%	8.3%	39.9%	39.8%

Test Hole	TH20-04	TH20-04	TH20-04	TH20-04	TH20-04	TH20-05
Depth (m)	0.9 - 1.1	1.2 - 1.4	1.5 - 1.7	2.1 - 2.3	2.9 - 3.0	0.1 - 0.2
Sample #	G11	G12	G13	G14	G15	G16
Tare ID	AB10	K5	AB87	W07	W02	AB63
Mass of tare	6.7	8.7	6.7	8.7	8.4	7.1
Mass wet + tare	241.5	177.2	233.1	390.7	273.5	198.4
Mass dry + tare	178.1	133.4	172.9	306.0	216.9	172.0
Mass water	63.4	43.8	60.2	84.7	56.6	26.4
Mass dry soil	171.4	124.7	166.2	297.3	208.5	164.9
Moisture %	37.0%	35.1%	36.2%	28.5%	27.1%	16.0%

Test Hole	TH20-05	TH20-05	TH20-05	TH20-05	TH20-05	TH20-05
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.5 - 1.7	2.9 - 3.0
Sample #	G17	G18	G19	G20	G21	G22
Tare ID	D35	E34	N57	AB48	AB60	E67
Mass of tare	8.6	8.5	8.7	6.8	6.6	8.7
Mass wet + tare	167.8	265.0	269.0	270.1	327.7	325.9
Mass dry + tare	125.5	193.7	198.5	207.8	253.7	252.8
Mass water	42.3	71.3	70.5	62.3	74.0	73.1
Mass dry soil	116.9	185.2	189.8	201.0	247.1	244.1
Moisture %	36.2%	38.5%	37.1%	31.0%	29.9%	29.9%

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Test Hole	TH20-06	TH20-06	TH20-06	TH20-06	TH20-06	TH20-06
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G23	G24	G25	G26	G27	G28
Tare ID	A39	K27	N16	H66	AB90	C8
Mass of tare	8.4	8.5	8.8	8.5	6.9	8.6
Mass wet + tare	178.1	377.6	260.0	224.5	290.5	313.1
Mass dry + tare	132.0	281.5	195.0	170.6	220.1	236.5
Mass water	46.1	96.1	65.0	53.9	70.4	76.6
Mass dry soil	123.6	273.0	186.2	162.1	213.2	227.9
Moisture %	37.3%	35.2%	34.9%	33.3%	33.0%	33.6%

Test Hole	TH20-06	TH20-07	TH20-07	TH20-07	TH20-07	TH20-07
Depth (m)	2.9 - 3.0	0.1 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G29	G30	G31	G32	G33	G34
Tare ID	W04	K20	P06	D45	Z73	C2
Mass of tare	8.6	8.5	8.9	8.7	9.0	8.7
Mass wet + tare	353.1	162.5	317.8	227.4	293.3	247.1
Mass dry + tare	266.0	124.6	244.2	172.1	224.4	187.7
Mass water	87.1	37.9	73.6	55.3	68.9	59.4
Mass dry soil	257.4	116.1	235.3	163.4	215.4	179.0
Moisture %	33.8%	32.6%	31.3%	33.8%	32.0%	33.2%

Test Hole	TH20-07	TH20-07	TH20-08	TH20-08	TH20-08	TH20-08
Depth (m)	1.7 - 1.8	2.9 - 3.0	0.1 - 0.2	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G35	G36	G37	G38	G39	G40
Tare ID	P11	AB17	Z09	W34	AB65	AB49
Mass of tare	8.5	8.5	8.4	8.5	7.1	6.7
Mass wet + tare	322.5	361.1	297.8	209.2	269.4	368.3
Mass dry + tare	242.2	265.5	275.0	160.5	204.9	280.0
Mass water	80.3	95.6	22.8	48.7	64.5	88.3
Mass dry soil	233.7	257.0	266.6	152.0	197.8	273.3
Moisture %	34.4%	37.2%	8.6%	32.0%	32.6%	32.3%

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Test Hole	TH20-08	TH20-08	TH20-08	TH20-09	TH20-09	TH20-09
Depth (m)	1.4 - 1.5	2.1 - 2.3	2.9 - 3.0	0.1 - 0.3	0.5 - 0.6	0.8 - 0.9
Sample #	G41	G42	G43	G44	G45	G46
Tare ID	F32	A32	P28	N32	AA19	W47
Mass of tare	8.4	9.1	8.6	8.4	6.8	8.7
Mass wet + tare	303.9	355.2	396.0	288.0	247.4	225.1
Mass dry + tare	232.0	271.5	303.5	244.6	187.4	170.3
Mass water	71.9	83.7	92.5	43.4	60.0	54.8
Mass dry soil	223.6	262.4	294.9	236.2	180.6	161.6
Moisture %	32.2%	31.9%	31.4%	18.4%	33.2%	33.9%

Test Hole	TH20-09	TH20-09	TH20-09	TH20-09	TH20-10	TH20-10
Depth (m)	1.1 - 1.2	1.4 - 1.5	2.0 - 2.1	2.9 - 3.0	0.1 - 0.2	0.5 - 0.6
Sample #	G47	G48	G49	G50	G51	G52
Tare ID	H16	N22	H20	AC10	E138	D21
Mass of tare	8.6	8.8	8.6	7.1	8.8	9.3
Mass wet + tare	215.3	380.5	399.6	404.0	242.3	343.1
Mass dry + tare	160.1	286.6	298.8	311.8	212.6	257.0
Mass water	55.2	93.9	100.8	92.2	29.7	86.1
Mass dry soil	151.5	277.8	290.2	304.7	203.8	247.7
Moisture %	36.4%	33.8%	34.7%	30.3%	14.6%	34.8%

Test Hole	TH20-10	TH20-10	TH20-10	TH20-10	TH20-10	TH20-11
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	2.1 - 2.3	2.9 - 3.0	0.2 - 0.3
Sample #	G53	G54	G55	G56	G57	G72
Tare ID	N74	Z69	E46	Z38	F54	F91
Mass of tare	8.5	8.5	8.5	8.6	8.5	8.5
Mass wet + tare	201.3	256.1	322.2	378.7	388.7	209.1
Mass dry + tare	150.1	189.8	240.0	287.5	290.4	153.4
Mass water	51.2	66.3	82.2	91.2	98.3	55.7
Mass dry soil	141.6	181.3	231.5	278.9	281.9	144.9
Moisture %	36.2%	36.6%	35.5%	32.7%	34.9%	38.4%

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Test Hole	TH20-11	TH20-11	TH20-11	TH20-11	TH20-11	TH20-11
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	2.0 - 2.1	2.9 - 3.0
Sample #	G73	G74	G75	G76	G77	G78
Tare ID	N39	AC01	W88	W72	Z139	F127
Mass of tare	8.5	6.7	8.4	8.8	8.6	8.5
Mass wet + tare	229.4	247.0	286.7	281.4	336.0	363.2
Mass dry + tare	170.9	184.7	218.5	216.4	255.8	278.0
Mass water	58.5	62.3	68.2	65.0	80.2	85.2
Mass dry soil	162.4	178.0	210.1	207.6	247.2	269.5
Moisture %	36.0%	35.0%	32.5%	31.3%	32.4%	31.6%

Test Hole	TH20-12	TH20-12	TH20-12	TH20-12	TH20-12	TH20-12
Depth (m)	0.1 - 0.2	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G65	G66	G67	G68	G69	G70
Tare ID	N104	Z84	W89	F77	H9	C6
Mass of tare	8.6	8.6	8.5	8.5	8.8	8.4
Mass wet + tare	309.2	346.1	260.6	361.4	321.5	363.4
Mass dry + tare	236.6	264.1	202.2	273.3	258.3	268.9
Mass water	72.6	82.0	58.4	88.1	63.2	94.5
Mass dry soil	228.0	255.5	193.7	264.8	249.5	260.5
Moisture %	31.8%	32.1%	30.1%	33.3%	25.3%	36.3%

Test Hole	TH20-12	TH20-13	TH20-13	TH20-13	TH20-13	TH20-13
Depth (m)	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G71	G58	G59	G60	G61	G62
Tare ID	K34	F99	Z106	N53	C3	N72
Mass of tare	8.7	9	8.5	8.5	9.3	8.8
Mass wet + tare	343.5	279.7	374.3	291.0	275.1	410.9
Mass dry + tare	241.0	267.0	290.3	225.3	211.5	321.8
Mass water	102.5	12.7	84.0	65.7	63.6	89.1
Mass dry soil	232.3	258.0	281.8	216.8	202.2	313.0
Moisture %	44.1%	4.9%	29.8%	30.3%	31.5%	28.5%

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Test Hole	TH20-13	TH20-13				
Depth (m)	1.5 - 1.7	2.3 - 2.4				
Sample #	G63	G64				
Tare ID	AC05	H15				
Mass of tare	6.8	9				
Mass wet + tare	423.8	426.2				
Mass dry + tare	346.6	306.5				
Mass water	77.2	119.7				
Mass dry soil	339.8	297.5				
Moisture %	22.7%	40.2%				

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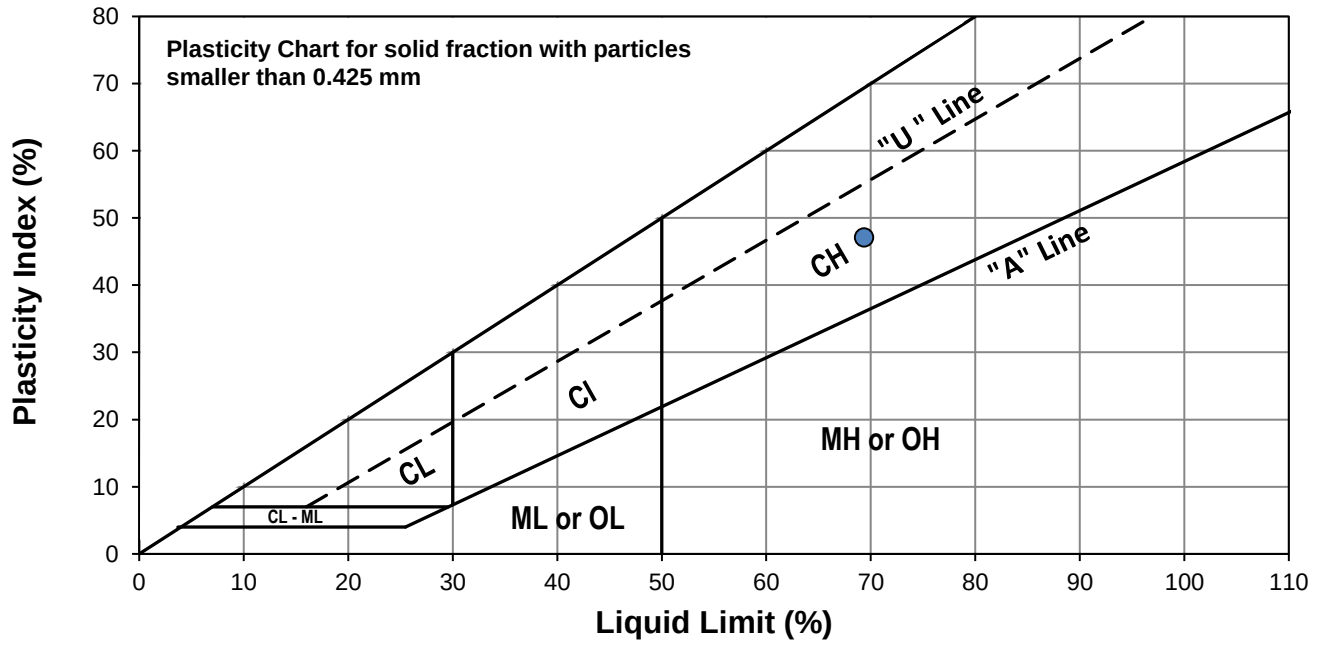
Atterberg Limits
ASTM D4318-10e1

Project No.	1000-049-04
Client	City of Winnipeg
Project	2020 Local Street - St Vital Park Road
Test Hole	TH20-01
Sample #	G03
Depth (m)	0.8 - 0.9
Sample Date	13-Jan-20
Test Date	17-Jan-20
Technician	AD

Liquid Limit	69
Plastic Limit	22
Plasticity Index	47

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	17	23	30		
Mass Wet Soil + Tare (g)	24.921	24.950	27.318		
Mass Dry Soil + Tare (g)	20.225	20.487	21.898		
Mass Tare (g)	13.718	14.066	13.970		
Mass Water (g)	4.696	4.463	5.420		
Mass Dry Soil (g)	6.507	6.421	7.928		
Moisture Content (%)	72.168	69.506	68.365		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	14.098	14.267			
Mass Wet Soil + Tare (g)	20.363	20.403			
Mass Dry Soil + Tare (g)	19.226	19.279			
Mass Water (g)	1.137	1.124			
Mass Dry Soil (g)	5.128	5.012			
Moisture Content (%)	22.172	22.426			

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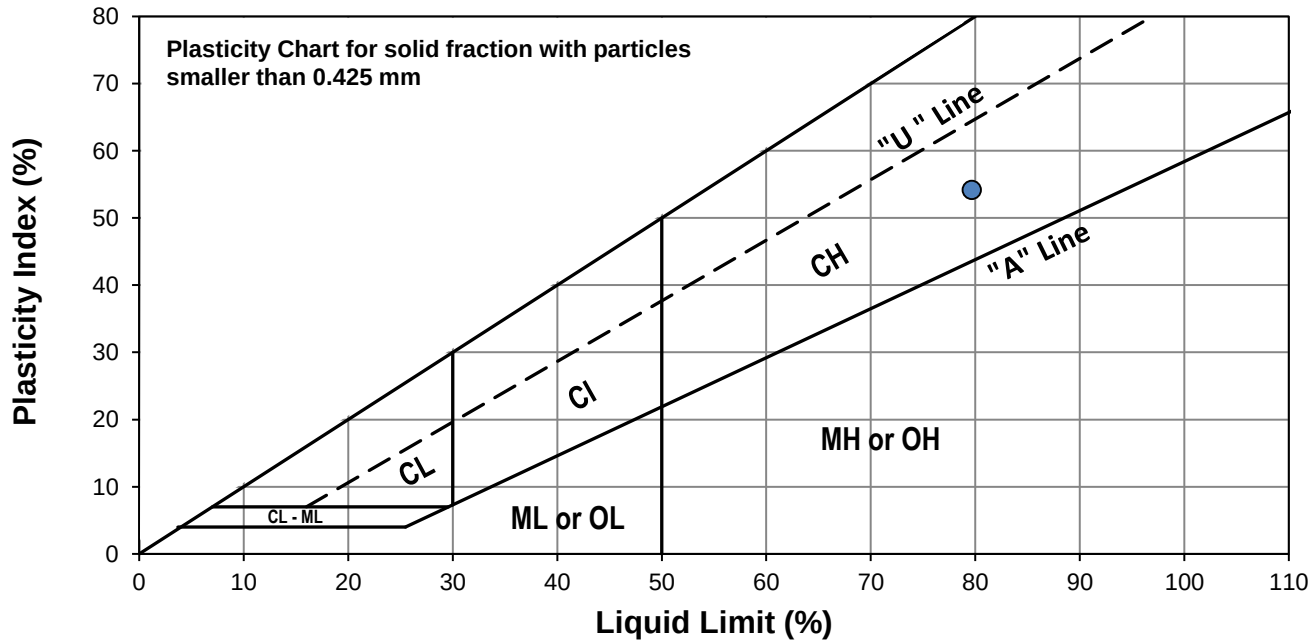
Atterberg Limits
ASTM D4318-10e1

Project No.	1000-049-04
Client	City of Winnipeg
Project	2020 Local Street - St Vital Park Road
Test Hole	TH20-05
Sample #	G18
Depth (m)	0.5 - 0.6
Sample Date	13-Jan-20
Test Date	17-Jan-20
Technician	AD

Liquid Limit	80
Plastic Limit	26
Plasticity Index	54

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	15	21	30		
Mass Wet Soil + Tare (g)	26.081	25.345	25.385		
Mass Dry Soil + Tare (g)	20.597	20.321	20.481		
Mass Tare (g)	14.056	14.138	14.198		
Mass Water (g)	5.484	5.024	4.904		
Mass Dry Soil (g)	6.541	6.183	6.283		
Moisture Content (%)	83.840	81.255	78.052		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	13.894	14.342			
Mass Wet Soil + Tare (g)	19.973	20.718			
Mass Dry Soil + Tare (g)	18.740	19.420			
Mass Water (g)	1.233	1.298			
Mass Dry Soil (g)	4.846	5.078			
Moisture Content (%)	25.444	25.561			

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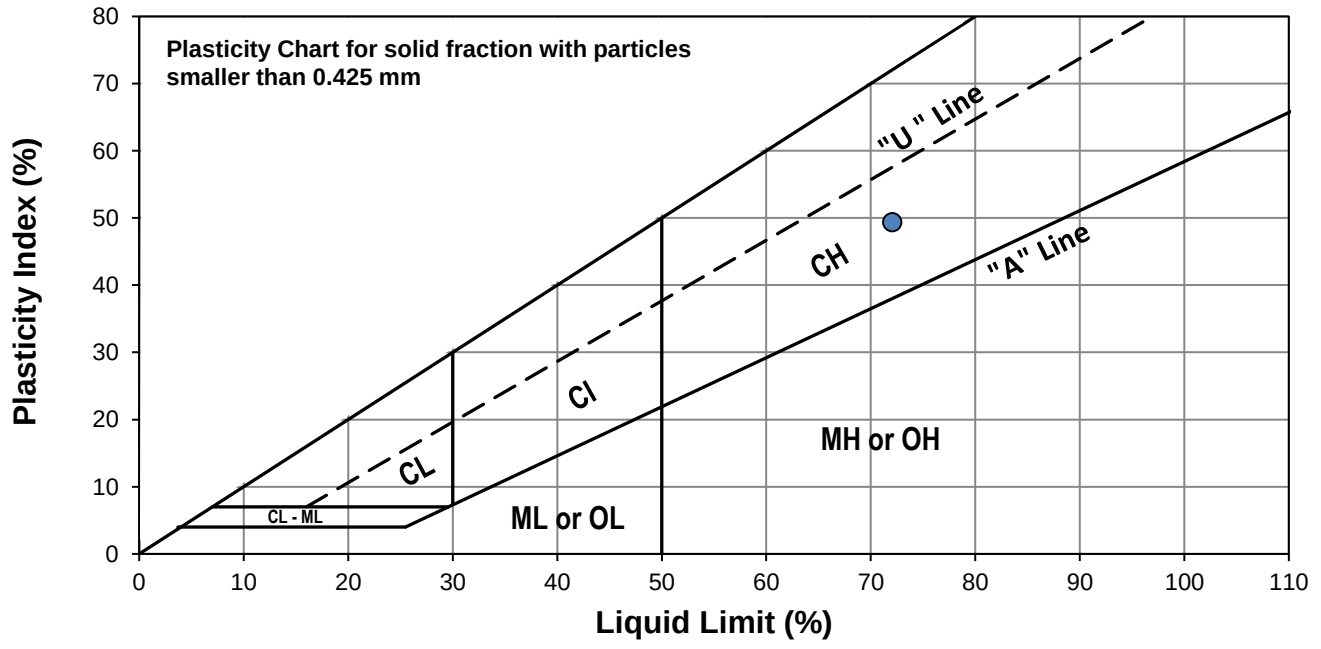
Atterberg Limits
ASTM D4318-10e1

Project No.	1000-049-04
Client	City of Winnipeg
Project	2020 Local Street - St Vital Park Road
Test Hole	TH20-07
Sample #	G31
Depth (m)	0.5 - 0.6
Sample Date	13-Jan-20
Test Date	17-Jan-20
Technician	AD

Liquid Limit	72
Plastic Limit	23
Plasticity Index	49

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	16	23	29		
Mass Wet Soil + Tare (g)	25.550	25.187	26.055		
Mass Dry Soil + Tare (g)	20.662	20.554	21.071		
Mass Tare (g)	14.200	14.184	14.034		
Mass Water (g)	4.888	4.633	4.984		
Mass Dry Soil (g)	6.462	6.370	7.037		
Moisture Content (%)	75.642	72.732	70.826		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	14.117	14.042			
Mass Wet Soil + Tare (g)	20.313	20.475			
Mass Dry Soil + Tare (g)	19.169	19.283			
Mass Water (g)	1.144	1.192			
Mass Dry Soil (g)	5.052	5.241			
Moisture Content (%)	22.644	22.744			

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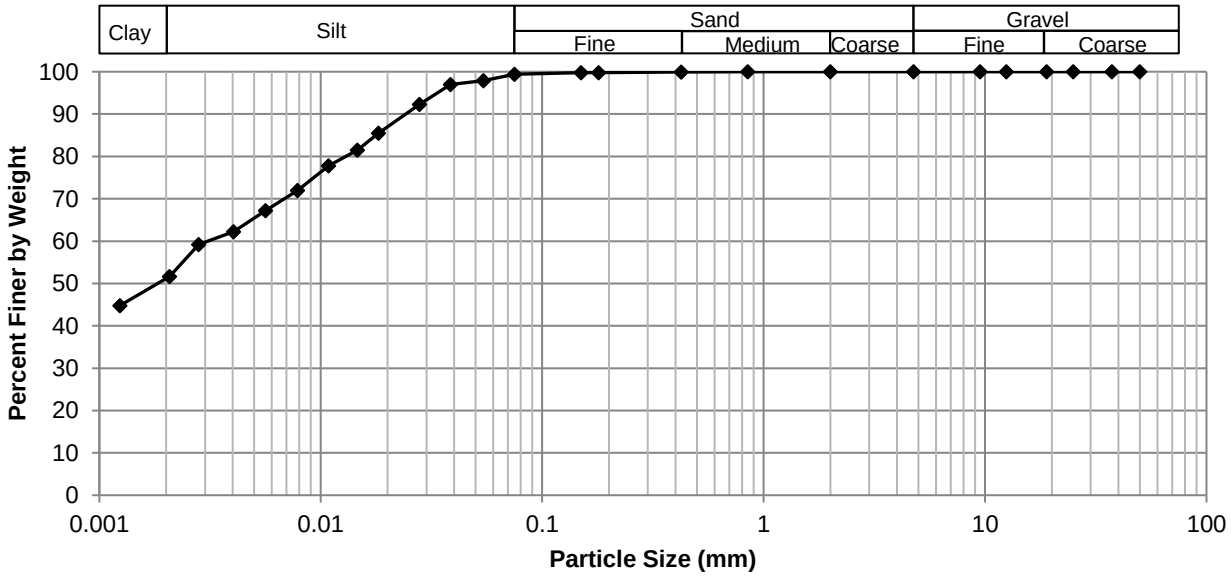
Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-049-04-400
Client	City of Winnipeg
Project	2020 Local Streets, St. Vital
Test Hole	TH20-01
Sample #	G03
Depth (m)	0.8 - 0.9
Sample Date	13-Jan-20
Test Date	17-Jan-20
Technician	AFK

Gravel	0.0%
Sand	0.6%
Silt	48.4%
Clay	51.0%

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	99.44
37.5	100.00	2.00	100.00	0.0543	97.92
25.0	100.00	0.850	100.00	0.0386	96.98
19.0	100.00	0.425	99.92	0.0279	92.29
12.5	100.00	0.180	99.76	0.0182	85.47
9.50	100.00	0.150	99.76	0.0147	81.48
4.75	100.00	0.075	99.44	0.0109	77.79
				0.0079	71.98
				0.0056	67.24
				0.0040	62.25
				0.0028	59.20
				0.0021	51.65
				0.0012	44.80

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Grain Size Analysis (Hydrometer Method)
AASHTO T 88

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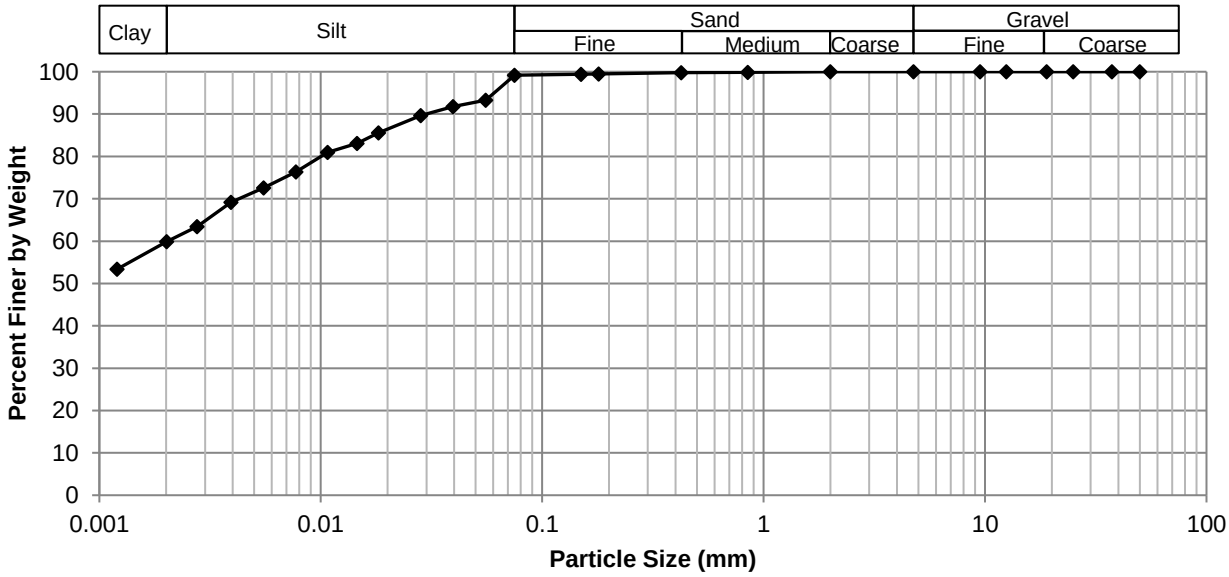
Project No.	1000-049-04-400
Client	City of Winnipeg
Project	2020 Local Streets, St. Vital
Test Hole	TH20-05
Sample #	G18
Depth (m)	0.5 - 0.6
Sample Date	13-Jan-20
Test Date	17-Jan-20
Technician	AFK

Gravel	0.0%
Sand	0.8%
Silt	39.4%
Clay	59.8%

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	99.20
37.5	100.00	2.00	100.00	0.0557	93.31
25.0	100.00	0.850	99.88	0.0397	91.75
19.0	100.00	0.425	99.77	0.0283	89.62
12.5	100.00	0.180	99.46	0.0182	85.56
9.50	100.00	0.150	99.43	0.0146	83.06
4.75	100.00	0.075	99.20	0.0107	80.93
				0.0077	76.37
				0.0055	72.57
				0.0039	69.21
				0.0028	63.41
				0.0020	59.91
				0.0012	53.39

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Grain Size Analysis (Hydrometer Method)
AASHTO T 88

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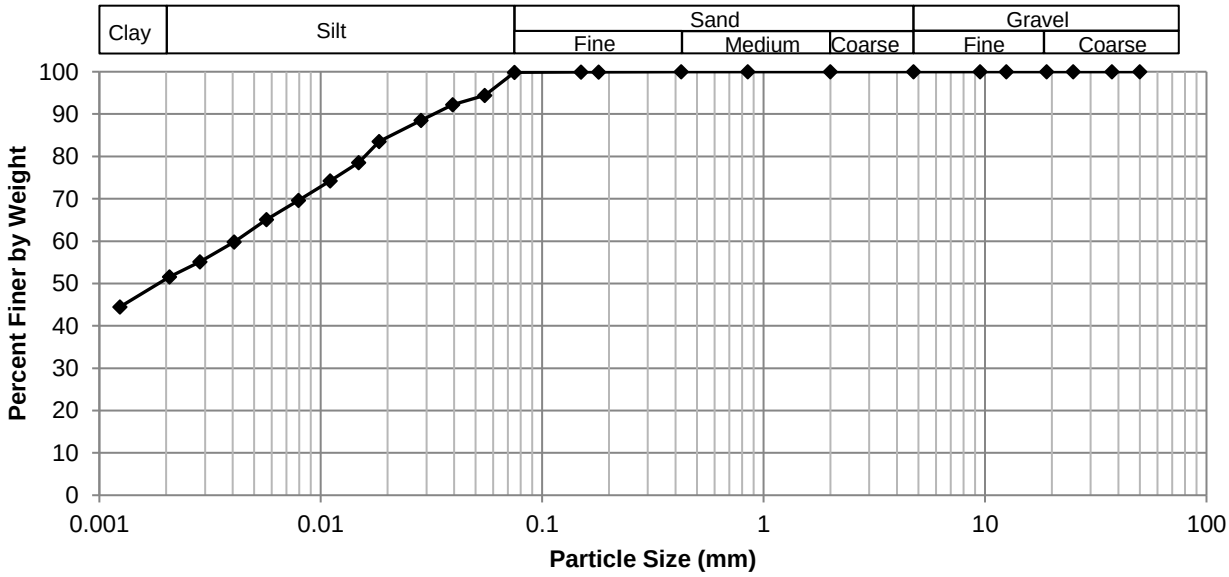
Project No.	1000-049-04-400
Client	City of Winnipeg
Project	2020 Local Streets, St. Vital
Test Hole	TH20-07
Sample #	G31
Depth (m)	0.5 - 0.6
Sample Date	13-Jan-20
Test Date	17-Jan-20
Technician	AFK

Gravel	0.0%
Sand	0.1%
Silt	48.9%
Clay	50.9%

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	99.88
37.5	100.00	2.00	100.00	0.0551	94.44
25.0	100.00	0.850	100.00	0.0394	92.25
19.0	100.00	0.425	100.00	0.0284	88.50
12.5	100.00	0.180	99.95	0.0184	83.55
9.50	100.00	0.150	99.95	0.0148	78.55
4.75	100.00	0.075	99.88	0.0110	74.23
				0.0079	69.65
				0.0057	65.12
				0.0041	59.82
				0.0028	55.15
				0.0021	51.57
				0.0012	44.50

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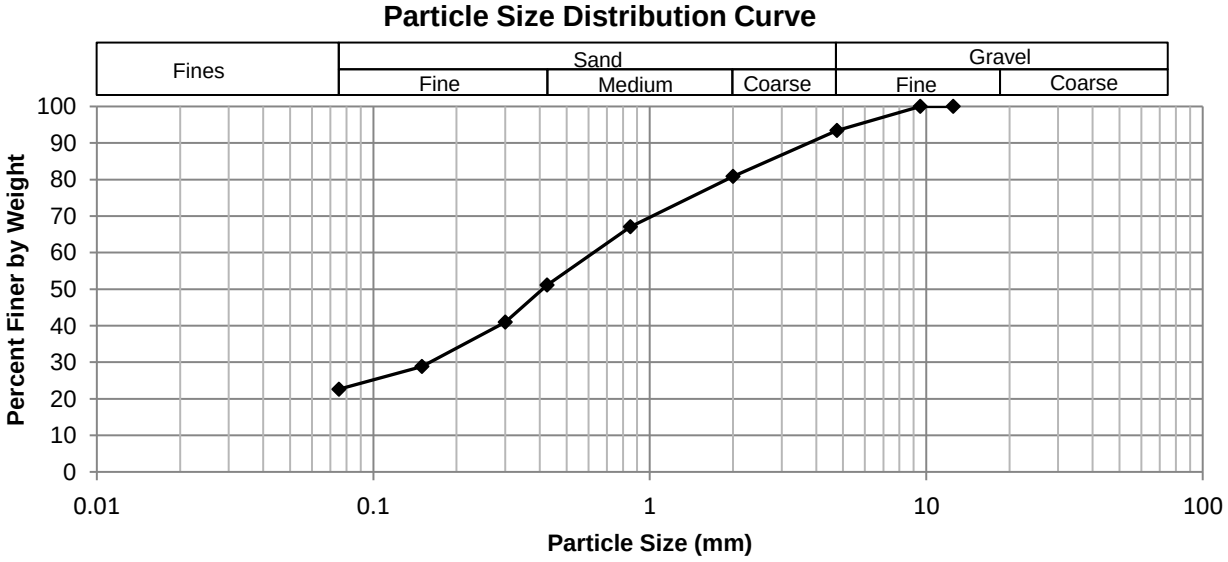
Grain Size Analysis (Sieve Method)
ASTM C136-06

Project No.	1000-049-04
Client	City of Winnipeg
Project	2020 Local Street - St. Vital Park Road
Test Hole	TH20-10
Sample #	G51
Depth	0.1 - 0.2
Date Sampled	13-Jan-20
Date Tested	20-Jan-20
Technician	BMH

Total Weight (g)	203.8
Gravel %	6.6
Sand %	70.8
Fines %	22.6



Sieve Opening (mm)	Percent Passing	Specification (Min-Max)
9.5	100	-
4.75	93	-
2.00	81	-
0.850	67	-
0.425	51	-
0.300	41	-
0.150	29	-
0.075	23	-

Appendix C

Photographs of Pavement Core Samples

Photo 1: Pavement Core Sample at Test Hole TH20-01

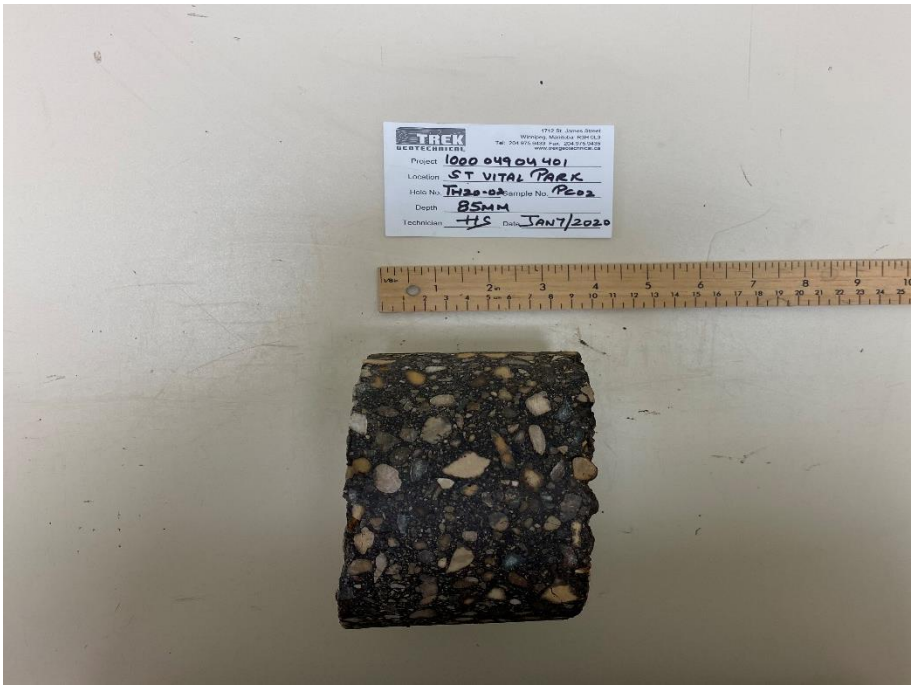


Photo 2: Pavement Core Sample at Test Hole TH20-02

Photo 3: Pavement Core Sample at Test Hole TH20-03

Photo 4: Pavement Core Sample at Test Hole TH20-04

Photo 5: Pavement Core Sample at Test Hole TH20-05

Photo 6: Pavement Core Sample at Test Hole TH20-06

Photo 7: Pavement Core Sample at Test Hole TH20-07

Photo 8: Pavement Core Sample at Test Hole TH20-08

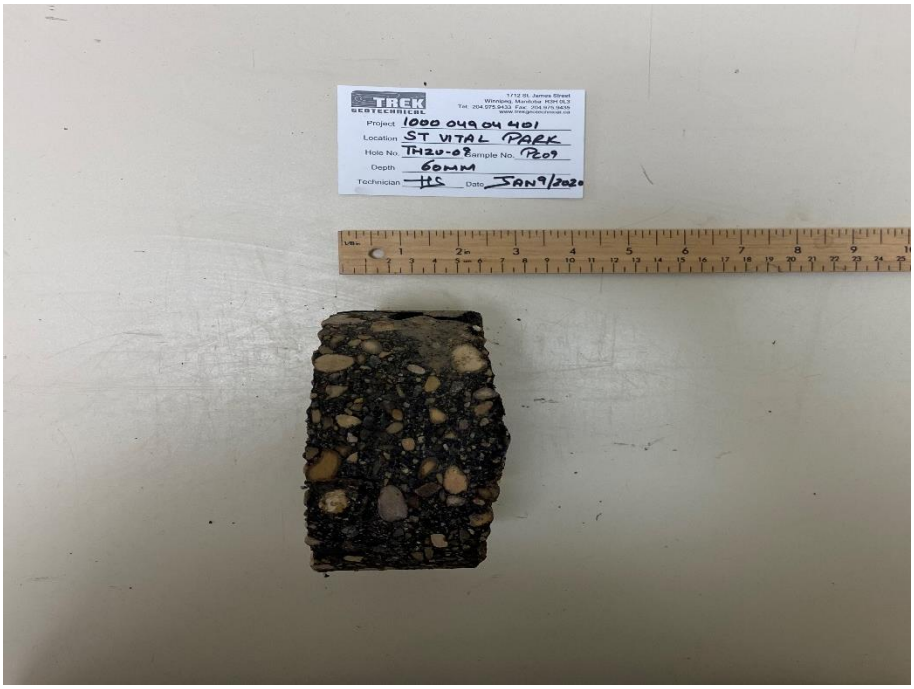


Photo 9: Pavement Core Sample at Test Hole TH20-09

Photo 10: Pavement Core Sample at Test Hole TH20-10

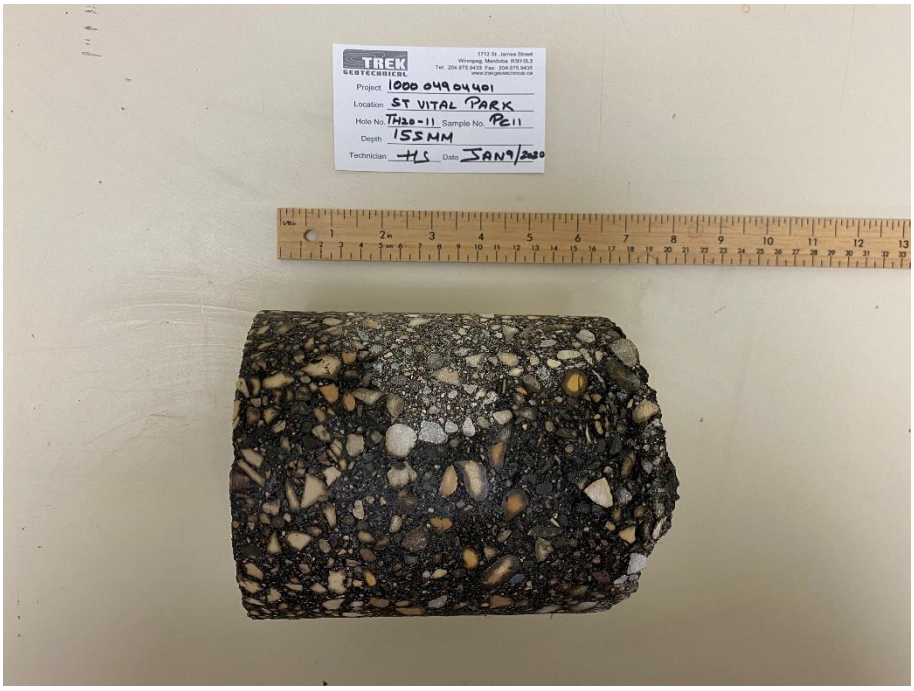


Photo 11: Pavement Core Sample at Test Hole TH20-11

Photo 12: Pavement Core Sample at Test Hole TH20-12

Photo 13: Pavement Core Sample at Test Hole TH20-13

Appendix D

Summary Table and Photographs of Additional Pavement Core Samples

2020 Local Street Renewal Program Road Investigation
St Vital Park Road

Pavement Core No.	Pavement Core Location	Pavement Surface		Pavement Structure Material	
		Type	Thickness (mm)	Type	Thickness (mm)
PC20-01	Located at approximate Sta. 7+40, 3.5 m West of East edge of road UTM N-5521398 E-633336	Asphalt	75	Concrete	N/A
PC20-02	Located at approximateat Sta. 8+40, 1.3 m West of East edge of road UTM N-5521302 E-633297	Asphalt	50	Concrete	N/A
PC20-03	Located at approximate at Sta. 9+40, 1.6 m East of West edge of road UTM N-5521201 E-633295	Asphalt	50	Concrete	N/A
PC20-04	Located at approximate at Sta. 10+30, 3.2 m East of West edge of road UTM N-5521109 E-633333	Asphalt	85	Concrete	N/A
PC20-05	Located at approximate at Sta. 17+00, 3 m North of South edge of road UTM N-5521183 E-633845	Asphalt	65	Concrete	N/A
PC20-06	Located at approximate at Sta. 18+00, 0.4 m South of North edge of road UTM N-5521219 E-633938	Asphalt	55	Concrete	N/A
PC20-07	Located at approximate at Sta. 2+50, 2 m West of East edge of road UTM N-5521363 E-633608	Asphalt	65	Concrete	N/A
PC20-08	Located at approximate Sta. 1+60, 1.6 m East of West edge of road UTM N-5521271 E-633602	Asphalt	60	Concrete	N/A
PC20-09	Located at approximate Sta. 0+50, 1 m South of North edge of road UTM N-5521237 E-633507	Asphalt	65	Concrete	N/A
PC20-10	Located at approximate Sta. 0+10, 2.8 m South of North edge of road UTM N-5521234 E-633476	Asphalt	65	Concrete	N/A

Note - Stations provided by City of Winnipeg

Photo 1: Pavement Core Sample at Pavement Hole PC20-14

Photo 2: Pavement Core Sample at Pavement Hole PC20-02

Photo 3: Pavement Core Sample at Pavement Hole PC20-03

Photo 4: Pavement Core Sample at Pavement Hole PC20-04

Photo 5: Pavement Core Sample at Pavement Hole PC20-05

Photo 6: Pavement Core Sample at Pavement Hole PC20-06

Photo 7: Pavement Core Sample at Pavement Hole PC20-07

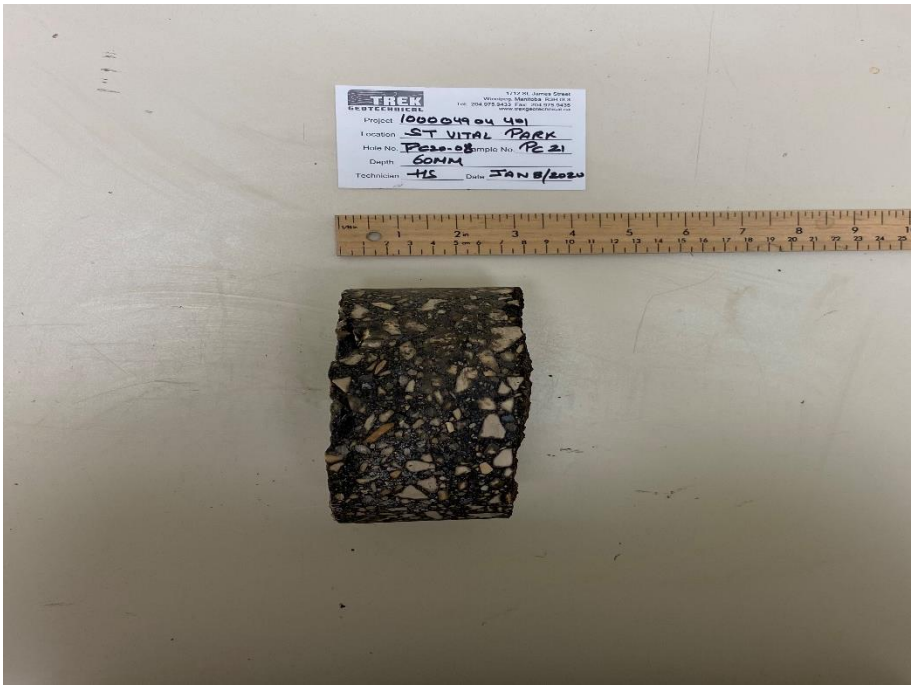


Photo 8: Pavement Core Sample at Pavement Hole PC20-08

Photo 9: Pavement Core Sample at Pavement Hole PC20-09

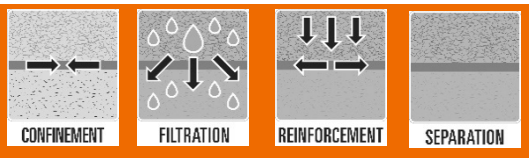
Photo 10: Pavement Core Sample at Pavement Hole PC20-10

APPENDIX 'B'

GEOTEXTILE FABRIC PRODUCT INFORMATION

TENCATE GEOSYNTHETICS
Americas

Mirafi® RS380*i*



Mirafi® RS380*i* is a revolutionary geotextile with orange identification yarns and super high-tenacity polypropylene filaments formed into an innovative weave to provide superior reinforcement strength and soil interaction integrated with high water flow and soil retention capabilities.

TenCate Geosynthetics Americas Laboratories are accredited by Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP).

Mechanical Properties	Test Method	Unit	Typical Roll Value	Minimum Average Roll Value
Tensile Strength @ 2% Strain (MD)	ASTM D4595	lbs/ft (kN/m)	720 (10.5)	600 (8.8)
Tensile Strength @ 2% Strain (CD)	ASTM D4595	lbs/ft (kN/m)	1200 (17.5)	1020 (14.9)
Tensile Strength @ 5% Strain (MD)	ASTM D4595	lbs/ft (kN/m)	2100 (30.6)	1800 (26.3)
Tensile Strength @ 5% Strain (CD)	ASTM D4595	lbs/ft (kN/m)	2580 (37.6)	2256 (32.9)
Flow Rate	ASTM D4491	gal/min/ft^2 (l/min/m^2)	85 (3463)	75 (3056)[1]
Permittivity	ASTM D4491	sec^{-1}	1.2	0.9[1]
			Typical Roll Value	
Pore Size O_{95}	ASTM D6767	microns	375	
Pore Size O_{50}	ASTM D6767	microns	205	
Index Properties			**Maximum Opening Size**	
Apparent Opening Size (AOS)	ASTM D4751	U.S. Sieve (mm)	50 (0.30)	40 (0.425)
			Minimum Test Value	
Interaction Coefficient[2]	ASTM D6706	--	0.89	
Factory Sewn Seam	ASTM D4884	lbs/ft (kN/m)	2700 (39.4)	
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	90	

[1] Minimum Roll Value
[2] Interaction Coefficient value is for sand or gravel based on testing conducted by SGI Testing Services.

Physical Properties	Unit	Roll Sizes	
Roll Dimensions (width x length)	ft (m)	15 x 300 (4.57 x 91)	17 x 300 (5.2 x 91)
Roll Area	yd^2 (m^2)	500 (419)	567 (474)

U.S. Patent 8,333,220 and Pending

GEOSYNTHETICS USED IN SUBGRADE STABILIZATION

Prepared by:

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July, 2013

General

This document is prepared to help ensure the geosynthetic soil reinforcement, once installed, will perform its intended design functions. To do so, the geosynthetic must be identified, handled, stored and installed in such a way that its physical property values are not affected and the design conditions are ultimately met as intended. This document does not account for every possible construction scenario. However, this document contains information consistent with generally accepted practices of identifying, handling, storing and installing geosynthetic materials for most roadway applications. If you have questions regarding a specific project or encounter conditions other than those described herein, call 888-795-0808. Failure to follow these guidelines may result in the unnecessary failure of the geosynthetic in a properly designed application.

Material Identification, Storage and Handling

The geosynthetic shall be rolled on cores having strength sufficient to avoid collapse or other damage from normal use. Each roll shall be wrapped with a plastic covering to protect the geosynthetic from damage during shipping and handling. Each roll shall be identified with a durable gummed label or the equivalent, clearly legible on the outside of the roll wrapping. The label shall indicate the manufacturer's name, the style number and the roll number.

Upon delivery, check the TenCate Mirafi® geosynthetic roll labels to verify the correct product has been received. Immediately inspect the geosynthetic to ensure it is free of any flaws or damage that might have occurred during shipping or handling.

While unloading or transferring the geosynthetic from one location to another, prevent damage to the wrapping, core, label or the geosynthetic itself. If the geosynthetic is to be stored for an extended period of time, the geosynthetic shall be located and placed in a manner that ensures the integrity of the wrapping, core and label as well as the physical properties of the geosynthetic. This can be accomplished by elevating the geosynthetic off the ground on dunnage and ensuring that it is adequately covered and protected from ultraviolet radiation, chemicals that are strong acids or strong bases, fire or flames including welding sparks, temperatures in excess of 140° F (60° C), and human or animal destruction.

Geosynthetic Placement and Overlap

Image 1 – Subgrade Preparation

Clear, grub and excavate (as required) to the plan subgrade or undercut elevation, stripping topsoil, deleterious debris and unsuitable material from the site. Cut stumps and other projecting vegetation as close and even to the ground surface as practical. Specialized equipment with low ground pressure, as directed by the Engineer, may be required for very soft soils (CBR ≤ 1.5%) to minimize subgrade disturbance. In addition, it may also be beneficial to leave root mats in place in such instances. The surface of the subgrade should be relatively smooth and level (Image 1), and depressions or humps greater than 6 inches (15 cm) should be graded out (i.e., back bladed/back dragged).

The geosynthetic reinforcement shall be placed directly on the prepared subgrade (Image 2). It should be rolled out flat and tight with no folds or wrinkles. Unroll the geosynthetic in the direction of travel so that the machine direction (i.e., long axis) of the roll is parallel with channelized traffic patterns. Adjacent rolls should be overlapped along their sides and ends as a function of subgrade strength as follows:

CBR ≥ 3%	12” to 18” (30-45 cm) overlap
1% ≤ CBR < 3%	24” to 36” (60-90 cm) overlap
0.5% ≤ CBR < 1%	36” (90 cm+) or Sewn*
CBR < 0.5%	Sewn*

Image 2 – Geosynthetic Deployment

** Please contact your local TenCate Geosynthetics representative for recommended sewing practices.*

If the need for 40" inches (1M) of overlap is reached, it is strongly suggested that the overlap is sewn or otherwise adhered to limit the potential formation of a slip plane between the overlapped panels. *Note: very heavy loading and very soft subgrades will also warrant sewn seams instead of overlapping panels*. Prior to fill placement, the geosynthetic can be held in place using U-shaped sod staples or simply by strategically placing shovelfuls of the fill to weigh down the geosynthetic. Overlap ("shingle") the geosynthetics in the direction fill will be spread to avoid peeling-back of the geosynthetic at overlaps by the advancing fill, just as shingles on a roof are installed to prevent water flowing beneath the adjacent row of shingles below.

Cut and overlap the geosynthetic to accommodate curves. Cutting may be done with sharp shears, razor knives or handheld power (i.e., "cutoff") saws. Cut the geosynthetic to conform to immovable protrusions, such as manhole covers and vertical utilities.

Fill Placement

Aggregate fill, as specified, should be placed directly over the geosynthetic in 8 - 12 (20-30 cm) inch loose lifts. Typically, if the design section thickness is ≤ 16 inches (40 cm), the entire section should be placed and compacted in one single lift to minimize further degradation of the subgrade.

Image 3 – End dumping aggregate

On relatively competent subgrades (CBR ≥ 4%), standard, highway-legal, rubber-tired vehicles (end dumps and belly dumps) may be driven over the exposed geosynthetic at slow speeds (less than 5 mph [8 km/hr]), and in straight paths. These vehicles can dump aggregate fill as they advance, provided this construction traffic will not cause significant rutting upon bare subgrade. Sudden braking, sudden starting and sharp turning should be avoided. Tracked construction equipment must not be operated directly upon the exposed geosynthetic. A minimum aggregate fill thickness of 6 inches (15 cm) is required prior to operation of tracked equipment on the geosynthetic. In addition, turning of tracked equipment should be kept to a minimum to prevent tracks from displacing the fill and damaging the geosynthetic.

Over softer subgrades (CBR < 4%), aggregate fill should be end-dumped from the edge of the previously placed material (Image 3), spreading from the middle outward (Image 4).

Image 4 – Spreading aggregate over geosynthetic

Compaction

Standard compaction methods may be used unless the soils are very soft (CBR ≤ 1.5%). In such cases, static compaction with a light smooth drum roller is considered prudent (Image 5).

Once a stable working platform has been achieved, compact aggregate fill to project specifications, after it has been graded smooth and before it is subjected to accumulated traffic.

Aggregate Fill Considerations

Preferred (not required) fill gradation for roadway applications is well-graded crushed aggregate fill with a maximum particle size of 1½ inches (40 mm) and less than 10% fines (passing #200 sieve). For unpaved applications, most clean granular fills, including sands are acceptable.

Image 5 – Smooth Drum Roller

Installation and Repairs for Utility Cuts or Damaged Areas

Repairs to roadway reinforcement geosynthetics can be made in the field by placing a repair panel or patch over the damaged area. The repair panel should extend a minimum of 3 ft (0.9 m) beyond the edges of the damaged geosynthetics as shown in Image 6. Pullout and/or direct sliding calculations should be performed by the project engineer to verify the minimum required overlap length to meet a specific project's requirements.

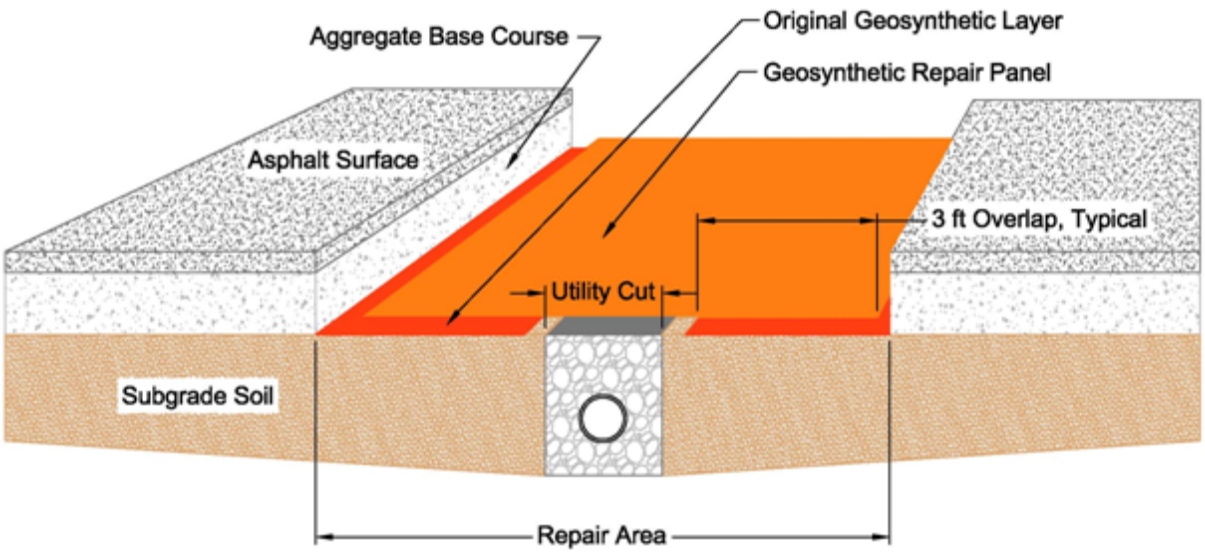

Image 6 – Typical Utility Cut Geosynthetic Repair Detail (NTS)

When placing roadway reinforcement geosynthetics in trenches or against excavations that terminate at existing curb and gutter, the geosynthetic can be wrapped up the sides of the excavation as shown in Image 7. Doing so provides extra embedment for the geosynthetic to resist pullout and sliding forces by sandwiching the material between the vertical faces of the existing materials and the newly compacted fill.

Image 7–Extending the Geosynthetic Reinforcement up a Vertical Face