



THE CITY OF WINNIPEG

TENDER

TENDER NO. 215-2020

**2019 LOCAL STREETS RENEWAL PROGRAM: SPEERS ROAD, LYNDALE DRIVE,
AND DES MEURONS STREET**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2019 Local Streets Renewal Program: Speers Road, Lyndale Drive, and Des Meurons Street

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, April 16, 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; and
 - (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; and
 - (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; and
- (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 (2) 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 D30. Any such costs shall be determined in accordance with D30.

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.

B9.6 Form B: Prices is organized into Parts: Part 1 of the Work and Part 2 of the Work. Bidders shall provide a total price for each Part and, on the summary sheet, a Total Bid Price consisting of the sum of prices for Part 1 and Part 2.

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;
- (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;
- (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
 - (iii) 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 A sample Bid Bond and Agreement to Bond are available on The City of Winnipeg, Corporate Finance, Materials Management Division website at <https://www.winnipeg.ca/MatMgt/templates/files/eBidsecurity.pdf>.
- B13.2 The Bidder shall provide digital bid security in the form of a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond).
- B13.3 Bid security shall be submitted in an electronic or digital format meeting the following criteria:
- (a) 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; all digital seals; with the surety company, or an approved verification service provider of the surety company;
 - (b) 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;
 - (c) 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; and
 - (d) The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B13.3(a).
- B13.4 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).
- B13.5 Bonds passing the verification process will be treated as original and authentic.
- B13.5.1 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.
- B13.6 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.
- B13.7 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; and
 - (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.
- B17.2.1 Any bid with an apparent imbalance between the unit prices in Part 1 and Part 2 may be determined to be non-responsive and rejected by the Award Authority in its sole discretion, acting reasonably.
- B17.3 Further to B17.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is qualified.
- 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 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 (1) 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 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D30 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.
- B18.4 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B17.
- B18.4.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.
- B18.5 As noted in D2 and identified in Form B: Prices, the Work of Part 2 will be contingent upon the Province approving funding for the Work. If sufficient funding for Part 2 Work is not approved by the Province the City shall have the right to eliminate all or any portion of Part 2 Work in accordance with D2.

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 two (2) parts:

- (a) Part 1 – City Funded Work; and
- (b) Part 2 – Manitoba Hydro Funded Work.

Part 1 – City Funded Work

D2.1 Part 1 – City Funded Work shall consist of:

- (a) Asphalt Reconstruction:
 - (i) Lyndale Drive from Main Street Bridge to Walmer Street.
- (b) Pavement Rehabilitation:
 - (i) Speers Road from Elizabeth Road to Winakwa Road.
 - (ii) Des Meurons Street from Carriere Avenue to Morier Avenue.

Part 2 – Manitoba Hydro Funded Work

D2.2 Part 2 – Manitoba Hydro Funded Work shall consist of:

- (a) Street Lighting and Associated Works:
 - (i) Lyndale Drive from Main Street Bridge to Walmer Street.

D2.3 The City currently has no approved funding in the Capital Budget for Part 2 of the Work, but is anticipating receiving notification about funding from the Province of Manitoba by late May. Part 2 of the Work is contingent upon the Province approving sufficient funding.

D2.3.1 Further to C7.1, if notice of sufficient funding is not received, the City shall have the right to eliminate all or any portion of Part 2, and the Contract Price will be reduced accordingly.

D2.3.2 Further to C7.5, C7.5.1, and C7.6, a reduction in the Contract Price pursuant to D2.3.1 shall not be considered in calculating the aggregate reduction in the Contract Price for purposes of C7.5.

D2.3.3 If all or any portion of Part 2 is eliminated pursuant to D2.3.1, the time periods stipulated in D20 for Substantial Performance of the Work and in D21 for Total Performance of the Work will be reduced proportionally by the Contract Administrator acting reasonably.

D2.4 The major components of the Work are as follows:

- (a) Asphalt Reconstruction:
 - (i) Remove existing pavement;
 - (ii) Excavation;
 - (iii) Repair of existing sewer and manholes as required;
 - (iv) Installation of subdrains;
 - (v) Compaction of existing subgrade;
 - (vi) Installation of catchbasins and connection pipe;
 - (vii) Placement of separation/reinforcement fabric;
 - (viii) Placement of sub-base and base course materials;

- (ix) Installation of street lighting;
 - (x) Construct curb and gutter utilizing slip-form paving equipment;
 - (xi) Adjustment of existing manholes;
 - (xii) Construct 150 mm concrete pavement (reinforced) as required at tie-ins;
 - (xiii) Construct 180 mm barrier curb (separate) as required at tie-ins;
 - (xiv) Renewal of existing sidewalk;
 - (xv) Placement of asphalt pavement utilizing grade control equipment (average thickness ~100 mm); and
 - (xvi) Boulevard grading and sodding.
- (b) Pavement Rehabilitation:
- (i) Planing of existing asphalt and concrete pavement as required for headers;
 - (ii) Full depth concrete repairs of existing slabs and joints;
 - (iii) Repair of existing sewer and manholes as required;
 - (iv) Renewal of existing curbs, bullnoses, and sidewalks as required;
 - (v) Adjustment of existing drainage inlets, valves and manholes;
 - (vi) Construct Active Transportation Path on Speers Road;
 - (vii) Boulevard grading and sodding;
 - (viii) Cleaning of all catchbasins and catch pits in the project area;
 - (ix) Asphalt patching over full depth concrete repairs;
 - (x) Longitudinal cold joint preparation in accordance with Clause 9.5.2 (b) of CW 3410; and
 - (xi) Placement of mainline asphalt overlay (average thickness – 75 mm) utilizing automatic grade control for final lift.

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is Dillon Consulting Limited, represented by:

Brad Cook, P. Eng.
Project Manager

Telephone No. 204 453-2301 ext. 4087

Email Address bcook@dillon.ca

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

D4. CONTRACTOR'S SUPERVISOR

D4.1 At the pre-construction meeting, the Contractor shall identify his/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) wrap-up liability insurance, in the amount of at least no less than five million dollars (\$5,000,000.00) inclusive per occurrence., with the City added as an additional insured,

with covering bodily injury, personal injury, property damage 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. Such policy will be written in the joint names of the City, Contractor and sub-contractors and include twelve months (12) completed operations after Total Performance. If required by contract, Manitoba Hydro shall be added as additional insureds;

- (b) Automobile liability insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The limit of liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence;
- (c) an all risks Installation Floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.

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. EQUIPMENT LIST

D12.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment List) at or prior to a pre-construction meeting, or at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the C4.1 for the return of the executed Contract Documents, if applicable.

D13. DETAILED WORK SCHEDULE

D13.1 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.

D13.2 If, prior to submitting the Detailed Work Schedule, the Contractor does not receive notification pursuant to D14.5 that all or some portion of Part 2 of the Work may be commenced, he/she shall complete the Detailed Work Schedule for only Part 1 of the Work assuming that, if all of Part 2 is eliminated, the time periods stipulated in D20 for Substantial Performance of the Work and in D21 for Total Performance of the Work will be reduced by two (2) Working Days

D13.3 If, after submitting the Detailed Work Schedule, the Contractor receives notification that all or any portion of Part 2 of the Work may be commenced, he/she shall submit a revised Detailed Work Schedule no later than two (2) Business Days from receipt of the notification.

D13.4 The detailed work schedule shall consist of the following:

- (a) a critical path method (C.P.M.) schedule for the Work;
- (b) a Gantt chart for the Work based on the C.P.M. schedule; and
- (c) all acceptable to the Contract Administrator.

D13.5 Further to D13.4(b), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

SCHEDULE OF WORK

D14. COMMENCEMENT

D14.1 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.

D14.2 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;
 - (viii) the equipment list specified in D12; and
 - (ix) the detailed work schedule specified in D13.
- (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.

- D14.3 The Contractor shall not commence the Work on the Site before June 15, 2020 and shall commence the Work on Site no later than July 1, 2020 weather permitting, unless directed or approved by the Contract Administrator.
- D14.4 The Contractor shall not commence the Work on Speers Road before July 1, 2020 due to a school being in the immediate vicinity, unless directed or approved by the Contract Administrator.
- D14.5 The Contractor shall not commence Part 2 of the Work as described in D2 and identified in Form B: Prices, unless he/she has received notification from the Contract Administrator that the City has received notice of sufficient funding from Manitoba Hydro.
- D14.5.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D15. WORKING DAYS

- D15.1 Further to C1.1(ii);
- D15.1.1 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.
- D15.1.2 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.
- D15.1.3 Further to D16.1, if a Contractor receives permission from the Contract Administrator for work to be performed on Saturdays, each Saturday worked will be considered a Working Day.
- D15.1.4 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.

D16. RESTRICTED WORK HOURS

- D16.1 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.

D17. WORK BY OTHERS

- D17.1 Work by others on or near the Site will include but not necessarily be limited to:
- (a) Manitoba Hydro:
 - (i) Supply and inspection of new street lighting hardware (to be installed by the Contractor) and the de-energizing and energizing of the new street light plant; and
 - (ii) Relocation of existing street light poles as required in this contract.
 - (b) Manitoba Hydro Gas Division:
 - (i) Gas services will be lowered if required on Reconstruction roadwork locations. This work should be coordinated immediately after excavation has taken place.
 - (c) BellMTS:
 - (i) Miscellaneous adjustments of manholes, relocation of BellMTS boxes and other appurtenances that may be required within this contract; and

- (ii) Conversion of BellMTS pedestals on Speers Road to flush-to-grade vaults. Expected to occur prior to construction.

D18. SEQUENCE OF WORK

D18.1 Further to C6.1, the sequence of work shall comply with the following:

- D18.1.1 Providing that the Work on each street is completed in a similar order to the order that the Work was commenced in, the Contractor will be permitted to have a maximum of three (3) streets under construction at any one time. Completion of a street means that all of the necessary concrete, asphalt including approaches and landscaping Work is completed to the satisfaction of the Contract Administrator.
- D18.1.2 Where the Contractor utilizes two (2) or more crews that work independently on the same major component of the Work as identified in D2, the Contract Administrator may approve an increase to the maximum number of streets under construction at any time.
- D18.1.3 Placing the topsoil and finished grading of all boulevard and median areas shall be completed prior to commencing construction of asphaltic concrete overlays, including scratch courses.
- D18.1.4 The Contractor will not be permitted to allow local and/or bus traffic on the planed surface. Planing of the full width of the road must be approved by the Contract Administrator.
- D18.1.5 Work on Speers Road shall be completed in four stages. The staging breakdown will be as follows:
 - (a) Stage 1 - Northbound Speers Road from Winakwa Road to Bernier Bay (south). The Contractor shall complete all Works including topsoil and sod to the satisfaction of the Contract Administrator prior to commencement of Stage 2.
 - (b) Stage 2 - Southbound Speers Road from Winakwa Road to Bernier Bay (south). The Contractor shall complete all Works including topsoil and sod to the satisfaction of the Contract Administrator prior to commencement of Stage 4.
 - (c) Stage 3 - Northbound Speers Road from Bernier Bay (south) to Elizabeth Road. The Contractor shall complete all Works including topsoil and sod to the satisfaction of the Contract Administrator prior to commencement of Stage 3.
 - (d) Stage 4 - Southbound Speers Road from Bernier Bay (south) to Elizabeth Road.

D19. CRITICAL STAGES

- D19.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:
 - (a) Critical Date - All Work on Speers Road must be completed by August 31, 2020.
- D19.2 When the Contractor considers the Work associated with Speers Road to be completed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Completion. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.
- D19.3 The date on which the Speers Road Work has been accepted by the Contract Administrator as being completed to the requirements of the Contract is the date on which completion of Speers Road has been achieved.

D20. SUBSTANTIAL PERFORMANCE

- D20.1 The Contractor shall achieve Substantial Performance within thirty-five (35) consecutive Working Days of the commencement of the Work as specified in D14.

D20.2 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.

D20.3 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.

D21. TOTAL PERFORMANCE

D21.1 The Contractor shall achieve Total Performance within forty (40) consecutive Working Days of the commencement of the Work as specified in D14.

D21.2 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.

D21.3 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.

D22. LIQUIDATED DAMAGES

D22.1 If the Contractor fails to achieve Critical Stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:

- (a) Critical Date Speers Road – Three thousand dollars (\$3,000.00);
- (b) Substantial Performance – Three thousand dollars (\$3,000.00); and
- (c) Total Performance – One thousand dollars (\$1,000.00).

D22.2 The amounts specified for liquidated damages in D22.1 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.

D22.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D23. COVID-19 SCHEDULE DELAYS

D23.1 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.

D23.2 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.

D23.3 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.

- D23.4 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 D23.3. Failure to provide this notice will result in no additional time delays being considered by the City.
- D23.5 The Work schedule, including the durations identified in D19 to D21 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.
- D23.6 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.
- D23.7 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.

D24. SCHEDULED MAINTENANCE

- D24.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:
- (a) Reflective Crack Maintenance (during one (1) year warranty period) as specified in CW 3250 – R7; and
 - (b) Sodding (Maintenance Period) as specified in CW 3510 – R9.
- D24.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

CONTROL OF WORK

D25. JOB MEETINGS

- D25.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one (1) representative of the Contract Administrator, one (1) representative of the City and one (1) representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.
- D25.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

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

- D26.1 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).

D27. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D27.1 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

D28. PAYMENT

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

WARRANTY

D29. WARRANTY

D29.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire one (1) year 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.

D29.2 Notwithstanding C13.2 or D29.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:

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

D29.2.1 In such case the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

THIRD PARTY AGREEMENTS

D30. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

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

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

D30.3 For the purposes of D30:

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

D30.4 Modified Insurance Requirements

D30.4.1 If not already required under the insurance requirements identified in 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.

- D30.4.2 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.
- D30.4.3 The Contractor shall obtain and maintain third party liability insurance with minimum coverage of two million dollars (\$2,000,000.00) per occurrence on all licensed vehicles operated at the Site. In the event that this requirement conflicts with another licensed vehicle insurance requirement in this Contract, then the requirement that provides the higher level of insurance shall apply.
- D30.4.4 Further to 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.
- D30.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.
- D30.5 Indemnification By Contractor
- D30.5.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for Construction, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers, servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.
- D30.6 Records Retention and Audits
- D30.6.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.
- D30.6.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for Construction, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total Performance, all records, documents, and contracts referred to in D30.6.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.
- D30.7 Other Obligations
- D30.7.1 The Contractor consents to the City providing a copy of the Contract Documents to the Government of Manitoba and/or the Government of Canada upon request from either entity.

- D30.7.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.
- D30.7.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.
- D30.7.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.

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. 215-2020

2019 Local Streets Renewal Program: Speers Road, Lyndale Drive, and Des Meurons Street 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. 215-2020

2019 Local Streets Renewal Program: Speers Road, Lyndale Drive, and Des Meurons Street

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)

2019 Local Streets Renewal Program: Speers Road, Lyndale Drive, and Des Meurons Street

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
<i>SURFACE WORKS:</i>		
Supply of Materials:		
Base Course & Sub-Base		
Geotextile Fabric		
Concrete		
Asphalt		
Sod & Topsoil		
Installation/Placement:		
Asphalt Planing		
Base Course & Sub-Base		
Geotextile Fabric		
Concrete		
Asphalt		
Sod & Topsoil		
<i>UNDERGROUND WORKS:</i>		
Supply of Materials:		
Catch basins/Manholes		
Connecting Pipe		
Subdrains		
Installation/Placement:		
Catch basins/Manholes		
Connecting Pipe		
Subdrains		

FORM K: EQUIPMENT
(See D12)

2019 Local Streets Renewal Program: Speers Road, Lyndale Drive, and Des Meurons Street

<p>1. Category/type: Asphalt Planing</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>2. Category/type: Asphalt Paving</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>3. Category/type: Slip-form Concrete Curbing</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>

FORM K: EQUIPMENT
(See D12)

2019 Local Streets Renewal Program: Speers Road, Lyndale Drive, and Des Meurons Street

<p>4. Category/type:</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>5. Category/type:</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>6. Category/type:</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>

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:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>	<u>Drawing (Original) Sheet Size</u>
215-2020-Sheet- 01	Cover Sheet	A1
215-2020-Sheet- 02	Speers Road Plan Profile (Start to Sta. 1+085)	A1
215-2020-Sheet- 03	Speers Road Plan Profile (Sta. 1+085 to 1+245)	A1
215-2020-Sheet- 04	Speers Road Plan Profile (Sta. 1+245 to 1+405)	A1
215-2020-Sheet- 05	Speers Road Plan Profile (Sta. 1+405 to 1+565)	A1
215-2020-Sheet- 06	Speers Road Plan Profile (Sta. 1+565 to 1+725)	A1
215-2020-Sheet- 07	Speers Road Plan Profile (Sta. 1+725 to End)	A1
215-2020-Sheet- 08	Lyndale Drive Plan Profile (Start to Sta. 1+090)	A1
215-2020-Sheet- 09	Lyndale Drive Plan Profile (Sta. 1+090 to 1+250)	A1
215-2020-Sheet- 10	Lyndale Drive Plan Profile (Sta. 1+250 to End)	A1
215-2020-Sheet- 11	Des Meurons Street Plan Profile (Start to Sta. 0+175)	A1
215-2020-Sheet- 12	Des Meurons Street Plan Profile (Sta. 0+175 to End)	A1
215-2020-Sheet- 13	Sections and Details	A1
215-2020-Sheet- 14	1-04707-DE-50000-0457-01 – Lyndale Drive	A1
215-2020-Sheet- 15	1-04707-DE-50000-0457-02 – Lyndale Drive	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; and
 - (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; and
 - (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 five percent (5%) of the Total Bid Price the lump sum price will be reduced to five percent (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) Sixty percent (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 forty percent (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; and
 - (ii) Distribution of the Declaration of Total Performance.
- E2.9 Mobilization and Demobilization will be paid only once (to a maximum of one hundred percent [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 'G'.

E4. OFFICE FACILITIES

- E4.1 The Contractor shall supply office facilities meeting the following requirements:
- (a) The field office shall be for the exclusive use of the Contract Administrator;
 - (b) The building shall be conveniently located near the site of the Work;
 - (c) The building shall have a minimum floor area of 20 m², a height of 2.4 m with two (2) windows for cross ventilation and a door entrance with a suitable lock;
 - (d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16 to 18°C or 24 to 25°C;
 - (e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three wall outlets;
 - (f) The building shall be furnished with one (1) design, one (1) drafting table, one (1) meeting table, one (1) stool, one (1) legal size filing cabinet, and a minimum of eight (8) chairs;
 - (g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City; and
 - (h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each site meeting. The Contract Administrator may request additional cleaning when he/she deems it necessary.
- E4.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.
- E4.3 The office facilities will be provided from the date of the commencement of the Work to the date of Total Performance.

E5. PROTECTION OF EXISTING TREES

- E5.1 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 m of trees.
 - (b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2,400 mm wood planks, or suitably protected as approved by the Contract Administrator.
 - (c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.
 - (d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.

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

E5.2 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.

E5.3 No separate measurement or payment will be made for the protection of trees.

E5.4 Except as required in clause E5.1(c) and E5.1(e), Elm trees shall not be pruned at any time between April 1 and July 31.

E6. TRAFFIC CONTROL

E6.1 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.

E6.2 Notwithstanding E6.1, 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; and
- (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.

E6.2.1 An exception to E6.2 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.

E6.2.2 Further to E6.2, 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.

E7. TRAFFIC MANAGEMENT

E7.1 Further to clause 3.7 of CW 1130:

E7.1.1 The Contractor shall schedule construction activities to meet the following:

- (a) Speers Road and Des Meurons Street will be closed to through traffic. Local access and/or bus traffic shall be maintained. The Contractor shall sign the street "Road Closed – No Exit" in accordance with the Manual of Temporary Traffic Control;
- (b) Lyndale Drive will be closed to all traffic. The Contractor shall sign the street "Road Closed – No Exit" in accordance with the Manual of Temporary Traffic Control. The Contractor must maintain access to all approaches to the Winnipeg Rowing Club at all times via Cromwell Street. Contractor to provide signage for direction to rowing club access;
- (c) Intersecting street and private approach access on Speers Road and Des Meurons Street shall be maintained at all times.

E7.1.2 Should the Contractor be unable to maintain an existing 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 twenty-four (24) hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

E7.1.3 Pedestrian and ambulance/emergency vehicle access must be maintained at all times.

E8. REFUSE AND RECYCLING COLLECTION

E8.1 While access to refuse and/or recycling collection vehicles is restricted, on collection day(s) the Contractor shall move all of the affected property owners refuse and/or recycling materials to a nearby common area, prior to an established time, in accordance with E8.2 to permit the normal collection vehicles to collect the materials. Immediately following recycling collection the Contractor shall return recycling receptacles to the addresses marked on the receptacles.

E8.2 Collection Schedule:

<u>Speers Road, from Elizabeth Road to Winakwa Road.</u>	
<i>Collection Day(s):</i>	Tuesday
<i>Collection Time:</i>	12:00 pm (noon)
<i>Common Collection Area:</i>	Front street pickup
<u>Lyndale Drive, from Marion Street Bridge to Walmer Street</u>	
<i>Collection Day(s):</i>	Tuesday
<i>Collection Time:</i>	7:00 am
<i>Common Collection Area:</i>	Carts to be relocated for pick up
<u>Des Meurons Street, from Carriere Avenue to Morier Avenue</u>	
<i>Collection Day(s):</i>	Tuesday
<i>Collection Time:</i>	7:00 am
<i>Common Collection Area:</i>	Front street pickup

E8.3 No measurement or payment will be made for the work associated with this specification.

E9. PEDESTRIAN SAFETY

- E9.1 During the project, a temporary snow fence shall be installed in locations such as open excavations that are adjacent to pedestrian facilities. Locations include but are not limited to Canad Inns on Speers Road and College Beliveau. The Contractor shall be responsible for maintaining the snow fence in a proper working condition. No measurement for payment shall be made for this work.

E10. WATER OBTAINED FROM THE CITY

- E10.1 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.

E11. SURFACE RESTORATIONS

- E11.1 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.

E12. INFRASTRUCTURE SIGNS

- E12.1 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

E13. SUPPLY AND INSTALLATION OF PAVEMENT REPAIR FABRIC

- E13.1 This Specification shall cover the supply and installation of pavement repair fabric for reinforcement of asphalt layers and is contained in Appendix 'I'.

E14. SUPPLY AND INSTALL WATERMAIN AND WATER SERVICE INSULATION

DESCRIPTION

- E14.1 Notwithstanding 3.12 of CW 2110, this specification covers the supply and installation of insulation in roadway excavations over watermains and water services.
- E14.2 Referenced Standard Construction Specifications:
- (a) CW 2030 – Excavation Bedding and Backfill; and
 - (b) CW 3110 – Sub –grade, Sub-base and Base Course Construction.
- E14.3 Referenced Standard Details:
- (a) SD-018 - Watermain and Water Service Insulation.

MATERIALS

- E14.4 Acceptable insulation is:
- (a) Extruded Polystyrene rigid foam insulation – Type 4, 4” in thickness.

DOW - Roofmate or Highload 40
Owen's Corning - Foamular 350 or Foamular 400.
2" X 48" X 96", 2" X 24" X 96", 4" X 24" X 96"

- E14.5 Sand Bedding :
(a) In accordance with CW 2030

CONSTRUCTION METHODS

- E14.6 Prior to the installation of any sub-base material or geotextile material, locate all existing water services. Further to SD-018, where directed by the Contract Administrator, excavate the sub-grade to allow the top of the insulation to be installed flush with the surrounding sub-grade. Install the insulation on a level surface centered over the located watermain or water service for the full width of the roadway excavation. Install sand bedding if required to level the surface. Stockpile and dispose of excavated material in accordance with CW 3110.
- E14.7 Thickness of insulation is 100 mm (4"). If using 50 mm (2") panels, two (2) layers are required. Total width of insulation to be as directed by the Contract Administrator. Place sufficient full width panels to meet or exceed the specified width.
- E14.8 Place insulation panels adjacent to each other over the specified area with no gaps between panels and less than 15mm of elevation difference along the adjoined edges. Where 2" thick panels are being used, offset the top layer to prevent the panel joints from aligning with the joints in the lower layer.
- E14.9 Use full panels of insulation where possible. Where necessary cut insulation panels to obtain coverage to specified lengths. Insulation pieces shall be a minimum of dimension of 300 mm in width or length.
- E14.10 Take appropriate measures to ensure panels are not displaced when installing geotextiles and during backfilling operations.

MEASUREMENT AND PAYMENT

- E14.11 Watermain and Water Service Insulation shall be measured on an area basis and paid for at the Contract Unit Price per square metre of "Watermain and Water Service Insulation". The area to be paid for shall be the total square meters of watermain and water service insulation supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- (a) Excavation of the roadway subgrade in accordance with E14.6 will not be measured for payment and will be included in the payment for "Watermain and Water Service Insulation".

E15. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO FEEDERMAIN

- E15.1 Description:

E15.1.1 This Section details operating constraints for all work to be carried out in close proximity to the City feeder mains and other critical water infrastructure. Close proximity shall be deemed to be any construction activity within a 5 m horizontal offset from the centreline of the feeder main, within 5 m of valve chambers and other appurtenances, and any other infrastructure identified below.

- E15.2 The following shall be considered critical pipelines and water infrastructure for this project.

- E15.2.1 Speers Road Feeder Main

- (a) 900 mm Pre-stressed Concrete Cylinder Pipe (PCCP) conforming to AWWA Standard C301-58. The Speers Road Feeder Main was manufactured and installed in 1962.
- (b) The feeder main runs along Speers Road within the project area.

E15.3 General Considerations for Work in Close Proximity to Critical Water Infrastructure.

E15.3.1 Feeder mains are a critical component of the City of Winnipeg Regional Water Supply System and work in close proximity to feeder mains shall be undertaken with an abundance of caution. Feeder mains cannot typically be taken out of service for extended periods to facilitate construction and inadvertent damage caused to the pipe would likely have catastrophic consequences.

E15.3.2 Work around feeder mains shall be planned and implemented to minimize the time period that work is carried out in close proximity to the pipe and to ensure that the pipeline is not subjected to excessive construction related loads, including excessive vibrations and/or concentrated or asymmetrical lateral loads during backfill placement.

E15.3.3 Large diameter pressure pipe generally has limited ability to withstand increased earth and live loading. Therefore, every precaution must be undertaken to ensure that applied loading during all phases of construction is within accepted loading parameters. PCCP typically fails in a non-ductile mode and has the potential to cause extensive consequential damage to infrastructure if failure should occur.

E15.3.4 Construction in close proximity to critical infrastructure shall not commence until both the equipment and construction method statements have been submitted, reviewed, and accepted by the Contract Administrator.

E15.4 Submittals

E15.4.1 Submit proposed construction equipment specifications to the Contract Administrator for review a minimum of five (5) Business Days prior to construction. The equipment submission shall include:

- (a) equipment operating and payload weights;
- (b) equipment dimensions, including: wheel or track base, track length or axle spacing, track widths or wheel configurations; and
- (c) load distributions in the intended operating configuration.

E15.4.2 Submit a construction method statement to the Contract Administrator a minimum of five (5) Business Days prior to construction. The construction method statement shall contain the following minimum information:

- (a) proposed construction plan including excavation locations, haul routes, excavation equipment locations, and loading positions;
- (b) excavation plans, including shoring designs, for excavations occurring in close proximity to feeder mains (within 5 m horizontal of the pipe's centerline) where the excavation is to be extended below the top of the feeder mains embedment zone 150 mm above the pipe)
- (c) trenchless construction methodology for feeder main crossings, including: installation methods, means of grade control, means of confirming clear separation between the new LDS (catch basin/catch pit leads) and existing feeder main; and
- (d) any other pertinent information required to accurately describe the construction activities in close proximity to the feeder main and permit the Contract Administrator to review the proposed construction plans.

E15.5 Feeder Main Operational Limitations

E15.5.1 Feeder main shutdowns are scheduled based on a number of factors including water demand, weather, reservoir operation, routine maintenance and repair work within the regional distribution system, and other factors. The City shall endeavour to make requested time periods available to the Contractor to schedule his/her work requiring removal of the feeder main from service, without limiting the City's control over the operation of the feeder main to complete other work, maintain adequate water supply and storage of water and maintain the integrity of the infrastructure. The City shall reserve the right to cancel and/or delay these schedule dates at any time, due to any circumstances that could adversely affect the feeder main or water supply including, but not limited to,

high water demand, abnormal weather, failures of related water system components and/or security concerns.

E15.5.2 Scheduling Restrictions:

- (a) Temporary feeder main shutdowns shall be limited to off-peak demand seasons (September 15 to May 15) and low demand hours including evenings or other low demand periods.

E15.6 Pre-Work, Planing and General Execution

- E15.6.1 No Work shall commence in close proximity to feeder mains, chambers, and critical infrastructure until the equipment specifications and construction method statement have been submitted and accepted, and feeder main locations have been clearly delineated in the field. Work over feeder mains shall only be carried out with equipment that has been reviewed and quantified in terms of its loading implications on the pipe.
- E15.6.2 Contact the City of Winnipeg Water and Waste Department, Construction Services Coordinator prior to construction.
- E15.6.3 Locate feeder mains and confirm their position horizontally and vertically at the proposed the following locations prior to undertaking work in close proximity to the identified feeder mains. Note, exact locations to be identified in the field. Deviations from the elevations noted on the Drawings shall be reported to Contract Administrator for review prior to proceeding with work:
 - (a) wherever subgrade construction is to occur; and
 - (b) at locations where land drainage or other subsurface utility construction is proposed.
- E15.6.4 Visually delineate all critical infrastructure identified herein on Site by use of paint, staking/flagging, construction fencing, snow fencing, or other suitable methods.
- E15.6.5 Only utilize construction practices and procedures that do not impart excessive vibratory loads on feeder mains and chambers or that would cause settlement of the subgrade below feeder mains and critical pipelines.
- E15.6.6 Where the existing road structure must be removed, crossing of critical infrastructure shall be prohibited from the time the existing roadway structure is removed until the road structure has been reconstructed.
- E15.6.7 Only equipment and construction practices stipulated in the accepted construction method statement and the supplemental requirements noted herein may be utilized in close proximity to feeder mains, chambers, and other critical infrastructure identified herein.
- E15.6.8 Construction operations should be staged in such a manner as to limit multiple construction loads at one time, (e.g., offset crossings sufficiently from each other, rollers should remain a sufficient distance behind spreaders to limit loads. A reasonable offset distance is 3 m between loads).
- E15.6.9 Granular material, construction material, soil, and/or other material shall not be stockpiled on the pipelines or within 5 m of any feeder main, valve chamber, or other critical infrastructure identified herein.
- E15.6.10 The Contractor shall ensure that all crew members understand and observe the requirements of working near feeder mains, valve chambers, and critical infrastructure. Prior to commencement of on-Site work, the Contractor shall jointly conduct an orientation meeting with the Contract Administer, all superintendents, foreman, and heavy equipment operators to make all workers on the Site fully cognizant of the limitations of altered loading on, the ramifications of inadvertent damage to, and the constraints associated with work in close proximity to feeder mains and critical pipelines. New personnel introduced after commencement of the project need to be formally orientated as outlined herein. It is recommended that restrictions associated with the crossing, consistent with the Contractor's submitted method statement be posted on Site and near the crossing.

E15.7 Demolition, Excavation, and Shoring

- E15.7.1 Use of pneumatic concrete breakers within 3 m of a feeder main, valve chamber, or critical pipeline is prohibited. Pavement shall be full depth sawcut and carefully removed. Use of hand held jackhammers for pavement removal will be allowed.
- E15.7.2 Offset excavation equipment a minimum of 3 m from the centerline of critical pipelines when undertaking excavations where there is less than 2.4 m of earth cover over the pipeline.
- E15.7.3 Utilize only smooth edged excavation buckets, soft excavation, or hand excavation techniques where there is less than 1.5 m of earth cover over the pipeline. Where there is less than 1.0 m of soil cover above the pipeline, provide full time supervision and complete the excavation utilizing hand excavation or soft excavation methods.
- E15.7.4 Equipment should not be allowed to operate while positioned directly over a feeder main or critical pipeline except where permitted herein, outlined in the reviewed and accepted construction method statement.
- E15.7.5 Excavations within 3 m of the outside edge of a feeder main (hydrovac holes for confirming trenchless installations excluded) and which extend below the invert of the feeder main shall utilize shoring methods that precludes the movement of native in-situ soils (i.e. a tight shoring system).
- E15.7.6 Pre-bore all piles to below the invert of critical infrastructure within 5 m (horizontally) of the pipeline's outside edge.
- E15.7.7 Offset pile driving equipment a minimum of 3 m (horizontally) from the centerline of the pipeline during piling operations.

E15.8 Underground Construction and Trenchless Pipe Installation

- E15.8.1 Install pipes to the grades shown on the Drawings. A minimum clear separation distance (outside to outside of pipe wall) of 500 mm shall be maintained between crossing pipes and the feeder mains.
- E15.8.2 The Contractor shall locate feeder mains and confirm their position horizontally and vertically prior to commencing with any trenchless pipe installations to ensure proper clearances are maintained. Under NO circumstances should blind coring proceed across feeder mains.
- E15.8.3 The Contractor shall visually confirm the location and alignment of the drill rods or jacking pipe (horizontally and vertically) prior to proceeding with the trenchless installation beneath the feeder main. It is recommended that the new pipe alignment be confirmed within 2 m of the outside of the feeder main pipe but no closer than .5 m from the outside edge of the pipe.
- E15.8.4 No trenchless methods involving soil displacement (plugs) shall be permitted in the vicinity of the Feeder main.
- E15.8.5 Pressure grouting or approved alternative methods shall be used to fill voids caused by the installation or if the bored hole diameter is greater than the outside diameter of the pipe by more than 25 mm.
- E15.8.6 Where excavation is required within the feeder main's embedment zone, the Contractor shall take steps to ensure the granular embedment material surrounding the feeder main remains stable during the work and the feeder main outside of the excavation is not undermined.

E15.9 Subgrade Construction

- E15.9.1 Subgrade and backfill compaction within 3 m (horizontal) of a critical pipeline or valve chamber shall be limited to non-vibratory methods only. Small walk behind vibratory packers will be permitted.

- E15.9.2 Subgrade, sub-base and base course construction shall be kept in a rut free condition at all times. Construction equipment is prohibited from crossing pipelines if the grade is insufficient to support the equipment without rutting.
- E15.9.3 Subgrade conditions should be inspected by personnel with competent geotechnical experience (e.g. ability to adequately visually classify soils and competency of subgrade, subbase, and base course materials). In the event of encountering unsuitable subgrade materials above the feeder main, proposed design revisions shall be submitted to this office for review to obtain approval from the Water and Waste Department relative to any change in conditions.
- E15.9.4 Fill material shall not be dumped directly on pipelines but shall be stockpiled outside the limits noted in these recommendations and shall be carefully bladed in-place.
- E15.9.5 Only use compaction equipment approved by the Contract Administrator to compact fill materials above critical pipelines. Compaction of fill materials shall be completed using static methods only, no vibratory compaction will be allowed within the limits noted in these recommendations.
- E15.9.6 Construction operations shall be staged to minimize the time period between excavation to subgrade and placement of granular subbase materials. Should bare subgrade be left overnight, measures shall be implemented to protect the subgrade against inadvertent travel over it and to minimize the impact of wet weather.
- E15.10 Subbase and Base Course Construction
- E15.10.1 Subbase or base course materials shall not be dumped directly on pipelines but shall be stockpiled outside limits noted in these recommendations and shall be carefully bladed in-place.
- E15.10.2 Subbase compaction within 3 m horizontal of the centreline of a critical pipeline shall be either carried out by static methods (without vibration) or with smaller approved equipment such as hand held plate packers or smaller roller equipment.
- E15.11 Paving
- E15.11.1 When constructing asphalt pavements only non-vibratory compaction should be used within 3 m (horizontal) of the center of critical pipelines.

E16. REMOVAL AND INSTALLATION OF POST AND CHAIN FENCE

DESCRIPTION

E16.1 General

- E16.1.1 This specification covers the removal of existing posts and the supply and installation of new post and chain fencing.

MATERIALS

- E16.1.2 All materials shall be as per Appendix 'B', Post and Chain Fencing SCD-105A, or as directed by the Contract Administrator.

CONSTRUCTION METHODS

E16.2 General

- E16.2.1 Contractor to remove existing wood posts and ensure surrounding facilities are not damaged.
- E16.2.2 Dispose of removed posts in accordance with clause 3.4 of CW 1130 and clause 9 of CW 3010.
- E16.2.3 Install new Post and Chain Fence as shown on the Drawings and as per Appendix B.

E16.2.4 The Contractor shall confirm the proposed location of the posts with the Contract Administrator prior to installation.

E16.2.5 The posts shall be installed true and plumb.

MEASUREMENT AND PAYMENT

E16.3 Wood Post Removal

E16.3.1 The removal of wood posts will be measured on a unit basis and will be paid for at the Contract Unit Price per unit for "Wood Post Removal", measured as specified herein, which price shall be payment in full for performing all operations required to complete the Work and all other items incidental to the Work included in this Specification.

E16.4 Supply and Installation of Post and Chain Fencing

E16.4.1 The supply and installation of post and chain fencing will be measured on a unit basis and will be paid for at the Contract Unit Price per unit for "Supply and Installation of Post and Chain Fencing", measured as specified herein, which price shall be payment in full for performing all operations required to complete the Work and all other items incidental to the Work included in this Specification.

E17. PAVING STONE REMOVAL

E17.1 Description

E17.1.1 This Specification covers the removal of paving stones.

E17.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E17.2 Referenced Specifications and Drawings

- (a) The latest version of the City of Winnipeg Standard Construction Specifications
 - (i) CW 3235 – Renewal of Existing Miscellaneous Concrete Slabs

E17.3 Construction Methods

E17.3.1 Remove paving stones at locations as shown on the Drawings or as directed by the Contract Administrator.

E17.3.2 Ensure the removal methods do not chip, damage or undercut the adjacent slabs that are to remain.

E17.3.3 Resaw-cut chipped, damaged or undercut slabs beyond the removal limits as directed by the Contract Administrator at the Contractors own expense.

E17.3.4 Remove the paving stones around existing curb stops and water valves by hand methods.

E17.3.5 Dispose of removed paving stone materials in accordance with clause 3.4 of CW 1130.

E17.4 Measurement and Payment

E17.4.1 Paving stone removal will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Paving Stone Removal". The area to be paid for will be the total number of square metres of existing brick paving stone removed in accordance with this Specification, accepted and measured by the Contract Administrator.

E18. SIGN SUPPORT CLAMPS

E18.1 The Contractor shall install all new sign support clamps at the locations shown on the Drawings or as directed by the Contract Administrator. The City shall supply all sign support clamps.

E18.2 All costs in connection with the installation of sign support clamps are incidental to the Contract.

E19. ASPHALT PATCHING OF MISCELLANEOUS CONCRETE

E19.1 Description

E19.2 General

E19.2.1 This Specification covers the placement of asphalt patches in various situations to prepare a concrete pavement for subsequent placement of mainline asphalt pavement overlay. This includes patching full depth concrete repairs, cracks and joints, and vertical faults.

E19.2.2 Referenced the latest version of the City of Winnipeg Standard Construction Specifications:

- (a) CW 1130-R2 – Site Requirements;
- (b) CW 3230 – Full-Depth Patching of Existing Slabs and Joints;
- (c) CW 3250-R7 – Joint and Crack Maintenance; and
- (d) CW 3410-R10 – Asphaltic Concrete Pavement Works.

E19.3 Material and Equipment

E19.3.1 Asphalt Materials

- (a) Asphalt material will be Type 1A supplied in accordance with clause 5 and 6 of CW 3410.

E19.3.2 Tack Coat

- (a) Tack Coat will be undiluted SS-1 emulsified asphalt or approval equal.

E19.4 Equipment

E19.4.1 Equipment as per clause 8 of CW 3410-R10.

E19.5 Construction Methods

E19.5.1 Full Depth Concrete Repairs:

- (a) Place asphaltic concrete over the newly constructed joint repair where there is a minimum of 20 mm elevation difference between repair surface and adjacent pavement surface. Remove any loose or debonded asphalt at the joint perimeter and place new asphaltic concrete in these areas as well;
- (b) Dispose of all material in accordance with clause 3.4 of CW 1130-R2;
- (c) Prior to placement of asphaltic concrete patching material, ensure surface is clean and dry;
- (d) Prepare the joint surface with a uniform application of tack coat applied in small quantities sufficient to wet the concrete surface;
- (e) Place and compact asphaltic concrete over the joint repair in accordance with clause 9.3 of CW 3410-R8 and to the satisfaction of the Contract Administrator so that the finished elevation of the patch is flush with surrounding asphalt surface;
- (f) Compact the asphalt material to an average ninety five percent (95%) of the seventy-five (75) blow Marshall Density of the paving mixture with no individual test being less than ninety percent (90%); and
- (g) Ensure that no traffic is allowed to cross the patched area until the asphalt has cooled to atmospheric temperature.

E19.5.2 Crack/Joint Patching

- (a) Construction Methods as per clause 3.4 of CW 3250-R7.

E19.6 Measurement and Payment

- (a) Asphalt Patching of Miscellaneous Concrete will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Asphalt Patching of Miscellaneous Concrete". The area to be paid for will be the total number of square metres of full depth joints, cracks and joints, and vertical faults patched in accordance with this Specification.

E20. REPLACE MANHOLE BENCHING

E20.1 Description

E20.2 General

E20.2.1 This Specification covers the placement of benching in existing manholes.

E20.3 Construction Methods

E20.3.1 Replace Manhole Benching

- (a) The Contractor shall remove and dispose of existing loose or crumbling benching mortar to the satisfaction of the Contract Administrator.
- (b) The Contractor shall bench and channel the manhole floor with mortar or concrete in accordance with CW 2130, SD-010 and SD-011. Flow channels shall curve smoothly and provide a smooth transition between inlet and outlet pipes.

E20.4 Measurement and Payment

- (a) Replacement of manhole benching will be measured on a unit basis and paid for at the Contract Unit Price for "Replace Manhole Benching". The number to be paid for shall be the total number of manholes that have been repaired in accordance with this Specification, accepted and measured by the Contract Administrator.

E21. INSTALLATION OF STREET LIGHTING AND ASSOCIATED WORK

E21.1 DEFINITIONS

LIMITS OF APPROACH means the shortest distance that is permissible between live high voltage (>750 volts) conductors or apparatus and any part of a worker's body, material or tools being handled, or equipment operated.

MANITOBA HYDRO CENTRAL STORES means Manitoba Hydro's Waverley Service and Reclaim Centre - 1840 Chevrier Blvd - Winnipeg, Manitoba.

OVERHEAD FEED means an electrical supply via an overhead conductor connected between streetlight standards. Typically strung between standards on a temporary basis.

OVERHEAD SOURCE means an electrical supply from Manitoba Hydro's system. (Typically an overhead conductor from a wooden distribution pole or a DIP/RISER located on a wooden distribution pole.)

RECLAIM material means existing material that has been removed from Manitoba Hydro's system and to be returned to Manitoba Hydro.

SCRAP material means existing material that has been removed from Manitoba Hydro's system and to be recycled/disposed of by the Contractor.

SURPLUS material means new material that has been requisitioned by the Contractor and not incorporated into the work at the end of the Contract.

WORK CLEARANCE means an ELECTRICAL AND/OR NATURAL GAS FACILITIES LOCATE form (see SAMPLE ONLY included as Appendix D) issued by each of Manitoba Hydro's Customer Service Centre (CSC) affected to permit work to commence (Permit to work).

E21.2 DESCRIPTION

E21.2.1 The work shall consist of the supply of all supervision, labour, materials (except as indicated under MATERIAL SUPPLIED BY MANITOBA HYDRO below) insurance, tools, backfill and equipment (and their maintenance), transportation, fuel, oil, meals and lodging, mobilization and de-mobilization, and warranty of workmanship as required to install and remove temporary Overhead Feeds, remove existing street light poles as required, install new street light poles and associated underground cables/conduits, all in accordance with the requirements specified in the tender documents.

E21.3 WORK LOCATIONS

E21.3.1 The proposed street light installation and removals are shown on construction drawings and are as follows:

(a) LYNDAL DRIVE

E21.4 COORDINATION OF WORK

E21.4.1 The Contractor shall provide a minimum of ten (10) working days' notice to Manitoba Hydro prior to the start of construction. The work shall be conducted and coordinated with Manitoba Hydro in a manner to ensure street lighting is maintained at all times for the duration of the work. The construction drawings provide the Proposed Sequence of Construction.

E21.4.2 The Contractor shall obtain Work Clearance from Manitoba Hydro's Customer Service Centre(s) (CSC) affected prior to the work commencing. No additional compensation shall be paid to the Contractor for delays obtaining Work Clearance for any reason.

E21.4.3 Manitoba Hydro's CSC will provide the Limits of Approach applicable to the Contractor on the Work Clearance form.

E21.5 ORIENTATION

E21.5.1 Prior to the commencement of the proposed work, the Contractor's crew foremen, electricians, and other key personnel shall attend one (1) day of orientation provided by Manitoba Hydro for various operations such as cable handling, cable splicing/termination, installation of street light poles, concrete bases, luminaires and various other construction standards and procedures. The Contractor will be responsible for all costs associated with personnel salaries, travel, sustenance and overheads, etc., during training.

E21.6 PRE-CONSTRUCTION MEETING

E21.6.1 Prior to the commencement of the work, the Contractor shall attend a pre-construction meeting with Manitoba Hydro. The agenda for this meeting shall include but not be limited to the following:

- (a) Reference the Contractor's Safe work Procedures;
- (b) Prime Contractor;
- (c) materials;
- (d) sequence of construction;
- (e) communication plan;
- (f) any training requirements and qualifications;
- (g) Drawing and Project review;
- (h) a review of the Contractor's proposed work schedule; and

- (i) any and all other topics of clarification that the Contractor and the Contract Administrator may wish to discuss.

E21.6.2 The Contractor's cost to attend this pre-construction meeting shall be incorporated into the unit prices for the work.

E21.7 QUALIFICATIONS AND CERTIFICATION

E21.7.1 The Contractor's Crew Foreman, installers and other key Contractor's Personnel shall possess the necessary certification, licensing, training, experience and familiarity with safety rules, procedures and hazards relating to the work. Journeyman Power Line Technician (PLT), Journeyman Lineman, Journeyman Cableman or Journeyman Electricians shall be required to perform portions of this work.

E21.7.2 Journeyman Power Line Technician (PLT), Journeyman Cableman and Journeyman Lineman are also required to possess a "Limited Specialized Trade Licence – 'M-P' Licence – Power Line" issued by the Province of Manitoba.

E21.7.3 Manitoba "Safe work" Bulletin M&E010 dated January 5, 2011 regarding Electrician Licenses discusses the requirements for a "Limited Specialized Trade Licence – 'M-P' Licence – Power Line".

For more information contact:
Manitoba
Mechanical and Engineering Branch
500-401 York Avenue
Winnipeg, Manitoba R3C 0P8
Tel. 204-945-3373
Fax 204-948-2309

E21.7.4 Licensed Journeyman Electricians or Journeyman PLT or Journeyman Cableman or Journeyman Lineman ARE REQUIRED for all cable handling operations included but not limited to: disconnecting cables in the handhole, installation and removal of temporary overhead feeds, installation and connection of ground rods, streetlight cable splices, termination of streetlight cables in handholds and at luminaires. The Contractor shall employ sufficient qualified personnel on its crews to conform to the Electrician's Licensing Act. The Contractor shall be prepared to provide proof of licences to Manitoba Hydro upon request.

E21.7.5 The Contractor shall assess the hazards associated with the work and have documented Safe work Procedures to perform the work. It is the Contractor's responsibility to train employees on these procedures. The Contractor shall be prepared to provide proof of training to Manitoba Hydro upon request.

E21.8 REFERENCED STANDARD CONSTRUCTION SPECIFICATIONS

E21.8.1 In addition to these Specifications, the work to be performed by the Contractor relative to the installation and/or replacement of street lighting poles, concrete bases and associated cabling shall be in accordance with the following:

- (a) Manitoba Hydro 66kV and Below Standards;
- (b) CSA C22.3 No. 7 (latest edition);
- (c) Canadian Electrical Code (CEC) Part 1 (latest edition);
- (d) Any other applicable codes; and
- (e) (collectively, the "Standards").

E21.8.2 Revisions and updates to the Manitoba Hydro 66kV and Below Standards are issued periodically and the latest issued version of the Standard will apply. For the convenience of the Contractor for bidding purposes, excerpts of the Manitoba Hydro 66kV and Below Standards have been included as Appendix A.

E21.8.3 In some cases, Municipal, Provincial or Federal laws or this Technical Specification may be more stringent than the CSA Standards. Whenever conflict exists, the Contractor shall comply with the most stringent requirements applicable at the place of the work.

E21.9 TOOLS, EQUIPMENT AND MATERIALS

E21.9.1 The Contractor shall be required to provide all tools and equipment required for performing the specified tasks. Equipment shall be in good operating condition, shall be properly maintained using original equipment manufacturer replacement parts and shall be provided with letters of testing/inspection from the manufacturer when requested. Where the equipment is provided as a kit with multiple parts and tools, the kit shall be complete with all parts required to perform the designed task. Contractor fabricated tools or equipment will not be accepted for use.

E21.9.2 The Contractor shall obtain the following specific Electrical Equipment including but not limited to:

- (a) Compression tool or tools and associated dies to perform compressions to a maximum size of 1/0 Al (MD-6 compression tools shall not be used).
- (b) Approved compression tools are:

Manufacture	Type	Model No.	Range
Burndy	In-line, battery	PATMD68-14V	350 Kcmil AL
Cembre	In-line, battery	B54Y (06V081E)	4/0 AWG AL
Burndy	Pistol, battery	BUR PAT60018V	350 Kcmil AL

E21.9.3 Dies shall be of the type shown in Standard CD210-21 and CD 210-24 only, must have identical markings, and compression tool die must match die number stamped on connector.

- (a) Modiewark Model #4444 or Fluke 1AC-II Volt Alert potential Indicator;
- (b) Voltage meter – Fluke model #T3C; and
- (c) Insulated wire cutters – used for cutting cable ends square.

E21.9.4 Alternative equipment manufacturers may be considered upon request by the Contractor and shall be approved for use by Manitoba Hydro prior to use.

E21.9.5 Manitoba Hydro may reject any tools or equipment that do not appear to be in good condition or fail to successfully provide the required function.

E21.10 MATERIAL SUPPLIED BY MANITOBA HYDRO

E21.10.1 Manitoba Hydro shall supply all street light poles, concrete bases, breakaway bases, luminaires, street light arms, ground rods, compression sleeves, grommets, nuts, electrical cables, conduits, relays, cable guards, Gel-caps and all other materials noted in the Standards. The Contractor shall sign receipts indicating the location on which the materials are to be used. The material shall be picked up by the contractor from the following locations:

E21.10.2 Manitoba Hydro Central Stores (contact personnel will be provided to the successful contractor).

E21.10.3 Materials requested will be supplied to the Contractor by Manitoba Hydro upon presentation of Manitoba Hydro's Stores Material Order Form. The Contractor shall assume all responsibilities for the loading, unloading, transportation, proper handling, secure storage and working of the materials and shall make replacements at its own expense in case any material is damaged, stolen or lost due to improper handling, storage or poor workmanship.

E21.10.4 The Contractor shall, at the time of materials release, check and confirm the quantity of materials. Shortages, discrepancies, or damages to materials shall be immediately reported in writing to Manitoba Hydro.

E21.10.5 After commencing performance of the work, the Contractor shall continually monitor all material required for the timely completion of the work and shall report additional material requirements to Manitoba Hydro a minimum of seventy-two (72) hours prior to materials being required to perform the work. No additional compensation shall be paid as a result of delays due to material shortages where additional material requirements were not reported a minimum of seventy-two (72) hours prior to being required for the work on an active project.

E21.11 MATERIAL SUPPLIED BY CONTRACTOR

E21.11.1 The Contractor shall be responsible to furnish gravel, sand, ¾" down limestone, ¼" down limestone, protective hose (i.e. typically 2" fire hose), duct seal and pit-run material for backfilling around street light poles and around cables as per the Standards. The cost of furnishing the above listed materials shall be incorporated into the unit prices for the work.

E21.12 SURPLUS, RECLAIM AND SCRAP MATERIAL

E21.12.1 Upon completion of the work, the Contractor shall, at its own expense, deliver to Manitoba Hydro Central Stores, all Surplus materials furnished by Manitoba Hydro and not used in the work, regardless of the location of said material at that time.

E21.12.2 In addition, the Contractor shall, at its own expense, deliver to Manitoba Hydro Central Stores all Reclaim materials from the work specifically HPS luminaires. Manitoba Hydro shall be responsible for the proper disposal of Reclaim HPS luminaires. The HPS bulb shall remain installed and unbroken in the Reclaim luminaire. The Contractor shall handle the Reclaim luminaires with care and shall avoid breaking the bulb or refractor.

E21.12.3 Manitoba Hydro's preference is to recycle as much Scrap Material as practicable. The Contractor is responsible to remove the Scrap Material, transport to the recycler or Manitoba Hydro approved disposal site, pay for any disposal fees and may retain any recycling value.

E21.13 DE-ENERGIZATION AND LOCKOUT

E21.13.1 **Manitoba Hydro** - Where a standard is supplied from an Overhead Source, Manitoba Hydro's staff shall be responsible to disconnect and isolate the street light standard or standards between the standard and Overhead Source. Some street light standards may be temporarily fed from an Overhead Source. This Overhead Source shall be disconnected and removed by Manitoba Hydro staff prior to commencing with the work. The streetlight circuits will not be Locked Out by Manitoba Hydro.

E21.13.2 **The Contractor** - The Contractor shall assess the hazards associated with the work and employ its own Safe Work Procedure for the work to be performed. The Contractor's Safe Work Procedure shall include provisions that the street light circuits will not be Locked Out by Manitoba Hydro. The Contractor's Safe Work Procedure shall achieve Lock Out or techniques equivalent to Lock Out.

E21.13.3 The Contractor shall complete a job planning form (an example is included as Appendix E) on a daily basis before any work commences and provide Manitoba Hydro with copies of the job plans if requested.

E21.14 TEMPORARY OVERHEAD FEEDS

E21.14.1 Manitoba Hydro in consultation with the Contractor will determine if temporary lighting will be provided by the existing street lights or from the new street lights.

E21.14.2 When using the existing poles for temporary lighting, Manitoba Hydro shall remove an Overhead Source in accordance with DE-ENERGIZATION AND LOCKOUT section above, prior to the Contractor installing a #4 duplex overhead conductor between the existing poles. The #4 duplex overhead conductor will normally be attached to the tenon of the davit arm near the luminaire with a pre-form grip. Older poles may require a spool insulator be attached to the pole using a pre-form grip to support the #4 duplex overhead conductor. A short length of 2C/#12 copper conductor is connected to the terminals of the luminaire

brought out and connected to the #4 duplex overhead conductor. The final span to the Overhead Source shall be installed by Manitoba Hydro.

E21.14.3 When using the new poles for temporary lighting, the Contractor shall install the new bases, poles and #4 duplex overhead conductor. The #4 duplex overhead conductor will be attached to the tenon of the davit arm near the luminaire with a pre-form grip. A short length of 2C/#12 copper conductor is connected to the terminals of the luminaire brought out and connected to the #4 duplex overhead conductor. The final span to the Overhead Source shall be installed by Manitoba Hydro.

E21.14.4 All material used to provide the temporary overhead feed shall be returned to Manitoba Hydro. Care shall be taken to coil and tag Reclaim conductor for reuse. If used, insulators shall be handled carefully to prevent breakage.

E21.15 SAFE EXCAVATION

E21.15.1 The work shall be performed in accordance with the requirements of Manitoba Hydro's Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B and Manitoba Workplace Safety and Health Regulation 217 latest revision.

E21.16 SAFE HANDLING

E21.16.1 The Contractor shall apply handling techniques in accordance with Manitoba Workplace Health and Safety Regulation 217 (latest revision).

E21.17 ELECTRIC CABLES AND CONDUITS

- (a) The Contractor shall use diligent care and proper equipment in handling of all cables, so as not to injure the jacket and avoid gouging, kinking, scratching or abrading the cables. If any material is damaged to any extent, the Contractor shall repair the damages at its own expense, in a manner approved by Manitoba Hydro or will be charged the full cost of the damaged items.
- (b) Cable reels shall not be dropped and must be handled and placed/stored in an upright position at all times and shall not be laid flat for any purpose or reason. Cable reels shall be adequately supported on hard surface to prevent the reel from sinking into the ground that can cause undue stress on the cables. Cable reels should be inspected for damages prior to use. If a cable reel is found to be defective, such defect shall be reported immediately to Manitoba Hydro.
- (c) The Contractor shall place all material and string the cables in such a manner as to cause the least interference with normal use of the land, street or roadway. All material shall be unloaded in a manner to preserve its condition, prevent loss and/or theft and permit easy access for Manitoba Hydro's inspection.
- (d) The Contractor shall provide Manitoba Hydro's inspector sufficient opportunity, in the sole discretion of Manitoba Hydro, to inspect the work.

E21.18 PRECAST CONCRETE BASES

E21.18.1 The Contractor shall handle, store, transport and unload the precast concrete bases in a manner to prevent damage to the threaded bolts and conduit casing.

E21.18.2 Precast Concrete Bases are extremely heavy. Approximate weight of pre-cast concrete bases are found in the Standards. The Contractor shall only use equipment rated for such weight.

E21.19 STREET LIGHT POLES AND ARMS

E21.19.1 The Contractor shall handle, store, transport, and provide proper load securement for the poles and arms in a manner to prevent damage.

E21.20 LUMINAIRES

E21.20.1 The Contractor shall handle, store, transport and unload the luminaires in their original packaging and in a manner to prevent damage.

E21.21 SMALL MATERIAL

E21.21.1 Photo electric cells, shorting caps, shims, nut covers and associated supplies shall be kept in a suitable warehouse provided by the Contractor at its own expense. Photo electric cells shall be transported and stored in such a manner as to prevent breakage.

E21.22 CARE OF MATERIALS

E21.22.1 The Contractor shall assume all responsibilities of all the materials and shall replace, at its own expense, any materials damaged, stolen or lost due to improper handling or poor workmanship.

E21.23 WIRE AND CABLE REEL STORAGE

E21.23.1 Cable reels shall be stored with the flanges upright and resting on a hard surface. At temporary storage sites where the soil may be soft, preservative-treated plywood sheets may be used to keep the flanges from sinking into the ground.

E21.23.2 If cable reels must be pancaked or stored on their side in vertical racks, do not lift the reel by the top flange. Spacers (two (2) 2 x 4s placed wide side up) should be placed under the bottom flange and between the reels in order to create a space to insert the forks and lift the reels without damaging the cable.

E21.24 REEL HANDLING

E21.24.1 When off-loading reels from a truck, reels shall be lowered using a hydraulic gate, hoist or forklift truck. When a reel is rolled from one point to another, care must be taken to see that the reel does not straddle objects such as rocks, pipes, curbs or wooden blocks which could damage the cable or protective covering. A reel should always be rolled on hard surfaces to avoid sinkage and in the opposite direction to the cable wraps to ensure that the reel is rolled in such a direction as to tighten the cable on the reel.

E21.24.2 When using a hoist, install a mandrel through the reel arbour hole and attach a sling. Use a spreader bar approximately 6 inches longer than the overall reel width placed between the sling ends just above the reel flanges. This will prevent bending of the reel flanges and damage to the cable.

E21.24.3 If a forklift is used to move a reel, the reel is to be approached from the flange side. Position the forks such that the reel is lifted by both reel flanges. The lift forks shall not contact the cable.

E21.24.4 Returnable reels shall be returned promptly to Manitoba Hydro Central Stores and in no case later than three (3) days after the completion of the work unless otherwise mutually agreed between the Contractor and Manitoba Hydro.

E21.25 PRESSURIZED WATER/VACUUM EXCAVATION

E21.25.1 Pressurized water/vacuum excavation (PW/VE) shall be used to daylight all buried utilities and structures where excavation by other mechanical means would be expected to provide a physical risk to that utility or structure.

E21.25.2 The work shall be performed in accordance with the requirements of Manitoba Hydro's Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B.

E21.26 REMOVAL STREET LIGHT POLE FROM EXISTING BASE

E21.26.1 This shall include all work required to remove a street light pole from an existing base as set forth in this Technical Specification. The pole may be on an existing precast concrete base, steel power installed screw base or poured in place concrete base.

- E21.26.2 The Contractor shall furnish all labour, supplies and materials (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary for the removal of the street light pole from the existing base. Care shall be taken to preserve the luminaire. The luminaire shall be reinstalled on the new street light pole or returned to Manitoba Hydro's stores as instructed by the Manitoba Hydro.
- E21.26.3 The Contractor shall be responsible to transport all Surplus and Reclaim materials to Manitoba Hydro Central Stores and transport and dispose of all Scrap material as set forth in this Specification.
- E21.27 REMOVAL OF BASE AND DIRECT BURIED STREET LIGHT POLE**
- E21.27.1 This shall include all excavation, whether by auger, pressurized water/vacuum excavation, by hand, or by other methods which may be necessary to remove a base or direct buried street light pole. The base may be poured in place concrete, steel power installed or precast concrete.
- E21.27.2 The Contractor shall be responsible to transport all Surplus and Reclaim materials to Manitoba Hydro Central Stores and transport and dispose of all Scrap material as set forth in this Specification.
- E21.27.3 The Contractor is responsible to supply all backfill material as specified in the Standards and carry out all backfill, compacting and leveling of all excavations and voids for removed bases and direct buried street light poles so as to be ready for top soil and seed or sod or as directed by Manitoba Hydro.
- E21.28 INSTALLATION OF FOUNDATION - CONCRETE BASE**
- E21.28.1 This shall include all excavation, whether by auger, pressurized water/vacuum excavation, by hand, or by other methods which may be necessary to replace or install a concrete base as set forth in this Specification.
- E21.28.2 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary to install a new or replace a concrete base. Excavation for the precast concrete base shall be to a diameter and depth specified in Standard CD 300-6. All excess material is to be removed by the Contractor.
- E21.28.3 The concrete base shall be set on a bed of $\frac{3}{4}$ " down limestone. The concrete base backfill material shall be compacted in lifts no more than 150 mm. Backfill material shall be $\frac{3}{4}$ " down limestone. Compacting of backfill material shall be done using a hydraulic tamper. Alternative tamping methods shall be approved by Manitoba Hydro. Underground cables entering the concrete base shall be protected by a length of protective hose supplied by the Contractor and a layer of sand surrounding the cables to protect it from the limestone. The concrete base shall be installed level in all 4 directions. Final grade must be established prior to installing the concrete bases.
- E21.28.4 The completed backfill shall be at least equal in compaction to undisturbed soil, as required by the Municipal authorities or elsewhere in this Specification. The Contractor shall level all excavations.
- E21.28.5 Should settlement occur in the excavation and cause a depression in the surface, the Contractor shall repair the surface. Placing of additional backfill material due to settlement shall be at the Contractor's expense.
- E21.28.6 The concrete base shall be oriented in the proper direction to allow the easy entrance of the underground cables into the plastic pipe preinstalled in the concrete base. Care shall be taken to prevent damage to the insulation or jacket of the conductors. The cable shall be left long enough to extend 1 m beyond the top of the hand hole.
- E21.29 BASE MOUNTED STREET LIGHT POLES**
- E21.29.1 This shall include all work required to install the street light pole on the concrete base as set forth in this Specification.

- E21.29.2 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary for the installation of the pole (straight shaft or davit) on the concrete base.
- E21.29.3 Unless otherwise specified on the construction drawings, the Contractor shall orient the poles so that the hand hole is on the left side of the pole when viewed from the road. A worker should be able to see oncoming traffic when working in the hand hole.
- E21.29.4 The Contractor shall level the street light pole in all 4 directions. Leveling shims may be used.
- E21.29.5 Tightening of bolts shall be performed in a manner that brings the surfaces up evenly. All nuts shall be tightened and torqued in accordance with Standard CD 300-9. The Contractor shall install the nut covers included with the pole.
- E21.29.6 Unless otherwise specified, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.
- E21.29.7 Existing street light poles may have street signs attached. The Contractor shall remove the signs from the existing pole and temporarily reattach the signs to the new pole. The Contractor shall notify Manitoba Hydro of the location where the signs have been removed.

E21.30 LUMINAIRES AND ASSOCIATED WIRING

- E21.30.1 The Contractor shall furnish labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary to install the luminaire and associated wiring. Unless otherwise specified, the luminaire shall be installed with a tilt of zero (0) degrees. The Contractor shall install a length of 2 conductor No. 12 gauge (2C-12) wire from the terminals of the luminaire, through the arm (if applicable), down the pole to the hand hole. 1 m of 2C-12 wire shall be left at the hand hole. Impact equipment (air or electric) shall not be used to tighten luminaire mounting bolts. The Contractor shall be liable for damage due to over tightening.
- E21.30.2 The Contractor shall verify the luminaire voltage matches the source voltage as shown on the construction drawings. If luminaire voltage does not match the source voltage, the Contractor shall re-wire the luminaire in accordance with the wiring diagram provided.
NOTE: Not applicable for LED luminaires.
- E21.30.3 As specified on the construction drawings, the luminaire will require either a photo electric cell (PEC) or shorting cap installed. When installing the PEC the eye shall be oriented north. The Contractor shall also install the appropriate wattage bulb in the luminaire.
NOTE: Bulb installation not applicable for LED luminaires.

E21.31 BREAK AWAY BASES

- E21.31.1 Break away bases shall be installed in accordance with Standard CD 300-10. The height of the concrete base above grade shall not exceed 50mm. The surface of the concrete base shall be flat and level. A reaction plate shall be installed between the concrete base and the break-away base.
- E21.31.2 The Contractor shall torque the couplers in accordance with Standard CD 300-10. Impact tools shall not be used to tighten or torque couplers or nuts associated with a break away base.

E21.32 SPLICING/CONNECTING CABLES

- E21.32.1 The electric cable shall be spliced/terminated as per Standards CD 215-12, CD 215-13, CD 310-1, CD 310-4, CD 310-9 and CD 310-10 with the exception that the Contractor will use a GELCAP-SL-2/0 splice kit (See Appendix C). Termination in the hand hole may include the installation of an inline fuse holder.
- E21.32.2 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary to splice/terminate the street light conductor(s).

E21.33 EXCAVATION

- E21.33.1 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary for the completion and maintenance of grade and line of the street light cables and conduit including water control if found to be necessary. The trench shall be graded to conform to the street light cables and conduit so that the street light cables and conduit rest firmly on a smooth surface throughout its length. All stones or other objects which, in the opinion of Manitoba Hydro might damage the street light cable jacket and conduit shall be removed. Where the presence of rock or other condition prevent a satisfactory bed for the cables, 150 mm of well-tamped, clean soil or ¼" down crushed limestone shall be placed in the bottom of the trench. In this case, the spoil bank from trenching operations shall not be allowed to fall into the trench or mix with the soil to be used in backfilling the trench. Loose debris or foreign matter and the spoil bank shall be placed so as not to hinder drainage, damage property, or obstruct traffic.
- E21.33.2 Trenches shall be dug to such a depth that will provide a minimum cover of 600 mm from final grade in sodded areas and 1,000 mm in roadways in accordance with Standard CD 305-1.

E21.34 LAYING CABLES

- E21.34.1 Cables are to be lowered in the trench in an orderly fashion so as to maintain a consistent path and straight alignment. All cables shall be lowered in a continuous run (NO SPLICING) and in accordance with the construction drawings; and shall maintain the necessary separation, where required. All cables shall be of continuous runs and capped and sealed if they are not being installed in the pole at that time. Cables shall not be dragged over paved surfaces.
- E21.34.2 Once a cable is cut its ends must be sealed immediately with an approved and appropriately sized, heat shrink or cold shrink sealing cap to prevent moisture ingress unless the cable is being installed in the pole at that time.
- E21.34.3 During the removal of the cable, the reels shall be placed on jacks, stands or trailers with a bar through the arbour holes which will allow the reel to be turned easily, and the cable to be paid out. Cables can be paid out from the bottom or the top of the reel. Cable in coils shall be handled in a similar manner. This can be achieved by supporting the coil in a vertical plane and rotating it by hand as the cable is carefully uncoiled. The cable shall never be pulled over the flange of a reel, or pulled off the side of a coil, since this will introduce a twist in the cable.
- E21.34.4 During installation, under no circumstance is the cable to be subjected to a bending radius tighter than that detailed in the Standards.
- E21.34.5 Where specified in the Standards or on the construction drawings, the Contractor shall install the street light cable in a conduit.

E21.35 INSTALLING CONDUIT AND CABLE BY BORING (HORIZONTAL DIRECTIONAL DRILLING)

- E21.35.1 The Contractor shall dig the approaches and openings necessary to install boring equipment, and the boring equipment used shall be of such a nature as to minimize the opening size required. The boring equipment shall produce a straight hole without unnecessary dips or bends. The bore hole shall be only slightly larger than the outside diameter of the conduits or cables to minimize possible settlement. Cables and conduits shall be pulled in with pulling eyes or using a kellum grip in a manner so as to guard against damage.
- E21.35.2 During construction as the drill bit crosses each existing facility a lookout shall be assigned by the Contractor to visually confirm the drill bit is maintaining a minimum 300 mm clearance from the existing facility all in accordance with Manitoba Hydro Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B. Maximum pulling tensions on any streetlight cable shall be limited to 2.9 kN/0.65 kips.

- E21.35.3 Drilling fluids and associated waste materials shall be disposed of in a manner that minimizes environmental effects.
- E21.35.4 The Contractor shall properly compact the backfill material and will be responsible for placing additional material should settlement occur for the duration of the warranty period.
- E21.36 BURIED UTILITY CROSSINGS**
- E21.36.1 All buried obstructions are not necessarily shown on the reference drawings and the locations of those indicated are approximate only.
- E21.36.2 The Contractor shall determine the location of all buried obstructions and shall notify the appropriate authorities and obtain all necessary permits prior to excavation, trenching and directional drilling near or across such obstructions. All buried obstructions where the new buried cable route crosses other utilities including but not limited to gas, water, sewer, telephone and electric lines shall be exposed as per each utilities guidelines by the Contractor, including the use of Pressurized Water/Vacuum Equipment (PW/VE) where necessary. Should any damage occur to such lines during the course of the work, the Contractor shall be responsible for the damage and the costs of repairs to buried obstructions caused by its operations and shall fully indemnify the City of Winnipeg and Manitoba Hydro from and against all claims arising out of such damage. Manitoba Hydro Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B shall be followed when crossing natural gas pipelines and electrical cables by the directional boring method.
- E21.36.3 The PW/VE technique, used to expose underground plant in certain conditions, must be performed in accordance with each utility's requirements, including but not limited to Manitoba Hydro, Manitoba Telecom Services, Shaw Cable, etc. PW/VE costs that the Contractor will incur during the work must be factored into the Contractor's bid prices. The Contractor shall not be entitled to extra compensation for the use of PW/VE on the work.
- E21.36.4 The Contractor shall be responsible to supply all backfill material and carry out all backfill, compacting and leveling of all excavations so as to be ready for topsoil and seed or sod or as directed by Manitoba Hydro.
- E21.37 BENDING CABLES/CONDUITS AND INSTALLATION INTO STANDARDS**
- E21.37.1 It is desired to reduce to a minimum the required number of bends and to lay the cables/conduits to conform to the contour of the ground and maintain a normal covering. This shall be accomplished by cutting the trench slightly deeper in approaches to road crossings and drainage ditches. It is intended that the Contractor shall eliminate unnecessary bending by operating the trenching machine at various depths rather than by finishing grading the trench by hand whenever practical.
- E21.37.2 Sharp bends of the cables/conduits shall be avoided at all times. All bends shall meet the requirements set out in this Specification. If excessive bending was exerted on any cable, the cable shall be replaced at the Contractor's cost. During installation, under no circumstance is the cable to be subjected to a bending radius tighter than that detailed in the Standards. At street light poles the Contractor shall install the ends of the cables into the plastic pipe preinstalled in the concrete base. Care shall be taken to prevent damage to the insulation or jacket of the conductors. Underground cables entering the concrete base shall be protected by a length of protective hose supplied by the Contractor and by a layer of sand surrounding the cables to protect it from the limestone. The cable shall be left long enough to extend 1 m beyond the hand hole. The street light cable in the trench shall be installed in conduit for mechanical protection and the ends sealed with duct seal supplied by the Contractor. Care shall be taken to prevent damaging the cable where it exits the conduit. The conduit shall only be installed into the concrete base if conduit sizes make it practicable.
- E21.37.3 Unless otherwise directed, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.

E21.38 BACKFILL

- E21.38.1 All backfilling material within 300 mm of the cables/conduits shall be clean, free of sod, vegetation, organic material, stones or other debris, and of a consistency as to not create significant voids or air spaces around the cables/conduits. Other backfilling material shall be free of stones greater than 150 mm on their maximum dimension. Where cinders or very acid soil are encountered or where gravel or incompressible fill is required by Municipal authorities, ¼" down crushed limestone shall be placed all around the cables for a depth of at least 300 mm. The completed backfill shall be at least equal in compaction to undisturbed soil or as directed by Manitoba Hydro. Backfill material is to be placed and compacted in lifts not exceeding 300 mm. All excess material is to be removed by the Contractor.
- E21.38.2 Tamping or flushing methods must be used where necessary to give the required compaction. Where tamping is used, hand tampers shall be used to at least 300 mm above the cable before machine tamping may be used. The Contractor shall level all excavations so as to be ready for topsoil and seed or sod or as directed by the Manitoba Hydro. Should settlement occur in the excavation and cause a depression in the surface, the Contractor shall repair the surface to the satisfaction of the Manitoba Hydro at the Contractor's cost.
- E21.38.3 Excavations remaining where poles have been removed shall be backfilled with spoil, pit run gravel or ¾" down limestone and compacted in lifts of 150 mm as directed by Manitoba Hydro. The top 300 mm of the excavation shall be backfilled with topsoil.
- E21.38.4 Excavations remaining where utility crossings have been exposed shall be backfilled with sand or clean spoil and compacted in lifts of 150 mm. The top 300 mm of the excavation shall be backfilled with topsoil.
- E21.38.5 Backfill of all excavations shall be in accordance with City of Winnipeg Standard Construction Specification CW 2030 (latest revision), to the satisfaction of the authority having jurisdiction and Manitoba Hydro.

E21.39 DEFECTIVE WORK AND WARRANTY

- E21.39.1 If any portion of the work fails to comply with the requirements of this Specification, fails within the Warranty period, or if the final tests prove or indicate the existence of any fault or defect in the work, or any part thereof, Manitoba Hydro may forthwith re-execute or make good the faulty or defective work or alter the same to make it comply with requirements of the Specification at the Contractor's expense. Manitoba Hydro shall give the Contractor notice together with particulars of such failure, fault or defect, Manitoba Hydro's cost to re-execute or make good the faulty or defective work and the Cost shall be deducted from the Contract.
- E21.39.2 At the completion of the work for each location, Manitoba Hydro shall prepare and issue a Network Commissioning Report, a sample of which is included as Appendix F, to the Contractor. The Network Commissioning Report shall be dated indicating the commencement of the Warranty period for the work performed at the location.

E21.40 AS-BUILT DRAWING

- E21.40.1 The Contractor shall provide an as-built drawing or mark-up drawing to Manitoba Hydro which accurately displays the "as-built" location of the buried street light cables, conduits and street light poles.

E21.41 MEASUREMENT AND PAYMENT

- E21.41.1 Removal of 25' to 35' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Removal of 25' to 35' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by

Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including removal of the pole, base, luminaire, appurtenances, use of pressurized water/vacuum excavation, transportation of Reclaim, Surplus and Scrap material, payment of associated disposal fees and all other items incidental to the work included in the Specification.

- E21.41.2 Removal of 45' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Removal of 45' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including removal of the pole, base, luminaire, appurtenances, use of pressurized water/vacuum excavation, transportation of Reclaim, Surplus and Scrap material, payment of associated disposal fees and all other items incidental to the work included in the Specification.
- E21.41.3 Installation of Conduit and #4 AL C/N or 1/0 AL Triplex Streetlight Cable in Conduit by Open Trench Method
- (a) This pay item will be measured on a linear metre basis and paid for at the Contract Unit Price per linear metre for "Installation of Conduit and #4 AL C/N or 1/0 AL Triplex streetlight cable in Conduit by open trench method." The number of meters to be paid for at the Contract Unit Price shall be measured and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the conduit, pulling cable into the conduit, backfilling the trench, buried utility crossings, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E21.41.4 Installation of 50 mm Conduit by Boring Method complete with Cable Insertion (#4 AL C/N or 1/0 AL Triplex)
- (a) This pay item will be measured on a linear metre basis and paid for at the Contract Unit Price per linear metre for "Installation of 50 mm conduit or conduits by boring method complete with cable insertion (#4 AL C/N or 1/0 AL Triplex)." The number of meters to be paid for at the Contract Unit Price shall be measured and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of 50 mm conduit or conduits by boring method, inserting the #4 AL C/N or 1/0 AL Triplex streetlight cable into the conduit(s), buried utility crossings, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E21.41.5 Installation of cable (#4 AL C/N or 1/0 AL Triplex) by boring method.
- (a) This pay item will be measured on a linear metre basis and paid for at the Contract Unit Price per linear metre for "Installation of cable(s) (#4 AL C/N or 1/0 AL Triplex) by boring method." The number of meters to be paid for at the Contract Unit Price shall be measured and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the cable or cables by boring method, buried utility crossings, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E21.41.6 Installation of 25'/35' Pole, Davit Arm and Precast Concrete Base Including Luminaire and Appurtenances
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of 25'/35' pole, davit arm and precast concrete base including luminaire and appurtenances." The number of units

to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the pole, davit arm, base, luminaire, appurtenances, placing the cable(s) into the base, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.

- E21.41.7 Installation of 45' Pole, Davit Arm and Precast Concrete Base Including Luminaire and Appurtenances
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of 45' pole, davit arm and precast concrete base including luminaire and appurtenances." The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the pole, davit arm, base, luminaire, appurtenances, placing the cable(s) into the base, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E21.41.8 Installation of One (1) 10' Ground Rod at Every Third Street Light, at the End of a Street Light Circuit or Anywhere Else as Shown on the Design Drawings. Trench #4 Ground Wire up to 1 m From Rod Location to New Street Light and Connect (Hammerlock) to Top of Ground Rod
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of one (1) 10' ground rod at every third street light, at the end of a street light circuit or anywhere else as shown on the design drawings. Trench #4 ground wire up to 1 m from rod location to new street light and connect (hammerlock) to top of the ground rod." The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including install one (1) 10' ground rod, trench the #4 ground wire to the new streetlight pole, connect (hammerlock) ground wire to rod and all other items incidental to the work included in the Specification.
- E21.41.9 Installation of Lower 3 m of Cable Guard, Ground Lug, Cable Up Pole, and First 3 M Section of Ground Rod Per Standard CD 315-5
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Install/lower 3 m of Cable Guard, ground lug, cable up pole, and first 3 m section of ground rod per Standard CD 315-5". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installing the lower section of cable guard, ground lug, ground rod, coiling cable(s) up the pole and all other items incidental to the work included in the Specification.
- E21.41.10 Installation and Connection of Externally-Mounted Relay and PEC Per Standards CD 315-12 and CD 315-13
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation and connection of externally-mounted relay and PEC per Standards CD 315-12 and CD 315-13". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including mounting the relay, PEC, wiring as per the schematic and all other items incidental to the work included in the Specification.
- E21.41.11 Termination of 2/C #12 Copper Conductor to Street Light Cables Per Standard CD310-4, CD310-9 or CD310-10

- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Terminate 2/C #12 copper conductor to street light cables per Standard CD310-4, CD310-9 or CD310-10". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including connection of the 2/C # 12 copper conductor to the #4 C/N or 1/0 Al Triplex cable(s) using a GELCAP-SL-2/0 splice kit and all other items incidental to the work included in the Specification.

E21.41.12 Splicing #4 AL C/N or 2 Single Conductor Street Light Cables

- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Splicing #4 Al C/N or 2 single conductor street light cables". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including splicing the #4 AL C/N or two (2) single conductor cables in accordance with Standard CD 215-12 and CD 215-13 and all other items incidental to the work included in the Specification.

E21.41.13 Splicing 1/0 AL Triplex Cable or 3 Single Conductor Street Light Cables

- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Splicing 1/0 AL triplex cable or three (3) single conductor street light cables". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including splicing the 1/0 Al triplex cable or set of three (3) single conductor cables in accordance with Standard CD 215-12 and CD 215-13 and all other items incidental to the work included in the Specification.

E21.41.14 Installation of Break-Away Base and Reaction Plate on Base-Mounted Poles up to 35'

- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of break-away base and reaction plate on base mounted poles up to 35'". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the reaction plate, break-away base and all other items incidental to the work included in the Specification.

E21.41.15 Installation of Overhead Span of #4 Duplex Between New or Existing Streetlight Poles and Connect Luminaire to Provide Temporary Overhead Feed

- (a) This pay item will be measured on per span basis and paid for at the Contract Unit Price per span for "Installation of Overhead Span of #4 duplex Between New or Existing Streetlight Poles and Connect Luminaire to Provide Temporary Overhead Feed". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including attachment of the #4 duplex overhead conductor using a perform grip (c/w spool insulator(s) to davit arm if necessary), sagging conductor, connection of luminaire using 2C#12 copper conductor and all other items incidental to the work included in the Specification.

E21.41.16 Removal of Overhead Span of #4 Duplex Between New or Existing Streetlight Poles to Remove Temporary Overhead Feed

- (a) This pay item will be measured on a per span basis and paid for at the Contract Unit Price per span for "Removal of Overhead Span of #4 duplex Between New or Existing Streetlight Poles to Remove Temporary Overhead Feed". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by the Manitoba Hydro. The Price shall be payment in

full for performing all operations herein described including removal of the #4 duplex overhead conductor, spool insulator(s) and all other items incidental to the work included in the Specification.

E21.41.17 Expose Underground Cable Entrance of Existing Streetlight Pole and Install New Streetlight Cable(s).

- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Expose Underground Cable Entrance of Existing Streetlight Pole and Install New Streetlight Cable(s)". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including excavation and exposure of the underground cable entrance by any means necessary including use of pressurized water/vacuum excavation, installation of the new streetlight cables(s), backfill, compaction and all other items incidental to the work included in the Specification

APPENDIX 'A'

MANITOBA HYDRO ELECTRICAL STANDARDS – 2020 STREET LIGHT INSTALLATIONS



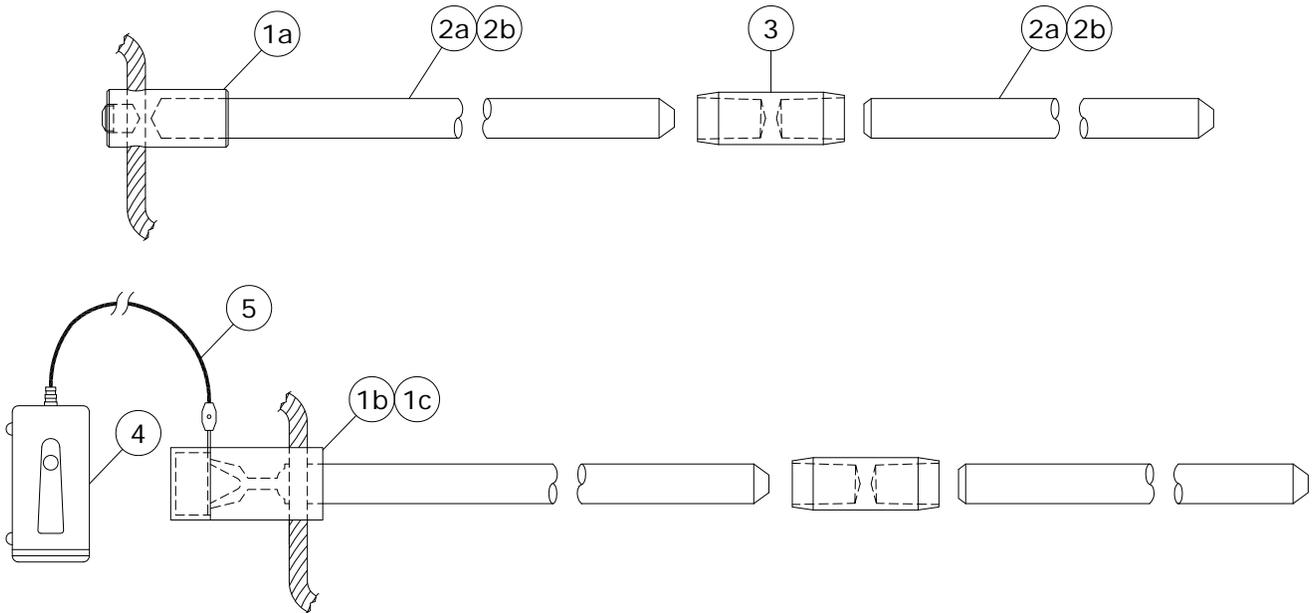
Appendix A
Electrical Standards
(2019 Streetlight Installations)

Refer to electronic copy issued under separate cover

Electric Standards for Streetlight Installations Table of Contents

50-7	Sheet 1 of 1	Ground Rod Material Detail
200-63	Sheet 1 & 2 of 2	Cable Guard Details on DIP/Riser Poles
210-12	Sheets 1 & 2 of 2	Underground Secondary Cable
210-15	Sheet 1 of 1	Standard Underground Secondary Cable Data
210-21	Sheet 1 of 1	Underground Secondary Cable Compression Connectors
210-24	Sheet 1 of 1	Underground Neutral Compression Connectors
215-12	Sheets 1, 2 & 3 of 3	Primary and Secondary Cable End Caps
215-13	Sheets 1 & 2 of 2	Splicing Secondary Neutral (Bare Copper to Insulated Aluminum)
300-1	Sheet 1 of 1	Standard Steel Street Light Poles
300-6	Sheets 1 & 2 of 3	Installation of Precast Concrete Base
300-9	Sheet 1 of 1	Method for Anchor Rod Tightening
300-10	Sheets 1 & 2 of 2	Breakaway Base Installation
300-18	Sheet 1 of 1	Rigging Weights of Street Light Components
300-24	Sheet 1 of 2	Standard LED Luminaires
305-1	Sheets 1 & 2 of 2	Plowing and Trenching Details for Underground Street Light Circuits
310-1	Sheets 1 & 2 of 2	Installation of Street Light Cables
310-3	Sheets 1 to 3 of 3	Raychem Gelcap Splice
310-4	Sheets 1 to 4 of 4	Connection Detail on Steel Street Light Standard
310-9	Sheets 1 to 4 of 4	Street Light Circuit Protected by 30A Fuse in Streetlight Standard
310-10	Sheets 1 to 4 of 4	Street Light Circuit Protected by 15A Fuse in Streetlight Standard
315-1	Sheet 1 of 1	Supply Voltages Street Light Circuits
315-2	Sheet 1 of 1	240/308v for Street Light Circuits
315-5	Sheet 1 of 1	DIP Pole for Underground Street Light Circuit
315-10	Sheet 1 of 1	Control Methods for Street Light Controls
315-12	Sheet 1 of 1	Installation of Externally-Mounted Relay
315-13	Sheet 1 of 1	Connection Schematic for Externally-Mounted Relay
315-35	Sheet 1 of 1	Identification of First Street Light Standard Connected to Circuit

Updated: February 11, 2019



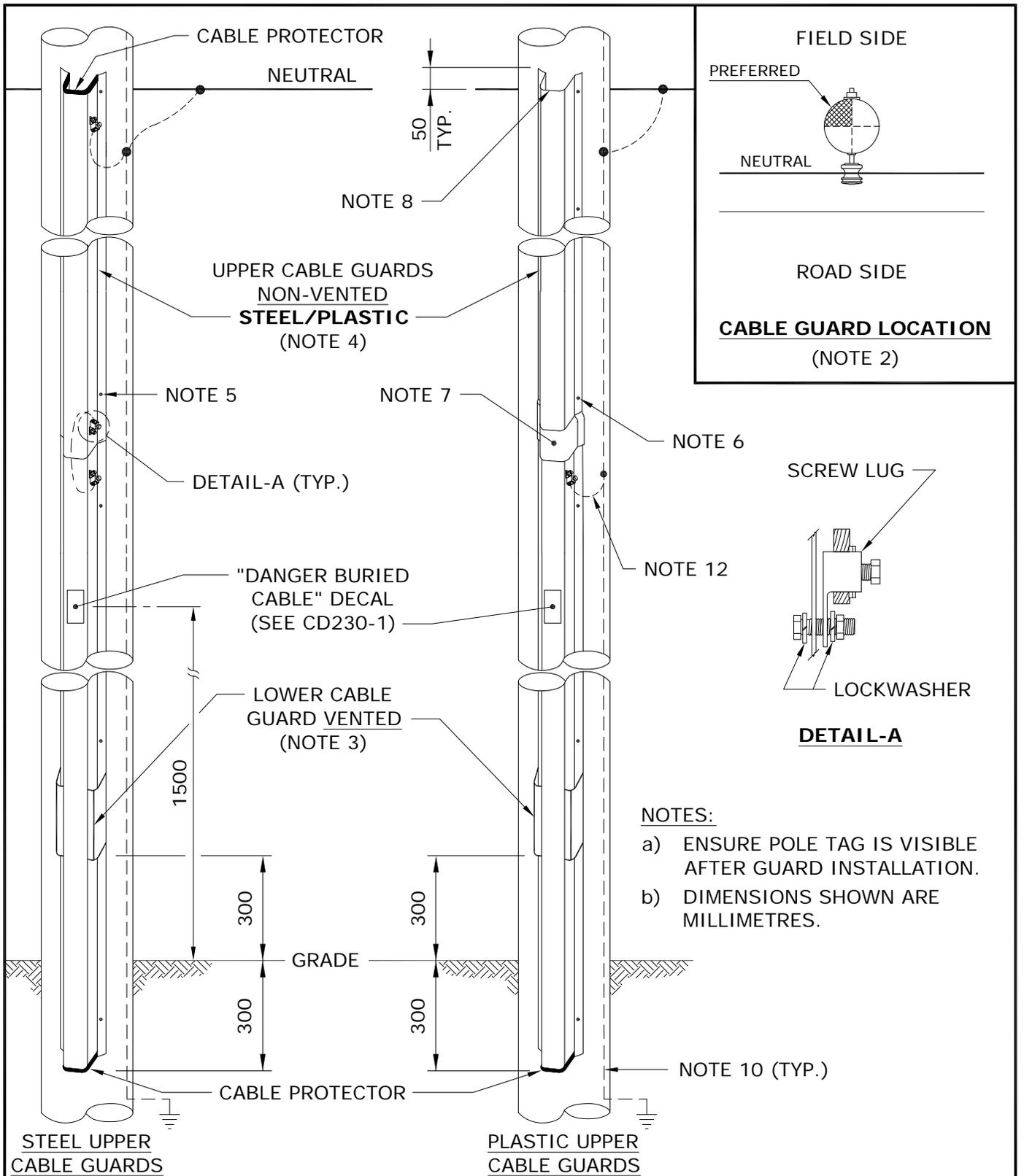
COPPERWELD - SECTIONAL

ITEM No.	DESCRIPTION	MH CIIC
1a	HAMMERLOCK FOR #2 & #4 CU	04 60 24
1b	ONE SHOT PLUS FOR 2/0	03 59 15
1c	ONE SHOT PLUS FOR 4/0	03 77 06
2a	10' CU-WELD ROD SECTIONAL (SEE NOTE 2)	71 70 10
2b	6' CU-WELD ROD SECTIONAL	00 68 26
3	COUPLING CU-WELD	00 52 27
4	ELECTRONIC IGNITER FOR ONE SHOT PLUS WITH 15' CORD	03 59 10
5	15' REPLACEMENT CORD	03 67 43

NOTES:

- FOR 3/4" GROUND RODS. IF A 5/8" GROUND ROD IS ENCOUNTERED, IT IS TO BE REPLACED WITH A 3/4" ROD.
- FIRST GROUND ROD SHALL BE A 10' ROD.

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 99-01-04	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS	
	13-01	3	ADDED HAMMERLOCK CONNECTOR	GROUND ROD MATERIAL DETAIL	
	08-07	2	ADDED ELECTRONIC IGNITER & REVISED TABLE		
00-08	1	REMOVED STEEL AND GALVANIZED RODS, ONE SHOT ADDED			
DRAWN R.L.B./CAD	CHECKED D.F./D.O.	DATE 98-08	CD 50-7		SHT 0001 OF 1
					REV 03



SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 15-10-29	16-04	4	REVISED NOTE	CABLE GUARD DETAILS ON DIP/RISER POLES	
	15-10	3	ADDED NOTE a), RESEALED		
	99-10	2	PLASTIC CABLE GUARD AND SHEET 2 ADDED		
DRAWN C.A.	CHECKED J.R.	DATE 15-10		CD 200-63	
				SHT	REV
				0001 OF 2	04

NOTES:

1. FOR CABLE GUARD SELECTION GUIDE, REFER TO DRAWING CD200-66.
2. TO PROVIDE A SAFER CLIMBING SURFACE AND TO PREVENT VEHICULAR DAMAGE TO THE CABLE GUARD, THE PREFERRED ATTACHMENT OF THE CABLE GUARD TO THE POLE SHOULD BE IN THE QUADRANT AS SHOWN.
3. THE LOWER CABLE GUARD SHALL BE GALVANIZED STEEL AND VENTED.
4. UPPER CABLE GUARD SHALL BE PLASTIC FOR THE 50mm & 90mm GUARDS AND GALVANIZED STEEL FOR THE 130mm GUARD.
5. ATTACH GALVANIZED STEEL CABLE GUARD TO POLE WITH 3/8" LAG SCREWS (72-60-03).
6. ATTACH THE PLASTIC CABLE GUARD TO THE POLE WITH #16 x 2" WOOD SCREWS (72-95-10), C/W FLAT WASHERS (86-10-04).
7. POSITION THE LAP-JOINT OF THE PLASTIC CABLE GUARD DOWN & OVER LAPPED A MINIMUM OF 25mm ONTO THE VENTED CABLE GUARD.
8. ENSURE THAT THE INNER EDGE IS BEVELLED.
9. CABLE GUARD TO EXTEND 50mm ABOVE THE NEUTRAL CONDUCTOR.
10. GROUNDING AND BONDING CONDUCTORS SHALL BE #4 BARE COPPER.
11. FOR GROUNDING CONNECTIONS, REFER TO DRAWING CD200-60.
12. BOND VENTED CABLE GUARD AT THIS POINT.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 99-11-03

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 15-10-29				CABLE GUARD DETAILS ON DIP/RISER POLES					
		16-04	2					ADDED FLAT WASHERS TO NOTE 6	
		15-10	1					RESEALED	
DRAWN C.A.	CHECKED J.R.	DATE 15-10		CD 200-63		SHT 0002 OF 2	REV 02		

SECONDARY CABLE	TYPICAL USAGE
#4 AL. CONCENTRIC NEUTRAL	STREET LIGHT CIRCUITS
1/0 AL. TRIPLEX	SECONDARY RESIDENTIAL SERVICES AND HEAVILY LOADED STREET LIGHT CIRCUITS WHERE VOLTAGE DROP MAY BE A PROBLEM
4/0 AL. TRIPLEX	SECONDARY RESIDENTIAL SERVICES
350 TRIPLEX	SECONDARY RESIDENTIAL SERVICES
4/0 AL. TRIPLEX	THREE PHASE SECONDARY SERVICES ADD #2 Cu BARE NEUTRAL UP TO 200 AMP
350 AL. QUADRAPLEX	THREE PHASE SECONDARY SERVICES 400 AMP OR 200A OVER 75m
750 AL. OR 1000 CU.	THREE PHASE SECONDARY SERVICES OVER 400 AMPS

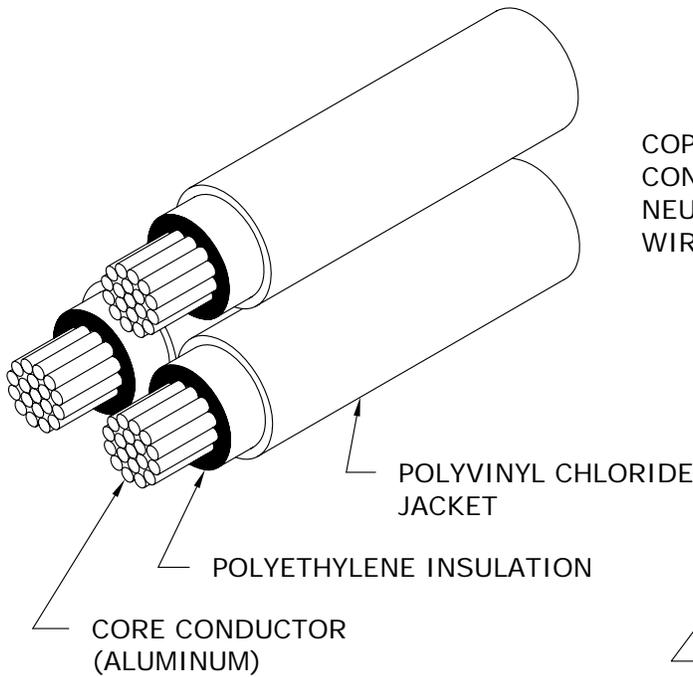
NOTE:

SEE CD225-4 FOR SIZING AND SPACING OF SINGLE AND THREE PHASE CONDUCTORS.

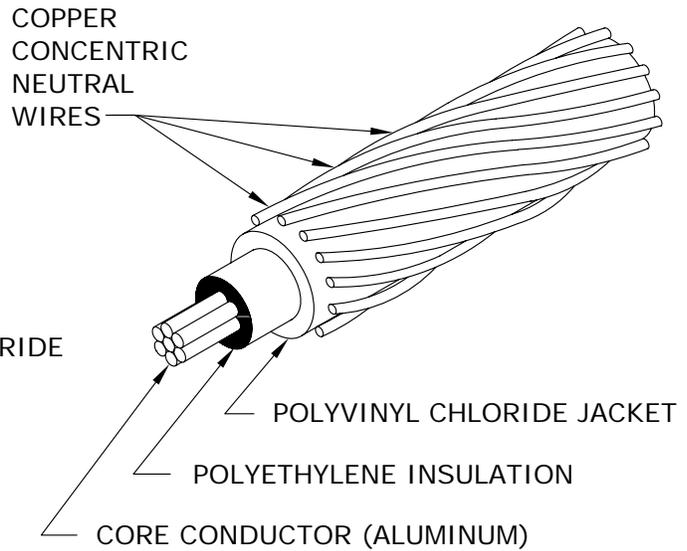
SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 88-03-29

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 17-01-25	17-01	11	ADDED 4/0 AL TRIPLEX TO TABLE, RESEALED	UNDERGROUND SECONDARY CABLE	
	06-03	10	ADDED NOTE AND 350 TRIPLEX		
	99-04	9	4/0 AL. TRIPLEX, NOTE CHANGED		
DRAWN C.A.	CHECKED K.S.	DATE 17-01	CD 210-12		SHT 0001 OF 2
					REV 11

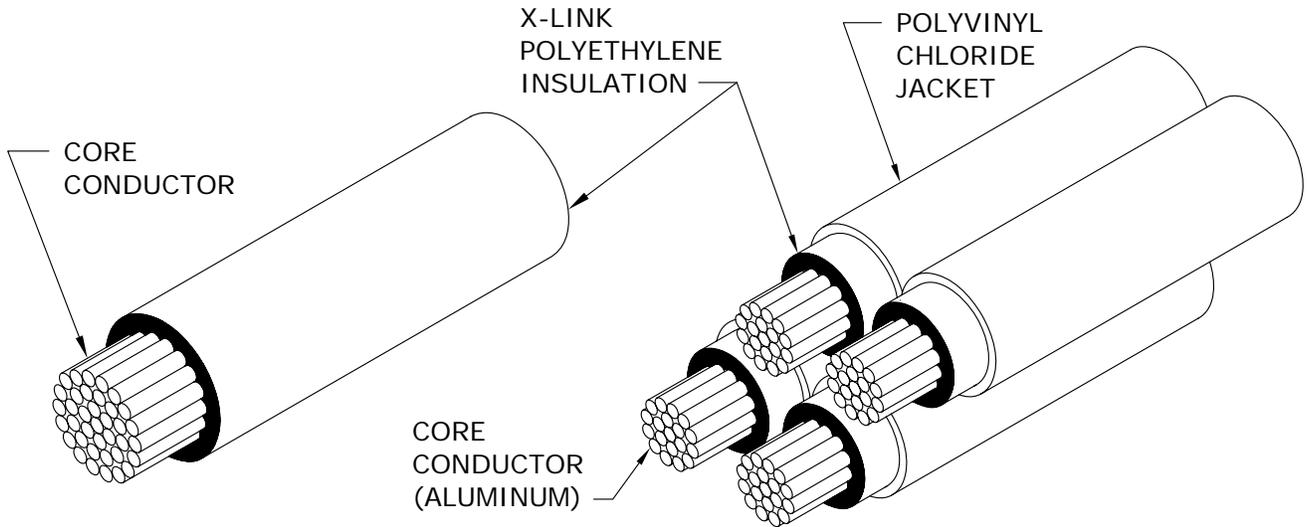
BASIC CONSTRUCTION OF UNDERGROUND SECONDARY CABLES



1/0 & 4/0 AND 350 TRIPLEX



4 CONCENTRIC NEUTRAL CABLE



750 kcmil (AL) & 1000 kcmil (CU) RWU

350 kcmil QUADRAPLEX

APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03	06-03	2	REPLACED 4/0 TRIPLEX WITH 4/0 & 350 TRIPLEX	UNDERGROUND SECONDARY CABLE			
	95-01	1	C/N WIRES NO LONGER TINNED				
	93-07	0	500 MCM DELETED 350 750 kcmil ADDED FORMERLY CD210-3				
DRAWN W.B./CAD	CHECKED B.H.	DATE 93-07	CD 210-12			SHT 0002 OF 2	REV 02

UNDERGROUND SECONDARY CABLE

VOLTAGE RATING	600V	600V	600V	600V	1000V	1000V	1000V
CORE CONDUCTOR SIZE	#4	1/0	4/0	350 kcmil	750 kcmil	1000 kcmil	1000 kcmil
CORE CONDUCTOR MATERIAL	ALUM.	ALUM.	ALUM.	ALUM.	ALUM.	ALUM.	COPPER
TYPE OF CABLE	C/N	TRIPLEX	TRIPLEX	TRIPLEX OR QUADPLEX	1-COND.	1-COND.	1-COND.
NEUTRAL SIZE AND TYPE	#6 CU. Concentric Neutral	1/0 ALUM.	4/0 ALUM.	350 kcmil ALUM.	NONE	NONE	NONE
MIN. BENDING RADIUS (mm)	125	115	150	180	250	300	300
DC RESISTANCE @ 20°C (OHMS/km)	1.360	0.538	0.269	0.163	0.076	0.057	0.035
** DIRECT BURIED AMPACITY (@ 20°C ambient)	125	215	300	420	* 725	* 840	* 1080
VENTED CABLE GUARD AMPACITY (@ 20°C ambient)	100	175	250	330	575	680	855
*** BURIED DUCT AMPACITY (@ 20°C ambient)	70	130	195	265	425	495	630
CONDUCTOR DIAMETER (mm)	5.4	8.9	12.7	15.8	25	26.9	26.9
NOMINAL DIA. OVER INSUL. (mm)	8.6	12.5	16.5	21.6	31.4	33.5	33.5
NOMINAL DIA. OVER JACKET (mm)	12.74	14.7	17.8	22.8	N/A	N/A	N/A
LINEAL MASS (kg/km)	N/A	760	1320	2200/2900	1330	1369	4983
COLD SHRINK END CAPS (MH CIIC)	N/A	15 31 40	15 31 40	15 31 60	15 31 75	15 31 75	15 31 75
HEAT SHRINK END CAPS (MH CIIC)	03 67 31	03 67 31	03 67 31	03 67 30	01 79 82	03 48 63	03 48 63

* PROVIDED MULTIPLE CONDUCTORS PER PHASE ARE SPACED AS SHOWN IN DRAWING CD225-4.

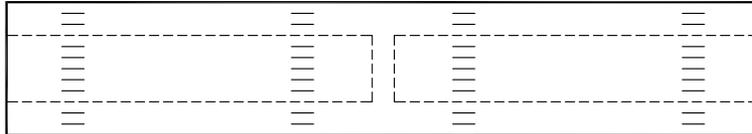
** CABLES DIRECTLY BURIED OUT OF PADMOUNT TRANSFORMERS OR PEDESTALS.

*** CABLES IN NON-VENTED CABLE GUARDS OR IN CONDUITS LONGER THAN 2 METRES.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 16-03-30	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
	17-01	5	REVISED TABLE		STANDARD UNDERGROUND SECONDARY CABLE DATA			
	16-03	4	ADDED 1000 kcmil ALUM. COND., REVISED DATE, RESEALED					
08-12	3	ADDED COLD & HEAT SHRINK CAPS AND LINEAL MASS TO TABLE						
DRAWN C.A.	CHECKED J.R.	DATE 16-03		CD 210-15			SHT 0001 OF 1	REV 05

1-04431-DA-58041-0009



- FOR SPLICING SECONDARY ALUMINUM/COPPER CONDUCTORS.
- NOT SUITABLE FOR USE ON PRIMARY CONDUCTORS.
- COMPLETE WITH BARRIER TO PREVENT MOISTURE MIGRATION.
- FILLED WITH SYNTHETIC INHIBITOR.
- STAMPED WITH CONDUCTOR AND DIE SIZE.
- **COMPRESSION TOOL DIE MUST MATCH DIE NUMBER STAMPED ON CONNECTOR.**
- WIRE BRUSH ALL CONDUCTORS PRIOR TO INSTALLING CONNECTOR.

*** UNDERGROUND SECONDARY CABLE COMPRESSION CONNECTORS**

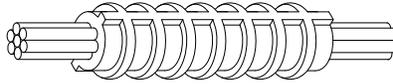
CONDUCTOR SIZE		STORES CODE	TOOL (DIES)	
FROM	TO		PREFERRED	ALTERNATE
#4	#4	74 27 64	Y35 (UCSA 22)	** MD6 (WCSA 22, BG)
1/0	#2	74 27 30		
1/0	1/0	74 27 65		
4/0	1/0	74 27 67	Y35 (UCSA 24)	** MD6 (WCSA 24, 249)
4/0	4/0	74 27 68		
350	4/0	74 27 78	Y35 (UCSA 28)	---
350	350	74 27 72		
750	500	74 27 27	Y46/ADPT (UCSA 30)	---

* FOR CONNECTING INSULATED ALUMINUM TO BARE COPPER, REFER TO DRAWING CD215-13.

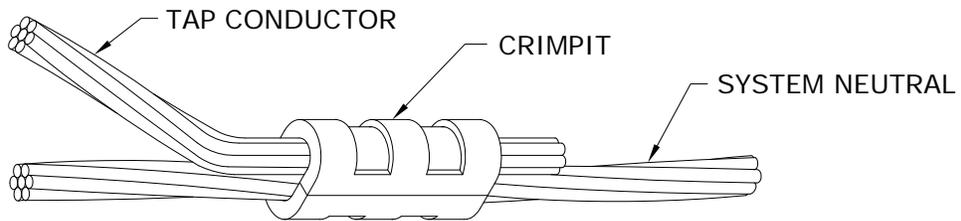
** ROTATE MD6 TOOL 180° AFTER EVERY CRIMP.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03				UNDERGROUND SECONDARY CABLE COMPRESSION CONNECTORS					
		95-09	2					350-4/0 CONNECTOR ADDED	
		95-01	1					NOTE ON MD6 TOOL ADDED	
DRAWN W.B./CAD	CHECKED G.W.	DATE 93-07		CD 210-21		SHT 0001 OF 1	REV 02		

- COMPRESSION TOOL DIE MUST MATCH DIE NUMBER STAMPED ON CONNECTOR.
- WIRE BRUSH CONDUCTORS PRIOR TO INSTALLING COMPRESSION CONNECTORS.



UNDERGROUND NEUTRAL COMPRESSION CONNECTORS			
CONDUCTOR SIZE		STORES CODE	TOOL (DIES)
FROM	TO		
#4	#4	74 32 04	MD6 (162)
#2	#2	74 32 02	MD6 (163)
2/0	2/0	74 31 26	MD6 (166)
4/0	4/0	74 31 28	Y35 (168)
350	350	74 32 31	Y35 (267)



UNDERGROUND NEUTRAL "C" TYPE (CRIMPIT) COMPRESSION CONNECTORS			
* (FOR USE ON COPPER CONDUCTORS ONLY)			
CONDUCTOR SIZE		STORES CODE	TOOL (DIES)
RUN	TAP		
#6 - #4	#6	74 41 10	MD6 (BG)
#4	#4	74 40 90	MD6 (BG)
#2	#4	74 40 80	MD6 (WC)
#2	#2	74 40 70	MD6 (WC)
1/0 - 2/0	1/0 - 2/0	74 41 12	Y35 (UO)
3/0 - 250	#6 - 2/0	74 41 15	Y35 (U997)
3/0 - 250	3/0 - 250	74 41 16	Y35 (U997)
300 - 500	#6 - 2/0	54 23 60	Y46 (P1011)
300 - 500	3/0 - 250	18 30 74	Y46 (P1011)

* FOR CONNECTING BARE COPPER TO INSULATED ALUMINUM, REFER TO DRAWING CD215-13.

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
	10-12	2	ADDED CONNECTOR	
	95-01	1	NOTES REARRANGED	
			UNDERGROUND NEUTRAL COMPRESSION CONNECTORS	
DRAWN W.B./CAD	CHECKED K.C.H.	DATE 93-07	CD 210-24	
			SHT 0001 OF 1	REV 02

THERE ARE THREE METHODS FOR SPLICING 600 VOLT UNDERGROUND SECONDARY CABLES:

- 1) HEAT SHRINK INSULATING TUBING SPLICE
- 2) PRE-STRETCHED INSULATING TUBING SPLICE
- 3) TAPED SPLICE

750 kcmil AND 1000 kcmil CABLES, USED IN CONJUNCTION WITH 3-PHASE COMMERCIAL SERVICES, SHALL NOT BE SPLICED, EXCEPT FOR EMERGENCY REPAIRS.

GENERAL INSTRUCTIONS:

1. a) FOR 1/0 AND 4/0 TRIPLEX CABLES:

- REMOVE ANY DAMAGED OR CONTAMINATED PORTIONS OF CABLE.
- TRAIN CABLES INTO FINAL POSITION (DO NOT SNAKE IN TRENCH).
- CUT CABLES SQUARE AND BUTT ENDS.
- STAGGER SPLICES.
- PROCEED TO STEP 2.

b) FOR #4 CONCENTRIC NEUTRAL CABLE:

- REMOVE ANY DAMAGED OR CONTAMINATED PORTIONS OF CABLE.
- TRAIN CABLES INTO FINAL POSITION WITH ENDS OVERLAPPING C/L BY 150mm.
- TIGHTLY TWIST CONCENTRIC NEUTRAL WIRES INTO A BUNDLED CONDUCTOR FOR APPROXIMATELY 250mm AND TEMPORARILY FOLD BACK.
- CUT OFF APPROXIMATELY 100mm OF CABLE FROM EACH END.
- PROCEED TO STEP 2.

2. SELECT APPROPRIATE SLEEVE AND DIE ACCORDING TO DRAWING CD210-21.

3. SELECT SPLICING METHOD (FOR CORRECT MANUFACTURED SPLICES, REFER TO TABLE ON SHEET 2 of 3).

NOTE:

FOR SPLICING BARE COPPER NEUTRAL WIRE TO INSULATED ALUMINUM CABLE, REFER TO DRAWING CD215-13.

4. REMOVE JACKET AND INSULATION FROM CABLES AS PER FIGURE 1 OR FOLLOW MANUFACTURERS INSTRUCTIONS; BE CAREFUL NOT TO NICK INSULATION OR CONDUCTOR.

5. CLEAN CONDUCTOR WITH WIRE BRUSH. INSTALL CONNECTOR.

NOTE:

EXCEPT FOR TAPED SPLICE, SLIDE TUBING OVER ONE CONDUCTOR BEFORE INSTALLING CONNECTOR.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 17-10-11	17-10	3	REMOVED RAYCHEM RAYVOLVE SPLICING, RESEALED	SPLICES FOR UNDERGROUND SECONDARY CABLES	
	96-05	2	NOTES REVISED, SHEET 3 ADDED		
	95-01	1	NOTES 3, 7 & TABLE ADDED		
DRAWN C.A.	CHECKED K.S.	DATE 17-10		CD 215-12	
				SHT 0001 OF 3	REV 03

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6. CLEAN JACKET (50mm), INSULATION, AND CONNECTOR WITH AN APPROVED CLEANING SOLVENT (S.C.# 43 11 95).

7. COMPLETE SELECTED SPLICE (AS CHOSEN IN STEP 3).

NOTE:

TO COMPLETE #4 CONCENTRIC NEUTRAL SPLICE, PROCEED TO STEP 8.

8. FOR #4 CONCENTRIC NEUTRAL CABLE: (CONT'D)

a) APPLY 1 LAYER OF 1/4 STRETCHED 50mm WIDE RUBBER MASTIC TAPE (S.C.#78 55 28) OVER CENTRE OF COMPLETED SPLICE.

b) TRAIN TWISTED CONCENTRIC NEUTRAL WIRE (STEP 1b) INTO FINAL POSITION ALLOWING ADEQUATE CLEARANCE FOR MD6 PRESS.

c) PLACE "C" TYPE COMPRESSION CONNECTOR OVER TWISTED WIRES AND CRIMP. REFER TO DRAWING CD210-24.

d) TRIM OFF PROTRUDING WIRES AND COMPRESS WITH PLIERS ELIMINATING ANY SHARP ENDS.

e) APPLY A 100mm STRIP OF 50mm WIDE RUBBER MASTIC TAPE OVER CONNECTOR AND PROTRUDING WIRES.

NOTE:

SHINY SIDE AGAINST CONNECTOR AND THE 100mm LENGTH PARALLEL TO CONNECTOR AND WIRE.

f) FORM TAPED CONCENTRIC NEUTRAL CONNECTION AND WIRES AROUND SPLICE AND CABLE.

g) APPLY 2 LAYERS 3/4 STRETCHED COLD WEATHER VINYL TAPE (S.C.#78 55 98) OVER TAPED CONCENTRIC NEUTRAL CONNECTION AND SPLICE, APPROXIMATELY 50mm WIDE.

MANUFACTURED SPLICES FOR SECONDARY CABLES		
CONDUCTOR SIZE	TYPE OF SPLICE	STORES CODE
#4 TO 1/0	PRESTRETCHED	85 13 10
4/0 TO 350	PRESTRETCHED	85 13 40
	HEAT SHRINK	85 13 50

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 17-10-11	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
	17-08	4	SPLICES FOR UNDERGROUND SECONDARY CABLES	
	15-02	3		
08-03	2			
DRAWN C.A.	CHECKED K.S.	DATE 17-08	CD 215-12	
			SHT 0002 OF 3	REV 04

FOR TAPED SPLICE

TAPES SHALL ONLY BE APPLIED DIRECTLY FROM ROLL ONTO SPLICE, HALF LAPPED AND STRETCHED TO 3/4 OF THEIR ORIGINAL WIDTH.

1. APPLY 3 LAYERS OF SELF-AMALGAMATING ETHYLENE PROPYLENE RUBBER (E.P.R.) TAPE (S.C.#78 55 23) AS PER FIGURE 2.
2. APPLY 2 LAYERS OF COLD WEATHER VINYL TAPE (S.C.#78 55 98) AS PER FIGURE 2.

OR

APPLY 3 LAYERS OF SELF-AMALGAMATING HIGH TEMPERATURE SILICONE TAPE (S.C.#03 74 67). VINYL TAPE IS NOT REQUIRED.

NOTE:
DIMENSIONS SHOWN ARE MILLIMETRES.

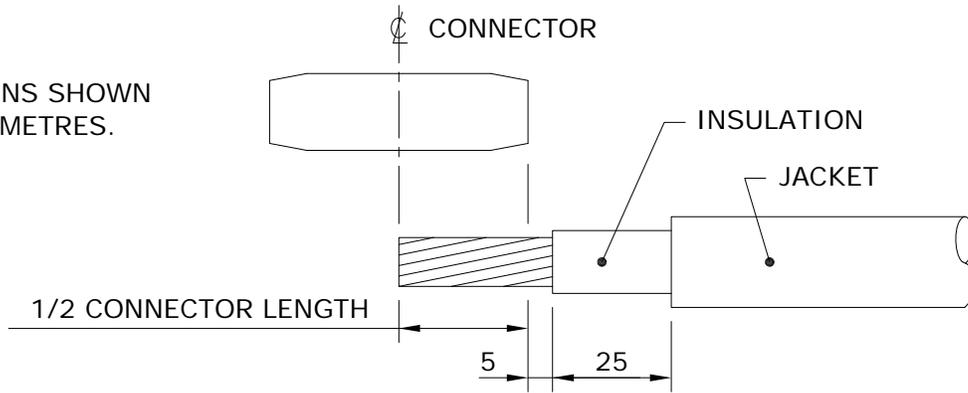


FIGURE 1

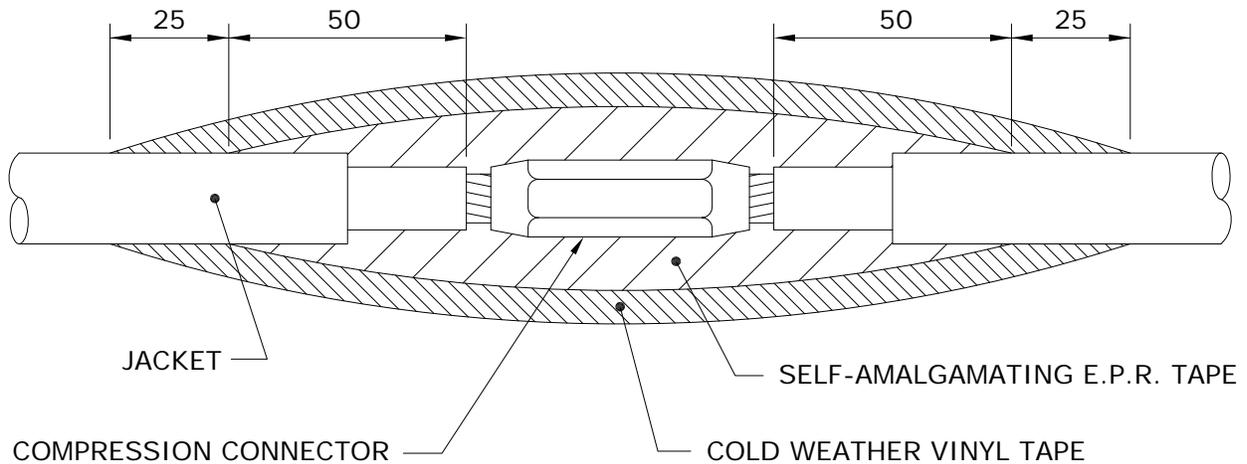


FIGURE 2

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 97-01-08

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 17-10-11				SPLICES FOR UNDERGROUND SECONDARY CABLES		
		17-10	2			RESEALED
		10-12	1			REVISED COMPRESSION CONNECTOR AND NOTE 2
DRAWN C.A.	CHECKED K.S.	DATE 17-10		CD 215-12		
						SHT 0003 OF 3

CABLE PREPARATION:

- ① REMOVE PVC (POLYVINYL CHLORIDE) JACKET TO DIMENSION "A" PLUS 25mm.
- ② REMOVE POLYETHYLENE INSULATION TO DIMENSION "A" PLUS 5mm.
USE ABRASIVE TAPE (SC. 78 50 04) ON ALL CONNECTON SURFACES.
- ③ INSTALL ROD CONNECTOR AS PER TABLE BELOW AND FIGURE 1.

CONDUCTOR SIZE	* ROD CONNECTOR STORES CODE No.	PRESS	DIE
1/0 ALUMINUM	74 27 62	Y35/MD6	CSA 22
4/0 ALUMINUM	74 27 69	Y35/MD6	CSA 24

* ROD IS FACTORY CRIMPED INTO CONNECTOR

- ④ CONNECT BARE COPPER STRANDED WIRE TO ROD CONNECTOR AS PER TABLE BELOW. USE ABRASIVE TAPE ON ALL CONNECTON SURFACES.

CONDUCTOR SIZE	CONNECTOR STORES CODE No.	PRESS	DIE
COPPER ROD TO #4 COPPER STRANDED	74 40 90	Y35/MD6	WBG
COPPER ROD TO #2 COPPER STRANDED	74 40 70	MD6	WC

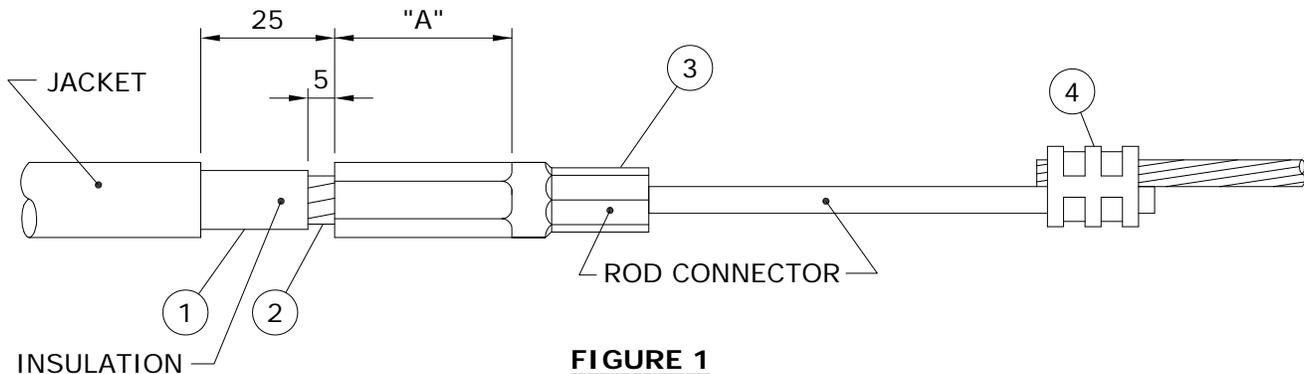


FIGURE 1

NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

APPROVED	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03			SPLICING SECONDARY NEUTRAL (BARE COPPER TO INSULATED ALUMINUM)		
	08-11	2			REVISED TABLE AND COMPRESSION CONNECTOR
	94-10	1			ROD CONNECTOR ADDED
DRAWN W.B./CAD	CHECKED B.H./K.C.H.	DATE 94-06	CD 215-13		
			SHT 0001 OF 2	REV 02	

TAPING:

- 5 ABRASE ROD PORTION OF ROD CONNECTOR WITH ABRASIVE TAPE AS SHOWN IN FIGURE 2.
- 6 CLEAN JACKET, INSULATION & ROD CONNECTOR WITH AN APPROVED CLEANING SOLVENT (S.C.# 43 11 95).
- 7 CUT ONE PIECE OF RUBBER MASTIC TAPE (S.C. 78 55 28) INTO EITHER A 50mm WIDE x 75mm LONG STRIP FOR 1/0 CONNECTOR OR A 50mm WIDE x 125mm LONG STRIP FOR 4/0 CONNECTOR.
- 8 APPLY THE PRECUT STRIP OF RUBBER MASTIC TAPE 1/4 STRETCHED, SHINING SIDE DOWN ONTO THE ROD AS SHOWN IN FIGURE 2.
- 9 APPLY 2 LAYERS OF HALF LAPPED 3/4 STRETCHED SELF AMALGAMATING ETHYLENE PROPYLENE RUBBER TAPE (S.C.# 78 55 23) AS SHOWN IN FIGURE 2.
- 10 APPLY 2 LAYERS OF HALF LAPPED 3/4 STRETCHED COLD WEATHER VINYL TAPE (S.C.# 78 55 98) AS SHOWN IN FIGURE 2.

NOTE:

WHEN INSTALLING A MANUFACTURED SPLICE INCLUDE STEPS 5 THRU 8 WITH THE MANUFACTURERS INSTRUCTIONS. THIS WILL PROVIDE THE PROPER INSULATION AND MOISTURE SEAL.

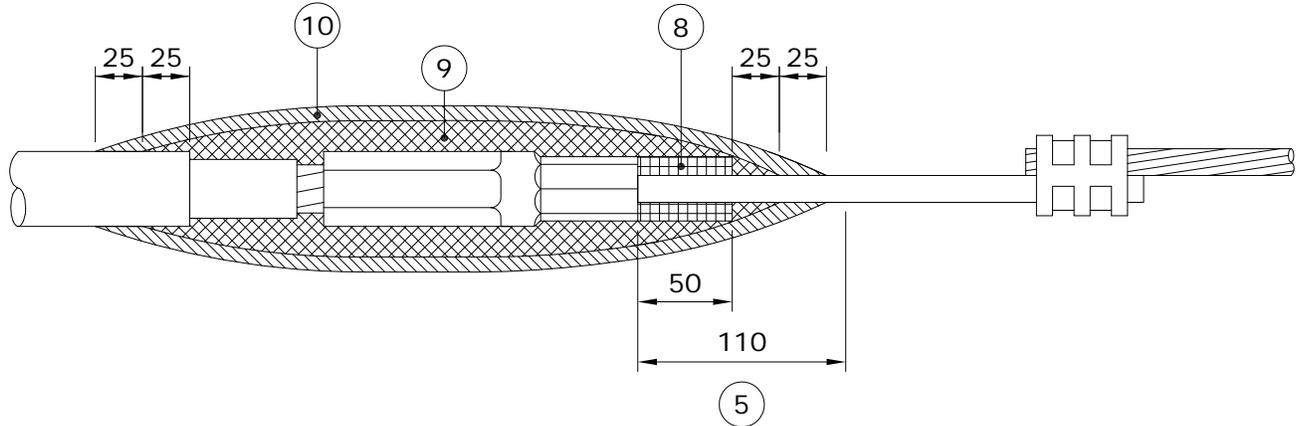
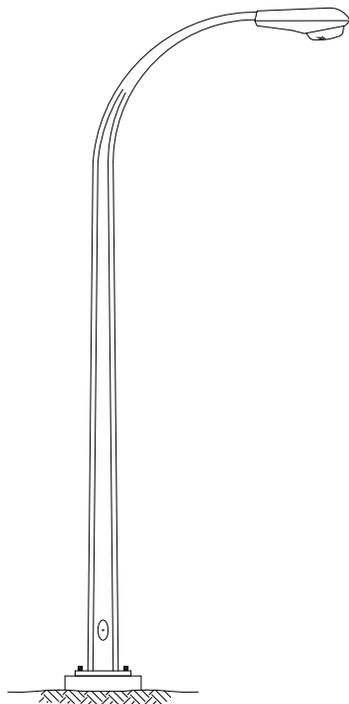


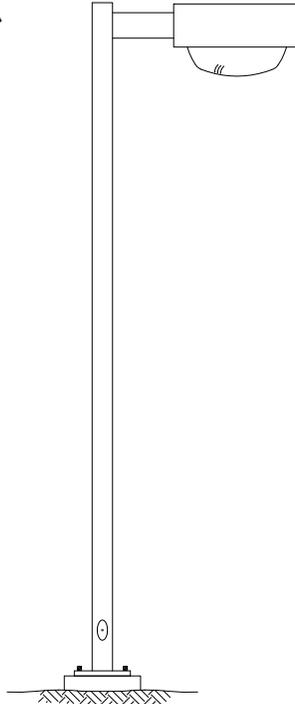
FIGURE 2

NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

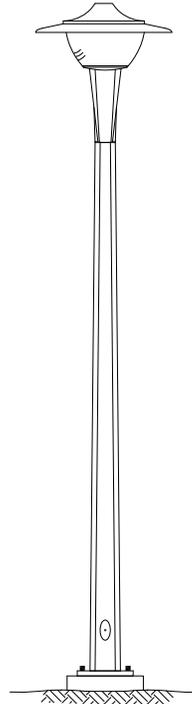
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03				SPLICING SECONDARY NEUTRAL (BARE COPPER TO INSULATED ALUMINUM)		
		08-11	2			REVISED NOTE 6 & COMPRESSION CONNECTOR
		94-10	1			TAPING PROCEDURE REVISED
DRAWN W.B./CAD	CHECKED K.C.H.	DATE 94-06	CD 215-13		SHT 0002 OF 2	
					REV 02	



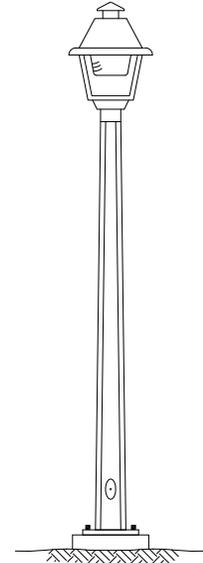
DAVIT BM
(BASE MOUNTED)



SQUARE BM
(BASE MOUNTED)



**POST-TOP
CONTEMPORARY BM**
(BASE MOUNTED)



**POST-TOP
COLONIAL BM**
(BASE MOUNTED)

POLE TYPE	COLOUR	MOUNTING HEIGHT m (ft)	ARM REACH m	BOLT SQUARE mm	BOLT CIRCLE mm	STORES CODE NO.	CABLE LENGTH m **
DAVIT BM	GALVANIZED	7.7 (25)	1.8	179	254	75 42 26	11
DAVIT BM *	GALVANIZED	9.1 (30)	2.4	197	279	75 43 30	13
DAVIT BM	GALVANIZED	10.7 (35)	3.0	206	292	75 44 36	15
DAVIT BM	GALVANIZED	13.7 (45)	3.0	243	343	75 46 45	18
SQUARE BM	DARK BRONZE	6.1 (20)	0.5	179	254	75 42 20	8
SQUARE BM	DARK BRONZE	10.7 (35)	0.5	206	292	75 45 30	14
POST-TOP BM CONTEMPORARY	GALVANIZED	6.1 (20)	N/A	179	254	75 41 22	7
POST-TOP BM COLONIAL	GALVANIZED	4.7 (15)	N/A	179	254	75 41 15	6

NOTES:

* FOR REPLACEMENT PURPOSES; NOT TO BE USED FOR NEW INSTALLATIONS.

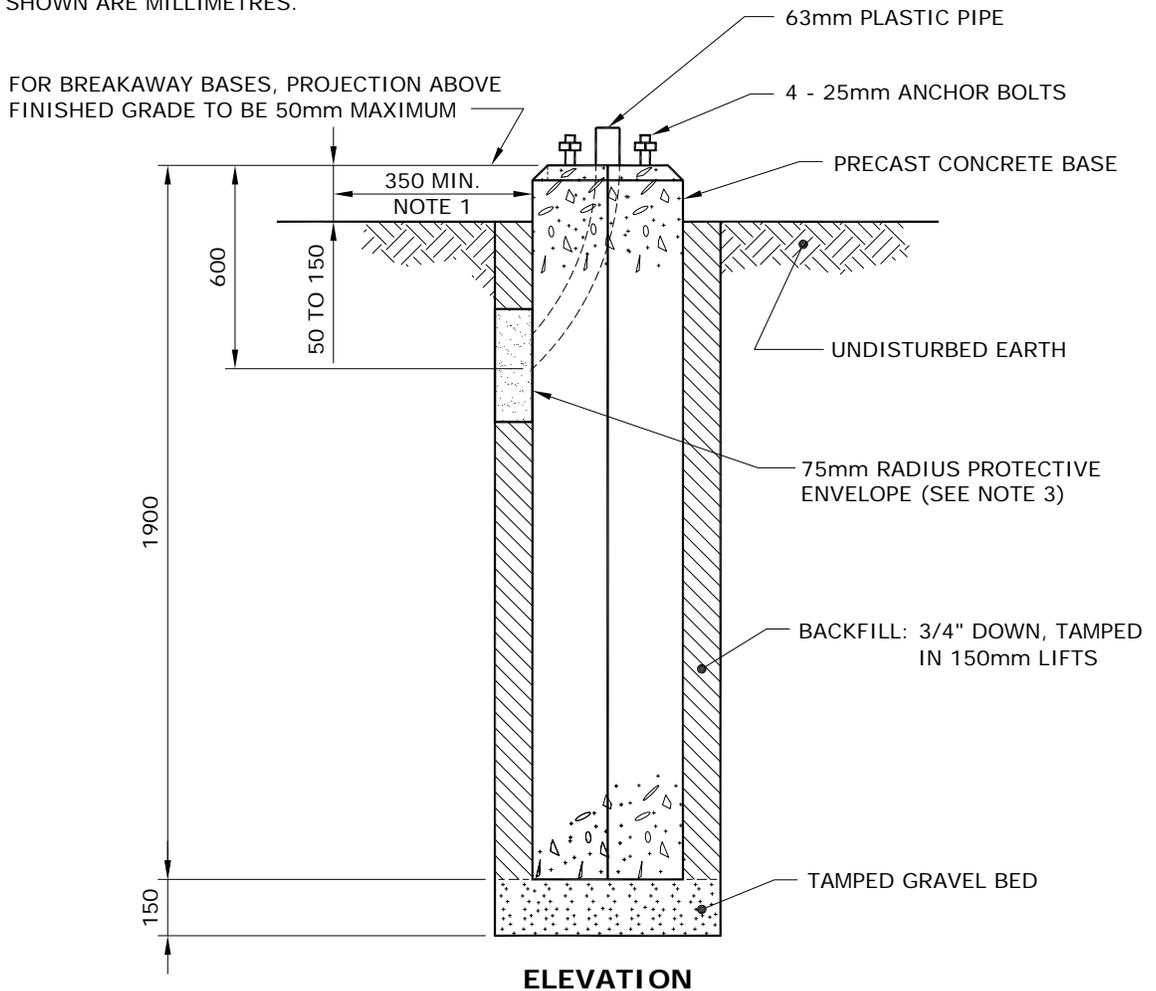
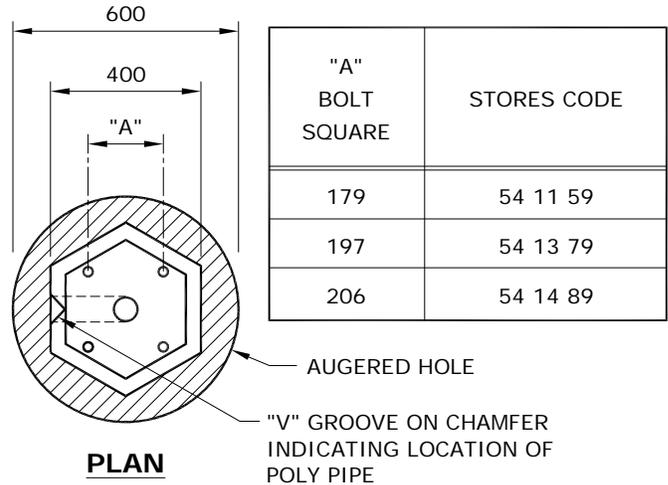
** LENGTH OF 2 CONDUCTORS #12 CABLE REQUIRED PER POLE.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	13-01	3	ADDED CONTEMPORARY AND COLONIAL POLES	STANDARD STEEL STREET LIGHT POLES			
	12-05	2	REVISED DRAWING & CANCELLED SHEETS 2 AND 3				
	94-09	1	DELETED ORNAMENTAL				
DRAWN W.B./CAD	CHECKED L.D./D.O.	DATE 88-06	CD 300-1		SHT	REV	
					0001 OF 1	03	

7.7 - 10.7 STREET LIGHT POLES

NOTES:

1. FOR FUTURE ACCESS TO LOWER PORTION OF PLASTIC PIPE, LOCATE "V" GROOVE SIDE OF BASE TO ROADWAY PROVIDED THAT:
 - a) A MIN. HORIZONTAL SEPARATION OF 350mm IS MAINTAINED TO ANY PAVED SURFACE OR STRUCTURE; OR
 - b) IF LESS THAN 350mm, ROTATE BASE 90°
2. ROUTE UNDERGROUND CABLES DIRECTLY INTO PLASTIC PIPE.
3. IN BACKFILL AREA, ENCASE UNDERGROUND CABLES IN A 75mm RADIUS ENVELOPE OF EXCAVATED MATERIAL OR SAND TO PROTECT CABLES. DO NOT BACKFILL WITH EXCAVATED MATERIAL OR SAND MORE THAN 1/6 OF THE WAY AROUND BASE.
4. SEE CD300-9 FOR ANCHOR ROD TIGHTENING METHOD.
5. DIMENSIONS SHOWN ARE MILLIMETRES.

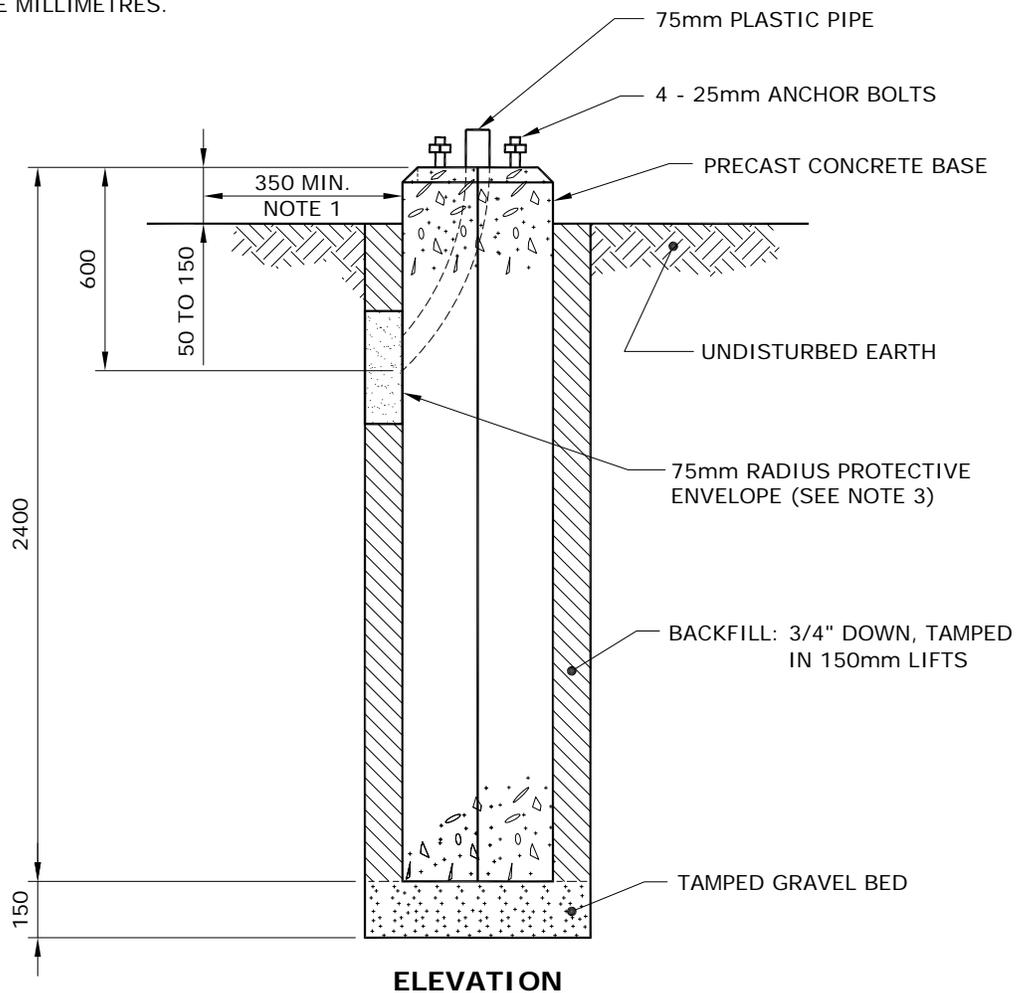
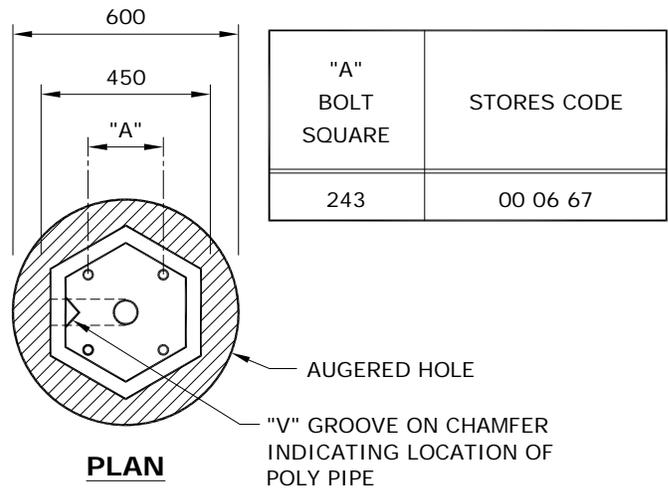


APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-29	10-08	3	CHANGED BACKFILL NOTES, AND ADDED SHEET 3	INSTALLATION OF PRECAST CONCRETE BASE			
	99-05	2	SHEET 2 of 2 ADDED, 7.7 - 10.7 STREET LIGHT ADDED				
	96-10	1	V-GROOVE LOCATION, POLY PIPE SIZE NOTES CHANGED				
DRAWN W.B./CAD	CHECKED L.D./K.C.H.	DATE 88-06	CD 300-6			SHT 0001 OF 3	REV 03

13.7 STREET LIGHT POLE

NOTES:

1. FOR FUTURE ACCESS TO LOWER PORTION OF PLASTIC PIPE, LOCATE "V" GROOVE SIDE OF BASE TO ROADWAY PROVIDED THAT:
 - a) A MIN. HORIZONTAL SEPARATION OF 350mm IS MAINTAINED TO ANY PAVED SURFACE OR STRUCTURE; OR
 - b) IF LESS THAN 350mm, ROTATE BASE 90°
2. ROUTE UNDERGROUND CABLES DIRECTLY INTO PLASTIC PIPE.
3. IN BACKFILL AREA, ENCASE UNDERGROUND CABLES IN A 75mm RADIUS ENVELOPE OF EXCAVATED MATERIAL OR SAND TO PROTECT CABLES. DO NOT BACKFILL WITH EXCAVATED MATERIAL OR SAND MORE THAN 1/6 OF THE WAY AROUND BASE.
4. SEE CD300-9 FOR ANCHOR ROD TIGHTENING METHOD.
5. DIMENSIONS SHOWN ARE MILLIMETRES.



APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-29		INSTALLATION OF PRECAST CONCRETE BASE	
	10-08 1 CHANGED BACKFILL NOTES, AND ADDED SHEET 3		
DRAWN R.L.B./CAD	CHECKED L.D./K.C.H.	DATE 99-05	CD 300-6
			SHT 0002 OF 3
			REV 01

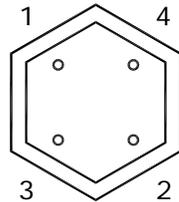
TO DEVELOP THE REQUIRED TENSION ON ANCHOR RODS, THE TURN-OF-NUT METHOD IS USED.

TURN-OF-NUT

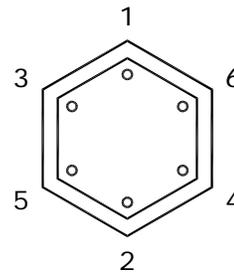
1. ENSURE ALL ANCHOR RODS AND NUTS ARE FREE OF DEBRIS AND THAT THE ANCHOR RODS ARE LUBRICATED.
2. PLACE POLE ONTO CONCRETE PILE, INSTALL WASHERS AND NUTS AND TIGHTEN UNTIL DEVELOPING A SNUG-TIGHTENED CONNECTION.

SNUG-TIGHTENED: THE TIGHTNESS THAT IS ATTAINED AFTER A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL FORCE OF A WORKER USING AN ORDINARY ONE FOOT LONG WRENCH.

3. TIGHTENING OF THE BOLTS MUST BE PERFORMED IN A MANNER THAT BRINGS THE FAYING SURFACES UP "EVENLY" AS PER THE STAR PATTERN TIGHTENING SEQUENCE.



FOUR ANCHOR BOLT PATTERN
(13.7m AND BELOW)



SIX ANCHOR BOLT PATTERN
(16.8m AND 19.8m)

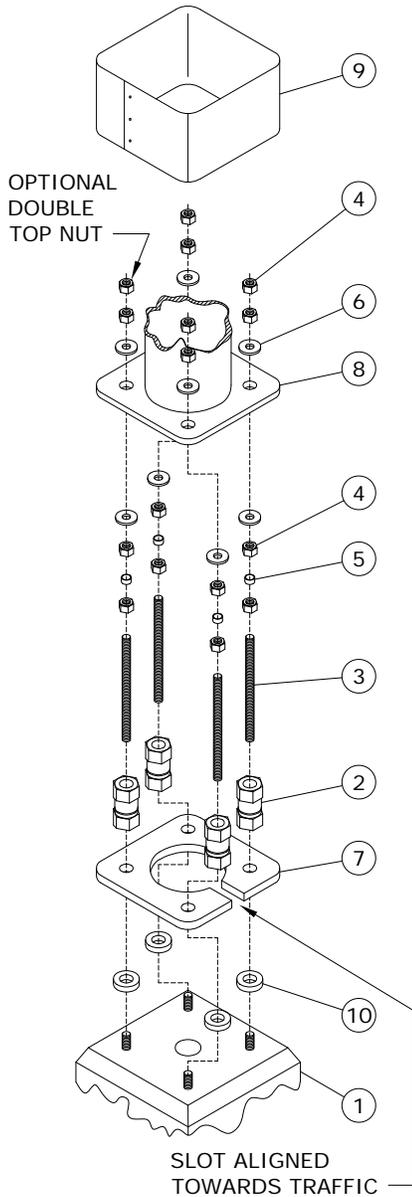
4. ENSURE THE POLE IS PLUMB AND ADD LEVELING SHIMS IF REQUIRED. SNUG-TIGHTEN THE ANCHOR BOLTS AGAIN.
5. BEVELED WASHERS ARE REQUIRED IF THE NUT CANNOT BE BROUGHT INTO FIRM CONTACT WITH THE BASE PLATE.
6. MARK THE REFERENCE LOCATION OF THE NUT AFTER SNUG-TIGHTENING THE PLUMB POLE.
7. FINAL TIGHTENING OF NUTS IS PERFORMED IN INCREMENTS AS PER THE STAR PATTERN, WITH A MINIMUM OF TWO FULL TIGHTENING CYCLES. PROPER TENSIONING IS ACHIEVED WHEN THE NUT IS ROTATED 1/3 OF A TURN BEYOND SNUG-TIGHT. THE TOLERANCE FOR THIS IS PLUS 20°.

APPROVED	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY K.C. HAMILTON 10-08-13			METHOD FOR ANCHOR ROD TIGHTENING	
DRAWN C.A.	CHECKED L.D.	DATE 10-08	CD 300-9	
			SHT 0001 OF 1	REV 00

THE FOLLOWING INSTALLATION INSTRUCTIONS ARE APPLICABLE TO NEW OR EXISTING BREAKAWAY BASE INSTALLATIONS ON CONCRETE BASES.

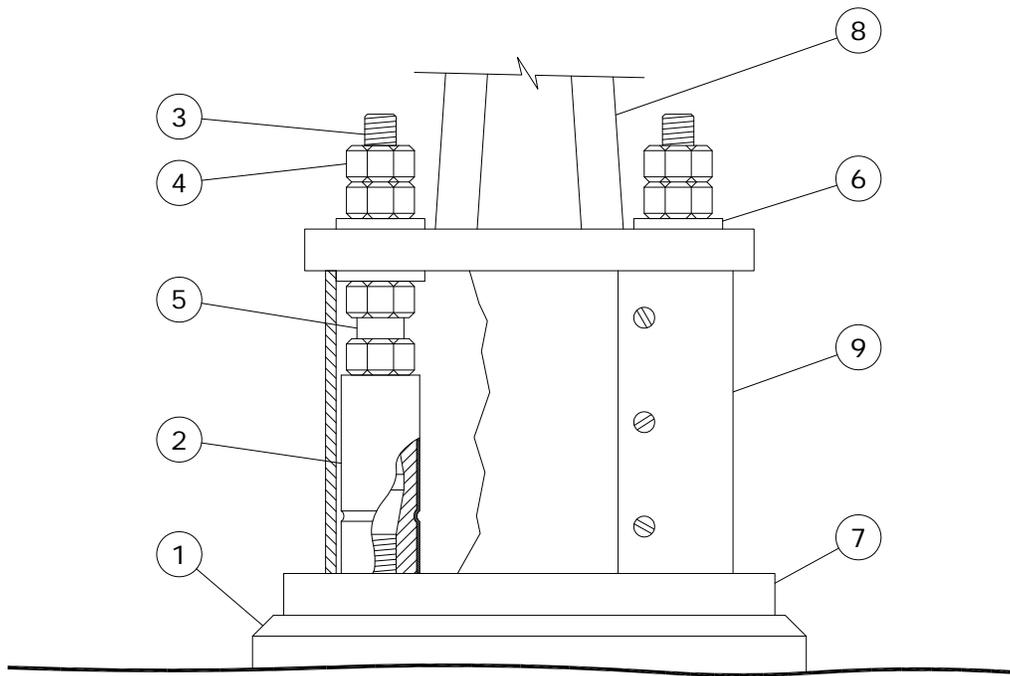
PROCEDURE:

1. CLEAN THE TOP SURFACE OF THE CONCRETE BASE AND ENSURE SURFACE IS FLAT AND LEVEL WITH NO SPALLING OR OTHER SURFACE CONDITIONS THAT MAY AFFECT THE PERFORMANCE OF THE COUPLERS.
 2. THE PREFERRED MAXIMUM HEIGHT ABOVE LEVEL GRADE TO THE BASE OF THE COUPLER IS 50mm OR LESS. THIS PROVIDES THE RECOMMENDED CLEARANCE IN THE EVENT OF A COLLISION WITH THE STRUCTURE.
 3. MEASURE THE HEIGHT OF THE THREADED ANCHOR BOLTS ABOVE THE REACTION PLATE AND VERIFY THIS MEASUREMENT IS BETWEEN 1 1/4" AND 1 5/8".
 4. IF THE EXPOSED LENGTH OF THE ANCHOR BOLT IS GREATER THAN THE RECOMMENDED LENGTH, OPTIONAL SPACERS MAY BE USED (ITEM 10).
 5. IT IS RECOMMENDED THAT THE THREADED ANCHOR BOLT-COUPLER CONNECTION BE COATED WITH RUST-INHIBITING GREASE. THIS WILL FACILITATE REMOVAL OF THE COUPLER WHEN IT IS NECESSARY. A SUITABLE PRODUCT FOR THIS APPLICATION IS ARCAN 1, A WHITE, WATER RESISTANT GREASE MARKETED BY IMPERIAL OIL LTD.
 6. THREAD THE COUPLER ASSEMBLY ON EACH ANCHOR BOLT (IF THE COUPLER ASSEMBLY UPPER STUD BECOMES LOOSE AS A RESULT OF HANDLING, ENSURE THAT THE STUD IS ENGAGED AT LEAST 38mm, BUT NOT MORE THAN 44mm IN THE COUPLER BEFORE LOCKING WITH THE LOCK NUT.)
 7. SNUG UP EACH COUPLER AGAINST THE CONCRETE BASE. TIGHTEN EACH COUPLER ALTERNATELY AND INCREMENTALLY, BY MEANS OF A WRENCH OR A PIPE WRENCH ON THE BOTTOM HEX OF THE COUPLER. USE THE TURN-OF-NUT METHOD AS PER CD300-9.
- NOTE: TIGHTENING THE COUPLER ON THE TOP HEX MAY WEAKEN THE COUPLER AT THE MACHINED GROOVE AND MAKE THE COUPLER UNUSEABLE.**
8. BRING THE LEVELING NUTS (AND HENCE, THE LOWER WASHERS) INTO A LEVEL PLANE AS DESIRED MAKING CERTAIN THAT AT LEAST ONE PLASTIC SPACER REMAINS IN CONTACT WITH ITS LEVELING NUT AND ITS LOCK NUT.
 9. PLACE THE POLE BASE OVER THE PROTRUDING STUDS, AND SECURE THE POLE WITH THE UPPER WASHERS AND RETAINING NUTS.
 10. WITH THE POLE IN THE REQUIRED VERTICAL ORIENTATION, AND BEFORE FINAL TIGHTENING, ENSURE THAT ALL LEVELING NUTS, RETAINING NUTS AND UPPER AND LOWER WASHERS ARE MADE SNUG AGAINST THE POLE BASE PLATE.
 11. TIGHTEN THE RETAINING NUTS WITH THE TURN-OF-NUT METHOD AS PER CD300-9.
 12. MAKE THE NECESSARY WIRING CONNECTIONS, AND INSTALL THE PROTECTIVE SHROUD.



SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY D.R. ORR 16-06-27	16-06	4	CORRECTED TYPO, RESEALED	BREAKAWAY BASE INSTALLATION	
	10-08	3	UPDATED STANDARD, REVISED TITLE, AND ADDED SHEET 2		
	07-06	2	REVISED NOTE 4 AND ADDED NOTE 5		
DRAWN C.A.	CHECKED L.D.	DATE 16-06		CD 300-10	
				SHT 0001 OF 2	REV 04



BILL OF MATERIAL

ITEM NO.	DESCRIPTION	QUANTITY
1	CONCRETE BASE	1
2	COUPLING	4
3	1" - 8 UNC GALV. STUD	4
4	1" - 8 UNC GALV. HEAVY HEX NUT	16
5	SPACER	4
6	1" GALV. FLAT WASHER	8
7	REACTION PLATE	1
8	POLE	1
9	SHROUD ASSEMBLY	1
10	GALV. SHIM	4

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY K.C. HAMILTON 10-08-13				BREAKAWAY BASE INSTALLATION					
DRAWN C.A.	CHECKED L.D.	DATE 10-08	CD 300-10		<table border="1"> <tr> <td>SHT</td> <td>REV</td> </tr> <tr> <td>0002 OF 2</td> <td>00</td> </tr> </table>	SHT	REV	0002 OF 2	00
SHT	REV								
0002 OF 2	00								

STREET LIGHT POLES *

POLE TYPE	MOUNTING HEIGHT m (ft)	MATERIAL	WEIGHT *, ** kg (±10%)
STRAIGHT SHAFT	10.7 (35)	ALUMINUM	91
DAVIT (DB)	11.3 (37)	CONCRETE	998
DAVIT (DB)	13.7 (45)	CONCRETE	1087
POST TOP (DB)	6.1 (20)	CONCRETE	544
DAVIT	7.7 (25)	STEEL	97
DAVIT	9.1 (30)	STEEL	125
DAVIT	10.7 (35)	STEEL	157
DAVIT	13.7 (45)	STEEL	219
DAVIT	16.8 (55)	STEEL	330
DAVIT	19.8 (65)	STEEL	428
POST TOP	4.7 (15)	STEEL	53
POST TOP	6.1 (20)	STEEL	68
STRAIGHT SHAFT	7.7 (25)	STEEL	90
STRAIGHT SHAFT	9.1 (30)	STEEL	113
STRAIGHT SHAFT	10.7 (35)	STEEL	172
STRAIGHT SHAFT	13.7 (45)	STEEL	220
STRAIGHT SHAFT	16.8 (55)	STEEL	388
STRAIGHT SHAFT	19.8 (65)	STEEL	557

* ALL POLES ARE BASE MOUNTED EXCEPT CONCRETE.

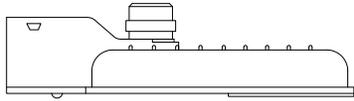
** WEIGHTS DO NOT INCLUDE ARMS OR LUMINAIRES.

*** WEIGHTS GATHERED FROM MANUFACTURER'S DRAWING.

BASES

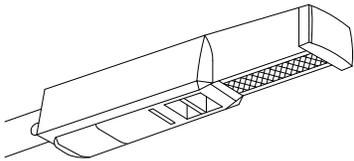
TYPE	WEIGHT kg (±10%)
179	605
197	605
206	605
243	970
418	2151

APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY D.R. ORR 16-01-14		RIGGING WEIGHTS OF STREET LIGHT COMPONENTS		
	18-04	1	UPDATED TABLES	
DRAWN C.A.	CHECKED J.R.	DATE 16-01	CD 300-18	
			SHT 0001 OF 1	REV 01



LED ROADWAY LUMINAIRE

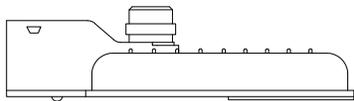
LED ROADWAY LUMINAIRES			
LUMINAIRE WATTAGE (NOMINAL)	REPLACES (HPS)	CIIC	
		GREY	BLACK
40 W LED	70 W HPS	05 15 44	05 15 71
60 W LED	100 W HPS	05 15 45	05 15 73
90 W LED	150 W HPS	05 15 47	05 15 74
150 W LED	250 W HPS	05 15 48	05 15 75
240 W LED	400 W HPS	05 15 49	05 15 76



LED LANE LUMINAIRE

LED LANE LUMINAIRES		
LUMINAIRE WATTAGE (NOMINAL)	REPLACES (HPS)	CIIC
50 W LED	70 W HPS	05 15 50

LED LANE LUMINAIRES ARE AVAILABLE WITH GREY COATING ONLY.



LED DUSK-TO-DAWN LUMINAIRE

LED DUSK-TO-DAWN (AREA) LUMINAIRES		
LUMINAIRE WATTAGE (NOMINAL)	REPLACES (HPS)	CIIC
60 W LED	100 W HPS	05 15 51
90 W LED	150 W HPS	05 15 52

LED DUSK-TO-DAWN LUMINAIRES ARE AVAILABLE WITH GREY COATING ONLY.

- ALL LED LUMINAIRES AUTOMATICALLY ADJUST FOR EITHER A 120V OR 240V SUPPLY.
- ALL LED LUMINAIRES COME WITH A PHOTOCCELL RECEPTACLE.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY D.R. ORR 15-02-11		16-12 1 REVISED NOTES		STANDARD LED LUMINAIRES	
		DATE 15-02		CD 300-24	
				SHT 0001 OF 2	
				REV 01	

TRENCH AND PLOW-IN LOCATION

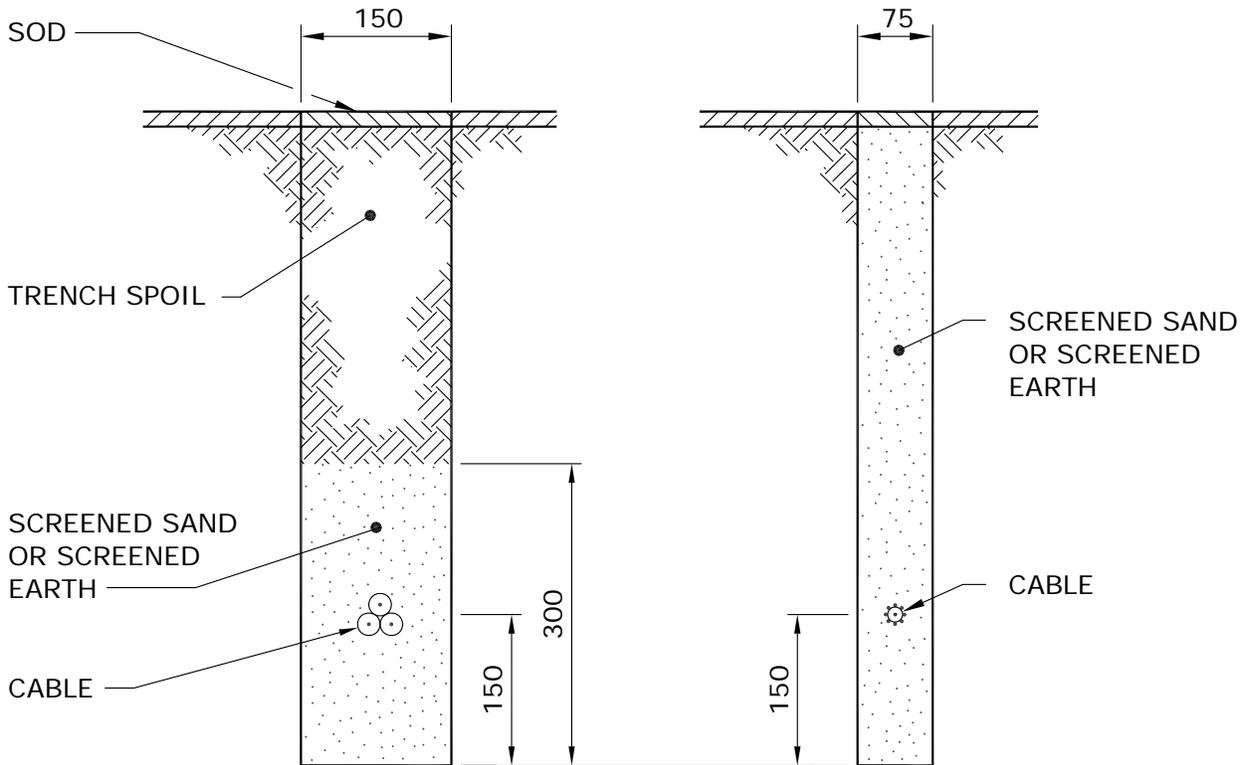
GENERALLY, THE TRENCH LOCATION WILL DICTATE THE LOCATION OF THE LIGHT STANDARDS. CONTACT SHALL BE MADE WITH THE GOVERNING MUNICIPAL AUTHORITY TO DETERMINE THEIR SET BACK REQUIREMENTS. CONTACT SHALL ALSO BE MADE WITH THE CITY OF WINNIPEG UNDERGROUND STRUCTURES OR THE INDIVIDUAL UTILITIES OUTSIDE WINNIPEG TO DETERMINE THE EXISTENCE AND EXACT LOCATION OF OTHER UTILITIES PLANT. THIS INFORMATION WILL BE INCLUDED ON THE WORK ORDER PLANS.

DEPTH OF BURIAL

THE CABLE SHALL BE BURIED BELOW THE SURFACE OF THE EARTH A MINIMUM OF 600mm IN SODDED AREAS AND 1000mm IN ROADWAYS.

TRENCH DETAILS

TYPICAL TRENCH DETAILS FOR SODDED AREAS ARE SHOWN BELOW, FOR TRENCH DETAILS UNDER ROADWAYS REFER TO DRAWING CD205-14. SEE NOTES ON SHEET 2 of 2.



NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	96-01	3	ROADWAY DEPTH ADDED	PLOWING AND TRENCHING DETAILS FOR UNDERGROUND STREET LIGHT CIRCUITS	
	95-09	2	BURIAL DEPTH NOTE ADDED		
	94-04	1	COMBINED WITH DWG. CD305-2		
DRAWN W.B./CAD	CHECKED	DATE 88-07	CD 305-1		SHT 0001 OF 2
					REV 03

NOTES:

1. FOR TYPICAL TRENCH DETAIL INSTALLATION UNDER ROADWAYS, REFER TO DRAWING CD205-14.
2. THESE ARE ALTERNATIVE TRENCH WIDTHS. A 75mm TRENCH IS PREFERABLE WHERE THE GROUND IS FIRM AND A CLEAN CUT CAN BE MADE. A 150mm TRENCH IS PREFERABLE WHERE THE GROUND IS TOO LOOSE TO MAINTAIN A FIRM TRENCH WALL.
3. THE CABLES INDICATED IN THE VIEWS CAN BE USED IN EITHER TRENCH.
4. THE 75mm TRENCH SHALL BE BACKFILLED WITH SCREENED SAND OR SCREENED EARTH.
5. THE 150mm TRENCH SHALL BE BACKFILLED WITH THE TRENCH SPOIL IF IT IS FREE FROM ROCKS OR DEBRIS. IF THE TRENCH SPOIL CONTAINS ROCKS OR DEBRIS, SCREENED SAND OR SCREENED EARTH SHALL BE INSTALLED AS SHOWN.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				PLOWING AND TRENCHING DETAILS FOR UNDERGROUND STREET LIGHT CIRCUITS		
		96-01	2			NOTES REVISED
		94-04	1			COMBINED WITH DWG. CD305-2
DRAWN W.B./CAD	CHECKED	DATE 88-07	CD 305-1		SHT 0002 OF 2	
					REV 02	

1. **GENERAL**

PLOWED-IN CABLES SHALL BE PULLED TO 1m ABOVE GRADE AT EACH STREET LIGHT STANDARD LOCATION. THE CABLE DEPTH SHALL BE MAINTAINED AT THE 600mm PLOW DEPTH AS CLOSE AS POSSIBLE TO THE STREET LIGHT STANDARD LOCATION BEFORE RAISING THE PLOW. THE PLOW SHALL BE RETURNED TO THE 600mm PLOW DEPTH AS CLOSE AS POSSIBLE TO THE CENTRE LINE OF THE STREET LIGHT STANDARD LOCATION.

CABLES LAID IN TRENCHES SHALL HAVE SUFFICIENT SLACK TO ALLOW FOR FUTURE MOVEMENT OR SETTLING OF THE TRENCH FLOOR. CABLES SHALL PROJECT 1m ABOVE GRADE AT EACH LOCATION.

2. **USE OF POLYETHYLENE PIPE**

2.1 WHERE CABLES ARE INSTALLED UNDER EXISTING PAVEMENT, POLYETHYLENE PIPE SHALL BE INSTALLED TO PROTECT THE CABLES IF THE HOLE IS AUGERED OR PUSHED THROUGH MATERIAL CONTAINING ROCKS, STONES, OR DEBRIS.

2.2 AT THE JUNCTION OF THE MAIN TRENCH AND THE STREET OR DRIVEWAY CROSSING, THE BOTTOM OF THE TRENCH SHALL BE BACKFILLED AND TAMPED TO THE LEVEL OF THE POLYETHYLENE PIPES TO PREVENT SHARP BENDS IN THE CABLE AND TRAPPING OF WATER IN THE PIPE.

3. **SPLICES - UNDERGROUND CABLES**

UNDERGROUND STREET LIGHT CABLES (i.e. #4 ALUMINUM CONCENTRIC NEUTRAL CABLE AND 1/0 TRIPLEXED CABLE) ARE TO BE SPLICED USING AN APPROPRIATE COMPRESSION SLEEVE (SEE DRAWING CD210-21) AND THE SPLICE IS TO BE INSULATED USING ONE OF THE FOLLOWING METHODS:

- 1) RAYCHEM RAYVOLVE SPLICE
- 2) PRE-STRETCHED INSULATING TUBING SPLICE
- 3) HEAT SHRINK INSULATING TUBING SPLICE
- 4) TAPED SPLICE

FOR COMPLETE INSTRUCTIONS REGARDING THE ABOVE SPLICES, REFER TO DRAWING CD215-12.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28		94-04 1		DWG. REFERENCE CHANGED			
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-07	CD 310-1			SHT	REV
						0001 OF 2	01

4. **CABLE END CAPS**

STREET LIGHT CABLES WHICH ARE NOT GOING TO BE SPLICED OR TERMINATED IMMEDIATELY FOLLOWING INSTALLATION SHALL BE CUT SQUARE AND SEALED WITH AN END CAP. REFER TO DRAWING CD215-21 FOR DETAILS.

5. **GROUNDING OF STREET LIGHT STANDARDS**

5.1 ALL STREET LIGHT STANDARDS SHALL BE GROUNDED BY CONNECTING THE NEUTRAL TO THE GROUND STUD INSIDE THE STANDARD. REFER TO DRAWING CD310-4 FOR DETAILS.

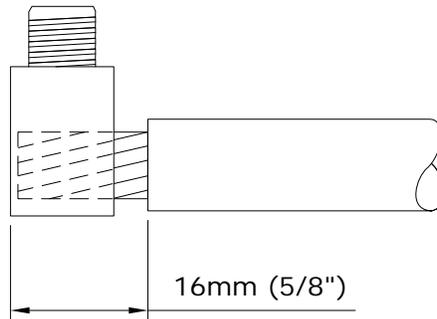
5.2 A GROUND ROD SHALL BE INSTALLED AND CONNECTED TO THE GROUND STUD AT THE LAST STANDARD ON THE STREET LIGHT CIRCUIT.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28		94-04 1 DWG. REFERENCE CHANGED		INSTALLATION OF STREET LIGHT CABLES	
W.B./CAD		W.C.		DATE	
				88-07	
CD 310-1				SHT	
				0002 OF 2	
				01	

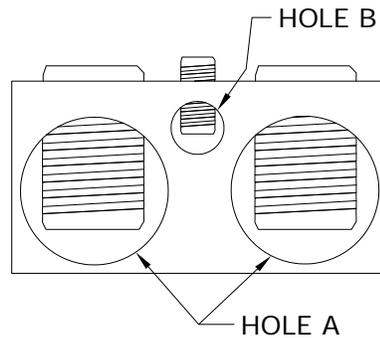
RAYCHEM GELCAP CIIC# 04-29-36

GENERAL INSTRUCTIONS:

1. REMOVE 16mm (5/8") OF INSULATION AND CLEAN EXPOSED ENDS.



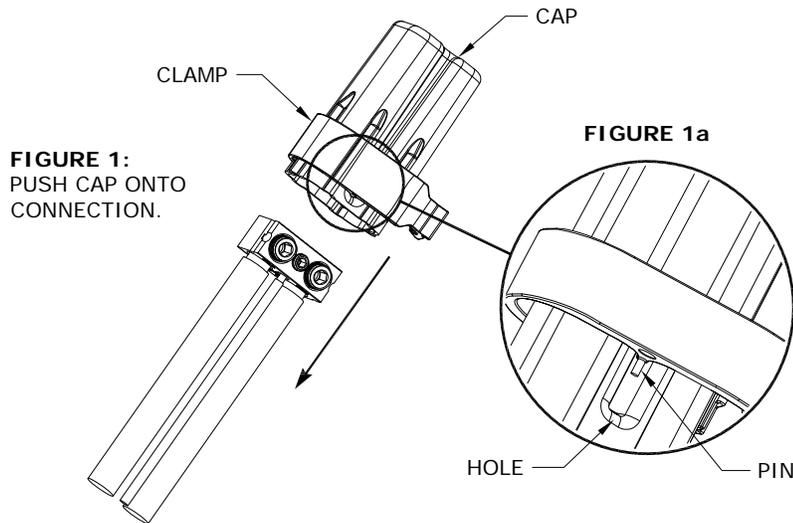
2. INSERT CONDUCTORS INTO CORRECT HOLES AND TORQUE AS SHOWN:



HOLE A		HOLE B	
WIRE RANGE	RECOMMENDED TORQUE VALUES	WIRE RANGE	RECOMMENDED TORQUE VALUES
#14 - 2/0 • STREET LIGHT CIRCUIT CABLES • GROUNDING CONNECTIONS • CONCENTRIC NEUTRAL • FUSE HOLDER WIRE	14 - 20 N-m (120 - 180 in-lbs)	#14 - #6 • LAMP LEADS	14 - 17 N-m (120 - 150 in-lbs)

APPROVED	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05			RAYCHEM GELCAP SPLICE		
DRAWN	CHECKED	DATE	CD 310-3	SHT	REV
C.A.	L.D.	17-11		0001 OF 3	00

- INSTALL CLAMP ON CAP. ENSURE THE TWO PINS ON THE BOTTOM EDGE OF THE CLAMP MATE WITH THE HOLES OF THE CAP AS SHOWN IN FIGURE 1a BELOW.



- INSTALL CAP BY HOLDING ALL WIRES AND PUSHING THE CAP OVER THE CONNECTION ASSEMBLY UNTIL IT GOES NO FURTHER AS SHOWN IN FIGURE 1 ABOVE.
- SNAP CLAMP CLOSED. IF NECESSARY, USE PLIERS TO SNAP CLAMP CLOSED AS SHOWN IN FIGURE 2 BELOW.

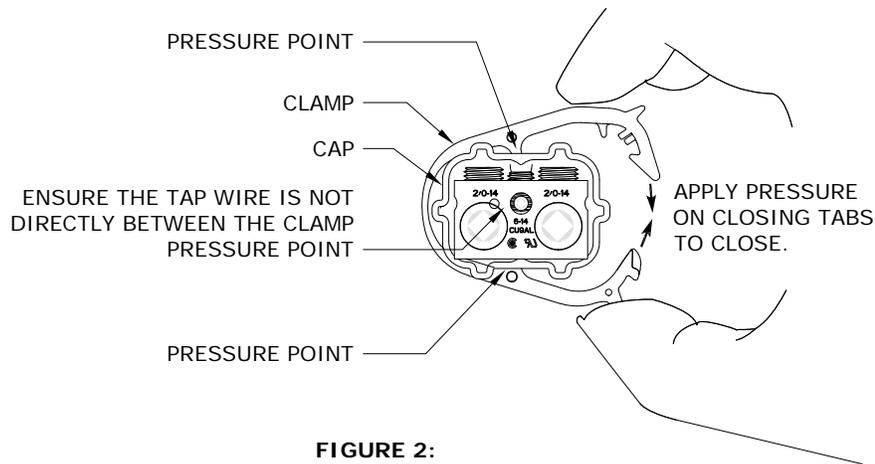
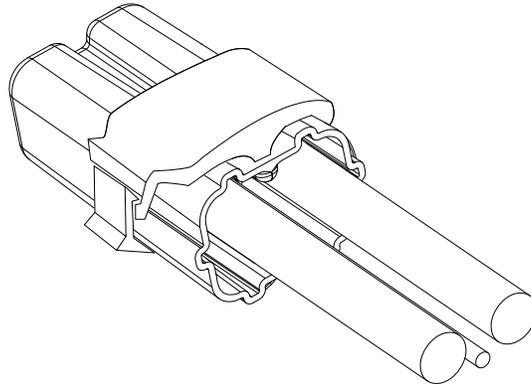


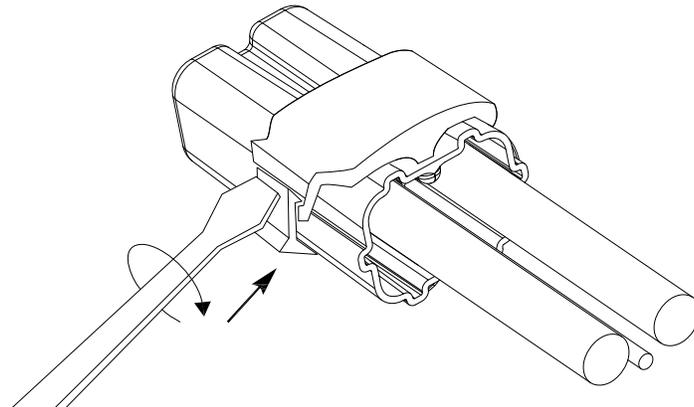
FIGURE 2:
CLAMP PRESSURE POINTS SHOULD FIT INTO OPPOSING GROOVES OF CAP AND APPLY PRESSURE BETWEEN CABLES. SNAP CLAMP CLOSED.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05				RAYCHEM GELCAP SPLICE	
DRAWN C.A.	CHECKED L.D.	DATE 17-11	CD 310-3		
					SHT 0002 OF 3

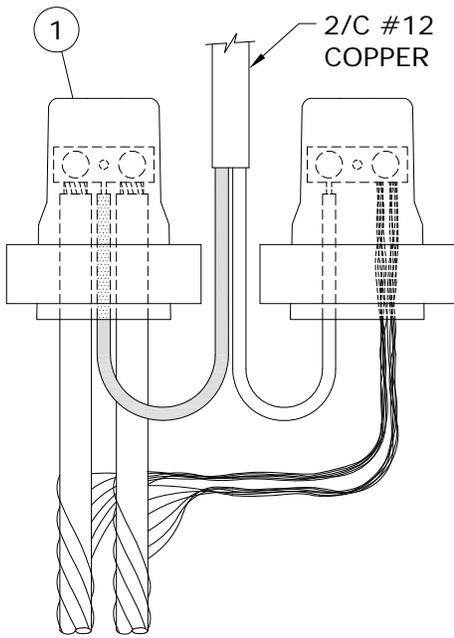
6. INSPECT THE INSTALLATION BY GENTLY PULLING ON THE CAP ENSURING IT IS LOCKED IN PLACE AND COVERS CONNECTOR AND BARE CONDUCTOR. THERE SHOULD BE NO EXPOSED METAL. ENSURE TAP CABLE IS NOT CAUGHT BETWEEN PRESSURE POINTS OF CLAMP. INSTALLATION IS COMPLETE.



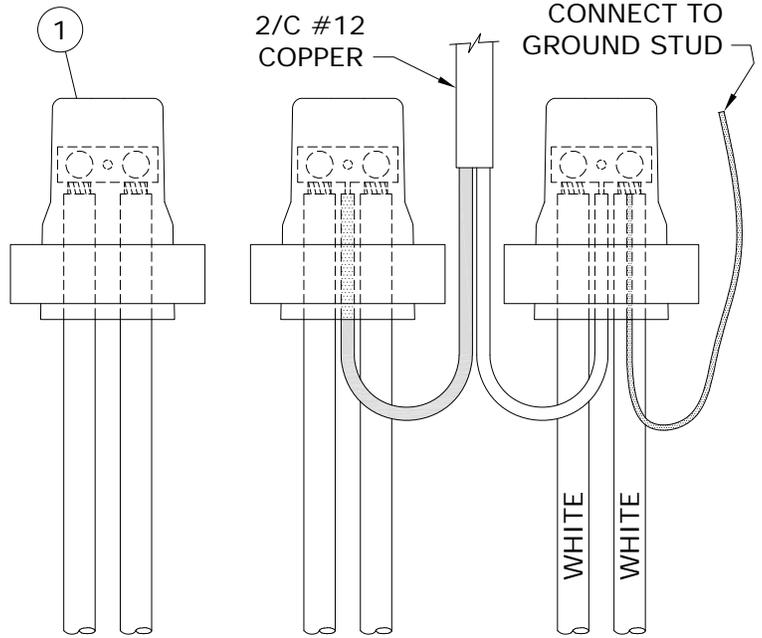
7. TO REMOVE, INSERT SCREWDRIVER BETWEEN THE CLOSING TABS AND TWIST TO OPEN THE CLAMP. REMOVE CAP SLOWLY FROM CONNECTION ALLOWING GEL TO REMAIN IN CAP.



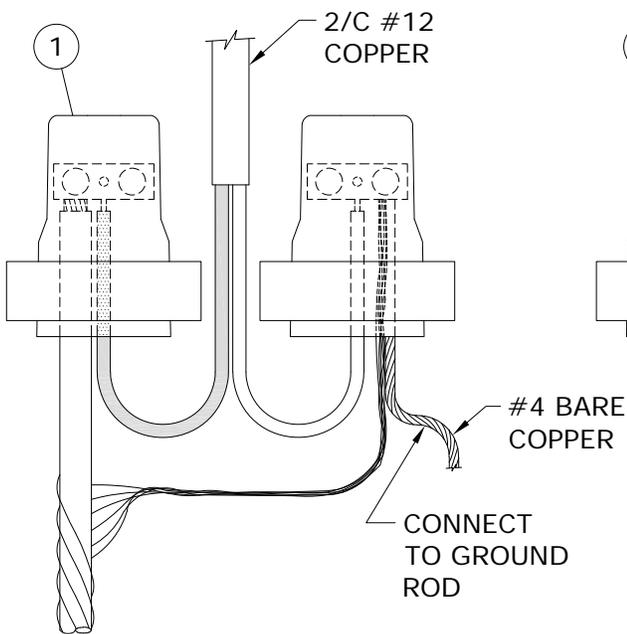
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05				RAYCHEM GELCAP SPLICE	
DRAWN C.A.	CHECKED L.D.	DATE 17-11	CD 310-3		
					SHT 0003 OF 3



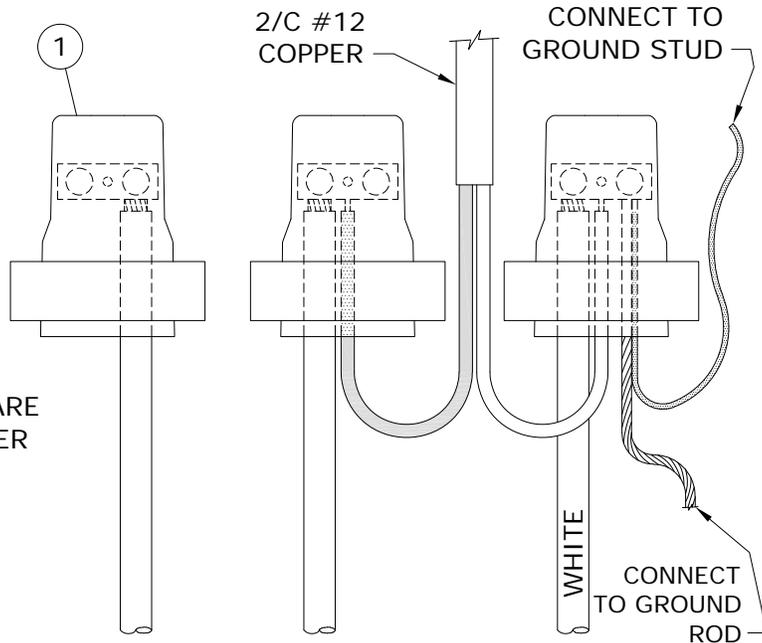
**No. 4 ALUMINUM C/N CABLE
(TYPICAL FEED THROUGH)**



**1/0 ALUMINUM TRIPLEX CABLE
(TYPICAL FEED THROUGH)**



**No. 4 ALUMINUM C/N CABLE
(TYPICAL END OF CIRCUIT)**



**1/0 ALUMINUM TRIPLEX CABLE
(TYPICAL END OF CABLE)**

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	18-04	2	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT1 TO SHT3, ADDED NEW GELCAP, DWG, REVISED TITLE, RESEALED	CONNECTION DETAIL IN STREET LIGHT STANDARD	
	94-04	1	CONN. REVISED DUE TO INSUL. NEUTRAL		
DRAWN C.A.	CHECKED L.D.	DATE 18-04		CD 310-4	

BILL OF MATERIAL			
ITEM No.	DESCRIPTION	STORES CODE No.	
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX
1	GEL CAP	04-29-36 (2 REQUIRED)	04-29-36 (3 REQUIRED)

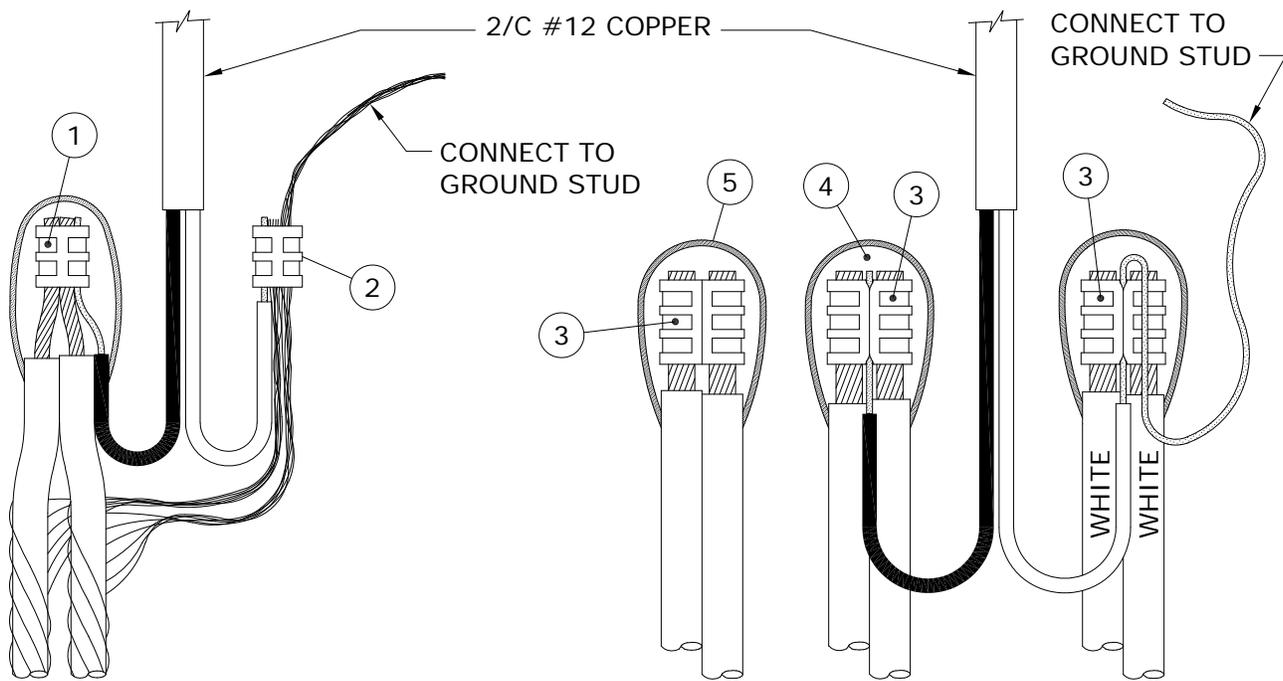
NOTES:

- 1. LEAVE SUFFICIENT SLACK ON CONDUCTORS TO ALLOW REMOVAL FROM HANDHOLE FOR MAINTENANCE.**
2. REFER TO DRAWING CD310-3 FOR GEL CAP INSTALLATION INSTRUCTIONS.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

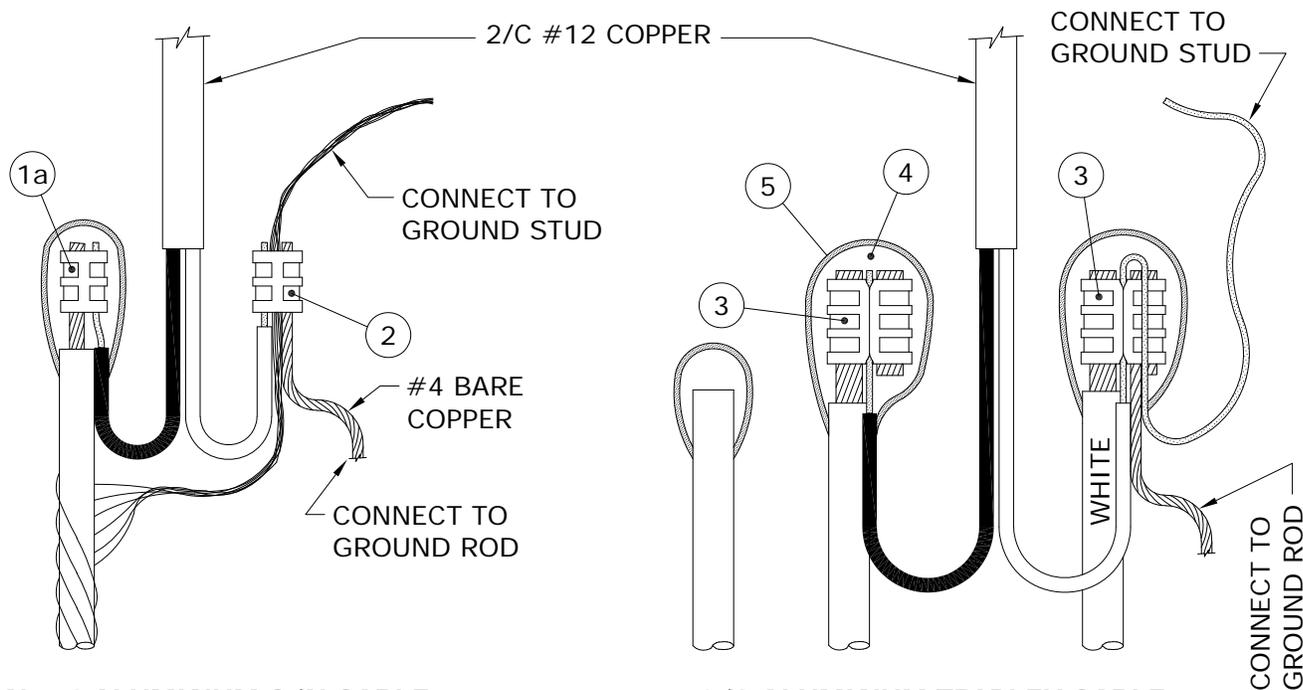
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		18-04 1 ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, REVISED TITLE, RESEALED		CONNECTION DETAIL IN STREET LIGHT STANDARD					
						DRAWN		CHECKED	DATE
C.A.		L.D.		18-04		CD 310-4		0002 OF 4	01

1-04431-DA-56200-0002



**No. 4 ALUMINUM C/N CABLE
(TYPICAL FEED THROUGH)**

**1/0 ALUMINUM TRIPLEX CABLE
(TYPICAL FEED THROUGH)**



**No. 4 ALUMINUM C/N CABLE
(TYPICAL END OF CIRCUIT)**

**1/0 ALUMINUM TRIPLEX CABLE
(TYPICAL END OF CIRCUIT)**

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		18-04 0 MOVED FROM SHEET 1		CONNECTION DETAIL IN STREET LIGHT STANDARD	
		DATE 18-04		CD 310-4	

BILL OF MATERIAL

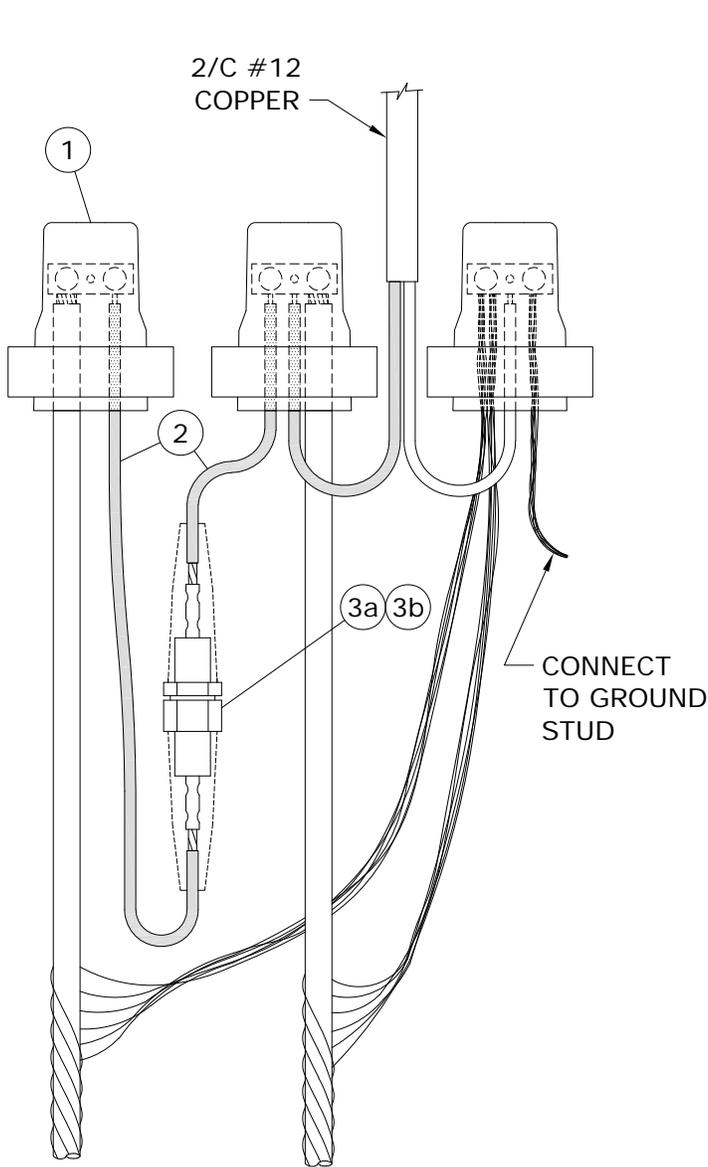
ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	'C' TYPE AL. COMPRESSION TAP	74-41-30	---	1
1a	'H' TYPE AL. COMPRESSION TAP	74-40-10	---	1 *
2	'C' TYPE CU. COMPRESSION TAP	74-40-90	---	1
3	'H' TYPE AL. COMPRESSION TAP	---	74-40-60	3 **
4	TAPE, SELF-AMALGAMATING EPR	78-55-23	78-55-23	1/4 ROLL
5	TAPE, COLD WEATHER VINYL	78-55-98	78-55-98	1/4 ROLL

- * FOR END OF CIRCUIT WHEN USING ONLY ONE CABLE.
- ** AT END OF CIRCUIT, QUANTITY MAY BE LESS THAN SHOWN.

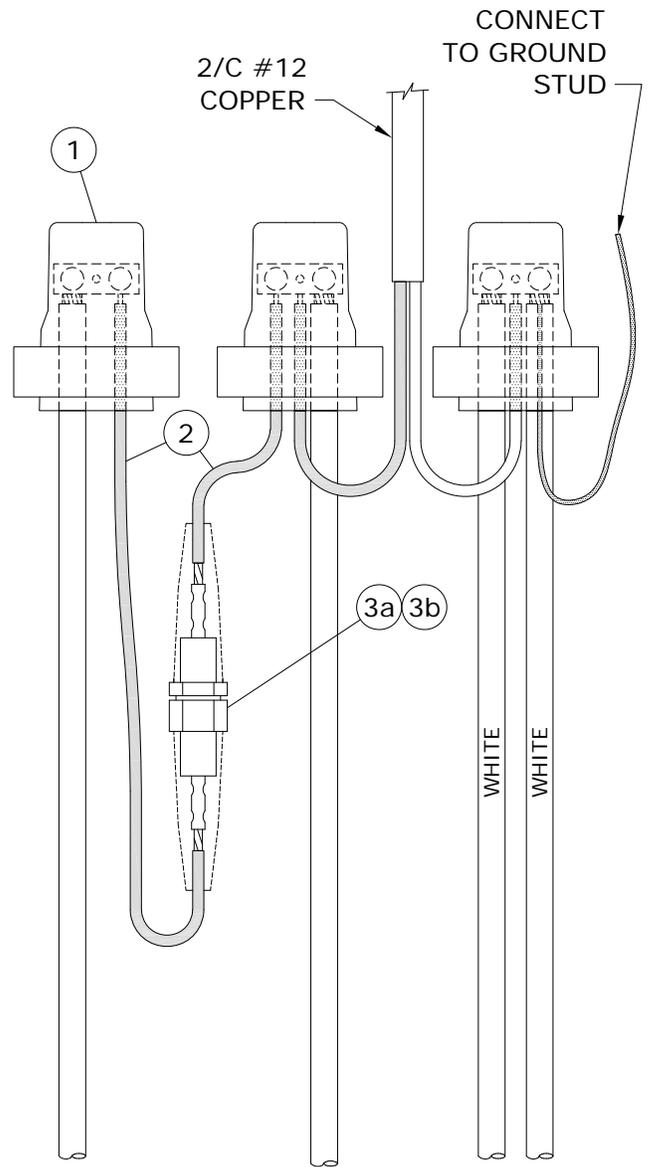
NOTES:

1. LEAVE SUFFICIENT SLACK ON CONDUCTORS TO ALLOW REMOVAL FROM HANDHOLE FOR MAINTENANCE.
2. FOR PROPER TAPING PROCEDURE, REFER TO DRAWING CD215-12.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		18-04 0		MOVED FROM SHEET 2			
DRAWN C.A.	CHECKED L.D.	DATE 18-04	CD 310-4		SHT	REV	
					0004 OF 4	00	



No. 4 ALUMINUM C/N CABLE



1/0 ALUMINUM TRIPLEX CABLE

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05	17-11	2	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT1 TO SHT3, ADDED NEW GELCAP DWG, RESEALED	STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD	
	94-04	1	CONN. REVISED DUE TO INSUL. NEUTRAL		
DRAWN C.A.	CHECKED L.D.	DATE 17-11		CD 310-9	

BILL OF MATERIAL

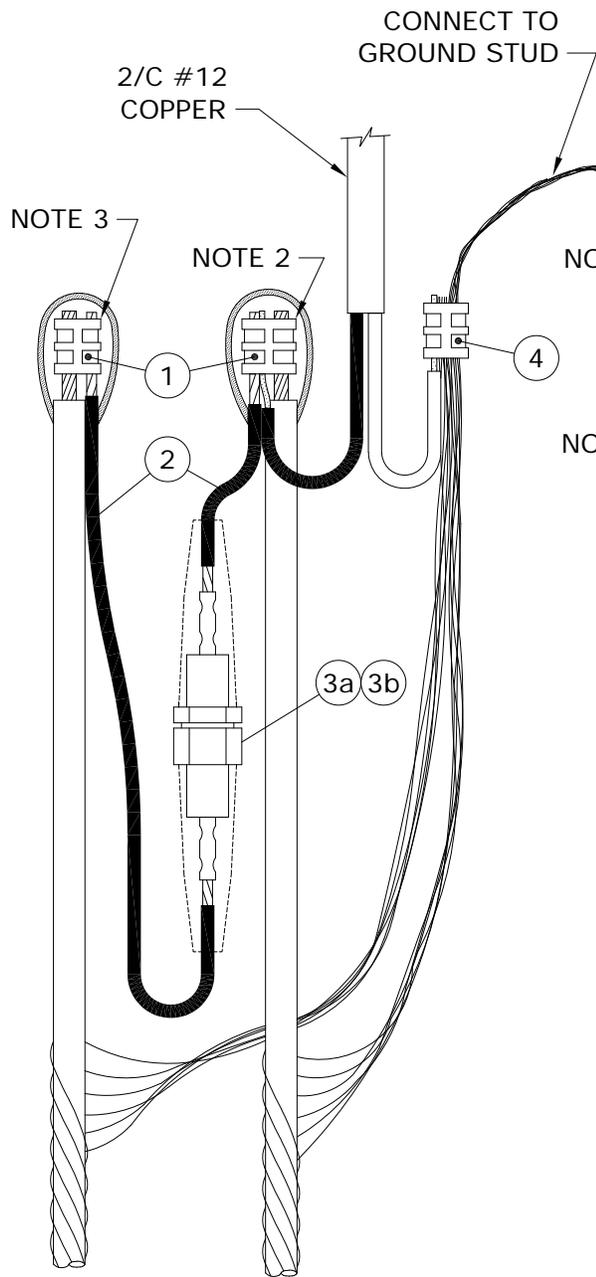
ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	GEL CAP	04-29-36	04-29-36	3
2	WIRE, # 8 CU., 600V, PVC	93-10-08	93-10-08	1m
3a	FUSEHOLDER, 15/30A C/W BOOTS	31-91-30	31-91-30	1
3b	FUSE, 30A	31-14-30	31-14-30	1

NOTES:

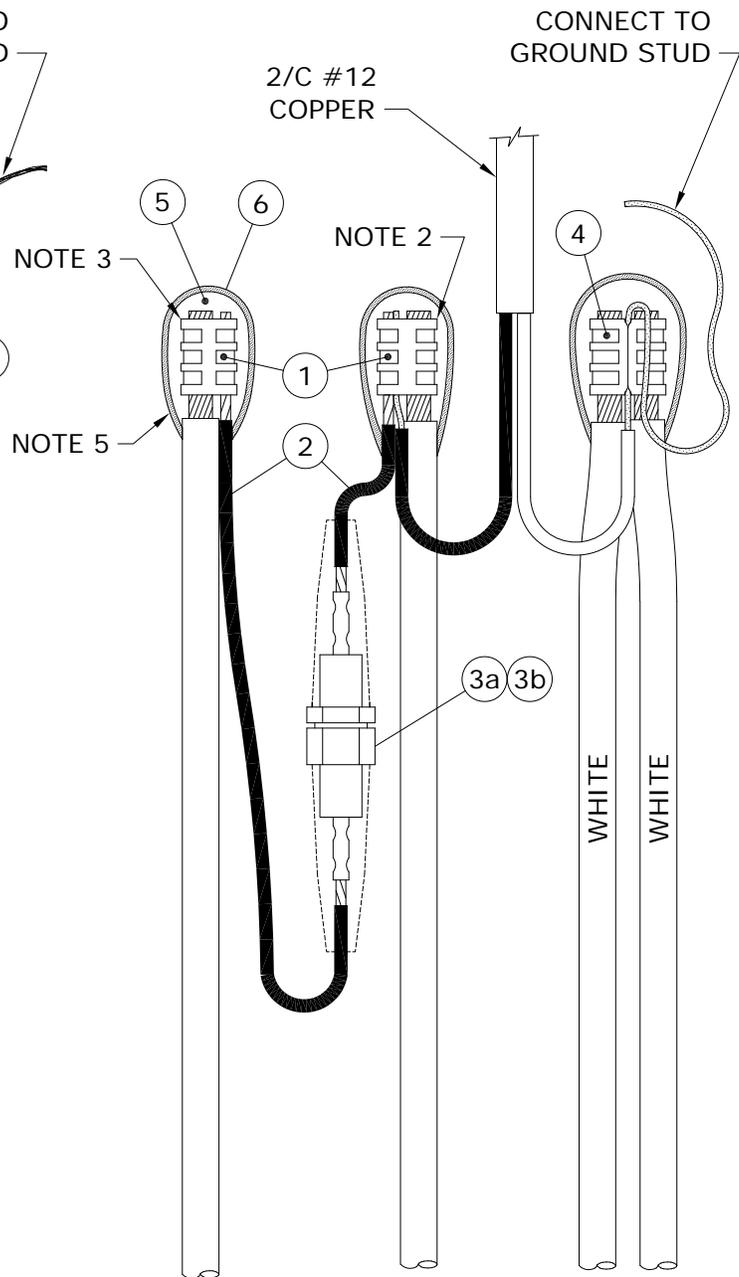
- 1. LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
2. FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
3. FOR GEL CAP INSTALLATION INSTRUCTIONS, REFER TO DRAWING CD310-3.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05				STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD	
		17-11	1		
DRAWN C.A.	CHECKED L.D.	DATE 17-11		CD 310-9	



No. 4 ALUMINUM C/N CABLE



1/0 ALUMINUM TRIPLEX CABLE

APPROVED	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05			STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD	
17-11	0	MOVED FROM SHEET 1		
DRAWN C.A.	CHECKED L.D.	DATE 17-11	CD 310-9	

BILL OF MATERIAL

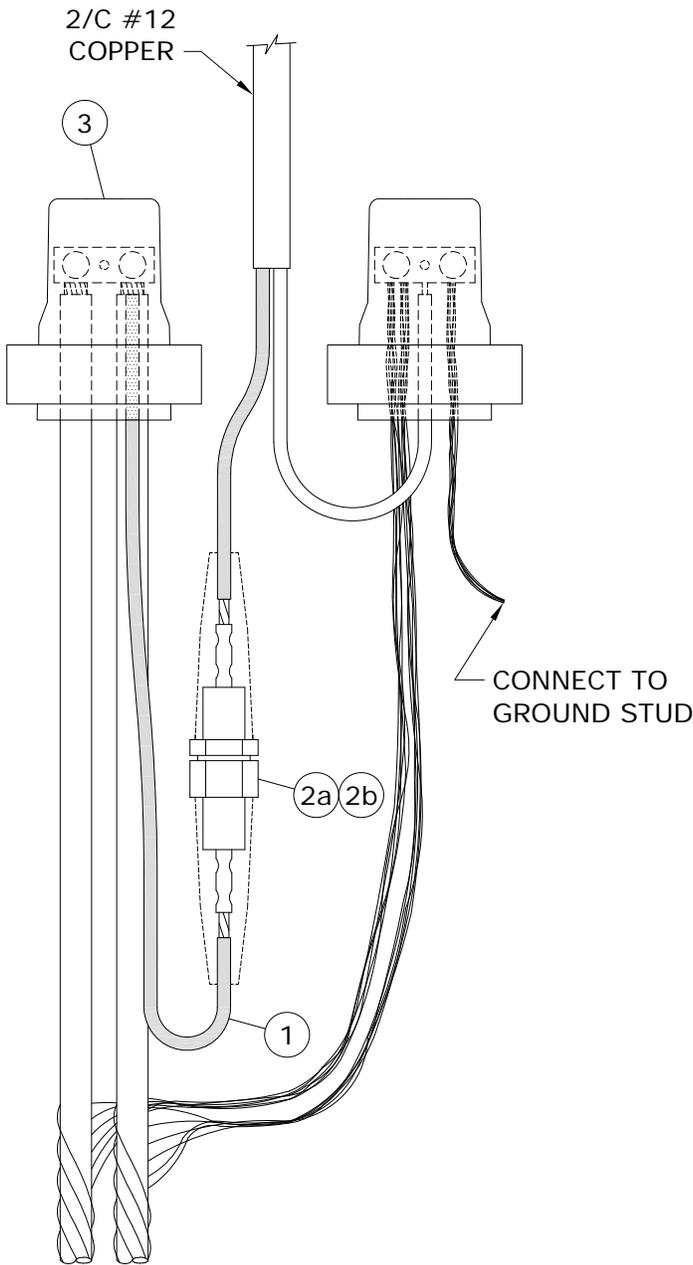
ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	'H' TYPE COMPRESSION TAP	74-40-10	74-40-30	2
2	WIRE, # 8 CU., 600V, PVC	93-10-08	93-10-08	1m
3a	FUSEHOLDER, 15/30A C/W BOOTS	31-91-30	31-91-30	1
3b	FUSE, 30A	31-14-30	31-14-30	1
4	'C' TYPE COMPRESSION TAP	74-40-90	---	1
	'H' TYPE COMPRESSION TAP	---	74-40-60	1 *
5	TAPE, SELF-AMALGAMATING EPR	78-55-23	78-55-23	1/4 ROLL
6	TAPE, COLD WEATHER VINYL	78-55-98	78-55-98	1/4 ROLL

* WHEN USING 1/0 ALUMINUM TRIPLEX 1 ADDITIONAL 'H' TYPE COMPRESSION TAP (S.C.# 74 40 60) IS REQUIRED TO CONNECT SECOND (FEED THROUGH) HOT LEG.

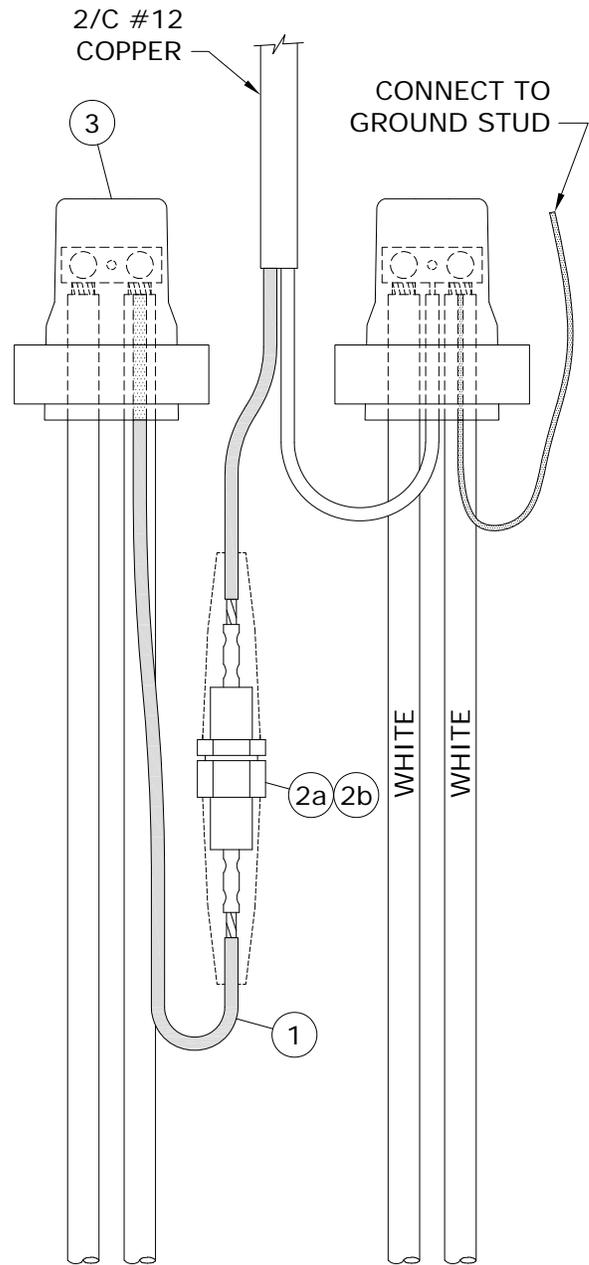
NOTES:

- LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
- INSERT #12 COPPER AND #8 COPPER IN SMALL GROOVE.
- INSERT DOUBLE THICKNESS OF #8 COPPER IN SMALL GROOVE.
- FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
- FOR PROPER TAPING PROCEDURE, REFER TO DRAWING CD215-12.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05		17-11 0		<p align="center">STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD</p>			
DRAWN C.A.	CHECKED L.D.	DATE 17-11		CD 310-9		SHT	REV
						0004 OF 4	00



No. 4 ALUMINUM C/N CABLE



1/0 ALUMINUM TRIPLEX CABLE

NOTE:

RECOMMENDED FOR PROTECTING LUMINAIRES WHICH ARE TO BE MOUNTED ON STREET LIGHT POLES 16.8m AND HIGHER.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 89-04-28

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	18-04	3	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT1 TO SHT3, ADDED NEW GELCAP, DWG, RESEALED	INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD	
	95-01	2	NOTE ADDED		
DRAWN C.A.	CHECKED L.D.	DATE 18-04		CD 310-10	

BILL OF MATERIAL

ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	2/C #12 COPPER	93-52-12	93-52-12	1m
2a	FUSEHOLDER, 15/30A C/W BOOTS	31-91-30	31-91-30	1
2b	FUSE, STREET LIGHT, 15A	31-14-15	31-14-15	1
3	GEL CAP	04-29-36	04-29-36	2

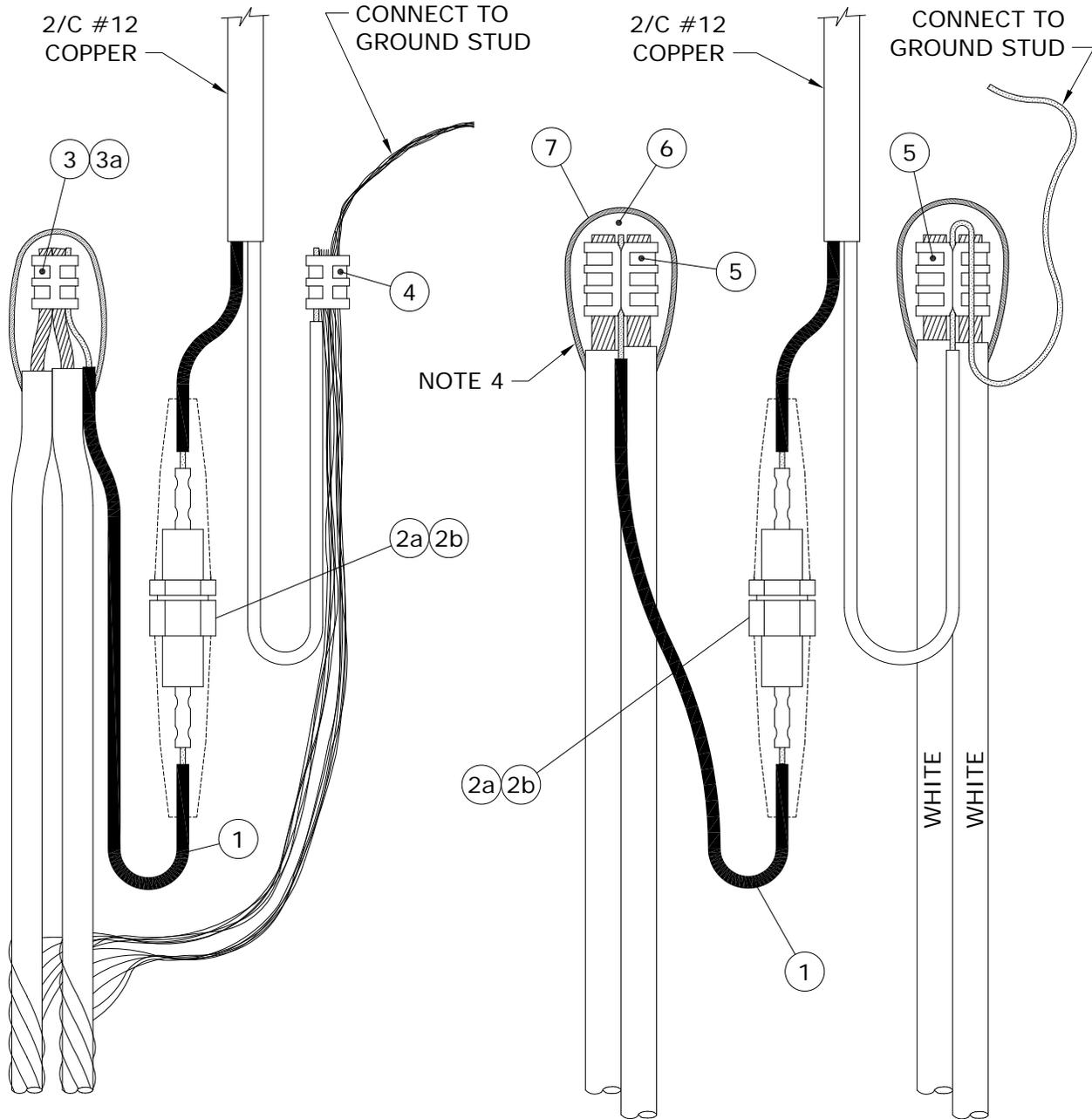
NOTES:

- 1. LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
2. FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
3. FOR END OF CIRCUIT, REFER TO DRAWING CD310-4.
4. FOR GEL CAP INSTALLATION INSTRUCTIONS, REFER TO DRAWING CD310-3.

SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS				
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		<table border="1"> <tr> <td>18-04</td> <td>1</td> <td>ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, RESEALED</td> </tr> </table>		18-04	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, RESEALED	<p align="center">INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD</p>	
				18-04	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, RESEALED		
DRAWN C.A.	CHECKED L.D.	DATE 18-04	SHT 0002 OF 4	REV 01				

CD 310-10



No. 4 ALUMINUM C/N CABLE

1/0 ALUMINUM TRIPLEX CABLE

NOTE:

RECOMMENDED FOR PROTECTING LUMINAIRES WHICH ARE TO BE MOUNTED ON STREET LIGHT POLES 16.8m AND HIGHER.

APPROVED	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11			INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD	
	18-04	0		
DRAWN C.A.	CHECKED L.D.	DATE 18-04	CD 310-10	

BILL OF MATERIAL

ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	2/C # 12 COPPER	93-52-12	93-52-12	1m
2a	FUSEHOLDER, 15/30A C/W BOOTS	31-91-30	31-91-30	1
2b	FUSE, STREET LIGHT, 15A	31-14-15	31-14-15	1
3	'C' TYPE AL. COMPRESSION TAP	74-41-30	---	1
3a	'H' TYPE AL. COMPRESSION TAP	74-40-10	---	1 *
4	'C' TYPE CU. COMPRESSION TAP	74-40-90	---	1
5	'H' TYPE AL. COMPRESSION TAP	---	74-40-60	3 **
6	TAPE, SELF-AMALGAMATING EPR	78-55-23	78-55-23	1/4 ROLL
7	TAPE, COLD WEATHER VINYL	78-55-98	78-55-98	1/4 ROLL

- * FOR END OF CIRCUIT WHEN USING ONLY ONE CABLE.
- ** AT END OF CIRCUIT, QUANTITY MAY BE LESS THAN SHOWN.

NOTES:

1. LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.
2. FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
3. FOR END OF CIRCUIT, REFER TO DRAWING CD310-4.
4. FOR PROPER TAPING PROCEDURE, REFER TO DRAWING CD215-12.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		18-04 0		<p align="center">INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD</p>			
DRAWN C.A.	CHECKED L.D.	DATE 18-04		CD 310-10		SHT	REV
						0004 OF 4	00

SUPPLY VOLTAGES

THE SUPPLY VOLTAGE FOR STREET LIGHT CIRCUITS MAY BE PROVIDED BY POLE-MOUNTED DISTRIBUTION TRANSFORMERS OR BY PAD-MOUNTED DISTRIBUTION TRANSFORMERS.

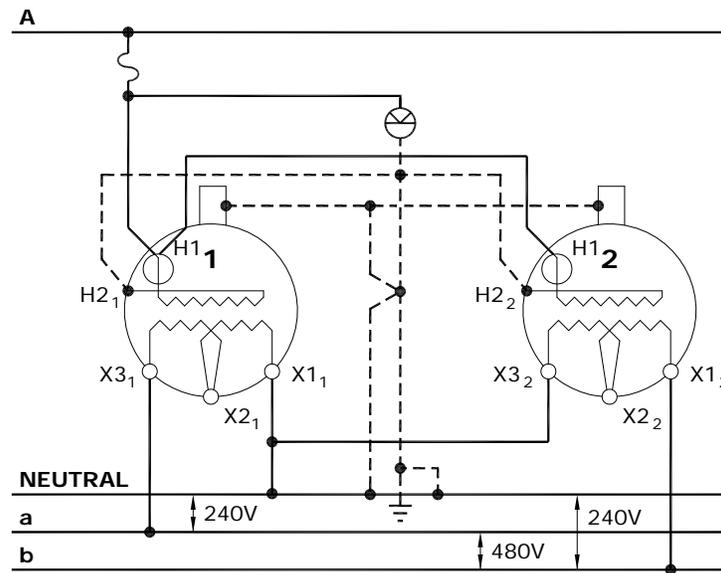
THE MAJORITY OF ROADWAY LUMINAIRES ARE RATED FOR OPERATION ON EITHER 120 VOLT OR 240 VOLT CIRCUITS AND ARE FACTORY WIRED FOR 120 VOLT OPERATION EXCEPT FOR 400 WATT H.P.S. LUMINAIRES WHICH ARE RATED FOR 120/240 VOLT OPERATION BUT ARE FACTORY WIRED FOR 240 VOLT OPERATION.

IN CASES WHERE EXCESSIVE VOLTAGE DROP IN A STREET LIGHTING CIRCUIT IS A PROBLEM, A SUPPLY VOLTAGE OF 240/480 MAY BE USED. A SUPPLY VOLTAGE OF 240/480 CAN BE OBTAINED FROM TWO SINGLE PHASE POLE-MOUNTED DISTRIBUTION TRANSFORMERS CONNECTED AS SHOWN ON DRAWING CD315-2. IF A SINGLE PHASE PAD-MOUNTED DISTRIBUTION TRANSFORMER WITH A 240/480 VOLT SECONDARY IS REQUIRED, THE TRANSFORMER MUST BE ORDERED FROM THE MANUFACTURER (SEE DRAWING CD315-2).

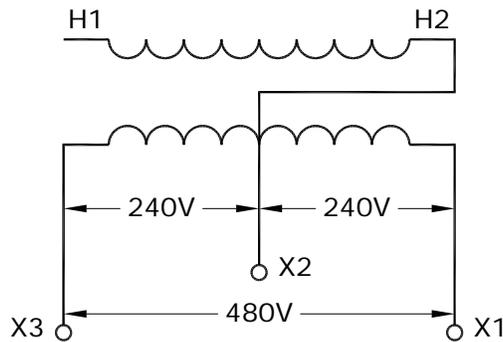
CAUTION:

PRIOR TO CONNECTING LUMINAIRES TO A 240 VOLT SUPPLY CIRCUIT IT IS IMPORTANT TO CHECK THE INTERNAL CONNECTIONS TO THE TERMINAL BLOCK TO ENSURE THAT THE UNIT IS PROPERLY CONNECTED FOR 240 VOLT OPERATION.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				SUPPLY VOLTAGES FOR STREET LIGHT CIRCUITS	
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-08	CD 315-1		SHT 0001 OF 1
					REV 00



SECONDARY VOLTAGE 240/480V GROUNDED. TWO SINGLE-PHASE POLE-MOUNTED TRANSFORMERS WITH 120/240V SECONDARIES.



SECONDARY VOLTAGE 240/480V GROUNDED. SINGLE-PHASE PAD-MOUNTED TRANSFORMER AS SUPPLIED BY MANUFACTURER

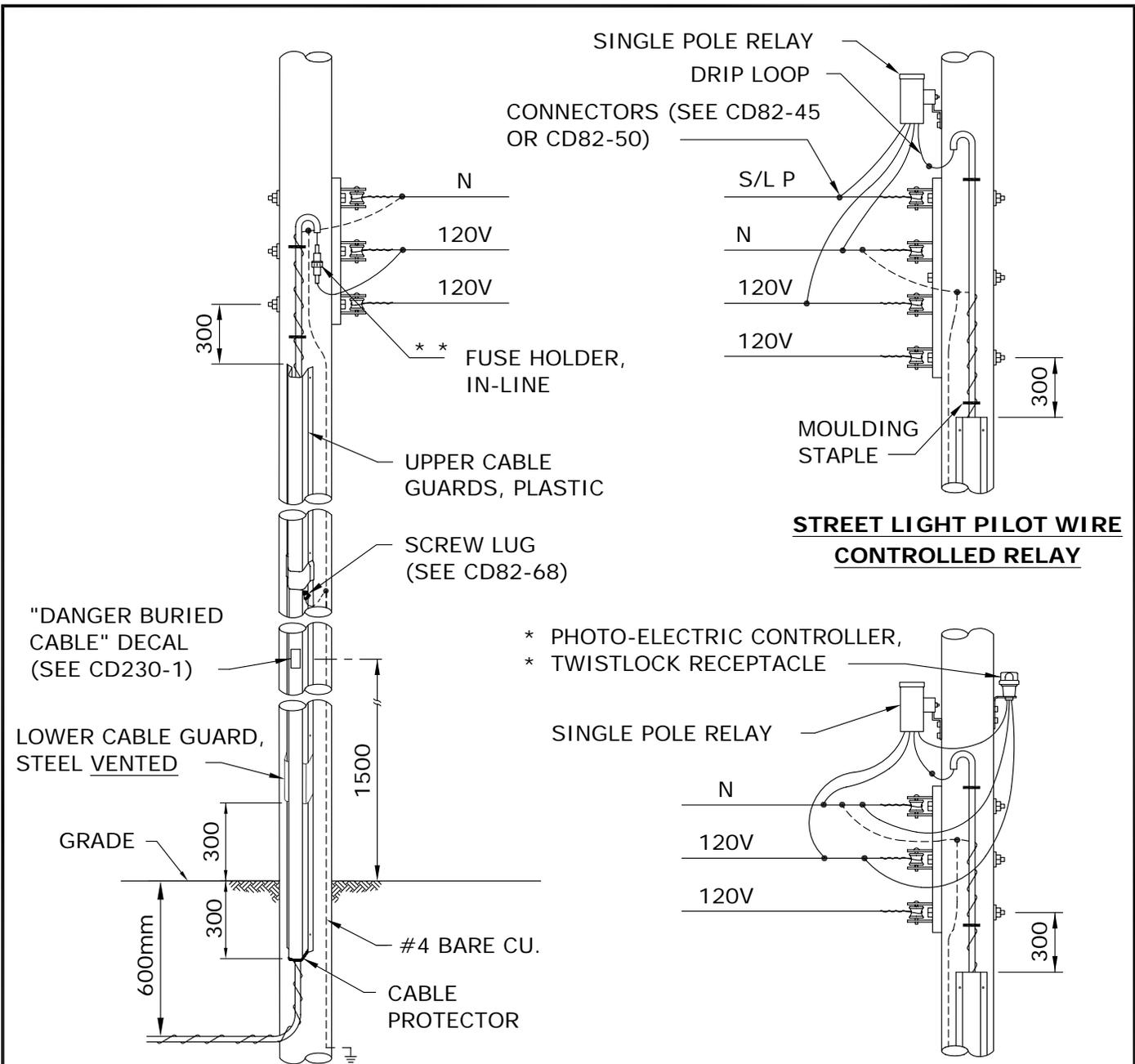
SAFETY PRECAUTION

1. SINGLE PHASE PAD MOUNTED TRANSFORMERS WITH ABOVE SECONDARY VOLTAGES TO HAVE WARNING SIGN "**CAUTION - 240/480V SECONDARY - SEE NAMEPLATE**", STENCILLED ON THE OUTSIDE OF THE TRANSFORMER NEAR NAMEPLATE.
2. NAMEPLATES OF MODIFIED TRANSFORMERS TO BE REVISED.

PURCHASE OF 240/480 VOLT TRANSFORMER

1. INCLUDE ABOVE WARNING SIGN REQUIREMENT IN PURCHASE DESCRIPTION.

APPROVED	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28			240/480 VOLT SUPPLY FOR STREET LIGHT CIRCUITS		
	13-01	2			REVISED DIAGRAM
	90-04	1			DROPOUT DELETED
DRAWN W.B./CAD	CHECKED L.D./D.O.	DATE 88-08	CD 315-2		
			SHT 0001 OF 1	REV 02	



**IN-LINE
FUSE PROTECTED**

**P.E. CELL
CONTROLLED RELAY**

* * USED WHERE POLY ISN'T USED

* USED WHERE ST./LT. PILOT DOES NOT EXIST

NOTES:

1. REFER TO DRAWING CD200-63 FOR CABLE GUARD INSTALLATION DETAILS.
2. INSTALL A GROUND ROD AT THE LAST POLE ON THE STREET LIGHT CIRCUIT.
3. DIMENSIONS SHOWN ARE MILLIMETRES.

APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	99-08	3	SHOW VENTED CABLE GUARD, SHEET 2 DELETED	DIP POLE FOR UNDERGROUND STREET LIGHTING CIRCUIT			
	94-04	2	DWG. REFERENCE CHANGED				
	92-06	1	NOTE 1				
DRAWN R.L.B./CAD	CHECKED K.C.H.	DATE 88-08	CD 315-5			SHT 0001 OF 1	REV 03

CONTROL METHODS

1. LUMINAIRES CONTROLLED INDIVIDUALLY BY PHOTO-ELECTRIC CELL

THE PREFERRED METHOD FOR PROVIDING ON/OFF CONTROL OF A STREET LIGHT LUMINAIRE IS TO INSTALL A PHOTO-ELECTRIC CELL ON EACH LUMINAIRE, IF LUMINAIRES ARE MOUNTED ON HIGHER POLES (IN EXCESS OF 10.7 M OR 35 FT.) WHERE IT IS DIFFICULT TO REACH THE LUMINAIRE WITH THE LOCAL DISTRICT BUCKET TRUCK, CONSIDERATION SHOULD BE GIVEN TO USING A PHOTO-ELECTRIC CONTROLLED EXTERNALLY-MOUNTED RELAY SYSTEM.

2. PHOTO-ELECTRIC CONTROLLED EXTERNALLY-MOUNTED RELAY

SEVERAL LUMINAIRES CAN BE CONTROLLED SIMULTANEOUSLY BY INSTALLING A PHOTO-ELECTRIC CONTROLLED, EXTERNALLY MOUNTED RELAY, ON A WOOD POLE (SEE CD315-11) OR ON A STEEL STREET LIGHT POLE (SEE CD315-12). SINGLE POLE (SINGLE CIRCUIT) RELAYS ARE AVAILABLE WITH EITHER A 30 AMP OR A 60 AMP RATING. A BY-PASS SWITCH MAY BE INSTALLED TO PROVIDE A MEANS OF ACTIVATING THE STREET LIGHT CIRCUIT FOR DAYLIGHT MAINTENANCE PURPOSES.

3. STREET LIGHT RELAY USING STREET LIGHT CONTROL

ACTIVATING SUCCESSIVE SECTIONS OF STREET LIGHTING CIRCUITS BY MEANS OF A SERIES OF RELAYS (KNOWN AS A CASCADE CONTROLLED SYSTEM) IS NO LONGER USED AS A CONTROL METHOD. HOWEVER, SOME CASCADE CONTROLLED RELAY SYSTEMS REMAIN IN SERVICE. THE CONNECTION DIAGRAMS FOR A CASCADE CONTROLLED RELAY SYSTEM ARE SHOWN ON DRAWING CD315-14. DOUBLE POLE (DOUBLE CIRCUIT) RELAYS ARE NO LONGER PURCHASED, THEREFORE, DOUBLE POLE RELAYS WHICH FAIL MUST BE REPLACED WITH TWO SINGLE POLE RELAYS. BOTH THE SINGLE AND DOUBLE POLE OLDER STYLE RELAYS HAVE A 5 AMP FUSE PROTECTING THE RELAY COIL.

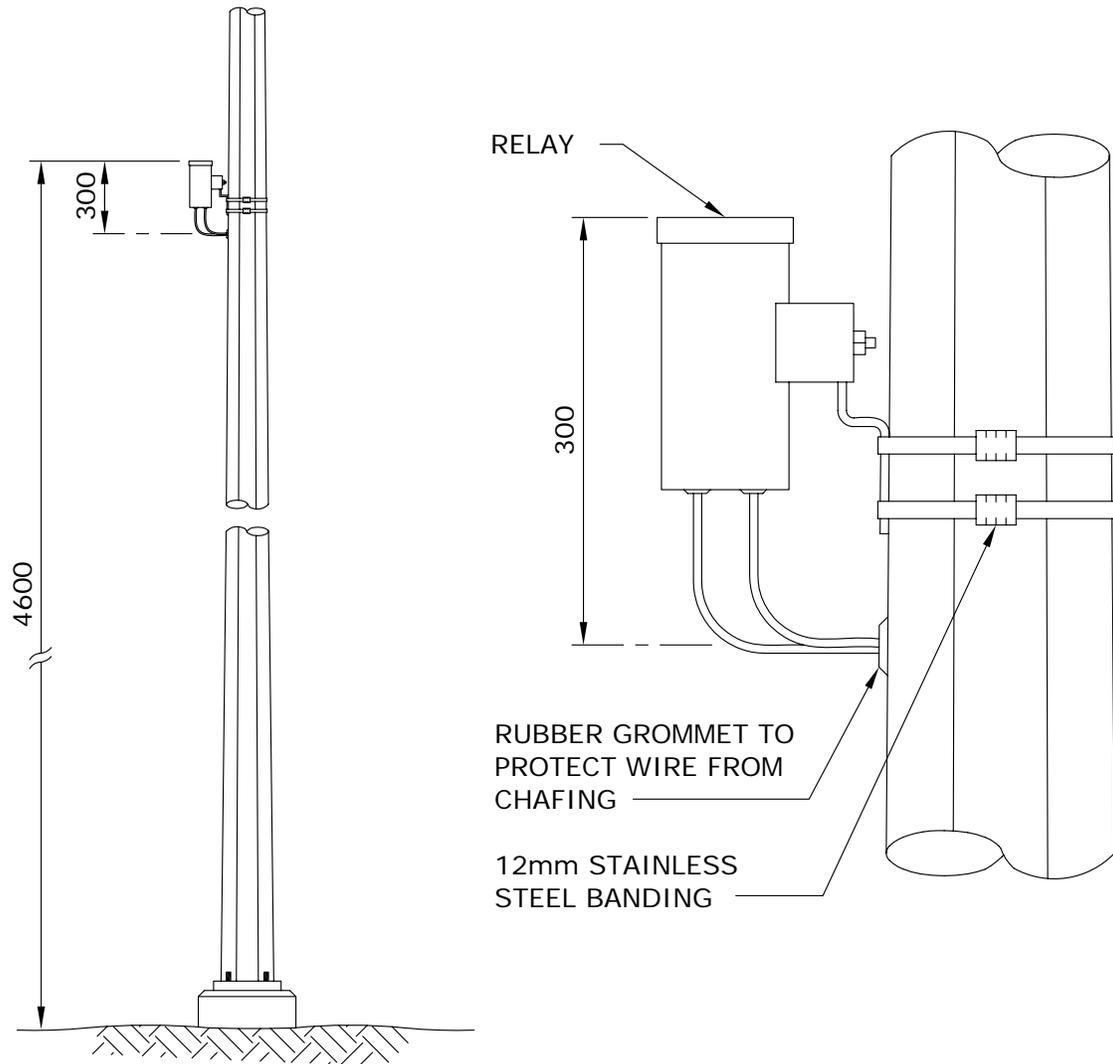
4. STREET LIGHT RELAY USING PILOT WIRE CONTROL

PILOT WIRE CONTROL SYSTEMS ARE NO LONGER USED FOR NEW CONSTRUCTION. HOWEVER, SOME PILOT WIRE CONTROL SYSTEMS REMAIN IN SERVICE. THE CONNECTION DIAGRAMS FOR PILOT WIRE CONTROL SYSTEMS ARE SHOWN ON DRAWING CD315-15. DOUBLE POLE (DOUBLE CIRCUIT) RELAYS ARE NO LONGER PURCHASED. THEREFORE, DOUBLE POLE RELAYS WHICH FAIL MUST BE REPLACED WITH TWO SINGLE POLE RELAYS.

5. PHOTO-ELECTRIC CONTROLLED RELAY IN BASE OF STANDARD

COMPACT RELAYS, MOUNTED IN THE BASE OF STEEL STREET LIGHT STANDARDS ARE NO LONGER USED FOR NEW CONSTRUCTION. THE COMPACT RELAY IS ACTIVATED VIA THE PHOTO-ELECTRIC CONTROLLER ON THE LUMINAIRE. IF A COMPACT RELAY FAILS AN EXTERNALLY-MOUNTED RELAY AND PHOTO-ELECTRIC CONTROLLER SHOULD BE INSTALLED (SEE CD315-12 AND CD315-13).

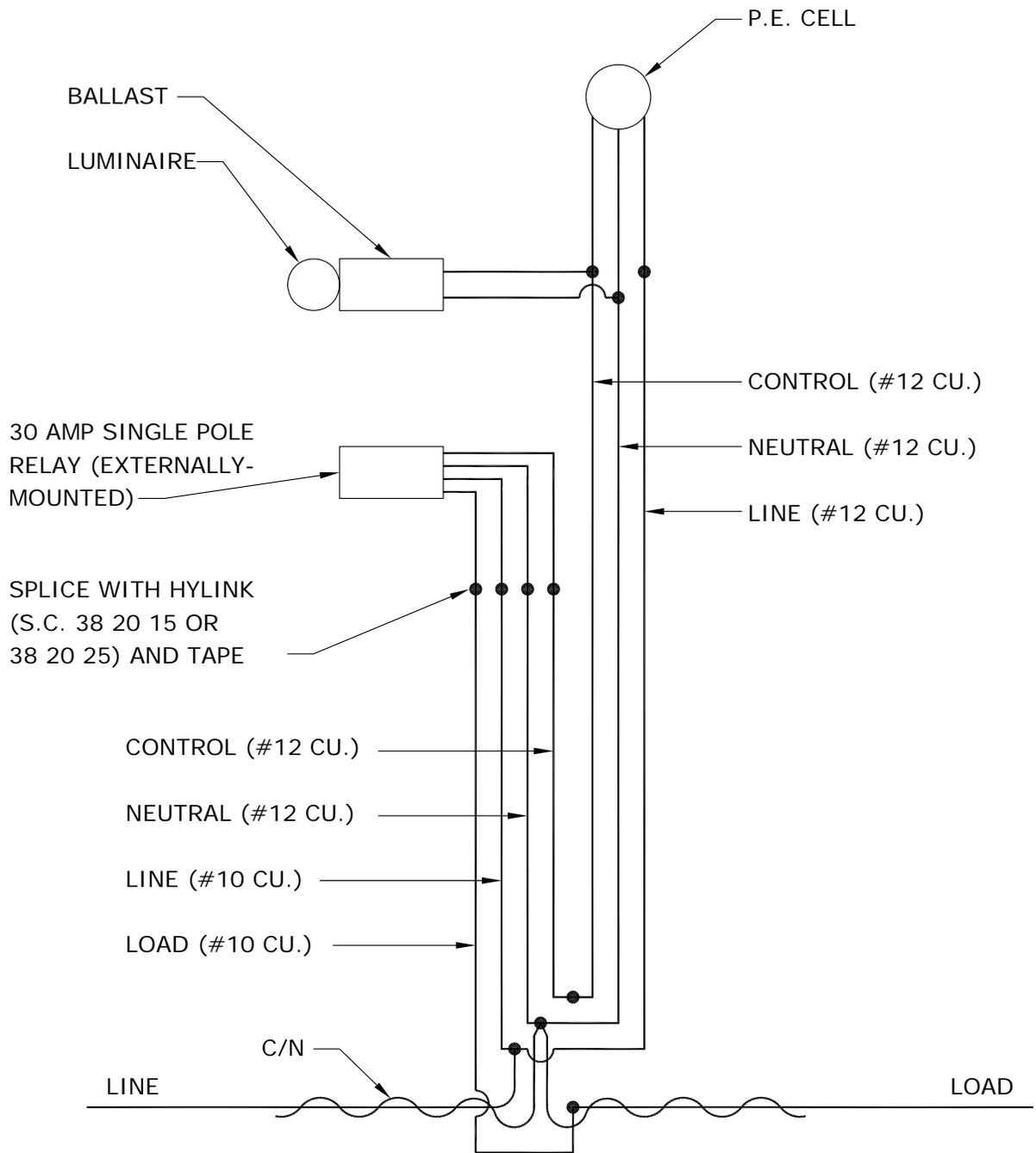
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				CONTROL METHODS FOR STREET LIGHT CONTROLS					
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-08	CD 315-10		<table border="1"> <tr> <td>SHT</td> <td>REV</td> </tr> <tr> <td>0001 of 1</td> <td>00</td> </tr> </table>	SHT	REV	0001 of 1	00
SHT	REV								
0001 of 1	00								



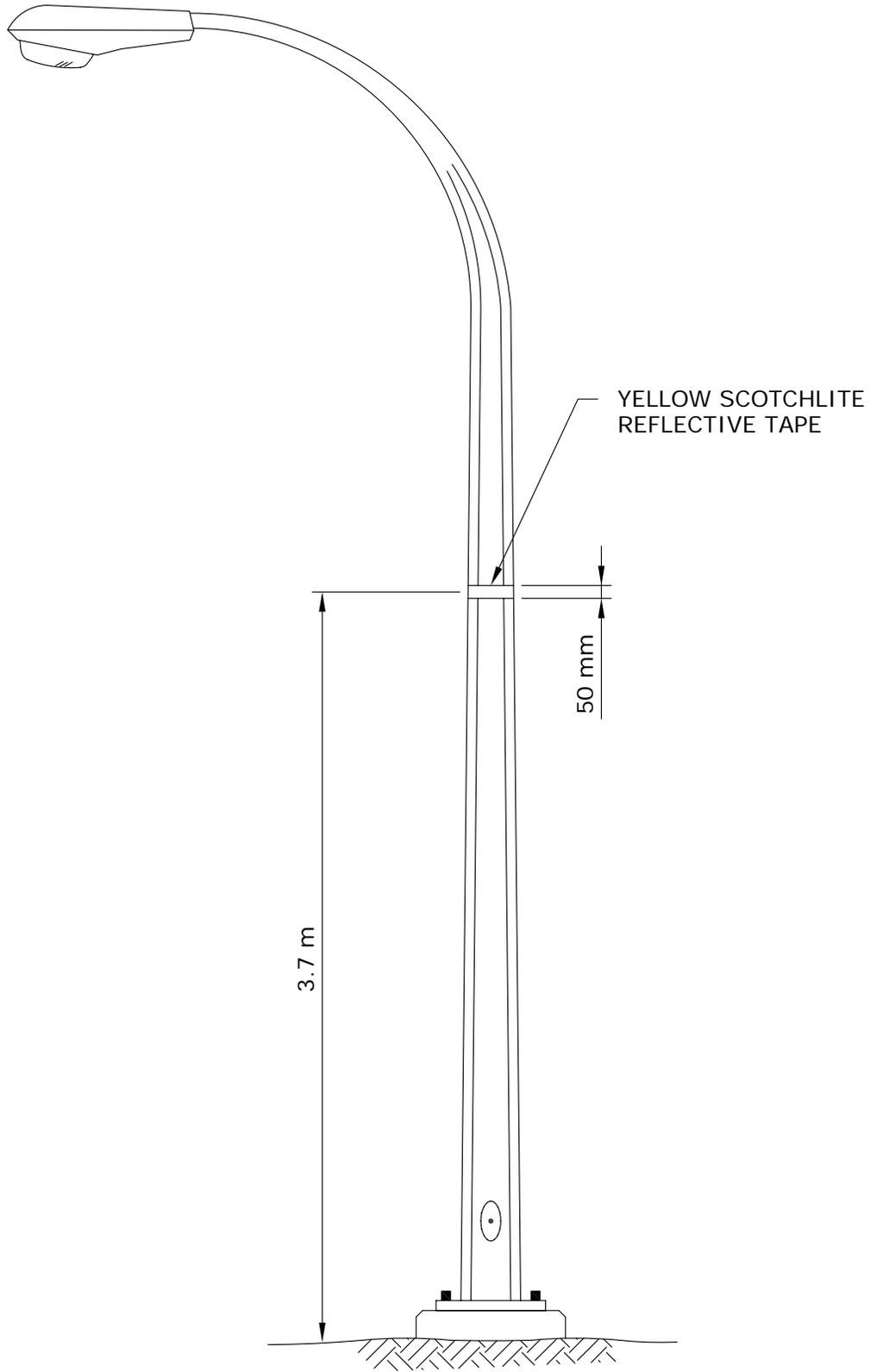
NOTES:

1. DRILL 25mm HOLE AT A POINT 4.3m ABOVE FINISHED GRADE.
2. INSTALL RUBBER GROMMET IN HOLE.
3. BAND RELAY TO POLE USING 12mm STAINLESS STEEL BANDING MATERIAL SO THAT THE TOP OF THE RELAY IS 300mm ABOVE THE CENTRE OF THE HOLE.
4. CONNECT RELAY LEADS TO 4.3m LENGTHS OF EQUAL SIZED CONDUCTOR AND PUSH SPLICES INSIDE POLE.
5. TAPE EXPOSED RELAY LEADS INTO A BUNDLE.
6. DIMENSIONS SHOWN ARE MILLIMETRES.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				INSTALLATION OF EXTERNALLY-MOUNTED RELAY					
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-09	CD 315-12		<table border="1"> <tr> <td>SHT</td> <td>REV</td> </tr> <tr> <td>0001 OF 1</td> <td>00</td> </tr> </table>	SHT	REV	0001 OF 1	00
SHT	REV								
0001 OF 1	00								



APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28		94-03 1 MAXIMUM RELAY SIZE		CONNECTION SCHEMATIC FOR EXTERNALLY-MOUNTED RELAY	
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-09	SHT 0001 OF 1		REV 01



APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				IDENTIFICATION OF FIRST STREET LIGHT STANDARD CONNECTION TO CIRCUIT	
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-09	CD 315-35		
			SHT		REV
			0001 OF 1		00

APPENDIX 'B'

SAFE EVACUATION AND SAFETY WATCH GUIDELINES



Safe Excavation & Safety Watch Guidelines



For your **SAFETY**

Click Before
YouDig**MB.com**

Or call 1-800-940-3447

 **Manitoba
Hydro**

RELEASE OF NATURAL GAS

In the event of any damage to a natural gas pipeline (regardless of whether it is steel, plastic or aluminum) or to its protective pipe coating or tracer wire, however minor, call Manitoba Hydro immediately 204-480-5900 or 1-888-624-9376. In most cases there is no charge for minor repairs.

In case of damage causing a release of natural gas:

- Call 911 and Manitoba Hydro immediately.
- Clear people from the vicinity and prevent people from approaching the area of the leak.
- Shut off all vehicles and equipment. Remove or extinguish all sources of ignition. **DO NOT** smoke or allow open flame in the presence of natural gas.
- If a gas line has been punctured, do not remove the tool or equipment that punctured the line. This could result in a larger gas leak and pose a greater hazard.
- **DO NOT** attempt to backfill over a leaking natural gas line or attempt to stop the leak; it is safest to allow the gas to vent into the atmosphere.

Before you start to dig, contact ClickBeforeYouDigMB.com to request to have underground lines located. Manitoba Hydro will be notified and will contact you within three business days to advise of the date we will locate our electric and natural gas lines.

- Once the lines are marked we will provide you with a Facilities Locate form with specific instructions. You must obtain this form prior to excavation.
- If work has not started within 14 calendar days after the locate was provided by Manitoba Hydro, you must contact us to have the lines re-marked and receive an updated Facilities Locate form.
- Contractors must ensure that everyone on the worksite is aware of the presence of all gas and electric facilities and ensure that the Facilities Locate form is kept at the excavation site until the excavation and backfill are complete.
- The location markings must be maintained and kept visible by the person or contractor doing the excavation. Be careful that site operators do not remove the line location markings.

In addition to contacting ClickBeforeYouDigMB.com be sure to contact any other underground services that may be in the area.

This guideline applies to the crossing of Manitoba Hydro electrical conductors and natural gas pipelines only. When Manitoba Hydro fibre optic cables are present contractors will be referred by the Manitoba Hydro Facilities Locator to the Manitoba Hydro communications department for more information.

Manitoba Hydro only locates facilities that it owns and has no knowledge of or responsibility for privately owned facilities. Electric conductors or gas pipes installed past the meter are owned privately by the property owner, and at times are installed below ground before entering the building. Outbuildings that are heated or have electric power, wells, septic systems, pumps, pools and hot tubs are examples where privately owned buried facilities may exist.

This booklet has been prepared by Manitoba Hydro for Manitoba Hydro staff, contractors and homeowners involved with excavation and is available at hydro.mb.ca. Information on excavation and safety watch is included to inform excavators about basic requirements for excavation in the vicinity of buried electric power lines and gas pipelines. Unless otherwise indicated, gas pipelines and underground power cables will be called "lines".

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WHY YOU SHOULD PLAN AHEAD

When you contact ClickBeforeYouDigMB.com before you dig, we can identify buried lines so you can dig safely. This prevents injury or death, costly repairs, equipment damage, service outages, and environmental pollution.

It is YOUR responsibility to contact all owners of buried underground services.

PLANNING LARGE PROJECTS

Determining the location of existing Manitoba Hydro Underground Structures within the work area should be one of the first priorities of any work. Knowing the location of all utilities infrastructure allows the third party to plan work proactively, mitigating the need for costly design changes or delays during construction.

Gas

Manitoba Hydro requests that drawings be submitted for review for all projects involving ground disturbance. Drawings shall be submitted to: gasdesign@hydro.mb.ca.

Drawings will be reviewed by Manitoba Hydro at no cost and a letter providing details of any work restrictions, specific requirements or costs will be provided to the contractor.

Drawings should be submitted a minimum of 4 weeks before the start of any excavation work. Drawings shall include the details of the proposed work and include any gas or electrical line in the work area.

Electric

Contact Manitoba Hydro in Winnipeg at 204-480-5900 or outside Winnipeg at 1-888-MBHYDRO (1-888-624-9376)

You will be referred to the local district office for further instruction.

REGULATIONS

There are several federal and provincial agencies overseeing the operation of and around natural gas pipelines and electric cables. The following regulations and safe practice guides specify requirements for both the contractor and the utility:

- Manitoba Gas Pipeline Act, Regulation 140/92 – Provides the legal definition of an excavation and outlines Excavator and Utility responsibilities.
- National Energy Board Pipeline Damage Prevention Regulations: Authorizations, SOR/2016-124; Obligations of pipeline companies, SOR/2016-133
- Manitoba Workplace Safety and Health Act and Regulation M.R. 217/2006 including Part 26, Excavations and Tunnels - Describes legal responsibilities in regards to excavating safely.
- Guideline for Excavation Work, Manitoba Workplace Safety & Health Division.
- CSA Z247 Damage Prevention Standard.

DEFINITIONS

Daylighting – A term used to describe the uncovering and exposing of underground utilities to daylight without the use of mechanical excavation.

Excavation – includes digging, boring, pushing, ploughing, trenching, grading, post installation and breaking and displacement of soil or other material below the existing level of the ground that will disturb more than the top 150 mm (6 inches) of the ground.

High Pressure gas line – A natural gas line that operates in excess of 700 KPa (100psi).

Hydrovac – A truck or trailer that injects pressurized water from an onboard reservoir tank into the ground through a handheld wand. As the soil cover is liquefied, the resulting slurry is simultaneously extracted by a powerful vacuum and stored in an onboard debris tank for later disposal.

Large diameter pipeline – A natural gas pipeline that is 168.3 mm (6 inches) in diameter or larger, regardless of operating pressure.

Safety Watcher – A person designated by Manitoba Hydro to ensure that workers are not put at risk as a result of special hazards on the work site.

Sonde - A transmitter behind the bore head which registers angle, rotation, direction and temperature data.

Tolerance Zone – The space in which a line or facility is located, and in which special care is to be taken.

White lining – Designating the route and/or work area of the excavation using white paint, stakes and/or flags to outline the work area prior to the locator arriving on the site.

EXCAVATOR PRE-MARKING

Pre-marking your proposed work site allows excavators to accurately communicate to Manitoba Hydro's facility locators where the excavation is to occur. This may be accomplished either electronically or by white lining.

For excavator pre-marking, contact ClickBeforeYouDigMB.com or call 1-800-940-3447 to communicate where the excavation is to occur and:

- Attach a sketch or map that clearly identifies the excavation area via email or
- Pre-mark the excavation area by white lining

In either scenario you will be issued a reference number and notified of the day the locator will be on site.

When a project is too large for or not conducive to pre-marking, face-to-face meetings between Manitoba Hydro's facility locator and the excavators will be arranged at the proposed work site.

White Line

The excavator designates the route and/or area of the excavation using white paint, stakes and/or flags to outline the work area prior to the locator arriving on the site.

White paint, white stakes or white flags with the excavator's company identifier on them are permissible methods of marking.

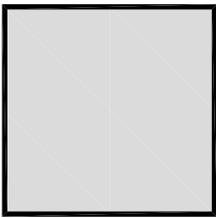
When using stakes or flags to mark the excavation work area, do not drive them into the ground deeper than 150 mm (6 inches). Any activity which disturbs more than 150 mm (6 inches) must have the facilities located.

Guidelines for excavation marking

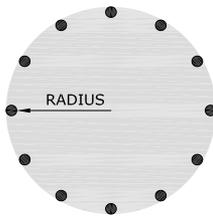
The following marking illustrations are examples of how excavators may choose to mark their area of proposed excavation. The use of white marking products (e.g. paint, flags, stakes, or a combination of these) may be used to identify the excavation site.

Mark in white paint the proposed area of excavation through the use of a continuous line, dots marking the radius or arcs, dashes marking the four corners of the project, or dashes outlining the excavation project. The recommended size of each dash is approximately 150 – 300 mm (6-12 inches) in length and 20 mm (3/4 inch) in width with interval spacing approximately 1 – 5 metres (3-16 feet) apart. The maximum separation of excavation marks is to be reduced to a length that can be reasonably seen by the operator's locators when the terrain or excavation site conditions warrant it. Dots of approximately 20 mm (3/4 inch) diameter are typically used to define arcs or radii and may be placed at closer intervals in lieu of dashes.

SINGLE POINT EXCAVATION MARKINGS

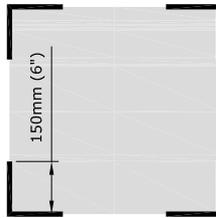


FULL LINE

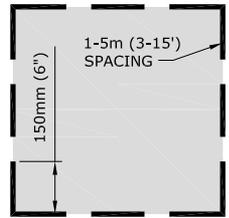


STAKE IN CENTRE WITH
COMPANY NAME & RADIUS
OF CIRCLE

RADIUS OR ARC



FOUR CORNERS



DASH LINE

If an excavation is contained within a 5 metre (16 feet) maximum radius then it can be marked with a single white stake at the centre of the excavation. The stake must clearly state the company identifier and the radius of the excavation in black lettering. This information must be conveyed to Manitoba Hydro.

After the area is Pre-Marked

On the appointed date, the locator will identify the Manitoba Hydro facilities that are located in the designated work area. They will document it using a sketch or map attached to the Electric and/or Natural Gas Facilities Locate Form.

When the locator has completed locating the facilities, they will advise the excavator and indicate whether there is a conflict. The Facilities Locate form will be available and must be on site prior to excavating.

The Manitoba Gas Pipeline Act, Regulation 140/92 and the Workplace Safety and Health Act, regulations M.R.217/2006, part 26.6 require that a valid Facilities Locate form be on the work site at all times until the project is complete.

If an excavation takes place without a current locate form on site, the locate is not valid. The excavator could face consequences which may include fines and/or sanctions by Manitoba Workplace Safety and Health and Manitoba Hydro.

APWA UNIFORM COLOUR CODE

Underground utility marking

	WHITE – Proposed Excavation
	PINK – Temporary Survey Markings
	RED – Electric Power Lines, Cables, Conduit and Lighting Cables
	YELLOW – Gas, Oil, Petroleum, or Gaseous Materials
	ORANGE – Communication, Alarm or Signal Lines, Cables or Conduit
	BLUE – Potable Water
	PURPLE – Reclaimed Water, Irrigation and Slurry Lines
	GREEN – Sewer and Drain Lines

GUIDELINES FOR EXCAVATION NEAR ELECTRICAL AND NATURAL GAS LINES

Hand Digging to Expose Lines

Mechanical excavation cannot be used within 1 metre (39 inches) of an electrical or gas line until the line is physically exposed by hand. Hand exposing means exposing a buried facility, whose location has been marked by Manitoba Hydro, using non-powered tools such as a Spade or shovel (hand augers are not acceptable). A water pressure/vacuum system (hydrovac) is an acceptable alternative.

There are several things to remember when hand exposing:

- No one should ever jump on or use their entire body weight on a shovel when digging.
- Use a prying (rather than striking) motion to loosen hard dirt.
- Never probe for the facility using a sharp pointed tool such as a pick axe or pointed bar.
- Dig on an angle if possible, such that any contact with the facility is a glancing blow rather than a direct hit.

Once the line is visible, mechanical excavation equipment can be used in accordance with the guidelines for mechanical excavation.

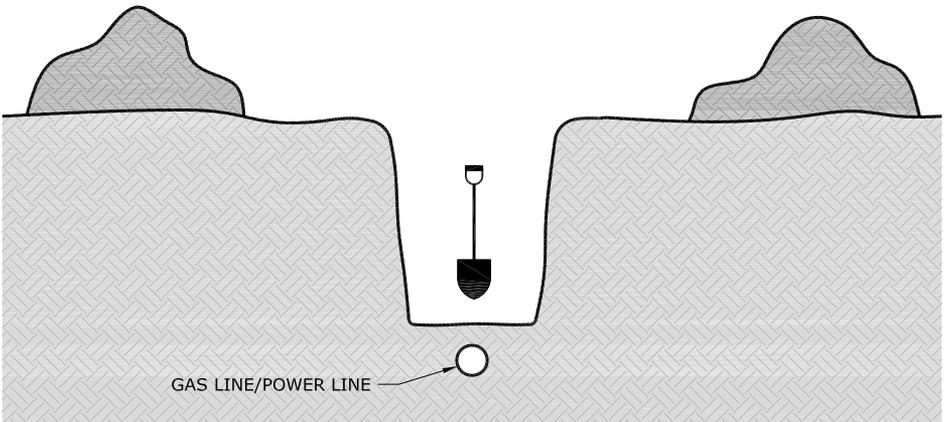
Water Pressure/Vacuum System (Hydrovac)

An alternative to exposing cables by hand digging is to use a water pressure/vacuum system capable of exposing Manitoba Hydro facilities without damage.

Only oscillating head type nozzles are to be used for the water wand. When excavating within 1 metre of a marked line the maximum setting of 38°C (100°F) water temperature and 10,342 Kpa (1,500 psi) must not be exceeded. The end of the vacuum tube shall be neoprene or equivalent. Expose the buried line by using a sweeping motion only, perpendicular to the locate markings, until the line is sighted. **IMPORTANT: After sighting, the line shall not be contacted by spray or vacuum to avoid damage to wraps and coatings.**

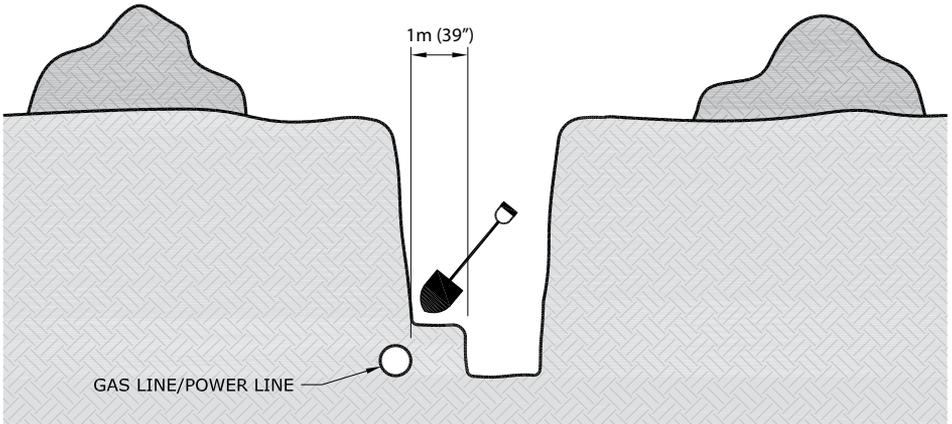
Some acceptable excavation methods:

a) Dig Vertically



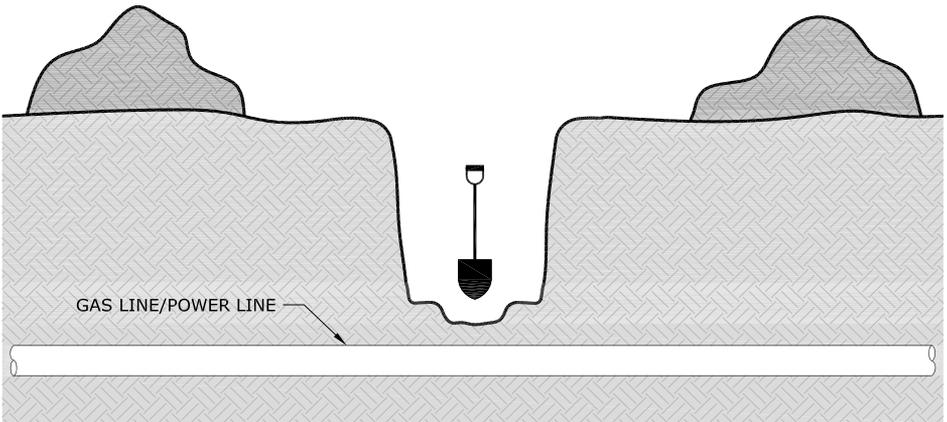
Dig a hole with a shovel directly above the line location until the line is exposed. Take care not to damage the line or coating. Mechanical excavation equipment **MUST NOT** be used to widen or deepen the hole before exposing the line.

b) Dig Laterally



Dig a trench or bell hole 1 metre (39 inches) from the line location, parallel to the line, then hand dig laterally to expose the line.

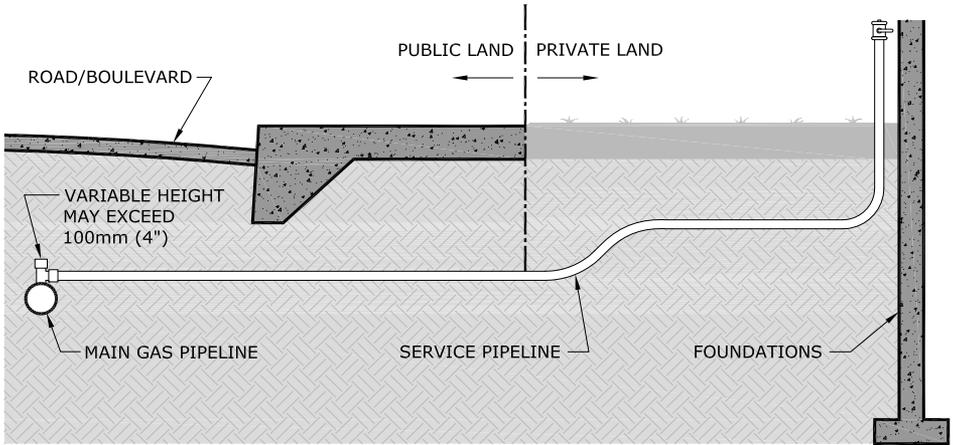
c) Dig Trench and excavate



Dig a trench by hand across the full width of the excavation (perpendicular to or “across from” the line). If the line is not uncovered, mechanically excavate to one half the depth of the trench. Repeat this process until the line is exposed.

Typical Gas Service Installation

(example only does not represent all installations)

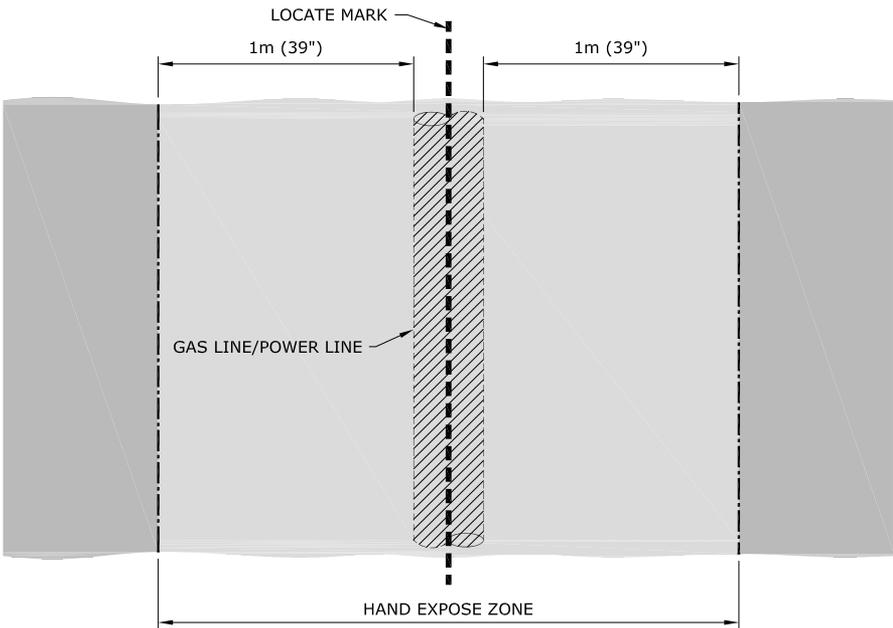


Fittings such as active or abandoned service tees may be present on gas pipelines, exercise care when excavating.

General Approach

- When the line is not visible, mechanical excavation shall not be used within 1 metre (39 inches) of an electrical or gas line.
- When the line is visible, mechanical excavation can be used no closer than 450 mm (18 inches) to natural gas lines and 600 mm (24 inches) to electrical lines.
- When soil conditions permit, a smooth edge bucket is preferred when excavating near gas and electrical lines.
- An observer (excavator staff) located near the line must maintain communication and control of the operator at all times by the use of hand signals and verbal communication. The observer is responsible for maintaining the minimum distance from the pipe. If at any point the observer or operator is unclear of the location or orientation of the line, no digging shall occur until this is confirmed and agreed upon by all on the worksite.

Before line is exposed



Crossing Lines

- When crossing a line, the line is to be exposed for the width of the excavation.
- After the line is daylighted, and provided there is space for excavator access, it is recommended that excavation near the line be performed parallel to the line.

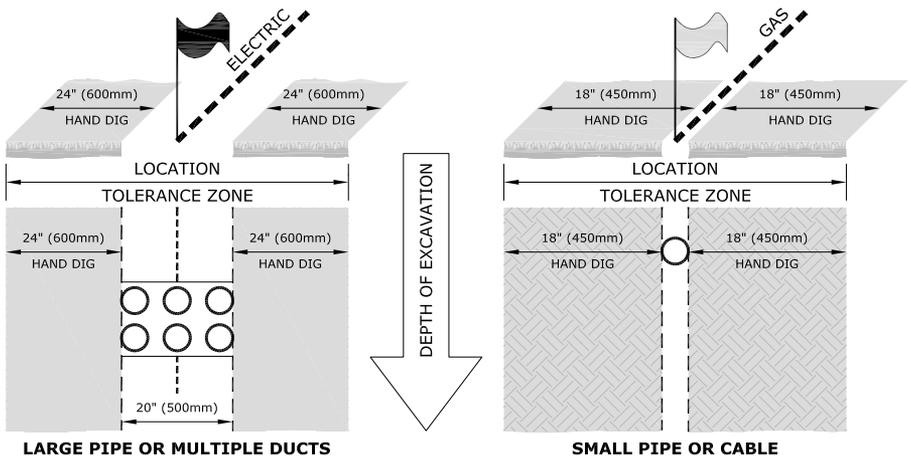
Working Parallel to Lines

- When working parallel to a line it is not necessary to expose the full length of the line to reduce the acceptable mechanical excavation separation. A series of daylight holes along the line is acceptable. The distance between daylight holes will be a maximum of 10 metres (33 feet) or as required to define the location of the line. Daylight holes must be large enough to expose the full width of the line or lines.
- After daylighting and previewing of the line, marks shall be placed a minimum of 450 mm (18 inches) from the outside of the line at each daylight hole for gas and 600 mm (24 inches)

for electrical lines. This tolerance zone should be marked along the entire length of the work area to ensure that the operator maintains proper alignment with the line. With the line daylighted and the tolerance zone marked, it is acceptable to use mechanical excavation on the outside of the marked line of the tolerance zone.

- If at any point the line becomes obscured, it shall be remarked immediately. The observer is responsible for maintaining the minimum distance from the pipe by confirming the machine's distance and alignment with the line. The operator will orient his machine parallel to the line so their bucket remains more than 450 mm (18 inches) away for gas and 600 mm (24 inches) away for electric lines. They must preview the work prior to entering their machine and prior to any trenching.

Once line is exposed



Hard Surface Removal

- Mechanical equipment can be used to remove the asphalt or concrete road/sidewalk surface and should only be used to the depth of that surface.
- Avoid starting the pavement break directly over the marked facility.
- Start a few feet away from the marks and attempt to “peel off” the pavement or break it into small chunks for removal.

Line Exposed

When a length of line is exposed consult the utility for proper handling procedures. The line may need to be supported to prevent settling or sagging.

No Relocation

The line shall not be moved or relocated. No operation or work shall be done that would put stress on the line.

Inspect for Damage

Electric Power Lines – If you suspect a power cable has been damaged, contact Manitoba Hydro to inspect the cable. Do not contact the cable as it may be energized.

Gas Pipelines – Thoroughly clean (with water only) and inspect the exposed gas line for damage to the pipe, yellow plastic pipe covering or tracer wire (used on plastic pipe). If damage is found, notify Manitoba Hydro. They will repair minor damage to the pipe coating or tracer wire at no charge.

Report Contact or Damage – Any contact with or damage to any line or underground cable must be reported immediately to Manitoba Hydro.

Backfilling

To prevent settling or stress, the contractor is required to place clean fill under the power or gas line and compact the fill. The backfill material must be free of rocks, sharp objects or other material that could damage the line.

If the backfill material is frozen, it should be free of large frozen lumps of soil. The backfill material must be gradually placed, not dumped, on the line. Alternatively, the line may be hand padded with 300 mm (12 inches) of screened sand or soft fill before backfilling.

If mechanical protection is required, or if the backfill contains rocks, the cable or pipeline must be enclosed in a 150 mm (6 inches) envelope of screened sand.

Access

Manitoba Hydro utility personnel shall have access to the excavation to inspect the underground line at any time during construction.

Project Closeout

When the excavation project has been completed all flags and stakes used to mark gas and electric lines shall be removed from the site.

SAFETY WATCH

Safety Watch is a program where an employee qualified by Manitoba Hydro observes the excavation work in progress and determines actions to be taken by the contractor to prevent injury, property damage or damage to Manitoba Hydro facilities.

Safety Watch personnel work with the excavator to check that:

- the excavation is done safely;
- rules and procedures related to the excavation are followed;
- the plant is located accurately;
- all documentation is accurate and complete;
- Hydrovac guidelines are followed.

Safety Watch personnel shall be recognized as an authority on site with the ability to shut the job down.

When is a Safety Watch required?

Any excavation within 3 metres (10 feet) of a cable or pipeline may require a Safety Watch. The need for a safety watch will be assessed and identified on the Facilities Locate form. The decision to provide a Safety Watch will be based on the excavation proposed, the type of cable or pipeline, and the proximity of the excavation to the cable or pipeline.

Why is a Safety Watch done?

Safety Watch service is provided to ensure the safety of customers and their contractors when working in close proximity to either energized electrical or pressurized gas lines. In addition, this protects the integrity of the utility lines minimizing the chance of an outage.

NOTE: Typically, Safety Watch personnel are not provided for low voltage conductors (under 750 volts) or distribution pressure gas mains and services under 168.3 mm (6 inches) diameter. However, Manitoba Hydro staff may assess the situation and choose to provide Safety Watch personnel where conditions warrant.

Who pays for a Safety Watch?

Generally, Safety Watch service is provided at no cost to the homeowner for minor projects. For larger projects, the contractor may be charged at a cost shared rate. Contact the local district office for further information.

How to arrange for a Safety Watch.

When an underground line is located in response to a Click Before You Dig request, the Manitoba Hydro employee will indicate whether a Safety Watch is required. Call Manitoba Hydro to arrange for a Safety Watch appointment a minimum of three business days before any excavation is to occur.

DIRECTIONAL BORING – CONTRACTOR GUIDELINES

As with all ground disturbance activity, the excavator must first obtain a facilities locate from Manitoba Hydro.

The distance measured to Manitoba Hydro electrical conductor or gas pipeline must always be measured from the **outside** diameter or wall of the Manitoba Hydro facility to the outside diameter of the back reamer. The same measuring methodology must be used when paralleling Manitoba Hydro facilities.

When boring within the tolerance zone of a high pressure or large diameter gas pipeline or any critical distribution gas pipeline or electrical conductor, as identified by Manitoba Hydro's Facilities Locate personnel, qualified natural gas or electric Safety Watch personnel are required.

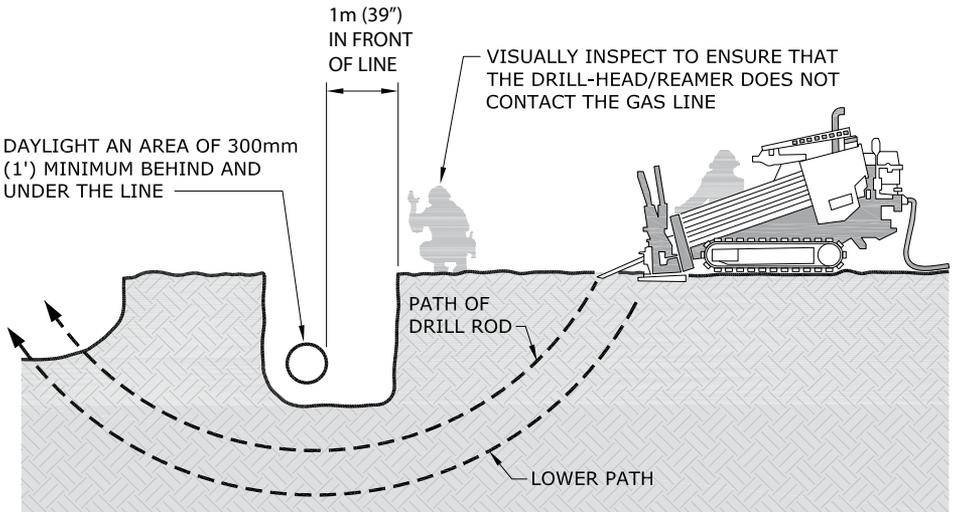
Electrical Conductors and Gas Pipelines

Prior to directional boring across Manitoba Hydro gas and electrical lines, the buried depth must be confirmed. Acceptable practice to verify line depth is to:

- Expose the line by hand digging, or
- Expose the line by water pressure/vacuum excavation; or
- Locate on the side wall of a trench that has been excavated 1 metre (39 inches) on either side of the surface locates; or
- Use reference measurements that are known to be accurate, for example: electrical duct lines.

The drill head and/or back reamer should at all times maintain a minimum of 1 metre (39 inches) clearance from all Manitoba Hydro lines.

Where underground facility congestion does not effectively allow a 1 metre (39 inches) clearance/separation from Manitoba Hydro lines, the contractor may consult with Manitoba Hydro Engineering for site specific direction. Any deviations in clearances/separations must be provided in writing and must be present on-site when the work is being performed.



Observation Hole Required When Crossing Any Manitoba Hydro Facility

The accuracy of the drill head location and depth must be visually verified 1 metre (39 inches) prior to crossing Manitoba Hydro facilities. An observation or discovery hole is required.

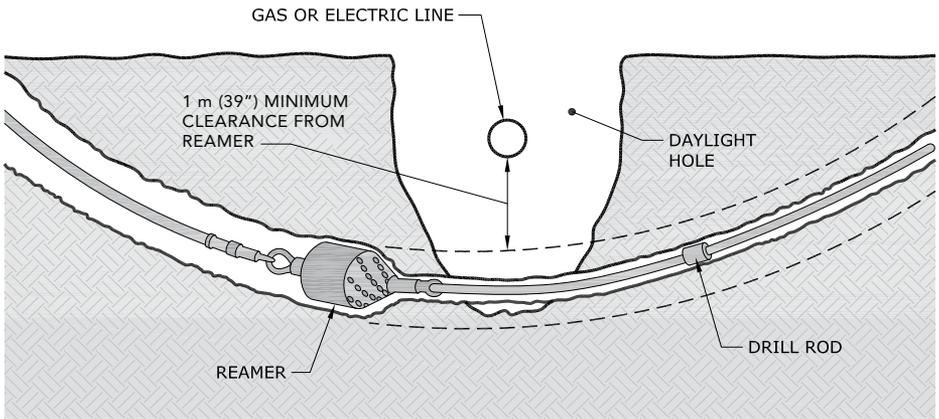
Acceptable practice for opening up the observation hole is using water pressure/vacuum or hand digging.

When boring head and/or back reamers path is crossing above a natural gas pipeline or electrical conductor the boring head and/or back reamer must be visually observed crossing the facility.

When the boring head and/or backreamer's path is crossing below a gas pipeline or electrical conductor an observer must verify that the bore head and/or reamer does not enter the observation hole within 1 metre of the line.

The minimum dimensions of the observation/discovery hole MUST BE:

- 1 metre (39 inches) in front of the gas pipeline or electrical conductor on the near side of the bore path;
- 300 mm (12 inches) on the far side of the bore path;
- 300 mm (12 inches) on each side of the bore path;
- 300 mm (12 inches) below natural gas pipeline or electrical conductor.



Drilling Parallel to Manitoba Hydro Facilities

Paralleling Electrical Conductors & Natural Gas Pipelines

There must be 1 metre (39 inches) of separation between the outside diameter of the back reamer assembly and the outside diameter of any Manitoba Hydro electrical conductors or natural gas pipelines.

NOTE: When drilling within 1 metre (39 inches) horizontally, the drill must be kept at a depth either deeper or shallower than the existing electrical conductor or natural gas pipeline to maintain 1 metre (39 inches) separation when measured diagonally.

If 1 metre (39 inches) horizontal separation cannot be maintained, the electrical conductor or natural gas pipeline adjacent to the bore path must be exposed. When it is not possible to de-energize electrical conductors, a Safety Hold-Off must be in place and qualified Safety Watch personnel must be on site.

When suspected of drilling within 1 metre (39 inches) of any gas or electrical lines determined by the boring head (sonde) position readings and the proximity to the locate marks, the location of the conductor or pipeline shall be verified; the electrical conductor or natural gas pipeline adjacent to the bore path must be hand exposed or exposed by water pressure/vacuum excavation as determined by Manitoba Hydro. The frequency of exposures depends on the consistency of the alignment of the existing facility.

Manitoba Hydro facilities must be exposed a minimum of once every 10 metres (33 feet), to confirm alignment. Where there is an alignment change indicated by the locator marks, the Manitoba Hydro facility shall be visually confirmed at each alignment deviation.

UNPLANNED CONTACT WITH ELECTRIC OR NATURAL GAS LINES

This guideline applies to people who come in contact with or simply expose a buried utility line while excavating.

Anyone who comes in contact with buried utility lines should contact the utility owner immediately. Although there may be no apparent external damage, the impact of striking a line can cause internal structural damage that can only be determined and repaired by qualified utility personnel. Generally, we do not charge for this inspection and coating repair.

Abrasions

Even if contact does not cause the utility line to stop working, a nick or cut to the outer, protective sheath of the utility line can allow ground water, laden with salts and other caustic substances, to corrode the line. Abrasions may compromise the sidewall strength of a plastic, steel or aluminum gas line.

Aerial

Cables suspended along utility poles can easily be damaged if struck by a vehicle or a mechanical implement like a hydraulic lift. Cable clamps and other attachments can be pulled apart and component housings may hide damage to the electronic equipment inside.

Stop Work

If any equipment is snared in the utility lines, it should be left in place. Trying to extract, flex or manipulate the line can compound the damage. Operations at the site shall stop immediately. Operators should stay in the equipment unless it is not safe (as in the case of a fire) and all others should be kept clear of the equipment as it may have become energized. If you must leave the equipment, jump clear with both feet together so you are not in contact with the equipment and the ground at the same time. Continue to hop or shuffle with your feet close together until you are a safe distance away.

Call It In

The person involved in the incident should call Manitoba Hydro immediately and report the location of the hit. (In Winnipeg at 204-480-5900 or outside of Winnipeg at 1-888-624-9376.) The exact address, or street intersection, along with what type of contact occurred, will help the utility respond in an appropriate manner.

Click  **Before**
YouDigMB.com[®]

Or call 1-800-940-3447

In addition to contacting
ClickBeforeYouDigMB.com
be sure to contact other
underground services in the area.

For more information visit
hydro.mb.ca

APPENDIX 'C'

GELCAP KIT



My Cart | My Part Lists | Sign In/Register

English (Change)

What can we help you find?

Submit

[Products](#) [Industries](#) [Resources](#) [About TE](#) [My Account](#) [Innovation](#) [Support Center](#)

GELCAP-SL-2/0-3HOLE(B10) Product Details

Share Print Email



GELCAP-SL-2/0-3HOLE (B10)

TE Internal Number: F40658-000



Power Cable Splices, Repair Sleeves and End Seals

Always EU RoHS/ELV Compliant (Statement of Compliance)

Product Highlights:

- Cable Splice
- Splice Type = Stub Splice
- Splice Style = Cap
- GelCap-SL Series
- Motor Connections Application, Street Lights Application

[View all Features](#)

Quick Links

- [Pricing & Availability](#)
- [Search for Tooling](#)
- [Product Feature Selector](#)
- [Contact Us About This Product](#)

[Add to My Part List](#) [Request Sample](#) [Find Similar Products](#) [Buy Product](#)

Documentation & Additional Information	
<p>Product Drawings:</p> <ul style="list-style-type: none"> • None Available <p>Catalog Pages/Data Sheets:</p> <ul style="list-style-type: none"> • None Available <p>Product Specifications:</p> <ul style="list-style-type: none"> • None Available <p>Application Specifications:</p> <ul style="list-style-type: none"> • None Available <p>Instruction Sheets:</p> <ul style="list-style-type: none"> • None Available <p>CAD Files:</p> <ul style="list-style-type: none"> • None Available 	<p>Additional Information:</p> <ul style="list-style-type: none"> • Product Line Information <p>Related Products:</p> <ul style="list-style-type: none"> • Tooling

Product Features (Please use the Product Drawing for all design activity)	
<p>Product Type Features:</p> <ul style="list-style-type: none"> • Product Type = Cable Splice • Splice Type = Stub Splice • Splice Style = Cap • Series = GelCap-SL • Cable Type = Polymeric • Retention Type = Clamp • Armored Cable = No • Jacketed Cable = With <p>Mechanical Attachment:</p> <ul style="list-style-type: none"> • Installation Type = Cold Applied <p>Configuration Features:</p> <ul style="list-style-type: none"> • Conductor (Wire) Size = #14 - 2/0 • Cable Shielding = Without 	<p>Industry Standards:</p> <ul style="list-style-type: none"> • RoHS/ELV Compliance = RoHS compliant, ELV compliant • Lead Free Solder Processes = Not relevant for lead free process • RoHS/ELV Compliance History = Always was RoHS compliant <p>Printer/Label Features:</p> <ul style="list-style-type: none"> • Voltage Rating (kV) = 0.6 <p>Operation/Application:</p> <ul style="list-style-type: none"> • Application = Motor Connections, Street Lights <p>Other:</p> <ul style="list-style-type: none"> • Brand = Raychem • Comment = Clear cap to allow visual inspection.; Port B - power port to light - #14-6 AWG; Kits include connectors

Corporate Information

- [About TE](#)
- [Investors](#)
- [News Room](#)
- [Supplier Portal](#)
- [Careers](#)
- [Terms & Conditions](#)
- [Privacy Policy](#)

Quick Links

- [Distributor Inventory](#)
- [Product Cross Reference](#)
- [Documents & Drawings](#)
- [Product Compliance Support Center](#)
- [Site Map](#)

Customer Support

- [Email or Chat With Us](#)
- [Find a Phone Number](#)
- [Knowledge Base](#)
- [Manage Your Account](#)

Keep Me Informed



APPENDIX 'D'

ELECTRIC GAS LOCATE



ELECTRIC AND/OR NATURAL GAS FACILITIES LOCATE
DEMANDE DE LOCALISATION DE CONDUITES
D'ÉLECTRICITÉ ET DE GAZ NATUREL

In case of Emergency, call /
 En cas d'urgence, composez le
 480-5900 or / ou
 1-888 MB HYDRO (1-888-624-9376)
 outside / à l'extérieur de Winnipeg



Address or location of work / Adresse ou site des travaux				Notice given by / Avis signifié par			
Name of contact on site / Nom de la personne-ressource sur le site		Contact tel. no. / Tél. de la personne-ressource		Company name (if applicable) / Nom de l'entreprise (s'il y a lieu)		Company tel. no. / N° de tél. de l'entreprise	
Description of work / Description des travaux							
Map no. / N° de carte		MIT Application #		Asbuilt no. / N° de plan définitif		DATE REQUIRED / DATE DEMANDÉE	yyyy mm dd / a. m. j.
						TIME REQUIRED / HEURE DEMANDÉE	hh mm / h min. <input type="checkbox"/> A.M. <input type="checkbox"/> P.M.

High pressure / Haute pression	Gas main / Conduite principale de gaz	Service line / Ligne de desserte	Size / Taille	High voltage > 750 V / Haute tension > 750 V	Secondary / Secondaire	Overhead line / Ligne aérienne	Under-ground cable / Câble souterrain	Address or location of work / Adresse ou site des travaux

Excavation constitutes a danger to the electrical cables and natural gas mains indicated below. / Les travaux d'excavation comportent des risques pour les câbles électriques et les conduites de gaz naturel indiqués ci-dessous.

Only the following utilities have been marked / Les services suivants sont les seuls à avoir été marqués :

- Electrical / Électrique :** RED markings, flags or marked stakes indicate power utility cables. / Les marques, les drapeaux ou les piquets **ROUGES** indiquent la présence de câbles électriques.
- Natural Gas / Gaz naturel :** YELLOW markings, flags or marked stakes indicate natural gas lines. / Les marques, les drapeaux ou les piquets **JAUNES** indiquent la présence de conduites de gaz naturel.

Sketch is for illustration purposes only. It is not to scale or in reference to property lines. Refer to actual stakes or markings for location(s). / Le croquis n'est qu'une illustration. Il n'est pas à l'échelle et il ne représente pas les limites des propriétés. Pour connaître l'emplacement exact, consulter les marques ou les piquets eux-mêmes.

Location or sketch / Emplacement ou croquis

See attached / Voir documents ci-joint

SAFETY WATCH REQUIRED / EXIGENCE DE SURVEILLANCE DE SÉCURITÉ :

Electricity / Électricité

Natural Gas / Gaz naturel

Notify the Utility at least **2 business days in advance** of excavation to request a Safety Watch / Avertir l'entreprise **2 jours ouvrables avant les travaux** d'excavation pour demander une surveillance de sécurité.

Work area is within three metres of overhead line. / La zone de travail est à moins de 3 mètres de distance d'une ligne aérienne.

Excavation area is within three metres but at least one metre away from power cable or gas line location. / La zone d'excavation est à moins de 3 mètres et à plus d'un mètre d'un câble électrique ou d'une conduite de gaz.

Hand dig within one metre of all markings/staking. / Creusez manuellement à moins d'un mètre des marques et des piquets.

Contact the Utility for further instructions before working/digging. / Communiquez avec le service public avant de commencer à travailler ou à creuser pour obtenir des instructions additionnelles.

Utility contact name / Personne-ressource (entreprise)

Tel. no. / N° de tél.

Prepared by (print name) / Fait par (nom en caractères d'imprimerie)		Employee signature / Signature de l'employé(e)		DATE ADVICE GIVEN / DATE DES CONSEILS	yyyy mm dd / a. m. j.
Received and conditions noted by (print name) / Reçu et conditions acceptées par (nom en caractères d'imprimerie)			Signature / Signature		

The recipient (must be 18 years of age or older) acknowledges receipt of the advice herein; and accepts and agrees to the Terms and Conditions as set out on the reverse. / Le récipiendaire, qui doit être âgé de 18 ans ou plus, reconnaît avoir reçu les conseils indiqués dans la présente et accepte les conditions générales indiquées au verso.

DISTRIBUTION / DISTRIBUTION : ORIGINAL / ORIGINAL – Office / Bureau COPY / COPIE : Customer / Abonné

TERMS AND CONDITIONS:

Wherever used herein, Utility refers to Manitoba Hydro and any employees or agents of the Utility.

You, by signing the front of this Electric and/or Natural Gas Facilities Locate, acknowledge that you are the owner, or an authorized agent for the owner of the location(s) of the excavation ("You") and You agree as follows:

1. The Utility shall not be liable for any claims, damages, costs, liability, damage to property, or injury or death arising from, or caused by the work or excavation, or failure to abide by the location advice or any other terms or conditions provided herein;
2. You agree to indemnify the Utility, its successors and assigns, from and against all causes of action, claims, damages, costs, liability, demands, damage to property, and injury or death which may be alleged, claimed or brought against the Utility by You, your heirs, successors, assigns, employees, contractors, invitees, or by any other third party, in respect or arising out of the work or excavation, or failure to abide by the location advice or any other terms or conditions provided herein;
3. You are responsible to provide supervision and safety watching services in respect of any work or excavation, unless it is otherwise indicated herein that the Utility shall provide same, in which case You are responsible to arrange for same with the Utility as outlined herein;
4. You shall immediately upon demand reimburse the Utility for any losses, claims, costs, or damages to the facilities of the Utility caused by or arising out of the work or excavation, or failure to abide by the location advice or any other terms or conditions provided herein.

INSTRUCTIONS:

Do not excavate (including digging, boring, pushing, ploughing, or trenching the ground) without first hand digging to expose lines at a number of locations sufficient to determine their exact position and depth. If any location appears not to coincide with the markings or stakes, contact the Utility for confirmation of the location. If exposed by the excavation, cable or pipe must be inspected by the Utility for damage or safety hazards.

Do not attempt to locate lines by probing the ground with any pointed tool or object.

Stakes and markings are provided only for the work area specified by you. If work has not started within 14 days after the locate is completed by the Utility, you must again notify the Utility to re-mark the work area and provide an updated Electric and/or Natural Gas Facilities Locate form. Notify the Utility of any changes in the nature of work or work area at least two business days before beginning excavation. This form must be kept at the work area until all work has been completed. Any changes in the work or work area that was originally specified by you may require additional staking. Work should not proceed until you have received a new Electric and/or Natural Gas Facilities Locate and all facilities are located and marked.

During the course of the work on any excavation, the excavator shall maintain, and keep in a visible condition, any markings placed there by the Utility. Do not proceed if the stakes or marks have become obliterated or are displaced. From the start of the excavation and until work and backfilling is completed, you must take every precaution to ensure that no damage will result to the lines, their coatings, protective wrapping or cathodic protection devices and no stress will be applied to the lines.

Do not move lines or other installations, dangerous conditions may result at this or other locations.

Safety Watch and High Pressure excavations (as indicated on the front of this form) must be supervised by the Utility.

CAUTION:

Notify the Utility of any damage, or gas and power line disturbances immediately at 480-5900 or 1 888 MB HYDRO (1-888-624-9376) outside Winnipeg.

If natural gas leaks, you must do the following:

- Notify all persons in any premises that may be affected
- Keep traffic and pedestrians out of the area; and
- Do not backfill any damaged facilities until the damage has been inspected by the Utility and the Utility has authorized the backfill.

Leaking natural gas must be allowed to dissipate into the air.

BACKFILLING PRECAUTIONS:

When backfilling, ensure that the cables or pipes will remain in their original position during settlement by thoroughly tamping the backfill under them; and keeping them supported.

Manitoba Hydro only locates facilities that it owns and has no knowledge of or responsibility for locating facilities owned by others.

These instructions are provided as an on-site reference. All excavations must adhere to the current Department of Labour Workplace Safety and Health Regulations and Manitoba Gas Pipe Line Excavations Regulations of the Gas Pipe Line Act. Copies of these acts can be obtained from the Utility or the Queen's Printer.

CONDITIONS GÉNÉRALES

Dans les présentes, chaque fois que le terme « Entreprise » est utilisé, il fait référence à Manitoba Hydro, ainsi qu'à tout employé ou agent de l'Entreprise.

En signant au recto le présent formulaire de demande de localisation des conduites d'électricité et de gaz naturel, vous reconnaissez que vous êtes le propriétaire de l'emplacement (des emplacements) de l'excavation ou un agent autorisé de ce dernier (« vous ») et vous convenez de ce qui suit :

1. *L'Entreprise ne doit pas être tenue responsable de toute réclamation ou responsabilité, ou de tous dommages-intérêts, coûts ou dommages causés à la propriété, ou de toute blessure ou tout décès découlant de l'excavation ou causés par cette dernière, ou par tout défaut de respecter les conseils relatifs aux excavations ou toute condition de la présente demande.*
2. *Vous acceptez de garantir l'Entreprise, ses successeurs et ayants droit, contre toute cause d'action, réclamation, responsabilité ou obligation, ou contre tous dommages-intérêts, coûts ou dommages causés à la propriété, ou contre toute blessure ou tout décès qui peuvent être présumés, réclamés ou déposés contre l'Entreprise par vous-même, vos héritiers, successeurs, ayants droit, employés, entrepreneurs ou invités, ou par toute tierce partie, relativement aux travaux ou à l'excavation ou à tout défaut de respecter les conseils relatifs aux excavations ou toute condition de la présente demande.*
3. *Il vous incombe de fournir une supervision et des services de surveillance de sécurité en rapport avec vos travaux ou votre excavation, sauf s'il est indiqué ailleurs dans la présente demande que l'Entreprise est responsable de fournir une telle supervision et de tels services de surveillance. Dans un tel cas, vous êtes responsable de prendre les dispositions appropriées avec l'Entreprise pour assurer une telle supervision et de tels services de surveillance.*
4. *Sur demande, vous devez rembourser immédiatement à l'Entreprise toutes les pertes ou sommes réclamées, ou tous les coûts, dommages-intérêts ou dommages causés aux installations de l'Entreprise qui découlent des travaux ou de l'excavation ou qui sont causés par ces derniers ou par tout défaut de respecter les conseils relatifs aux excavations ou toute condition de la présente demande.*

INSTRUCTIONS

N'entrez jamais des travaux d'excavation, y compris le creusage ou le forage de trous, l'entassement ou le labourage du sol, ou le creusage d'une tranchée, sans tout d'abord creuser manuellement pour exposer les conduites à suffisamment d'endroits pour établir leur position et leur profondeur exactes. Si un emplacement ne semble pas coïncider avec les marques ou les piquets, communiquez avec l'Entreprise pour confirmer l'emplacement. Toute ligne ou conduite exposée par les travaux d'excavation doit être inspectée par l'Entreprise afin de vérifier si elle présente des dommages ou des risques pour la sécurité.

N'essayez jamais de localiser des conduites en sondant le sol à l'aide d'un objet ou d'un outil pointu.

Les piquets et les marques ne sont fournis que pour la zone des travaux que vous délimitez. Si les travaux ne sont pas entrepris dans les quatorze jours qui suivent la localisation effectuée par l'Entreprise, vous devez communiquer avec l'Entreprise pour faire poser à nouveau des piquets et soumettre un formulaire de localisation de lignes électriques et de conduites de gaz naturel mis à jour. Vous devez signaler à l'Entreprise toute modification apportée à la nature ou à la zone des travaux au moins deux jours ouvrables avant d'entreprendre l'excavation. Ce formulaire doit demeurer sur le site des travaux jusqu'à ce qu'ils soient terminés. Toute modification apportée à la nature ou à la zone des travaux originalement délimitée peut exiger un piquetage additionnel. Les travaux ne devraient pas être entrepris avant que vous ne receviez un nouveau formulaire de demande de localisation de conduites d'électricité et de gaz naturel et que toutes les installations ne soient localisées et marquées.

Les piquets et les marques doivent demeurer visibles et en bon état. N'entrez pas les travaux si les piquets ou les marques ont disparu ou ont été déplacés. Du début de l'excavation jusqu'à son parachèvement, y compris le remblayage, vous devez prendre toutes les précautions nécessaires pour veiller à ce que les lignes, leur revêtement, leur enveloppe protectrice et les dispositifs de protection cathodique ne soient pas endommagés et à ce qu'aucune contrainte ne s'applique aux lignes.

Ne déplacez pas les lignes ou les autres installations, car cela peut créer des conditions dangereuses à cet emplacement ou à d'autres emplacements.

Toute excavation qui exige une surveillance de sécurité ou porte sur des conduites haute pression (voir le recto du présent formulaire) doit être supervisée par l'Entreprise.

ATTENTION

Vous devez signaler immédiatement à l'Entreprise tous les dommages ou toute perturbation des conduites en composant le 480-5900 ou le 1 888 MB HYDRO (1 888 624-9376) (à l'extérieur de Winnipeg).

En cas de fuite de gaz naturel, vous devez adopter les mesures suivantes :

- **Avertissez toutes les personnes qui sont dans les locaux qui peuvent être visés.**
- **Éloignez les piétons et la circulation automobile de la zone.**
- **Ne remblayez jamais des installations endommagées avant que l'Entreprise n'inspecte les dommages et n'autorise le remblayage.**

Le gaz naturel qui fuit doit avoir la possibilité de se dissiper dans l'air ambiant.

PRÉCAUTIONS RELATIVES AU REMBLAYAGE

Pendant le remblayage, vous devez veiller à ce que les conduites demeurent dans leur position originale pendant le tassement du sol en pilonnant soigneusement le matériau de remblayage sous eux et en les supportant adéquatement.

Manitoba Hydro n'effectue que la localisation des installations qu'elle possède. Elle n'a aucune connaissance des installations que possèdent les autres services publics et n'assume aucune responsabilité pour la localisation de ces installations.

Les présentes instructions sont offertes à titre de référence sur place. Toute excavation doit se conformer au Règlement sur les excavations effectuées à proximité des conduites de gaz de la Loi sur les gazoducs, ainsi qu'aux règlements pertinents sur la sécurité et l'hygiène au travail du ministère du Travail. Vous pouvez vous procurer des exemplaires des documents en vous adressant à l'Entreprise ou aux Publications officielles du gouvernement provincial.

APPENDIX 'E'

SAMPLE JOB PLAN

5. HAVE WE CONSIDERED (It is critical that we make note of any changes that may occur during the work cycle)				
People	Procedures	Hardware/Equipment	Environment	Workers Affect on Environment
<input type="checkbox"/> Qualification of personnel <input type="checkbox"/> Other work groups/contractors <input type="checkbox"/> Effective Communication <input type="checkbox"/> Worker fatigue <input type="checkbox"/> Pedestrian control <input type="checkbox"/> General public <input type="checkbox"/> Traffic control <input type="checkbox"/> Safety watcher	<input type="checkbox"/> Limits of approach <input type="checkbox"/> De-energize/Isolation of apparatus <input type="checkbox"/> Safety hold off/Blocking required <input type="checkbox"/> Switching orders <input type="checkbox"/> Adequate cover-up <input type="checkbox"/> Grounding apparatus and vehicles <input type="checkbox"/> Work permit/Clearance to work <input type="checkbox"/> Permit checklists (soft dig, confined space, etc.) <input type="checkbox"/> Review rescue procedures <input type="checkbox"/> Spiking/Stethoscoping <input type="checkbox"/> Cut Hazards/Cut Resistant Gloves	<input type="checkbox"/> Inspection of equipment <input type="checkbox"/> Inspection of tools & PPE <input type="checkbox"/> Inspection of vehicles <input type="checkbox"/> Condition of structures <input type="checkbox"/> Safe loads for rigging <input type="checkbox"/> Adequate cover-up <input type="checkbox"/> Specialized tools - calibrated/tested & up-to-date	<input type="checkbox"/> Environment checklist <input type="checkbox"/> Underground locates <input type="checkbox"/> Weather conditions <input type="checkbox"/> Soil conditions/Shoring <input type="checkbox"/> Lighting conditions <input type="checkbox"/> Adjacent structures/Vegetation <input type="checkbox"/> Housekeeping <input type="checkbox"/> Emergency plan/procedure <input type="checkbox"/> Open excavations/Trench <input type="checkbox"/> Distractions and Interruptions	<input type="checkbox"/> Cause erosion <input type="checkbox"/> Release/spills (liquids/gases/solids) <input type="checkbox"/> Waste disposal (liquids/solids) <input type="checkbox"/> Noise <input type="checkbox"/> Fire <input type="checkbox"/> Species at risk (plant and animal) <input type="checkbox"/> Disturbing waterways/drainage/wetlands/burial grounds <input type="checkbox"/> Wildlife Habitat <input type="checkbox"/> Bio Security
WHAT ARE THE CHANGES?		HOW WILL THIS AFFECT YOUR WORK?		

6. HUMAN ERROR REDUCTION TOOLS (Consider which HER Tools you need to safely execute task or Critical Steps)		
<input type="checkbox"/> Stop When Unsure / Know When to Stop Stop when unclear on task / outcomes	<input type="checkbox"/> Procedure Use and Adherence Verify correct / accurate procedure	<input type="checkbox"/> Self Check STAR Stop / Think / Act / Review
<input type="checkbox"/> Questioning Attitude Identify confusion / doubt / uncertainty	<input type="checkbox"/> Effective Communication Send message / paraphrase back / acknowledge	

7. PERSONS WORKING ON THE JOB			
Designated person in charge (Print Name):	Crew cell no.:	Designated person in charge (Signature):	Date: yyyy mm dd
Print Full Names of Crew Members:			
yyyy mm dd	Initial/Sign off for Tailboard Discussion		

8. OTHER CREWS AND VISITORS		Multi-crew job coordinator	Cell phone:
Be aware of all work crews in the area.			
WHAT OTHER CREWS ARE ON SITE	PERSON IN CHARGE	HOW WILL THEIR JOB AFFECT YOURS	

Any visitors to your site shall read and sign your Plan.

WORKSITE VISITOR SIGN OFF	DATE yyyy mm dd	WORKSITE VISITOR SIGN OFF	DATE yyyy mm dd

APPENDIX 'F'

NETWORK COMMISSIONING REPORT

Network number

WORK CATEGORIES	APPLICABLE		STATE ALL DEFICIENCIES OR DISCREPANCIES	CORRECTIONS COMPLETED	
	Yes	No		Department	yyyy mm dd
Poles					
Primary System					
Secondary System					
Transformer					
Equipment Data					
Street Lights					
Connect/ Disconnects					
Regulator					
Capacitors					
URD Secondary					
URD Primary					
Terminals					
Materials Location/Condition					
Site Condition					
Sub Transmission System					
Transmission System					
Station System					
GPS Locations Synchronized					

SIGN OFFS (Network Authenticated Signatures):			
Deficiencies identified by (Customer Service Center Representative)	yyyy mm dd	Corrections completed by	yyyy mm dd
WORK COMPLETION			
I hereby accept the Construction and Workmanship of this Order and Consider it to be Complete.			
Accepted as complete by (Customer Service Center Representative)	yyyy mm dd	Accepted as complete by (Construction Manager)	yyyy mm dd

APPENDIX 'G'

GEOTECHNICAL REPORT



wood.

Geotechnical Investigation

City of Winnipeg Local Street Investigation

Winnipeg, Manitoba

WX18716

26 February 2019



Environment & Infrastructure Solutions
 440 Dovercourt Drive, Winnipeg Manitoba, Canada R3Y 1N4
 Phone: (204) 488-2997
www.woodplc.com

Geotechnical Investigation
City of Winnipeg Local Street Investigation
Wood Project Number - WX18716

Prepared for:	Dillon Consulting Limited 1558 Willson Place Winnipeg, Manitoba R3T 0Y4		
Contact:	Brad Cook, P.Eng.		
Report Distribution:			
Dillon Consulting Limited:	Brad Cook, P.Eng.		
Third Party:			
Report Classification:	Confidential		
	Name	Job Title	Signature
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Reviewed by:	Brad Wiebe., P.Eng.	Senior Associate Geotechnical Engineer	
Project Manager:	Caolan McEvoy, E.I.T., C.E.T.	Geotechnical Engineer-in- Training	
Other Technical Contributors			
Rev.	Date	Revision Notes	
0	26 Feb. 2019	Issued Final to Client	
Permit Stamp		Engineer Seal	



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Appendix A

Test Hole Logs

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Core and Test Hole Summary Tables

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Core Photo Log



1.0 Introduction

At the authorization of Mr. Brad Cook, P. Eng., of Dillon Consulting Limited (Dillon), Wood Environment & Infrastructure Solutions, a division of Wood Canada Limited (Wood), completed a pavement coring and test hole drilling program related to the pavement evaluation and potential asphalt reconstruction and rehabilitation for nine (9) street locations in the City of Winnipeg, Manitoba. Locations and scope are itemized in Table 1-1.

Table 1-1: Street Location and Investigation Scope

Street Name	Locations	Number of Cores	Number of Test Holes	Test Hole Numbers
Lyndale Drive	400 m asphalt reconstruction from Main Street Bridge to Walmer Street	8	8	TH01 to TH08
Pulberry Street	330 m asphalt reconstruction from Parkville Drive to St. Michael Road	7	7	TH09 to TH15
Flynn Street	145 m asphalt reconstruction from Barrington Avenue to Moore Avenue	3	3	TH16 to TH18
Speers Road	800 m rehabilitation from Elizabeth Road to Winakwa Road	8	-	TH-S01 to TH-S08
Traverse Avenue	750 m rehabilitation from Dollard Boulevard to Marion Street	8	-	TH-TA01 to TH-TA08
Hamel Avenue	500 m rehabilitation from Des Meurons Street to Aulneau Street	5	-	TH-H01 to TH-H05
Des Meurons Street	275 m rehabilitation from Carriere Avenue to Morier Avenue	6	-	TH-D01 to TH-D06
Hazelwood Avenue	330 m rehabilitation from Dakota Street to Dells Crescent	7	-	TH-HW01 to TH-HW07
Traynor Bay	240 m rehabilitation from St Michael Road to St. Michael Road	5	-	TH-TB01 to TH-TB05
	Total	57	18	

The geotechnical investigation was completed in accordance with the Scope of Work and Terms and Conditions outlined in Wood Proposal No. WPG2018.683 dated 19 December 2018.

2.0 Geotechnical Investigation

Prior to initiating drilling, Wood notified public utility providers (i.e. Manitoba Hydro, MTS, Shaw, etc.) of the intent to drill in order to clear public utilities, and where required, met with said representatives on-site.

On 28th and 31st of January 2019, Wood supervised the drilling and coring of a total of eighteen test holes (TH01 through TH18) on Lyndale Drive, Pulberry Street, and Flynn Street. The test hole locations are illustrated in Figure 1. All locations were cored using a 150 mm diameter core barrel, while test hole

drilling was conducted using a truck mounted Mobile B40LX drill rig equipped with 125 mm solid stem augers, owned and operated by Maple Leaf Drilling of Springfield, Manitoba.

During coring, Wood field personnel identified pavement types and thicknesses, as well as underlying granular structure, while during drilling, Wood field personnel visually classified the soil stratigraphy within the test holes in accordance with the Modified Unified Soil Classification System (MUSCS); as well as noted observed seepage and/or sloughing conditions. Soil sampling consisted of grab samples of the auger cuttings at all test hole locations. All grab samples were retained in sealed plastic bags and shipped to Wood's Winnipeg laboratory for review and selected testing. All pavement core samples were shipped to Winnipeg laboratory to be measured and photographed; core thickness measurements were based on the average of three measurements for each core. The measured core data and underlying pavement structure information are provided in the Appendix C summary tables, while the core photo log can be found in Appendix D.

Following completion of the field drilling program, a laboratory testing program was conducted on all soil samples obtained from the test holes. The laboratory testing program consisted of moisture content determinations, Atterberg limits, and particle size distributions (hydrometer method). A summary of the Atterberg limit and particle size distribution are presented in Appendix B. Detailed test hole logs summarizing the sampling, field testing, laboratory test results, and subsurface conditions encountered at the test hole locations are presented in Appendix A. Actual depths noted on the test hole logs may vary by ± 0.3 m from those recorded due to the method by which the soil cuttings are returned to the surface. Summaries of the terms and symbols used on the test hole logs and of the Modified Unified Soil Classification System are also presented in Appendix A.

3.0 Pavement Investigation

Between the dates of 23 January 2019 and 01 February 2019, Wood cored a total of thirty-nine test holes on Speers Road, Traverse Avenue, Hamel Avenue, Des Meurons Street, Hazelwood Avenue and Traynor Bay. The coring locations are illustrated in Figures 2 and 3. All test holes were cored by Wood using a 150 mm diameter core barrel. All pavement core samples were shipped to Winnipeg laboratory and where measured and photographed; core thickness measurements were based on the average of three measurements for each core. During coring Wood identified the pavement structure materials directly below the concrete/asphalt. The measured core data, underlying pavement structure information, and a tabular summary of the testing results are provided in the Appendix C summary tables, while the core photo log can be found in Appendix D.

4.0 Closure

The findings of this report were based on the results of field and laboratory investigations at test hole locations determined based on the City of Winnipeg requirements.

The site investigation was conducted for the sole purpose of profiling the pavement and subsurface conditions. Although no environmental issues were identified during the fieldwork, this does not indicate that no such issues exist. If the owner or other parties have any concern regarding the presence of environmental issues, then an appropriate level environmental assessment should be conducted.

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



in soil conditions, which may result in modification of any potential design and construction procedures which may arise from this factual investigative report.

Respectfully submitted,

**Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited**

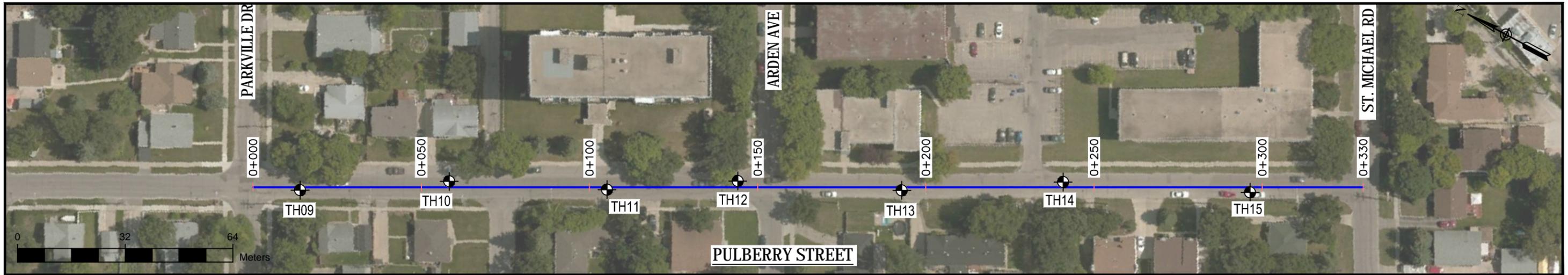
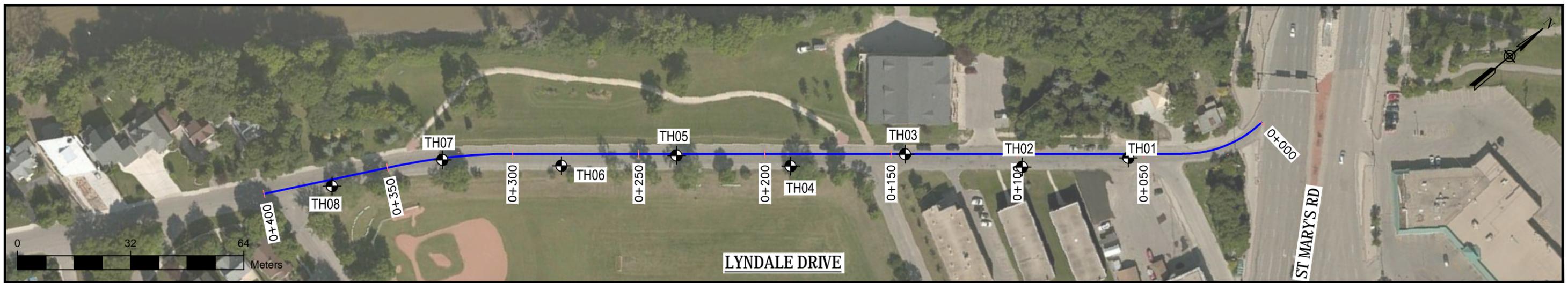


Figures



Figure 1: Test Hole and Coring Location Plan (Lyndale Drive, Pulberry Street, and Flynn Street)





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NOTES: SITE FEATURES AND LOCATIONS ARE APPROXIMATE ONLY. IMAGES FROM GOOGLE EARTH PRO AND TOPO MAPS.

LEGEND:

CORING LOCATIONS



REVISION	BY	DATE
----	----	----

CLIENT:



440 DOVERCOURT DRIVE
WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX: 204.489.8261

DWN BY:	MD
CHK'D BY:	BW
DATUM:	NAD83
PROJECTION:	UTM Zone 14 U
SCALE:	AS SHOWN

CITY OF WINNIPEG STREET INVESTIGATION
19-R-5 LOCAL STREET PACKAGE
WINNIPEG, MANITOBA

TEST HOLE AND CORING LOCATION PLAN
(LYNDALE DRIVE, PULBERRY STREET, AND FLYNN STREET)

DATE:	FEBRUARY 2019
PROJECT NO.:	WX18716
REV. NO.:	A
FIGURE NO.:	FIGURE 1

Figure 2: Coring Location Plan (Speers Road, Traverse Avenue, and Hamel Avenue)





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LEGEND:
CORING LOCATIONS



REVISION	BY	DATE
----	----	----

CLIENT:

wood.

440 DOVERCOURT DRIVE
WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX: 204.489.8261

DWN BY:	MD
CHK'D BY:	BW
DATUM:	NAD83
PROJECTION:	UTM Zone 14 U
SCALE:	AS SHOWN

CITY OF WINNIPEG STREET INVESTIGATION
19-R-5 LOCAL STREET PACKAGE
WINNIPEG, MANITOBA

CORING LOCATION PLAN
(SPEERS ROAD, TRAVERSE AVENUE, AND HAMEL AVENUE)

DATE:	FEBRUARY 2019
PROJECT NO.:	WX18716
REV. NO.:	A
FIGURE NO.:	FIGURE 2

Figure 3: Coring Location Plan (Des Meurons Street, Hazelwood Avenue, and Traynor Avenue)





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LEGEND:
CORING LOCATIONS



REVISION	BY	DATE
----	----	----

CLIENT:




440 DOVERCOURT DRIVE
WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX: 204.489.8261

DWN BY:	MD
CHK'D BY:	BW
DATUM:	NAD83
PROJECTION:	UTM Zone 14 U
SCALE:	AS SHOWN

CITY OF WINNIPEG STREET INVESTIGATION
19-R-5 LOCAL STREET PACKAGE
WINNIPEG, MANITOBA

CORING LOCATION PLAN
(DES MEURONS ST, HAZELWOOD AVE, AND TRAYNOR AVE)

DATE:	FEBRUARY 2019
PROJECT NO.:	WX18716
REV. NO.:	A
FIGURE NO.:	FIGURE 3

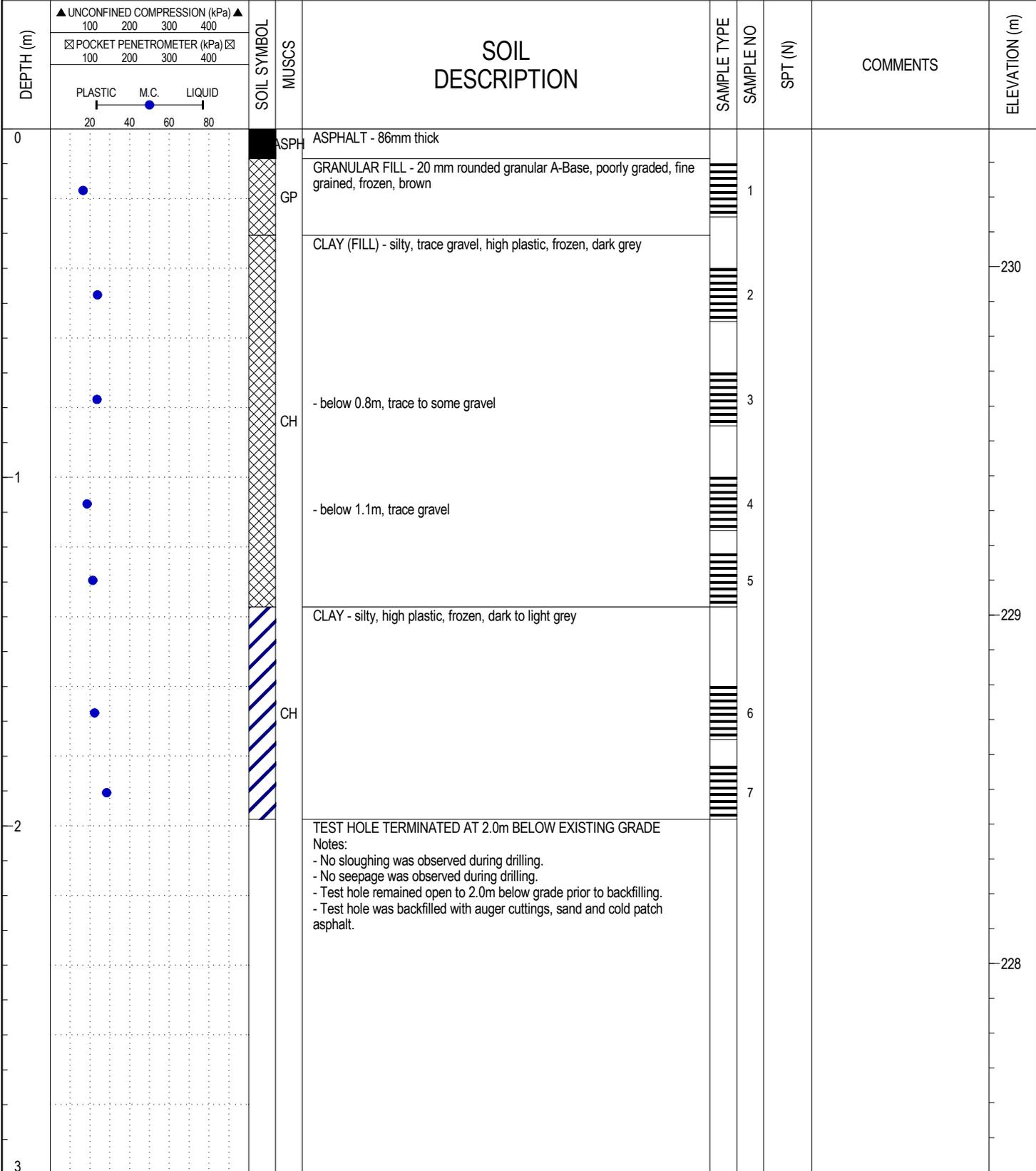
Appendix A

Test Hole Logs



PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH01 (LYNDALE)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5527117.2 E634374.4	DRILL METHOD: 125mm SSA	ELEVATION: 230.4 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



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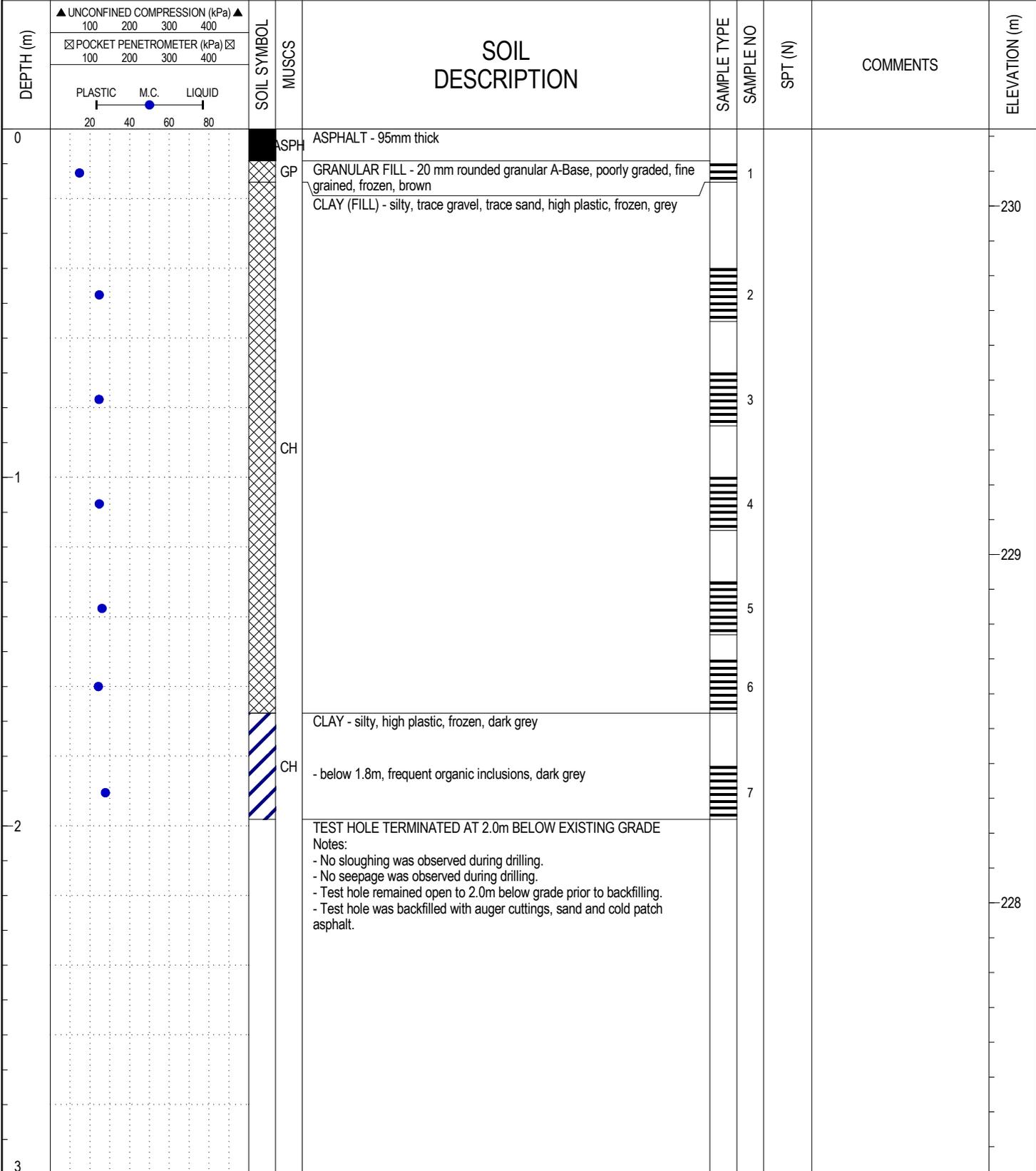


Wood Environment & Infrastructure Solutions
 a division of Wood Canada Limited

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REVIEWED BY: BW	COMPLETION DATE: 28 January 2019
Figure No. A1	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH02 (LYNDALE)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5527082 E634351	DRILL METHOD: 125mm SSA	ELEVATION: 230.22 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



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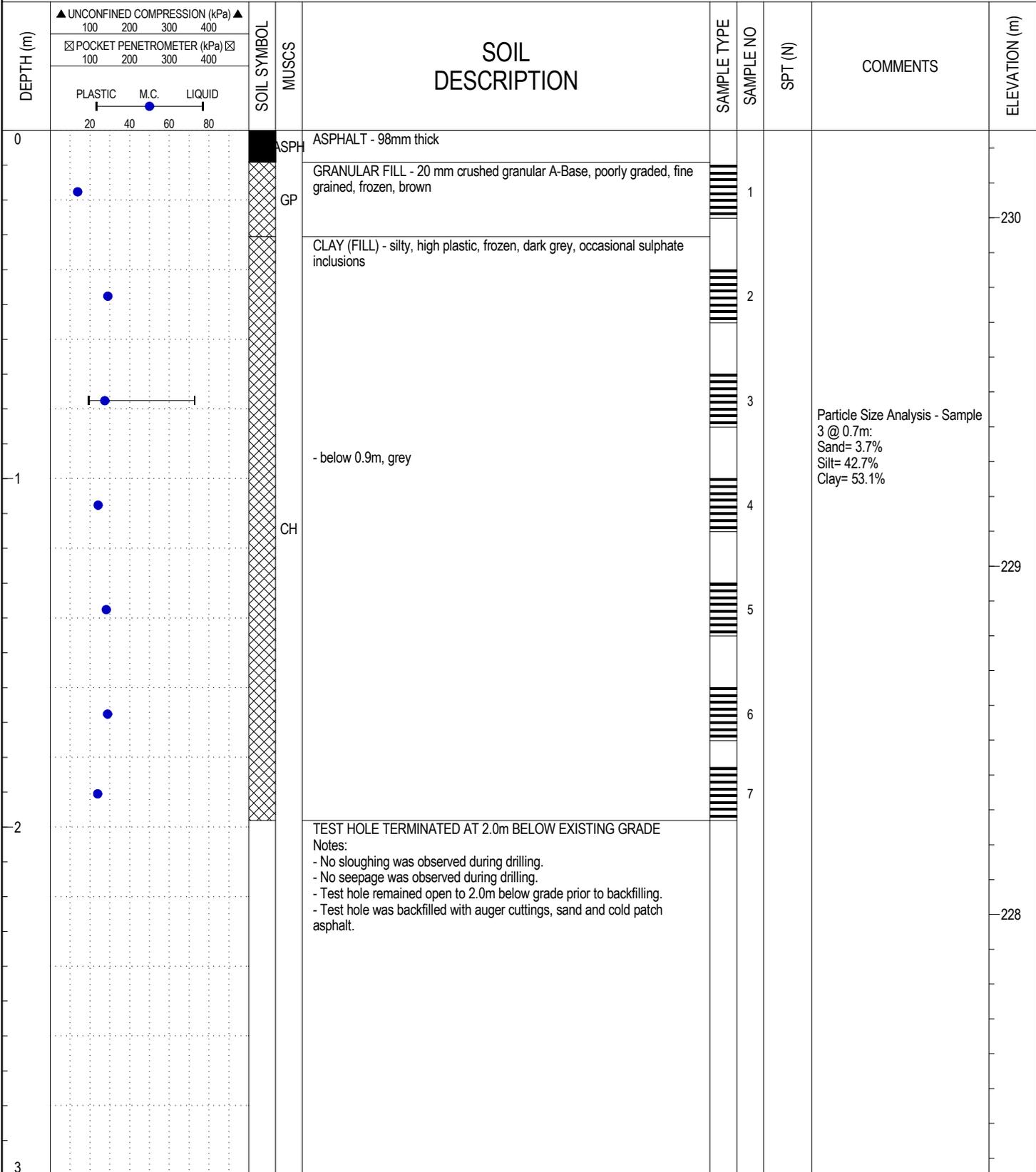


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REVIEWED BY: BW	COMPLETION DATE: 28 January 2019
Figure No. A2	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH03 (LYNDALE)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5527048.8 E634318.3	DRILL METHOD: 125mm SSA	ELEVATION: 230.25 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



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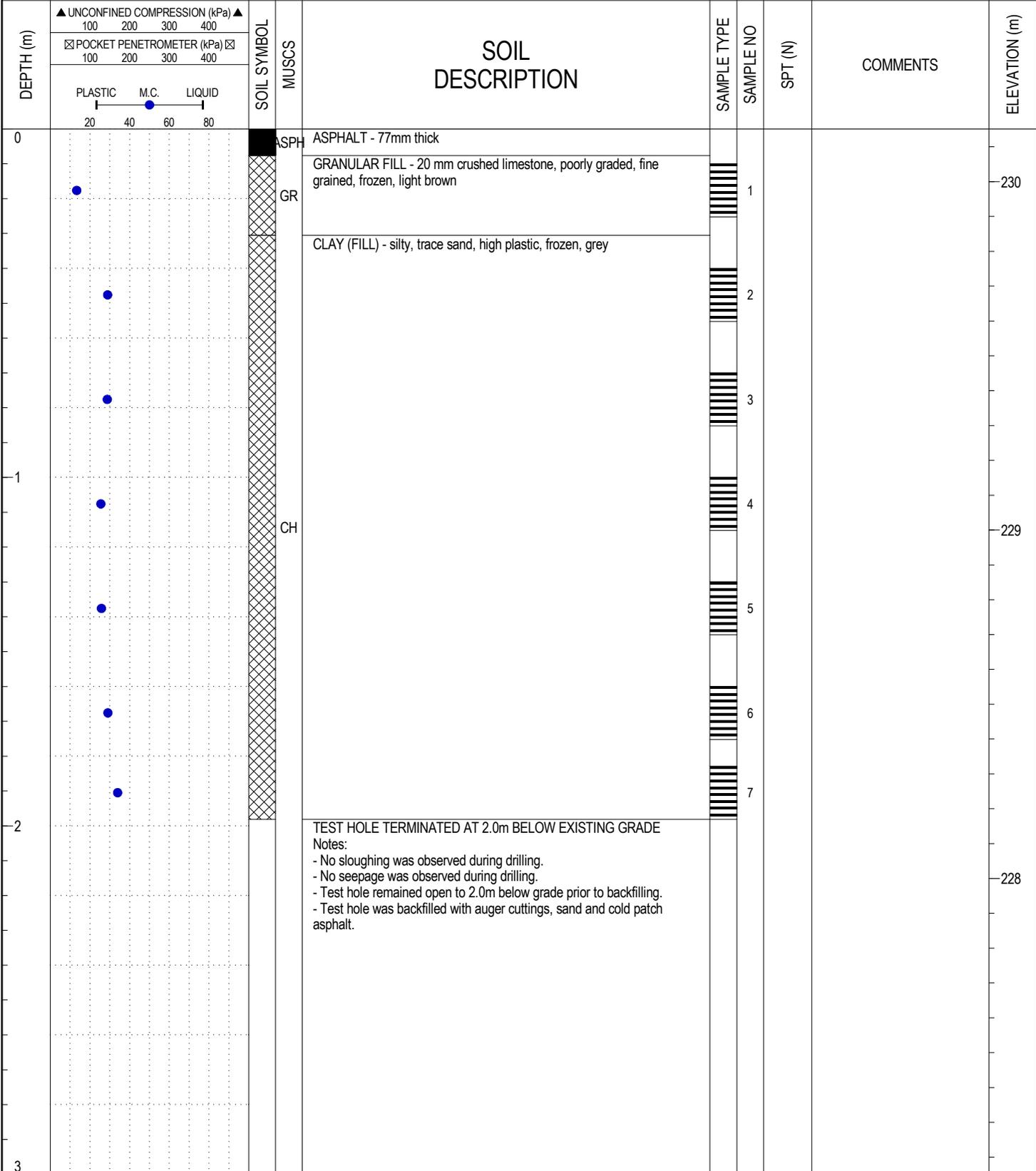


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Figure No. A3	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH04 (LYNDALE)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5527010.3 E634293.8	DRILL METHOD: 125mm SSA	ELEVATION: 230.15 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



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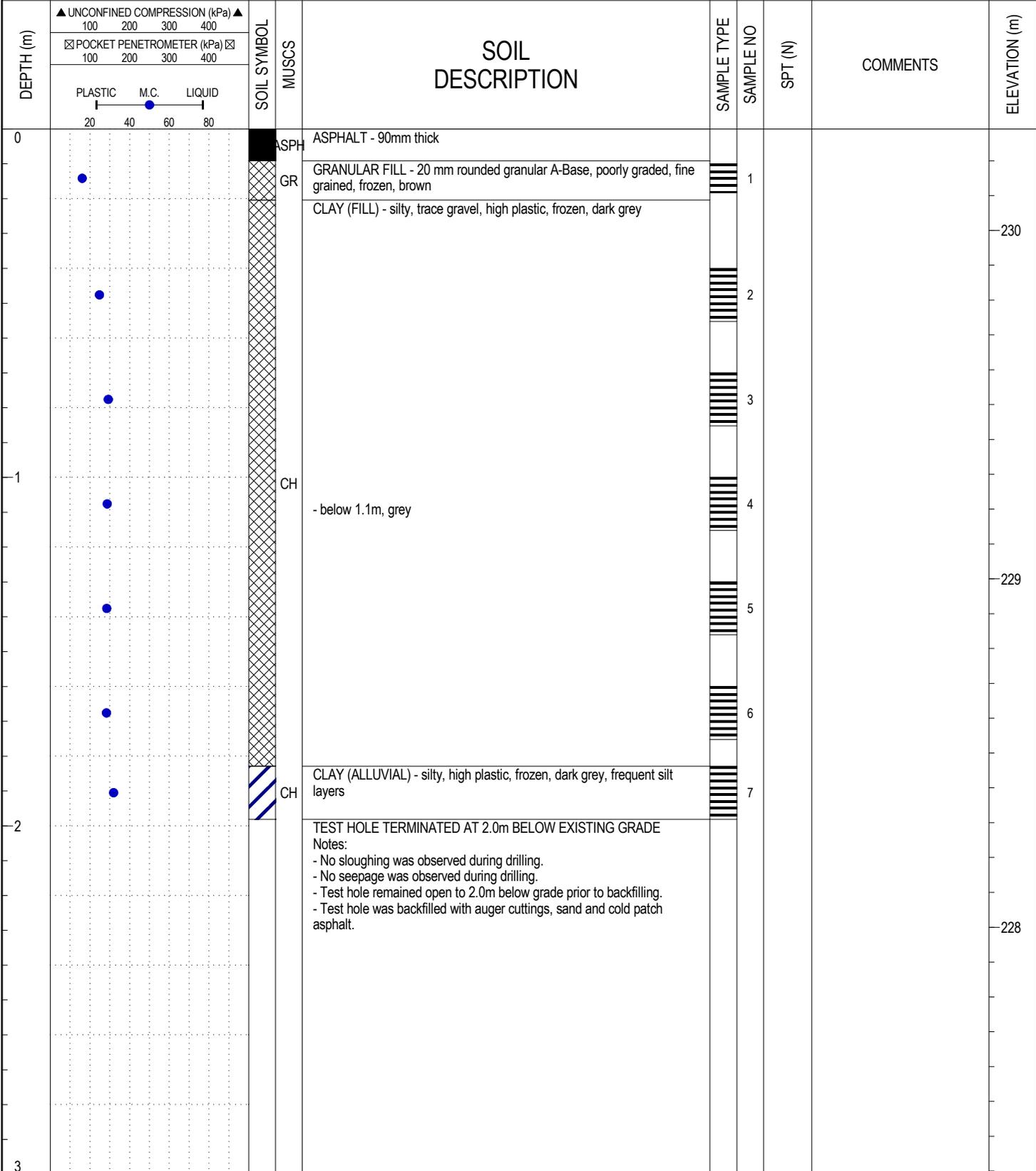


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Figure No. A4	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH05 (LYNDALE)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5526977.5 E634262.3	DRILL METHOD: 125mm SSA	ELEVATION: 230.29 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



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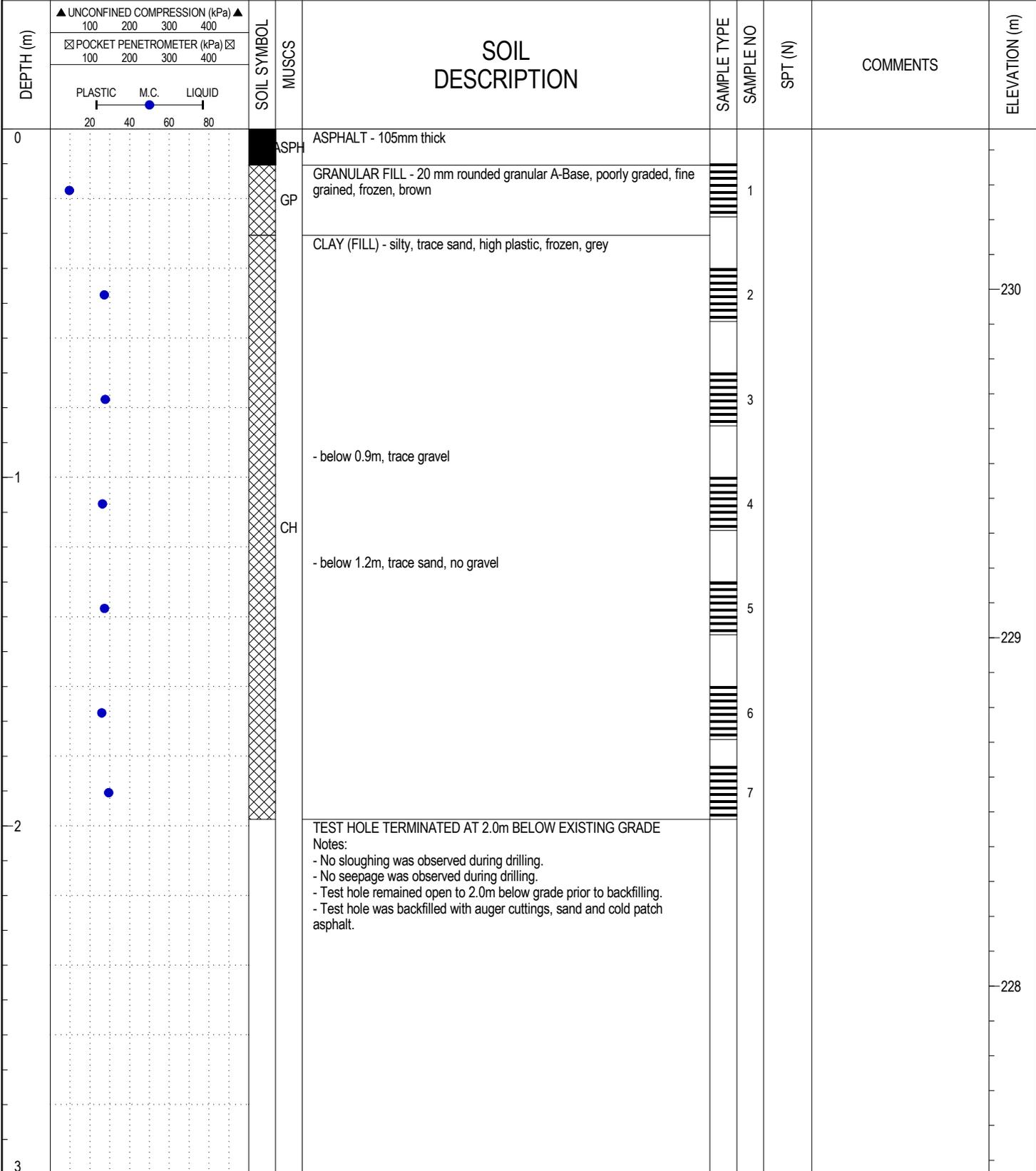


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REVIEWED BY: BW	COMPLETION DATE: 28 January 2019
Figure No. A5	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH06 (LYNDALE)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5526939.2 E634237.2	DRILL METHOD: 125mm SSA	ELEVATION: 230.46 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
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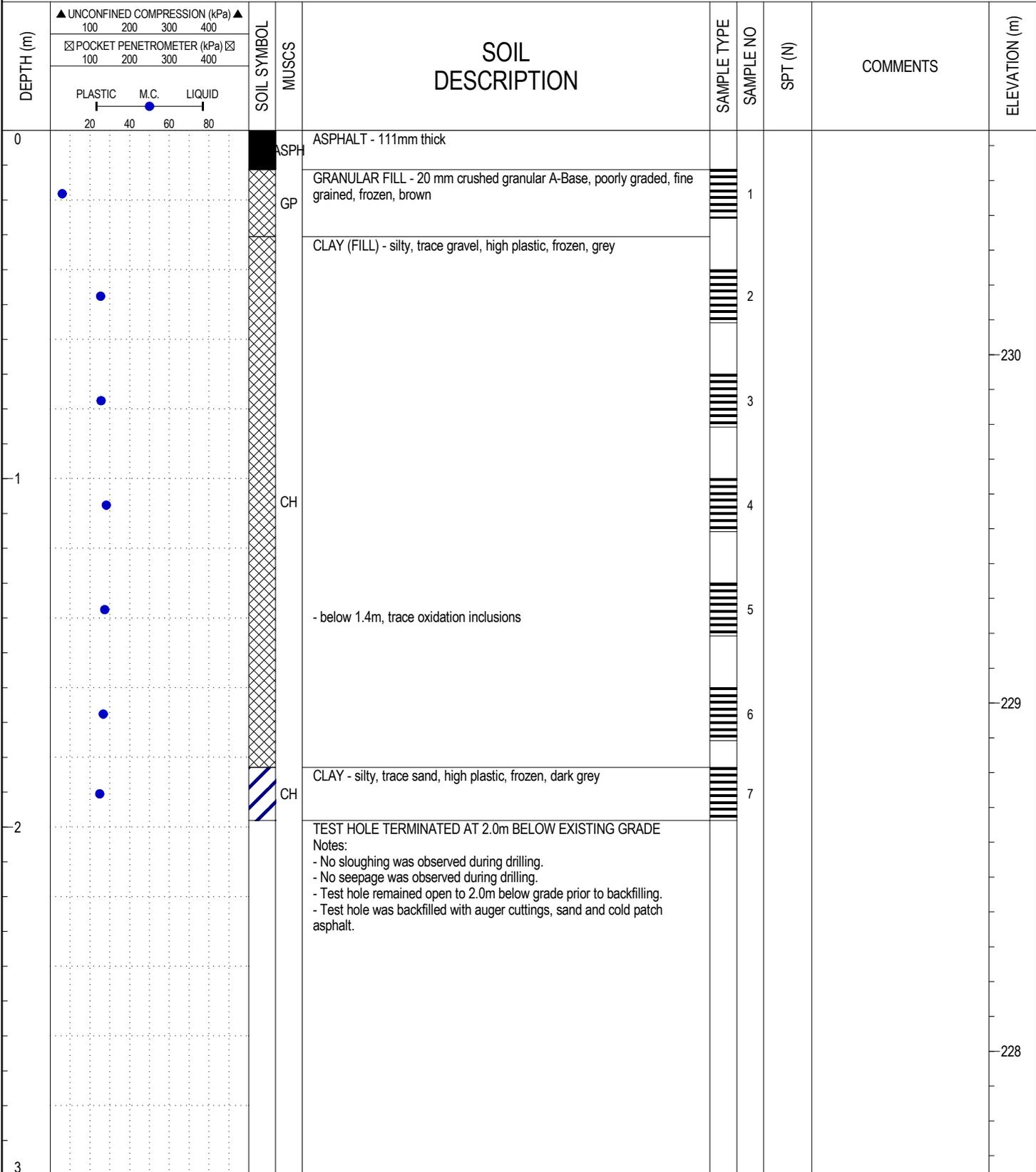


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Figure No. A6	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH07 (LYNDALE)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5526903.7 E634206	DRILL METHOD: 125mm SSA	ELEVATION: 230.64 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
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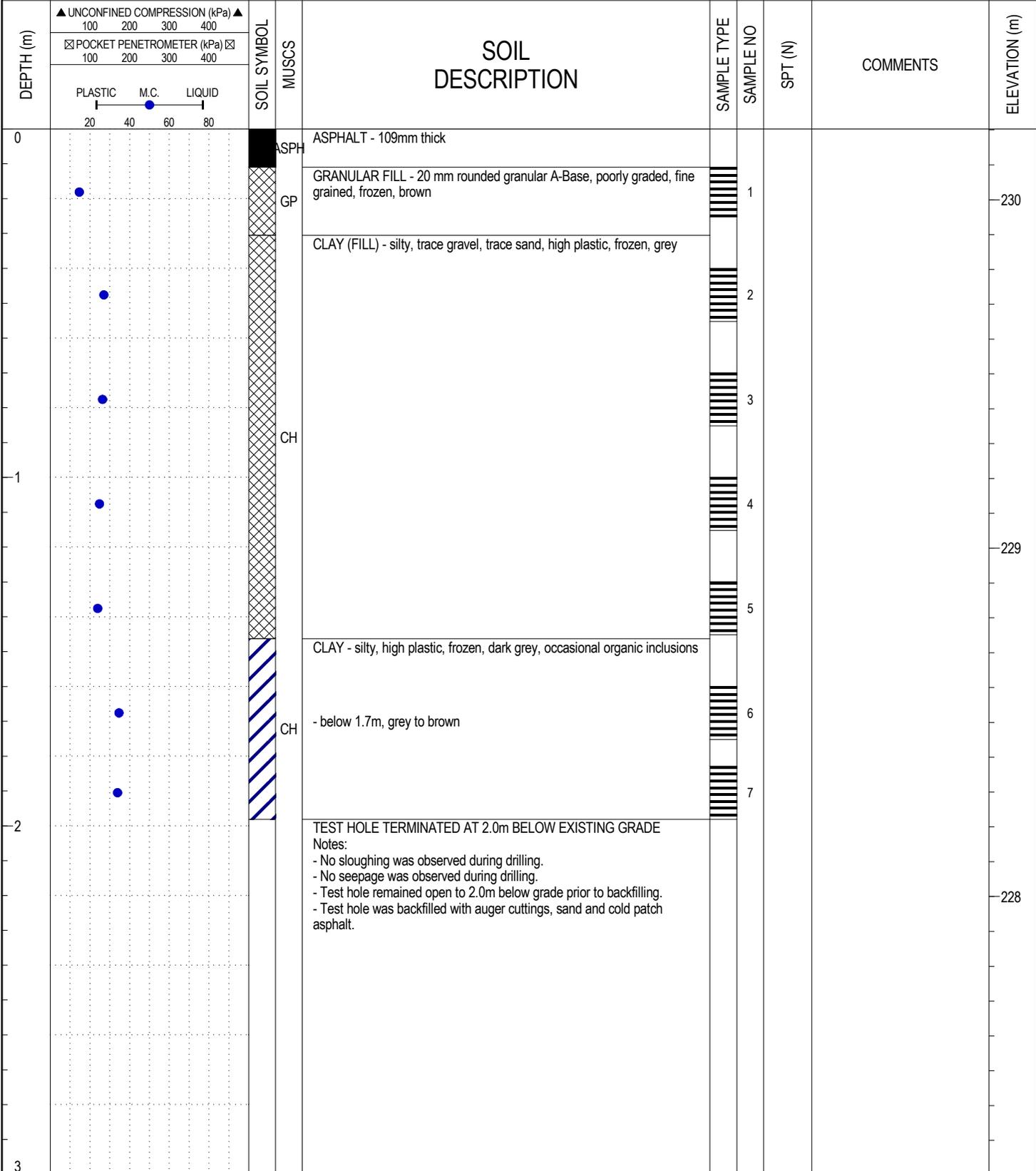


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Figure No. A7	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH08 (LYNDALE)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5526862.9 E634187	DRILL METHOD: 125mm SSA	ELEVATION: 230.2 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



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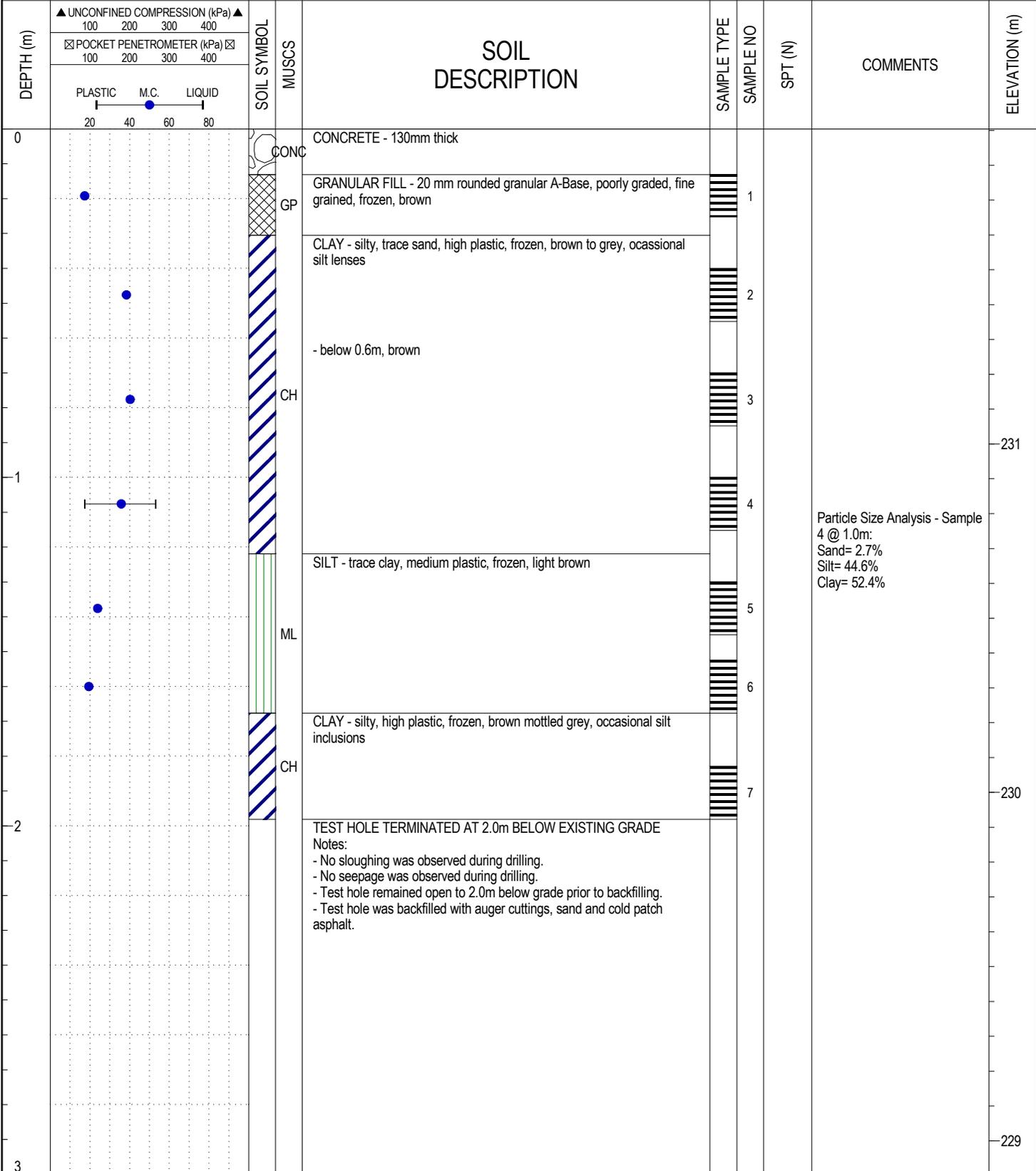


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REVIEWED BY: BW	COMPLETION DATE: 28 January 2019
Figure No. A8	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH09 (PULBERRY)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5521991.7 E635320.7	DRILL METHOD: 125mm SSA	ELEVATION: 231.9 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



WX18716 DILLON CONSTRUCTION - CITY OF WINNIPEG STREET INVESTIGATION - LOCAL STREETS.GPJ 19/02/19 08:26 AM (WPG - GEOTECH LOG 1)

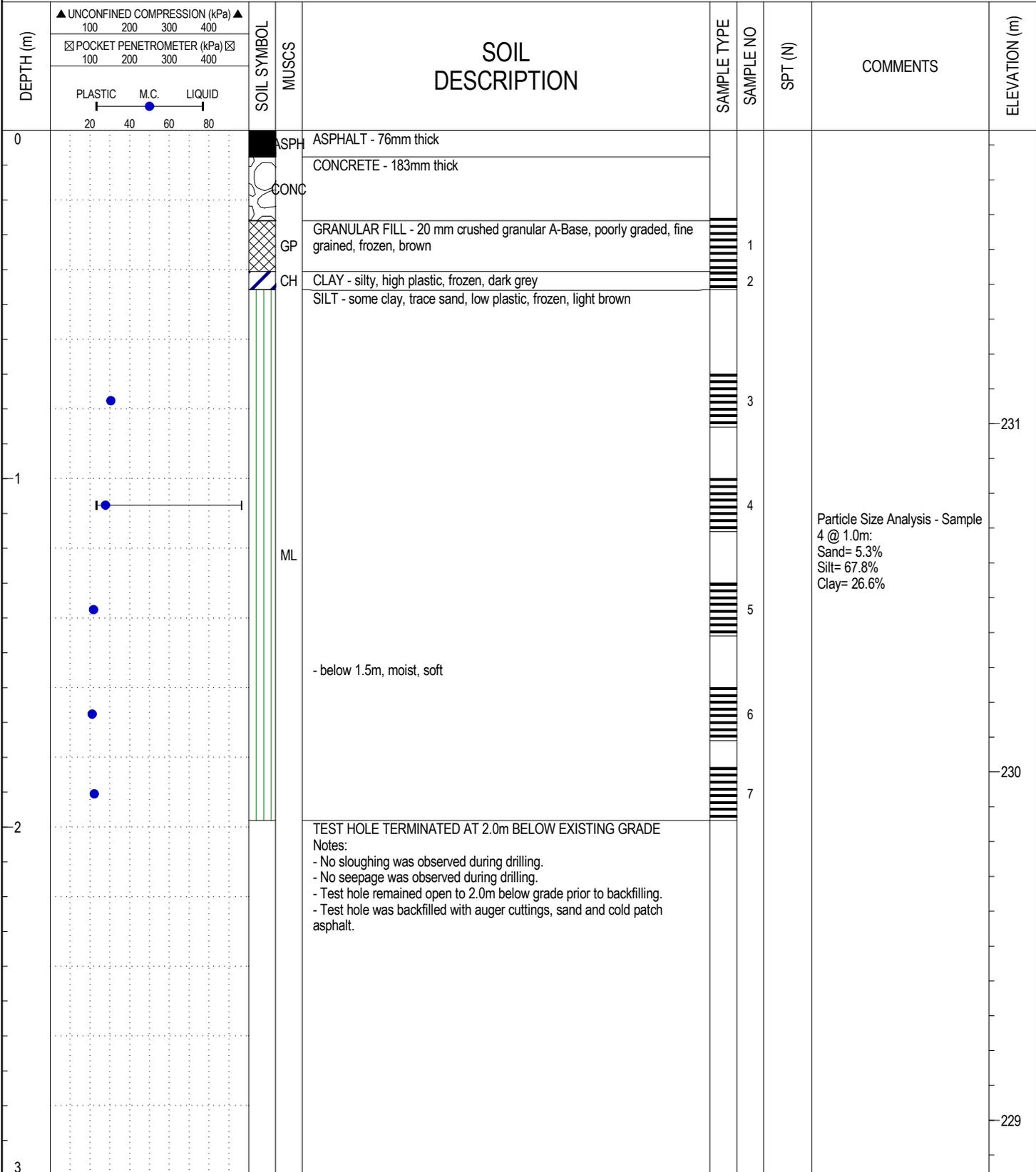


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REVIEWED BY: BW	COMPLETION DATE: 31 January 2019
Figure No. A9	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH11 (PULBERRY)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5521879.8 E635387	DRILL METHOD: 125mm SSA	ELEVATION: 231.84 m

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BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



WX18716 DILLON CONSTRUCTION - CITY OF WINNIPEG STREET INVESTIGATION - LOCAL STREETS.GPJ 19/02/19 08:26 AM (WPG - GEOTECH LOG 1)

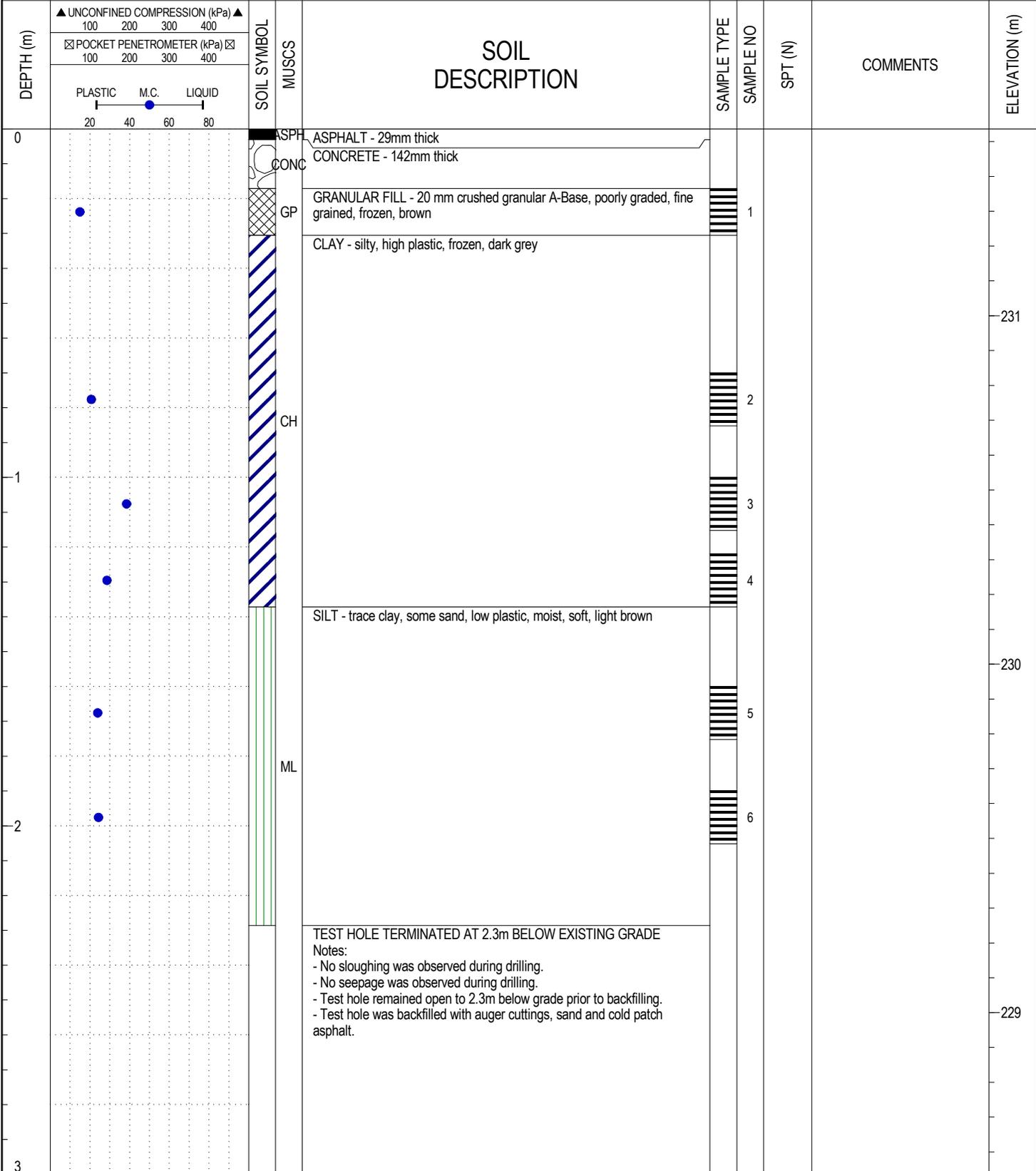


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REVIEWED BY: BW	COMPLETION DATE: 31 January 2019
Figure No. A11	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH12 (PULBERRY)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5521795.4 E635434.3	DRILL METHOD: 125mm SSA	ELEVATION: 231.54 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



WX18716 DILLON CONSTRUCTION - CITY OF WINNIPEG STREET INVESTIGATION - LOCAL STREETS.GPJ 19/02/19 08:26 AM (WPG - GEOTECH LOG 1)

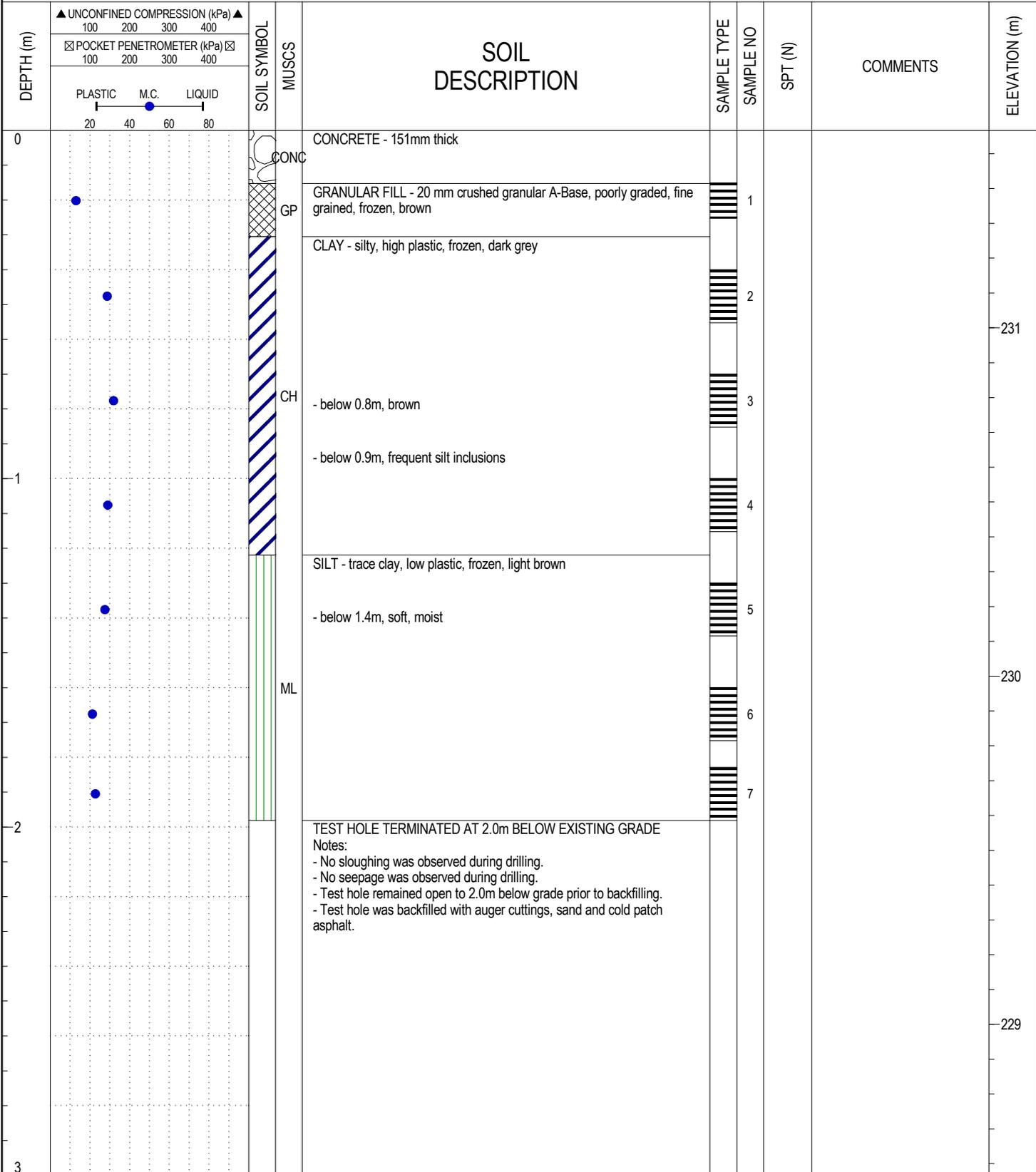


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LOGGED BY: CM	COMPLETION DEPTH: 2.3 m
REVIEWED BY: BW	COMPLETION DATE: 31 January 2019
Figure No. A12	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH13 (PULBERRY)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5521835.9 E635408.6	DRILL METHOD: 125mm SSA	ELEVATION: 231.57 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



WX18716 DILLON CONSTRUCTION - CITY OF WINNIPEG STREET INVESTIGATION - LOCAL STREETS.GPJ 19/02/19 08:26 AM (WPG - GEOTECH LOG 1)

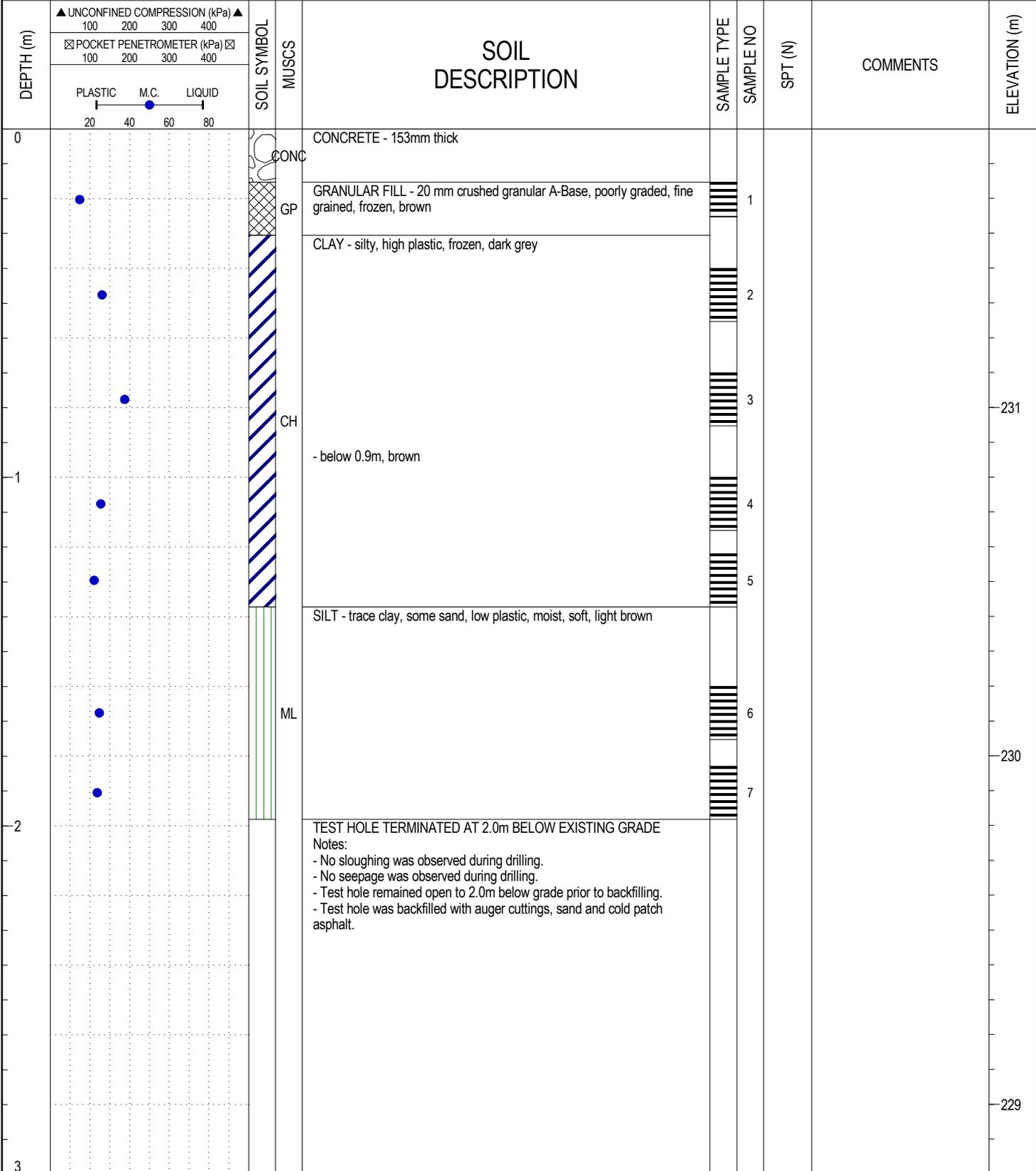


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LOGGED BY: CM	COMPLETION DEPTH: 2 m
REVIEWED BY: BW	COMPLETION DATE: 31 January 2019
Figure No. A13	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH14(PULBERRY)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5521912.4 E635365.7	DRILL METHOD: 125mm SSA	ELEVATION: 231.8 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



WX18716 DILLON CONSTRUCTION - CITY OF WINNIPEG STREET INVESTIGATION - LOCAL STREETS.GPJ 19/02/19 08:26 AM (WPG - GEOTECH LOG 1)

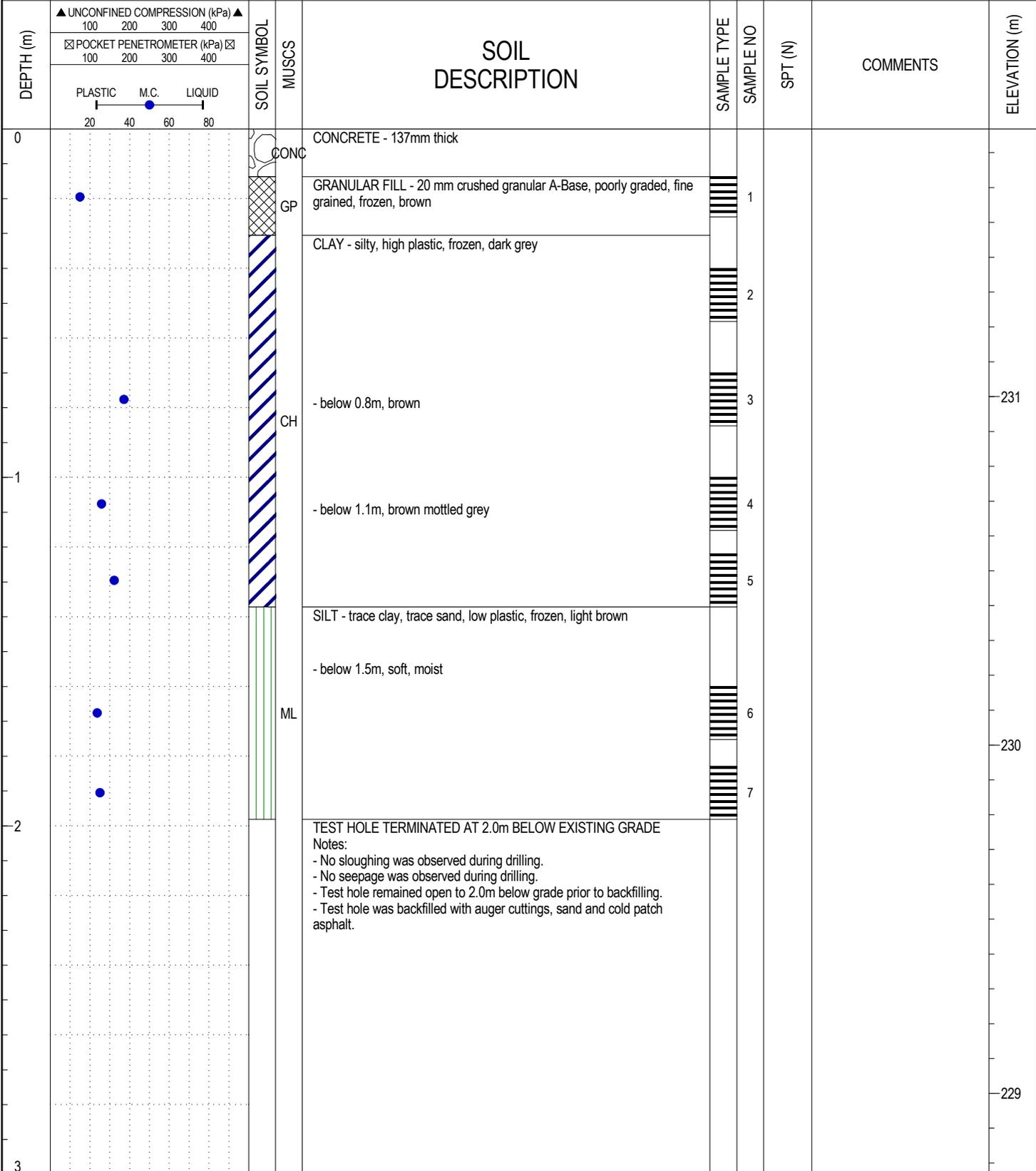


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REVIEWED BY: BW	COMPLETION DATE: 31 January 2019
Figure No. A14	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH15 (PULBERRY)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5521745.5 E635459	DRILL METHOD: 125mm SSA	ELEVATION: 231.77 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



WX18716 DILLON CONSTRUCTION - CITY OF WINNIPEG STREET INVESTIGATION - LOCAL STREETS.GPJ 19/02/19 08:26 AM (WPG - GEOTECH LOG 1)

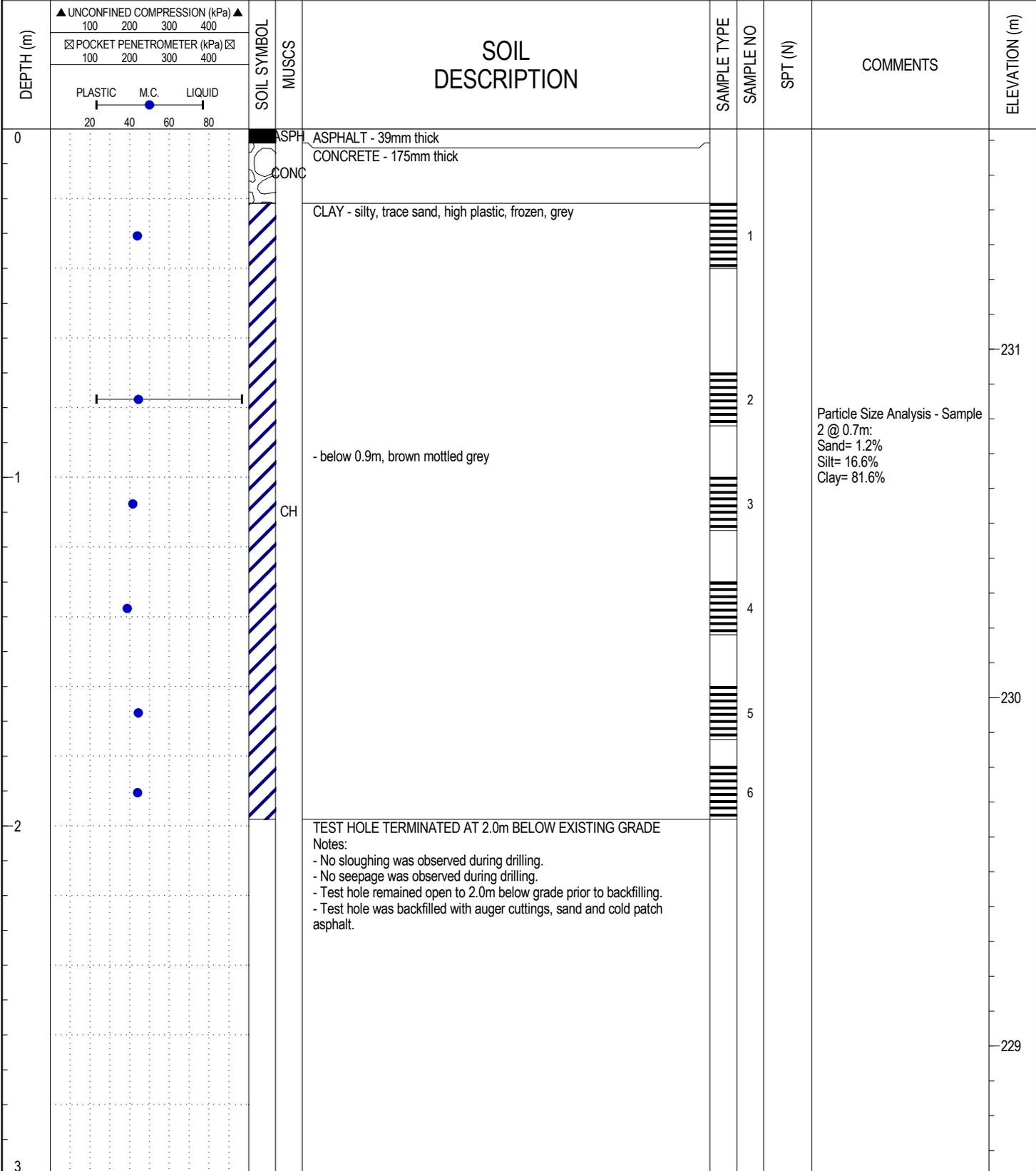


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LOGGED BY: CM	COMPLETION DEPTH: 2 m
REVIEWED BY: BW	COMPLETION DATE: 31 January 2019
Figure No. A15	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH16 (FLYNN)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5522231.8 E634852.5	DRILL METHOD: 125mm SSA	ELEVATION: 231.63 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



WX18716 DILLON CONSTRUCTION - CITY OF WINNIPEG STREET INVESTIGATION - LOCAL STREETS.GPJ 19/02/19 08:26 AM (WPG - GEOTECH LOG 1)

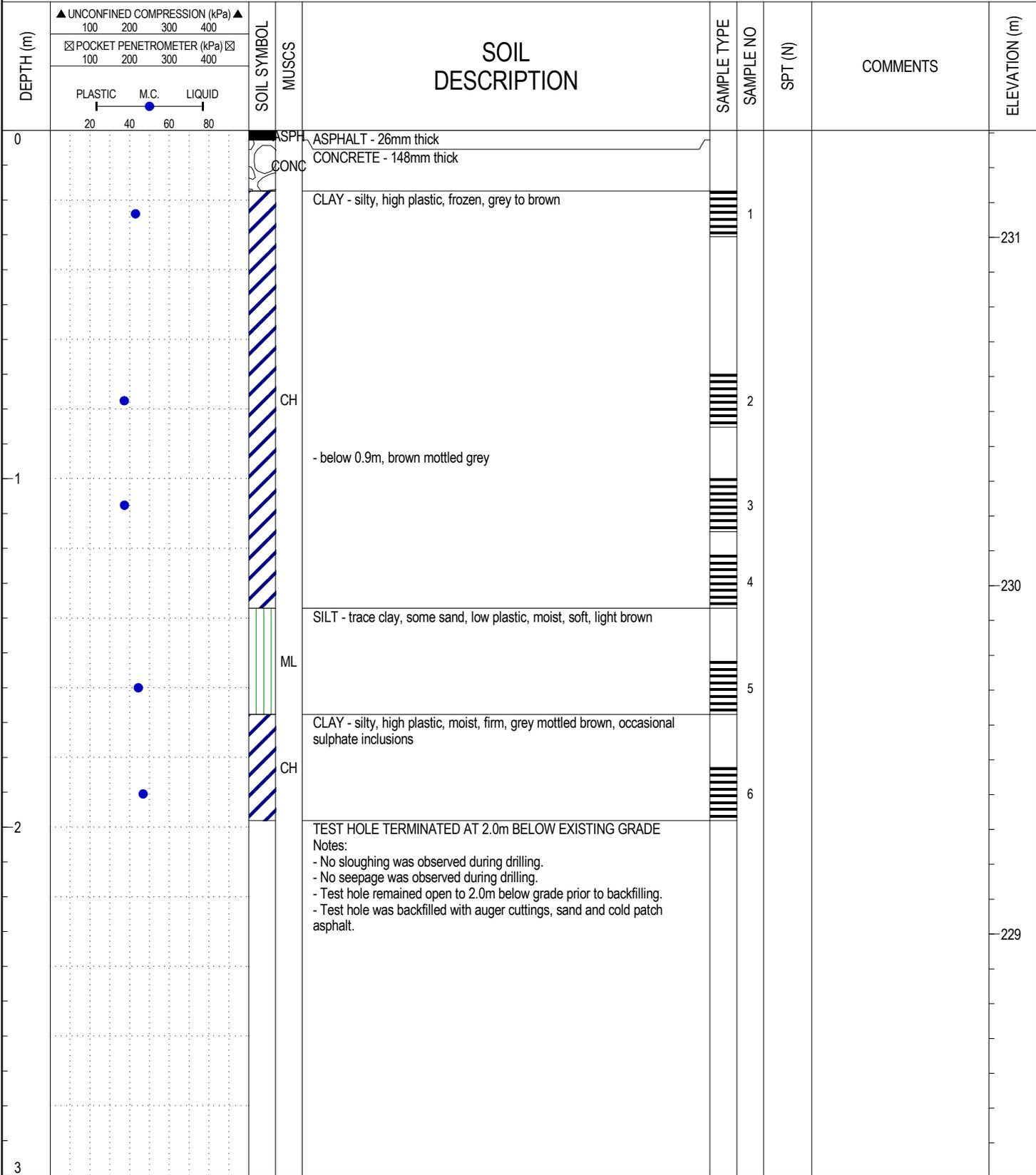


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REVIEWED BY: BW	COMPLETION DATE: 31 January 2019
Figure No. A16	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH17 (FLYNN)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5522183.5 E634883.4	DRILL METHOD: 125mm SSA	ELEVATION: 231.31 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



WX18716 DILLON CONSTRUCTION - CITY OF WINNIPEG STREET INVESTIGATION - LOCAL STREETS.GPJ 19/02/19 08:26 AM (WPG - GEOTECH LOG 1)

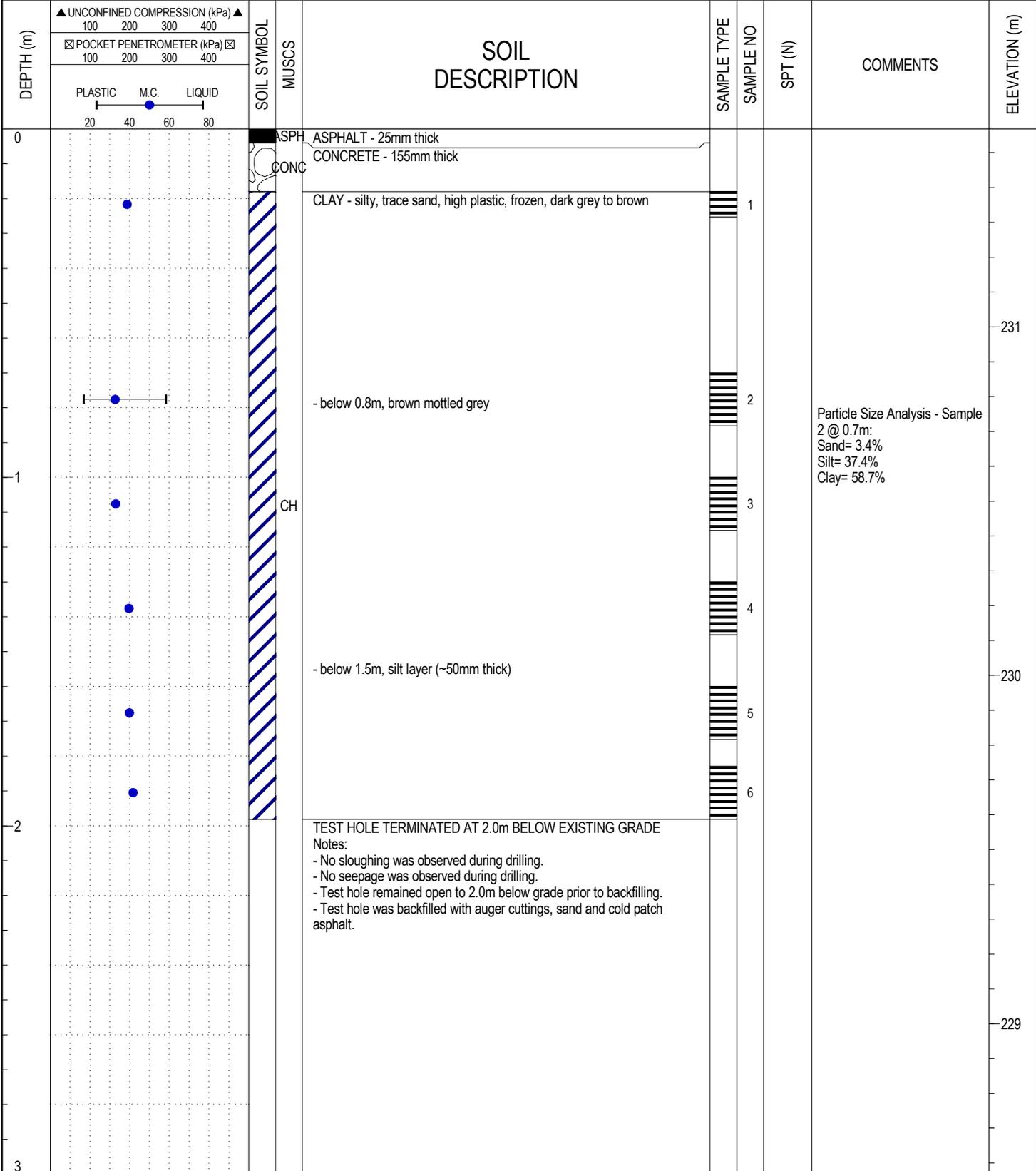


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LOGGED BY: CM	COMPLETION DEPTH: 2 m
REVIEWED BY: BW	COMPLETION DATE: 31 January 2019
Figure No. A17	Sheet 1 of 1

PROJECT: City of Winnipeg Street Investigation	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: TH18 (FLYNN)
CLIENT: Dillon Consulting Limited	DRILL RIG: Mobile B40LX Truck Mounted	PROJECT No: WX18716
LOCATION: N5522145.6 E634902.6	DRILL METHOD: 125mm SSA	ELEVATION: 231.57 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input checked="" type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



WX18716 DILLON CONSTRUCTION - CITY OF WINNIPEG STREET INVESTIGATION - LOCAL STREETS.GPJ 19/02/19 08:26 AM (WPG - GEOTECH LOG 1)



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REVIEWED BY: BW	COMPLETION DATE: 31 January 2019
Figure No. A18	Sheet 1 of 1

EXPLANATION OF TERMS AND SYMBOLS

The terms and symbols used on the borehole logs to summarize the results of field investigation and subsequent laboratory testing are described in these pages.

It should be noted that materials, boundaries and conditions have been established only at the borehole locations at the time of investigation and are not necessarily representative of subsurface conditions elsewhere across the site.

TEST DATA

Data obtained during the field investigation and from laboratory testing are shown at the appropriate depth interval.

Abbreviations, graphic symbols, and relevant test method designations are as follows:

*C	Consolidation test	*ST	Swelling test
D _R	Relative density	TV	Torvane shear strength
*k	Permeability coefficient	VS	Vane shear strength
*MA	Mechanical grain size analysis and hydrometer test	w	Natural Moisture Content (ASTM D2216)
N	Standard Penetration Test (CSA A119.1-60)	w _l	Liquid limit (ASTM D 423)
N _d	Dynamic cone penetration test	w _p	Plastic Limit (ASTM D 424)
NP	Non plastic soil	E _f	Unit strain at failure
pp	Pocket penetrometer strength	γ	Unit weight of soil or rock
*q	Triaxial compression test	γ _d	Dry unit weight of soil or rock
q _u	Unconfined compressive strength	ρ	Density of soil or rock
*SB	Shearbox test	ρ _d	Dry Density of soil or rock
SO ₄	Concentration of water-soluble sulphate	C _u	Undrained shear strength
		→	Seepage
		▼	Observed water level

* The results of these tests are usually reported separately

Soils are classified and described according to their engineering properties and behaviour.

The soil of each stratum is described using the Unified Soil Classification System¹ modified slightly so that an inorganic clay of "medium plasticity" is recognized.

The modifying adjectives used to define the actual or estimated percentage range by weight of minor components are consistent with the Canadian Foundation Engineering Manual².

Relative Density and Consistency:

<u>Cohesionless Soils</u>		<u>Cohesive Soils</u>		
Relative Density	SPT (N) Value	Consistency	Undrained Shear Strength c _u (kPa)	Approximate SPT (N) Value
Very Loose	0-4	Very Soft	0-12	0-2
Loose	4-10	Soft	12-25	2-4
Compact	10-30	Firm	25-50	4-8
Dense	30-50	Stiff	50-100	8-15
Very Dense	>50	Very Stiff	100-200	15-30
		Hard	>200	>30

Standard Penetration Resistance ("N" value)

The number of blows by a 63.6kg hammer dropped 760 mm to drive a 50 mm diameter open sampler attached to "A" drill rods for a distance of 300 mm after an initial penetration of 150 mm.

¹ "Unified Soil Classification System", Technical Memorandum 36-357 prepared by Waterways Experiment Station, Vicksburg, Mississippi, Corps of Engineers, U.S. Army. Vol. 1 March 1953.

² "Canadian Foundation Engineering Manual", 3rd Edition, Canadian Geotechnical Society, 1992.

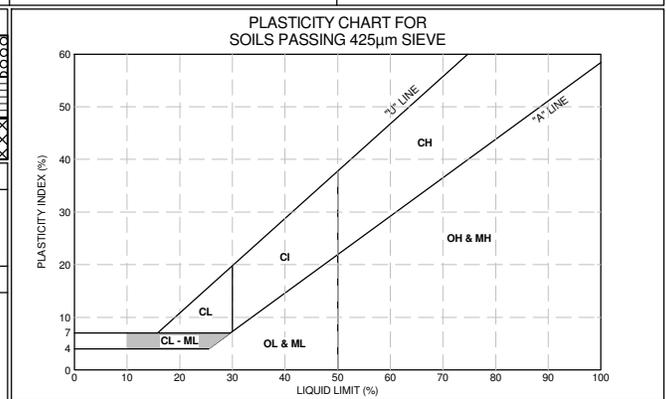
MODIFIED UNIFIED CLASSIFICATION SYSTEM FOR SOILS

MAJOR DIVISIONS			SYMBOLS			TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
			USCS	GRAPH	COLOUR			
COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN 75µm)	GRAVELS MORE THAN HALF THE COARSE FRACTION LARGER THAN 4.75mm	CLEAN GRAVELS (TRACE OR NO FINES)	GW		RED	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	$C_u = D_{60}/D_{10} > 4$; $C_c = (D_{30})^2 / (D_{10} \times D_{60}) = 1 \text{ to } 3$	
			GP		RED	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS	
		DIRTY GRAVELS (WITH SOME OR MORE FINES)	GM		YELLOW	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	ATTERBERG LIMITS BELOW "A" LINE OR PI LESS THAN 4	
			GC		YELLOW	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	ATTERBERG LIMITS ABOVE "A" LINE AND PI MORE THAN 7	
	SANDS MORE THAN HALF THE COARSE FRACTION SMALLER THAN 4.75mm	CLEAN SANDS (TRACE OR NO FINES)	SW		RED	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	$C_u = D_{60}/D_{10} > 6$; $C_c = (D_{30})^2 / (D_{10} \times D_{60}) = 1 \text{ to } 3$	
			SP		RED	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS	
		DIRTY SANDS (WITH SOME OR MORE FINES)	SM		YELLOW	SILTY SANDS, SAND-SILT MIXTURES	ATTERBERG LIMITS BELOW "A" LINE OR PI LESS THAN 4	
			SC		YELLOW	CLAYEY SANDS, SAND-CLAY MIXTURES	ATTERBERG LIMITS ABOVE "A" LINE AND PI MORE THAN 7	
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT SMALLER THAN 75µm)	SILTS BELOW "A" LINE NEGLECTIBLE ORGANIC CONTENT	$W_L < 50\%$	ML		GREEN	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW)	
		$W_L > 50\%$	MH		BLUE	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SAND OR SILTY SOILS		
	CLAYS ABOVE "A" LINE NEGLECTIBLE ORGANIC CONTENT	$W_L < 30\%$	CL		GREEN	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY OR SILTY CLAYS, LEAN CLAYS		
		$30\% < W_L < 50\%$	CI		GREEN-BLUE	INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS		
		$W_L > 50\%$	CH		BLUE	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		
	ORGANIC SILTS & CLAYS BELOW "A" LINE	$W_L < 50\%$	OL		GREEN	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		WHENEVER THE NATURE OF THE FINES CONTENT HAS NOT BEEN DETERMINED, IT IS DESIGNATED BY THE LETTER "F", E.G. SF IS A MIXTURE OF SAND WITH SILT OR CLAY
		$W_L > 50\%$	OH		BLUE	ORGANIC CLAYS OF HIGH PLASTICITY		
	HIGHLY ORGANIC SOILS			PT		ORANGE		PEAT AND OTHER HIGHLY ORGANIC SOILS

SPECIAL SYMBOLS			
LIMESTONE		OILSAND	
SANDSTONE		SHALE	
SILTSTONE		FILL (UNDIFFERENTIATED)	

SOIL COMPONENTS				
FRACTION	U.S. STANDARD METRIC SIEVE SIZE		DEFINING RANGES OF PERCENT BY WEIGHT OF MINOR COMPONENTS	
	PASSING	RETAINED	PERCENT	DESCRIPTOR
GRAVEL	76mm	19mm	35 - 50	AND
	COARSE	19mm		
SAND	COARSE	4.75mm	2.00mm	Y / EY
	MEDIUM	2.00mm	425µm	SOME
	FINE	425µm	75µm	TRACE
FINES (SILT OR CLAY BASED ON PLASTICITY)	75µm		1 - 10	TRACE

OVERSIZED MATERIAL	
ROUNDED OR SUBROUNDED: COBBLES 76mm to 200mm BOULDERS > 200mm	NOT ROUNDED: ROCK FRAGMENTS ? 76mm ROCKS > 0.76 CUBIC METRE IN VOLUME



- NOTES:**
- ALL SIEVE SIZES MENTIONED ARE U.S. STANDARD ASTM E.11.
 - COARSE GRAINED SOILS WITH TRACE TO SOME FINES GIVEN COMBINED GROUP SYMBOLS, E.G. GW-GC IS A WELL GRADED GRAVEL SAND MIXTURE WITH TRACE TO SOME CLAY.
 - DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

Appendix B

Laboratory Test Reports

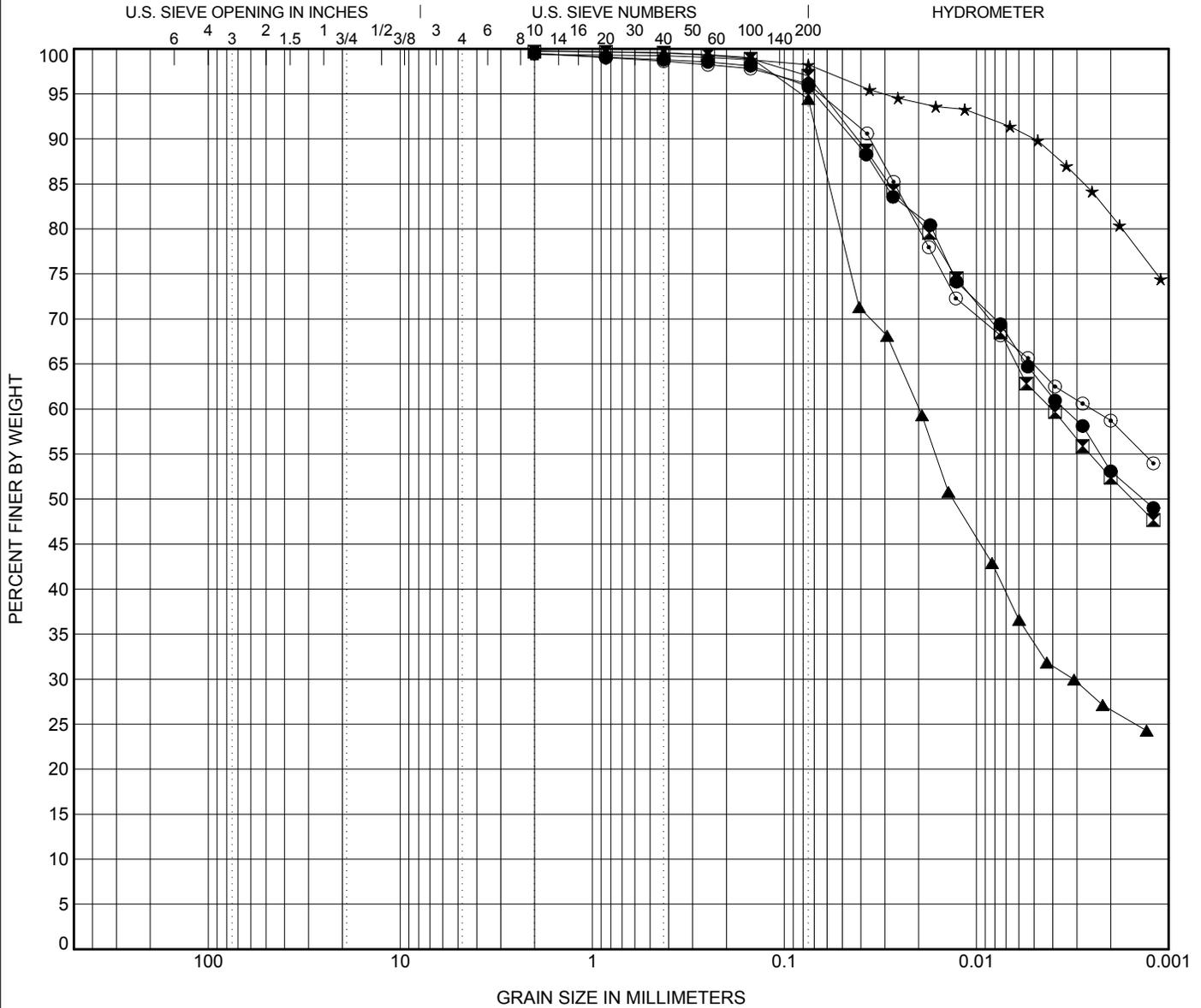


GRAIN SIZE DISTRIBUTION

CLIENT: Dillon Consulting Limited

PROJECT: City of Winnipeg Street Investigation

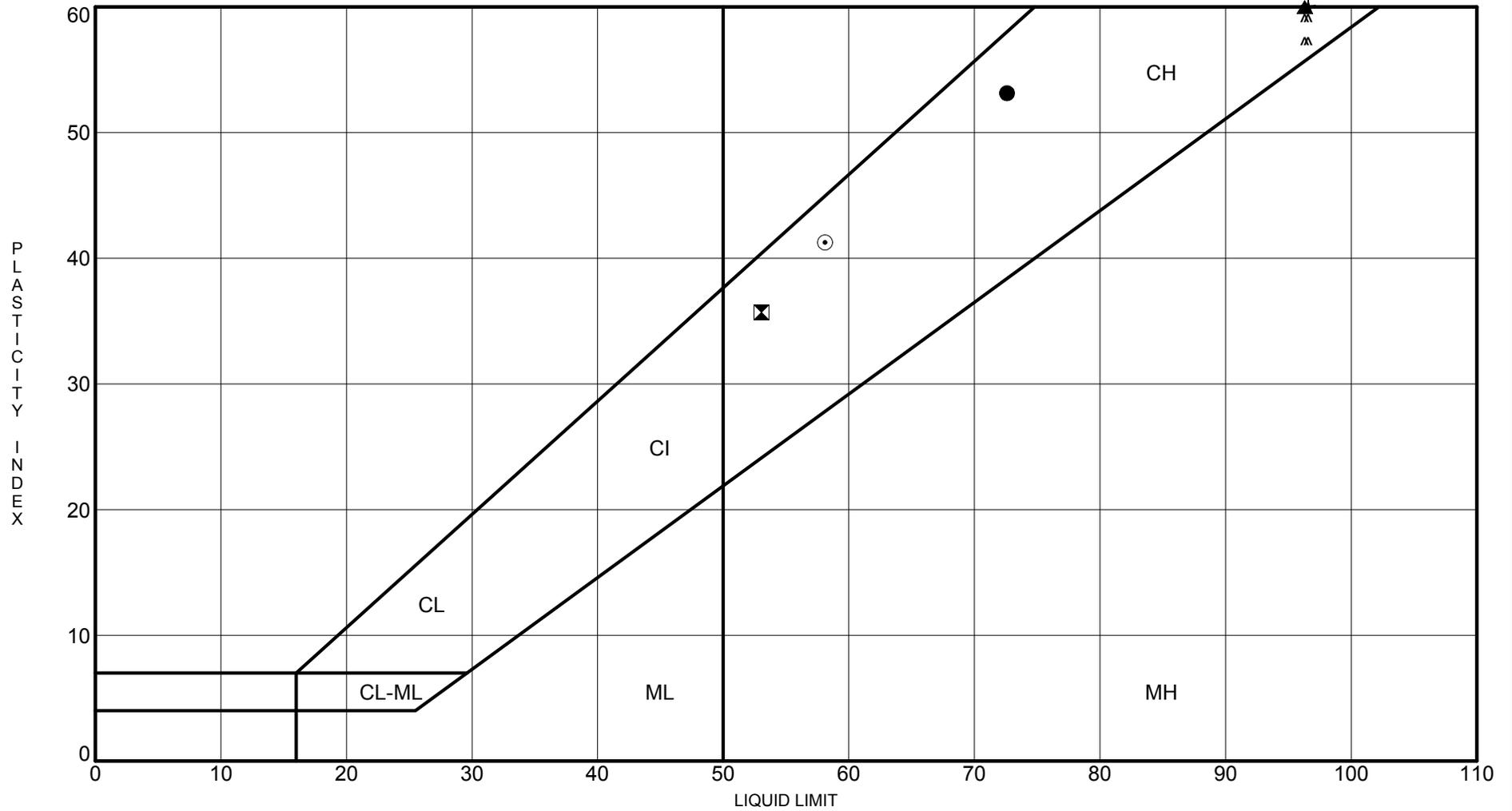
PROJECT NO: WX18716



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample No.	Classification					LL	PL	PI	Cc	Cu
● TH03 (LYNDALE)	FAT CLAY(CH)					73	19	54		
⊠ TH09 (PULBERRY)	FAT CLAY(CH)					53	17	36		
▲ TH11 (PULBERRY)	FAT CLAY(CH)					96	23	73		
★ TH16 (FLYNN)	FAT CLAY(CH)					97	23	74		
⊙ TH18 (FLYNN)	FAT CLAY(CH)					58	17	41		
Sample No.	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● TH03 (LYNDALE)	2	0.003				3.7	42.7	53.1		
⊠ TH09 (PULBERRY)	2	0.004				2.7	44.6	52.4		
▲ TH11 (PULBERRY)	2	0.02	0.003			5.3	67.8	26.6		
★ TH16 (FLYNN)	2					1.2	16.6	81.6		
⊙ TH18 (FLYNN)	2	0.003				3.4	37.4	58.7		

WX18716 DILLON CONSTRUCTION - CITY OF WINNIPEG STREET INVESTIGATION - LOCAL STREETS.GPJ - 19/02/19 08:27 AM (GRAIN SIZE FOR MAT CLIENTS)



Borehole	Depth (m)	LL	PL	PI
● TH03	0.7	73	19	54
⊠ TH09	1.0	53	17	36
▲ TH11	1.0	96	23	73
★ TH16	0.7	97	23	74
⊙ TH18	0.7	58	17	41

ATTERBERG LIMIT RESULTS

Appendix C

Core and Test Hole Summary Tables





SUMMARY TABLE

Client: Dillion Construction
 Project: City of Winnipeg Local Street Investigation
 Date Cored: 28-Jan-19
 Cored By: Caolan McEvoy

Project No: WX18716
 Core Diameter: 150 mm Core Barrel
 Street: Lyndale Drive
 Measured By: Rolando Rongcal

Test Hole No.	Test Hole Location	Pavement Surface		Soil Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)		Top	Bottom		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH01	UTM 14U Northing 5527117.169, Easting 634374.396	Asphalt	86	GRANULAR FILL	0.1	0.3	16.5							
				CLAY FILL	0.4	0.6	23.8							
				CLAY FILL	0.7	0.9	23.5							
				CLAY FILL	1.0	1.2	18.5							
				CLAY FILL	1.2	1.4	21.4							
				CLAY	1.6	1.8	22.3							
				CLAY	1.8	2.0	28.4							
TH02	UTM 14U Northing 5527081.962, Easting 634351.002	Asphalt	95	GRANULAR FILL	0.1	0.2	14.7							
				CLAY FILL	0.4	0.6	24.7							
				CLAY FILL	0.7	0.9	24.5							
				CLAY FILL	1.0	1.2	24.7							
				CLAY FILL	1.3	1.5	26.1							
				CLAY FILL	1.5	1.7	24.2							
				CLAY	1.8	2.0	27.7							
TH03	UTM 14U Northing 5527048.796, Easting 634318.251	Asphalt	98	GRANULAR FILL	0.1	0.3	13.8							
				CLAY FILL	0.4	0.6	29.0							
				CLAY FILL	0.7	0.9	27.5	0	3.7	42.7	53.1	73	19	54
				CLAY FILL	1.0	1.2	24.1							
				CLAY FILL	1.3	1.5	28.2							
				CLAY FILL	1.6	1.8	28.9							
				CLAY FILL	1.8	2.0	23.9							
TH04	UTM 14U Northing 5527010.284, Easting 634293.752	Asphalt	77	GRANULAR FILL	0.1	0.3	13.3							
				CLAY FILL	0.4	0.6	28.9							
				CLAY FILL	0.7	0.9	28.7							
				CLAY FILL	1.0	1.2	25.5							
				CLAY FILL	1.3	1.5	25.8							
				CLAY FILL	1.6	1.8	29.0							
				CLAY FILL	1.8	2.0	34.0							



SUMMARY TABLE

Client: Dillion Construction
 Project: City of Winnipeg Local Street Investigation
 Date Cored: 28-Jan-19
 Cored By: Caolan McEvoy

Project No: WX18716
 Core Diameter: 150 mm Core Barrel
 Street: Lyndale Drive
 Measured By: Rolando Rongcal

Test Hole No.	Test Hole Location	Pavement Surface		Soil Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)		Top	Bottom		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH05	UTM 14U Northing 5526977.486, Easting 6634262.343	Asphalt	90	GRANULAR FILL	0.1	0.2	16.1							
				CLAY FILL	0.4	0.6	24.7							
				CLAY FILL	0.7	0.9	29.2							
				CLAY FILL	1.0	1.2	28.7							
				CLAY FILL	1.3	1.5	28.4							
				CLAY FILL	1.6	1.8	28.3							
				ALLUVIAL CLAY	1.8	2.0	31.9							
TH06	UTM 14U Northing 5526939.179, Easting 634237.2	Asphalt	105	GRANULAR FILL	0.1	0.3	9.6							
				CLAY FILL	0.4	0.6	27.2							
				CLAY FILL	0.7	0.9	27.7							
				CLAY FILL	1.0	1.2	26.3							
				CLAY FILL	1.3	1.5	27.3							
				CLAY FILL	1.6	1.8	25.9							
				CLAY FILL	1.8	2.0	29.4							
TH07	UTM 14U Northing 5526903.654, Easting 634206.047	Asphalt	111	GRANULAR FILL	0.1	0.3	6.0							
				CLAY FILL	0.4	0.6	25.4							
				CLAY FILL	0.7	0.9	25.6							
				CLAY FILL	1.0	1.2	28.2							
				CLAY FILL	1.3	1.5	27.4							
				CLAY FILL	1.6	1.8	26.7							
				CLAY	1.8	2.0	24.9							
TH08	UTM 14U Northing 5526862.918, Easting 634187.04	Asphalt	109	GRANULAR FILL	0.1	0.3	14.6							
				CLAY FILL	0.4	0.6	27.0							
				CLAY FILL	0.7	0.9	26.3							
				CLAY FILL	1.0	1.2	24.8							
				CLAY FILL	1.3	1.5	23.9							
				CLAY	1.6	1.8	34.6							
				CLAY	1.8	2.0	33.9							



SUMMARY TABLE

Client: Dillion Construction
 Project: City of Winnipeg Local Street Investigation
 Date Cored: 31-Jan-19
 Cored By: Caolan McEvoy

Project No: WX18716
 Core Diameter: 150 mm Core Barrel
 Street: Pulberry Street
 Measured By: Rolando Rongcal

Test Hole No.	Test Hole Location	Pavement Surface		Soil Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits			
		Type	Thickness (mm)		Top	Bottom		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index	
TH13	UTM 14U Northing 5521835.908, Easting 635408.615	Concrete	151	GRANULAR FILL	0.2	0.3	12.9								
				CLAY	0.4	0.6	28.7								
				CLAY	0.7	0.9	31.9								
				CLAY	1.0	1.2	29.0								
				SILT	1.3	1.5	27.5								
				SILT	1.6	1.8	21.2								
				SILT	1.8	2.0	22.7								
TH14	UTM 14U Northing 5521912.363, Easting 635365.72	Concrete	153	GRANULAR FILL	0.2	0.3	14.8								
				CLAY	0.4	0.6	26.1								
				CLAY	0.7	0.9	37.5								
				CLAY	1.0	1.2	25.4								
				CLAY	1.2	1.4	22.1								
				SILT	1.6	1.8	24.7								
				SILT	1.8	2.0	23.7								
TH15	UTM 14U Northing 5521745.462, Easting 635458.992	Concrete	137	GRANULAR FILL	0.1	0.3	15.0								
				CLAY	0.4	0.6	No Recovery at this depth								
				CLAY	0.7	0.9	37.1								
				CLAY	1.0	1.2	25.8								
				CLAY	1.2	1.4	32.2								
				SILT	1.6	1.8	23.6								
				SILT	1.8	2.0	25.0								



SUMMARY TABLE

Client: Dillion Construction
 Project: City of Winnipeg Local Street Investigation
 Date Cored: 23-Jan-19
 Cored By: Michael Lafrance

Project No: WX18716
 Core Diameter: 150 mm Core Barrel
 Street: Speers Road
 Measured By: Rolando Rongcal

Test Hole No.	Test Hole Location				Pavement Surface		Underlying Soil Description
	Distance from Cross Street	Offset From Curb	House Number	Travel Lane	Type	Thickness (mm)	
TH-S01	50 m South of Elizabeth Road	1.5 m East from West Curb	None	Southbound Lane	Asphalt	38.7	CLAY
					Concrete	187.3	
TH-S02	150 m South of Elizabeth Road	2.0 m West from East Curb	1055 Baudoux Pl.	Northbound Lane	Asphalt	47.0	CLAY
					Concrete	207.7	
TH-S03	20 m North of Northwest corner of Bernier Bay	1.0 m East from West Curb	139 Speers Road	Southbound Lane	Asphalt	37.0	CLAY
					Concrete	187.7	
TH-S04	17 m North of Northwest corner of Bernier bay	2.0 m West from East Curb	163 Speers Road	Northbound Lane	Asphalt	32.0	CLAY
					Concrete	203.0	
TH-S05	12 m North of new corner of Halliday Bay	1.2 m East from West Curb	189 Speers Road	Southbound Lane	Asphalt	53.3	CLAY
					Concrete	189.7	
TH-S06	4 m South of Southwest corner of Halliday Bay	2.0 m West from East Curb	217 Speers Road	Northbound Lane	Asphalt	57.0	CLAY
					Concrete	203.3	
TH-S07	15 m south of Betournay Street	1.5 m West from East Curb	243 Speers Road	Northbound Lane	Concrete	160.0	CLAY
TH-S08	49 m North of Winakwa	1.5 m East from West Curb	269 Speers Road	Southbound Lane	Asphalt	6.7	CLAY
					Concrete	153.0	

Remarks: _____



SUMMARY TABLE

Client: Dillion Construction
 Project: City of Winnipeg Local Street Investigation
 Date Cored: 24-Jan-19
 Cored By: Michael Lafrance

Project No: WX18716
 Core Diameter: 150 mm Core Barrel
 Street: Traverse Avenue
 Measured By: Rolando Rongcal

Test Hole No.	Test Hole Location				Pavement Surface		Underlying Soil Description
	Distance from Cross Street	Offset From Curb	House Number	Travel Lane	Type	Thickness (mm)	
TH-TA01	16 m South of Dollard Blvd.	2.0 m East from West Curb	240 Dollard Blvd.	Southbound Lane	Asphalt	33.3	CLAY
					Concrete	175.0	
TH-TA02	116 m South of Dollard Blvd.	2.0 m West from East Curb	None	Northbound Lane	Asphalt	41.3	CLAY
					Concrete	151.0	
TH-TA03	18.5 m South of Bertrand Street	2.0 m East from West Curb	244 Bertrand Street	Southbound Lane	Asphalt	37.3	CLAY
					Concrete	143.0	
TH-TA04	21 m North of Thomas Berry Street	1.5 m West from East Curb	241 Thomas Berry Street	Northbound Lane	Asphalt	177.6	UNKNOWN
					Concrete	*200+	
TH-TA05	21 m South of Thomas Berry Street	2.0 m East from West Curb	242 Thomas Berry Street	Southbound Lane	Asphalt	38.3	CLAY
					Concrete	149.7	
TH-TA06	32 m North of Goulet Street	1.5 m West from East Curb	261 Goulet Street	Northbound Lane	Asphalt	36.7	CLAY
					Concrete	118.3	
TH-TA07	30 m North of Marion Street	1.5 m West from East Curb	245 Marion Street	Northbound Lane	Asphalt	43.7	CLAY
					Concrete	152.7	
TH-TA08	17 m North of Marion Street	2.0 m East from West Curb	None	Southbound Lane	Asphalt	47.7	CLAY
					Concrete	148.7	

Remarks: *Core Barrel Maxed out on TH-TA04, could not extract core



SUMMARY TABLE

Client: Dillion Construction
 Project: City of Winnipeg Local Street Investigation
 Date Cored: 25-Jan-19
 Cored By: Michael Lafrance

Project No: WX18716
 Core Diameter: 150 mm Core Barrel
 Street: Hamel Avenue
 Measured By: Rolando Rongcal

Test Hole No.	Test Hole Location				Pavement Surface		Underlying Soil Description
	Distance from Cross Street	Offset From Curb	House Number	Travel Lane	Type	Thickness (mm)	
TH-H01	58 m East of Rue Aulneau	1.5 m South from North Curb	240 Hamel Avenue	Westbound Lane	Asphalt	48.3	CLAY
					Concrete	214.7	
TH-H02	39 m West of Rue Ritchot	1.2 m North from South Curb	270 Hamel Avenue	Eastbound Lane	Asphalt	37.0	CLAY
					Concrete	214.0	
TH-H03	30 m East of Rue Ritchot	1.0 m South from North Curb	500 Rue Ritchot	Westbound Lane	Asphalt	69.0	CLAY
					Concrete	214.3	
TH-H04	28 m West of Rue de la Morenie	2.0 m North from South Curb	491 Rue de la Morenie	Eastbound Lane	Asphalt	62.7	UNKNOWN
					Concrete	*250+	
TH-H05*	32 m West of Des Meurons Street	1.5 m South from North Curb	495 Des Meurons Street	Westbound Lane	Asphalt	50.0	CLAY
					Concrete	250.0	

Remarks: *Core Barrel Maxed out on TH-H04, could not extract core, TH-H05 concrete and asphalt was poor condition core could not be retrieved, clay was observed during coring, depth was measured from penetration from the core barrel.



SUMMARY TABLE

Client: Dillion Construction
 Project: City of Winnipeg Local Street Investigation
 Date Cored: 28-Jan-19
 Cored By: Michael Lafrance

Project No: WX18716
 Core Diameter: 150 mm Core Barrel
 Street: Des Meurons Street
 Measured By: Rolando Rongcal

Test Hole No.	Test Hole Location				Pavement Surface		Underlying Soil Description
	Distance from Cross Street	Offset From Curb	House Number	Travel Lane	Type	Thickness (mm)	
TH-D01	28 m South of Carriere Avenue	2.0 m East from West Curb	62 Carriere Avenue	Southbound Lane	Asphalt	62.0	CLAY
					Concrete	205.0	
TH-D02	28 m North of Fifth Avenue	1.5 m West from East Curb	65 Fifth Avenue	Northbound Lane	Asphalt	50.0	CLAY
					Concrete	195.0	
TH-D03	28 m South of Fifth Avenue	1.0 m East from West Curb	58 Fifth Avenue	Southbound Lane	Concrete	208.3	CLAY
TH-D04	21m North of Guay Avenue	1.2 m West from East Curb	61 Guay Avenue	Northbound Lane	Concrete	193.7	CLAY
TH-D05	26 m South of Guay Avenue	1.0 m East from West Curb	56 Guay Avenue	Southbound Lane	Asphalt	49.0	CLAY
					Concrete	183.7	
TH-D06	17 m North of Morier Avenue	1.0 m West from East Curb	59 Morier Avenue	Northbound Lane	Asphalt	24.0	CLAY
					Concrete	214.0	

Remarks: _____



SUMMARY TABLE

Client: Dillion Construction
 Project: City of Winnipeg Local Street Investigation
 Date Cored: 31-Jan-19
 Cored By: Michael Lafrance

Project No: WX18716
 Core Diameter: 150 mm Core Barrel
 Street: Hazelwood Avenue
 Measured By: Rolando Rongcal

Test Hole No.	Test Hole Location				Pavement Surface		Underlying Soil Description
	Distance from Cross Street	Offset From Curb	House Number	Travel Lane	Type	Thickness (mm)	
TH-HW01	21 m West of Dells Crescent	1.5 m South from North Curb	291 Hazelwood Avenue	Westbound Lane	Concrete	153.3	CLAY
TH-HW02	78 m West of Dells Crescent	1.2 m North from South Curb	274 Hazelwood Avenue	Eastbound Lane	Concrete	155.0	CLAY
TH-HW03	32 m East of Wakopa Street	1.5 m South from North Curb	263 Hazelwood Avenue	Westbound Lane	Concrete	155.0	GRANULAR FILL - (20 mm crushed A-Base)
TH-HW04	8 m West of Wakopa Street	1.5 m North from South Curb	250 Hazelwood Avenue	Eastbound Lane	Concrete	153.3	GRANULAR FILL - (20 mm crushed A-Base)
TH-HW05	13 m East of Dells Crescent	1.5 m South from North Curb	239 Hazelwood Avenue	Westbound Lane	Concrete	142.7	GRANULAR FILL - (20 mm crushed A-Base)
TH-HW06	31 m West of Dells Crescent	1.5 m North from South Curb	223 Hazelwood Avenue	Eastbound Lane	Concrete	163.3	GRANULAR FILL - (20 mm crushed A-Base)
TH-HW07	35 m East of Dakota Street	1.5 m South from North Curb	219 Hazelwood Avenue	Westbound Lane	Concrete	142.7	GRANULAR FILL - (20 mm crushed A-Base)

Remarks: _____



SUMMARY TABLE

Client: Dillion Construction
 Project: City of Winnipeg Local Street Investigation
 Date Cored: 1-Feb-19
 Cored By: Michael Lafrance

Project No: WX18716
 Core Diameter: 150 mm Core Barrel
 Street: Traynor Bay
 Measured By: Rolando Rongcal

Test Hole No.	Test Hole Location				Pavement Surface		Underlying Soil Description
	Distance from Cross Street	Offset From Curb	House Number	Travel Lane	Type	Thickness (mm)	
TH-TB01	37 m North of St. Michael Road	1.0 m West from East Curb	7 Traynor Bay	Northbound Lane	Concrete	162.3	CLAY
TH-TB02	64 m North of St. Michael Road	1.0 m West from East Curb	15 Traynor Bay	Northbound Lane	Concrete	141.7	CLAY
TH-TB03	120 m North of St. Michael Road	0.5 m North from South Curb	31 Traynor Bay	Eastbound Lane	Concrete	145.0	CLAY
TH-TB04	71 m North of St. Michael Road	1.5 m East from West Curb	51 Traynor Bay	Southbound Lane	Concrete	151.7	CLAY
TH-TB05	34 m North of St. Michael Road	2.0 m West from East Curb	58 Traynor Bay	Northbound Lane	Concrete	152.7	CLAY

Remarks: _____

Appendix D

Core Photo Log





Lyndale Drive
Core ID: TH01

CORE #TH01

Wood Environment and Infrastructure
Solutions

CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH01
LYNDALE DRIVE
WINNIPEG, MANITOBA

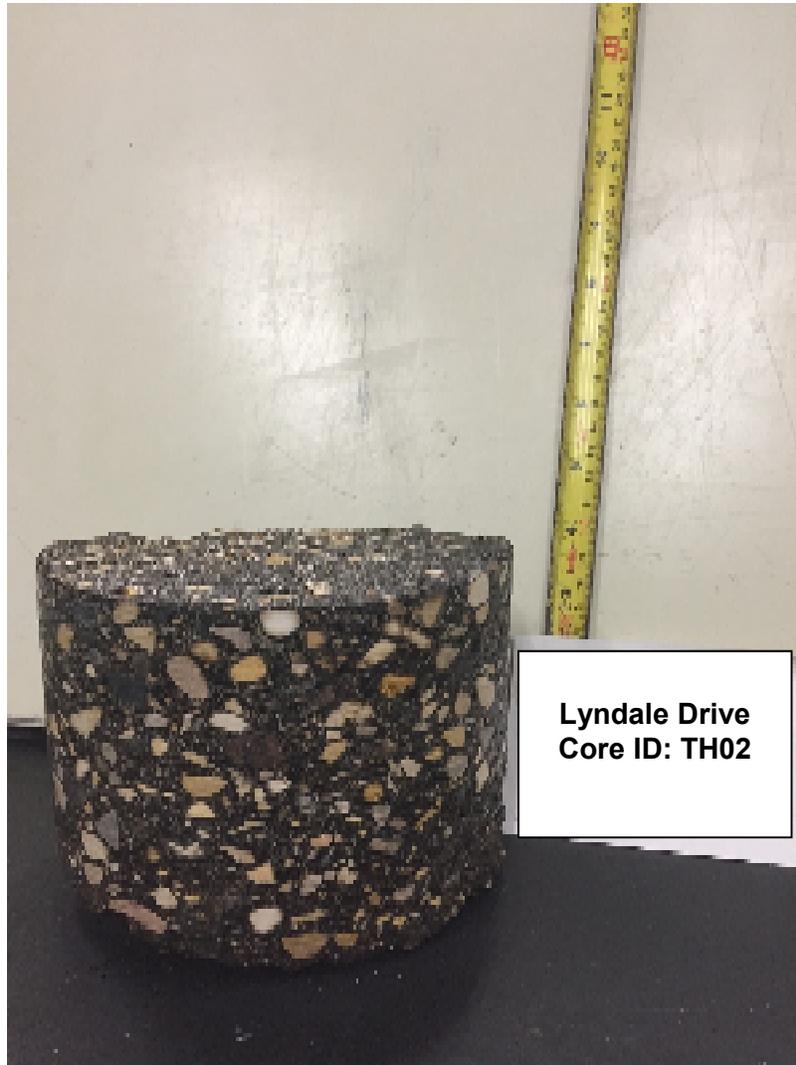
Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D1



Lyndale Drive
Core ID: TH02

CORE #TH02

Wood Environment and Infrastructure
Solutions

CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH02
LYNDALE DRIVE
WINNIPEG, MANITOBA

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

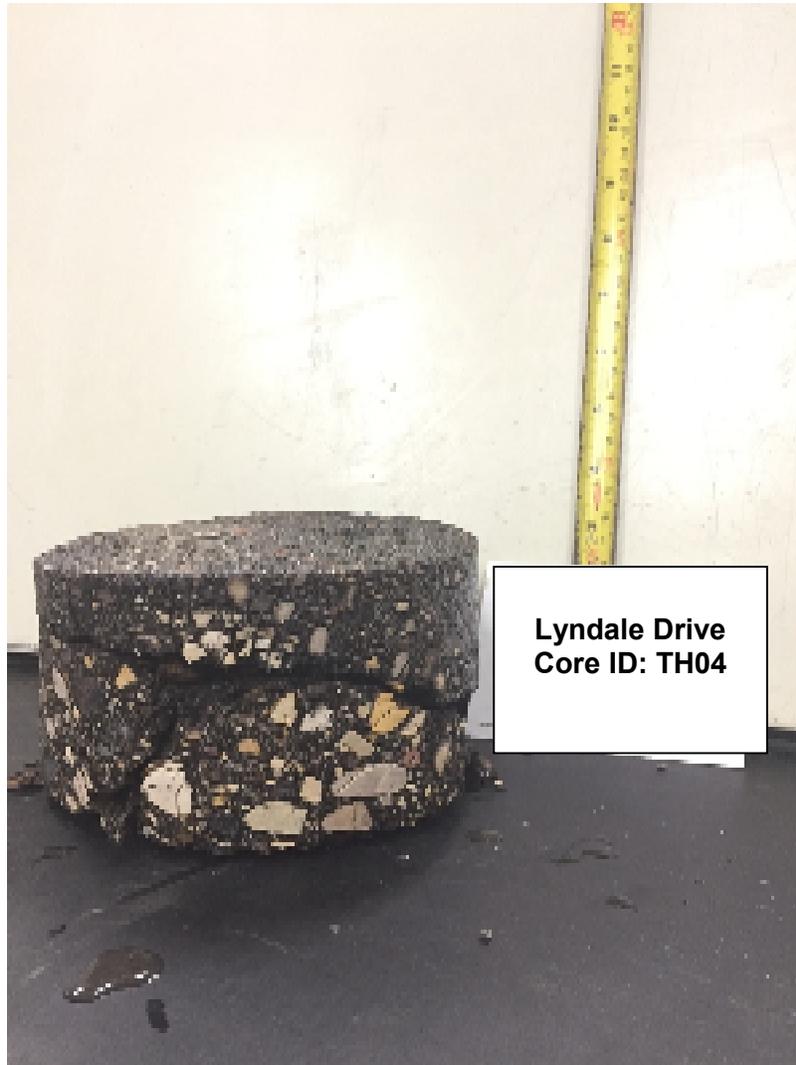
Figure: D2



**Lyndale Drive
Core ID: TH03**

CORE #TH03

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH03 LYNDALE DRIVE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D3</p>



Lyndale Drive
Core ID: TH04

CORE #TH04

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH04 LYNDALE DRIVE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D4</p>



Lyndale Drive
Core ID: TH05

CORE #TH05

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH05 LYNDALE DRIVE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D6</p>



**Lyndale Drive
Core ID: TH06**

CORE #TH06

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH06
LYNDALE DRIVE
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D6



CORE #TH07

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH07 LYNDALE DRIVE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D7</p>



**Lyndale Drive
Core ID: TH08**

CORE #TH08

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH08 LYNDALE DRIVE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D8</p>



**Pulberry Street
Core ID: TH09**

CORE #TH09

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH09
PULBERRY STREET
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D9



CORE #TH10

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH10 PULBERRY STREET WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D10</p>



CORE #TH11

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH11 PULBERRY STREET WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D11</p>



CORE #TH12

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH12 PULBERRY STREET WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D12</p>



**Pulberry Street
Core ID: TH13**

CORE #TH13

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH13
PULBERRY STREET
WINNIPEG, MANITOBA**

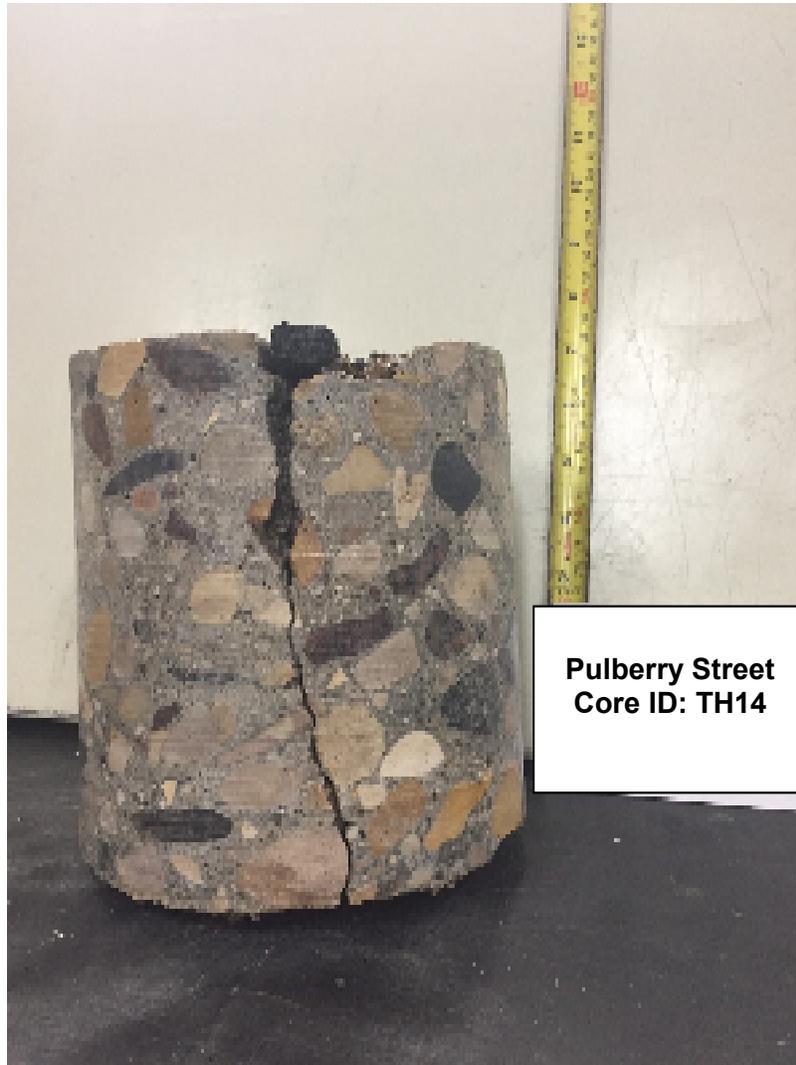
Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D13



**Pulberry Street
Core ID: TH14**

CORE #TH14

Wood Environment and Infrastructure Solutions		CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH14 PULBERRY STREET WINNIPEG, MANITOBA		
Drawn: CM	Scale: N/A	Date: 14 February 2019	Project No.: WX18716	Figure: D14



**Pulberry Street
Core ID: TH15**

CORE #TH15

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH15
PULBERRY STREET
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D15



CORE #TH16

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH16
PULBERRY STREET
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D16



**Flynn Street
Core ID: TH17**

CORE #TH17

Wood Environment and Infrastructure Solutions		CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH17 PULBERRY STREET WINNIPEG, MANITOBA		
Drawn: CM	Scale: N/A	Date: 14 February 2019	Project No.: WX18716	Figure: D17



CORE #TH18

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH18
PULBERRY STREET
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D18



CORE #TH-S01

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-S01 SPEERS ROAD WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D19</p>



CORE #TH-S02

Wood Environment and Infrastructure Solutions		CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-S02 SPEERS ROAD WINNIPEG, MANITOBA		
Drawn: CM	Scale: N/A	Date: 14 February 2019	Project No.: WX18716	Figure: D20



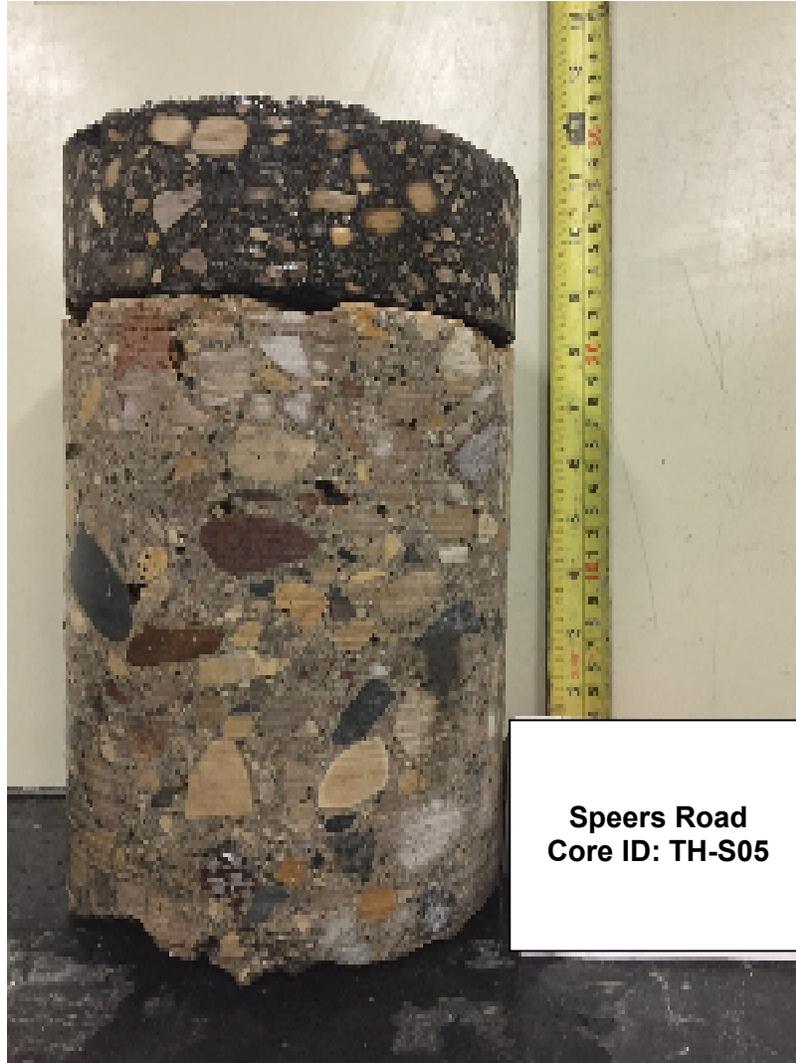
CORE #TH-S03

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-S03 SPEERS ROAD WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D21</p>



CORE #TH-S04

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-S04 SPEERS ROAD WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D22</p>



**Speers Road
Core ID: TH-S05**

CORE #TH-S05

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-S05
SPEERS ROAD
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D23



CORE #TH-S06

Wood Environment and Infrastructure Solutions		CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-S06 SPEERS ROAD WINNIPEG, MANITOBA		
Drawn: CM	Scale: N/A	Date: 14 February 2019	Project No.: WX18716	Figure: D24



CORE #TH-S07

Wood Environment and Infrastructure Solutions		CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-S07 SPEERS ROAD WINNIPEG, MANITOBA		
Drawn: CM	Scale: N/A	Date: 14 February 2019	Project No.: WX18716	Figure: D25



CORE #TH-S08

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-S08 SPEERS ROAD WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D26</p>



**Traverse Avenue
Core ID: TH-TA01**

CORE #TH-TA01

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-TA01
TRAVERSE AVENUE
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

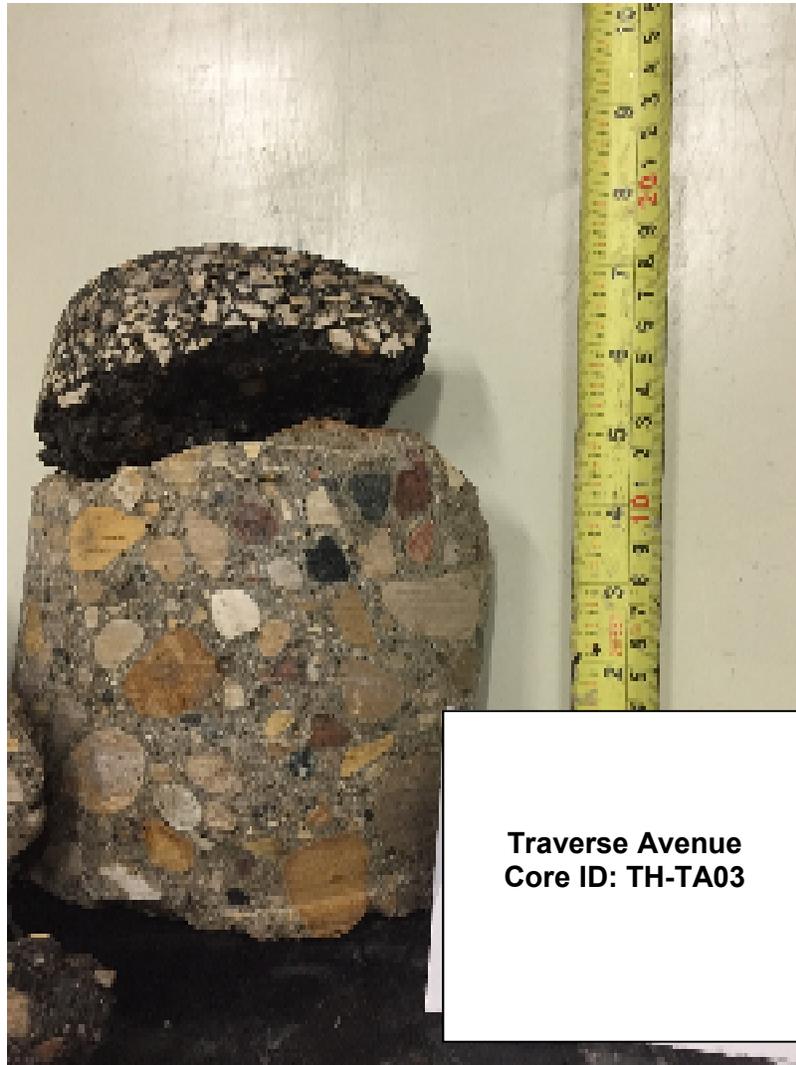
Figure: D27



**Traverse Avenue
Core ID: TH-TA02**

CORE #TH-TA02

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-TA02 TRAVERSE AVENUE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D28</p>



CORE #TH-TA03

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-TA03
TRAVERSE AVENUE
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D29



**Traverse Avenue
Core ID: TH-TA04**

CORE #TH-TA04

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-TA04
TRAVERSE AVENUE
WINNIPEG, MANITOBA**

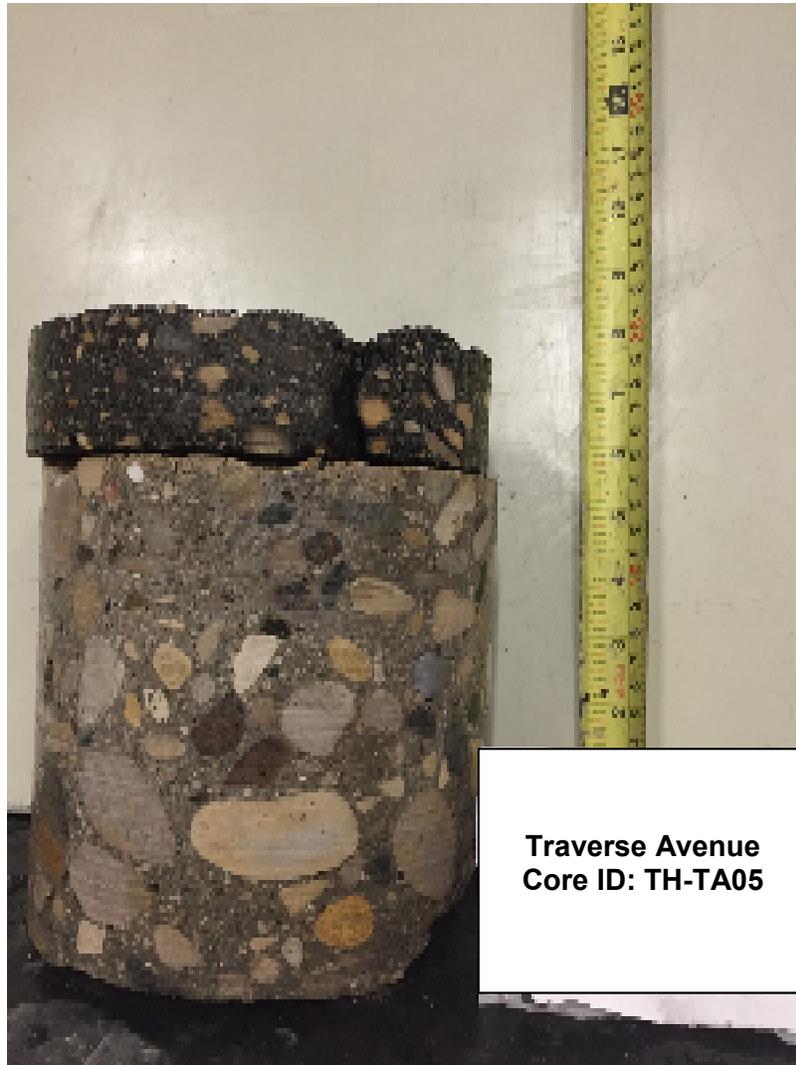
Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

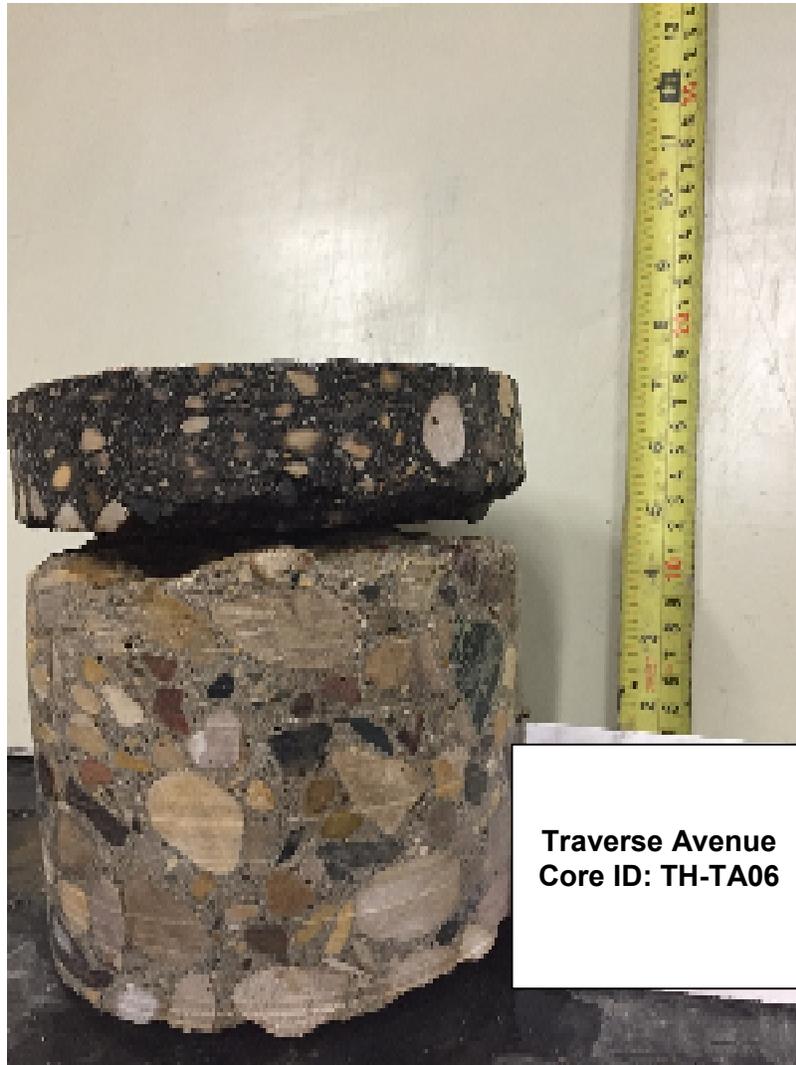
Figure: D30



**Traverse Avenue
Core ID: TH-TA05**

CORE #TH-TA05

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-TA05 TRAVERSE AVENUE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D31</p>



CORE #TH-TA06

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-TA06
TRAVERSE AVENUE
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

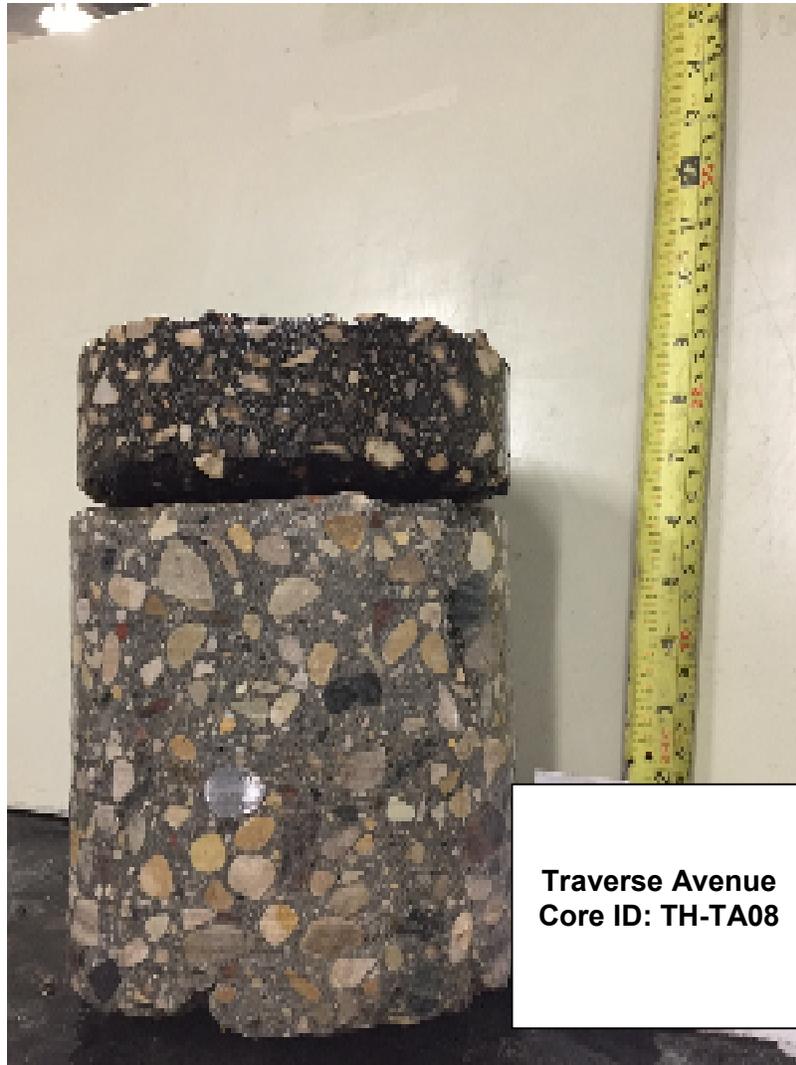
Figure: D32



**Traverse Avenue
Core ID: TH-TA07**

CORE #TH-TA07

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-TA07 TRAVERSE AVENUE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D33</p>



**Traverse Avenue
Core ID: TH-TA08**

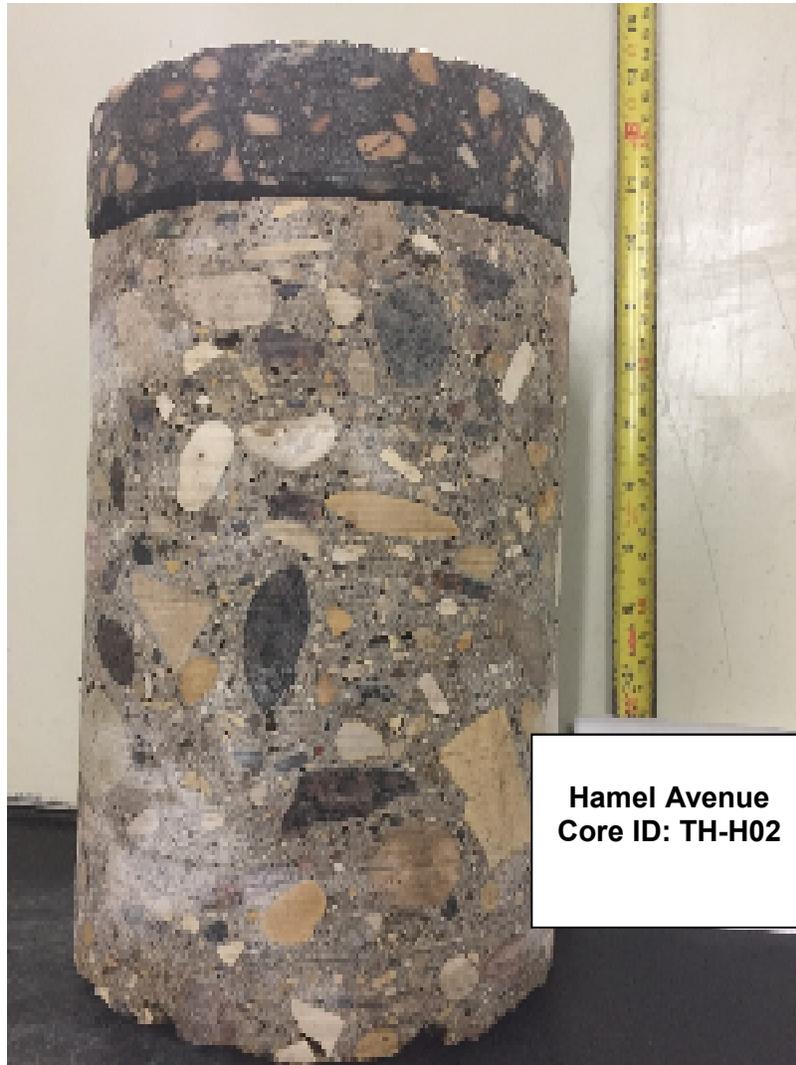
CORE #TH-TA08

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-TA08 TRAVERSE AVENUE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D34</p>



CORE #TH-H01

Wood Environment and Infrastructure Solutions		CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-H01 HAMEL AVENUE WINNIPEG, MANITOBA		
Drawn: CM	Scale: N/A	Date: 14 February 2019	Project No.: WX18716	Figure: D35



Hamel Avenue
Core ID: TH-H02

CORE #TH-H02

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-H02 HAMEL AVENUE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D36</p>



**Hamel Avenue
Core ID: TH-H03**

CORE #TH-H03

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-H03 HAMEL AVENUE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D37</p>



Hamel Avenue
Core ID: TH-H04

CORE #TH-H04

Wood Environment and Infrastructure
Solutions

CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-H04
HAMEL AVENUE
WINNIPEG, MANITOBA

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D38



CORE #TH-D01

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-D01 DES MEURONS STREET WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D39</p>



CORE #TH-D02

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-D02 DES MEURONS STREET WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D40</p>



**Des Meurons
Street
Core ID: TH-D03**

CORE #TH-D03

Wood Environment and Infrastructure Solutions		CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-D03 DES MEURONS STREET WINNIPEG, MANITOBA		
Drawn: CM	Scale: N/A	Date: 14 February 2019	Project No.: WX18716	Figure: D41



**Des Meurons
Street
Core ID: TH-D04**

CORE #TH-D04

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-D04 DES MEURONS STREET WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D42</p>



**Des Meurons
Street
Core ID: TH-D05**

CORE #TH-D05

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-D05 DES MEURONS STREET WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D43</p>



CORE #TH-D06

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-D06 DES MEURONS STREET WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D44</p>



**Hazelwood Street
Core ID: TH-HW01**

CORE #TH-HW01

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-HW01
HAZELWOOD AVENUE
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D45



**Hazelwood Street
Core ID: TH-HW02**

CORE #TH-HW02

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-HW02
HAZELWOOD AVENUE
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D46



**Hazelwood Street
Core ID: TH-HW03**

CORE #TH-HW03

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-HW03
HAZELWOOD AVENUE
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D47



CORE #TH-HW04

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-HW04 HAZELWOOD AVENUE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D48</p>



**Hazelwood Street
Core ID: TH-HW05**

CORE #TH-HW05

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-HW05
HAZELWOOD AVENUE
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D49



**Hazelwood Street
Core ID: TH-HW06**

CORE #TH-HW06

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-HW06 HAZELWOOD AVENUE WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D50</p>



**Hazelwood Street
Core ID: TH-HW07**

CORE #TH-HW07

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-HW07
HAZELWOOD AVENUE
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D51



**Traynor Bay
Core ID: TH-TB01**

CORE #TH-TB01

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-TB01
TRAYNOR BAY
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D52



**Traynor Bay
Core ID: TH-TB02**

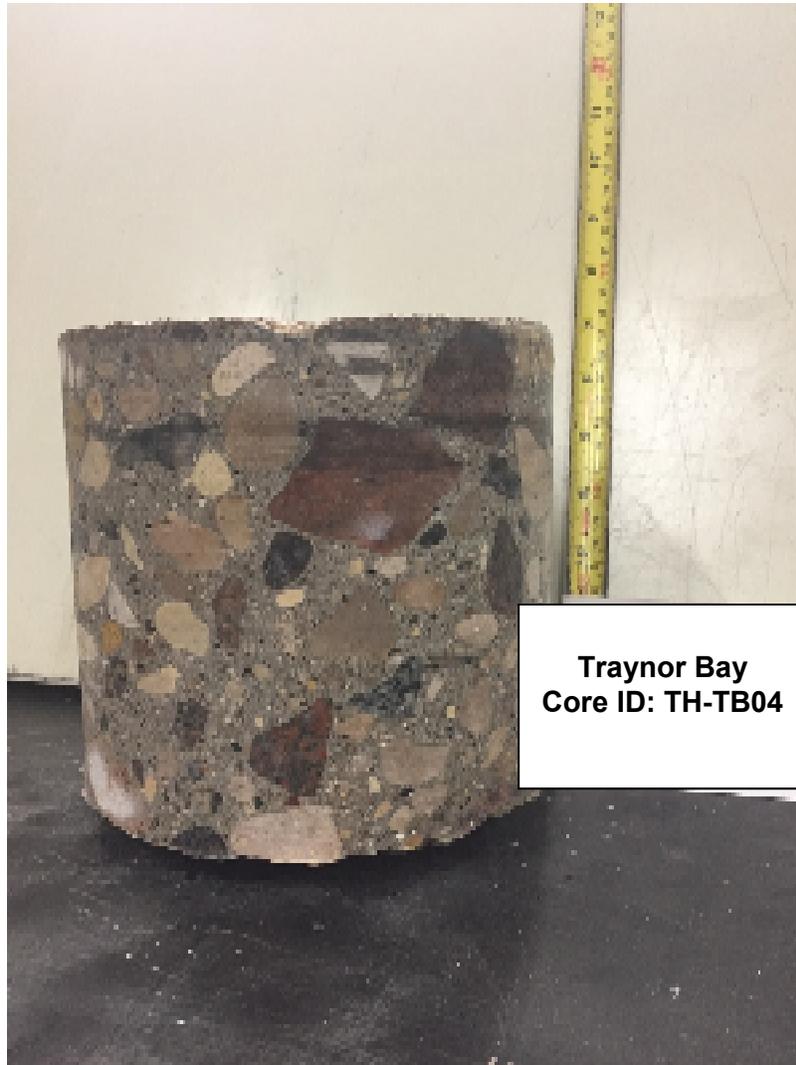
CORE #TH-TB02

<p>Wood Environment and Infrastructure Solutions</p>	<p>CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-TB02 TRAYNOR BAY WINNIPEG, MANITOBA</p>			
<p>Drawn: CM</p>	<p>Scale: N/A</p>	<p>Date: 14 February 2019</p>	<p>Project No.: WX18716</p>	<p>Figure: D53</p>



CORE #TH-TB03

Wood Environment and Infrastructure Solutions		CORE PHOTOGRAPHS PAVEMENT CORE SAMPLE TH-TB03 TRAYNOR BAY WINNIPEG, MANITOBA		
Drawn: CM	Scale: N/A	Date: 14 February 2019	Project No.: WX18716	Figure: D54



**Traynor Bay
Core ID: TH-TB04**

CORE #TH-TB04

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-TB04
TRAYNOR BAY
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D55



**Traynor Bay
Core ID: TH-TB05**

CORE #TH-TB05

**Wood Environment and Infrastructure
Solutions**

**CORE PHOTOGRAPHS
PAVEMENT CORE SAMPLE TH-TB05
TRAYNOR BAY
WINNIPEG, MANITOBA**

Drawn: CM

Scale: N/A

Date: 14 February 2019

Project No.: WX18716

Figure: D56

APPENDIX 'H'

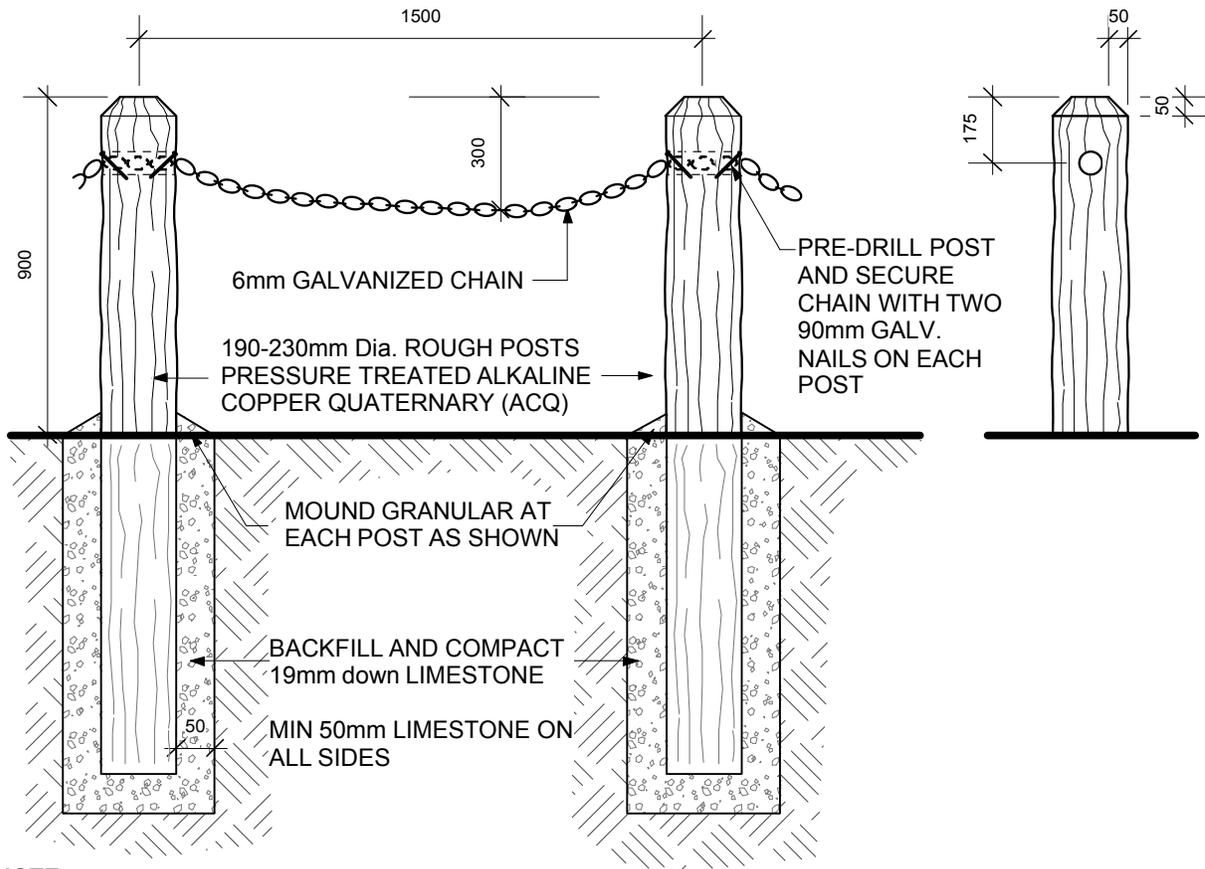
POST AND CHAIN FENCING

Drawing Title:

POST AND CHAIN FENCING

Drawing No:

SCD-105A



NOTE:

- SECURE CHAIN TO EACH POST WITH TWO ONLY 90mm GALV. NAILS TO PREVENT CHAIN SLIPPING. DRAPE CHAIN AS INDICATED.
- ALL POSTS THOROUGHLY TAMPED AND GRANULAR MOUNDED AT EACH POST FOR FUTURE SETTLING AND DRAINAGE AWAY FROM POST. SURPLUS EARTH TO BE LEGALLY DISPOSED OF.
- FENCE POSTS ARE TO FOLLOW THE NATURAL CONTOUR OF THE LAND EXCEPT FOR SMALL UNDULATIONS WHICH WOULD TEND TO REDUCE THE AESTHETIC APPEARANCE OF THE FINISHED PRODUCT.

DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

REVISION: 2
DATE: December 20, 2012
SCALE: N.T.S.
DRAWN BY: SP

The City of Winnipeg
Planning, Property and Development Department
Planning and Land Use Division
Unit 15 - 30 Fort Street, Winnipeg, MB, R3C 4X5



APPENDIX 'I'

PAVEMENT REPAIR FABRIC

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1. DESCRIPTION

1.1 General

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

1.2 Definitions

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

1.2.2 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.

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

1.2.4 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.

1.2.5 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 minimize both thermal and stress related reflective cracking.

1.3 Referenced Standard Construction Specifications

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

1.3.2. CW 3410 – Asphaltic Concrete Pavement Works

1.3.3. Approved Products for Surface Works.

2. MATERIALS

2.1 Approved Products

- 1.1.1 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

2.2 Material Identification

- 2.2.1. 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.

2.3 Storage and Handling

- 1.3.1 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.
- 1.3.2 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.
- 1.3.3 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.

2.4 Certification

- 1.4.1 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.
- 1.4.2 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.
- 1.4.3 All testing and data shall be in accordance with approved ASTM standards. Data reported in accordance with other standards will not be accepted.

2.5 Pavement Repair Fabric Properties

- 2.5.1. 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.
- 2.5.2. The axis with the least strength will be taken as the ultimate strength of the fabric for any given property.

2.5.3. 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

2.5.4. 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

2.5.5. 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.

2.5.6. Aperture Sizes shall be as follows:

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

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

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

3. CONSTRUCTION METHODS

- 3.1. 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.
- 3.2. 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.
- 3.3. 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.
- 3.4. 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.
- 3.5. 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 be permitted on tight radii to prevent ripples.
- 3.6. 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.
- 3.7. 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.
- 3.8. 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.
- 3.9. Roller tires shall be kept clean to the satisfaction of the Contract Administrator.
- 3.10. If bonding of the fabric is not readily achieved, it shall be removed and replaced at the Contractor's expense.
- 3.11. 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.
- 3.12. Protect the Pavement Repair Fabric until placement of the finished asphalt topping.
- 3.13. 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.
- 3.14. 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.

- 3.15. 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.
- 3.16. 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.

4. QUALITY ASSURANCE TESTING

- 4.1. The Contract Administrator shall test the adhesion for pavement repair fabric in field during construction is as follows:
 - 4.1.1 Place approximately 1 m² of fabric on a prepared surface that is representative of the project conditions.
 - 4.1.2 Activate self-adhesive glue by rolling with a rubber-tired roller or by applying adequate pressure to fully activate the pressure-sensitive adhesive.
 - 4.1.3 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.
 - 4.1.4 A 9 kg pull is required without pulling the grid free or creating ripples in the fabric.

5. MEASUREMENT AND PAYMENT

- 5.1. 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.
- 5.2. Only material placed within the designated limits will be included in the payment for "Supply and Install Pavement Repair Fabric".
- 5.3. No measurement or payment will be made for Pavement Repair Fabric removed and replaced due to improper installation or damaged materials.
- 5.4. No measurement or payment will be made for transverse and longitudinal overlap.