THE CITY OF WINNIPEG

TENDER

TENDER NO. 452-2019

2019 LOCAL STREET RENEWAL PROGRAM – ANDREWS ST, CORK AVE, AND OTHER LOCATIONS

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2019 Local Street Renewal Program – Andrews St, Cork Ave, and Other Locations

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, June 6, 2019.

B2.2 Bids determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.

B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. ENQUIRIES

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

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

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 Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/bidopp.asp

B5.4 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B5.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B5.6 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, hard copy;

(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 enclosed and sealed in an envelope clearly marked with the Tender number and the Bidder's name and address.

B7.4.1 Samples or other components of the Bid which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Tender number, the Bidder's name and address, and an indication that the contents are part of the Bidder’s Bid.

B7.4.2 A hard copy of Form B: Prices must be submitted with the Bid. If there is any discrepancy between the Adobe PDF version of Form B: Prices and the Microsoft Excel version of Form B: Prices, the PDF version shall take precedence.

B7.5 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.

B7.6 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).

B7.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B7.8 Bids shall be submitted to:

The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg MB R3B 1J1

B8. BID

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

B8.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:

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

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

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

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

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

B8.3 In Paragraph 3 of Form A: Bid, 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 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 the corporate seal, if the corporation has one, shall be affixed;

(d) if the Bidder is carrying on business under a name other than his/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 should be printed below such signatures.

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

B9. PRICES

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

B9.1.1 Prices stated on Form B: Prices shall not include any costs which may be incurred by the Contractor with respect to any applicable funding agreement obligations as outlined in D29. Any such costs shall be determined in accordance with D29.

B9.1.2 For the convenience of Bidders, and pursuant to B7.4.2 and B17.4.2, an electronic spreadsheet Form B: Prices in Microsoft Excel (.xls) format is available along with the Adobe PDF documents for this Tender on the Bid Opportunities page at the Materials Management Division website at http://www.winnipeg.ca/matmgt/

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

B11.2 Conflict of Interest means any situation or circumstance where a Bidder or employee of the Bidder proposed for the Work has:

(a) other commitments;

(b) relationships;

(c) financial interests; or

(d) involvement in ongoing litigation;

that could or would be seen to:

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

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

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

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

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

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

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

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

B11.4 Without limiting B11.3, the City may, in its sole discretion, waive any and all perceived, potential or actual Conflicts of Interest. The City's waiver may be based upon such terms and conditions as the City, in its sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately avoided or mitigated, including requiring the Bidder to put into place such policies,

procedures, measures and other safeguards as may be required by and be acceptable to the City, in its sole discretion, to avoid or mitigate the impact of such Conflict of Interest.

B11.5 Without limiting B11.3, and in addition to all contractual or other rights or rights at law or in equity or legislation that may be available to the City, the City may, in its sole discretion:

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

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

(c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B11.4 to avoid or mitigate a Conflict of Interest; and

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

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

B12. QUALIFICATION

B12.1 The Bidder shall:

(a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and

(b) be financially capable of carrying out the terms of the Contract; and

(c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

B12.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

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

B12.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

(a) have successfully carried out work similar in nature, scope and value to the Work; and

(b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and

(c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);

B12.4 Further to B12.3(c), the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

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

(i) a copy of their valid Manitoba COR certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Certificate of Recognition (COR)

Program administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or

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

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

B12.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B12.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B13. BID SECURITY

B13.1 The Bidder shall provide 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).

B13.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B13.1.2 All signatures on bid securities shall be original.

B13.1.3 The Bidder shall sign the Bid Bond.

B13.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.

B13.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the contract securities are furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B13.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Tender.

B14. OPENING OF BIDS AND RELEASE OF INFORMATION

B14.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Division, or in such other office as may be designated by the Manager of Materials.

B14.1.1 Bidders or their representatives may attend.

B14.1.2 Bids determined by the Manager of Materials, or his/her designate, to not include the bid security specified in B13 will not be read out.

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 Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at

The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/

B14.3 After award of Contract, the name(s) of the successful Bidder(s), their address(es) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/

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.

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 executed 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.

B16. WITHDRAWAL OF BIDS

B16.1 A Bidder may withdraw his/her Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B16.1.1 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B16.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 13 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B16.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:

a) retain the Bid until after the Submission Deadline has elapsed;

b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 13 of Form A: Bid; and

c) if the notice has been given by any one of the persons specified in B16.1.3b), declare the Bid withdrawn.

B16.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B15.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B17. EVALUATION OF BIDS

B17.1 Award of the Contract shall be based on the following bid evaluation criteria:

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

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B12 (pass/fail);

(c) Total Bid Price;

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

B17.2 Further to B17.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.

B17.2.1 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 Further to B17.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

B17.4.2 The electronic Form B: Prices and the formulas imbedded in that spreadsheet are only provided for the convenience of Bidders. The City makes no representations or warranties as to the correctness of the imbedded formulas. It is the Bidder's responsibility to ensure the extensions of the unit prices and the sum of Total Bid Price performed as a function of the formulas within the electronic Form B: Prices are correct.

B18. AWARD OF CONTRACT

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

B18.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be qualified, and the Bids are determined to be responsive.

B18.2.1 Without limiting the generality of B18.2, the City will have no obligation to award a Contract where:

a) the prices exceed the available City funds for the Work;

b) the prices are materially in excess of the prices received for similar work in the past;

c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;

d) only one Bid is received; or

e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.

B18.3 The Work of this Contract is contingent upon the City receiving funding from the Government of Manitoba and/or the Government of Canada by June 20, 2019. If the City does not receive sufficient funding for the Work, the City will have no obligation to award a Contract.

B18.4 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D29 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.

B18.5 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B17.

B18.5.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

B18.6 As noted in D2 and identified in Form B: Prices, the Work of Part 2 will be contingent upon Manitoba Hydro approving funding for the Work. If sufficient funding for Part 2 Work is not approved by Manitoba Hydro, 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 2019-01-15) are applicable to the Work of the Contract.

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

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 parts:

(a) Part 1 – City Funded Work

(b) Part 2 – Manitoba Hydro Funded Work.

Part 1 – City Funded Work

D2.2 Part 1 – City Funded Work shall consist of:

(a) Asphalt Reconstruction
  (i) Cork Avenue – Sly Drive to Salter Street

(b) Concrete Reconstruction
  (i) Nora Street – Logan Avenue to Alexander Avenue

(c) Concrete Pavement Rehabilitation
  (i) Andrews Street – Leila Avenue to Hartford Avenue
  (ii) Stardust Avenue – Watson Street to McPhillips Street
  (iii) Neville Street – Margate Road to Mapleton Drive

(d) Asphalt Pavement Rehabilitation
  (i) Kairistine Lane – Kinver Avenue to Dexter Street
  (ii) Palms Boulevard – Garden Grove Drive to Burrows Avenue

(e) Sewer Repairs

Part 2 – Manitoba Hydro Funded Work

D2.3 Part 2 – Manitoba Hydro Funded Work shall consist of:

(a) Street Lighting and Associated Work
  (i) Cork Avenue – Sly Drive to Salter Street

D2.4 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 Manitoba Hydro by the Award Date. Part 2 of the Work is contingent upon Manitoba Hydro approving sufficient funding.

D2.4.1 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.

D2.4.2 Further to C7.5, C7.5.1, and C7.6, a reduction in the Contract Price pursuant to D2.4.1 shall not be considered in calculating the aggregate reduction in the Contract Price for purposes of C7.5.

D2.4.3 If all or any portion of Part 2 is eliminated pursuant to D2.4.1, 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.

D2.5 The major components of the Work are as follows:

Part 1 – City Funded Work

(a) Asphalt Reconstruction
- (i) Removal of existing pavement
- (ii) Complete required sewer repairs
- (iii) Excavation
- (iv) Installation of subdrains
- (v) Compaction of existing sub-grade
- (vi) Installation of catch basins and sewer service pipe
- (vii) Placement of separation/geotextile fabric
- (viii) Placement of sub-base and base course materials
- (ix) Construction of curb and gutter utilizing slip-form paving equipment
- (x) Adjustment of existing manholes
- (xi) Placement of asphalt pavement (Type 1A, 100mm thick)
- (xii) Renewal of existing sidewalk,
- (xiii) Boulevard restoration

(b) Concrete Reconstruction
- (i) Planing of existing asphalt and at intersections as required;
- (ii) Removal of existing pavement;
- (iii) Removal of existing;
- (iv) Installation of catch basins and sewer service pipe;
- (v) Installation of subdrains;
- (vi) Excavation;
- (vii) Compaction of existing sub-grade;
- (viii) Adjustment of existing pavement and boulevard structures;
- (ix) Placement of geotextile fabric;
- (x) Placement of sub-base material;
- (xi) Placement of base course material;
- (xii) Construction of 150mm concrete pavement (reinforced) and integral 180mm barrier curb utilizing slip form paving equipment;
- (xiii) Installation of curb inlet frames;
- (xiv) Renewal of concrete sidewalks as required;
- (xv) Installation of detectable warning surface tiles;
- (xvi) Boulevard restoration, salt tolerant seed and sod.

(c) Concrete Pavement Rehabilitation
- (i) Planing of existing asphalt at tie-ins
- (ii) Renewal of existing sidewalks as required
- (iii) Installation of detectable warning surface tiles
- (iv) Removal of existing curb as required
- (v) Replacing existing catch basins as required
- (vi) Installation of catch pits and drainage connection/sewer service pipes
- (vii) Partial depth milling and asphalt patching of existing joints
- (viii) Full depth concrete repairs of existing slabs and joints
- (ix) Adjustment of existing pavement and boulevard structures
- (x) Construction of concrete barrier curb using slip form paving equipment (150mm reveal height)
- (xi) Boulevard restoration

(xii) Installation of pavement repair fabric
(xiii) Construction of asphalt overlay(average thickness 80mm)

(d) Asphalt Pavement Rehabilitation and Associated Works
(i) Planing of existing asphalt as required
(ii) Removal of existing curb as required;
(iii) Removal of existing curb and gutter as required;
(iv) Renewal of existing sidewalks as required;
(v) Installation of detectable warning surface tiles;
(vi) Replacing existing catch basins as required;
(vii) Installation of catch pits and drainage connection/sewer service pipes;
(viii) Renewal of concrete approaches and tie-ins;
(ix) Adjustment of existing pavement and boulevard structures;
(x) Boulevard restoration
(xi) Asphalt patching
(xii) Reflective Asphalt Crack Sealing
(xiii) Installation of pavement repair fabric
(xiv) Construction of asphalt overlay(average thickness 50mm)
(xv) Construction of asphalt barrier curb (125mm reveal ht)

(e) Sewer/Manhole Repairs and Associated Works
(i) Sewer service renewals and reconnections
(ii) Patching and replacing manhole risers
(iii) Repairing benching of manholes
(iv) Sewer and sewer service video inspection

Part 2 – Manitoba Hydro Funded Work

(a) Street Lighting and Associated Works
(i) Installation of foundation – concrete base
(ii) Installation of breakaway bases
(iii) Installation of street light poles on concrete bases
(iv) Installation of the luminaire and associated wiring
(v) Splicing /connecting of electrical cables
(vi) Excavation of street light cable/conduit trench
(vii) Installation of conduits and cables
(viii) Backfill the street light cable/conduit trench
(ix) Removal of street light poles from existing bases
(x) Removal of concrete bases and direct buried street light poles
(xi) Provide as-built drawing of the buried street light cable, conduits and street light standards.

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is:

Cory Humbert
Technologist 3

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

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

D3.3 Bids Submissions must be submitted to the address in B7.

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. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

D5.1 The Contract, all deliverables produced or developed, and information provided to or acquired by the Contractor are the property of the City and shall not be appropriated for the Contractors own use, or for the use of any third party.

D5.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.

D5.3 The following shall be confidential and shall not be disclosed by the Contractor to the media or any member of the public without the prior written authorization of the Contract Administrator;

(a) information provided to the Contractor by the City or acquired by the Contractor during the course of the Work;

(b) the Contract, all deliverables produced or developed; and

(c) any statement of fact or opinion regarding any aspect of the Contract.

D5.4 A Contractor who violates any provision of D5 may be determined to be in breach of Contract.

D6. NOTICES

D6.1 Except as provided for in C23.2.2, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid.

D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D6.3 D6.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D3.

D6.3 Notwithstanding C21, all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following:

The City of Winnipeg
Attn: Chief Financial Officer
Office of the Chief Administrative Officer
Susan A. Thompson Building
2nd Floor, 510 Main Street
Winnipeg MB R3B 1B9

D6.4 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services

Facsimile No.: 204-947-9155

D6.5 Bids Submissions must not be submitted to this facsimile number. Bids must be submitted in accordance with B7.

D7. FURNISHING OF DOCUMENTS

D7.1 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

D8. AUTHORITY TO CARRY ON BUSINESS

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

D9. SAFE WORK PLAN

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

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

D10. INSURANCE

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

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

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

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

D10.2 Deductibles shall be borne by the Contractor.

D10.3 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.

D10.4 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.

D11. CONTRACT SECURITY

D11.1 The Contractor shall provide and maintain the performance bond and the labour and material payment bond until the expiration of the warranty period in the form of:

(a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; and

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

D11.2 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 letter of intent 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.

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

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

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

D12. SUBCONTRACTOR LIST

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

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.

D13.2 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.

D13.3 The detailed work schedule shall consist of the following:

(a) a Gantt chart for the Work

all acceptable to the Contract Administrator.

D13.4 Further to D13.3(a), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

SCHEDULE OF WORK

D14. COMMENCEMENT

D14.1 The Contractor shall not commence any Work until he/she is in receipt of a letter of intent 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 D8;
  (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 D9;
  (v) evidence of the insurance specified in D10;
  (vi) the contract security specified in D11;
  (vii) the subcontractor list specified in D12; and
  (viii) 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 commence the Work on the Site within seven (7) Working Days of receipt of the letter of intent.

D14.4 The City intends to award this Contract by July 3, 2019.

D14.4.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D15. WORKING DAYS

D15.1 Further to C1.1(ll);

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 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) City of Winnipeg Geomatics Branch - Various work on survey monuments;

(b) Manitoba Hydro Gas Division – Lowering and/or rock wrapping of gas main and services;

(c) Manitoba Hydro – Supply and inspection of new street lighting hardware (to be installed by the contractor) and the energizing of new street light plant;

(d) Manitoba Hydro – Supply and installation of new street lighting hardware and the energizing of new street light.

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 inD2, 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.

D19. CRITICAL STAGES

D19.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

(a) Cork Avenue – Sly Drive to Salter Street

(i) The Contractor shall not commence the Work on the Site before July 2, 2019 and shall complete all Work on Site as outlined in D2.5 no later than August 30, 2019, as directed by the Contract Administrator.

(b) Neville Street – Margate Road to Mapleton Drive

(i) The Contractor shall not commence the Work on the Site before July 2, 2019 and shall complete all Work on Site as outlined in D2.5 no later than August 30, 2019, as directed by the Contract Administrator.

D19.2 When the Contractor considers the Work associated with D19.1 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 Work associated with D19.1 has been accepted by the Contract Administrator as being completed to the requirements of the Contract is the date on which completion of Critical Stages has been achieved.

D20. SUBSTANTIAL PERFORMANCE

D20.1 The Contractor shall achieve Substantial Performance within Sixty-five (65) 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 Seventy (70) 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 Stage: Cork Avenue – Sly Drive to Salter Street – four thousand dollars ($4,000.00);

(b) Critical Stage: Neville Street – Margate Road to Mapleton Drive – four thousand dollars ($4,000.00);

(c) Substantial Performance – four thousand dollars ($4,000.00);

(d) 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. SCHEDULED MAINTENANCE

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

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

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

D23.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

CONTROL OF WORK

D24. JOB MEETINGS

D24.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

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

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

D25.1 Further to C6.24, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

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

D26.1 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

D27. PAYMENT

D27.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D28. WARRANTY

D28.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire one (1) years thereafter for pavement rehabilitation works, and two (2) years thereafter for pavement reconstruction works, unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

THIRD PARTY AGREEMENTS

D29. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D29.1 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.

D29.2 Further to D29.1, in the event that the obligations in D29 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.

D29.3 For the purposes of D29:

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.

D29.4 Modified Insurance Requirements

D29.4.1 If not already required under the insurance requirements identified in D10, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars ($2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and its Ministers, officers, employees, and agents shall be added as additional insureds.

D29.4.2 If not already required under the insurance requirements identified in D10, the Contractor will be required to provide builders' risk insurance (including boiler and machinery insurance, as applicable) providing all risks coverage at full replacement cost, or such lower level of insurance that the City may identify on a case-by-case basis, such as an installation floater.

D29.4.3 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.

D29.4.4 Further to D10.3, 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.

D29.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D29.5 Indemnification By Contractor

D29.5.1 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.

D29.6 Records Retention and Audits

D29.6.1 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.

D29.6.2 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 D29.6.1 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.

D29.7 Other Obligations

D29.7.1 The Contractor consents to the City providing a copy of the Contract to the Government of Manitoba and/or the Government of Canada upon request from either entity.

D29.7.2 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.

D29.7.3 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.

D29.7.4 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 D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 452-2019

2019 Local Street Renewal Program – Andrews St, Cork Ave, and Other Locations
which is by reference made part hereof and is hereinafter referred to as the “Contract”.

NOW THEREFORE the condition of the above obligation is such that if the Principal shall:

(a) carry out and perform the Contract and every part thereof in the manner and within the times set forth in the Contract and in accordance with the terms and conditions specified in the Contract;
(b) perform the Work in a good, proper, workmanlike manner;
(c) make all the payments whether to the Obligee or to others as therein provided;
(d) in every other respect comply with the conditions and perform the covenants contained in the Contract; and
(e) indemnify and save harmless the Obligee against and from all loss, costs, damages, claims, and demands of every description as set forth in the Contract, and from all penalties, assessments, claims, actions for loss, damages or compensation whether arising under "The Workers Compensation Act", or any other Act or otherwise arising out of or in any way connected with the performance or non-performance of the Contract or any part thereof during the term of the Contract and the warranty period provided for therein;

THEN THIS OBLIGATION SHALL BE VOID, but otherwise shall remain in full force and effect. The Surety shall not, however, be liable for a greater sum than the sum specified above.

AND IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable as Principal, and that nothing of any kind or matter whatsoever that will not discharge the Principal shall operate as a discharge or release of liability of the Surety, any law or usage relating to the liability of Sureties to the contrary notwithstanding.

IN WITNESS WHEREOF the Principal and Surety have signed and sealed this bond the

_____ day of _____ , 20____ .

SIGNED AND SEALED
in the presence of:

_____
(Witness as to Principal if no seal)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

By: _____ (Seal)
(Attorney-in-Fact)

FORM H2: LABOUR AND MATERIAL PAYMENT BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

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

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 452-2019

2019 Local Street Renewal Program – Andrews St, Cork Ave, and Other Locations

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

(ii) 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;

(iii) 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;

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

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

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

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

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

_____ day of _____ , 20____ .

SIGNED AND SEALED
in the presence of:

_____
(Witness as to Principal if no seal)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

By: _____ (Seal)
(Attorney-in-Fact)

FORM J: SUBCONTRACTOR LIST
(See D12)

2019 Local Street Renewal Program – Andrews St, Cork Ave, and Other Locations

Portion of the Work	Name	Address
SURFACE WORKS:		
Supply of Materials:		
Concrete		
Asphalt		
Sub-base and Base Course		
Topsoil/Sod		
Geotextile Fabrics		
Installation/Placement:		
Geotextile Fabrics		
Sub-base and Base Course		
Concrete		
Asphalt		
Topsoil/Sod		
Joint Sealant		
UNDERGROUND WORKS:		
Supply of Materials:		
Pre-cast concrete Catch Pit/Catch Basin/Risers		
Catch Pit/ Catch Basin/Manhole Frames, Covers and Boxes		
Drainage Connection Pipes/Sewer Service Pipes		
Watermain Valve/Service Boxes		
Water Service/Watermain Insulation		
Subdrains		
Installation/Placement:		
Pre-cast Concrete Catch Pit/Catch Basin/Risers		
Catch Pit/Catch Basin/Manhole Frames, Covers and Boxes		
Drainage Connection Pipes/Sewer Service Pipes		
SURFACE WORKS:		
Supply of Materials:		
Concrete		

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.

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
	Cover Sheet	A1
SE-19-44	Andrews Street - 1+00 to 2+05	A1
SE-19-45	Andrews Street - 2+05 to 3+25	A1
SE-19-46	Andrews Street - 3+25 to 4+30	A1
SE-19-47	Andrews Street - 4+30 to 5+35	A1
SE-19-48	Andrews Street - 5+35 to 6+40	A1
SE-19-49	Andrews Street - 6+40 to 7+60	A1
SE-19-50	Andrews Street - 7+60 to 8+53	A1
SE-19-41	Cork Avenue - 0+89 to 1+95	A1
SE-19-42	Cork Avenue - 1+95 to 3+00	A1
SE-19-43	Cork Avenue - 3+00 to 3+71	A1
SE-19-38	Kairistine Lane - 1+00 to 2+35	A1
SE-19-39	Kairistine Lane – 2+35 to 3+70	A1
SE-19-40	Kairistine Lane – 3+70 to 4+75	A1
SE-19-09	Neville Street – 1+00 to 2+00	A1
SE-19-10	Neville Street – 2+00 to 3+20	A1
SE-19-11	Neville Street – 3+20 to 4+34	A1
SE-19-12	Nora Street – 0+93 to 2+11	A1
SE-19-51	Palms Boulevard – 1+00 to 2+30	A1
SE-19-52	Palms Boulevard – 2+30 to 3+95	A1
SE-19-53	Palms Boulevard – 3+95 to 5+35	A1
SE-19-54	Palms Boulevard – 5+35 to 5+99	A1
SE-19-13	Stardust Avenue – 0+82 to 2+00	A1
SE-19-14	Stardust Avenue – 2+00 to 3+20	A1
SE-19-15	Stardust Avenue – 3+20 to 4+40	A1
SE-19-16	Stardust Avenue – 4+40 to 4+89	A1
1-04707-DE-50000-0464	Street Lighting Project – Cork Avenue	A1

E2. GEOTECHNICAL REPORT

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

E3. PROTECTION OF EXISTING TREES

E3.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within the limits of the construction area:

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

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

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

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

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

E3.2 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the City Forester or his/her designate.

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

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

E4. TRAFFIC CONTROL

E4.1 Further to clauses 3.6, 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.

E4.2 Notwithstanding E4.1, in accordance with the MTTC, the Contract Administrator shall make arrangements with the **Traffic Services Branch of the City of Winnipeg** to place, maintain, and remove all **regulatory signs** and traffic control devices authorized and/or required by the Traffic Management Branch in the following situations:

(a) Parking restrictions,

(b) Stopping restrictions,

(c) Turn restrictions,

(d) Diamond lane removal,

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

(f) Traffic routed across a median,

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

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

E4.2.1 An exception to E4.2 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.

E4.2.2 Further to E4.2, 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.

E5. TRAFFIC MANAGEMENT

E5.1 Further to clause 3.7 of CW 1130:

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

a) Andrews Street, Kairistine Lane, Palms Boulevard, Stardust Avenue, and Neville Street:

(i) At least one lane for local access traffic shall be maintained along each of these streets during construction. At least one intersection on adjacent bays shall be open at a time.

b) Cork Avenue and Nora Street 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.

E5.1.2 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 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

E5.1.3 Pedestrian and ambulance/emergency vehicle access must be maintained at all times.

E6. REFUSE AND RECYCLING COLLECTION

E6.1 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 E6.2 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.

E6.2 Collection Schedule:

Cork Avenue – Sly Drive to Salter Street .

Collection Day(s): **Wednesday**

Collection Time: **7:00 a.m.**

Common Collection Area: **Alleys/Side Streets**

Nora Street – Logan Avenue to Alexander Avenue.

Collection Day(s): **Thursday**

Collection Time: **7:00 a.m.**

Common Collection Area: **Alleys/Side Streets**

E6.3 No measurement or payment will be made for the work associated with this specification.

E7. WATER OBTAINED FROM THE CITY

E7.1 Further to clause 3.7 of CW 1120, the Contractor shall pay for all costs, including sewer charges, associated with obtaining water from the City in accordance with the Waterworks and Sewer By-laws.

E8. SURFACE RESTORATIONS

E8.1 Further to clause 3.3 of CW 1130, when Total Performance is not achieved in the year the Contract is commenced, the Contractor shall temporarily repair any Work commenced and not completed to the satisfaction of the Contract Administrator. The Contractor shall maintain the temporary repairs in a safe condition as determined by the Contract Administrator until permanent repairs are completed. The Contractor shall bear all costs associated with temporary repairs and their maintenance.

E9. INFRASTRUCTURE SIGNS

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

E10. PATCHING OF EXISTING PAVEMENT

DESCRIPTION

E10.1 General

E10.1.1 This specification covers patching of existing concrete pavement in preparation for an asphalt overlay.

E10.1.2 Referenced Standard Construction Specifications

a) CW 3110 – Sub-Grade, Sub-Base and Base Course Construction.

b) CW 3130 – Supply and Installation of Geotextile Fabrics.

c) CW 3410 – Asphaltic Concrete Pavement Works.

MATERIALS

E10.2 Crushed Sub-Base Material

E10.2.1 Crushed Sub-base material will have a maximum aggregate size of 50 millimetre and be supplied in accordance with Section 2.1 of CW 3110.

E10.3 Geotextile Fabric

E10.3.1 Geotextile fabric will be supplied in accordance with Section 2 of CW 3130.

E10.4 Asphalt Material

E10.4.1 Asphalt material will be Type 1A and will be supplied in accordance with Sections 5 and 6 of CW 3410.

CONSTRUCTION METHODS

E10.5 General

E10.5.1 Remove existing concrete pavement to a minimum width of 1.5 metres at locations as shown on the Drawings or as directed by the Contract Administrator in accordance with Section 3.1 of Specification CW 3110.

E10.5.2 Excavate to a depth of 350 millimetres below the top of the existing pavement.

E10.5.3 Compact existing sub-grade to a minimum of 95% Standard Proctor Density.

E10.5.4 Place separation/reinforcement geotextile fabric in accordance with Specification CW 3130.

E10.5.5 Place and compact crushed sub-base material in accordance with CW 3110 to a 300 millimetres compacted depth. Compact to a minimum of 100% Standard Proctor Density.

E10.5.6 Place and compact asphalt material to a 50 millimetres compacted depth matching the top of the existing concrete pavement. Compact to an average of 95% percent of the 75 Blow Marshall Density of the paving mixture with no individual test being less than 90% percent.

E10.5.7 Each layer must be levelled and accepted by the Contract Administrator before the succeeding layer may be placed.

E10.5.8 Additional excavation and placement of sub-base material beyond the identified pavement structure will be completed in accordance with CW 3110 as directed by the Contract Administrator.

MEASUREMENT AND PAYMENT

E10.6 Pavement Patching

E10.6.1 Pavement patching will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Pavement Patching”. The area to be paid for will be the total number of square metres of pavement patched in accordance with this specification, accepted and measured by the Contract Administrator.

E11. SUPPLY AND INSTALLATION OF PAVEMENT REPAIR FABRIC

DESCRIPTION

E11.1 General

E11.1.1 This specification covers the supply and installation of pavement repair fabric.

E11.1.2 Referenced Standard Construction

a) CW 3130 – Supply and Installation of Geotextile Fabrics.

MATERIALS

E11.2 Storage and Handling

E11.2.1 Store and handle material in accordance with Section 2 of CW 3130.

E11.3 Pavement Repair Fabric

E11.3.1 Pavement repair fabric will be Glas Grid Road Reinforcement Mesh - Style 8501.

CONSTRUCTION METHODS

E11.4 General

E11.4.1 Install pavement repair fabric at random locations as directed by the Contract Administrator.

E11.4.2 The extent of the placement limits and quantities required will be determined by the Contract Administrator and provided 48 hours prior to the placement of asphalt.

E11.4.3 Proceed with installation upon completion and acceptance of the asphalt levelling course.

E11.4.4 Install fabric in accordance with the manufacturer's specifications and recommendations.

E11.4.5 Only construction equipment required to place the final asphalt surface course will be allowed to travel on the exposed fabric.

E11.4.6 Replace damaged or improperly placed fabric.

E11.4.7 Ensure temperature of the asphalt material does not exceed the melting point of the fabric.

MEASUREMENT AND PAYMENT

E11.5 Pavement Repair Fabric

E11.5.1 The supply and installation of the pavement repair fabric will be measured on an area basis and paid for at the Contract Unit Price per square metre for "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.

E12. PARTIAL DEPTH PATCHING OF EXISTING JOINTS

DESCRIPTION

E12.1 General

E12.1.1 This specification covers the Partial Depth Patching of existing concrete pavement joints.

E12.2 Referenced Standard Construction Specifications

a) CW 3230 – Full-Depth Patching of Existing Slabs and Joints
b) CW 3410 – Asphalt Concrete Pavement Works

MATERIALS

E12.3 Asphalt Materials

E12.3.1 Asphalt material will be Type 1A supplied in accordance with Sections 5 and 6 of CW 3410.

E12.4 Tack Coat

E12.4.1 Tack Coat will be undiluted SS-1 emulsified asphalt.

CONSTRUCTION METHODS

E12.5 Planing of Joints

E12.5.1 Plane existing joints designated by the Contract Administrator to a minimum depth of 50 mm and a maximum of depth 90 mm to remove ravelled or deteriorated concrete. Width of joint to be planed will vary with depth.

E12.5.2 Should the depth of joint deterioration exceed the maximum indicated, as determined by the Contract Administrator, the entire joint shall be renewed and paid for in accordance with CW 3230 as a full depth joint repair. Planing completed shall be paid for in accordance with Section E12.7 of this specification.

E12.5.3 Dispose of material in accordance with Section 3.4 of CW 1130.

E12.6 Placement of Asphalt Material

E12.6.1 Prior to placement of asphalt material, the planed joint shall be swept or blow clean of any loose material.

E12.6.2 Apply Tack Coat uniformly on the entire surface of the planed joint. The application rate shall not exceed 0.23 litres per square metre. The planed joint shall be dry prior to applying the tack coat.

E12.6.3 Place and compact asphalt material in accordance with Section 9.3 of CW 3410 to the satisfaction of the Contract Administrator. The finished elevation of the patch shall be flush with surrounding pavement surface.

E12.6.4 Compact the asphalt material to an average 95% of the 75 blow Marshall Density of the paving mixture with no individual test being less than 90 %.

E12.6.5 Ensure that no traffic is allowed to travel over the patched area until the asphalt has cooled to atmospheric temperature.

MEASUREMENT AND PAYMENT

E12.7 Partial Depth Planing of Existing Joints

E12.7.1 Partial Depth Planing of Existing Joints will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Partial Depth Planing of Existing Joints”. The area to be paid for will be the total number of square metres of joints planed in accordance with this specification, accepted and measured by the Contract Administrator.

E12.8 Asphalt Patching of Partial Depth Joints

E12.9 Asphalt Patching of Partial Depth Joints will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Asphalt Patching of Partial Depth Joints”. The area to be paid for will be the total number of square metres of joints patched in accordance with this specification, accepted, and measured by the Contract Administrator.

E13. SALT TOLERANT GRASS SEEDING

DESCRIPTION

E13.1 Further to CW 3520 and CW3540, this specification shall cover sub-grade preparation and the supply and placement of Salt Tolerant Grass Seed.

MATERIALS

E13.2 Salt Tolerant Grass Seed

E13.2.1 Salt Tolerant Grass Seed for regional and collector boulevards, medians and interchange areas shall be a mixture composed of:

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

EQUIPMENT

E13.3 Scarification equipment shall be suitable for the area being scarified, shall be capable of scarifying the sub-grade to the specified depth and shall be accepted by the Contract Administrator. For confined areas a toothed bucket may be acceptable. For larger areas tilling equipment may be required.

CONSTRUCTION METHODS

E13.4 Preparation of Existing Grade

E13.4.1 Prior to placing topsoil, in areas to be seeded greater in width than 600mm, prepare the existing sub-grade by scarifying to a minimum depth of 75mm and to a maximum depth of 100mm to the satisfaction of the Contract Administrator.

E13.4.2 Scarification shall consist of breaking up and loosening the sub-grade. No scarification shall occur within the edge of a tree canopy (or drip line).

E13.5 Salt Tolerant Grass Seeding

E13.5.1 Salt Tolerant Grass Seed shall be sown at a rate of 2.2 kilograms per 100 square meters.

MEASUREMENT AND PAYMENT

E13.6 Supply, placement and maintenance of Salt Tolerant Grass Seed will be paid for at the Contract Unit Price per square metre for "Salt Tolerant Grass Seeding", measured as specified herein, which price shall be payment in full for supplying all materials and for completing all operations herein described and all other items incidental to the work included in this Specification. Payment for Salt Tolerant Grass Seeding shall be in accordance with the following:

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

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

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

(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.

E14.7 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.

E14.8 Stockpile and dispose of excavated material in accordance with CW 3110.

E14.9 Thickness of insulation is 100 mm (4”). If using 50 mm (2”) panels 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.

E14.10 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.

E14.11 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.

E14.12 Take appropriate measures to ensure panels are not displaced when installing geotextiles and during backfilling operations.

MEASUREMENT AND PAYMENT

E14.13 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.

E14.14 Excavation of the roadway subgrade in accordance with E14.7 will not be measured for payment and will be included in the payment for “Watermain and Water Service Insulation”.

E15. REMOVAL OF CURB INLETS

DESCRIPTION

E15.1 General

E15.1.1 This specification covers the removal of any curb inlet frames and related connection pipe between curb inlet and existing catch basin or catch pit.

E15.1.2 The removal of curb inlets shall be included with concrete curb removal/renewal and/or pavement removal.

E15.2 Referenced Standard Construction Specifications

(a) CW 3110 – Pavement Removal

(b) CW 3240 – Concrete Curb Renewal

MEASUREMENT AND PAYMENT

E15.3 There will be no payment for this work. All work is to be incidental to CW 3110 - Concrete Curb Renewal and/or CW 3240 - Pavement Removal.

E16. EXISTING MANHOLE REPAIRS

E16.1 Patching of existing manholes will be constructed in accordance with CW 2130.

E16.2 Patching around the perimeter of connecting sewer pipes at the manhole interface will be measured for payment on a lump sum basis and paid for at the contract lump sum price for “Patching of Pipe/MH Interface”.

E16.3 Patching of the manhole benching will be measured for payment on a lump sum basis and paid for at the contract lump sum price for “Patching of Benching”.

E16.4 Replacement of the manhole benching shall include removal of the existing benching and will be measured for payment on a lump sum basis and paid for at the contract lump sum price for “Replacement of Benching”.

E17. ASPHALT BARRIER CURB

E17.1 DESCRIPTION

E17.1.1 This specification covers the supply and installation of asphaltic curb to the dimensions and grade specified on the plans or staked out by the Contract Administrator.

E17.2 MATERIAL

E17.2.1 Asphalt Materials

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

(i) As stated in Section 9.2 of CW 3410, in no case shall the mixture be placed at a temperature of less than 125°C, nor greater than 155°C.

E17.2.2 Tack Coat

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

E17.3 CONSTRUCTION METHODS

E17.3.1 The surface on which the asphalt curb is to be constructed shall be thoroughly cleaned and a tack coat applied by means of an approved spraying device prior to curb placement.

E17.3.2 The curb material shall be extruded under pressure in a shape to meet the dimensions on the drawings and obtain minimum density of ninety percent (90%) of the density obtainable for the same material compacted in the laboratory by the 75 Blow Marshall Density method.

E17.4 MEASUREMENT AND PAYMENT

E17.4.1 Measurement and Payment for Asphalt Barrier Curb will be on a length basis paid for at the Contract Unit Price per linear metre for “Asphalt Curb”. The length to be paid for will be the total length of Asphalt Barrier Curb supplied and placed in accordance with this specification and accepted by the Contract Administrator.

E18. CATCH BASIN LEAD REMOVAL

E18.1 Removal of existing catch basin lead will be incidental to installation of new catch basin lead and will not be paid for as a separate item.

E19. INSTALLATION OF STREET LIGHTING AND ASSOCIATED WORKS

E19.1 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).

E19.2 DESCRIPTION

E19.2.1 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.

E19.3 WORK LOCATIONS

E19.3.1 The proposed street light installation and removals are shown on construction drawings and are as follows:

a) CORK AVE

E19.4 COORDINATION OF WORK

E19.4.1 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.

E19.4.2 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.

E19.4.3 Manitoba Hydro's CSC will provide the Limits of Approach applicable to the Contractor on the Work Clearance form.

E19.5 ORIENTATION

E19.5.1 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.

E19.6 PRE-CONSTRUCTION MEETING

E19.6.1 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 & 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.

E19.6.2 The Contractor's cost to attend this pre-construction meeting shall be incorporated into the unit prices for the work.

E19.7 QUALIFICATIONS AND CERTIFICATION

E19.7.1 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.

E19.7.2 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.

E19.7.3 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
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Fax 204-948-2309

E19.7.4 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.

E19.7.5 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.

E19.8 REFERENCED STANDARD CONSTRUCTION SPECIFICATIONS

E19.8.1 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); and

d) Any other applicable codes

e) (collectively, the "Standards")

E19.8.2 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.

E19.8.3 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.

E19.9 TOOLS, EQUIPMENT AND MATERIALS

E19.9.1 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.

E19.9.2 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

E19.9.3 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

c) Insulated wire cutters – used for cutting cable ends square.

E19.9.4 Alternative equipment manufacturers may be considered upon request by the Contractor and shall be approved for use by Manitoba Hydro prior to use.

E19.9.5 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.

E19.10 MATERIAL SUPPLIED BY MANITOBA HYDRO

E19.10.1 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:

E19.10.2 Manitoba Hydro Central Stores (contact personnel will be provided to the successful contractor).

E19.10.3 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.

E19.10.4 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.

E19.10.5 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 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 72 hours prior to being required for the work on an active project.

E19.11 MATERIAL SUPPLIED BY CONTRACTOR

E19.11.1 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.

E19.12 SURPLUS, RECLAIM AND SCRAP MATERIAL

E19.12.1 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.

E19.12.2 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.

E19.12.3 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.

E19.13 DE-ENERGIZATION AND LOCKOUT

E19.13.1 **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.

E19.13.2 **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.

E19.13.3 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.

E19.14 TEMPORARY OVERHEAD FEEDS

E19.14.1 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.

E19.14.2 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.

E19.14.3 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.

E19.14.4 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.

E19.15 SAFE EXCAVATION

E19.15.1 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.

E19.16 SAFE HANDLING

E19.16.1 The Contractor shall apply handling techniques in accordance with Manitoba Workplace Health and Safety Regulation 217 (latest revision).

E19.17 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.

E19.18 PRECAST CONCRETE BASES

E19.18.1 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.

E19.18.2 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.

E19.19 STREET LIGHT POLES AND ARMS

E19.19.1 The Contractor shall handle, store, transport, and provide proper load securement for the poles and arms in a manner to prevent damage.

E19.20 LUMINAIRES

E19.20.1 The Contractor shall handle, store, transport and unload the luminaires in their original packaging and in a manner to prevent damage.

E19.21 SMALL MATERIAL

E19.21.1 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.

E19.22 CARE OF MATERIALS

E19.22.1 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.

E19.23 WIRE AND CABLE REEL STORAGE

E19.23.1 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.

E19.23.2 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 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.

E19.24 REEL HANDLING

E19.24.1 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.

E19.24.2 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.

E19.24.3 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.

E19.24.4 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.

E19.25 PRESSURIZED WATER/VACUUM EXCAVATION

E19.25.1 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.

E19.25.2 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.

E19.26 REMOVAL STREET LIGHT POLE FROM EXISTING BASE

E19.26.1 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.

E19.26.2 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.

E19.26.3 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.

E19.27 REMOVAL OF BASE AND DIRECT BURIED STREET LIGHT POLE

E19.27.1 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.

E19.27.2 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.

E19.27.3 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.

E19.28 INSTALLATION OF FOUNDATION - CONCRETE BASE

E19.28.1 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.

E19.28.2 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.

E19.28.3 The concrete base shall be set on a bed of ¾" down limestone. The concrete base backfill material shall be compacted in lifts no more than 150 mm. Backfill material shall be ¾" 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.

E19.28.4 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.

E19.28.5 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.

E19.28.6 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 one (1) metre beyond the top of the hand hole.

E19.29 BASE MOUNTED STREET LIGHT POLES

E19.29.1 This shall include all work required to install the street light pole on the concrete base as set forth in this Specification.

E19.29.2 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.

E19.29.3 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.

E19.29.4 The Contractor shall level the street light pole in all 4 directions. Leveling shims may be used.

E19.29.5 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.

E19.29.6 Unless otherwise specified, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.

E19.29.7 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.

E19.30 LUMINAIRES AND ASSOCIATED WIRING

E19.30.1 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. One (1) metre 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.

E19.30.2 The Contractor shall verify the luminare 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.

E19.30.3 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.

E19.31 BREAK AWAY BASES

E19.31.1 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.

E19.31.2 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.

E19.32 SPLICING/CONNECTING CABLES

E19.32.1 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.

E19.32.2 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).

E19.33 EXCAVATION

E19.33.1 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.

E19.33.2 Trenches shall be dug to such a depth that will provide a minimum cover of 600 mm from final grade in sodded areas and 1000 mm in roadways in accordance with Standard CD 305-1.

E19.34 LAYING CABLES

E19.34.1 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.

E19.34.2 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.

E19.34.3 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.

E19.34.4 During installation, under no circumstance is the cable to be subjected to a bending radius tighter than that detailed in the Standards.

E19.34.5 Where specified in the Standards or on the construction drawings, the Contractor shall install the street light cable in a conduit.

E19.35 INSTALLING CONDUIT AND CABLE BY BORING (HORIZONTAL DIRECTIONAL DRILLING)

E19.35.1 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.

E19.35.2 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.

E19.35.3 Drilling fluids and associated waste materials shall be disposed of in a manner that minimizes environmental effects.

E19.35.4 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.

E19.36 BURIED UTILITY CROSSINGS

E19.36.1 All buried obstructions are not necessarily shown on the reference drawings and the locations of those indicated are approximate only.

E19.36.2 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.

E19.36.3 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.

E19.36.4 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.

E19.37 BENDING CABLES/CONDUITS AND INSTALLATION INTO STANDARDS

E19.37.1 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.

E19.37.2 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 one (1) metre 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.

E19.37.3 Unless otherwise directed, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.

E19.38 BACKFILL

E19.38.1 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.

E19.38.2 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.

E19.38.3 Excavations remaining where poles have been removed shall be backfilled with spoil, pit run gravel or ¾" down limestone and compacted in lifts of 150mm as directed by Manitoba Hydro. The top 300 mm of the excavation shall be backfilled with topsoil.

E19.38.4 Excavations remaining where utility crossings have been exposed shall be backfilled with sand or clean spoil and compacted in lifts of 150mm. The top 300 mm of the excavation shall be backfilled with topsoil.

E19.38.5 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.

E19.39 DEFECTIVE WORK & WARRANTY

E19.39.1 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.

E19.39.2 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.

E19.40 AS-BUILT DRAWING

E19.40.1 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.

E19.41 MEASUREMENT AND PAYMENT

E19.41.1 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.

E19.41.2 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.

E19.41.3 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.

E19.41.4 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 50mm 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.

E19.41.5 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.

E19.41.6 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.

E19.41.7 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.

E19.41.8 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.

E19.41.9 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.

E19.41.10 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.

E19.41.11 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.

E19.41.12 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 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.

E19.41.13 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 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 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.

E19.41.14 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.

E19.41.15 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.

E19.41.16 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.

E19.41.17 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'

GEOTECHNICAL REPORT

Appendix A

Cork Avenue – Sly Drive to Salter Street

Test Hole Logs, Summary Table, Lab Data and Photographs of Pavement Core Samples

TREK GEOTECHNICAL

0015 029 00
City of Winnipeg
2019 Local Street Renewal Program - Cork Avenue

KEY PLAN
SCALE : N.T.S.

0 10 20 30 40 50 m
SCALE = 1 : 1 000 (279 mm x 432 mm)

LEGEND: TEST HOLE (TREK, 2018)

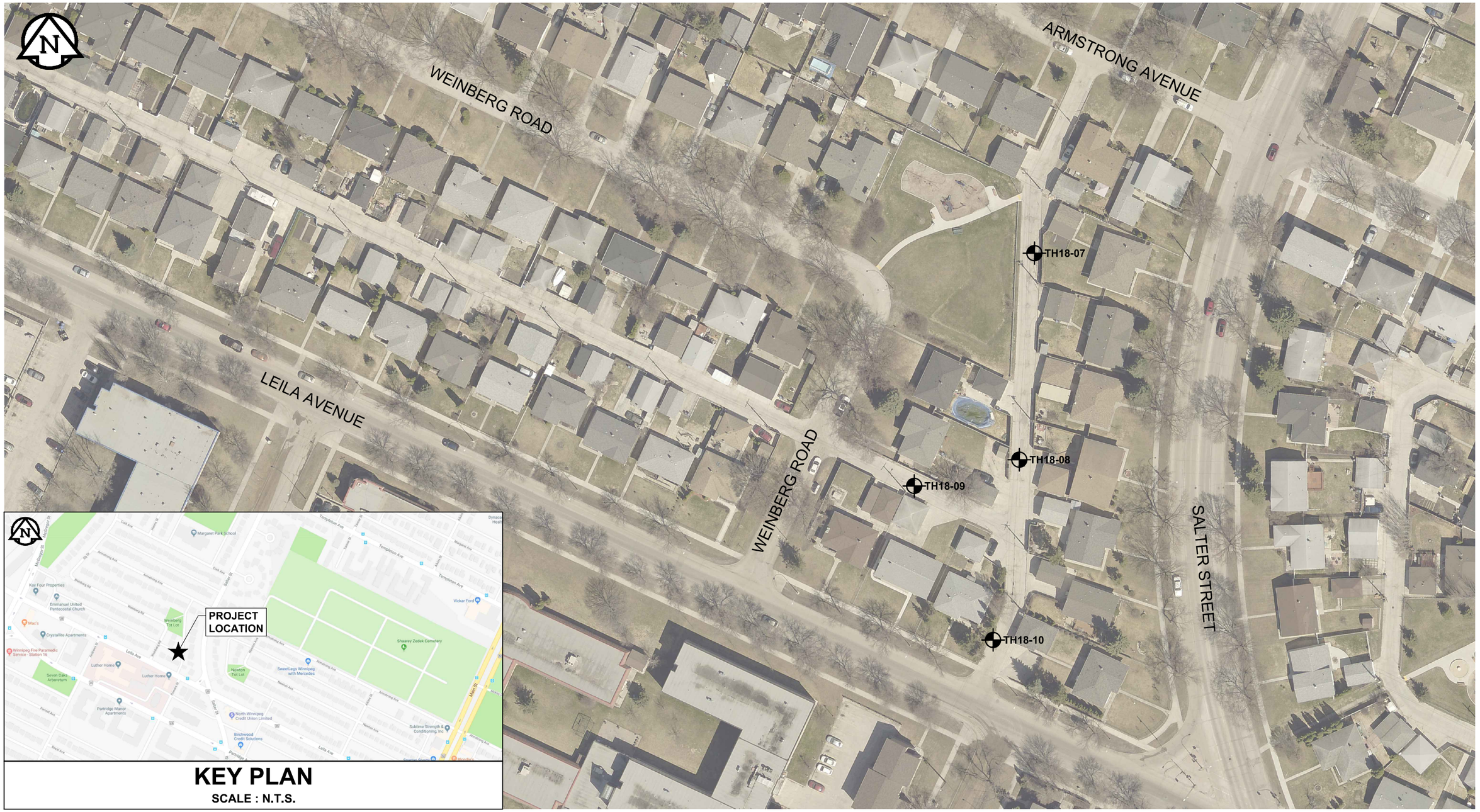
NOTES:
1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 01
TEST HOLE LOCATION PLAN

Z:\Projects\0015 City of Winnipeg\0015 029 00 2019 Local St Package\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder\Fig 1-11_2019-01-25-LOCAL ST RENEWAL_0_A_DW_0015-029-00.dwg, 1/25/2019 8:51:11 AM, (11.00 x 17.00 Inches)

TREK GEOTECHNICAL

0015 029 00
City of Winnipeg
2019 Local Street Renewal Program - Salter Street/Weinberg Road Alley



KEY PLAN
SCALE : N.T.S.

0 10 20 30 40 50 m
SCALE = 1 : 1 000 (279 mm x 432 mm)

LEGEND: TEST HOLE (TREK, 2018)

NOTES:
1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 02
TEST HOLE LOCATION PLAN

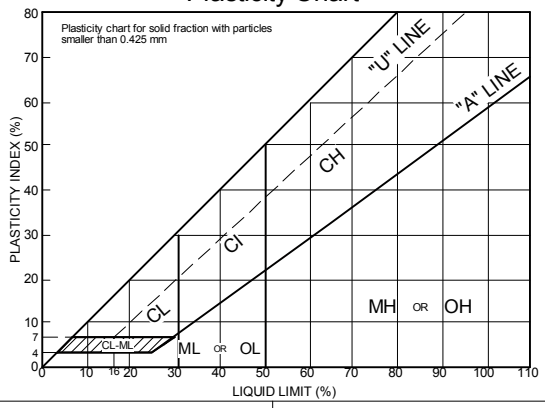
Z:\Projects\0015 City of Winnipeg\0015 029 00 2019 Local St Package\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder\Fig 1-11_2019-01-25-LOCAL ST RENEWAL_0_A_DW_0015-029-00.dwg, 1/25/2019 8:36:28 AM, (11.00 x 17.00 Inches)

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

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



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

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

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

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

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

Sub-Surface Log

Test Hole TH18-01
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Cork Avenue	**Location:**	UTM-14U, 5534539N, 634660E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 19, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		ASPHALT - 25 mm thick				
		CONCRETE - 135 mm thick				
		CLAY - silty, trace gravel (<20 mm diam.) - mottled brown and grey - frozen to 0.9 m, moist and stiff when thawed - high plasticity		G01		
0.5		- trace gravel (<10 mm diam.) below 0.6 m		G02		
1.0				G03		
		SILT - trace clay, trace sand - light brown - moist, firm - low plasticity		G04		
1.5				G05		
		- some clay, low to intermediate plasticity below 1.8 m		G06		
2.0		- very soft to soft below 2.1 m		G07		
2.5		CLAY - silty, - brown - moist, firm - high plasticity		G08		
				G09		
3.0						

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located in Westbound lane, 1.0 m South of North curb, at House #426.

Logged By: Nuno Mendonca **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES CORK AVENUE_0015-029-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 1/25/19

Sub-Surface Log

Test Hole TH18-02
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Cork Avenue	**Location:**	UTM-14U, 5534510N, 634713E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 19, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE - 165 mm thick		
		CLAY - silty, trace gravel (<20 mm diam.) - brown - frozen to 0.9 m, moist and stiff when thawed - high plasticity - trace organics and black below 0.3 m		G10
0.5				G11
		SILT AND CLAY - trace sand - mottled brown and grey - moist, firm to stiff, laminated (<2 mm thick) - intermediate plasticity		G12
1.0				G13
				G14
1.5		SILT - trace to some clay, trace sand - light brown - moist, very soft to soft - low to intermediate plasticity		G15
2.0				G16
2.5		CLAY - silty - grey - moist, firm - high plasticity		G17
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa) — Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○: 0 50 100 150 200 250

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located in Eastbound lane, 1.5 m North of South curb, at House #410.

Logged By: Nuno Mendonca **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES CORK AVENUE_0015-029-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 1/25/19

Sub-Surface Log

Test Hole TH18-03
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Cork Avenue	**Location:**	UTM-14U, 5534493N, 634756E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 19, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT - 50 mm thick		
		CONCRETE - 140 mm thick		
		CLAY - silty, trace gravel (<20 mm diam.) - brown - frozen to 0.8 m, moist and stiff when thawed - high plasticity		G18
0.5				G19
		- trace organics below 0.6 m		G20
1.0				G21
		- trace gravel (<15 mm diam.), light brown, laminated (<2 mm thick) below 1.0 m		G22
1.5				G23
		SILT - trace clay, trace sand - light brown - moist, very soft to soft - low plasticity		
2.0				G24
2.5				G25
		CLAY - silty, - grey - moist, firm - high plasticity		
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located in Eastbound lane, 1.5 m North of South curb, at House #398.

Logged By: Nuno Mendonca **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES CORK AVENUE_0015-029-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 1/25/19

Sub-Surface Log

Test Hole TH18-04

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Cork Avenue	**Location:**	UTM-14U, 5534476N, 634799E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 19, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
0		CONCRETE - 150 mm thick		
		CLAY - silty, trace gravel (<20 mm diam.), trace organics - brownish dark grey - frozen to 0.8 m, moist and stiff when thawed - high plasticity		G26
0.5				G27
				G28
1.0		- no gravel, no organics, brown, very stiff below 0.9 m		G29
		SILT - trace clay, trace sand - light brown - moist, very soft to soft - low plasticity		G30
1.5				G31
		CLAY - silty - grey - moist, firm - high plasticity		
2.0				G32
2.5				
				G33
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ | ✤ Pocket Pen. ✤ | ☒ Qu ☒ | ○ Field Vane ○

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY

1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located in Westbound lane, 1.5 m South of North curb, at House #390.

Logged By: Nuno Mendonca **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES CORK AVENUE_0015-029-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 1/25/19

Sub-Surface Log

Test Hole TH18-05
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Cork Avenue	**Location:**	UTM-14U, 5534458N, 634840E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 19, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		CONCRETE - 125 mm thick				
		CLAY - silty, trace gravel (<20 mm diam.), trace organics - mottled black and brown - frozen, moist and stiff when thawed - high plasticity		G34		
0.5				G35		
		SILT - some clay, trace sand - light brown - moist, very soft to soft - low to intermediate plasticity		G36		
1.0				G37		
1.5				G38		
		CLAY - silty - mottled brown and grey - moist, stiff - high plasticity		G39		
2.0						
		- trace gravel (<20 mm diam.) below 2.3 m		G40		
2.5						
		- firm below 2.9 m		G41		
3.0						

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located in Westbound lane, 1.5 m South of North curb, at House #380.

Logged By: Nuno Mendonca **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES CORK AVENUE_0015-029-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 1/25/19

Sub-Surface Log

Test Hole TH18-06

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Cork Avenue	**Location:**	UTM-14U, 5534428N, 634889E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 19, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT - 50 mm thick				
		CONCRETE - 100 mm thick				
		CLAY - silty, trace gravel (<20 mm diam.), trace organics - mottled black and brown - frozen to 0.8 m, moist and stiff when thawed - high plasticity	G	G42	●	
0.5			G	G43	●	
			G	G44	●	△ ✤
1.0		SILT - trace clay, trace sand - light brown - moist, very soft to soft - low plasticity	G	G45	●	✤△
			G	G46	●	✤
1.5		- some clay, soft, intermediate plasticity below 1.7 m	G	G47	●	△✤
		CLAY - silty - mottled brown and grey - moist, firm - high plasticity	G	G48	●	✤
2.0						
2.5		- grey below 2.4 m				
			G	G49	●	△✤
3.0		END OF TEST HOLE AT 3.1 m DEPTH IN CLAY				

1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located in Eastbound lane, 1.5 m North of South curb, at House # 1154.

Logged By: Nuno Mendonca **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES CORK AVENUE_0015-029-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 1/25/19

2019 Local Street Renewal Program
Sub-Surface Investigation
Cork Ave

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH18-01	UTM: 5534539 N, 634660 E Located in Westbound lane, 1.0 m South of North curb, at House #426	Asphalt	25	Concrete	135											
						CLAY	0.2	0.3	31							
						CLAY	0.6	0.8	30	0	1	30	69	21	77	26
						CLAY	0.9	1.1	28							
						SILT	1.2	1.4	25							
						SILT	1.5	1.7	23							
						SILT	1.8	2.0	25							
						SILT	2.1	2.3	25							
						CLAY	2.4	2.6	39							
						CLAY	2.7	2.9	52							
TH18-02	UTM: 5534510 N, 634713 E Located in Eastbound lane, 1.5 m North of South curb, at House #410	Asphalt	N/A	Concrete	135											
						CLAY	0.2	0.3	23							
						CLAY	0.5	0.6	24							
						SILT AND CLAY	0.8	0.9	22							
						SILT AND CLAY	1.1	1.2	23							
						SILT AND CLAY	1.4	1.5	30							
						SILT	1.7	1.8	23							
						SILT	2.3	2.4	25							
						CLAY	2.9	3.0	35							
TH18-03	UTM: 5534493 N, 634756 E Located in Eastbound lane, 1.5 m North of South curb, at House #398	Asphalt	50	Concrete	140											
						CLAY	0.2	0.3	25							
						CLAY	0.5	0.6	28							
						CLAY	0.8	0.9	26							
						CLAY	1.1	1.2	26							
						CLAY	1.4	1.5	28							
						SILT	1.7	1.8	27							
						SILT	2.3	2.4	24							
						CLAY	2.7	2.9	49							
TH18-04	UTM: 5534476 N, 634799 E Located in Westbound lane, 1.5 m South of North curb, at House #390	Asphalt	N/A	Concrete	150											
						CLAY	0.2	0.3	31							
						CLAY	0.5	0.6	33							
						CLAY	0.8	0.9	32							
						CLAY	1.1	1.2	29							
						SILT	1.4	1.5	23							
						CLAY	1.7	1.8	39							
						CLAY	2.3	2.4	49							
						CLAY	2.9	3.0	50							

2019 Local Street Renewal Program
Sub-Surface Investigation
Cork Ave

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH18-05	UTM: 5534458 N, 634840 E Located in Westbound lane, 1.5 m South of North curb, at House #380	Asphalt	N/A	Concrete	125											
						CLAY	0.2	0.3	24							
						CLAY	0.5	0.6	31							
						SILT	0.8	0.9	19	0	2	81	17	17	28	11
						SILT	1.1	1.2	22							
						SILT	1.4	1.5	24							
						CLAY	1.7	1.8	30							
						CLAY	2.3	2.4	41							
						CLAY	2.9	3.0	52							
TH18-06	UTM: 5534428 N, 634889 E Located in Eastbound lane, 1.5 m North of South curb, at House # 1154	Asphalt	50	Concrete	100											
						CLAY	0.2	0.3	34							
						CLAY	0.5	0.6	34							
						CLAY	0.8	0.9	30							
						SILT	1.1	1.2	23							
						SILT	1.4	1.5	22							
						SILT	1.7	1.8	23							
						CLAY	1.8	2.0	31							
						CLAY	2.7	2.9	51							

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Moisture Content Report
ASTM D2216-10

Project No. 0015-029-00
Client City of Winnipeg
Project 2019 Local Street Renewal Program - Cork Ave

Sample Date 19-Dec-18
Test Date 03-Jan-19
Technician HS

Test Hole	TH18-01	TH18-01	TH18-01	TH18-01	TH18-01	TH18-01
Depth (m)	0.2 - 0.3	0.6 - 0.8	0.9 - 1.1	1.2 - 1.4	1.5 - 1.7	1.8 - 2.0
Sample #	G01	G02	G03	G04	G05	G06
Tare ID	AC16	P17	W05	Z59	W96	Q01
Mass of tare	6.8	8.5	8.4	8.5	8.8	8.5
Mass wet + tare	239.0	400.6	307.5	331.1	240.7	300.3
Mass dry + tare	184.0	310.0	241.7	266.8	197.8	242.7
Mass water	55.0	90.6	65.8	64.3	42.9	57.6
Mass dry soil	177.2	301.5	233.3	258.3	189.0	234.2
Moisture %	31.0%	30.0%	28.2%	24.9%	22.7%	24.6%

Test Hole	TH18-01	TH18-01	TH18-01	TH18-02	TH18-02	TH18-02
Depth (m)	2.1 - 2.3	2.4 - 2.6	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9
Sample #	G07	G08	G09	G10	G11	G12
Tare ID	H67	Z63	C6	Z07	C20	Z75
Mass of tare	8.5	8.5	8.4	8.7	8.4	8.4
Mass wet + tare	248.9	334.5	169.4	153.0	250.5	246.3
Mass dry + tare	201.0	243.1	114.4	126.4	203.3	203.4
Mass water	47.9	91.4	55.0	26.6	47.2	42.9
Mass dry soil	192.5	234.6	106.0	117.7	194.9	195.0
Moisture %	24.9%	39.0%	51.9%	22.6%	24.2%	22.0%

Test Hole	TH18-02	TH18-02	TH18-02	TH18-02	TH18-02	TH18-03
Depth (m)	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.3 - 2.4	2.9 - 3.0	0.2 - 0.3
Sample #	G13	G14	G15	G16	G17	G18
Tare ID	Z77	Z72	E135	N37	N05	W75
Mass of tare	8.5	9.0	8.5	8.5	8.6	8.6
Mass wet + tare	210.5	196.4	197.2	227.1	309.6	266.0
Mass dry + tare	173.1	153.7	162.0	183.7	231.3	213.8
Mass water	37.4	42.7	35.2	43.4	78.3	52.2
Mass dry soil	164.6	144.7	153.5	175.2	222.7	205.2
Moisture %	22.7%	29.5%	22.9%	24.8%	35.2%	25.4%

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Moisture Content Report
ASTM D2216-10

Project No. 0015-029-00
Client City of Winnipeg
Project 2019 Local Street Renewal Program - Cork Ave

Sample Date 19-Dec-18
Test Date 03-Jan-19
Technician HS

Test Hole	TH18-03	TH18-03	TH18-03	TH18-03	TH18-03	TH18-03
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.1 - 2.3
Sample #	G19	G20	G21	G22	G23	G24
Tare ID	W17	Z31	AB74	P36	E112	E114
Mass of tare	8.7	8.4	6.9	8.4	8.6	8.7
Mass wet + tare	208.1	243.1	293.1	229.9	228.1	343.9
Mass dry + tare	164.6	195.3	234.5	182.1	181.5	279.5
Mass water	43.5	47.8	58.6	47.8	46.6	64.4
Mass dry soil	155.9	186.9	227.6	173.7	172.9	270.8
Moisture %	27.9%	25.6%	25.7%	27.5%	27.0%	23.8%

Test Hole	TH18-03	TH18-04	TH18-04	TH18-04	TH18-04	TH18-04
Depth (m)	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G25	G26	G27	G28	G29	G30
Tare ID	F146	N11	K35	F137	AB42	H65
Mass of tare	8.6	8.5	8.5	8.5	6.8	8.7
Mass wet + tare	283.6	229.3	240.7	280.5	250.4	259.8
Mass dry + tare	193.0	177.3	183.0	215.2	196.0	212.4
Mass water	90.6	52.0	57.7	65.3	54.4	47.4
Mass dry soil	184.4	168.8	174.5	206.7	189.2	203.7
Moisture %	49.1%	30.8%	33.1%	31.6%	28.8%	23.3%

Test Hole	TH18-04	TH18-04	TH18-04	TH18-05	TH18-05	TH18-05
Depth (m)	1.7 - 1.8	2.3 - 2.4	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9
Sample #	G31	G32	G33	G34	G35	G36
Tare ID	AA15	AB44	N38	N39	F69	F21
Mass of tare	6.7	6.7	8.6	8.4	8.5	8.5
Mass wet + tare	338.0	258.1	255.6	266.7	219.9	414.9
Mass dry + tare	245.7	176.0	172.9	216.5	170.1	349.6
Mass water	92.3	82.1	82.7	50.2	49.8	65.3
Mass dry soil	239.0	169.3	164.3	208.1	161.6	341.1
Moisture %	38.6%	48.5%	50.3%	24.1%	30.8%	19.1%

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Moisture Content Report
ASTM D2216-10

Project No. 0015-029-00
Client City of Winnipeg
Project 2019 Local Street Renewal Program - Cork Ave

Sample Date 19-Dec-18
Test Date 03-Jan-19
Technician HS

Test Hole	TH18-05	TH18-05	TH18-05	TH18-05	TH18-05	TH18-06
Depth (m)	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.3 - 2.4	2.9 - 3.0	0.2 - 0.3
Sample #	G37	G38	G39	G40	G41	G42
Tare ID	E113	E33	Z130	D40	E121	Z70
Mass of tare	8.5	8.6	8.4	8.3	8.5	8.6
Mass wet + tare	238.2	276.0	201.1	191.1	280.4	249.2
Mass dry + tare	197.1	224.2	156.4	138.4	187.0	188.6
Mass water	41.1	51.8	44.7	52.7	93.4	60.6
Mass dry soil	188.6	215.6	148.0	130.1	178.5	180.0
Moisture %	21.8%	24.0%	30.2%	40.5%	52.3%	33.7%

Test Hole	TH18-06	TH18-06	TH18-06	TH18-06	TH18-06	TH18-06
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	1.8 - 2.0
Sample #	G43	G44	G45	G46	G47	G48
Tare ID	H78	E62	E62	AC07	K27	E12
Mass of tare	8.4	8.4	6.8	6.7	8.5	8.9
Mass wet + tare	233.5	307.3	398.7	271.9	227.0	357.4
Mass dry + tare	176.7	237.8	324.6	223.8	185.7	274.2
Mass water	56.8	69.5	74.1	48.1	41.3	83.2
Mass dry soil	168.3	229.4	317.8	217.1	177.2	265.3
Moisture %	33.7%	30.3%	23.3%	22.2%	23.3%	31.4%

Test Hole	TH18-06					
Depth (m)	2.7 - 2.9					
Sample #	G49					
Tare ID	F79					
Mass of tare	8.7					
Mass wet + tare	238.6					
Mass dry + tare	161.4					
Mass water	77.2					
Mass dry soil	152.7					
Moisture %	50.6%					

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Grain Size Analysis (Hydrometer Method)
ASTM D422

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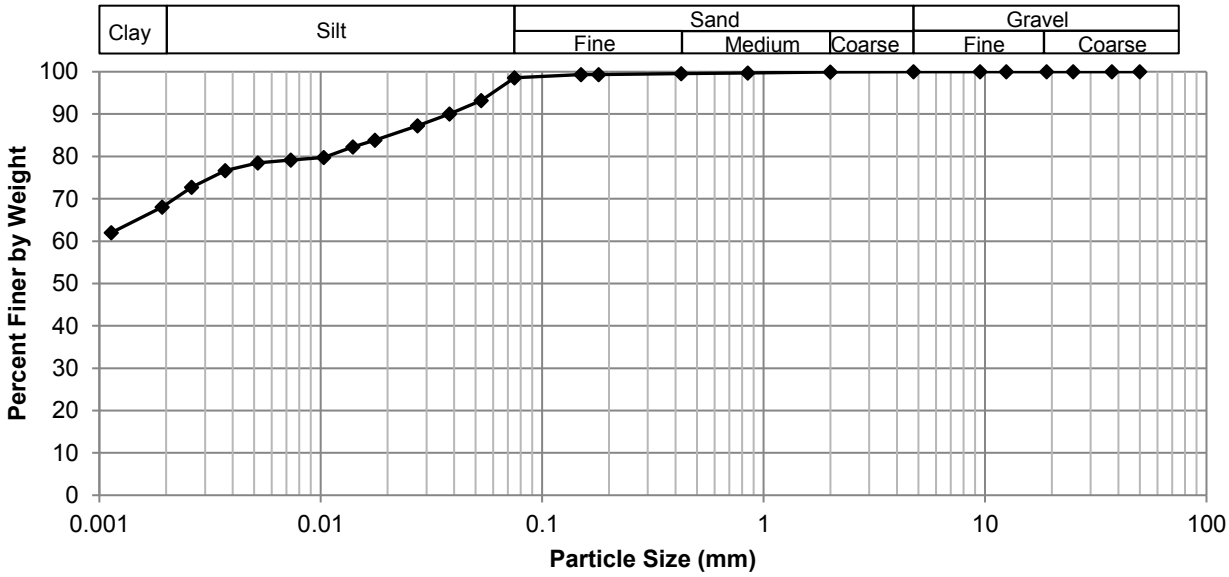
Project No.	0015-029-00
Client	City of Winnipeg
Project	2019 Local Street Renewal Program - Cork Ave.
Test Hole	TH18-01
Sample #	G02
Depth (m)	0.6 - 0.8
Sample Date	19-Dec-18
Test Date	15-Jan-19
Technician	DS

Gravel	0.0%
Sand	1.4%
Silt	30.0%
Clay	68.6%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	98.58
37.5	100.00	2.00	99.95	0.0531	93.19
25.0	100.00	0.850	99.74	0.0382	90.07
19.0	100.00	0.425	99.58	0.0273	87.25
12.5	100.00	0.180	99.33	0.0176	83.82
9.50	100.00	0.150	99.32	0.0140	82.25
4.75	100.00	0.075	98.58	0.0103	79.75
				0.0073	79.13
				0.0052	78.50
				0.0037	76.63
				0.0026	72.77
				0.0019	68.03
				0.0011	62.00

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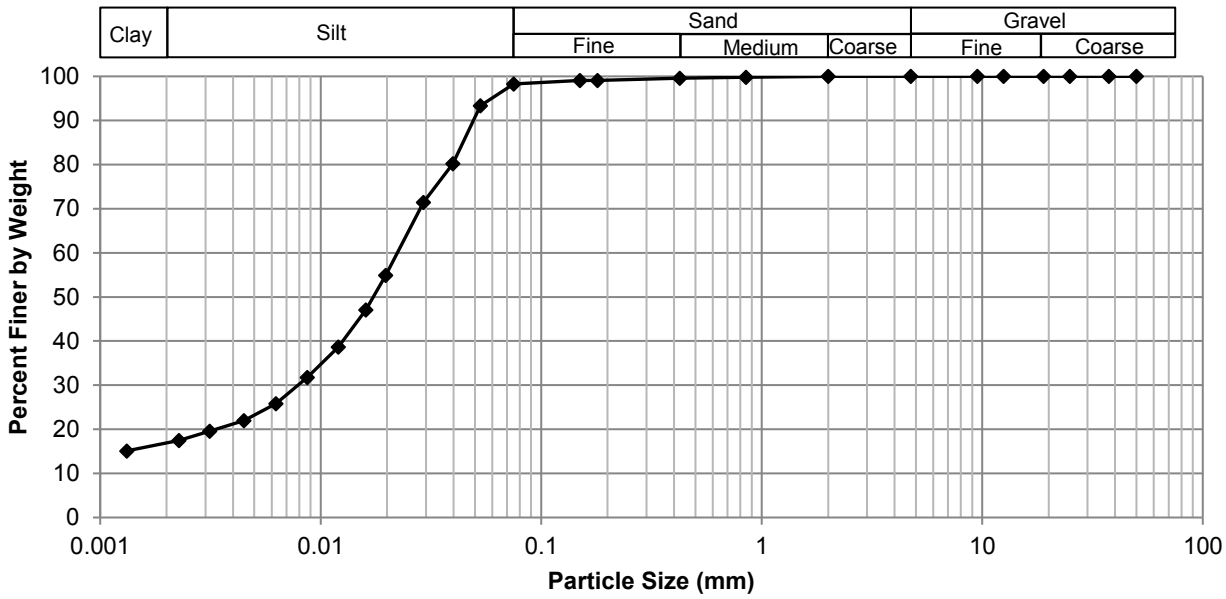
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0015-029-00
Client	City of Winnipeg
Project	2019 Local Street Renewal Program - Cork Ave.
Test Hole	TH18-05
Sample #	G36
Depth (m)	0.8 - 0.9
Sample Date	19-Dec-18
Test Date	7-Jan-19
Technician	BMH

Gravel	0.0%
Sand	1.7%
Silt	81.4%
Clay	16.9%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	98.31
37.5	100.00	2.00	100.00	0.0529	93.34
25.0	100.00	0.850	99.82	0.0398	80.20
19.0	100.00	0.425	99.55	0.0292	71.45
12.5	100.00	0.180	99.09	0.0197	54.88
9.50	100.00	0.150	99.09	0.0160	47.06
4.75	100.00	0.075	98.31	0.0120	38.62
				0.0087	31.74
				0.0063	25.80
				0.0045	21.98
				0.0031	19.60
				0.0023	17.48
				0.0013	15.11

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

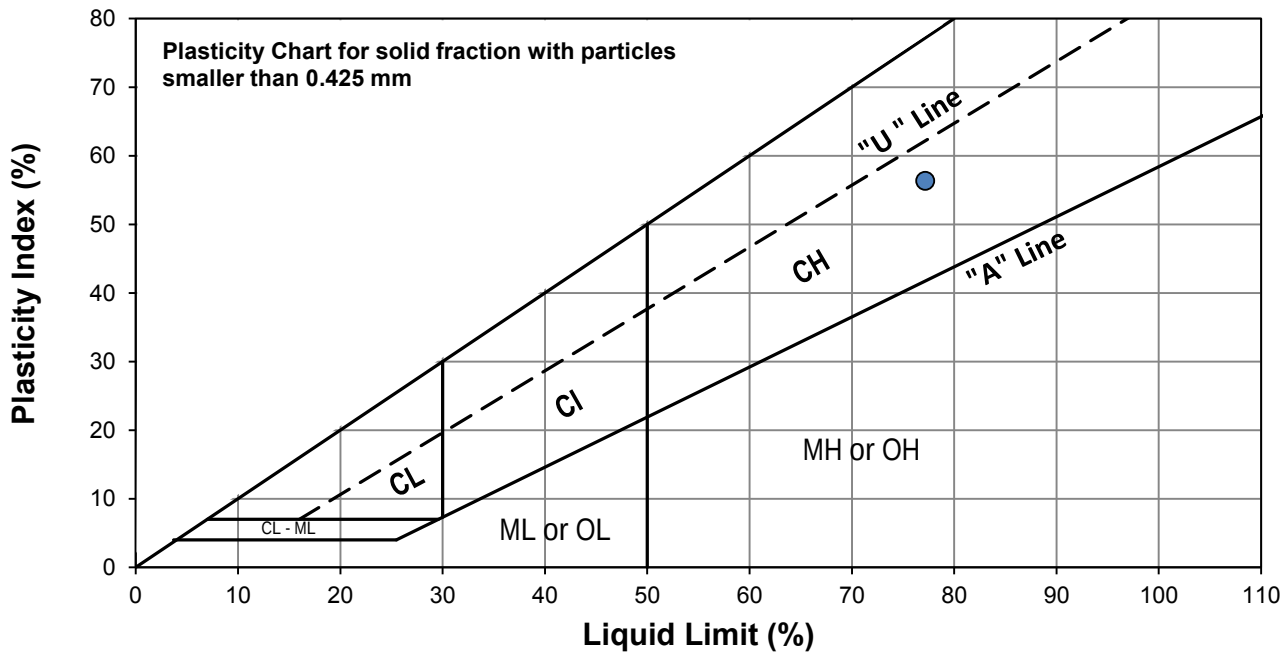
Atterberg Limits
ASTM D4318-10e1

Project No.	0015-0029-00
Client	City of Winnipeg
Project	2019 Local Street Renewal Program - Cork Ave.
Test Hole	TH18-01
Sample #	G02
Depth (m)	0.6 - 0.8
Sample Date	19-Dec-18
Test Date	8-Jan-19
Technician	DS

Liquid Limit	77
Plastic Limit	21
Plasticity Index	56

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	17	27	32		
Mass Wet Soil + Tare (g)	23.378	21.039	24.964		
Mass Dry Soil + Tare (g)	19.159	17.861	20.264		
Mass Tare (g)	13.955	13.706	13.960		
Mass Water (g)	4.219	3.178	4.700		
Mass Dry Soil (g)	5.204	4.155	6.304		
Moisture Content (%)	81.072	76.486	74.556		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	20.574	22.444			
Mass Wet Soil + Tare (g)	19.458	21.033			
Mass Dry Soil + Tare (g)	14.067	14.297			
Mass Water (g)	1.116	1.411			
Mass Dry Soil (g)	5.391	6.736			
Moisture Content (%)	20.701	20.947			

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Tel: 204.975.9433 Fax: 204.975.9435

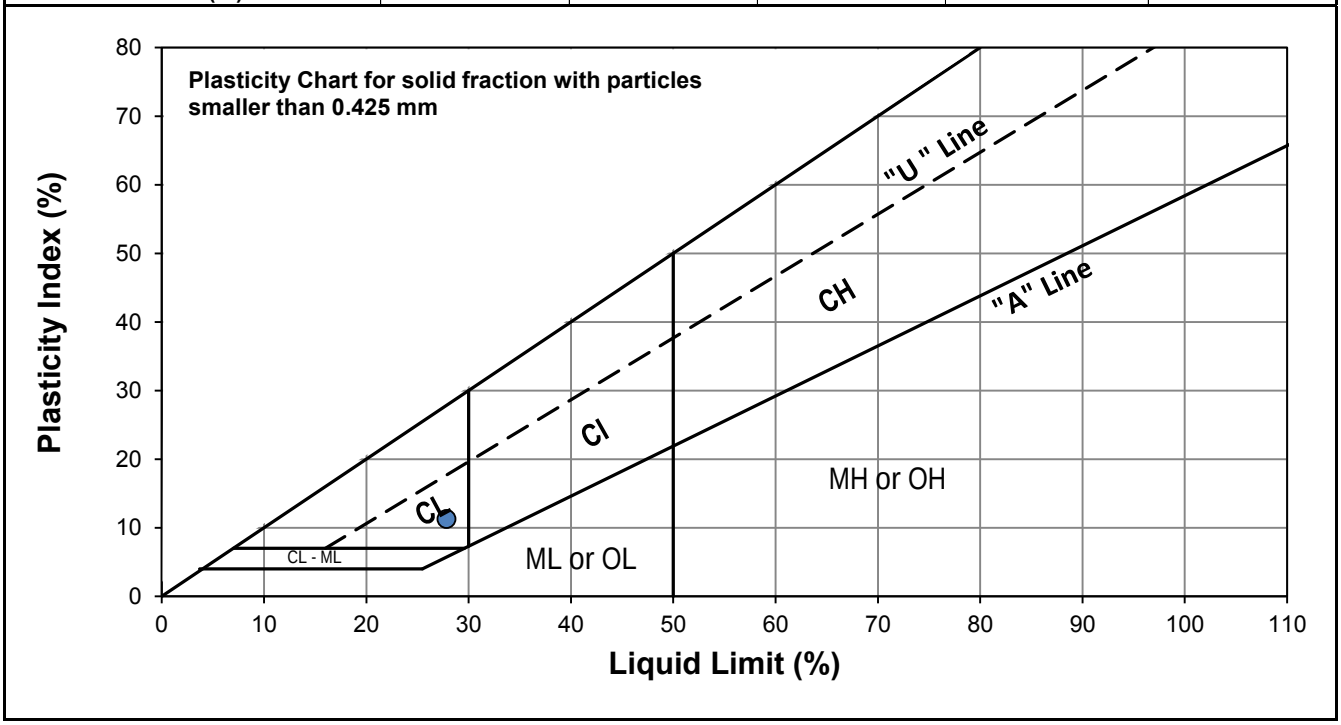
Atterberg Limits
ASTM D4318-10e1

Project No.	0015-0029-00
Client	City of Winnipeg
Project	2019 Local Street Renewal Program - Cork Ave.
Test Hole	TH18-05
Sample #	G36
Depth (m)	0.8 - 0.9
Sample Date	19-Dec-18
Test Date	7-Jan-19
Technician	DS

Liquid Limit	28
Plastic Limit	17
Plasticity Index	11

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	17	28	31		
Mass Wet Soil + Tare (g)	24.028	25.236	23.799		
Mass Dry Soil + Tare (g)	21.754	22.872	21.725		
Mass Tare (g)	14.091	14.228	13.970		
Mass Water (g)	2.274	2.364	2.074		
Mass Dry Soil (g)	7.663	8.644	7.755		
Moisture Content (%)	29.675	27.348	26.744		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	20.667	21.686			
Mass Wet Soil + Tare (g)	19.708	20.627			
Mass Dry Soil + Tare (g)	13.873	14.308			
Mass Water (g)	0.959	1.059			
Mass Dry Soil (g)	5.835	6.319			
Moisture Content (%)	16.435	16.759			

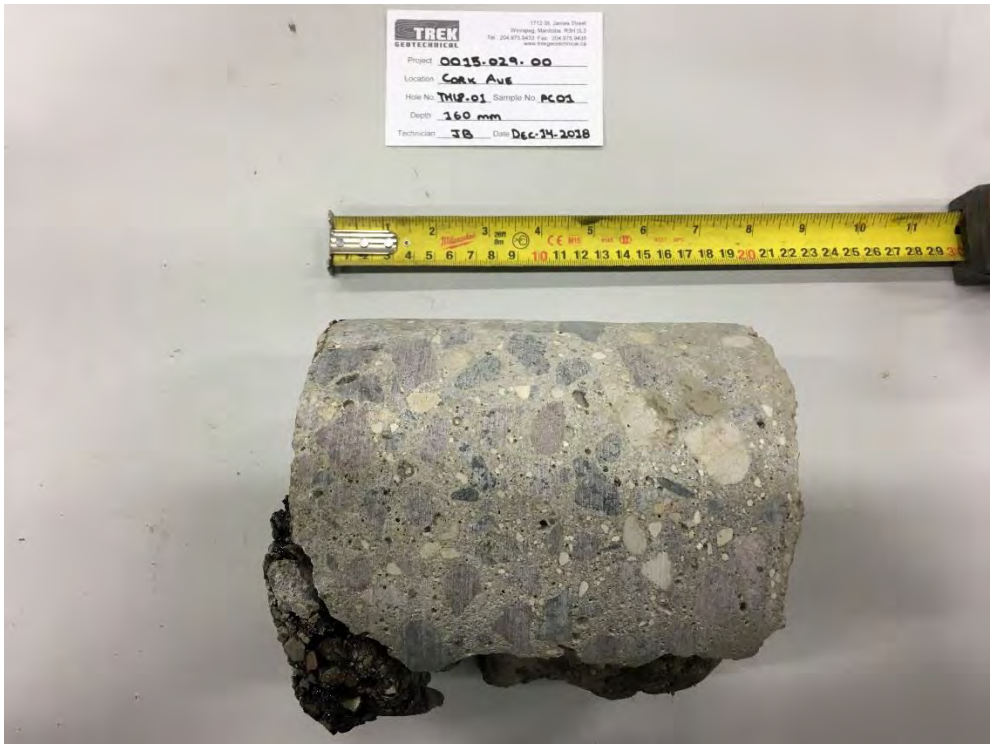


Photo 1: Pavement Core Sample at Test Hole TH18-01

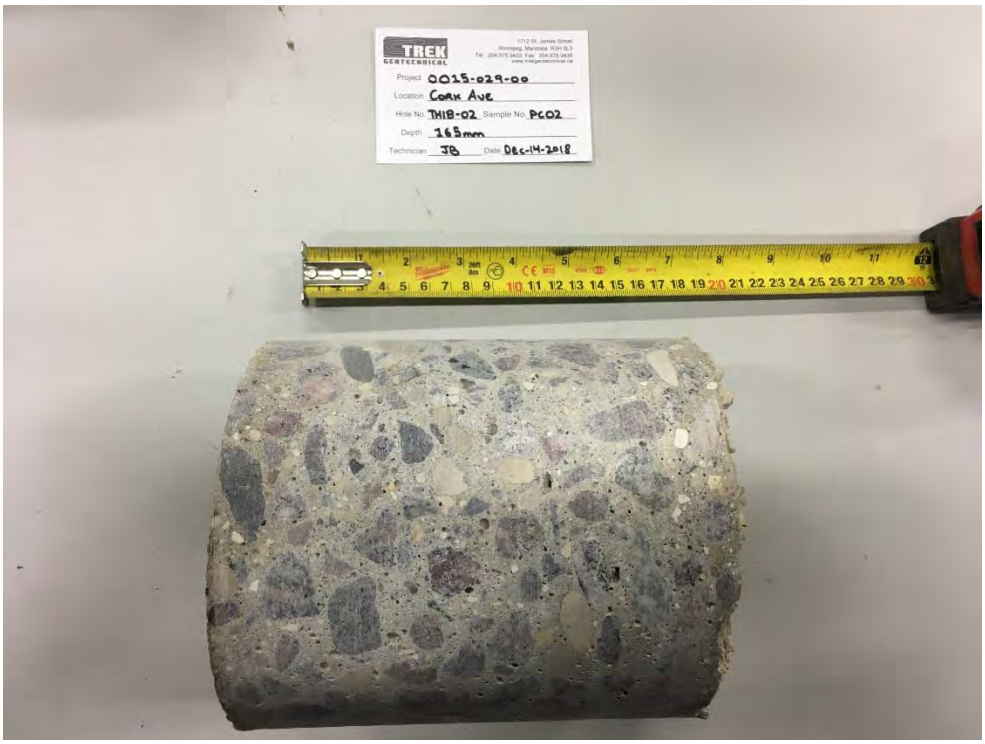


Photo 2: Pavement Core Sample at Test Hole TH18-02

Photo 3: Pavement Core Sample at Test Hole TH18-03

Photo 4: Pavement Core Sample at Test Hole TH18-04

Photo 5: Pavement Core Sample at Test Hole TH18-05

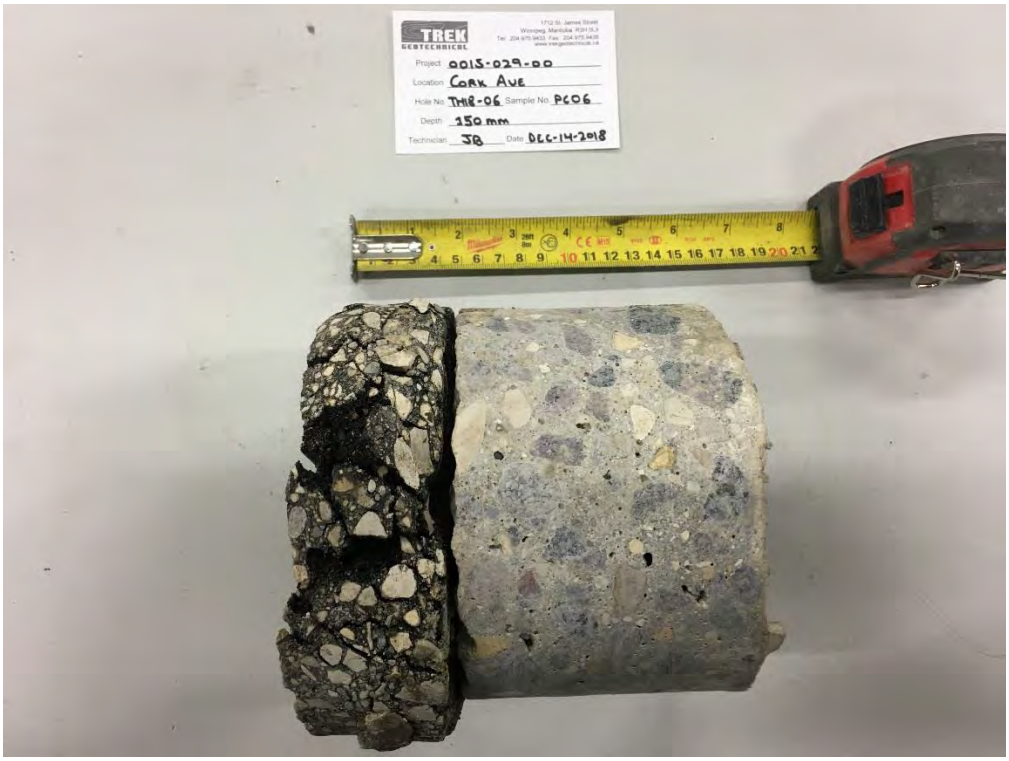


Photo 6: Pavement Core Sample at Test Hole TH18-06

Stantec Consulting Ltd.
500–311 Portage Avenue, Winnipeg MB R3B 2B9

January 14, 2019
File: 123314117

Attention: Richard Weibel
City of Winnipeg
Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

Good day Richard,

Reference: Geotechnical Investigation for 2019 Local Street Renewal Program – Nora Street

Stantec Consulting Ltd. recovered a total of three core samples and advanced three testholes on Nora Street on December 7 and December 11, 2018. The purpose of the pavement investigation was to determine the thickness of the pavement structure and observe the underlying soil conditions. Upon completion of drilling, the testholes were backfilled with crushed limestone and the top 100 mm was patched with cold mix asphalt. The findings are outlined below.

1. LABORATORY TEST RESULTS

The laboratory test results are summarized on **Table 1** and **Table 2** and are included in the testhole records.

Table 1 – Atterberg Limits Test Data

Testhole No.	Sample Depth	Soil Type	Liquid Limit	Plastic Limit	Plasticity Index
TH02	0.7 m	Lean Clay	47	16	31
TH02	1.0 m	Fat Clay	67	23	44

Table 2 – Particle Size Analysis Test Data

Testhole No.	Sample Depth	Soil Type	Gravel	Sand	Silt	Clay
TH02	0.7 m	Lean Clay	0.0%	3.9%	42.9%	53.2%
TH02	1.0 m	Fat Clay	0.0%	2.6%	17.1%	80.3%

The core findings, core photographs, testhole location plan, testhole records and laboratory test results for Nora Street are attached.

We appreciate the opportunity to assist you on this project. Please contact the undersigned if you have any questions regarding our report.

Reference: **Geotechnical Investigation for 2019 Local Street Renewal Program – Nora Street**

Regards,

Stantec Consulting Ltd.

Guillaume Beauce P.Eng.
Geotechnical Engineer
Phone: (204) 928-7618
guillaume.beauce@stantec.com

Jason Thompson C.E.T.
Principal – Manager, Materials Testing Services
Phone: (204) 928-4004
jason.thompson@stantec.com

Attachments: Table 3 – Core Findings
Core Photographs
Testhole Location Plan
Testhole Records
Laboratory Test Results

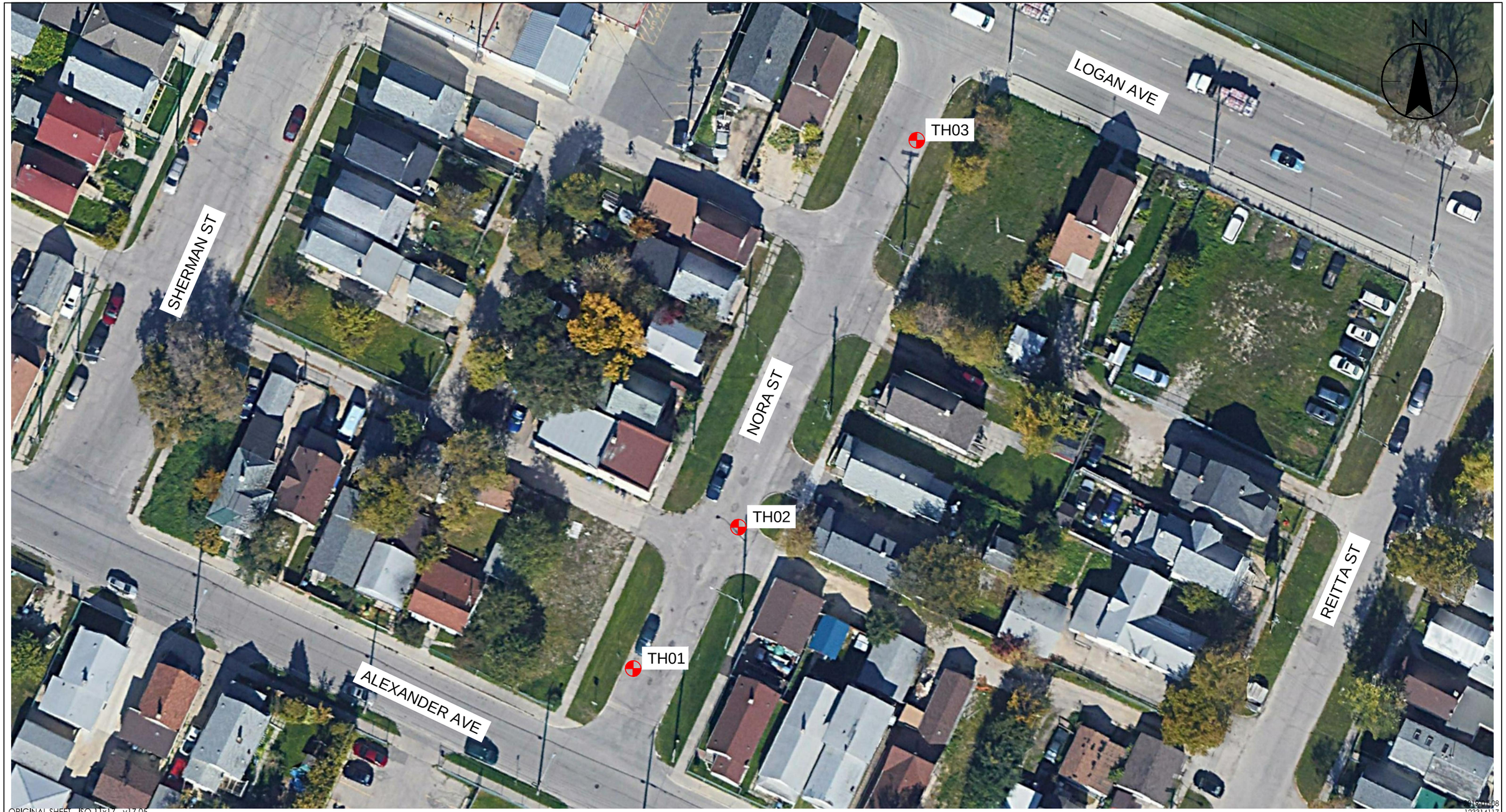
Table 3 - 2019 Local Street Renewal Program – Nora Street from Alexander Avenue to Logan Avenue

Testhole ID	Testhole Location	Pavement Surface		Comments
		Type	Thickness (mm)	
TH01	Nora Street Southbound lane, 10 m north of Alexander Avenue 1 m east of west curb	Asphalt	25	• deterioration of asphalt pavement from 0 to 25 mm • asphalt pavement not bonded to underlying concrete pavement • deterioration of concrete pavement from 25 to 215 mm • crushed limestone below concrete pavement
		Concrete	190	
TH02	Nora Street Northbound lane, 35 m north of Alexander Avenue 1 m west of east curb	Asphalt	40	• deterioration of asphalt pavement from 0 to 40 mm • asphalt pavement not bonded to underlying concrete pavement • deterioration of concrete pavement from 40 to 200 mm • clay base below concrete pavement
		Concrete	160	
TH03	Nora Street Northbound lane, 10 m south of Logan Avenue 1 m west of east curb	Asphalt	170	• intact asphalt pavement from 0 to 170 mm • crushed limestone base below asphalt pavement

Figure 1 - TH01 Core

Figure 2 - TH02 Core

Figure 3 - TH03 Core



ORIGINAL SHEET - ISO 11x17 - v17.05

2019-01-08
123314117

V:\1233\active\123314117\0300_drawing\14117-thlp.dwg 5
2019/01/09 10:16 AM By: Boughton, Lee

Stantec

Stantec Consulting Ltd.
Suite 500, 311 Portage Avenue
Winnipeg MB Canada R3B 2B9
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www.stantec.com

Legend

APPROXIMATE TESTHOLE LOCATION

Notes

Client/Project
CITY OF WINNIPEG
2019 LOCAL STREET RENEWAL PROGRAM
WINNIPEG, MB

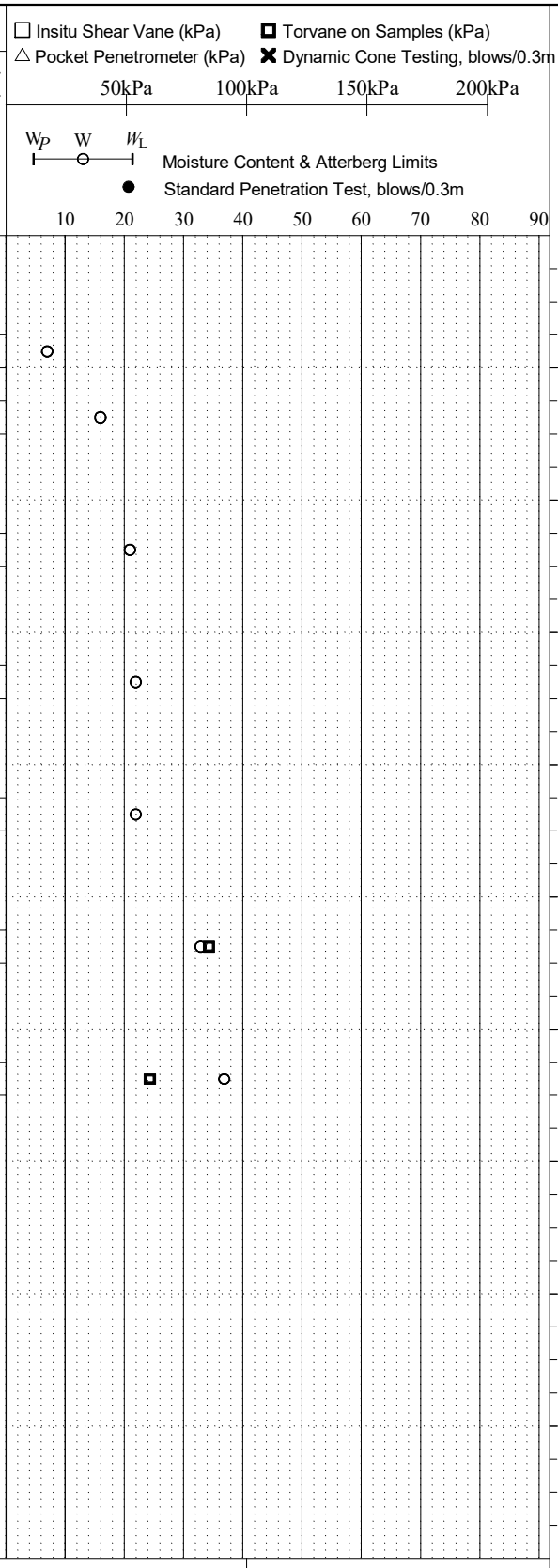
Figure No. 4

Title
NORA STREET
TESTHOLE LOCATION PLAN

TH01 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department PROJECT No. 123314117
PROJECT 2019 Regional Street Renewal Program DATUM Geodetic NORTHING 5530112
LOCATION Nora Street from Alexander Ave to Logan Ave ELEVATION EASTING 632238
DRILLING DATE December 11, 2018 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete			
	GW		Crushed Limestone	GS		7
	CL		soft tan lean CLAY (CL) - with silt, trace fine to coarse sand	GS		16
				GS		21
1				GS		22
				GS		22
	CH		stiff brown fat CLAY (CH) - silty, trace fine to coarse sand	GS		33
				GS		37
2			End of Testhole • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Frost observed to a depth of 1.1 m. • Testhole terminated at depth of 2.0 m.			
3						



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TH02 TESTHOLE RECORD

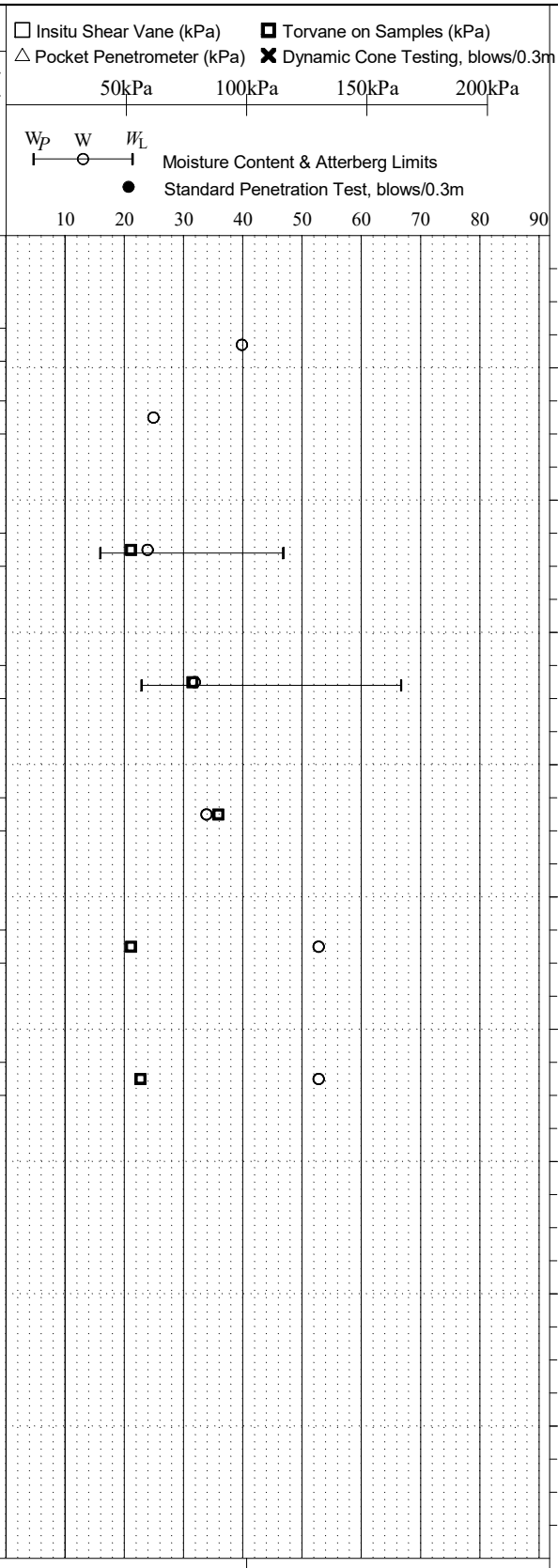
CLIENT City of Winnipeg, Public Works Department — PROJECT No. 123314117

PROJECT 2019 Regional Street Renewal Program — DATUM Geodetic — NORTHING 5530131

LOCATION Nora Street from Alexander Ave to Logan Ave — ELEVATION — EASTING 632253

DRILLING DATE December 11, 2018 — DRILLING CO. Maple Leaf Drilling — DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete			
	FL		FILL: stiff brown clay - silty, some organics, trace fine to coarse sand, trace gravel	GS		40
				GS		25
	CL		soft to stiff tan lean CLAY (CL) - with silt, trace fine to coarse sand Particle Size Anaylsis Results @ 0.7 m: - 0% Gravel, 3.9% Sand, 42.9% Silt, 53.2% Clay	GS		24
1	CH		stiff brown fat CLAY (CH) - silty, trace fine to coarse sand Particle Size Anaylsis Results @ 1.0 m: - 0% Gravel, 2.6% Sand, 17.1% Silt, 80.3% Clay	GS		32
				GS		34
				GS		53
2				GS		53
			End of Testhole • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Frost observed to a depth of 0.9 m. • Testhole terminated at depth of 2.0 m.			
3						



DEPTH (ft): 0, 2, 4, 6, 8, 10

Sample Type: GS - Grab Sample; SS - Split Spoon; RC - Rock Core; ST - Shelby Tube; PT - Piston Tube; VT - Shear Vane Test

Piezometer Backfill Type: Bentonite; Drill Cuttings; Sand; Slough

Logged by: Nestor Abarca

Reviewed by: German Leal

Stantec

TH03 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department PROJECT No. 123314117

PROJECT 2019 Regional Street Renewal Program DATUM Geodetic NORTHING 5530183

LOCATION Nora Street from Alexander Ave to Logan Ave ELEVATION EASTING 632277

DRILLING DATE December 11, 2018 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt			
	FL	FILL: stiff brown clay - silty, some organics, trace fine to coarse sand, trace gravel	GS		34
	CL	soft tan lean CLAY (CL) - with silt, trace fine to coarse sand	GS		19
			GS		20
1	CH	firm to stiff brown fat CLAY (CH) - silty, trace fine to coarse sand	GS		26
			GS		25
			GS		46
2			GS		53
		End of Testhole • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Frost observed to a depth of 0.75 m. • Testhole terminated at depth of 2.0 m.			
3					

□ Insitu Shear Vane (kPa) ■ Torvane on Samples (kPa)

△ Pocket Penetrometer (kPa) ✖ Dynamic Cone Testing, blows/0.3m

50kPa 100kPa 150kPa 200kPa

W_P W W_L Moisture Content & Atterberg Limits

● Standard Penetration Test, blows/0.3m

10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Nestor Abarca

Reviewed by: German Leal

Stantec

Atterberg Limits
ASTM D4318
Method B- One Point

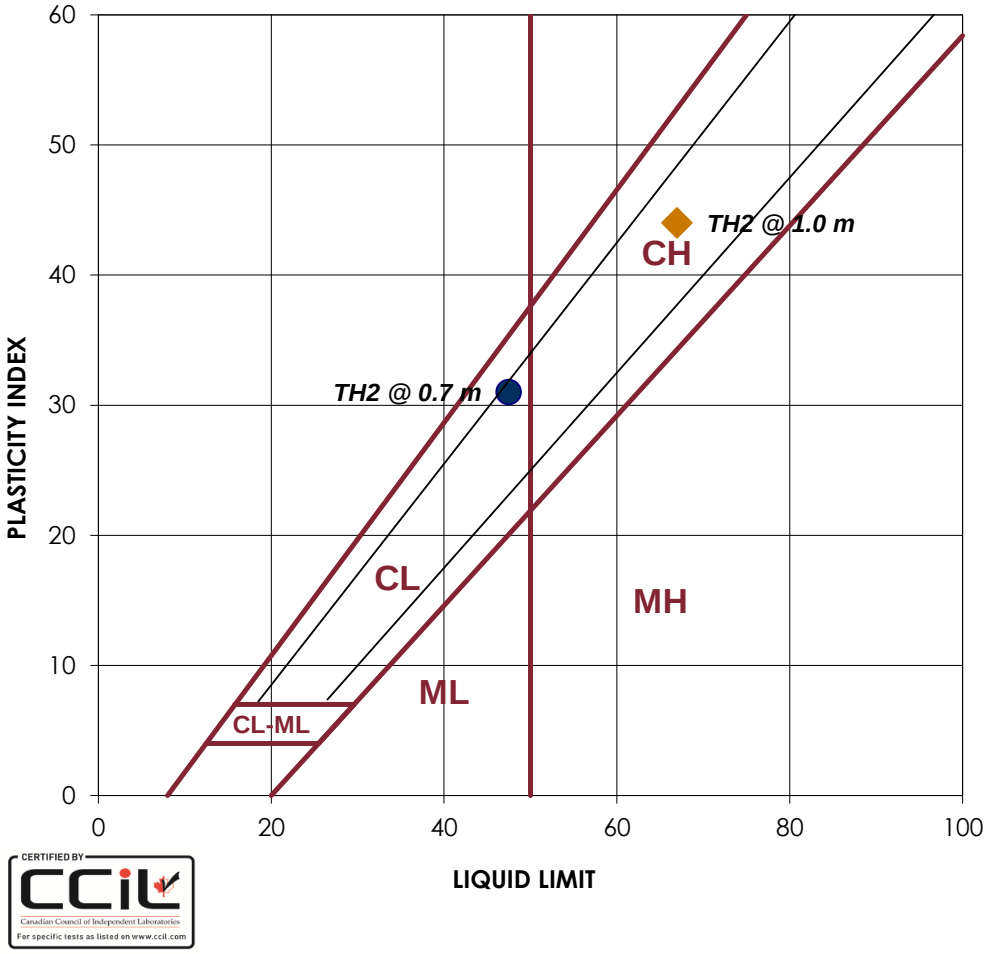
Client: Stantec Consulting Ltd.
Project Name: 2019 Street Renewal (Nora Street)

Project No: 123314117
Date Received: December 12, 2018
Date Tested: December 21, 2018
Tested By: Nestor Abarca, C.Tech.

LABORATORY
199 Henlow Bay

Winnipeg, Manitoba
Canada R3Y 1G4
Tel: (204) 488-6999

Sample: TH2 @ 0.7 m			Sample: TH2 @ 1.0 m	
LIQUID			LIQUID	
1	2	Trial No.	1	2
27	27	Number of Blows	24	24
226	260	Container Number	282	301
34.36	36.85	Wt. Sample (wet+tare)(g)	33.34	37.72
29.68	31.43	Wt. Sample (dry+tare)(g)	27.99	30.66
19.70	19.95	Wt. Tare (g)	20.03	20.18
10.0	11.5	Wt. Dry Soil (g)	8.0	10.5
4.7	5.4	Wt. Water (g)	5.4	7.1
46.9%	47.2%	Water Content (%)	67.2%	67.4%
47.3%	47.7%	Corrected Water Content (%	66.9%	67.0%
PLASTIC			PLASTIC	
1	2	Trial No.	1	2
274	285	Container Number	312	317
32.08	30.96	Wt. Sample (wet+tare)(g)	29.52	30.07
30.49	29.55	Wt. Sample (dry+tare)(g)	27.71	28.22
20.55	20.76	Wt. Tare (g)	19.76	20.05
9.9	8.8	Wt. Dry Soil (g)	8.0	8.2
1.6	1.4	Wt. Water (g)	1.8	1.9
16.0%	16.0%	Water Content (%)	22.8%	22.6%
AVERAGE VALUES			AVERAGE VALUES	
1	2		1	2
LL	47		LL	67
PL	16		PL	23
PI	31		PI	44
Natural MC (%)	24.4%		Natural MC (%)	32.4%
CLASSIFICATION			CLASSIFICATION	
CL			CH	



CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. STANTEC is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of STANTEC.

Reviewed By: Guilluame Beauce, B.Sc., P. Eng.

LABORATORY
199 Henlow Bay
Winnipeg MB R3Y 1G4
Tel: (204) 488-6999

PARTICLE SIZE ANALYSIS
ASTM D422

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, Manitoba
R3B 2B9

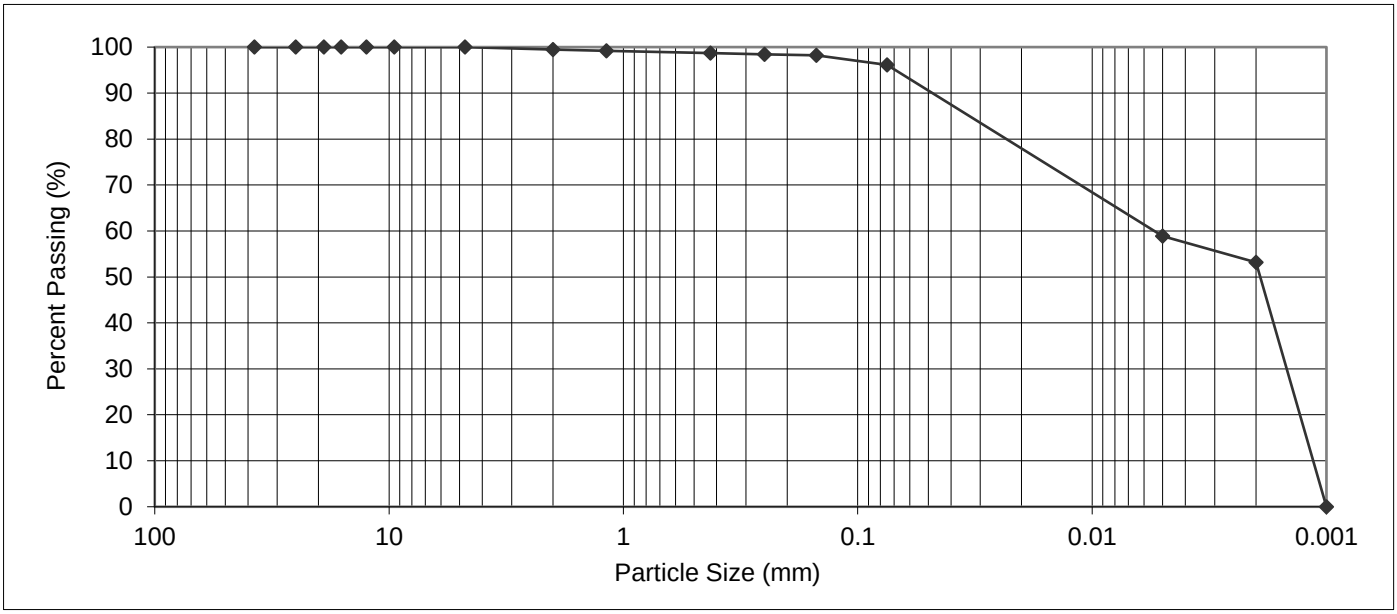
PROJECT: 2019 Street Renewal Project
(Nora Street)

Attention: Guilllaume Beauce

PROJECT NO.: 123314117

SAMPLED BY: Nestor Abarca, C.Tech.
SAMPLE ID: TH2 @ 0.7 m

DATE RECEIVED: December 12, 2018
TESTED BY: Nestor Abarca, C.Tech.



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	100.0
2.00 mm	99.5

PARTICLE SIZE	PERCENT PASSING
1.18 mm	99.2
0.425 mm	98.7
0.250 mm	98.4
0.150 mm	98.2
0.075 mm	96.1
0.005 mm	58.9
0.002 mm	53.2
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.5	0.8	2.6	42.9	53.2	NT*

NT* Sample not tested for colloids

REPORT DATE: January 8, 2019

REVIEWED BY: Guillaume Beauce, B.Sc., P. Eng.

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LABORATORY
199 Henlow Bay
Winnipeg MB R3Y 1G4
Tel: (204) 488-6999

PARTICLE SIZE ANALYSIS
ASTM D422

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, Manitoba
R3B 2B9

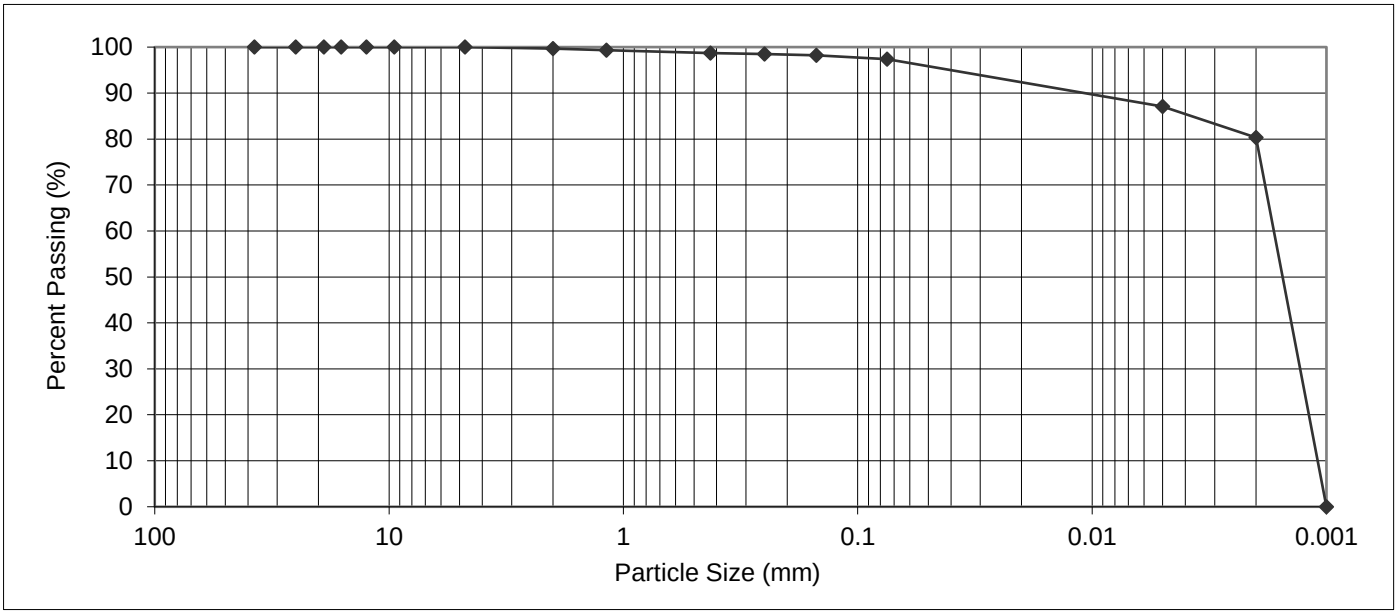
PROJECT: 2019 Street Renewal Project
(Nora Street)

Attention: Guilllaume Beauce

PROJECT NO.: 123314117

SAMPLED BY: Nestor Abarca, C.Tech.
SAMPLE ID: TH2 @ 1.0 m

DATE RECEIVED: December 12, 2018
TESTED BY: Nestor Abarca, C.Tech.



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	100.0
2.00 mm	99.7

PARTICLE SIZE	PERCENT PASSING
1.18 mm	99.3
0.425 mm	98.7
0.250 mm	98.5
0.150 mm	98.2
0.075 mm	97.4
0.005 mm	87.1
0.002 mm	80.3
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.3	1.0	1.3	17.1	80.3	NT*

NT* Sample not tested for colloids

REPORT DATE: January 8, 2019

REVIEWED BY: Guillaume Beauce, B.Sc., P. Eng.

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.

Appendix H

Andrews Street – Leila Avenue to Hartford Avenue

Summary Table & Photographs of Pavement Core Samples

TREK GEOTECHNICAL

0015 029 00
City of Winnipeg
2019 Local Street Renewal Program - Powers Street and Andrews Street

0 25 50 75 m
SCALE = 1 : 1 500 (279 mm x 432 mm)

LEGEND: PAVEMENT CORE (TREK, 2018)

NOTES:
1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 09
PAVEMENT CORE LOCATION PLAN

Z:\Projects\0015 City of Winnipeg\0015 029 00 2019 Local St Package\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder\Fig 1-11_2019-01-25-LOCAL ST RENEWAL_0_A_DW_0015-029-00.dwg, 1/25/2019 8:50:01 AM, Adobe PDF (11.00 x 17.00 Inches)

FIGURE 9
MATCHLINE

PC18 - 35
PC18 - 36
PC18 - 37
PC18 - 38
PC18 - 39

KINGSBURY AVENUE
BURRIN AVENUE
SEMPLE AVENUE
KILBRIDE AVENUE
BELMONT AVENUE
McGREGOR STREET
ANDREWS STREET
POWERS STREET

KEY PLAN
SCALE : N.T.S.

0 25 50 75 m
SCALE = 1 : 1 750 (279 mm x 432 mm)

LEGEND: PAVEMENT CORE (TREK, 2018)

NOTES:
1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 10
PAVEMENT CORE LOCATION PLAN

Z:\Projects\0015 City of Winnipeg\0015 029 00 2019 Local St Package\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder\Fig 1-11_2019-01-25-LOCAL ST RENEWAL_0_A_DW_0015-029-00.dwg, 1/25/2019 3:50:11 PM, Adobe PDF (11.00 x 17.00 Inches)

2019 Local Street Renewal Program
Road Investigation
Andrews Street

Pavement Core No.	Pavement Core Location	Pavement Surface		Pavement Structure Material	
		Type	Thickness (mm)	Type	Thickness (mm)
PC18 - 32 (On Joint)	Located at Apartment #1080, Centreline of the Road UTM N553424 E0634602	Asphalt	N/A	Concrete	155
PC18 - 33 (On Joint)	Located at Apartment # 1075, Centreline of Road, 6 m South of Forest Avenue backlane UTM N5534143 E0634556	Asphalt	N/A	Concrete	170
PC18 - 34	2.5 m West of East curb, 20 m North of North sidewalk of Royal Ave UTM N5534053 E0634517	Asphalt	N/A	Concrete	145
PC18 - 35	Located at Intersection of Kingsbury Avenue and Andrews Street, 1 m East of West curb UTM N5533965 E0634469	Asphalt	N/A	Concrete	150
PC18 - 36	20 m South of Burrin Avenue South sidewalk, 1.5 m West of East Curb of the Road UTM N5533878 E0634435	Asphalt	N/A	Concrete	175
PC18 - 37	1.5 East of West curb, 25 m South of Semple Street South sidewalk UTM N5533779 E0634385	Asphalt	20	Concrete	130
PC18 - 38	2 m South of Belmount Avenue Backlane, 1.5 m West of East curb UTM N5533692 E0634348	Asphalt	N/A	Concrete	190
PC18 - 39	7 m North of Hartford Avenue North sidewalk, 2 m East of West Curb of the Road UTM N5533602 E0634302	Asphalt	N/A	Concrete	160

Photo 1: Pavement Core Sample at Test Hole PC18-32 (On Joint)

Photo 2: Pavement Core Sample view of Joint at Test Hole PC18-32

Photo 3: Pavement Core Sample at Test Hole PC18-33 (On Joint)

Photo 4: Pavement Core Sample view of Joint at Test Hole PC18-33

Photo 5: Pavement Core Sample at Test Hole PC18-34

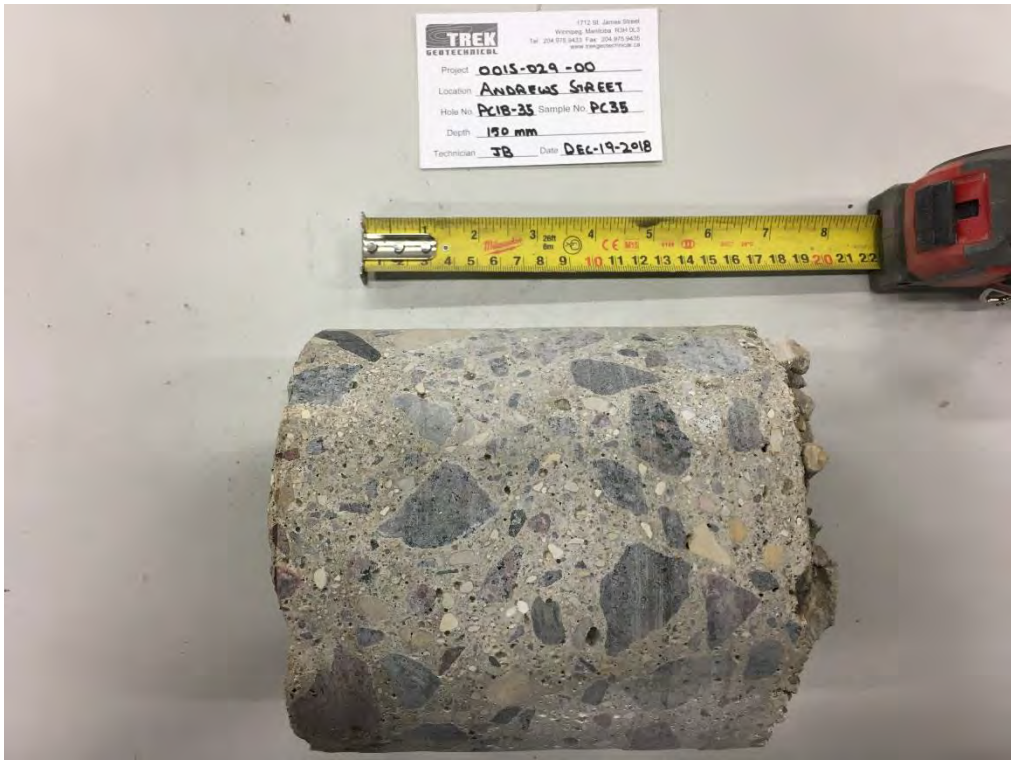


Photo 6: Pavement Core Sample at Test Hole PC18-35

Photo 7: Pavement Core Sample at Test Hole PC18-36

Photo 8: Pavement Core Sample at Test Hole PC18-37

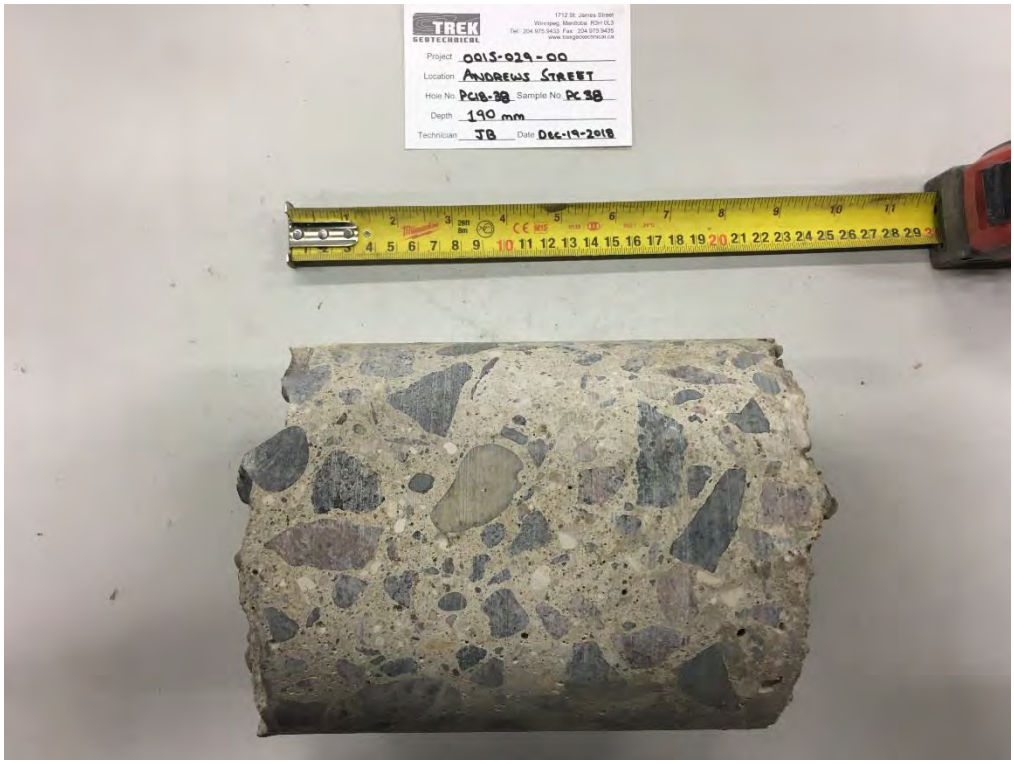


Photo 9: Pavement Core Sample at Test Hole PC18-38

Photo 10: Pavement Core Sample at Test Hole PC18-39

Stantec Consulting Ltd.
500–311 Portage Avenue, Winnipeg MB R3B 2B9

January 14, 2019
File: 123314117

Attention: Richard Weibel
City of Winnipeg
Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

Good day Richard,

Reference: Geotechnical Investigation for 2019 Local Street Renewal Program – Stardust Avenue

Stantec Consulting Ltd. recovered a total of two core samples on Stardust Avenue on December 11, 2018. The purpose of the pavement investigation was to determine the thickness of the pavement structure. Upon completion of coring, the core hole was patched with cold mix asphalt.

The core findings, core photographs and testhole location plan for Stardust Avenue are attached.

We appreciate the opportunity to assist you on this project. Please contact the undersigned if you have any questions regarding our report.

Regards,

Stantec Consulting Ltd.

Guillaume Beauce P.Eng.
Geotechnical Engineer
Phone: (204) 928-7618
guillaume.beauce@stantec.com

Jason Thompson C.E.T.
Principal – Manager, Materials Testing Services
Phone: (204) 928-4004
jason.thompson@stantec.com

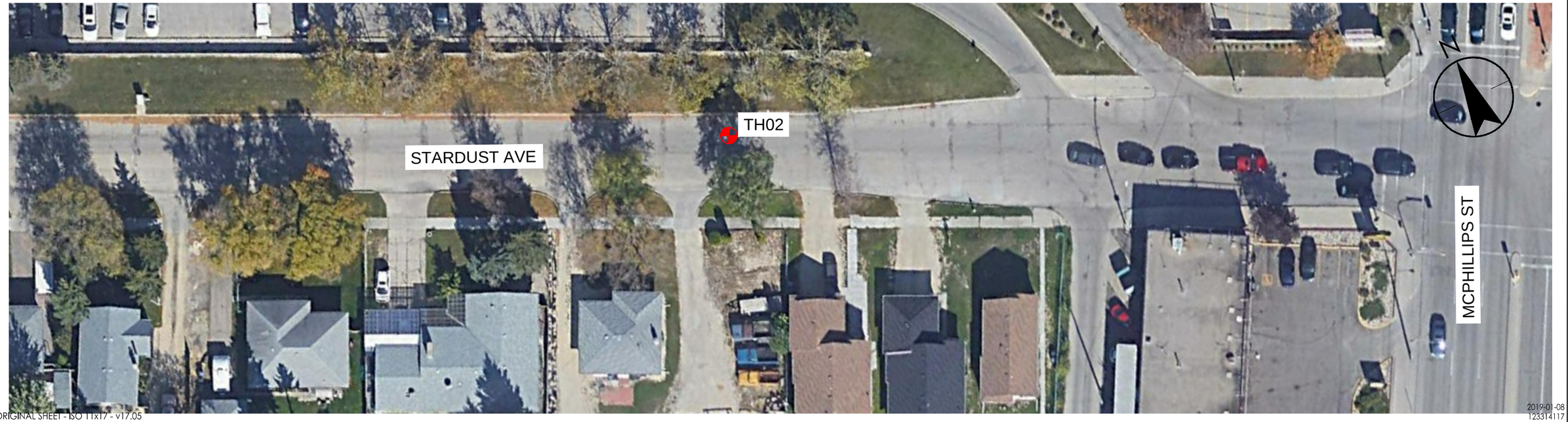
Attachments: Table 1 – Core Findings
Core Photographs
Testhole Location Plan

Table 1 - 2019 Local Street Renewal Program – Stardust Avenue from Watson Street to McPhillips Street

Testhole ID	Testhole Location	Pavement Surface		Comments
		Type	Thickness (mm)	
TH01	Stardust Avenue Eastbound lane, 36 m east of Watson Street 1 m north of south curb	Concrete	205	• intact concrete from 0 to 205 mm • crushed limestone base below concrete pavement
TH02	Ellice Avenue Westbound lane, 89 m west of McPhillips Street 1 m south of north curb	Concrete	195	• deterioration of concrete from 0 to 195 mm • crushed limestone base below concrete pavement

Figure 1 - TH01 Core

Figure 2 - TH02 Core



V:\1233\active\123314117\0300_drawing\14117-fhlp.dwg 1
2019/01/09 10:13 AM By: Boughton, Lee

ORIGINAL SHEET - ISO 11x17 - v17.05

2019-01-08
123314117

Stantec

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Winnipeg MB Canada R3B 2B9
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Legend

APPROXIMATE TESTHOLE LOCATION

Notes

Client/Project
CITY OF WINNIPEG
2019 LOCAL STREET RENEWAL PROGRAM
WINNIPEG, MB

Figure No. 3
STARDUST AVENUE

Title
TESTHOLE LOCATION PLAN

Appendix C

Kairistine Lane – Kinver Avenue to Dexter Street

Test Hole Logs, Summary Table, Lab Data and Photographs of Pavement Core Samples

TREK GEOTECHNICAL

0015 029 00
City of Winnipeg
2019 Local Street Renewal Program - Kairistine Lane

KEY PLAN
SCALE : N.T.S.

0 25 50 75 100 m
SCALE = 1 : 2 000 (279 mm x 432 mm)

LEGEND: TEST HOLE (TREK, 2018)

NOTES:
1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 03
TEST HOLE LOCATION PLAN

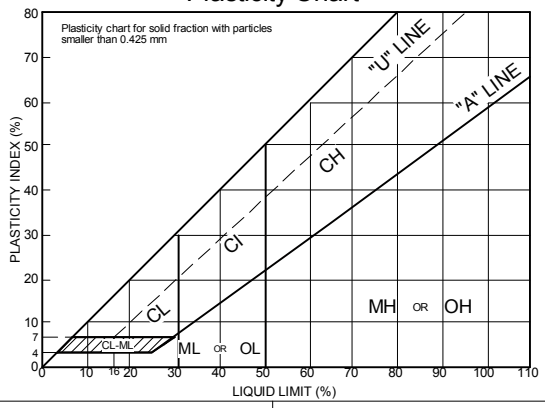
Z:\Projects\0015 City of Winnipeg\0015 029 00 2019 Local St Package\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder\Fig 1-11_2019-01-25-LOCAL ST RENEWAL_0_A_DW_0015-029-00.dwg, 1/25/2019 8:36:14 AM (11.00 x 17.00 Inches)

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

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



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

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

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

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

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

Sub-Surface Log

Test Hole TH18-11
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Kairistine Lane	**Location:**	UTM-14U, 5533698N, 629131E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 19, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT - 105mm				
		SAND (FILL) - silty, trace gravel (<20 mm diam.), light brown, frozen, moist and compact when thawed, poorly graded, sub-angular to angular		G83	●	
				G84	●	
		CLAY - silty, trace sand, trace gravel (<20 mm diam.) - mottled grey and brown - frozen to 0.7 m, moist and stiff when thawed - intermediate plasticity				
0.5				G85	●	
				G86	●	△ ✤
1.0		- trace organics, black, intermediate to high plasticity below 0.9 m		G87	●	△ ✤
		SILT - trace clay, trace sand - grey - moist, soft - low plasticity				
1.5		- no to low plasticity below 1.4 m		G88	●	
				G89	●	△
		CLAY - trace silt - brownish grey - stiff to very stiff - high plasticity		G90	●	✤
2.0						
		- firm below 2.3 m				
2.5						
		- mottled light brown and grey below 2.7 m		G91	●	✤
3.0						

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located on Southbound Lane, 1.0 m West of East curb at House #73

Logged By: Bryan Hiebert **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES KAIRISTINE LANE_0015-029-00_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 4/25/19

Sub-Surface Log

Test Hole TH18-12
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Kairistine Lane	**Location:**	UTM-14U, 5533702N, 629078E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 19, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT - 120 mm thick				
		SAND (FILL) - silty, trace gravel (<20 mm diam.), light brown, frozen, moist and compact when thawed, well graded medium sand to gravel, sub-angular to angular		G92		
		CLAY - silty, trace sand, trace gravel (<15 mm diam.) - dark grey - frozen to 0.75 m, moist and firm when thawed - intermediate plasticity		G93		
0.5		- trace gravel (<10 mm diam.), high plasticity below 0.5 m		G94		
				G95		
1.0		SILT AND CLAY - trace organics - dark grey - moist, firm - intermediate plasticity		G96		
				G97		
1.5		- no organics, brown below 1.5 m		G98		
		CLAY - silty - light brown - moist, stiff - high plasticity		G99		
2.0				G100		
2.5		- firm below 2.7 m				
3.0				G101		

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located on Eastbound Lane, 1.0 m North of South curb at House #20.

Logged By: Bryan Hiebert **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES KAIRISTINE LANE_0015-029-00_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 4/25/19

Sub-Surface Log

Test Hole TH18-13
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Kairistine Lane	**Location:**	UTM-14U, 5533801N, 629078E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 20, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT - 95 mm thick				
		CLAY - silty, trace gravel (<15 mm diam.) - brown - frozen to 0.6 m, moist and stiff when thawed - intermediate to high plasticity		G102	●	
0.5				G103	●	
		SILT - clayey, trace sand - brown - moist, firm - intermediate plasticity		G104	●	✤ △
1.0		CLAY - silty - dark grey - moist, very stiff - high plasticity - firm below 1.2 m		G105	●	✤
1.5				G106	●	✤
				G107	●	✤ △
2.0				G108	●	✤ △
2.5		- soft below 2.6 m		G109	●	✤ △
3.0						

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located on Southbound Lane, 1.0 m West of East curb at House #73.

Logged By: Bryan Hiebert **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES KAIRISTINE LANE_0015-029-00_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 4/25/19

Sub-Surface Log

Test Hole TH18-14

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Kairistine Lane	**Location:**	UTM-14U, 5533897N, 629074E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 20, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m^3) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		ASPHALT - 160 mm thick				
		SAND (FILL) - silty, trace gravel (<15 mm diam.), light brown, frozen, moist, compact, poorly graded, sub-angular to angular		G110		
0.5		SILT - some sand, trace clay - light brown - frozen to 0.6 m, moist and soft when thawed - low plasticity		G111		
				G112		
1.0		- some clay, moist, low to intermediate plasticity below 0.9 m		G113		
		CLAY - silty, silt inclusions (<10 mm diam.) - brownish grey - moist, very stiff - high plasticity		G114		
1.5		- firm below 1.5 m		G115		
2.0				G116		
2.5						
3.0				G117		

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located on Centreline of road at House #102.

Logged By: Bryan Hiebert **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

Sub-Surface Log

Test Hole TH18-15
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Kairistine Lane	**Location:**	UTM-14U, 5533988N, 629069E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 20, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		ASPHALT - 130 mm thick				
		SAND (FILL) - silty, trace gravel (<15 mm diam.), light brown, frozen, moist, compact, poorly graded, sub-angular to angular		G118	●	
				G119	●	
0.5		CLAY - silty, trace sand, trace gravel (<15 mm diam.), trace organics - mottled black and grey - frozen to 0.6 m, moist and firm when thawed - high plasticity		G120	●	
				G121	●	✤
1.0		SILT AND CLAY - trace sand - grey - moist, firm, laminated (<2 mm thick) - intermediate plasticity		G122	●	✤
		SILT - some clay - light brown - moist, firm - low to intermediate plasticity		G123	●	△ ✤
1.5						
		CLAY - silty, trace sand, silt inclusions (<10 mm diam.) - brown - moist, stiff to very still - high plasticity		G124	●	✤
2.0						
				G125	●	△ ✤
2.5		- firm to stiff below 2.7 m				
				G126	●	△ ✤
3.0		END OF TEST HOLE AT 3.1 m DEPTH IN CLAY				

1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located on Southbound Lane, 2.0 m East of West curb at House #140.

Logged By: Bryan Hiebert **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES KAIRISTINE LANE_0015-029-00_0_A_BMH.GPJ TREK GEOTECHNICAL.GDT 4/25/19

2019 Local Street Renewal Program
Sub-Surface Investigation
Kairistine Lane

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH18-11	UTM: 5533698 N, 629131 E Located on Centreline of Road at House #2	Asphalt	105	Concrete	N/A											
						SAND (FILL)	0.1	0.2	10							
						CLAY	0.2	0.3	24							
						CLAY	0.5	0.6	23							
						CLAY	0.8	0.9	33	0	4	49	17	22	47	25
						CLAY	1.1	1.2	30							
						SILT	1.4	1.5	20							
						SILT	1.7	1.8	21							
						CLAY	1.8	2.0	27							
						CLAY	2.7	2.9	44							
TH18-12	UTM: 5533702 N, 629078 E Located on Eastbound Lane, 1.0 m North of South curb at House #20	Asphalt	120	Concrete	N/A							%Fines				
						SAND (FILL)	0.1	0.2	17	9	71	20				
						CLAY	0.2	0.3	25							
						CLAY	0.5	0.6	24							
						CLAY	0.8	0.9	33							
						SILT AND CLAY	1.1	1.2	31							
						SILT AND CLAY	1.4	1.5	25							
						SILT AND CLAY	1.5	1.7	24							
						CLAY	1.7	1.8	33							
						CLAY	2.1	2.3	29							
						CLAY	2.9	3.0	46							
TH18-13	UTM: 5533801 N, 629078 E Located on Southbound Lane, 1.0 m West of East curb at House #73	Asphalt	95	Concrete	N/A											
						CLAY	0.1	0.3	16							
						CLAY	0.5	0.6	21							
						SILT	0.8	0.9	21	0	6	73	21	15	33	17
						CLAY	1.1	1.2	33							
						CLAY	1.4	1.5	37							
						CLAY	1.7	1.8	44							
						CLAY	2.1	2.3	51							
						CLAY	2.6	2.7	58							
TH18-14	UTM: 5533897 N, 627074 E Located on Centreline of road at House #102	Asphalt	160	Concrete	N/A											
						SAND (FILL)	0.2	0.3	15							
						SILT	0.5	0.6	16	0	13	77	10	17	22	5
						SILT	0.8	0.9	15							
						SILT	1.1	1.2	20							
						CLAY	1.2	1.4	28							
						CLAY	1.7	1.8	41							
						CLAY	2.3	2.4	55							
						CLAY	2.9	3.0	58							

2019 Local Street Renewal Program
Sub-Surface Investigation
Kairistine Lane

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH18-15	UTM: 5533988 N, 629069 E Located on Southbound Lane, 2.0 m East of West curb at House #140	Asphalt	130	Concrete	N/A											
						SAND (FILL)	0.1	0.2	13							
						SAND (FILL)	0.2	0.4	21							
						CLAY	0.5	0.6	23							
						CLAY	0.8	0.9	34							
						SILT AND CLAY	1.1	1.2	24							
						SILT	1.4	1.5	19							
						CLAY	1.7	1.8	26							
						CLAY	2.3	2.4	36							
						CLAY	2.9	3.0	50							

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Moisture Content Report
ASTM D2216-10

Project No. 0015-029-00
Client City of Winnipeg
Project 2019 Local Street Renewal Program - Kairistine Lane

Sample Date 19-Dec-18
Test Date 03-Jan-19
Technician JB

Test Hole	TH18-11	TH18-11	TH18-11	TH18-11	TH18-11	TH18-11
Depth (m)	0.1 - 0.2	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G83	G84	G85	G86	G87	G88
Tare ID	F57	F58	N40	W98	Z105	D20
Mass of tare	9.0	8.6	8.4	8.8	8.4	8.6
Mass wet + tare	247.4	240.6	230.6	420.2	263.0	226.4
Mass dry + tare	225.4	196.0	189.2	318.7	203.6	189.7
Mass water	22.0	44.6	41.4	101.5	59.4	36.7
Mass dry soil	216.4	187.4	180.8	309.9	195.2	181.1
Moisture %	10.2%	23.8%	22.9%	32.8%	30.4%	20.3%

Test Hole	TH18-11	TH18-11	TH18-11	TH18-12	TH18-12	TH18-12
Depth (m)	1.7 - 1.8	1.8 - 2.0	2.7 - 2.9	0.1 - 0.2	0.2 - 0.3	0.5 - 0.6
Sample #	G89	G90	G91	G92	G93	G94
Tare ID	P13	E40	P10	F18	AA02	N115
Mass of tare	8.4	8.6	8.6	8.6	6.6	8.6
Mass wet + tare	359.2	388.2	183.0	906.6	263.4	262.4
Mass dry + tare	298.5	307.8	129.5	773.9	212.5	212.8
Mass water	60.7	80.4	53.5	132.7	50.9	49.6
Mass dry soil	290.1	299.2	120.9	765.3	205.9	204.2
Moisture %	20.9%	26.9%	44.3%	17.3%	24.7%	24.3%

Test Hole	TH18-12	TH18-12	TH18-12	TH18-12	TH18-12	TH18-12
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.5 - 1.7	1.7 - 1.8	2.1 - 2.3
Sample #	G95	G96	G97	G98	G99	G100
Tare ID	H34	F46	F105	F76	K19	F138
Mass of tare	9.0	8.8	8.8	8.6	8.6	8.8
Mass wet + tare	243.4	272.4	256.6	312.8	251.6	271.8
Mass dry + tare	185.5	209.8	207.0	254.2	191.2	212.4
Mass water	57.9	62.6	49.6	58.6	60.4	59.4
Mass dry soil	176.5	201.0	198.2	245.6	182.6	203.6
Moisture %	32.8%	31.1%	25.0%	23.9%	33.1%	29.2%

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Moisture Content Report
ASTM D2216-10

Project No. 0015-029-00
Client City of Winnipeg
Project 2019 Local Street Renewal Program - Kairistine Lane

Sample Date 19-Dec-18
Test Date 03-Jan-19
Technician JB

Test Hole	TH18-12	TH18-13	TH18-13	TH18-13	TH18-13	TH18-13
Depth (m)	2.9 - 3.0	0.1 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G101	G102	G103	G104	G105	G106
Tare ID	Z19	F52	AB58	E92	C17	W04
Mass of tare	8.8	8.4	6.8	8.0	8.6	8.6
Mass wet + tare	183.2	174.2	144.4	401.6	170.8	176.8
Mass dry + tare	128.5	151.0	120.1	333.5	131.0	131.4
Mass water	54.7	23.2	24.3	68.1	39.8	45.4
Mass dry soil	119.7	142.6	113.3	325.5	122.4	122.8
Moisture %	45.7%	16.3%	21.4%	20.9%	32.5%	37.0%

Test Hole	TH18-13	TH18-13	TH18-13	TH18-14	TH18-14	TH18-14
Depth (m)	1.7 - 1.8	2.1 - 2.3	2.6 - 2.7	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9
Sample #	G107	G108	G109	G110	G111	G112
Tare ID	AB48	F71	N54	A14	A13	Z33
Mass of tare	6.8	8.6	8.6	8.4	8.4	8.6
Mass wet + tare	169.0	167.6	183.2	216.8	392.0	200.6
Mass dry + tare	119.4	114.2	119.2	190.2	339.6	175.1
Mass water	49.6	53.4	64.0	26.6	52.4	25.5
Mass dry soil	112.6	105.6	110.6	181.8	331.2	166.5
Moisture %	44.0%	50.6%	57.9%	14.6%	15.8%	15.3%

Test Hole	TH18-14	TH18-14	TH18-14	TH18-14	TH18-14	TH18-15
Depth (m)	1.1 - 1.2	1.2 - 1.4	1.7 - 1.8	2.3 - 2.4	2.9 - 3.0	0.1 - 0.2
Sample #	G113	G114	G115	G116	G117	G118
Tare ID	F98	AB38	A103	AB40	Z109	P85
Mass of tare	8.6	6.6	8.6	6.6	8.6	8.6
Mass wet + tare	176.2	149.4	160.4	156.4	126.0	267.6
Mass dry + tare	148.8	118.4	116.4	103.5	82.7	238.4
Mass water	27.4	31.0	44.0	52.9	43.3	29.2
Mass dry soil	140.2	111.8	107.8	96.9	74.1	229.8
Moisture %	19.5%	27.7%	40.8%	54.6%	58.4%	12.7%

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Moisture Content Report
ASTM D2216-10

Project No. 0015-029-00
Client City of Winnipeg
Project 2019 Local Street Renewal Program - Kairistine Lane

Sample Date 19-Dec-18
Test Date 03-Jan-19
Technician JB

Test Hole	TH18-15	TH18-15	TH18-15	TH18-15	TH18-15	TH18-15
Depth (m)	0.2 - 0.4	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G119	G120	G121	G122	G123	G124
Tare ID	N48	E22	AC02	AA05	K30	H12
Mass of tare	8.8	8.8	6.8	6.6	8.4	8.6
Mass wet + tare	195.2	153.2	214.8	135.2	114.8	219.8
Mass dry + tare	162.5	125.8	161.9	110.2	97.7	176.7
Mass water	32.7	27.4	52.9	25.0	17.1	43.1
Mass dry soil	153.7	117.0	155.1	103.6	89.3	168.1
Moisture %	21.3%	23.4%	34.1%	24.1%	19.1%	25.6%

Test Hole	TH18-15	TH18-15				
Depth (m)	2.3 - 2.4	2.9 - 3.0				
Sample #	G125	G126				
Tare ID	A17	N35				
Mass of tare	8.6	8.4				
Mass wet + tare	252.6	191.8				
Mass dry + tare	188.0	131.0				
Mass water	64.6	60.8				
Mass dry soil	179.4	122.6				
Moisture %	36.0%	49.6%				

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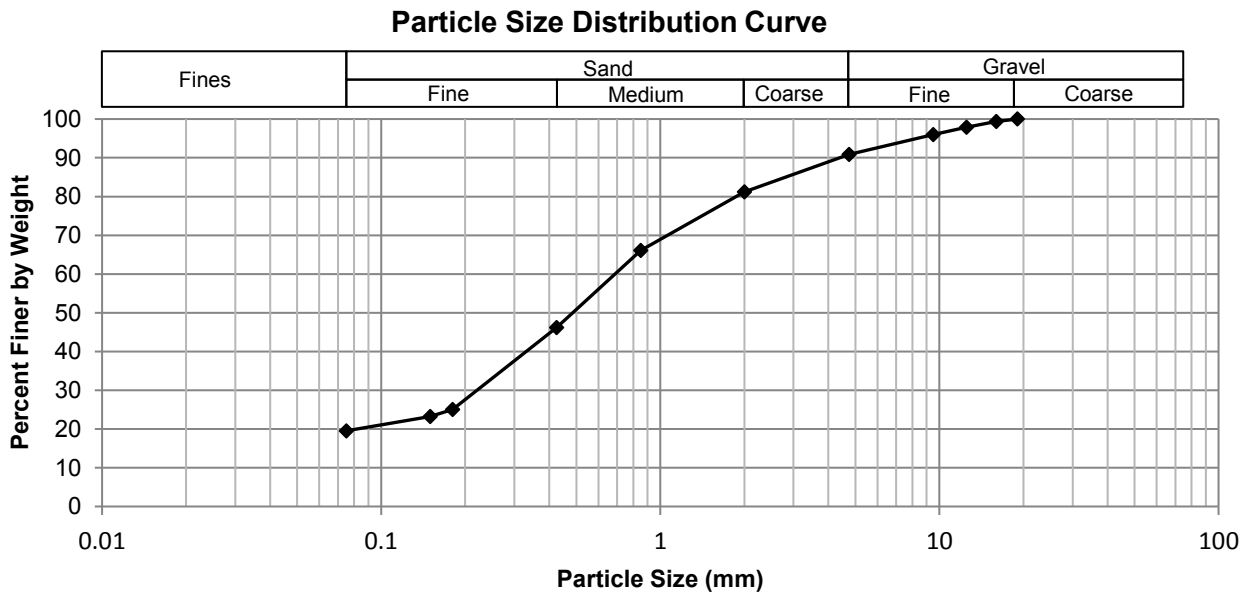
Grain Size Analysis (Sieve Method)
ASTM C136-14

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	0015-029-00
Client	City of Winnipeg
Project	Local Street Packages - Kairistine Lane
Test Hole	TH18-12
Sample #	G92
Depth	0.1 m - 0.2 m
Date Sampled	20-Dec-18
Date Tested	7-Jan-18
Technician	HS

Gravel %	9.1
Sand %	71.3
Fines %	19.5



Sieve Number	Sieve Opening (mm)	Percent Passing	Specification (Min-Max)
3/4"	19.0	100	-
5/8"	16.0	99	-
1/2"	12.5	98	-
3/8"	9.5	96	-
no. 4	4.75	91	-
no. 10	2.00	81	-
no. 20	0.850	66	-
no. 40	0.425	46	-
no. 80	0.180	25	-
no. 100	0.150	23	-
no. 200	0.075	20	-

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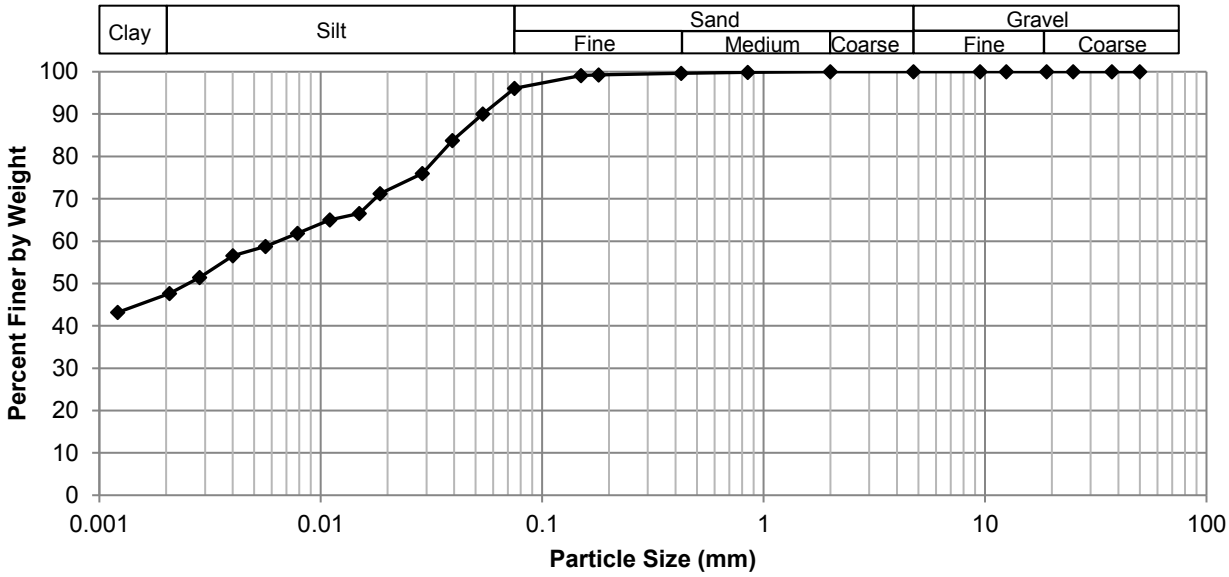
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0015-029-00
Client	City of Winnipeg
Project	2019 Local Street Renewal Program - Kairstine Lane
Test Hole	TH18-11
Sample #	G86
Depth (m)	0.8 - 0.9
Sample Date	20-Dec-18
Test Date	15-Jan-19
Technician	BMH

Gravel	0.0%
Sand	3.9%
Silt	49.1%
Clay	47.0%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	96.09
37.5	100.00	2.00	100.00	0.0540	90.01
25.0	100.00	0.850	99.89	0.0393	83.76
19.0	100.00	0.425	99.65	0.0288	75.94
12.5	100.00	0.180	99.23	0.0186	71.25
9.50	100.00	0.150	99.13	0.0150	66.56
4.75	100.00	0.075	96.09	0.0110	65.00
				0.0079	61.87
				0.0056	58.75
				0.0040	56.56
				0.0028	51.43
				0.0021	47.61
				0.0012	43.18

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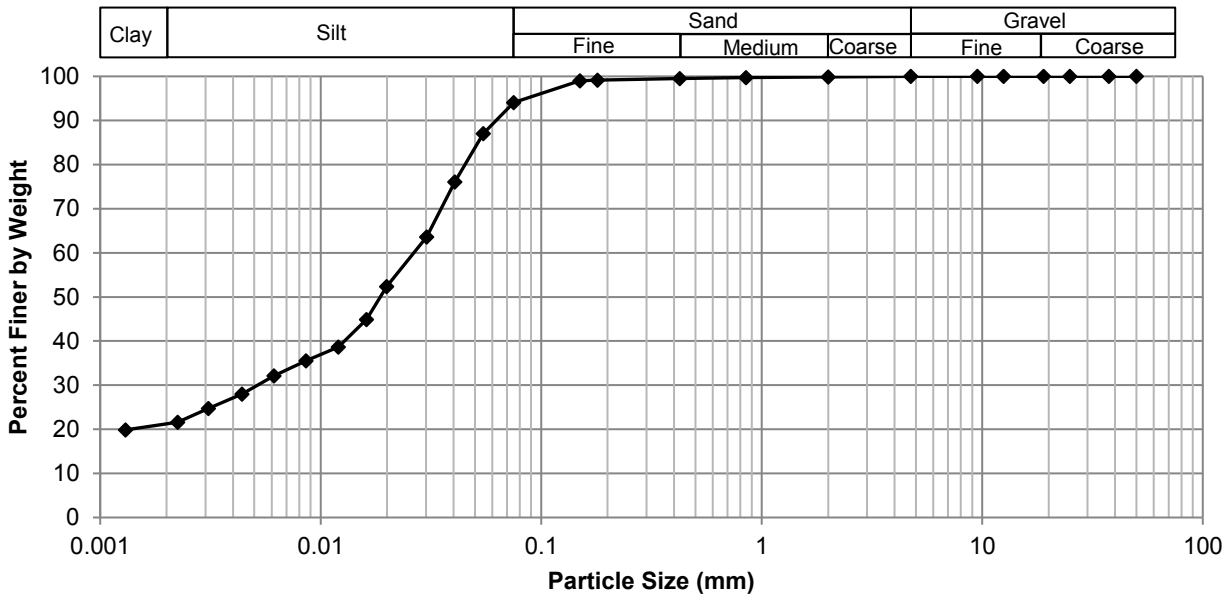
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0015-029-00
Client	City of Winnipeg
Project	2019 Local Street Renewal Program - Kairstine Lane
Test Hole	TH18-13
Sample #	G104
Depth (m)	0.8 - 0.9
Sample Date	20-Dec-18
Test Date	7-Jan-19
Technician	BMH

Gravel	0.0%
Sand	5.9%
Silt	72.9%
Clay	21.2%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	94.10
37.5	100.00	2.00	99.91	0.0546	87.02
25.0	100.00	0.850	99.72	0.0406	76.08
19.0	100.00	0.425	99.51	0.0302	63.59
12.5	100.00	0.180	99.12	0.0199	52.34
9.50	100.00	0.150	99.03	0.0161	44.90
4.75	100.00	0.075	94.10	0.0120	38.65
				0.0086	35.53
				0.0061	32.09
				0.0044	27.98
				0.0031	24.69
				0.0022	21.62
				0.0013	19.86

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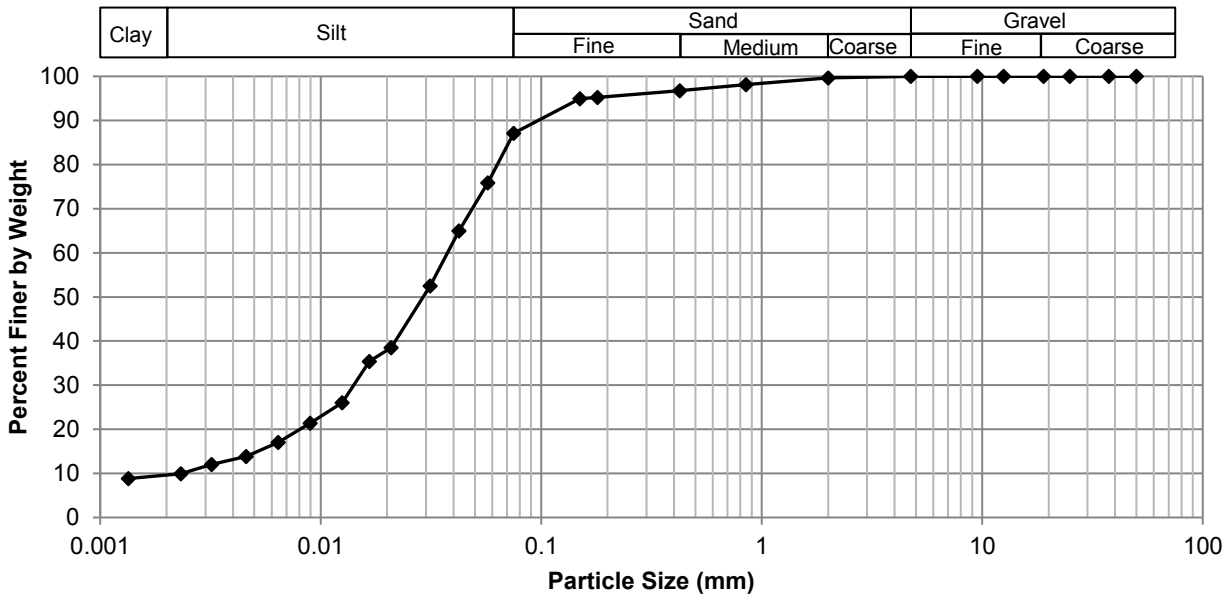
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0015-029-00
Client	City of Winnipeg
Project	2019 Local Street Renewal Program - Kairstine Lane
Test Hole	TH18-14
Sample #	G111
Depth (m)	0.5 - 0.6
Sample Date	20-Dec-18
Test Date	7-Jan-19
Technician	BMH

Gravel	0.0%
Sand	12.9%
Silt	77.4%
Clay	9.6%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	87.07
37.5	100.00	2.00	99.64	0.0573	75.88
25.0	100.00	0.850	98.15	0.0424	64.98
19.0	100.00	0.425	96.73	0.0314	52.52
12.5	100.00	0.180	95.25	0.0208	38.50
9.50	100.00	0.150	94.97	0.0166	35.38
4.75	100.00	0.075	87.07	0.0125	26.04
				0.0090	21.36
				0.0064	17.00
				0.0046	13.81
				0.0032	12.03
				0.0023	9.93
				0.0013	8.83

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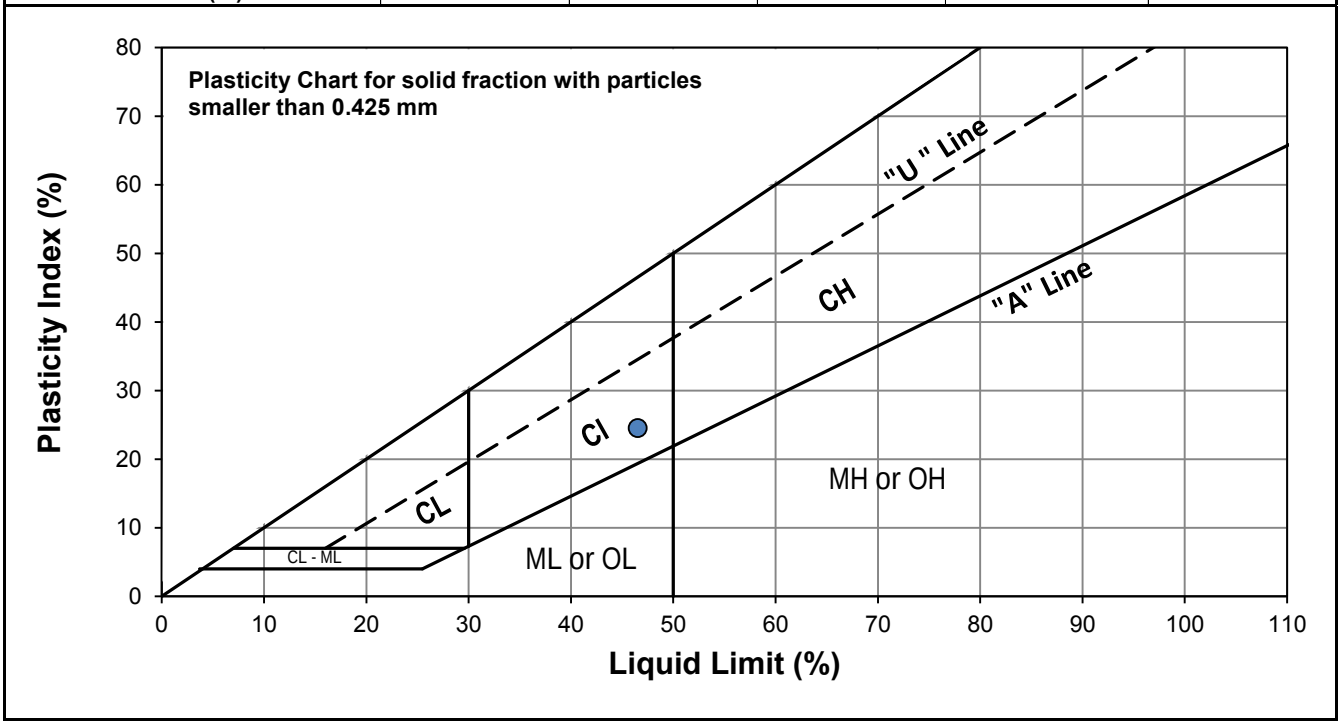
Atterberg Limits
ASTM D4318-10e1

Project No.	0015-029-00
Client	City Of Winnipeg
Project	2019 Local Street Renewal Program - Kairstine Lane
Test Hole	TH18-11
Sample #	G86
Depth (m)	0.8 - 0.9
Sample Date	19-Dec-18
Test Date	8-Jan-19
Technician	DS

Liquid Limit	47
Plastic Limit	22
Plasticity Index	25

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	22	33		
Mass Wet Soil + Tare (g)	24.282	23.022	23.806		
Mass Dry Soil + Tare (g)	21.013	20.208	20.820		
Mass Tare (g)	14.231	14.269	14.176		
Mass Water (g)	3.269	2.814	2.986		
Mass Dry Soil (g)	6.782	5.939	6.644		
Moisture Content (%)	48.201	47.382	44.943		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	20.464	20.574			
Mass Wet Soil + Tare (g)	19.327	19.380			
Mass Dry Soil + Tare (g)	14.245	13.857			
Mass Water (g)	1.137	1.194			
Mass Dry Soil (g)	5.082	5.523			
Moisture Content (%)	22.373	21.619			

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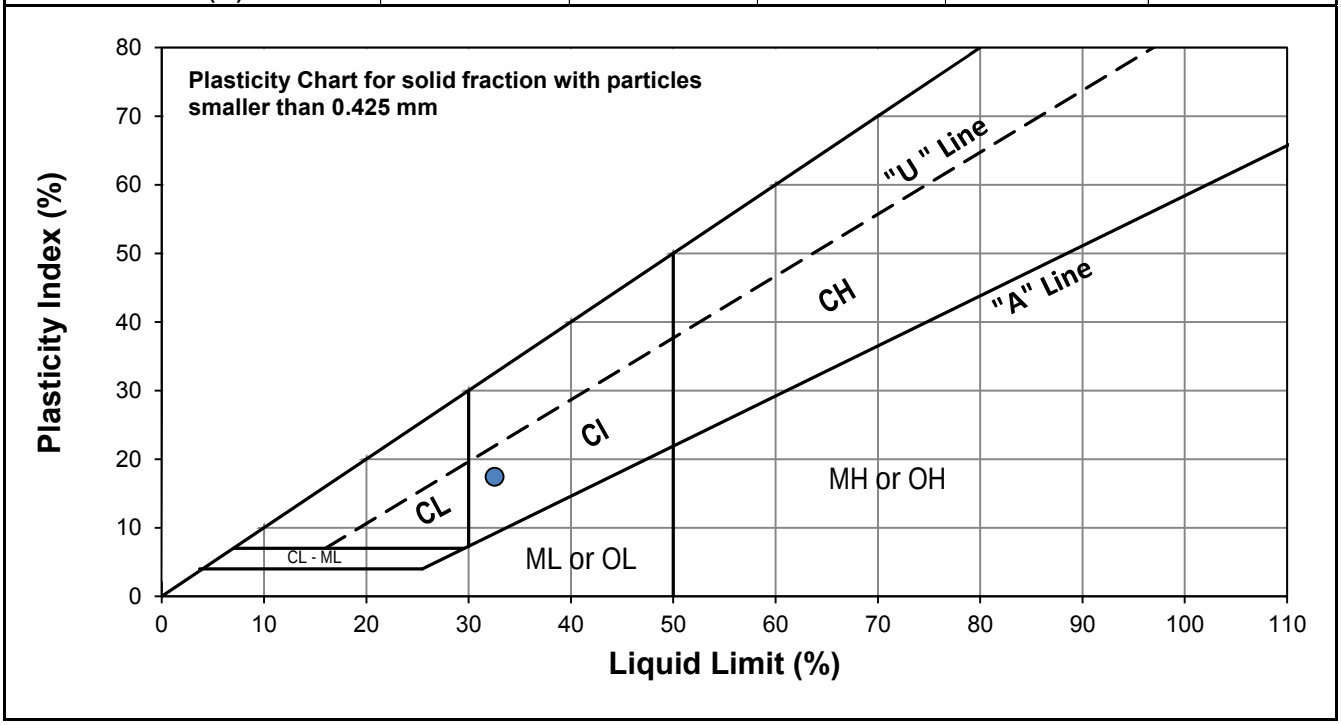
Atterberg Limits
ASTM D4318-10e1

Project No.	0015-029-00
Client	City Of Winnipeg
Project	2019 Local Street Renewal Program - Kairstine Lane
Test Hole	TH18-13
Sample #	G104
Depth (m)	0.8 - 0.9
Sample Date	20-Dec-18
Test Date	7-Jan-19
Technician	BMH

Liquid Limit	33
Plastic Limit	15
Plasticity Index	17

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	16	25	35		
Mass Wet Soil + Tare (g)	25.435	25.276	25.195		
Mass Dry Soil + Tare (g)	22.517	22.468	22.548		
Mass Tare (g)	14.123	13.752	14.062		
Mass Water (g)	2.918	2.808	2.647		
Mass Dry Soil (g)	8.394	8.716	8.486		
Moisture Content (%)	34.763	32.217	31.193		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	28.124	24.968			
Mass Wet Soil + Tare (g)	26.299	23.532			
Mass Dry Soil + Tare (g)	14.196	14.121			
Mass Water (g)	1.825	1.436			
Mass Dry Soil (g)	12.103	9.411			
Moisture Content (%)	15.079	15.259			

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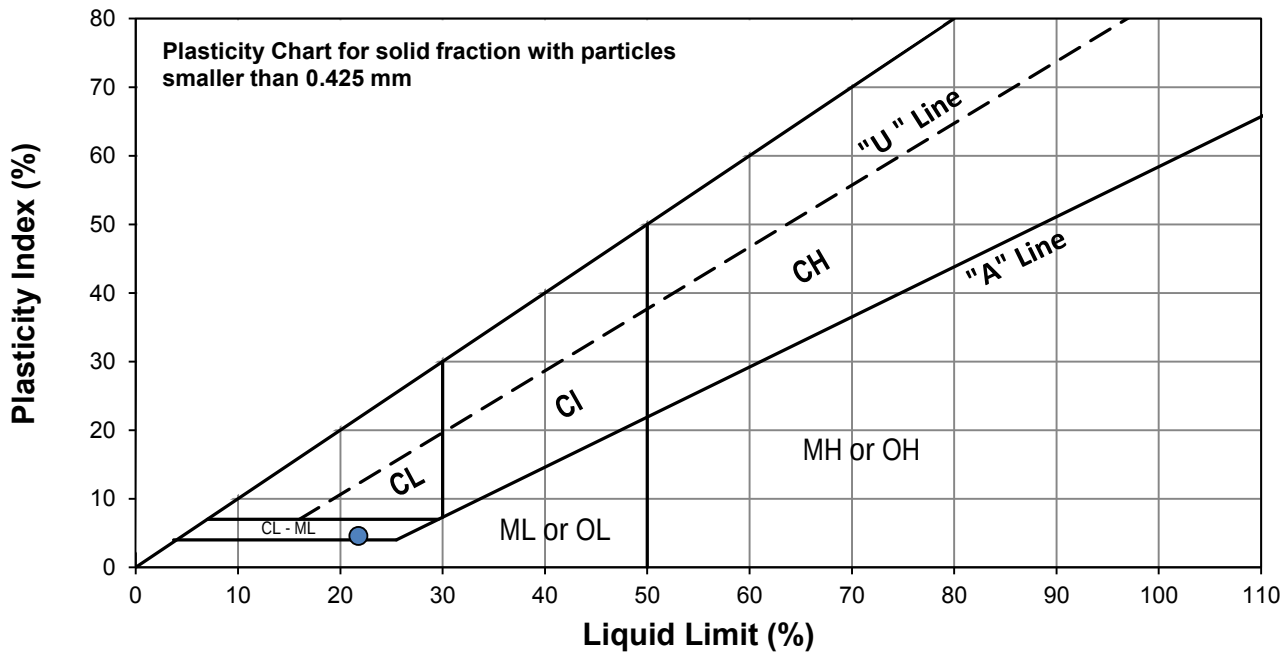
Atterberg Limits
ASTM D4318-10e1

Project No.	0015-029-00
Client	City Of Winnipeg
Project	2019 Local Street Renewal Program - Kairstine Lane
Test Hole	TH18-14
Sample #	G111
Depth (m)	0.5 - 0.6
Sample Date	20-Dec-18
Test Date	7-Jan-19
Technician	BMH

Liquid Limit	22
Plastic Limit	17
Plasticity Index	5

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	15	20	29		
Mass Wet Soil + Tare (g)	25.083	28.795	29.361		
Mass Dry Soil + Tare (g)	23.027	26.141	26.661		
Mass Tare (g)	13.995	14.192	14.093		
Mass Water (g)	2.056	2.654	2.700		
Mass Dry Soil (g)	9.032	11.949	12.568		
Moisture Content (%)	22.764	22.211	21.483		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	23.346	23.397			
Mass Wet Soil + Tare (g)	22.025	22.040			
Mass Dry Soil + Tare (g)	14.340	14.183			
Mass Water (g)	1.321	1.357			
Mass Dry Soil (g)	7.685	7.857			
Moisture Content (%)	17.189	17.271			

Photo 1: Pavement Core Sample at Test Hole TH18-11

Photo 2: Pavement Core Sample at Test Hole TH18-12

Photo 3: Pavement Core Sample at Test Hole TH18-13

Photo 4: Pavement Core Sample at Test Hole TH18-14

Photo 5: Pavement Core Sample at Test Hole TH18-15

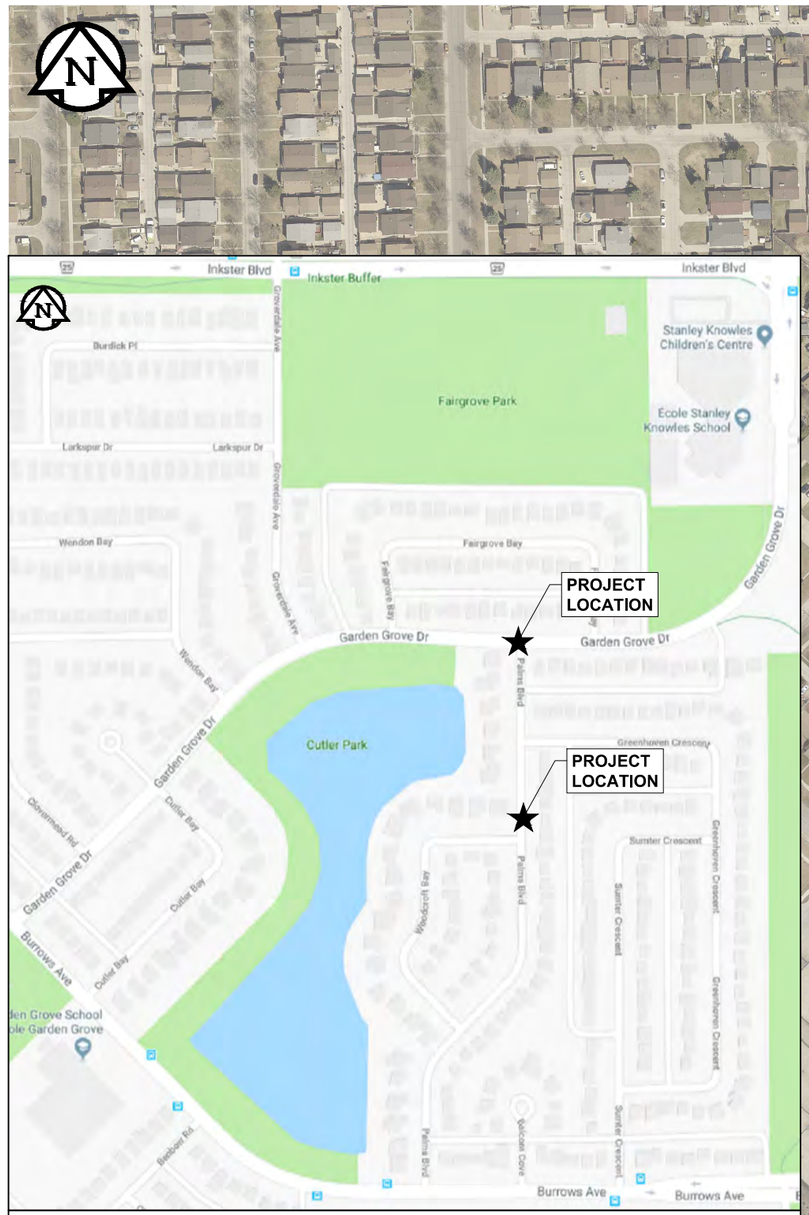
Appendix D

Palms Boulevard – Garden Grove Drive to Burrows Avenue

Test Hole Logs, Summary Table, Lab Data and Photographs of Pavement Core Samples

TREK GEOTECHNICAL

0015 029 00
City of Winnipeg
2019 Local Street Renewal Program - Garden Grove Drive and Palms Boulevard



KEY PLAN
SCALE : N.T.S.

0 25 50 75 100 m
SCALE = 1 : 2 000 (279 mm x 432 mm)

LEGEND: TEST HOLE (TREK, 2018)

NOTES:
1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 04
TEST HOLE LOCATION PLAN

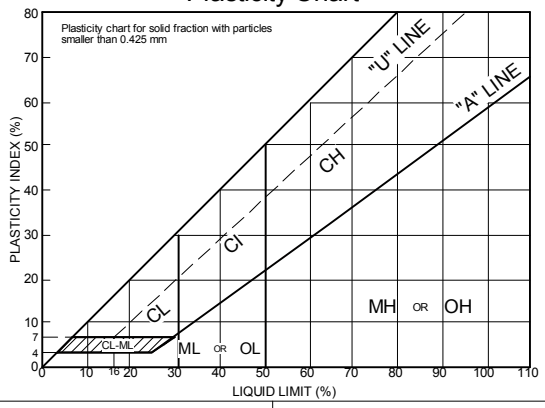
Z:\Projects\0015 City of Winnipeg\0015 029 00 2019 Local St Package\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder\Fig 1-11_2019-01-25-LOCAL ST RENEWAL_0_A_DW_0015-029-00.dwg, 1/25/2019 8:36:56 AM (11.00 x 17.00 Inches)

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

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



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

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

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

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

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

Sub-Surface Log

Test Hole TH18-16
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Palms Boulevard	**Location:**	UTM-14U, 5533377N, 628355E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 20, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT - 100 mm				
		SAND (FILL) - silty, trace gravel (<15 mm diam.), light brown, frozen, moist and compact when thawed, poorly graded, sub-angular to angular		G127	●	
				G128	●	
		CLAY - silty, trace sand, trace gravel (<10 mm diam.) - greyish brown - frozen to 0.6 m, moist and firm when thawed - high plasticity				
0.5		- no gravel below 0.5 m		G129	● PL MC LL	
				G130	●	△ ✤
1.0		SILT - clayey - light brown - moist, soft - low to intermediate plasticity		G131	●	
				G132	●	
1.5				G133	●	
2.0		CLAY - silty - grey - moist, firm - high plasticity		G134	●	✤ △
2.5				G135	●	✤ △
3.0		END OF TEST HOLE AT 3.1 m DEPTH IN CLAY				

1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located in Northbound lane, 1.0 m East of West curb at House #2.

Logged By: Bryan Hiebert **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES PALMS BLVD_0015-029-00_0_A_BMH - .GPJ TREK GEOTECHNICAL.GDT 1/25/19

Sub-Surface Log

Test Hole TH18-17
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Palms Boulevard	**Location:**	UTM-14U, 5533470N, 628369E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 20, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT - 80 mm thick		
		SAND (FILL) - silty, trace gravel (<20 mm diam.), greyish brown, frozen, moist and compact when thawed, poorly graded, sub-angular to angular		G136
		CLAY - silty, trace sand, trace gravel (<10 mm diam.) - mottled dark grey and brown - frozen to 0.6 m, moist and firm when thawed - high plasticity		G137
0.5		SILT - trace clay, trace sand - light brown - moist, soft - no to low plasticity		G138
1.0				G139
		- some clay, low to intermediate plasticity below 1.4 m		G140
1.5		CLAY - silty, silt inclusions (<10 mm diam.), trace gravel (<10 mm diam.) - brown - moist, firm - high plasticity		G141
2.0		- no silt inclusions, no gravel, dark grey, soft to firm below 2.0 m		G142
2.5				G143
3.0		END OF TEST HOLE AT 3.1 m DEPTH IN CLAY		

Bulk Unit Wt (kN/m^3): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa) — Test Type: △ Torvane △, ✤ Pocket Pen. ✤, ☒ Qu ☒, ○ Field Vane ○: 0 50 100 150 200 250

1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located on Centreline of road at House #27.

Logged By: Bryan Hiebert **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES PALMS BLVD_0015-029-00_0_A_BMH - .GPJ TREK GEOTECHNICAL.GDT 1/25/19

Sub-Surface Log

Test Hole TH18-18
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Palms Boulevard	**Location:**	UTM-14U, 5533628N, 628438E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 20, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT - 100 mm thick				
		SAND (FILL) - silty, trace gravel (<15 mm diam.), greyish brown, frozen, moist, compact, poorly graded, sub-angular to angular		G144		
		SILT - sandy, trace clay, trace gravel (<10 mm diam.) - light brown - frozen to 0.6 m, moist and soft when thawed - no to low plasticity		G145		
0.5		- no gravel below 0.5 m		G146		
		- low to intermediate plasticity below 0.8 m		G147		
1.0				G148		
				G149		
1.5		CLAY - silty - brown - moist, stiff - high plasticity		G150		
2.0		- firm below 2.0 m		G151		
2.5						
3.0				G152		

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located in Southbound lane, 1.0 m West of East curb at House #79.

Logged By: Bryan Hiebert **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES PALMS BLVD_0015-029-00_0_A_BMH - .GPJ TREK GEOTECHNICAL.GDT 1/25/19

Sub-Surface Log

Test Hole TH18-19
1 of 1

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Palms Boulevard	**Location:**	UTM-14U, 5533754N, 628430E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 20, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT - 95 mm thick				
		SAND (FILL) - silty, trace gravel (<15 mm diam.), light brown, frozen, moist, compact, poorly graded, sub-angular to angular		G153		
		CLAY - silty, some sand, trace gravel (<15 mm diam.), trace organics, mottled black and brown, frozen, moist, firm, intermediate plasticity		G154		
0.5		SILT - some clay, trace sand - light brown - frozen to 0.6 m, moist and soft when thawed - low plasticity		G155		
				G156		
1.0				G157		
		- some clay, low to intermediate plasticity below 1.4 m		G158		
1.5		CLAY - silty - dark grey - moist, stiff - high plasticity		G159		
2.0				G160		
2.5						
3.0				G161		

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located in Northbound lane, 1.0 m East of West curb at House #108.

Logged By: Bryan Hiebert **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES PALMS BLVD_0015-029-00_0_A_BMH - .GPJ TREK GEOTECHNICAL.GDT 1/25/19

Sub-Surface Log

Test Hole TH18-22

Client:	City of Winnipeg	**Project Number:**	0015-029-00
Project Name:	2019 Local Street Renewal Program - Palms Boulevard	**Location:**	UTM-14U, 5533538N, 628434E
Contractor:	Maple Leaf Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125 mm Solid Stem Geoprobe 782207 Track-Mount	**Date Drilled:**	December 20, 2018

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT - 100 mm thick				
		SAND (FILL) - silty, trace gravel (<20 mm diam.), dark brown, frozen, moist and compact when thawed, poorly graded		G175	●	
0.5		SILT AND CLAY - trace sand - brown - frozen to 0.8 m, moist and firm when thawed - high plasticity		G176	●	
				G177	●	△ ✤
1.0		SILT - trace to some clay - light brown - moist, very soft - low to intermediate plasticity		G178	●	✤
				G179	●	✤ △
1.5		- firm below 1.7 m		G180	●	✤
2.0		- very soft below 2.1 m				
				G181	●	△
2.5						
		CLAY - silty - dark grey - moist, firm - high plasticity		G182	●	△ ✤
3.0						

END OF TEST HOLE AT 3.1 m DEPTH IN CLAY
1) No seepage or sloughing observed.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cement grout.
3) Test hole located on Northbound Lane, 1.0 m West of East curb at House #51.

Logged By: Bryan Hiebert **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2019-01-02_LOCAL STREET PACKAGES PALMS BLVD_0015-029-00_0_A_BMH - .GPJ TREK GEOTECHNICAL.GDT 1/25/19

2019 Local Street Renewal Program
Sub-Surface Investigation
Palms Blvd.

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH18-16	UTM: 5533377 N, 628355 E Located in Northbound lane, 1.0 m East of West curb at House #2	Asphalt	100	Concrete	N/A											
						SAND (FILL)	0.1	0.2	7							
						CLAY	0.2	0.3	20							
						CLAY	0.5	0.6	33	0	2	33	65	22	69	47
						CLAY	0.8	0.9	31							
						SILT	1.1	1.2	22							
						SILT	1.4	1.5	22							
						SILT	1.7	1.8	21							
						CLAY	2.1	2.3	41							
						CLAY	2.7	2.9	42							
TH18-17	UTM: 553470 N, 628369 E Located on Centreline of road at House #27.	Asphalt	85	Concrete	N/A											
						SAND (FILL)	0.1	0.3	16							
						CLAY	0.5	0.6	27							
						SILT	0.8	0.9	17							
						SILT	1.1	1.2	16							
						SILT	1.4	1.5	23							
						CLAY	1.7	1.8	38							
						CLAY	2.1	2.3	51							
						CLAY	2.7	2.9	57							
TH18-18	UTM: 5533628 N, 628438 E Located in Southbound lane, 1.0 m West of East curb at House #79	Asphalt	100	Concrete	N/A							%Fines				
						SAND (FILL)	0.1	0.2	15	8	60	32				
						SILT	0.3	0.5	21							
						SILT	0.5	0.6	18							
						SILT	0.8	0.9	18							
						SILT	1.1	1.2	22							
						SILT	1.4	1.5	21							
						CLAY	1.7	1.8	30							
						CLAY	2.0	2.1	44							
						CLAY	2.9	3.0	56							
TH18-19	UTM: 5533754 N, 628430 E Located in Northbound lane, 1.0 m East of West curb at House #108	Asphalt	95	Concrete	N/A											
						SAND (FILL)	0.1	0.2	18							
						CLAY	0.2	0.3	31							
						SILT	0.5	0.6	23							
						SILT	0.8	0.9	17	0	4	80	16	17	27	10
						SILT	1.1	1.2	18							
						SILT	1.4	1.5	29							
						CLAY	1.7	1.8	31							
						CLAY	2.1	2.3	48							
						CLAY	2.9	3.0	56							

2019 Local Street Renewal Program
Sub-Surface Investigation
Palms Blvd.

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH18-22	UTM: 5533538 N, 628434 E Located on Northbound Lane, 1.0 m West of East curb at House #51	Asphalt	100	Concrete	N/A											
						SAND (FILL)	0.1	0.3	12							
						SILT AND CLAY	0.5	0.6	28							
						SILT AND CLAY	0.8	0.9	28	0	4	37	59	21	72	52
						SILT	1.1	1.2	20							
						SILT	1.4	1.5	24							
						SILT	1.7	1.8	22							
						SILT	2.3	2.4	23							
						CLAY	2.9	3.0	38							

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Moisture Content Report
ASTM D2216-10

Project No. 0015-029-00
Client City of Winnipeg
Project 2019 Local Street Renewal Program - Palms Blvd.

Sample Date 20-Dec-18
Test Date 03-Jan-19
Technician DS

Test Hole	TH18-16	TH18-16	TH18-16	TH18-16	TH18-16	TH18-16
Depth (m)	0.1 - 0.2	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G127	G128	G129	G130	G131	G132
Tare ID	A1	F127	AB26	W07	E100	D28
Mass of tare	8.2	8.3	6.7	8.6	8.6	8.5
Mass wet + tare	240.0	222.0	404.6	202.1	211.5	386.1
Mass dry + tare	225.7	186.6	307.0	156.6	174.6	319.3
Mass water	14.3	35.4	97.6	45.5	36.9	66.8
Mass dry soil	217.5	178.3	300.3	148.0	166.0	310.8
Moisture %	6.6%	19.9%	32.5%	30.7%	22.2%	21.5%

Test Hole	TH18-16	TH18-16	TH18-16	TH18-17	TH18-17	TH18-17
Depth (m)	1.7 - 1.8	2.1 - 2.3	2.7 - 2.9	0.1 - 0.3	0.5 - 0.6	0.8 - 0.9
Sample #	G133	G134	G135	G136	G137	G138
Tare ID	AB08	AB28	AC08	P06	Z41	E106
Mass of tare	6.8	6.8	6.8	8.5	8.6	8.5
Mass wet + tare	306.4	340.6	267.7	231.2	244.8	272.1
Mass dry + tare	255.2	243.2	191.1	200.8	195.0	233.0
Mass water	51.2	97.4	76.6	30.4	49.8	39.1
Mass dry soil	248.4	236.4	184.3	192.3	186.4	224.5
Moisture %	20.6%	41.2%	41.6%	15.8%	26.7%	17.4%

Test Hole	TH18-17	TH18-17	TH18-17	TH18-17	TH18-17	TH18-18
Depth (m)	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.1 - 2.3	2.7 - 2.9	0.1 - 0.2
Sample #	G139	G140	G141	G142	G143	G144
Tare ID	AA13	N04	Z98	Z01	H25	E119
Mass of tare	6.7	8.7	8.5	8.5	8.4	8.5
Mass wet + tare	324.6	262.2	277.6	273.6	207.3	343.8
Mass dry + tare	281.5	214.2	203.3	183.6	134.9	299.9
Mass water	43.1	48.0	74.3	90.0	72.4	43.9
Mass dry soil	274.8	205.5	194.8	175.1	126.5	291.4
Moisture %	15.7%	23.4%	38.1%	51.4%	57.2%	15.1%

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Moisture Content Report
ASTM D2216-10

Project No. 0015-029-00
Client City of Winnipeg
Project 2019 Local Street Renewal Program - Palms Blvd.

Sample Date 20-Dec-18
Test Date 03-Jan-19
Technician DS

Test Hole	TH18-18	TH18-18	TH18-18	TH18-18	TH18-18	TH18-18
Depth (m)	0.3 - 0.5	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G145	G146	G147	G148	G149	G150
Tare ID	P11	D47	W45	AB53	A25	Z58
Mass of tare	8.4	8.7	8.4	6.8	8.6	8.7
Mass wet + tare	234.3	178.4	227.4	170.7	301.4	230.3
Mass dry + tare	194.6	152.1	194.2	141.7	250.3	179.8
Mass water	39.7	26.3	33.2	29.0	51.1	50.5
Mass dry soil	186.2	143.4	185.8	134.9	241.7	171.1
Moisture %	21.3%	18.3%	17.9%	21.5%	21.1%	29.5%

Test Hole	TH18-18	TH18-18	TH18-19	TH18-19	TH18-19	TH18-19
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.1 - 0.2	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9
Sample #	G151	G152	G153	G154	G155	G156
Tare ID	Z15	W48	Z123	C11	Z47	Z136
Mass of tare	8.5	8.4	8.4	8.3	8.5	8.5
Mass wet + tare	259.7	181.5	171.9	174.0	220.6	421.0
Mass dry + tare	183.6	119.7	147.5	135.2	181.5	360.7
Mass water	76.1	61.8	24.4	38.8	39.1	60.3
Mass dry soil	175.1	111.3	139.1	126.9	173.0	352.2
Moisture %	43.5%	55.5%	17.5%	30.6%	22.6%	17.1%

Test Hole	TH18-19	TH18-19	TH18-19	TH18-19	TH18-19	TH18-22
Depth (m)	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.1 - 2.3	2.9 - 3.0	0.1 - 0.3
Sample #	G157	G158	G159	G160	G161	G175
Tare ID	F93	W50	D38	D43	E46	F117
Mass of tare	8.3	8.4	8.5	8.6	8.6	5.0
Mass wet + tare	213.4	188.1	225.0	205.1	166.7	146.3
Mass dry + tare	182.4	147.8	174.4	141.8	110.3	131.3
Mass water	31.0	40.3	50.6	63.3	56.4	15.0
Mass dry soil	174.1	139.4	165.9	133.2	101.7	126.3
Moisture %	17.8%	28.9%	30.5%	47.5%	55.5%	11.9%

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Moisture Content Report
ASTM D2216-10

Project No. 0015-029-00
Client City of Winnipeg
Project 2019 Local Street Renewal Program - Palms Blvd.

Sample Date 20-Dec-18
Test Date 03-Jan-19
Technician DS

Test Hole	TH18-22	TH18-22	TH18-22	TH18-22	TH18-22	TH18-22
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.3 - 2.4
Sample #	G176	G177	G178	G179	G180	G181
Tare ID	E24	Z68	P34	W47	F129	D2
Mass of tare	8.7	8.5	8.6	8.6	8.6	8.5
Mass wet + tare	129.3	409.6	136.5	278.2	204.0	283.6
Mass dry + tare	103.2	322.0	115.2	226.5	168.6	231.9
Mass water	26.1	87.6	21.3	51.7	35.4	51.7
Mass dry soil	94.5	313.5	106.6	217.9	160.0	223.4
Moisture %	27.6%	27.9%	20.0%	23.7%	22.1%	23.1%

Test Hole	TH18-22					
Depth (m)	2.9 - 0.3					
Sample #	G182					
Tare ID	F5					
Mass of tare	8.6					
Mass wet + tare	129.4					
Mass dry + tare	96.4					
Mass water	33.0					
Mass dry soil	87.8					
Moisture %	37.6%					

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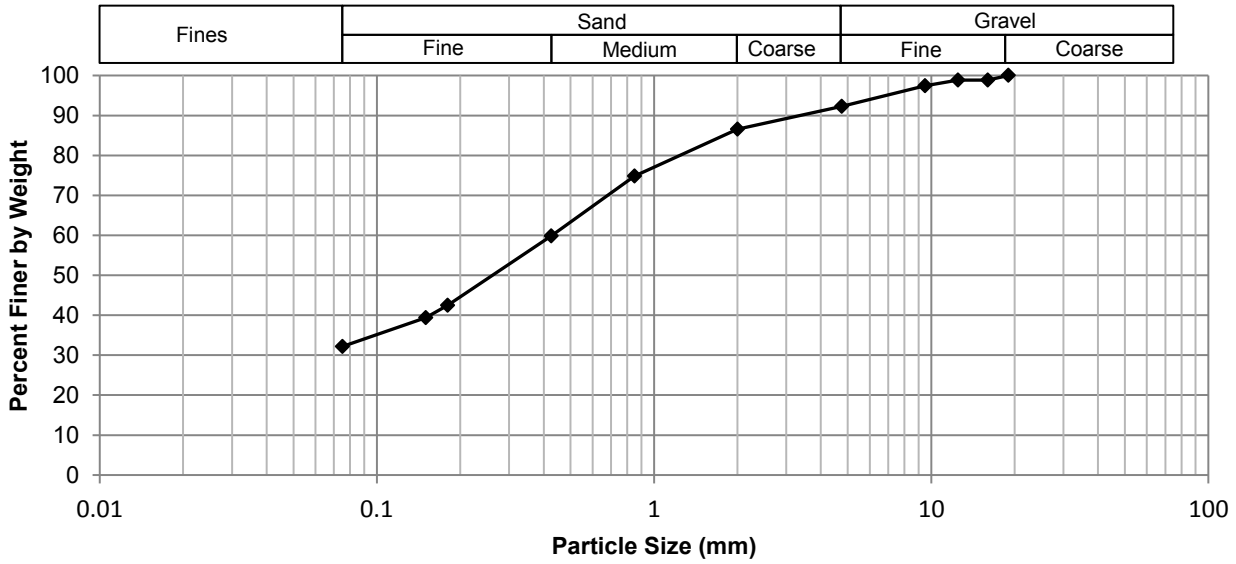
Grain Size Analysis (Sieve Method)
ASTM C136-14

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	0015-029-00
Client	City of Winnipeg
Project	Local Street Packages - Palms Blvd.
Test Hole	TH18-18
Sample #	G144
Depth	0.1 m - 0.2 m
Date Sampled	20-Dec-18
Date Tested	7-Jan-18
Technician	HS

Gravel %	7.7
Sand %	60.1
Fines %	32.2

Particle Size Distribution Curve



Sieve Number	Sieve Opening (mm)	Percent Passing	Specification (Min-Max)
3/4"	19.0	100	-
5/8"	16.0	99	-
1/2"	12.5	99	-
3/8"	9.5	97	-
no. 4	4.75	92	-
no. 10	2.00	87	-
no. 20	0.850	75	-
no. 40	0.425	60	-
no. 80	0.180	42	-
no. 100	0.150	39	-
no. 200	0.075	32	-

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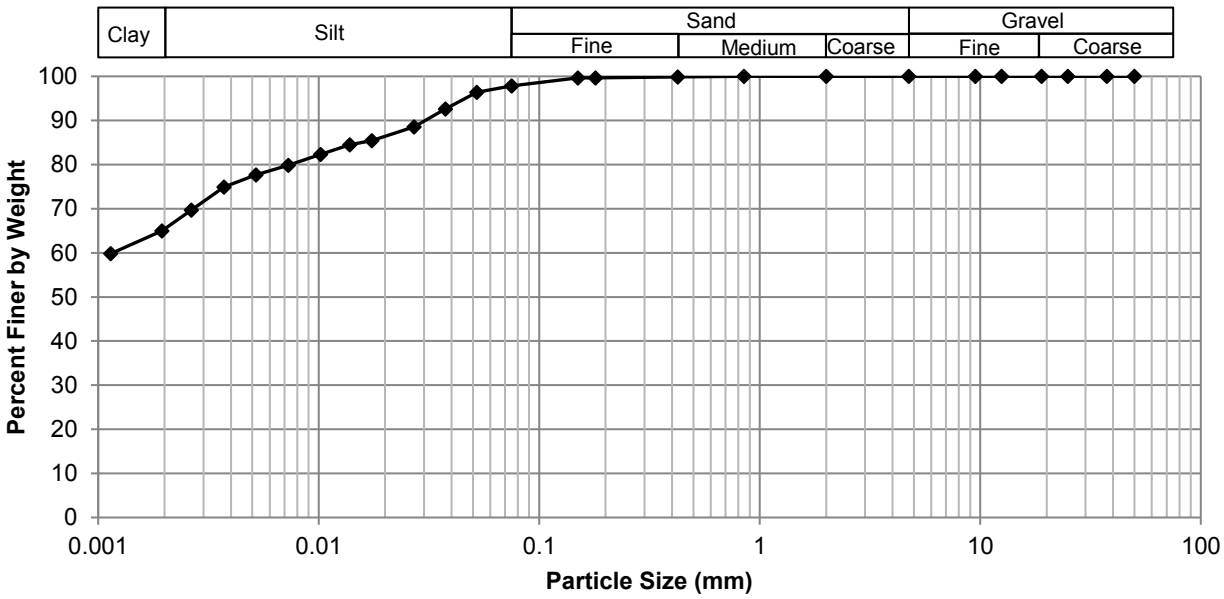
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0015-029-00
Client	City of Winnipeg
Project	2019 Local Street Renewal Package - Palms Blvd.
Test Hole	TH18-16
Sample #	G129
Depth (m)	0.5 - 0.6
Sample Date	20-Dec-18
Test Date	7-Jan-19
Technician	BMH

Gravel	0.0%
Sand	2.2%
Silt	32.5%
Clay	65.3%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	97.83
37.5	100.00	2.00	100.00	0.0522	96.40
25.0	100.00	0.850	100.00	0.0376	92.65
19.0	100.00	0.425	99.87	0.0271	88.58
12.5	100.00	0.180	99.66	0.0174	85.45
9.50	100.00	0.150	99.66	0.0138	84.52
4.75	100.00	0.075	97.83	0.0102	82.33
				0.0073	79.83
				0.0052	77.70
				0.0037	74.89
				0.0026	69.69
				0.0019	65.00
				0.0011	59.82

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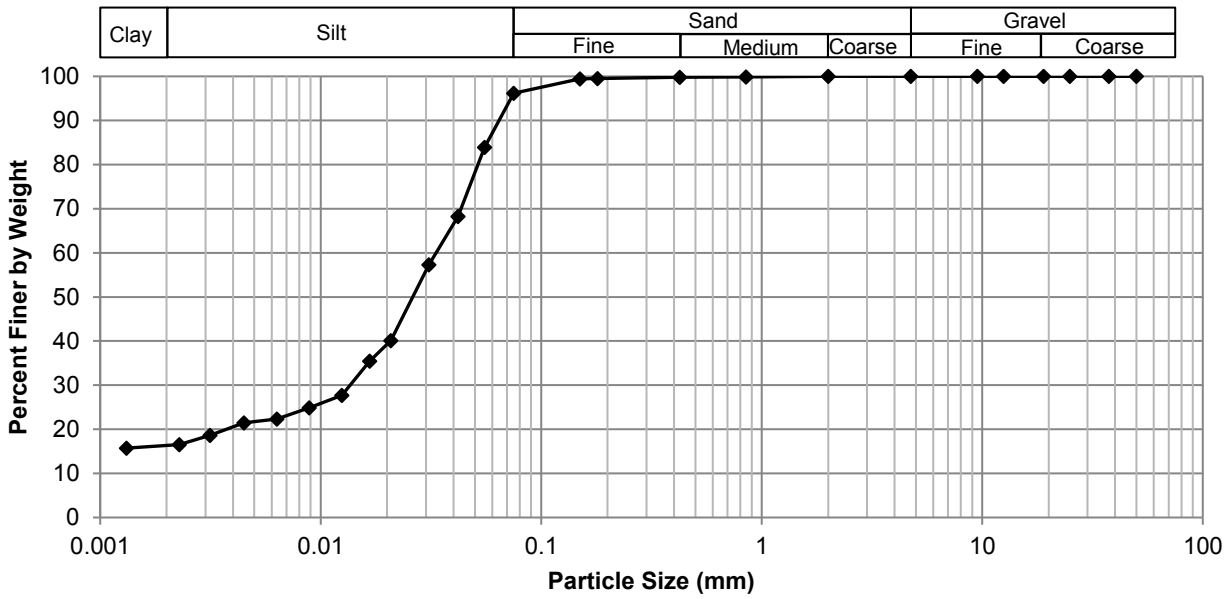
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0015-029-00
Client	City of Winnipeg
Project	2019 Local Street Renewal Package - Palms Blvd.
Test Hole	TH18-19
Sample #	G156
Depth (m)	0.8 - 0.9
Sample Date	20-Dec-18
Test Date	7-Jan-19
Technician	BMH

Gravel	0.0%
Sand	3.8%
Silt	79.9%
Clay	16.3%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	96.19
37.5	100.00	2.00	100.00	0.0554	83.89
25.0	100.00	0.850	99.91	0.0419	68.26
19.0	100.00	0.425	99.79	0.0309	57.31
12.5	100.00	0.180	99.53	0.0208	40.12
9.50	100.00	0.150	99.44	0.0167	35.43
4.75	100.00	0.075	96.19	0.0125	27.68
				0.0089	24.86
				0.0063	22.36
				0.0045	21.42
				0.0031	18.66
				0.0023	16.54
				0.0013	15.73

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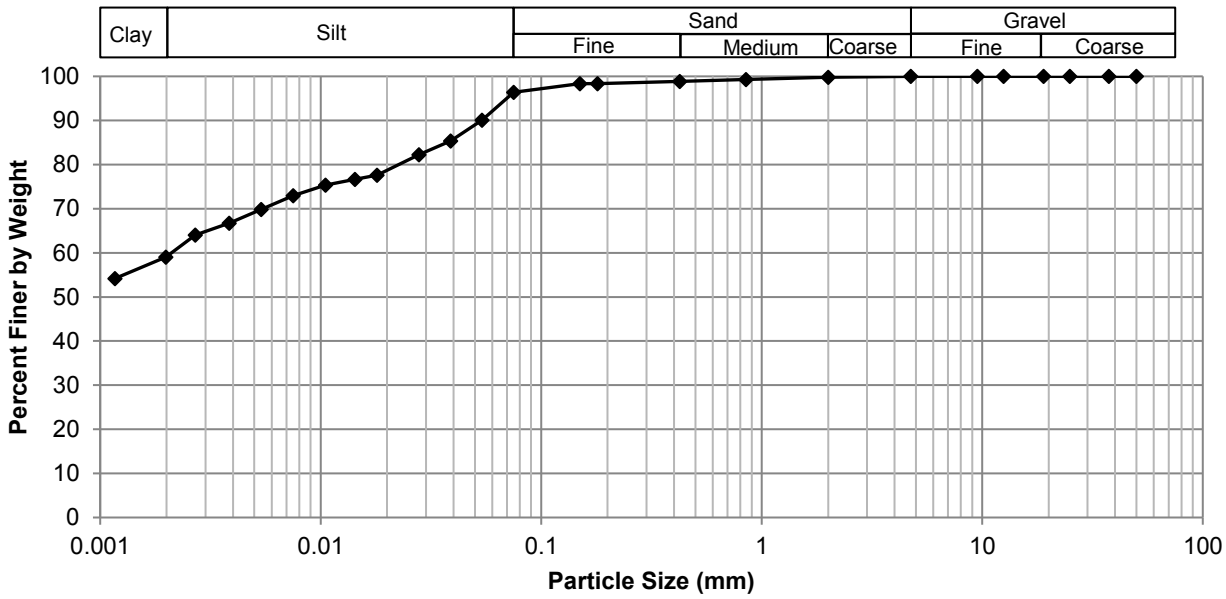
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0015-029-00
Client	City of Winnipeg
Project	2019 Local Street Renewal Package - Palms Blvd.
Test Hole	TH18-22
Sample #	G177
Depth (m)	0.8 - 0.9
Sample Date	20-Dec-18
Test Date	7-Jan-19
Technician	BMH

Gravel	0.0%
Sand	3.6%
Silt	37.1%
Clay	59.3%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	96.41
37.5	100.00	2.00	99.81	0.0538	90.05
25.0	100.00	0.850	99.32	0.0389	85.37
19.0	100.00	0.425	98.83	0.0279	82.25
12.5	100.00	0.180	98.35	0.0180	77.57
9.50	100.00	0.150	98.35	0.0143	76.63
4.75	100.00	0.075	96.41	0.0105	75.39
				0.0075	72.94
				0.0054	69.82
				0.0038	66.70
				0.0027	64.04
				0.0020	59.05
				0.0012	54.17

Photo 1: Pavement Core Sample at Test Hole TH18-16

Photo 2: Pavement Core Sample at Test Hole TH18-17

Photo 3: Pavement Core Sample at Test Hole TH18-22

Photo 4: Pavement Core Sample at Test Hole TH18-18

Photo 5: Pavement Core Sample at Test Hole TH18-19

APPENDIX 'B'

MANITOBA HYDRO ELECTRICAL STANDARDS (2019 STREETLIGHT INSTALLATIONS)

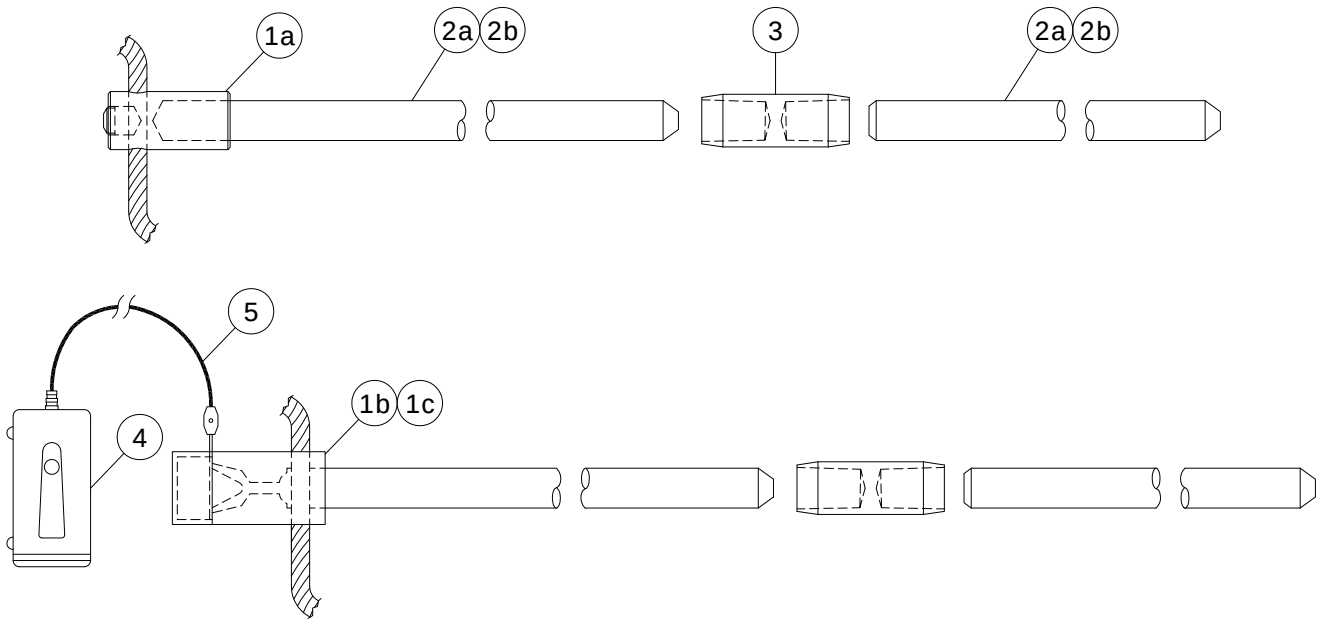
Appendix A

Electrical Standards
(2019 Streetlight Installations)

Refer to electronic copy issued under separate cover

Electric Standards for Streetlight Installations Table of Contents

Updated: February 11, 2019



COPPERWELD - SECTIONAL

ITEM No.	DESCRIPTION	MH CIIC
1a	HAMMERLOCK FOR #2 & #4 CU	04 60 24
1b 1c	ONE SHOT PLUS FOR 2/0 ONE SHOT PLUS FOR 4/0	03 59 15 03 77 06
2a 2b	10' CU-WELD ROD SECTIONAL (SEE NOTE 2) 6' CU-WELD ROD SECTIONAL	71 70 10 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:

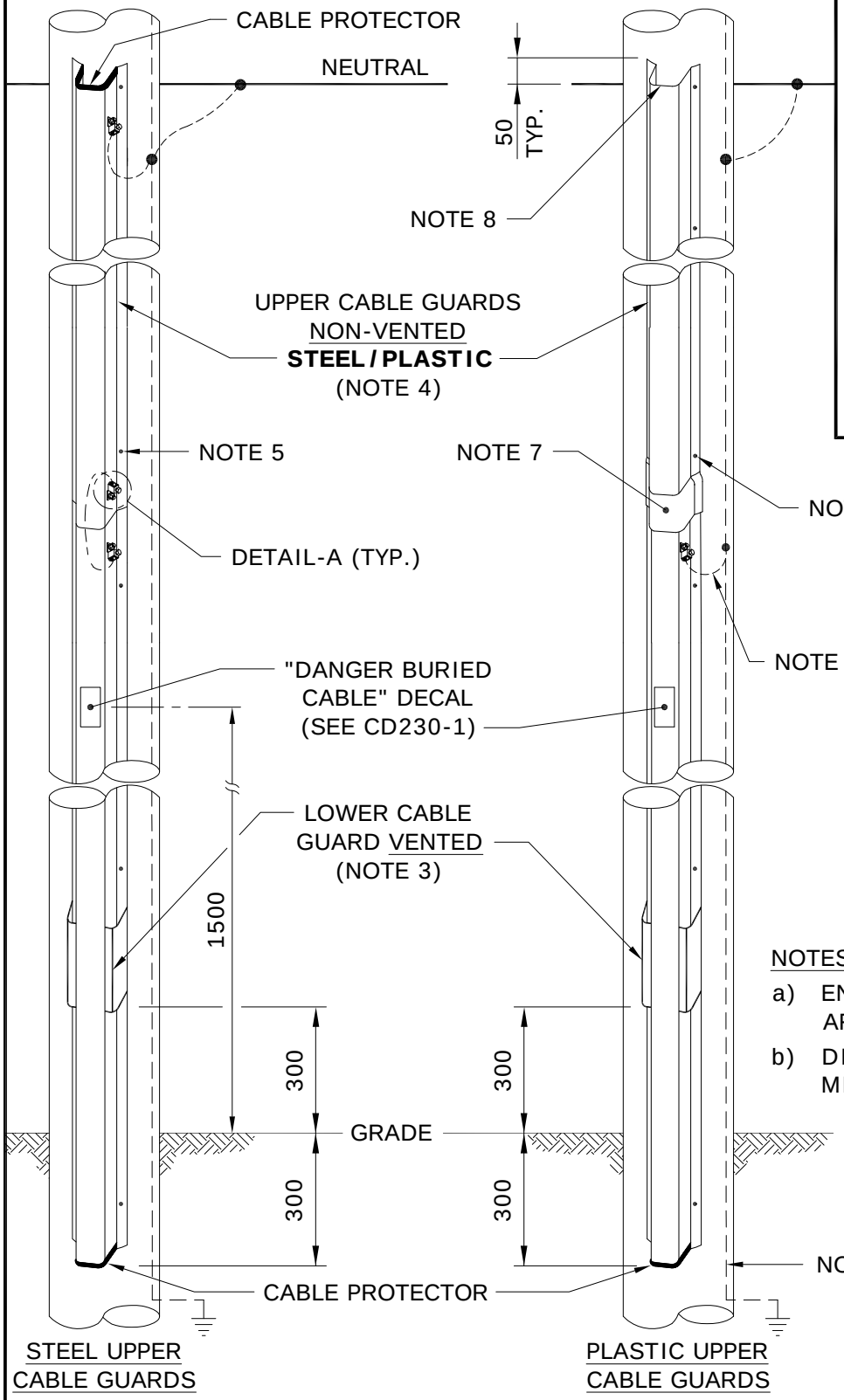
1. FOR 3/4" GROUND RODS. IF A 5/8" GROUND ROD IS ENCOUNTERED, IT IS TO BE REPLACED WITH A 3/4" ROD.

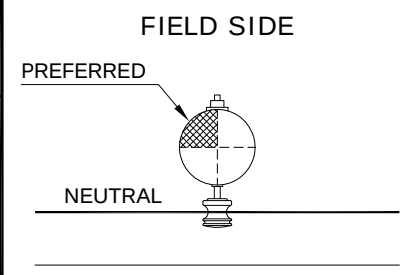
2. FIRST GROUND ROD SHALL BE A 10' ROD.

APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY E.H. WIEBE 99-01-04	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	

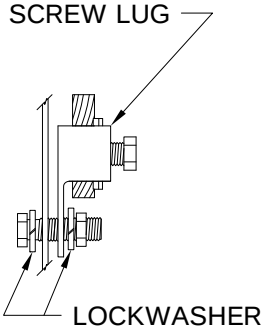
DRAWN	CHECKED	DATE		SHT	REV
R.L.B./CAD	D.F./D.O.	98-08	**CD 50-7**	0001 OF 1	03

1-04430-DA-56800-0003





CABLE GUARD LOCATION
(NOTE 2)



DETAIL-A

NOTES:

a) ENSURE POLE TAG IS VISIBLE AFTER GUARD INSTALLATION.

b) DIMENSIONS SHOWN ARE MILLIMETRES.

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 0001 OF 2	REV 04

1-04431-DA-52090-0034

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

1-04431-DA-52090-0034

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.

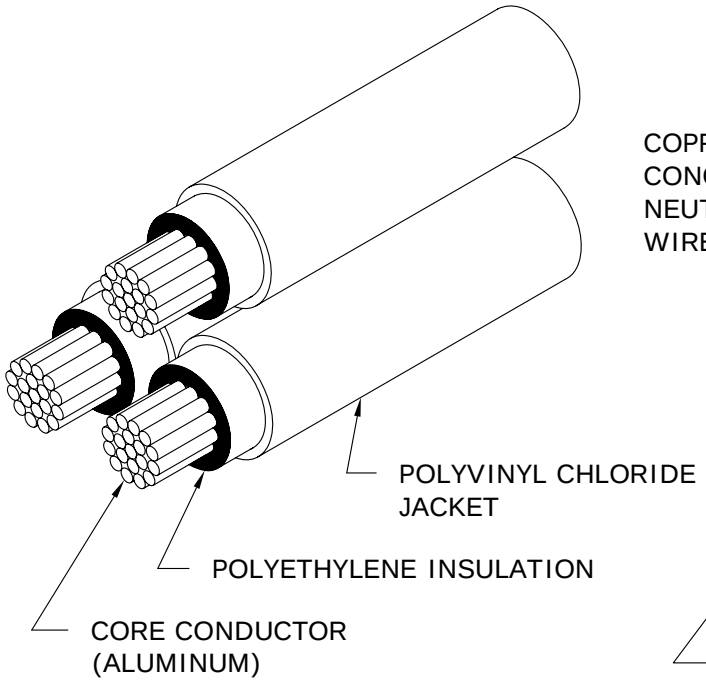
SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 88-03-29

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	

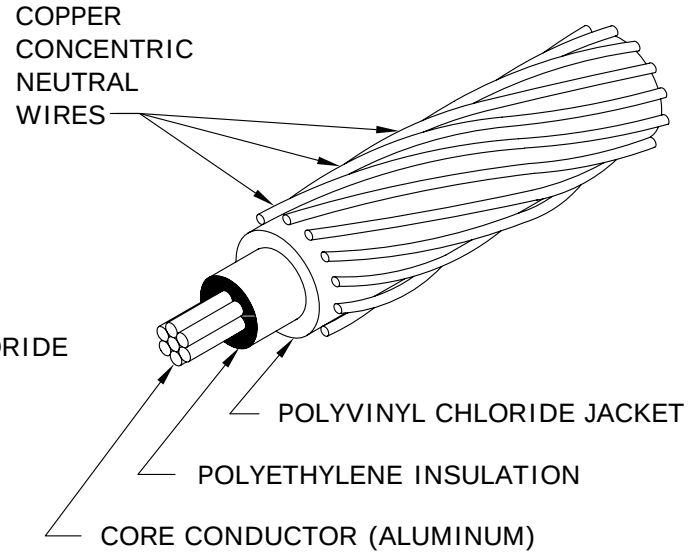
DRAWN	CHECKED	DATE		SHT	REV
C.A.	K.S.	17-01	**CD 210-12**	0001 OF 2	11

1-04431-DA-58041-0008

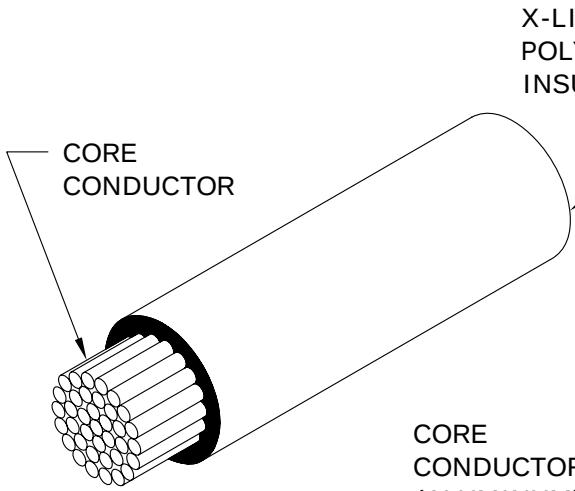
BASIC CONSTRUCTION OF UNDERGROUND SECONDARY CABLES



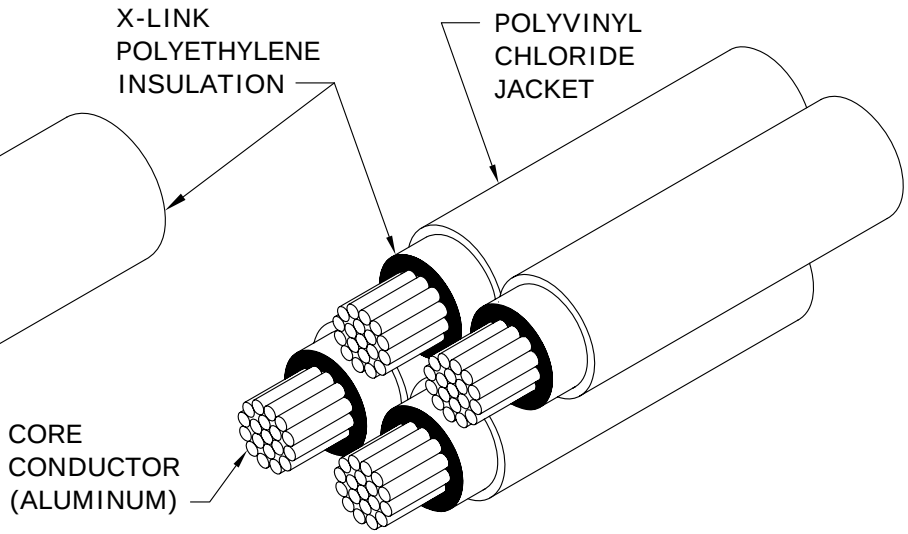
1/0 & 4/0 AND 350 TRIPLEX



 # 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	CHECKED	DATE		SHT	REV
W.B./CAD	B.H.	93-07	**CD 210-12**	0002 OF 2	02

1-04431-DA-58041-0008

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
NOMIMAL 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		
17-01	5	REVISED TABLE
16-03	4	ADDED 1000 kcmil ALUM. COND., REVISED DATE, RESEALED
08-12	3	ADDED COLD & HEAT SHRINK CAPS AND LINEAL MASS TO TABLE

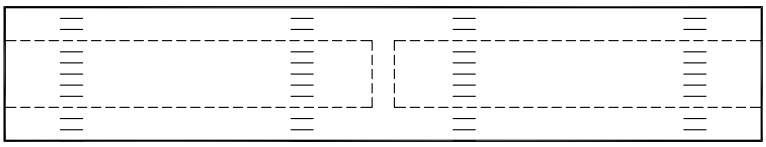
MANITOBA HYDRO DISTRIBUTION STANDARDS

STANDARD UNDERGROUND

SECONDARY CABLE DATA

DRAWN	CHECKED	DATE		SHT	REV
C.A.	J.R.	16-03	**CD 210-15**	0001 OF 1	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.

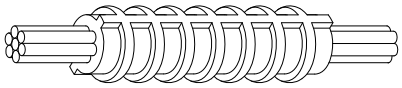
** ROTATE MD6 TOOL 180° AFTER EVERY CRIMP.

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	

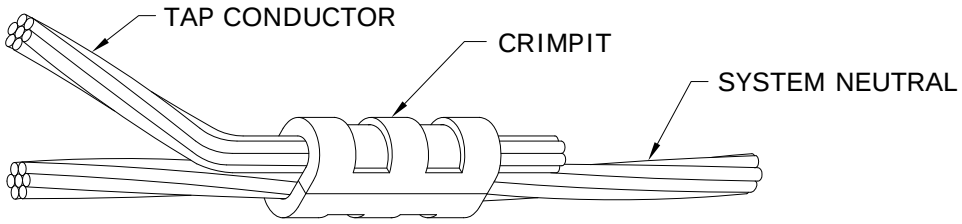
DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	G.W.	93-07	**CD 210-21**	0001 OF 1	02

1-04431-DA-58043-0006

- 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	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03	10-12	2	ADDED CONNECTOR	**UNDERGROUND NEUTRAL COMPRESSION CONNECTORS**
	95-01	1	NOTES REARRANGED	
	93-07	0	CONNECTORS ADDED, FORMERLY CD210-8	

DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	K.C.H.	93-07	**CD 210-24**	0001 OF 1	02

1-04431-DA-58043-0007

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	CHECKED	DATE		SHT	REV
C.A.	K.S.	17-10	**CD 215-12**	0001 OF 3	03

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		
17-08	4	REVISED TABLE, RESEALED
15-02	3	REMOVED RAYVOLVE SPLICE FROM TABLE
08-03	2	REVISED TABLE AND NOTE 6

MANITOBA HYDRO DISTRIBUTION STANDARDS

SPLICES FOR UNDERGROUND SECONDARY CABLES

DRAWN	CHECKED	DATE		SHT	REV
C.A.	K.S.	17-08	**CD 215-12**	0002 OF 3	04

1-04431-DA-58043-0017

FOR TAPED SPLICE

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

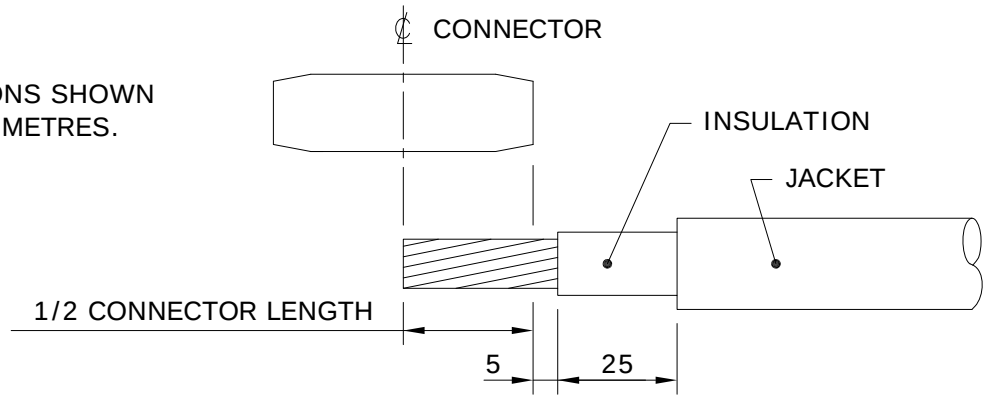


FIGURE 1

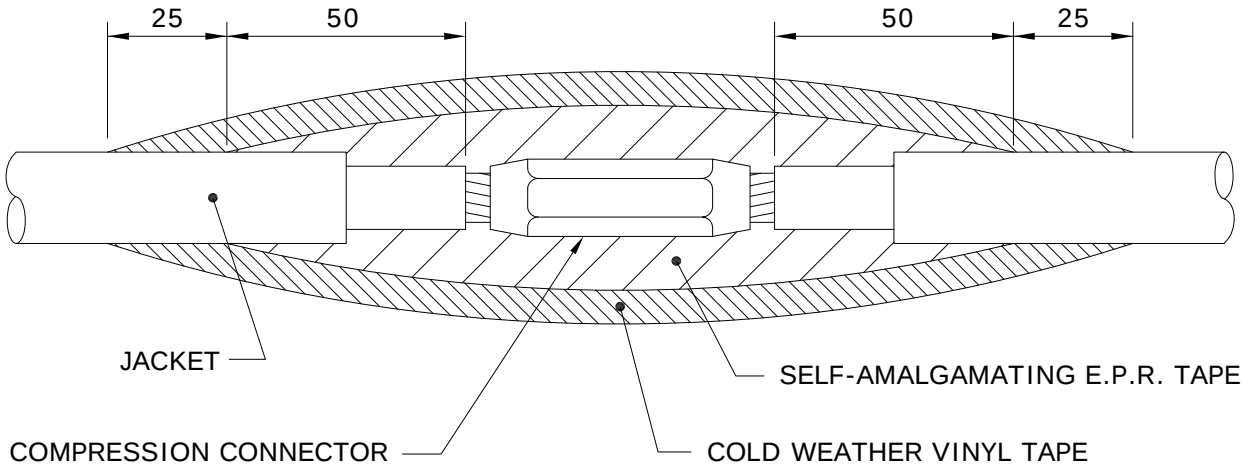


FIGURE 2

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	REV 02

1-04431-DA-58043-0017

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

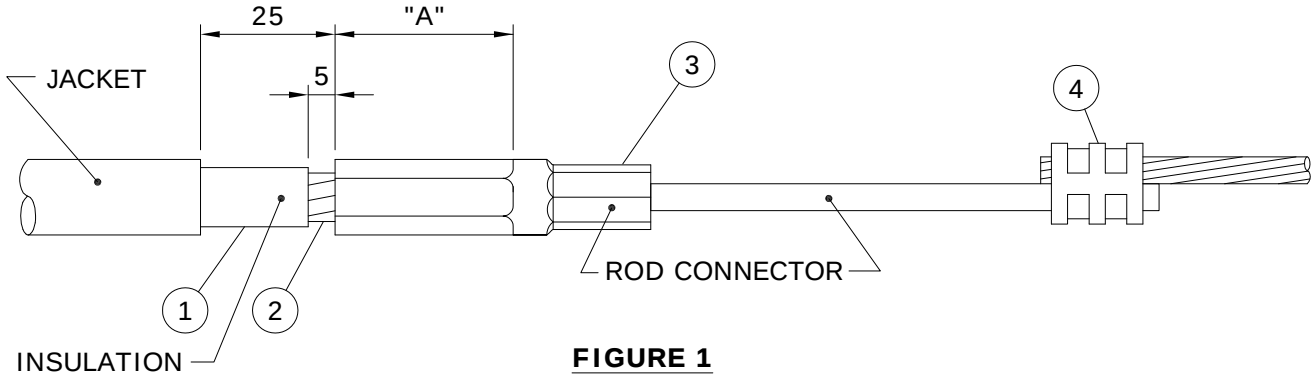


FIGURE 1

NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03	08-11	2	REVISED TABLE AND COMPRESSION CONNECTOR	**SPLICING SECONDARY NEUTRAL (BARE COPPER TO INSULATED ALUMINUM)**
	94-10	1	ROD CONNECTOR ADDED	

DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	B.H./K.C.H.	94-06	**CD 215-13**	0001 OF 2	02

1-04431-DA-58043-0018

TAPING:

(5) ABRADE 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.

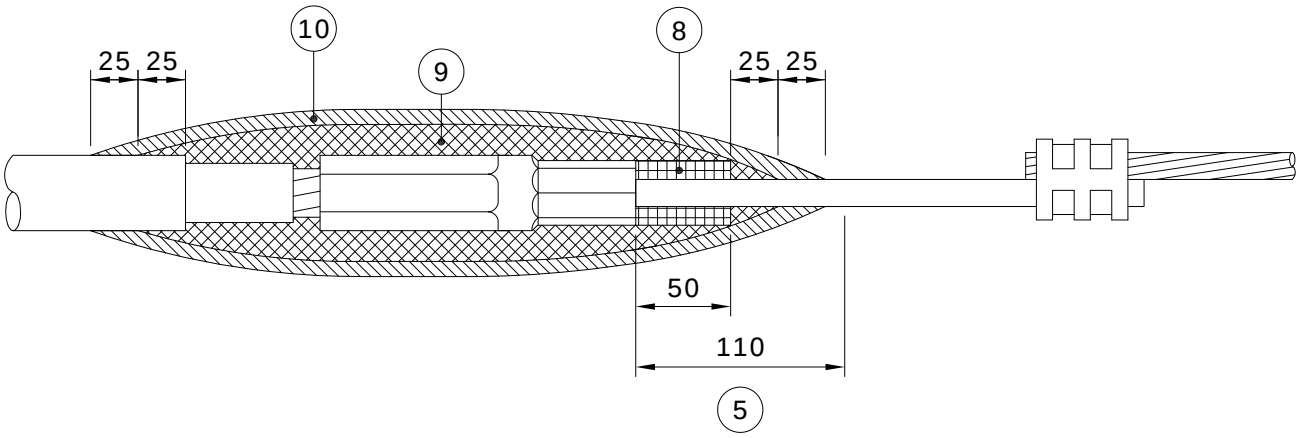
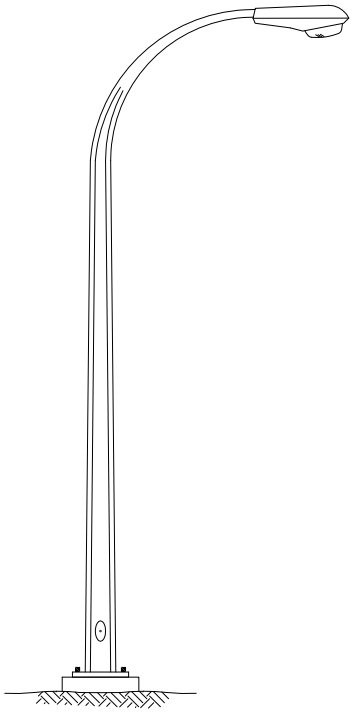


FIGURE 2

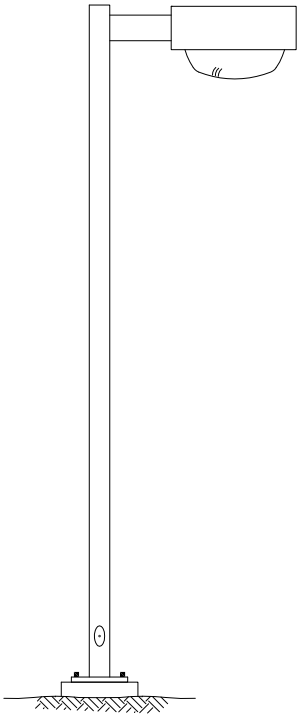
NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

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

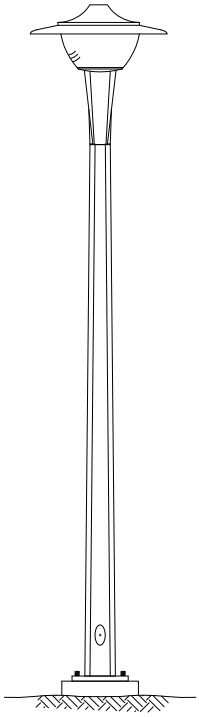
1-04431-DA-58043-0018



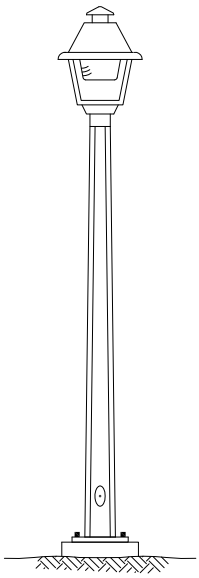
DAVIT BM
(BASE MOUNTED)



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

ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28

REVISIONS		
13-01	3	ADDED CONTEMPORARY AND COLONIAL POLES
12-05	2	REVISED DRAWING & CANCELLED SHEETS 2 AND 3
94-09	1	DELETED ORNAMENTAL

MANITOBA HYDRO DISTRIBUTION STANDARDS

STANDARD STEEL STREET LIGHT POLES

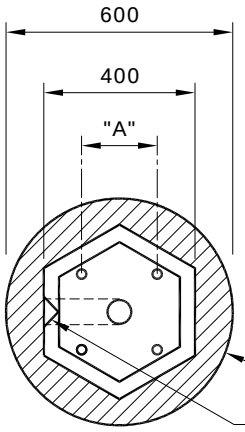
DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	L.D./D.O.	88-06	**CD 300-1**	0001 OF 1	03

1-04431-DA-25620-0001

7.7 - 10.7 STREET LIGHT POLES

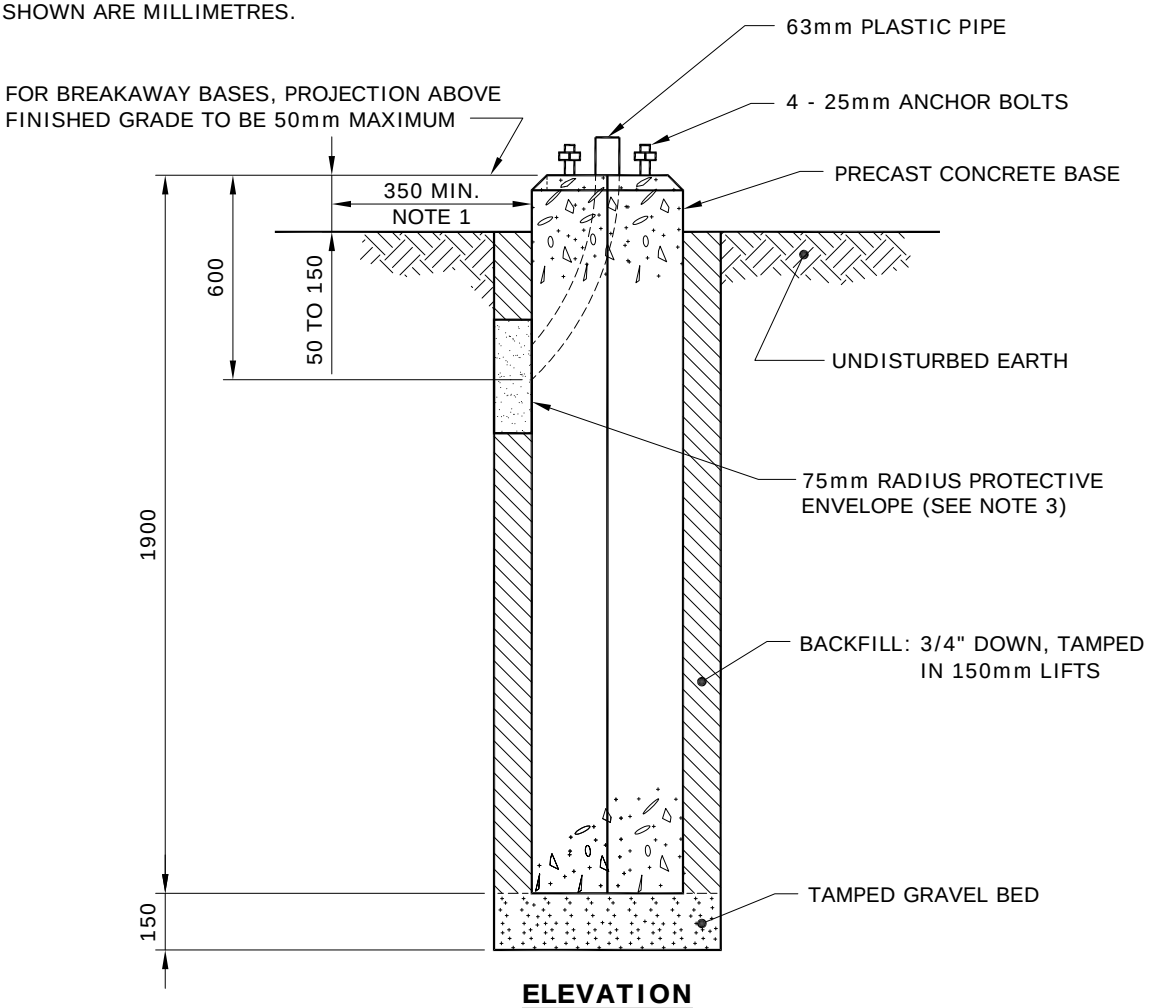
NOTES:

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.



PLAN

"A" BOLT SQUARE	STORES CODE
179	54 11 59
197	54 13 79
206	54 14 89



ELEVATION

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	

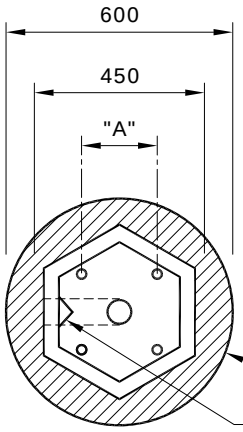
DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	L.D./K.C.H.	88-06	**CD 300-6**	0001 OF 3	03

1-04431-DA-24620-0001

13.7 STREET LIGHT POLE

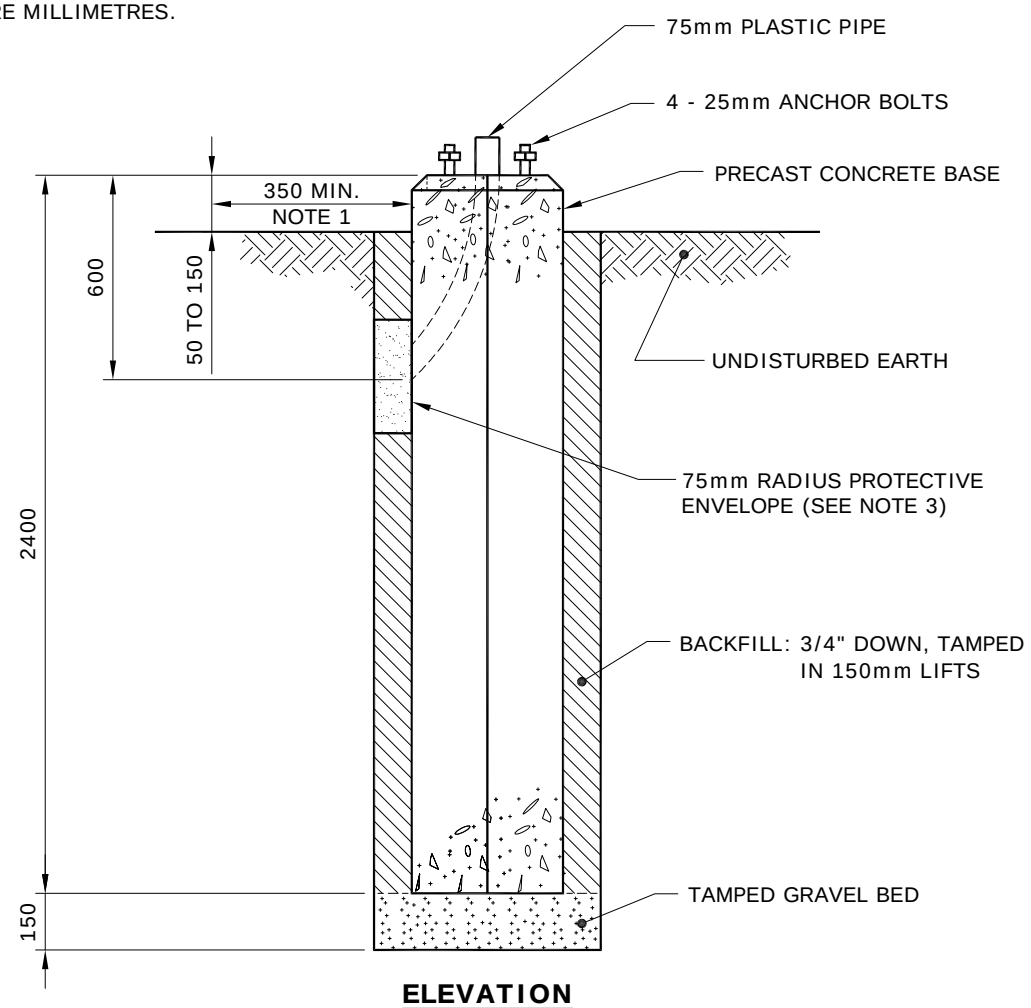
NOTES:

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.



PLAN

"A" BOLT SQUARE	STORES CODE
243	00 06 67



ELEVATION

APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-29	10-08 | 1 | CHANGED BACKFILL NOTES, AND ADDED SHEET 3	**INSTALLATION OF PRECAST CONCRETE BASE**

DRAWN	CHECKED	DATE		SHT	REV
R.L.B./CAD	L.D./K.C.H.	99-05	**CD 300-6**	0002 OF 3	01

1-04431-DA-24620-0001

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

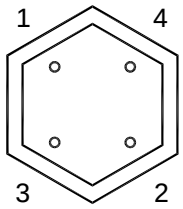
TURN-OF-NUT

1. ENSURE ALL ANCHOR RODS AND NUTS ARE FREE OF DEBRIS AND THAT THE ANCHOR RODS ARE LUBRICATED.

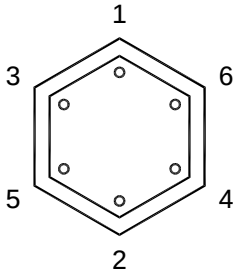
2. PLACE POLE ONTO CONCRETE PILE, INSTALL WASHERS AND NUTS AND TIGHTEN UNTIL DEVELOPING A SNUG-TIGHTENED CONNECTION.

   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.

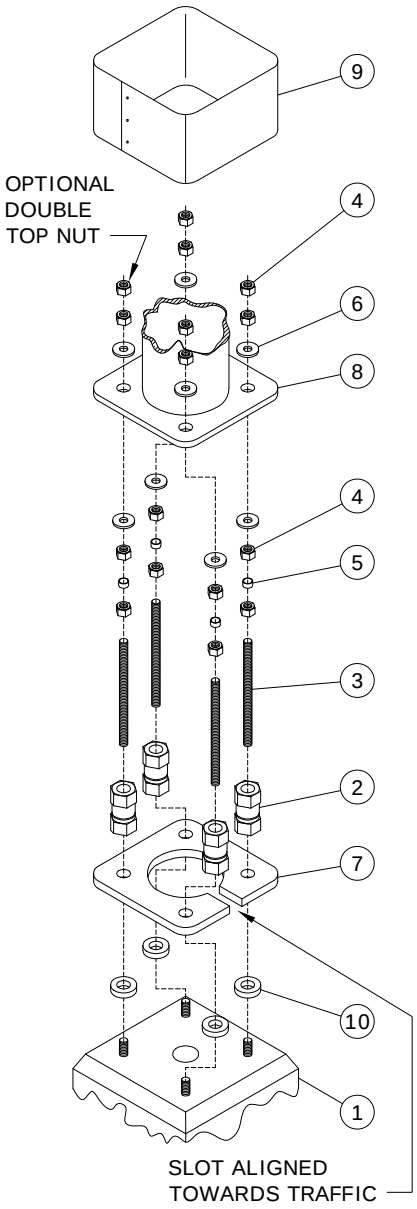
6. MARK THE REFERENCE LOCATION OF THE NUT AFTER SNUG-TIGHTENING THE PLUMB POLE.

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	CHECKED	DATE		SHT	REV
C.A.	L.D.	10-08	**CD 300-9**	0001 OF 1	00

1-04431-DA-24620-0006



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.

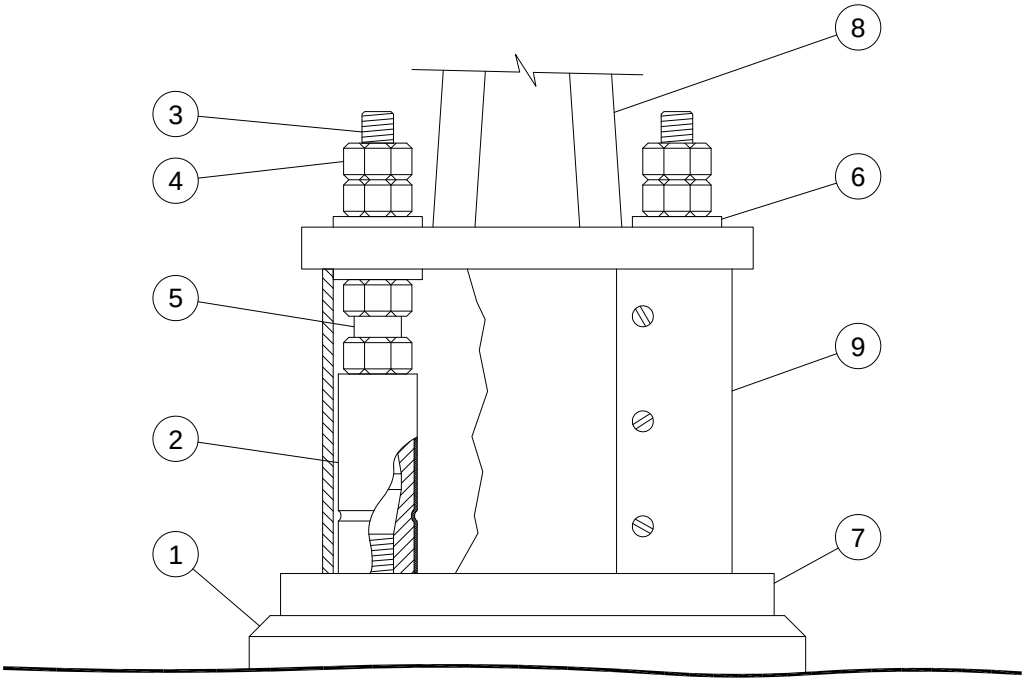
   NOTE: TIGHTENING THE COUPLER ON THE TOP HEX MAY WEAKEN THE COUPLER AT THE MACHINED GROOVE AND MAKE THE COUPLER UNUSEABLE.
8. BRING THE LEVELING NUTS (AND HENCE, THE LOWER WASHERS) INTO A LEVEL PLANE AS DESIRED MAKING CERTAIN THAT AT LEAST ONE PLASTIC SPACER REMAINS IN CONTACT WITH ITS LEVELING NUT AND 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	CHECKED	DATE		SHT	REV
C.A.	L.D.	16-06	**CD 300-10**	0001 OF 2	04

1-04431-DA-24620-0004



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	CHECKED	DATE		SHT	REV
C.A.	L.D.	10-08	**CD 300-10**	0002 OF 2	00

1-04431-DA-24620-0004

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.

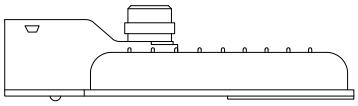
BASES

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	18-04 | 1 | UPDATED TABLES	**RIGGING WEIGHTS OF STREET LIGHT COMPONENTS**

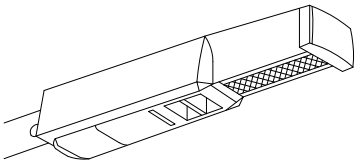
DRAWN	CHECKED	DATE		SHT	REV
C.A.	J.R.	16-01	**CD 300-18**	0001 OF 1	01

1-04431-DA-25620-0010



LED ROADWAY LUMINAIRE

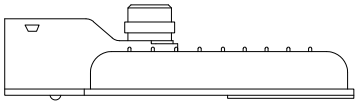
LED ROADWAY LUMINAIRES			
LUMINAIRE WATTAGE (NOMINAL)	REPLACES (HPS)	CIIC	
		GREY	BLACK
40 W LED	70 W HPS	05 15 44	05 15 71
60 W LED	100 W HPS	05 15 45	05 15 73
90 W LED	150 W HPS	05 15 47	05 15 74
150 W LED	250 W HPS	05 15 48	05 15 75
240 W LED	400 W HPS	05 15 49	05 15 76



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 PHOTOCELL RECEPTACLE.

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

1-04431-DA-25620-0009

TRENCH AND PLOW-IN LOCATION

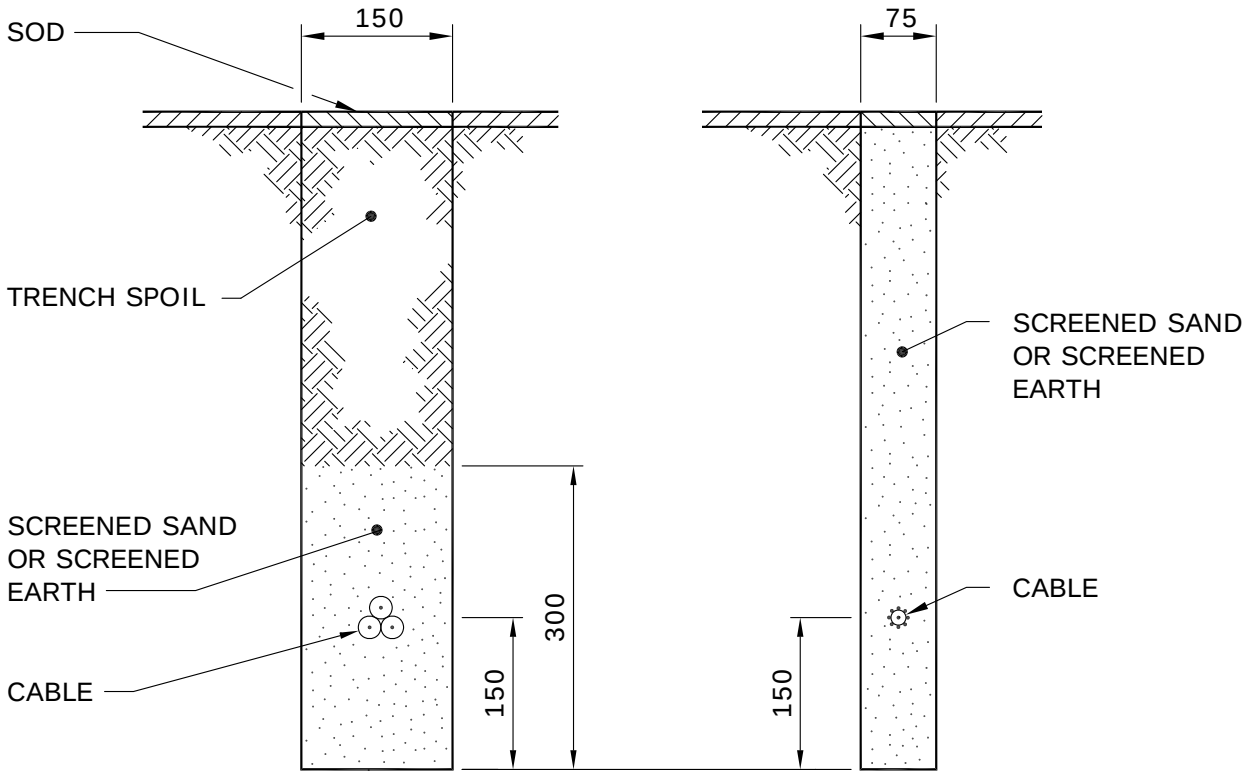
GENERALLY, THE TRENCH LOCATION WILL DICTATE THE LOCATION OF THE LIGHT STANDARDS. CONTACT SHALL BE MADE WITH THE GOVERNING MUNICIPAL AUTHORITY TO DETERMINE THEIR SET BACK REQUIREMENTS. CONTACT SHALL ALSO BE MADE WITH THE CITY OF WINNIPEG UNDERGROUND STRUCTURES OR THE INDIVIDUAL UTILITIES OUTSIDE WINNIPEG 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	CHECKED	DATE		SHT	REV
W.B./CAD		88-07	**CD 305-1**	0001 OF 2	03

1-04431-DA-10500-0016

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	CHECKED	DATE		SHT	REV
W.B./CAD		88-07	**CD 305-1**	0002 OF 2	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	**INSTALLATION OF STREET LIGHT CABLES**

DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	W.C.	88-07	**CD 310-1**	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.

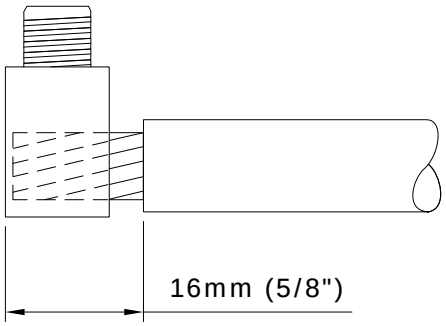
APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	94-04	1	DWG. REFERENCE CHANGED	**INSTALLATION OF STREET LIGHT CABLES**		
DRAWN W.B./CAD	CHECKED W.C.		DATE 88-07	**CD 310-1**	SHT 0002 OF 2	REV 01

1-04431-DA-56200-0001

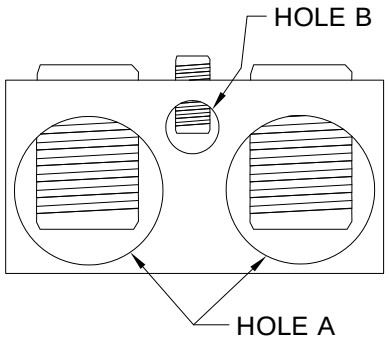
RAYCHEM GELCAP CIIC# 04-29-36

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		SHT	REV
C.A.	L.D.	17-11	**CD 310-3**	0001 OF 3	00

1-04431-DA-56200-0006

3. 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.

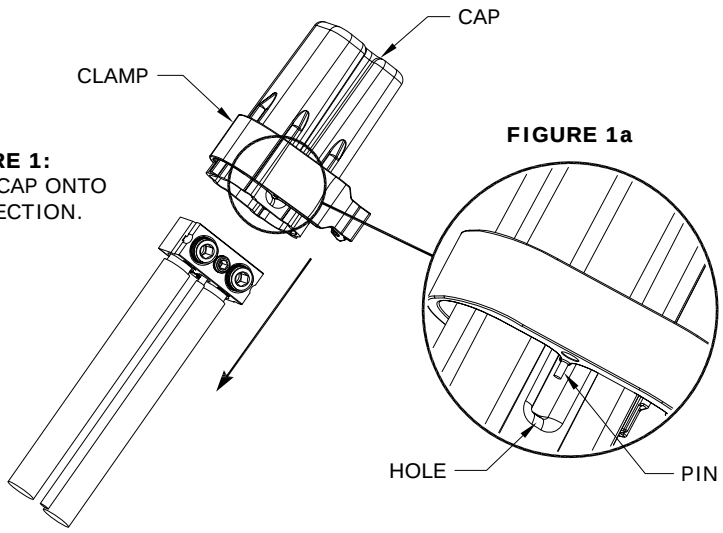


FIGURE 1:
PUSH CAP ONTO CONNECTION.

4. 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.

5. SNAP CLAMP CLOSED. IF NECESSARY, USE PLIERS TO SNAP CLAMP CLOSED AS SHOWN IN FIGURE 2 BELOW.

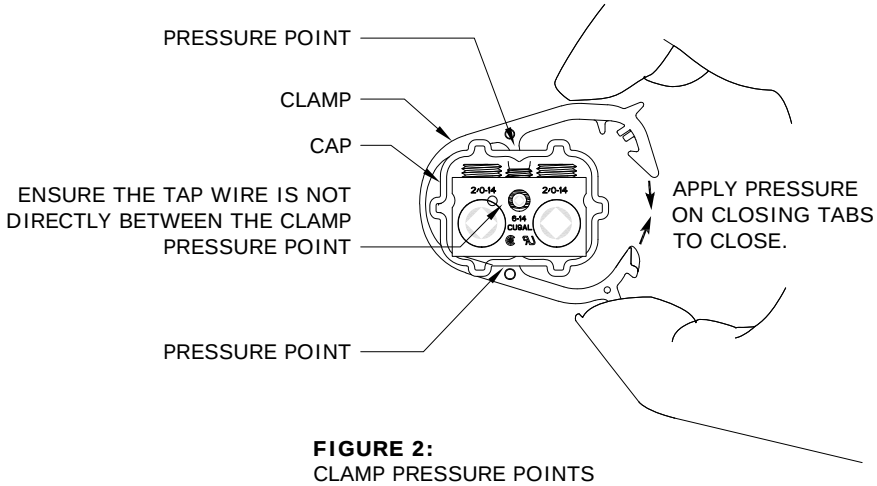
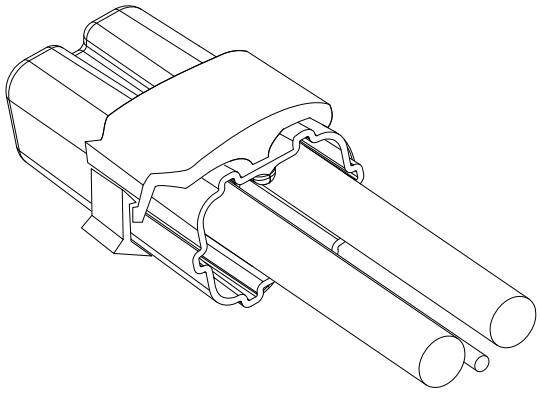


FIGURE 2:
CLAMP PRESSURE POINTS SHOULD FIT INTO OPPOSING GROOVES OF CAP AND APPLY PRESSURE BETWEEN CABLES. SNAP CLAMP CLOSED.

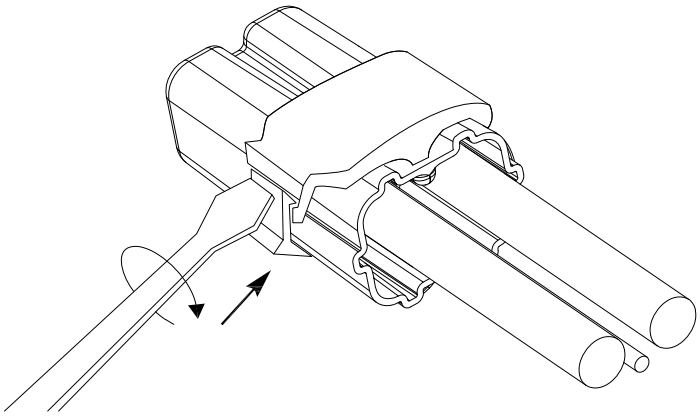
APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05		**RAYCHEM GELCAP SPLICE**		
DRAWN C.A.	CHECKED L.D.	DATE 17-11	**CD 310-3**	SHT 0002 OF 3 / REV 00

1-04431-DA-56200-0006

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.

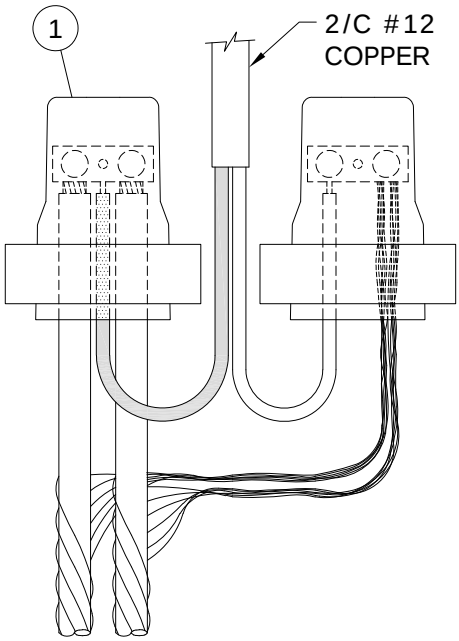


7. TO REMOVE, INSERT SCREWDRIVER BETWEEN THE CLOSING TABS AND TWIST TO OPEN THE CLAMP. REMOVE CAP SLOWLY FROM CONNECTION ALLOWING GEL TO REMAIN IN CAP.

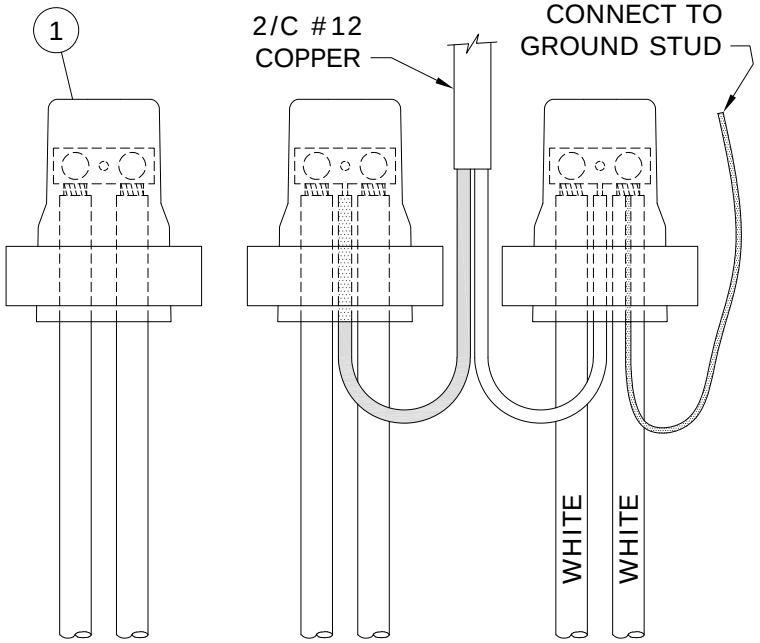


APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05		**RAYCHEM GELCAP SPLICE**

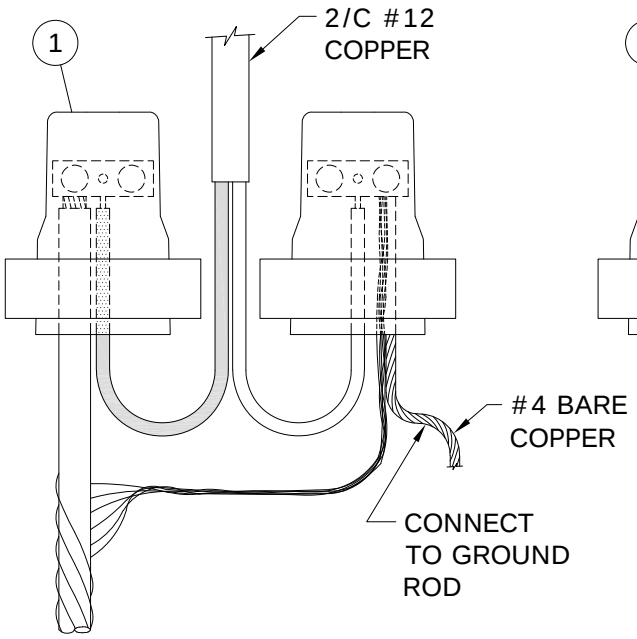
DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	17-11	**CD 310-3**	0003 OF 3	00



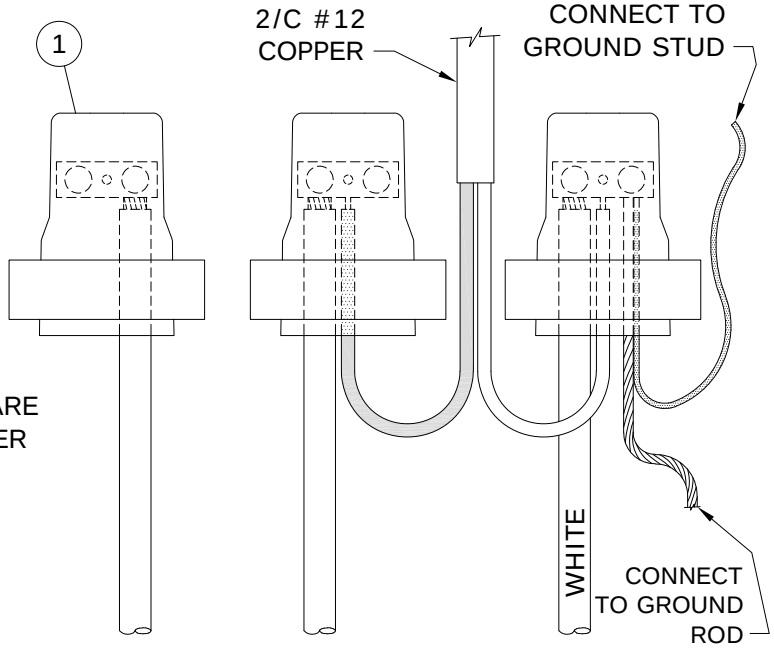
No. 4 ALUMINUM C/N CABLE
(TYPICAL FEED THROUGH)



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	CHECKED	DATE		SHT	REV
C.A.	L.D.	18-04	**CD 310-4**	0001 OF 4	02

1-04431-DA-56200-0002

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:

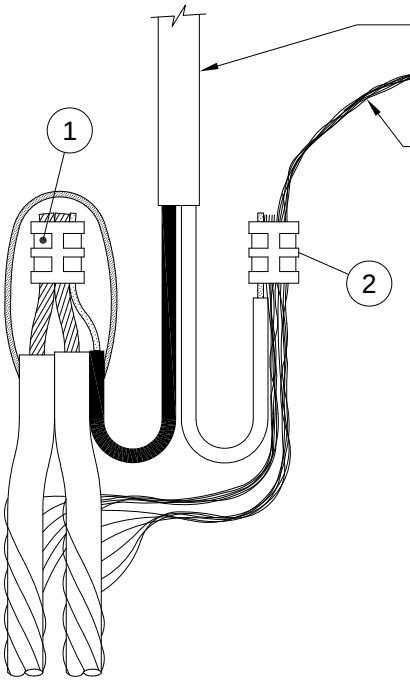
1. **LEAVE SUFFICIENT SLACK ON CONDUCTORS TO ALLOW REMOVAL FROM HANDHOLE FOR MAINTENANCE.**
2. REFER TO DRAWING CD310-3 FOR GEL CAP INSTALLATION INSTRUCTIONS.

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

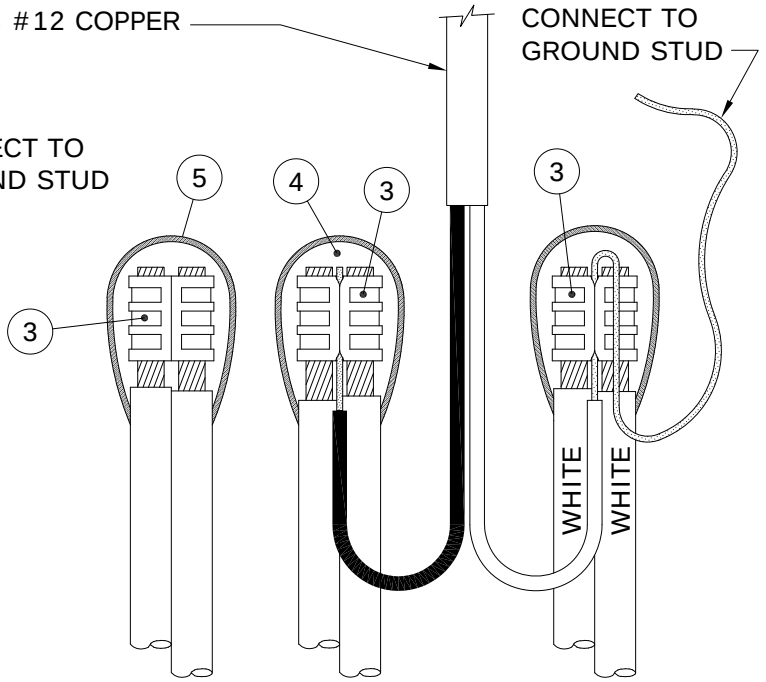
APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	18-04	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, REVISED TITLE, RESEALED	**CONNECTION DETAIL IN STREET LIGHT STANDARD**

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	18-04	**CD 310-4**	0002 OF 4	01

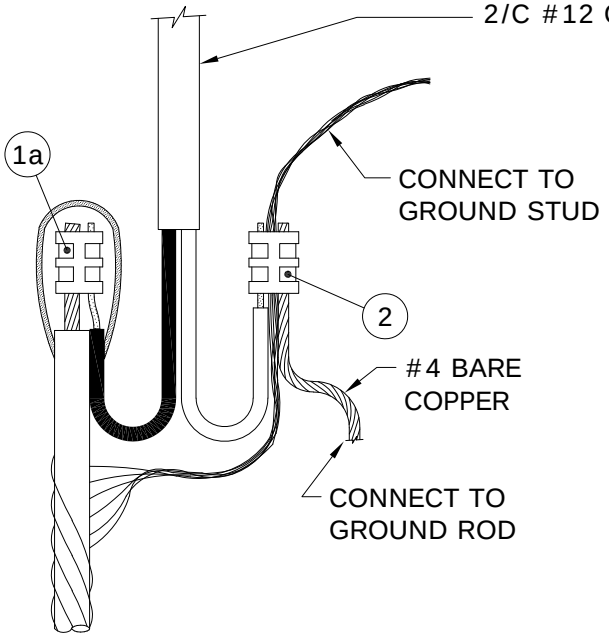
1-04431-DA-56200-0002



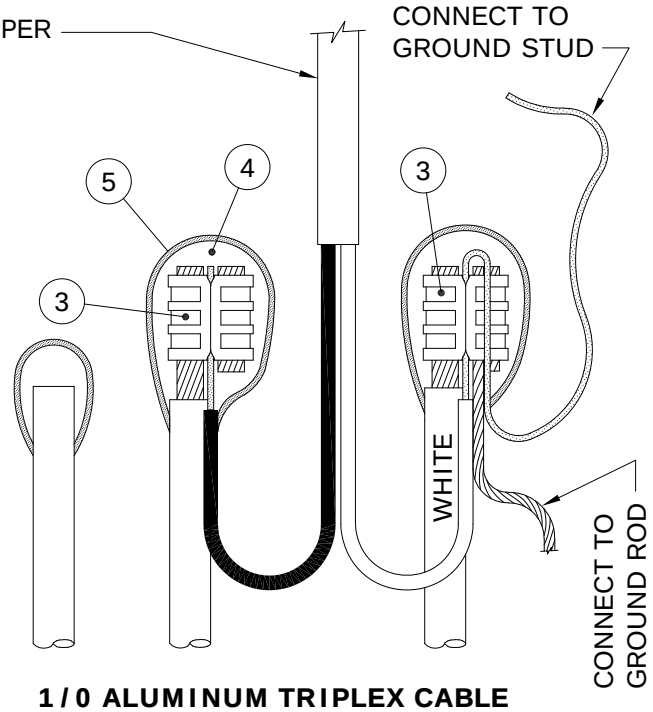
No. 4 ALUMINUM C/N CABLE
(TYPICAL FEED THROUGH)



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**

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	18-04	**CD 310-4**	0003 OF 4	00

1-04431-DA-56200-0002

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.

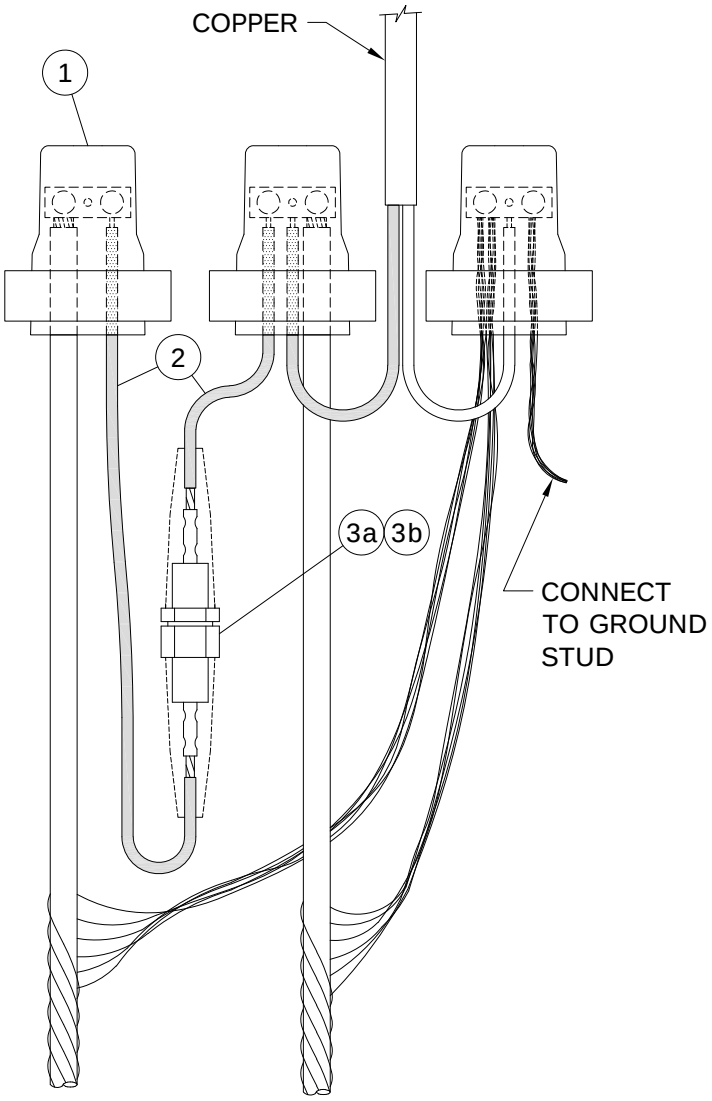
NOTES:

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

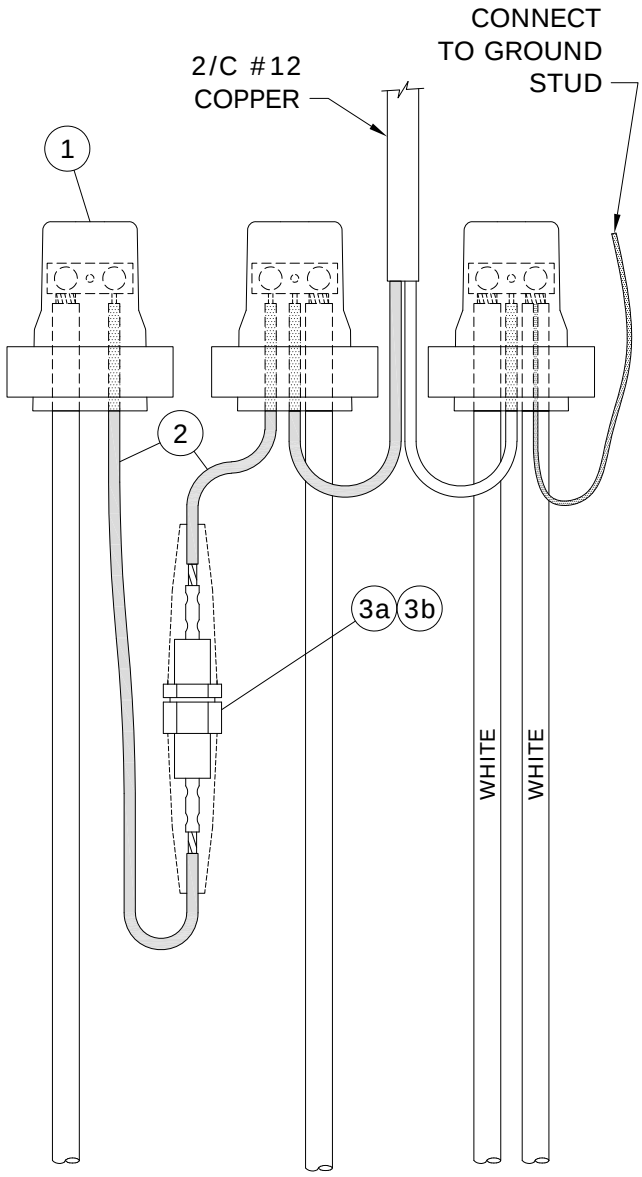
APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	18-04 | 0 | MOVED FROM SHEET 2	**CONNECTION DETAIL IN STREET LIGHT STANDARD**

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	18-04	**CD 310-4**	0004 OF 4	00

1-04431-DA-56200-0002



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	CHECKED	DATE		SHT	REV
C.A.	L.D.	17-11	**CD 310-9**	0001 OF 4	02

1-04431-DA-56200-0004

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:

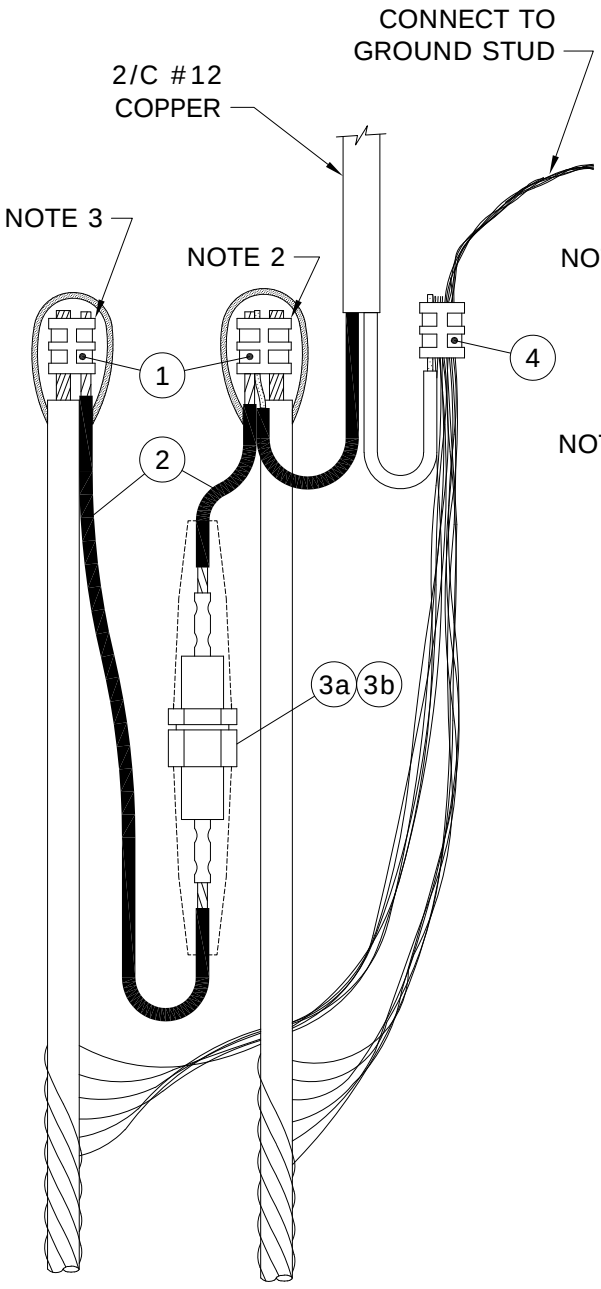
1. **LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
2. FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
3. FOR GEL CAP INSTALLATION INSTRUCTIONS, REFER TO DRAWING CD310-3.

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

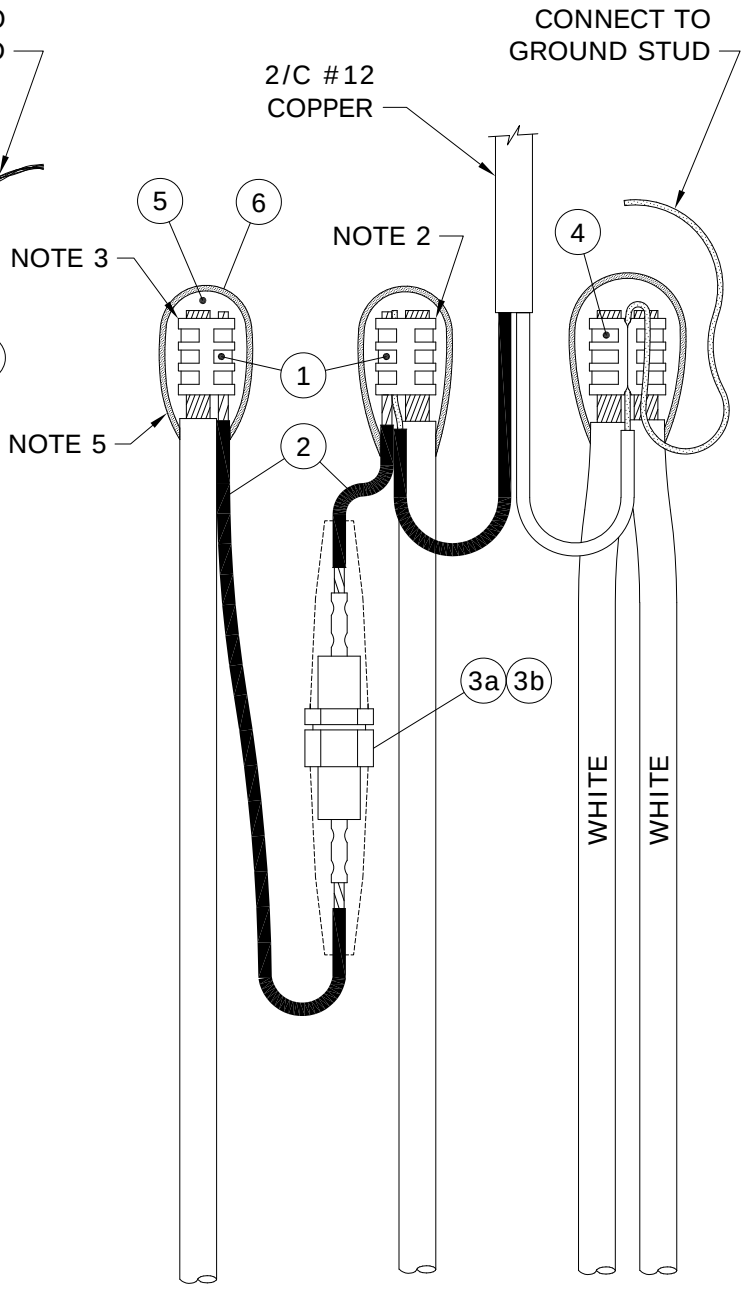
APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05				**STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD**
	17-11	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, RESEALED	

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	17-11	**CD 310-9**	0002 OF 4	01

1-04431-DA-56200-0004



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	17-11 | 0 | MOVED FROM SHEET 1	**STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD**

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	17-11	**CD 310-9**	0003 OF 4	00

1-04431-DA-56200-0004

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.

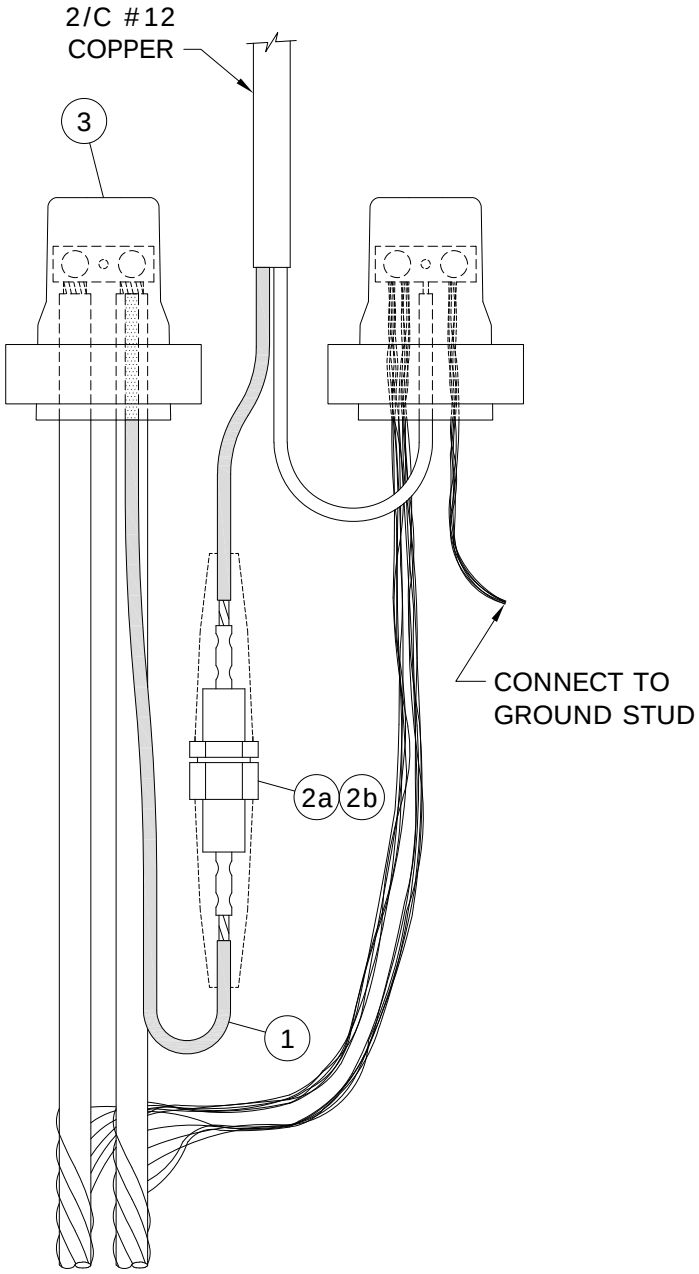
NOTES:

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

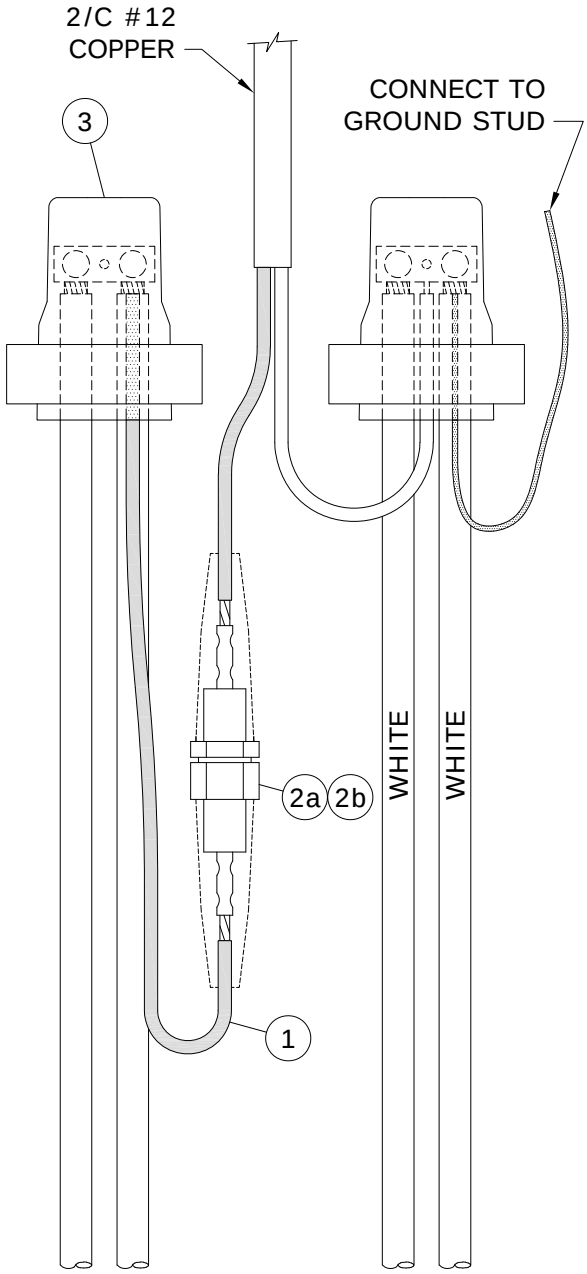
APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05	17-11 | 0 | MOVED FROM SHEET 2	**STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD**

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	17-11	**CD 310-9**	0004 OF 4	00

1-04431-DA-56200-0004



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**	SHT 0001 OF 4	REV 03

1-04431-DA-56200-0005

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:

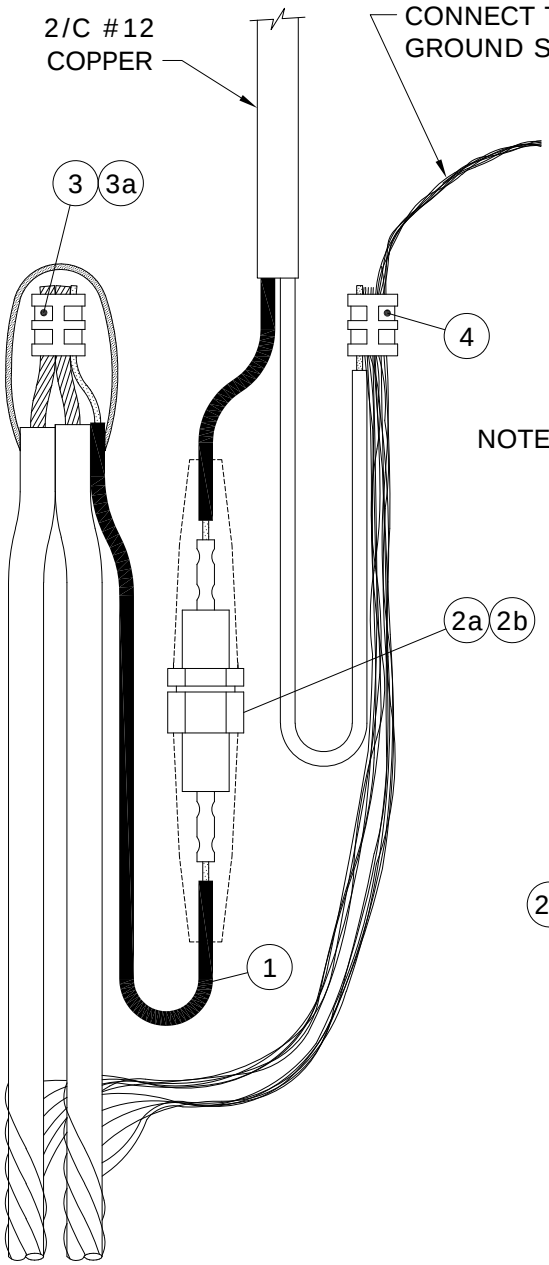
1. **LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
2. FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
3. FOR END OF CIRCUIT, REFER TO DRAWING CD310-4.
4. FOR GEL CAP INSTALLATION INSTRUCTIONS, REFER TO DRAWING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

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

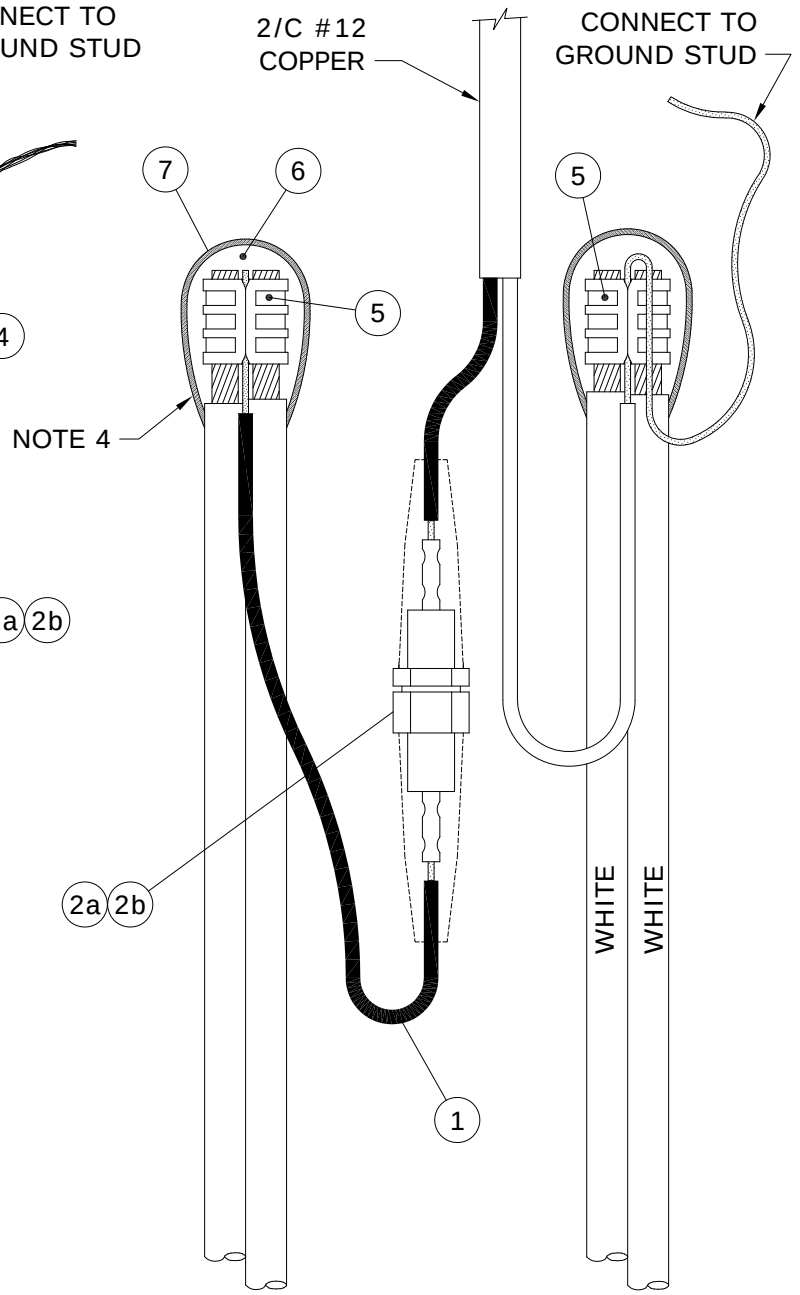
APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	18-04	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, RESEALED	**INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD**

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	18-04	**CD 310-10**	0002 OF 4	01

1-04431-DA-56200-0005



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	18-04 | 0 | MOVED FROM SHEET 1	**INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD**

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	18-04	**CD 310-10**	0003 OF 4	00

1-04431-DA-56200-0005

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 | MOVED FROM SHEET 2	**INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD**

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	18-04	**CD 310-10**	0004 OF 4	00

1-04431-DA-56200-0005

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.

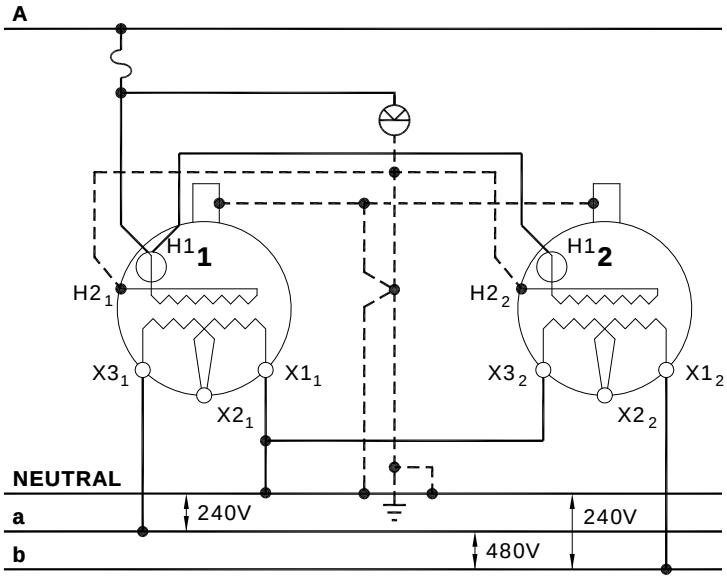
IN CASES WHERE EXCESSIVE VOLTAGE DROP IN A STREET LIGHTING CIRCUIT IS A PROBLEM, A SUPPLY VOLTAGE OF 240/480 MAY BE USED. A SUPPLY VOLTAGE OF 240/480 CAN BE OBTAINED FROM TWO SINGLE PHASE POLE-MOUNTED DISTRIBUTION TRANSFORMERS CONNECTED AS SHOWN ON DRAWING CD315-2. IF A SINGLE PHASE PAD-MOUNTED DISTRIBUTION 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.

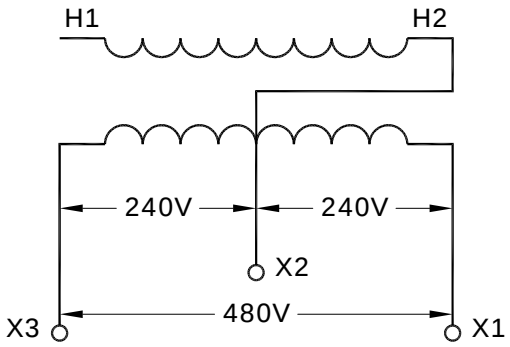
APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28		**SUPPLY VOLTAGES FOR STREET LIGHT CIRCUITS**

DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	W.C.	88-08	**CD 315-1**	0001 OF 1	00

1-04431-DA-65620-0001



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.

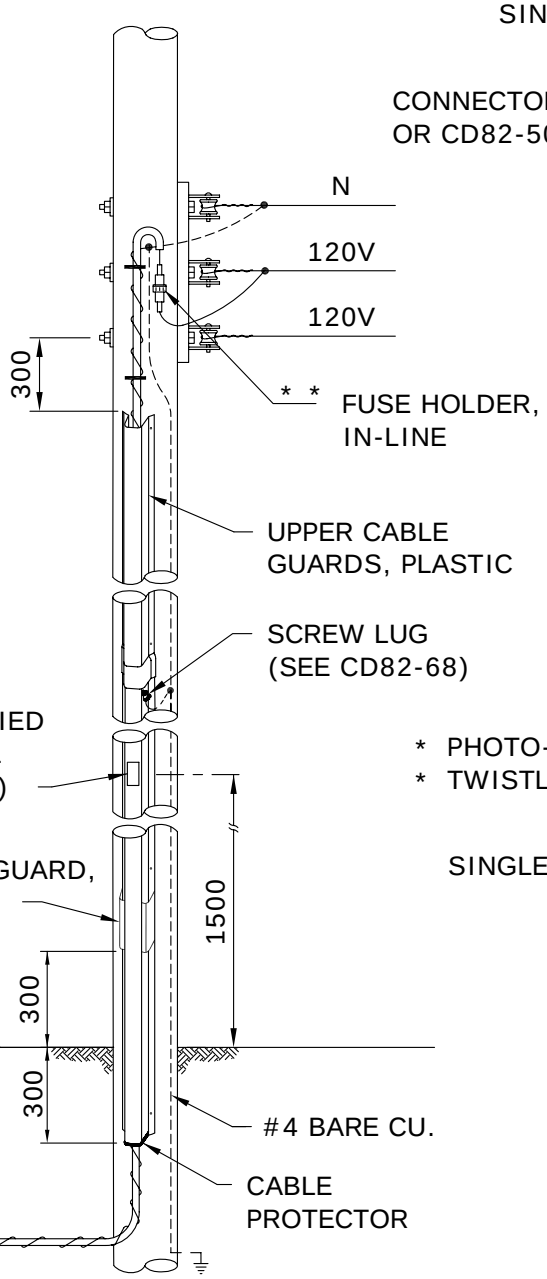
PURCHASE OF 240/480 VOLT TRANSFORMER

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	13-01	2	REVISED DIAGRAM	**240/480 VOLT SUPPLY FOR STREET LIGHT CIRCUITS**
	90-04	1	DROPOUT DELETED	

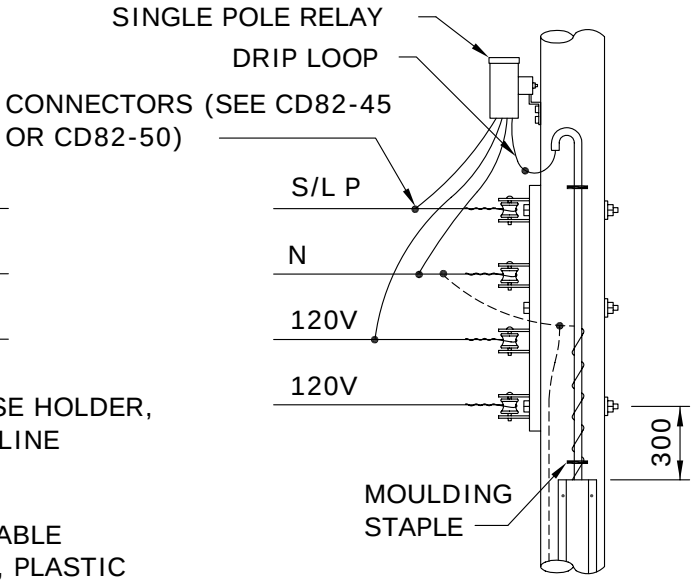
DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	L.D./D.O.	88-08	**CD 315-2**	0001 OF 1	02

1-04431-DA-65620-0002

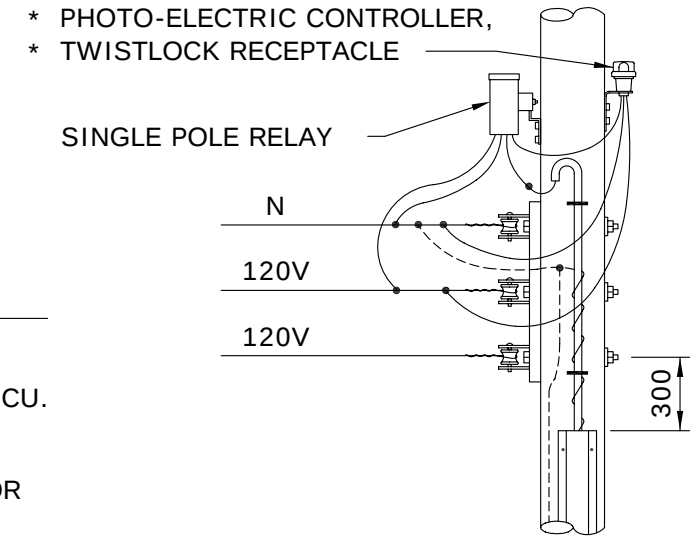


IN-LINE
FUSE PROTECTED

* * USED WHERE POLY ISN'T USED



STREET LIGHT PILOT WIRE
CONTROLLED RELAY



P.E. CELL
CONTROLLED RELAY

* 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	CHECKED	DATE		SHT	REV
R.L.B./CAD	K.C.H.	88-08	**CD 315-5**	0001 OF 1	03

1-04431-DA-65620-0003

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	CHECKED	DATE		SHT	REV
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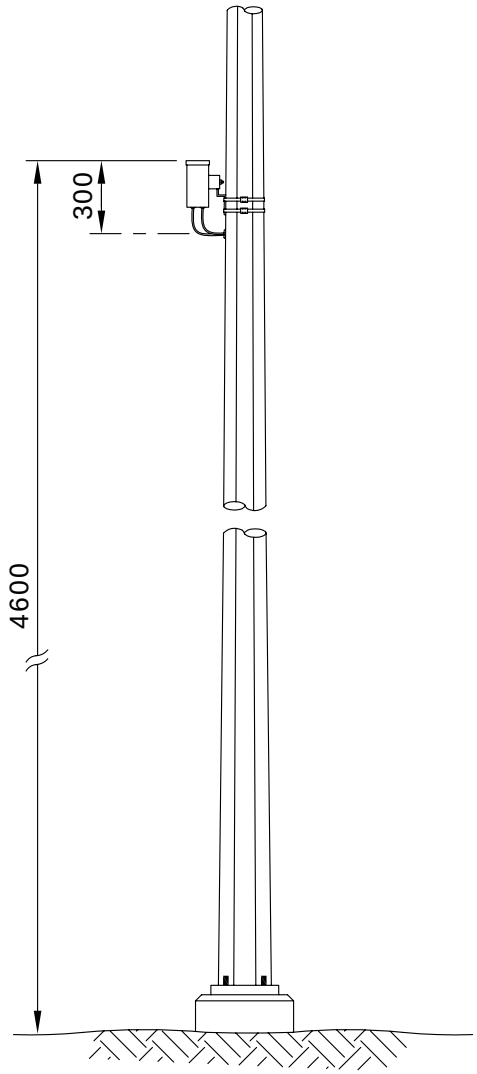
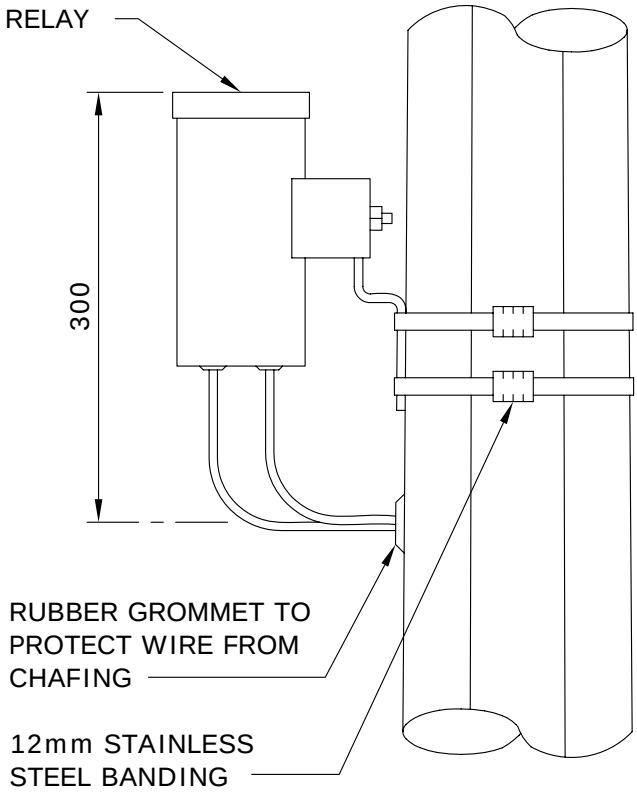




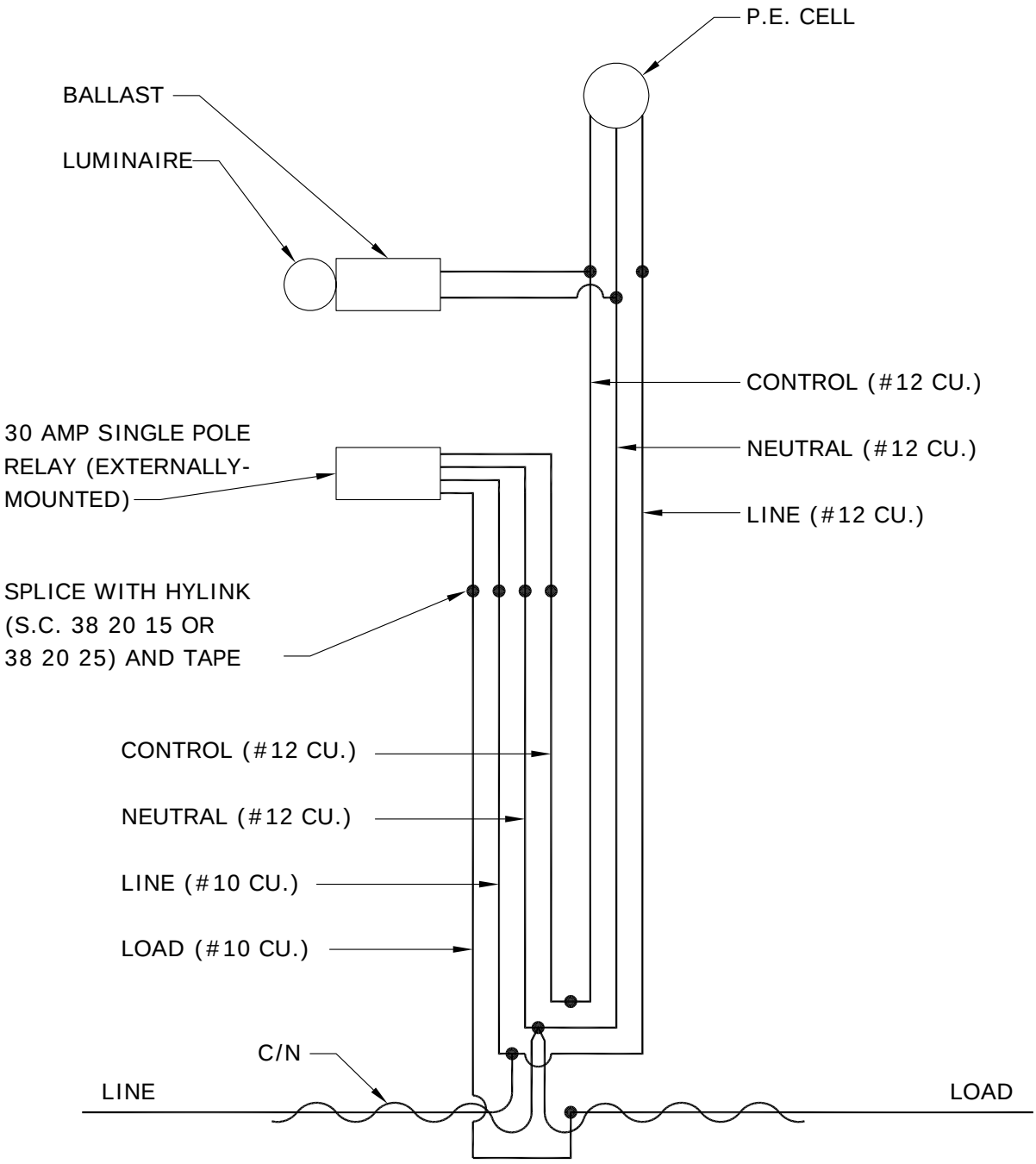
NOTES:

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	CHECKED	DATE		SHT	REV
W.B./CAD	W.C.	88-09	**CD 315-12**	0001 OF 1	00

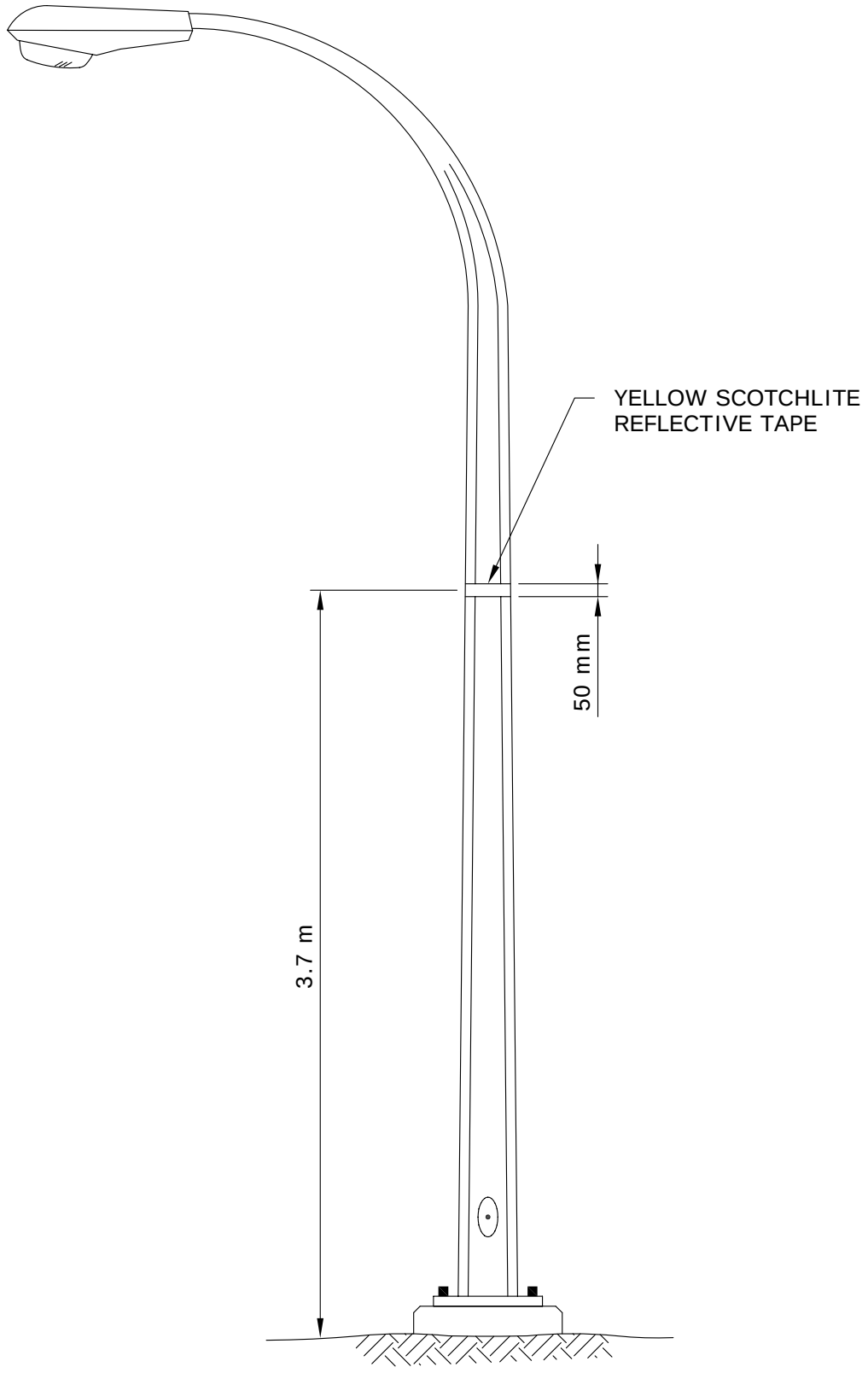
1-04431-DA-65620-0006



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	CHECKED	DATE		SHT	REV
W.B./CAD	W.C.	88-09	**CD 315-13**	0001 OF 1	01

1-04431-DA-65620-0007



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	CHECKED	DATE		SHT	REV
W.B./CAD	W.C.	88-09	**CD 315-35**	0001 OF 1	00

1-04431-DA-65620-0014

APPENDIX 'C'

MANITOBA HYDRO
SAFE EXCAVATION & SAFETY WATCH GUIDELINES

Safe Excavation & Safety Watch Guidelines

For your **SAFETY**

ClickBeforeYouDigMB.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".

Table of Contents

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.

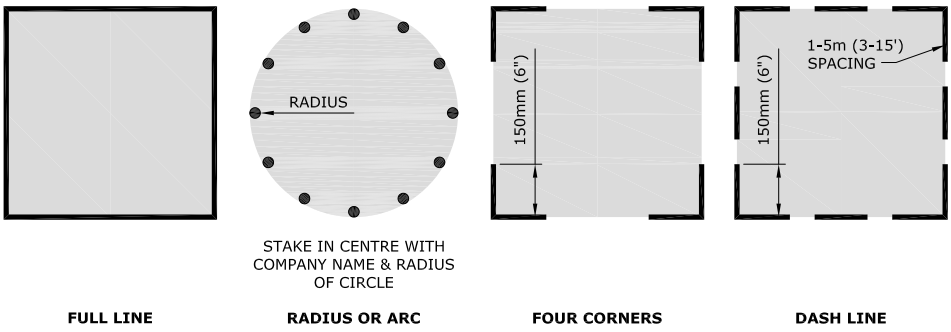
When using stakes or flags to mark the excavation work area, do not drive them into the ground deeper than 150 mm (6 inches). Any activity which disturbs more than 150 mm (6 inches) must have the facilities located.

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



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.

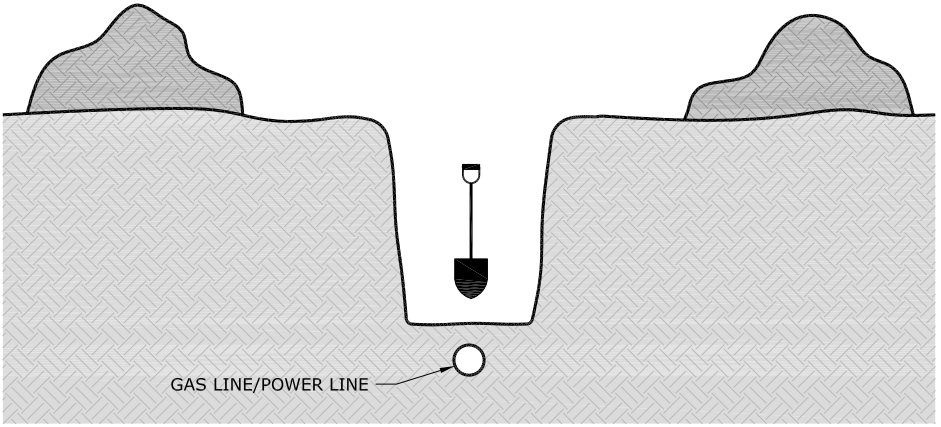
Water Pressure/Vacuum System (Hydrovac)

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.*

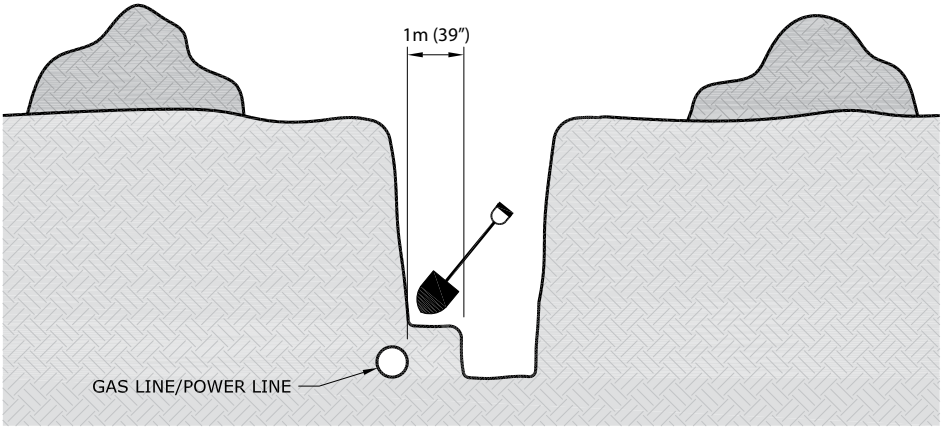
Some acceptable excavation methods:

a) Dig Vertically



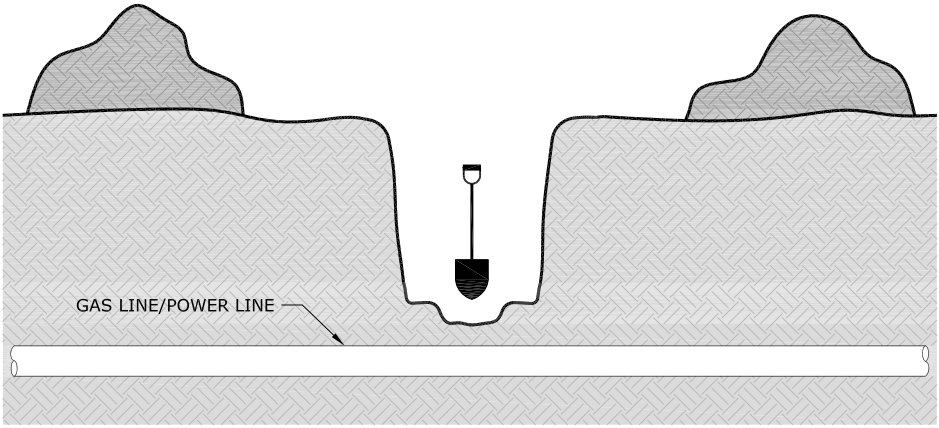
Dig a hole with a shovel directly above the line location until the line is exposed. Take care not to damage the line or coating. Mechanical excavation equipment MUST NOT be used to widen or deepen the hole before exposing the line.

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.

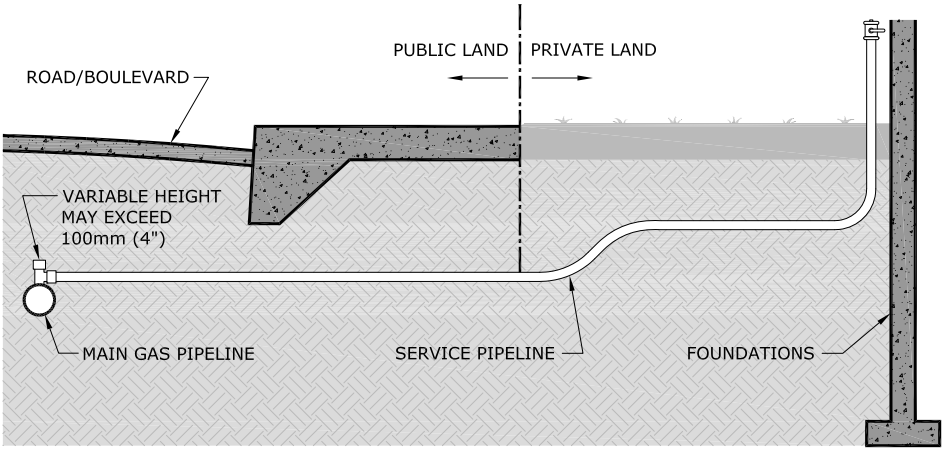
c) Dig Trench and excavate



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)

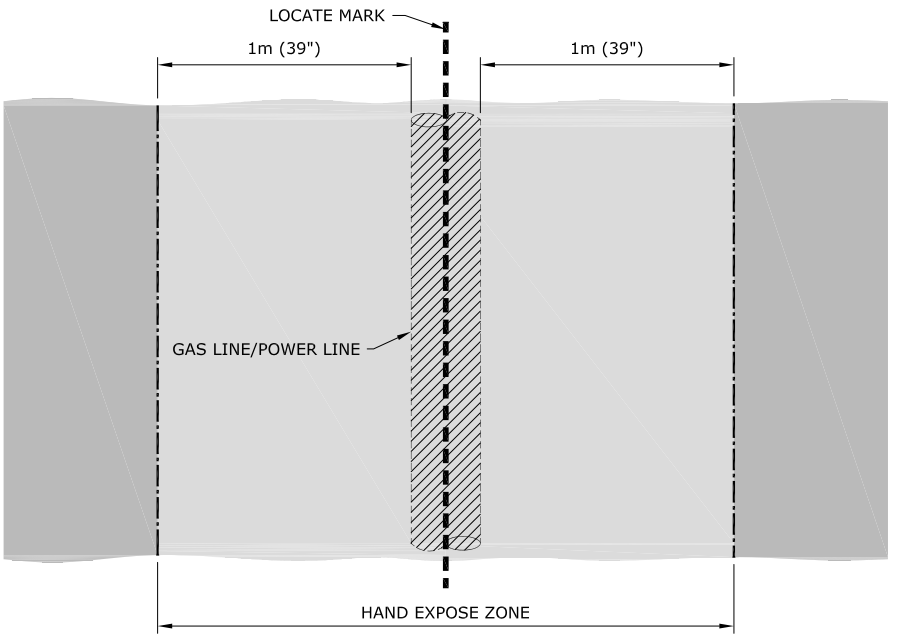


Fittings such as active or abandoned service tees may be present on gas pipelines, exercise care when excavating.

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.

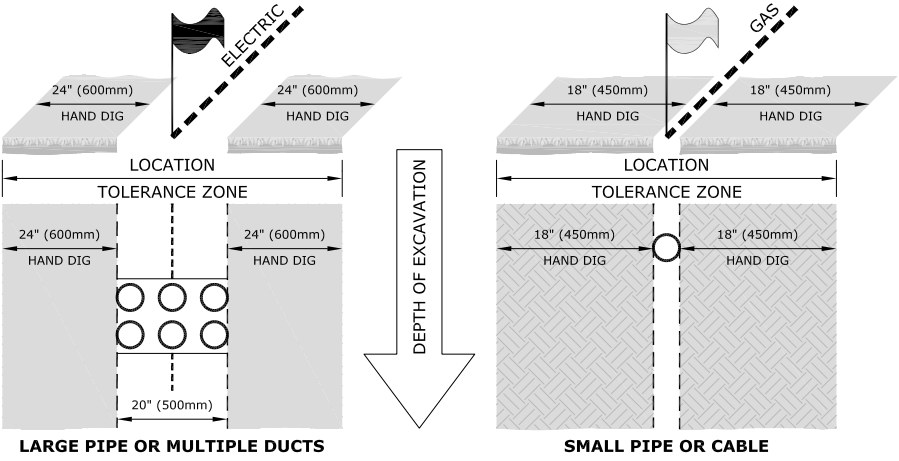
Working Parallel to Lines

- 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



LARGE PIPE OR MULTIPLE DUCTS **SMALL PIPE OR CABLE**

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.

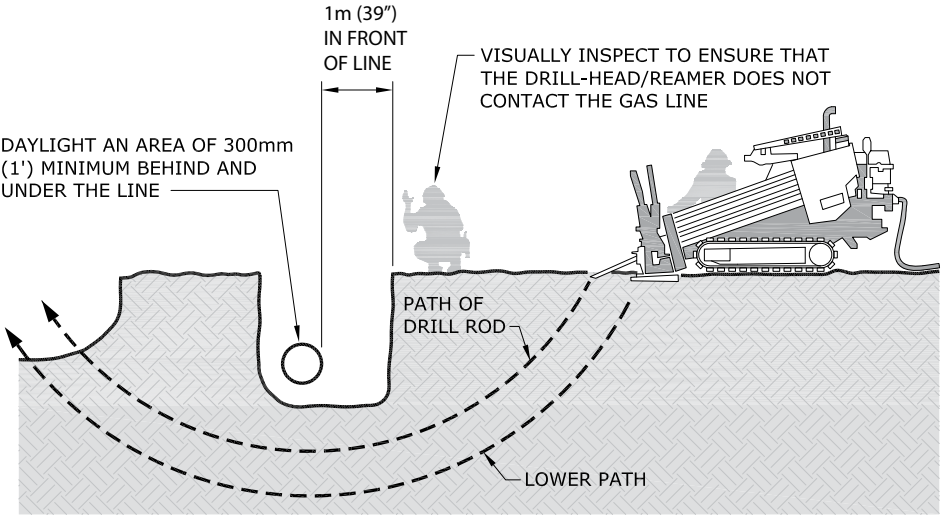
Electrical Conductors and Gas Pipelines

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.

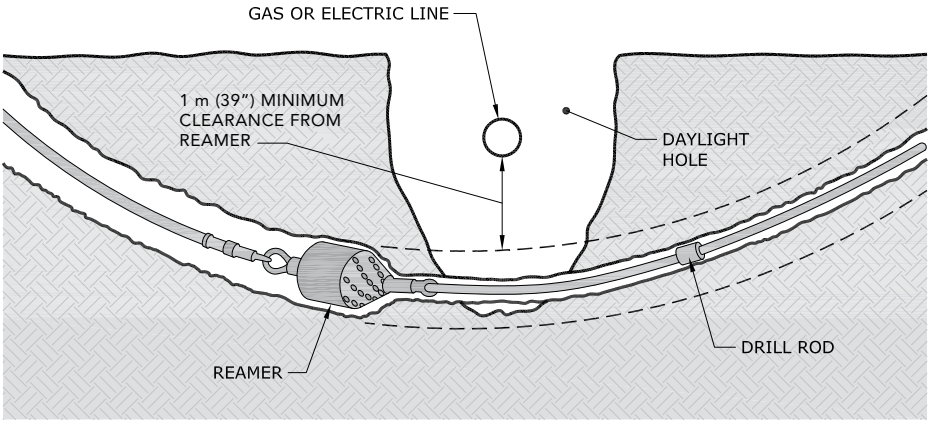
Acceptable practice for opening up the observation hole is using water pressure/vacuum or hand digging.

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.

Notes

ClickBeforeYouDigMB.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

Manitoba Hydro

Rev. 2016 07

APPENDIX 'D'

MANITOBA HYDRO GELCAP KIT DETAIL

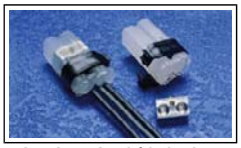
My Cart | My Part Lists | Sign In/Register English (Change)

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

Active

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

Product Drawings:
- None Available

Catalog Pages/Data Sheets:
- None Available

Product Specifications:
- None Available

Application Specifications:
- None Available

Instruction Sheets:
- None Available

CAD Files:
- None Available

Additional Information:
- Product Line Information

Related Products:
- Tooling

Product Features (Please use the Product Drawing for all design activity)

Product Type Features:
- 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

Mechanical Attachment:
- Installation Type = Cold Applied

Configuration Features:
- Conductor (Wire) Size = #14 - 2/0
- Cable Shielding = Without

Industry Standards:
- 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

Printer/Label Features:
- Voltage Rating (kV) = 0.6

Operation/Application:
- Application = Motor Connections, Street Lights

Other:
- 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

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APPENDIX ‘E’

MANITOBA HYDRO ELECTRIC/GAS FACILITIES LOCATE FORM

0371/f Rev 16 07
v1.93

Manitoba Hydro

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. / *Nº de tél. de l'entreprise*
Description of work / *Description des travaux*			

Map no. / *Nº de carte*	MIT Application #	Asbuilt no. / *Nº de plan définitif*	**DATE REQUIRED / *DATE DEMANDÉE***	yyyy mm dd / *a. m. j.*	**TIME REQUIRED / *HEURE DEMANDÉE***	hh mm / *h min.* ☐ **A.M.** ☐ **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.*

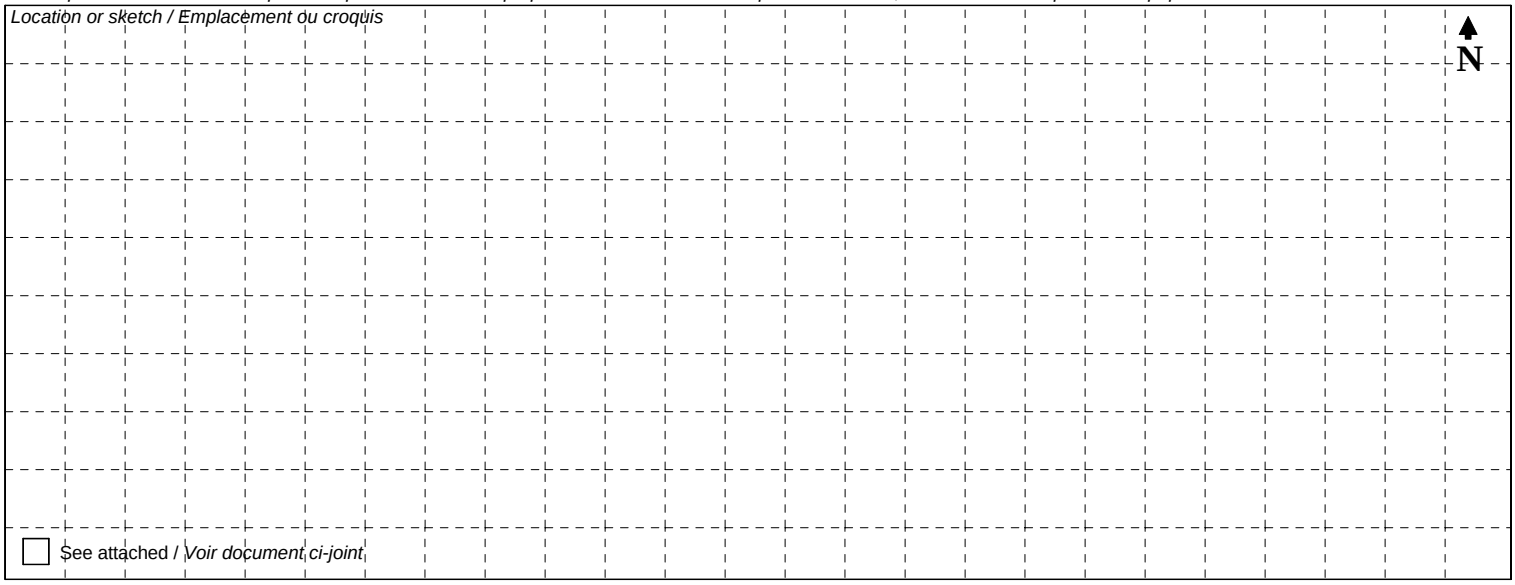
Only the following utilities have been marked / Les services suivants sont les seuls à avoir été marqués :

☐ **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 document 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. / *Nº 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'entreprenez 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 recommuniquer 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'entreprenez 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 'F'

MANITOBA HYDRO SAMPLE JOB PLAN

Manitoba Hydro

JOB PLAN - ENGINEERING & CONSTRUCTION
Underground Construction - Winnipeg

1. EMERGENCY RESPONSE PLAN

Identify exact location for emergency response:

How will you execute a rescue?

Emergency phone numbers:

911
204-360-HELP (4357)
SCC: 204-474-3369, 204-474-3007, 204-474-3327,
VHF: 040
Spill Response no./FSO: Jeff Breakey - 204-871-2003

Blowing Gas - Wpg. 204-480-5900
Blowing Gas - Rural 1-888-624-9376

INSTRUCTION: Prepare, discuss and review the job plan with the crew daily and whenever a change is introduced to the job.

2.	CURRENT DATE	yyyy mm dd	Project name	Work Order no.	Description

CSC and Radio Channel	Line or feeder	Blocked ☐ Yes ☐ No	Upstream protective device	Blocking received from Time	Phone no.

3. HAZARD IDENTIFICATION LIST

1. **M**echanical	2. **E**lectricity	3. **G**ravity	4. **A**pplicable
1.1 Equipment failure	2.1 Live contact HV	3.1 Falling from a height	4.1 Vehicular
1.2 Lifting with a boom	2.2 Live contact LV	3.2 Falling objects	4.2 Kenetic
1.3 Max work loads	2.3 Induction/backfeed HV	3.3 Falling structures	4.3 Thermal
1.4 Vehicle stability	2.4 Induction/backfeed LV	3.4 Rigging failure	4.4 Chemical
1.5 Moving parts/Sharp objects	2.5 Static charge	3.5 Working over water	4.5 Confined Space
1.6 Tension loads/Springs	2.6 Step potential		4.6 Excavations
	2.7 ARC Flash potential		4.7 Vehicle or pedestrian traffic
	2.8 Clothing ignition hazard/ FRC required		4.8 Underground Utilities
	2.9 Lockout/Tagout		4.9 Other, specify:
			4.9.1 _____

Hand contact:	Incident energy -	ARC flash boundary -	ARC Flash PPE Level -
Hot stick Work:	Incident energy -	ARC flash boundary -	ARC Flash PPE Level -

4. JOB STEPS	MAJOR HAZARDS	REQUIRED BARRIERS	PPE: Minimum Hard Hat and Safety Footwear LIST ALL OTHER REQUIRED PPE including eyewear. FRC: ☐ Yes ☐ No	**TIMES** (LO/TO)

REVIEWED BY	DATE yyyy mm dd

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
☐ Qualification of personnel	☐ Limits of approach	☐ Inspection of equipment	☐ Environment checklist	☐ Cause erosion
☐ Other work groups/ contractors	☐ De-energize/Isolation of apparatus	☐ Inspection of tools & PPE	☐ Underground locates	☐ Release/spills (liquids/gases/solids)
☐ Effective Communication	☐ Safety hold off/ Blocking required	☐ Inspection of vehicles	☐ Weather conditions	☐ Waste disposal liquids/solids)
☐ Worker fatigue	☐ Switching orders	☐ Condition of structures	☐ Soil conditions/Shoring	☐ Noise
☐ Pedestrian control	☐ Adequate cover-up	☐ Safe loads for rigging	☐ Lighting conditions	☐ Fire
☐ General public	☐ Grounding apparatus and vehicles	☐ Adequate cover-up	☐ Adjacent structures/ Vegetation	☐ Species at risk (plant and animal)
☐ Traffic control	☐ Work permit/ Clearance to work	☐ Specialized tools - calibrated/tested & up-to-date	☐ Housekeeping	☐ Disturbing waterways/ drainage/wetlands/ burial grounds
☐ Safety watcher	☐ Permit checklists (soft dig, confined space, etc.)		☐ Emergency plan/ procedure	☐ Wildlife Habitat
	☐ Review rescue procedures		☐ Open excavations/ Trench	☐ Bio Security
	☐ Spiking/Stethoscoping		☐ Distractions and Interuptions	
	☐ Cut Hazards/Cut Resistant Gloves			

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)

☐ **Stop When Unsure / Know When to Stop** Stop when unclear on task / outcomes	☐ **Procedure Use and Adherence** Verify correct / accurate procedure	☐ **Self Check STAR** Stop / Think / Act / Review
☐ **Questioning Attitude** Identify confusion / doubt / uncertainty	☐ **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

Be aware of **all** work crews in the area.

Multi-crew job coordinator _____ Cell phone: _____

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 ‘G’

MANITOBA HYDRO
NETWORK COMMISSIONING REPORT

NETWORK COMMISSIONING REPORT

FIELD INSTRUCTIONS: Preferred Best Practice

1. Construction Foreman to contact Customer Service Center Supervisor upon completion of project.
2. Customer Service Center Supervisor to provide a delegate that will review project details with Construction Foreman in the field.
3. Delegate to identify deficiencies and record on report. If project is accepted as complete proceed to Step 5.
4. Construction to complete deficiencies and review with delegate.
5. Once project deemed acceptable delegate to sign under "Accepted as complete by Customer Service Center Representative"
6. One copy of report to be attached to working file.
7. One copy of report to be forwarded to Customer Service Center Supervisor with close out package.
8. Construction Manager to sign under "Accepted as Complete by Construction Manager" and file with final close out package.

Network number	Description			
Foreman name (line)	Foreman name (pole)		Foreman name (underground)	
IN-SERVICE DATE	yyyy mm dd	Plan attached ☐ Yes ☐ No	Built as estimated ☐ Yes ☐ No	Field Supervisor responsible for work
GENERAL COMMENTS				

Prepared by (Construction Coordinator/Foreman) : Network Authenticated Signature	yyyy mm dd

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