THE CITY OF WINNIPEG

TENDER

TENDER NO. 834-2020

2021 REGIONAL STREET RENEWAL PROGRAM – ARCHIBALD STREET PAVEMENT RECONSTRUCTION

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2021 Regional Street Renewal Program – Archibald Street Pavement Reconstruction.

B2. SUBMISSION DEADLINE

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

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

B3. ENQUIRIES

B3.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.

B3.2 If the Bidder finds errors, discrepancies or omissions in the Tender, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.

B3.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Tender will be provided by the Contract Administrator to all Bidders by issuing an addendum.

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

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

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

B4. CONFIDENTIALITY

B4.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:

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

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

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

B4.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Tender to the media or any member of the public without the prior written authorization of the Contract Administrator.

B5. ADDENDA

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

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

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

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

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

B5.6 Notwithstanding B3, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D4.

B6. SUBSTITUTES

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

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

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

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

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

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

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

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

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

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

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

B6.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.

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

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

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

B7. BID COMPONENTS

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

(a) Form A: Bid;

(b) Form B: Prices;

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

B7.2 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.

B7.3 The Bid shall be submitted electronically through MERX at www.merx.com.

B7.3.1 Bids will **only** be accepted electronically through MERX.

B7.4 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B17.1(a).

B8. BID/PROPOSAL

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

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

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

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

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

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

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

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

B8.4 Paragraph 13 of Form A: Bid/Proposal shall be signed in accordance with the following requirements:

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

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

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

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

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

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

B9. PRICES

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

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

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

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

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

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

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

B10. DISCLOSURE

B10.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.

B10.2 The Persons are:

(a) Bayview Construction Ltd. – Exposure of existing utilities within the project limits

B11. CONFLICT OF INTEREST AND GOOD FAITH

B11.1 Further to C3.2, Bidders, by responding to this Tender, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.

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

(a) other commitments;

(b) relationships;

(c) financial interests; or

(d) involvement in ongoing litigation;

that could or would be seen to:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

B12. QUALIFICATION

B12.1 The Bidder shall:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

B13. BID SECURITY

B13.1 The Bidder shall include in its Bid Submission bid security in the form of a digital bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in Form G1: Bid Bond and Agreement to Bond, available on The City of Winnipeg, Corporate Finance, Materials Management Division website at https://www.winnipeg.ca/MatMgt/templates/files/eBidsecurity.pdf.

B13.2 Bid security shall be submitted in a digital format meeting the following criteria:

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

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

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

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

(e) The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B13.2(a).

B13.3 Bonds failing the verification process will not be considered to be valid and the bid shall be determined to be non-responsive in accordance with B17.1(a).

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

B13.4.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B13.5 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly formed with the successful Bidder and the contract securities are furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B13.6 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Tender.

B14. OPENING OF BIDS AND RELEASE OF INFORMATION

B14.1 Bids will not be opened publicly.

B14.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the MERX website at www.merx.com.

B14.3 After award of Contract, the name(s) of the successful Bidder(s) and their Contract amount(s) will be available on the MERX website at www.merx.com.

B14.4 The Bidder is advised that any information contained in any Bid may be released if required by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law or by City policy or procedures (which may include access by members of City Council).

B14.4.1 To the extent permitted, the City shall treat as confidential information, those aspects of a Bid Submission identified by the Bidder as such in accordance with and by reference to Part 2, Section 17 or Section 18 or Section 26 of The Freedom of Information and Protection of Privacy Act (Manitoba), as amended.

B15. IRREVOCABLE BID

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

B15.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly formed and the contract securities have been furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B16. WITHDRAWAL OF BIDS

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

B17. EVALUATION OF BIDS

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

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

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

(c) Total Bid Price;

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

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

B17.2.1 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 may determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

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

B18. AWARD OF CONTRACT

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

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

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

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

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

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

(d) only one Bid is received; or

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

B18.3 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.

B18.3.1 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.

B18.4 As noted in D3 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 2020-01-31) are applicable to the Work of the Contract.

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

C0.2 A reference in the Tender to a section, clause or subclause with the prefix "**C**" designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

D1.1 In addition to the General Conditions for Construction, these Supplemental Conditions are applicable to the Work of the Contract.

D2. FORM OF CONTRACT DOCUMENTS

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

D3. SCOPE OF WORK

D3.1 The Work to be done under the Contract shall consist of two parts:

(a) Part 1 – City Funded Work

(b) Part 2 – Manitoba Hydro Funded Work

Part 1 – City Funded Work

D3.2 Part 1 – City Funded Work shall consist of:

(a) Concrete Pavement Reconstruction
  (i) Archibald Street from Elizabeth Road to St. Catherine Street

(b) Water and Waste Work
  (i) Archibald Street from Elizabeth Road to St. Catherine Street

(c) Traffic Signal Conduit and Base Installation and Associated Works
  (i) Archibald Street and Elizabeth Road intersection
  (ii) Archibald Street and Gareau Street intersection
  (iii) CN Railway Crossing on Archibald Street south of Messier Street

Part 2 – Manitoba Hydro Funded Work

D3.3 Part 2 – Manitoba Hydro Funded Work shall consist of:

(a) Street Lighting and Associated Works
  (i) Archibald Street from Elizabeth Road to St. Catherine Street

D3.4 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 early May 2021. Part 2 of the Work is contingent upon Manitoba Hydro approving sufficient funding.

D3.4.1 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.

D3.4.2 Further to C7.5, C7.5.1, and C7.6, a reduction in the Contract Price pursuant to D3.4.1 shall not be considered in calculating the aggregate reduction in the Contract Price for purposes of C7.5.

D3.4.3 If all or any portion of Part 2 is eliminated pursuant to D3.4.1, 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.

D3.5 The major components of the Work are as follows:

(a) Concrete Pavement Reconstruction
  (i) Remove existing catch basins and curb inlets and abandon existing leads;
  (ii) Installation of catch basins, catch pits and connection pipe;
  (iii) Catch pit and catch basin insulation where required;
  (iv) Installation of temporary snow fencing;
  (v) Construction of temporary detour pavement;
  (vi) Removal of existing composite pavement;
  (vii) Excavation;
  (viii) Compaction of existing subgrade;
  (ix) Placement of separation/filtration geotextile fabric and Class A geogrid;
  (x) Placement of 50 mm and 100 mm sub-base materials;
  (xi) Placement of base course material;
  (xii) Construction of 250 mm plain-dowelled concrete pavement (hand pour and slip-form);
  (xiii) Construction of 200 mm reinforced concrete pavement approaches (hand pour);
  (xiv) Construction and renewal of 180 mm barrier curb (integral, separate and dowelled);
  (xv) Construction of 100 mm splash strip (separate);
  (xvi) Removal of existing sidewalk and construction of new 100 mm sidewalk with blockouts and paving stone indicator surfaces;
  (xvii) Renewal of existing sidewalk;
  (xviii) Regrading of existing paving stones and patio blocks;
  (xix) Construction of concrete medians and safety median;
  (xx) Placement of asphalt for tie-ins and approaches;
  (xxi) Placement of asphalt for active transportation pathway on west side of Archibald Street from Elizabeth Road to Guilbault Street;
  (xxii) Adjustment of manholes, water valves and curb stops;
  (xxiii) Boulevard Grading; and
  (xxiv) Sodding.

(b) Water and Waste Work
  (i) Remove and replace existing concrete manhole risers; and
  (ii) Insulation of watermain and water services under roadway.

(c) Traffic Signal Conduit and Base Installation and Associated Works
  (i) Installation of conduit (including into new/existing concrete bases and service boxes)
  (ii) Installation of concrete bases;
  (iii) Installation of service boxes;
  (iv) Removal of concrete bases;
  (v) Removal of service boxes;
  (vi) Installation of ground rods; and
  (vii) Cutovers.

(d) Street Lighting and Associated Works
  (i) Installation and removal of temporary overhead feeds;
  (ii) Removal of existing street light poles and bases;
  (iii) Installation of new pre-cast concrete bases including luminaire and appurtenances;
  (iv) Installation of new street lighting cables in conduit (trenching and boring) and poles including cable termination; and
  (v) Installation of ground rods.

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is AECOM Canada Ltd., represented by:

Ryan Cunningham, P.Eng.
Telephone No. (204) 928-8377
Email Address ryan.cunningham1@aecom.com

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

D5. CONTRACTOR'S SUPERVISOR

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

D5.2 At least two (2) Business Days prior to the commencement of any Work on the site, the Contractor shall provide the Contract Administrator with a phone number where the supervisor identified in D5.1 or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

D6. NOTICES

D6.1 Except as provided for in C22.4, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid/Proposal.

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

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

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

D7. FURNISHING OF DOCUMENTS

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

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

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

D9. SAFE WORK PLAN

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

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

D9.3 Notwithstanding B12.4 at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

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 ten million dollars ($10,000,000.00) inclusive, with the City, CN and its subsidiaries, Manitoba and its Ministers, officers, employees and agents, and Manitoba Hydro, as required by contract(s) added as additional insureds, with a cross-liability clause. Such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability, sudden and accidental pollution liability, contingent employer's liability, broad form property damage cover, a waiver of subrogation in favour of CN and it's subsidiaries and the City and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period. Said policy shall not contain any special limitations on the scope of coverage afforded the Contractor, or its employees related to liability for operations within or around railroads and railway tracks;

(b) automobile liability insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The limit of liability shall not be less than $5,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence and include a waiver of subrogation in favour of CN and it's subsidiaries and the City;

(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 Supervisor of Insurance, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in the C4.1 for the return of the executed Contract Documents, as applicable. Such certificate(s) shall contain a clause stating that the City, CN's and Manitoba's interests will not be prejudiced in the event the first named insured breaches any warranty of the policy;

D10.4 All policies shall be taken out with insurers duly licensed to carry on business in the Province of Manitoba.

D10.5 All Subcontractors performing Work on the Project shall provide the Contractor with evidence of insurance as outlined in D10.1 (a), (b) and (c) above and be registered with Workers Compensation Board of Manitoba and maintain insurance and workers compensation coverage throughout the performance of the Work, The Contractor shall provide the Contract Administrator with evidence of same prior to the commencement of any Work.

D10.6 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.

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

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

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

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

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

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

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

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

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

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

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

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

D12. SUBCONTRACTOR LIST

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

D13. DETAILED WORK SCHEDULE

D13.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Conditions for the return of the executed Contract Documents, as applicable.

D13.2 If, prior to submitting the Detailed Work Schedule, the Contractor does not receive notification pursuant to D14.4 that all or some portion of Part 2 of the Work may be commenced, he/she shall complete the Detailed Work Schedule for only Part 1 of the Work assuming that, if all of Part 2 is eliminated, the time periods stipulated in D20 for Substantial Performance of the Work and in D21 for Total Performance of the Work will be reduced by three (3) Working Days

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

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

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

D13.5 Further to D13.4(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 an award letter from the Award Authority authorizing the commencement of the Work.

D14.2 The Contractor shall not commence any Work on the Site until:

(a) the Contract Administrator has confirmed receipt and approval of:
  (i) evidence of authority to carry on business specified in D8;
  (ii) evidence of the workers compensation coverage specified in C6.15;
  (iii) the twenty-four (24) hour emergency response phone number specified in D5.2.
  (iv) the Safe Work Plan specified in D9;
  (v) evidence of the insurance specified in D10;
  (vi) the contract security specified in D11;
  (vii) the subcontractor list specified in D12; 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 not commence the Work on the Site before May 3, 2021, and shall commence the Work on Site no later than May 10, 2021, as directed by the Contract Administrator and weather permitting.

D14.4 The Contractor shall not commence Part 2 of the Work as described in D3 and identified in Form B: Prices, unless prior to May 3, 2021, he/she has received notification from the Contract Administrator that the City has received notice of sufficient funding from Manitoba Hydro.

D14.5 The City intends to award this Contract by March 12, 2021.

D14.5.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D15. WORKING DAYS

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

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) Manitoba Hydro (Street Lighting) – electrical supply and inspection of new street lighting hardware (to be installed by the Contractor) and the energizing of the new street light plant;

(b) Manitoba Hydro (Distribution) – hookup of Contractor machinery to temporarily stabilize distribution poles on the east side of Archibald Street during roadway excavation and backfill with sub-base material. Provide machinery to stabilize distribution poles with a primary dip. Removal of cutoff wooden poles;

(c) Manitoba Hydro (Gas) – lowering and/or rock wrapping of gas mains/services;

(d) Bell MTS – rebuilding of vault roofs in southbound pavement at Cote Street, Cusson Street and Deniset Street (work is scheduled to be complete prior to commencement of this contract);

(e) Telus – adjustment of vaults at Elizabeth Road, Guilbault Street and 730 Archibald Street;

(f) City of Winnipeg, Geomatics Branch – various works on survey monuments;

(g) City of Winnipeg, Traffic Signals Branch – work associated with installation and hookup of traffic signals plant at Elizabeth Road and Gareau Street not included in this Contract;

(h) City of Winnipeg, Transit – Dismantling and reinstallation of bus shelters, temporary relocation of bus stops; and

(i) City of Winnipeg, Water and Waste Department – Checking of water main valves.

D18. SEQUENCE OF WORK

D18.1 Further to C6.1, the sequence of work shall be as follows:

D18.1.1 The Work shall be divided into six stages, which are identified on the Construction Staging plans listed in E1.4. Stages are further subdivided into major items of work.

D18.1.2 <u>Stage 1</u>

(a) Underground Works

(i) Remove existing catch basins and curb inlets and abandon existing leads;

(ii) Install new catch basins and pipe and connect to existing manholes, new catch basins and sewer mains; and

(iii) Install new catch pits and connect to new catch basins.

(b) Traffic Signal Works (Majority of Works to be completed in Stage 1, stage Works as identified on the Construction Staging drawings and in consultation with the Contract Administrator and Traffic Signals Branch)

(i) Complete traffic signal works at Elizabeth Road, Gareau Street and the CN Railway crossing on Archibald Street south of Messier Street.

(c) Temporary Asphalt Pavement Construction

(i) Remove existing medians, pavement, curb and sidewalk at the locations identified on the drawings; and

(ii) Construct new temporary asphalt pavement.

D18.1.3 Stage 2, 3 and 4

(a) Construction of East Lanes

(i) Construct new 250 mm plain-dowelled concrete pavement and 200 mm reinforced concrete pavement;

(ii) Construct new 100 mm sidewalk with blockouts and paving stone indicator surfaces; and

(iii) Construct new curb and separate splash strip.

D18.1.4 Stage 5

(a) Construction of West Lanes

(i) Construct new 250 mm plain-dowelled concrete pavement and 200 mm reinforced concrete pavement;

(ii) Construct new 100 mm sidewalk with blockouts and paving stone indicator surfaces;

(iii) Construct new curb and separate splash strip; and

(iv) Construct new asphalt pathway.

D18.1.5 Stage 6

(a) Construction of Southbound Left Turn Lane and Medians at Elizabeth Road

(i) Construct new 250 mm plain-dowelled concrete pavement; and

(ii) Construct new median and safety median.

D18.1.6 Immediately following the completion of each phase, the Contractor shall clean up the Site and remove all plant, surplus material, waste and debris, other than that left by the City or other Contractors.

D19. CRITICAL STAGES

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

(a) Stage 4 – Stage 4 will not be permitted to commence until July 1, 2021 and must be totally completed by August 31, 2021. Total completion includes all pavement, sidewalk, curb, asphalt (temporary and final), landscaping and traffic signal works, to the satisfaction of the Contract Administrator.

D19.2 When the Contractor considers the Work associated with Stage 4 to be totally 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 Stage 4 Work has been accepted by the Contract Administrator as being completed to the requirements of the Contract is the date on which completion of Stage 4 has been achieved.

D20. SUBSTANTIAL PERFORMANCE

D20.1 The Contractor shall achieve Substantial Performance within one-hundred ten (110) 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 one-hundred fifteen (115) 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) Stage 4 – Three-Thousand Dollars ($3,000);

(b) Substantial Performance – Three-Thousand Dollars ($3,000);

(c) Total Performance – One-Thousand Five-Hundred Dollars ($1,500).

D22.2 The amounts specified for liquidated damages in D22.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

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

D23. COVID-19 SCHEDULE DELAYS

D23.1 The City acknowledges that the schedule for this Contract may be impacted by the COVID-19 pandemic. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the health and safety of workers and the public, directives from health authorities and various levels of government and in close consultation with the Contract Administrator.

D23.2 If the Contractor is delayed in the performance of the Work by reason of the COVID-19 pandemic, the Work schedule may be adjusted by a period of time equal to the time lost due to such delay and costs related to such delay will be determined as identified herein.

D23.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether COVID-19 will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to COVID-19, including but not limited to evidence related to availability of staff, availability of Material or work by others.

D23.4 For any delay related to COVID-19 and identified after Work has commenced, the Contractor shall within seven (7) Calendar Days of becoming aware of the anticipated delay declare the additional delay and shall provide sufficient evidence as indicated in D23.3. Failure to provide this notice will result in no additional time delays being considered by the City.

D23.5 The Work schedule, including the durations identified in D19 to D21 where applicable, will be adjusted to reflect delays accepted by the Contract Administrator. No additional payment will be made for adjustment of schedules except where seasonal work, not previously identified in the Contract, is carried over to the following construction season.

D23.6 Where Work not previously identified is being carried over solely as a result of delays related to COVID-19, as confirmed by the Contract Administrator, the cost of temporary works to maintain the Work in a safe manner until Work recommences, will be considered by the Contract Administrator. Where the Work is carried over only partially due to COVID-19, a partial consideration of the cost of temporary works will be considered by the Contract Administrator.

D23.7 Any time or cost implications as a result of COVID-19 and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

D24. SCHEDULED MAINTENANCE

D24.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

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

(b) Sod Maintenance as specified in CW 3510-R9.

D24.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

CONTROL OF WORK

D25. JOB MEETINGS

D25.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D25.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

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

D26.1 Further to C6.26, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

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

D27.1 Further to B12.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B12.4.

MEASUREMENT AND PAYMENT

D28. PAYMENT

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

WARRANTY

D29. WARRANTY

D29.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

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

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

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

THIRD PARTY AGREEMENTS

D30. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

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

D30.2 For the purposes of D30:

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

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

D30.3 Indemnification By Contractor

D30.3.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for Construction, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers,

servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.

D30.4 Records Retention and Audits

D30.4.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.

D30.4.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for Construction, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total Performance, all records, documents, and contracts referred to in D30.4.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.

D30.5 Other Obligations

D30.5.1 The Contractor consents to the City providing a copy of the Contract Documents to the Government of Manitoba and/or the Government of Canada upon request from either entity.

D30.5.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.

D30.5.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.

D30.5.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.

D30.5.5 The Contractor represents and warrants that no current or former public servant or public office holder, to whom the Value and Ethics Code for the Public Sector, the Policy on Conflict of Interest and Post Employment, or the Conflict of Interest Act applies, shall derive direct benefit from this Contract, including any employment, payments, or gifts, unless the provision or receipt of such benefits is in compliance with such codes and the legislation.

D30.5.6 The Contractor represents and warrants that no member of the House of Commons or of the Senate of Canada or of the Legislative Assembly of Manitoba is a shareholder, director or officer of the Contractor or of a Subcontractor, and that no such member is entitled to any benefits arising from this Contract or from a contract with the Contractor or a Subcontractor concerning the Work.

FORM H1: PERFORMANCE BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 834-2020

2021 Regional Street Renewal Program – Archibald Street Pavement Reconstruction
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. 834-2020

2021 Regional Street Renewal Program – Archibald Street Pavement Reconstruction

which is by reference made part hereof and is hereinafter referred to as the “Contract”.

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

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

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

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

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

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

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

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

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

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

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

_____ day of _____ , 20____ .

SIGNED AND SEALED
in the presence of:

_____
(Witness as to Principal if no seal)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

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

FORM J: SUBCONTRACTOR LIST

(See D12)

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Portion of the Work	Name	Address
SURFACE WORKS:		
Supply of Materials:		
Concrete		
Asphalt		
Base Course and Sub-Base		
Separation Filtration Geotextile Fabric/Geogrid		
Sod		
Installation/Placement:		
Concrete		
Asphalt		
Base Course and Sub-Base		
Separation Filtration Geotextile Fabric/Geogrid		
Sod		
Joint Sealant		
UNDERGROUND WORKS:		
Supply of Materials:		
Sewer Service Pipe		
Catch Basins and Catch Pits		
Frames and Covers		
Installation/Placement:		
Sewer Service Pipe		
Catch Basins and Catch Pits		
TRAFFIC SIGNAL WORKS		
Installation/Placement:		
Conduit, Bases, Service Boxes, Ground Rods, Cutovers		
STREET LIGHTING WORKS		
Installation/Placement:		
Street Light Poles, Conduit, Bases, Cable and Appurtenances		

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

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

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

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

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

E1.3 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B6. In every instance where a brand name or design specification is used, the City will also consider approved equals and/or approved alternatives in accordance with B6.

E1.4 The following are applicable to the Work:

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
CT-00	Cover Sheet and Location Plan	A1
CT-01	Plan/Profile – Station 0+110 to Station 0+240	A1
CT-02	Plan/Profile – Station 0+240 to Station 0+360	A1
CT-03	Plan/Profile – Station 0+360 to Station 0+480	A1
CT-04	Plan/Profile – Station 0+480 to Station 0+600	A1
CT-05	Plan/Profile – Station 0+600 to Station 0+730	A1
CT-06	Plan/Profile – Station 0+730 to Station 0+860	A1
CT-07	Plan/Profile – Station 0+860 to Station 0+980	A1
CT-08	Plan/Profile – Station 0+980 to Station 1+090	A1
CT-09	Plan/Profile – Station 1+090 to Station 1+190	A1
CT-10	Plan/Profile – Station 1+190 to Station 1+330	A1
CT-11	Concrete Joint Plan – Station 0+120 to Station 0+490	A1
CT-12	Concrete Joint Plan – Station 0+490 to Station 1+060	A1
CT-13	Concrete Joint Plan – Station 1+060 to Station 1+320	A1
CT-14	Cross Sections and Details	A1
CT-15	Construction Staging Cross Sections	A1
CT-16	Construction Staging – Stage 1 – Temporary Pavement & Underground Works	A1
CT-17	Construction Staging – Stage 1 – Temporary Pavement & Underground Works	A1
CT-18	Construction Staging – Stages 2, 3 &4	A1
CT-19	Construction Staging – Stages 2, 3 &4	A1
CT-20	Construction Staging – Stages 2, 3 &4	A1
CT-21	Construction Staging – Stages 2, 3 &4	A1
CT-22	Construction Staging – Stage 5	A1
CT-23	Construction Staging – Stage 5 & 6	A1
CT-24	Construction Staging – Stage 5 & 6	A1
S-1734	Traffic Signals – Archibald St. & Elizabeth Rd.	A1
S-1180	Traffic Signals – Archibald St. & Gareau St.	A1
S-2100	Advance Railway Crossing – Archibald St. & Messier St.	A1

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
SD-315.A	Signal Pole Base – Type PM	
SD-315.C	Signal Pole Base - POD	
SL-REF-01	Archibald Street – Street Lighting – Elizabeth Road to St. Catherine Street	A1

E1.4.1 Traffic signals drawings (S-1734, S-1180 and S-2100) and street light drawings are provided for bidding purposes only. Sealed traffic signals drawings and street light drawings will be provided to the Contractor prior to commencement of construction.

E2. MOBILIZATION AND DEMOBILIZATION PAYMENT

DESCRIPTION

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

E2.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E2.3 The inclusion of a payment item for the Work under this Specification shall not release or reduce the responsibilities of the Contractor under any other specification in this Contract.

SCOPE OF WORK

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

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

(b) Demobilization shall include, but not be limited to:
   (i) All activities and costs for transportation of personnel, equipment, and supplies not used in the project from the site, and/or sites, and/or between sites;
   (ii) Disassembly, removal, and site cleanup and restoration of offices, buildings, and other facilities assembled on the site and/or sites;
   (iii) Repair of access roads, temporary haul roads, and equipment parking areas leaving the project site in the same or better condition than at the start of the project;
   (iv) General cleanup and housekeeping needed to restore a neat and orderly project site.

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

MEASUREMENT AND PAYMENT

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

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

E2.7 Payment for Mobilization:

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

E2.8 Payment for Demobilization:

(a) The remaining 40% of the lump-sum price will be paid upon:
  (i) Restoration of the site and/or sites to the satisfaction of the Contract Administrator;
  (ii) Distribution of the Declaration of Total Performance.

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

E3. GEOTECHNICAL REPORT

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

E4. OFFICE FACILITIES

E4.1 The Contractor shall supply office facilities meeting the following requirements:

(a) The field office shall be for the exclusive use of the Contract Administrator.

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

(c) The building shall have a minimum floor area of 20 square metres, a height of 2.4 m with two windows for cross ventilation and a door entrance with a suitable lock.

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

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

(f) The building shall be furnished with one desk, one drafting table, one table 3 m X 1.2 m, one stool, and a minimum of 8 chairs.

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

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

E4.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E4.3 The office facilities will be provided from the date of the commencement of the Work to the date of Total Performance.

E5. PROTECTION OF EXISTING TREES

E5.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within the limits of the construction area:

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

E5.2 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the City Forester or his/her designate.

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

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

E6. TRAFFIC CONTROL

E6.1 Further to clauses 3.6, 3.7 and 3.8 of CW 1130:

(a) Where directed by the Contract Administrator, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planing drop-offs to the satisfaction of the Contract Administrator. Payment shall be in accordance with CW 3410.

(b) The Contractor shall be designated as the Authorized Construction Agency for this Contract.

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

(d) Restoration and/or installation of permanent signage will be completed by the Traffic Services Branch of the City of Winnipeg.

E6.2 Further to E6.1(b) and E6.1(c), in accordance with the MTTC, the Contractor shall be responsible for and bear all costs associated with supplying, placing, maintaining and removing the regulatory signage indicated on the Construction Staging plans approved by the Traffic Management Branch (Drawings CT-16 to CT-24). The Contractor shall also be responsible for supplying, placing, maintaining and removing the bicycle detour and bicycles yield to pedestrian signs indicated on the Construction Staging plans. In cases where the Contractor is unable to

perform the responsibilities noted above, the Contract Administrator shall make arrangements with the Traffic Services Branch of the City of Winnipeg to supply, place, maintain and remove these traffic control devices. The Contractor is authorized and responsible to supply, place, maintain and remove the traffic control devices in the following situations for this Contract (as identified in Section 2.04 of the MTTC):

(a) Parking restrictions,

(b) Stopping restrictions,

(c) Turn restrictions,

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

(e) Traffic routed across a median,

(f) 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.

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

E6.2.1 All signs with a written message supplied and placed by the Contractor shall be bilingual.

E6.2.2 The contractor shall supply and install flexible yellow temporary overlay markers (TOM) to separate two-way traffic as noted on the construction staging drawings. TOM's must have adhesive for installation and be reflectorized on both sides. TOM's shall be placed every 10 metres on a clean and dry surface, where the atmospheric temperature is 10 degrees Celsius or higher. No measurement or payment will be made for the supply and installation of TOM's.

E6.2.3 Further to E6.1 and E6.2, where the Contract Administrator has determined that the services of the Traffic Services Branch are required, the City shall bear the costs associated with the placement of temporary traffic control devices by the Traffic Services Branch of the City of Winnipeg in connection with the works undertaken by the Contractor.

E7. TRAFFIC MANAGEMENT

E7.1.1 The Construction Staging drawings include details on traffic management, pedestrian/cyclist access and signage placement and are identified in E1.4.

E7.1.2 Maintain a minimum of one lane of traffic northbound and one lane of traffic southbound at on Archibald Street at all times, including during paving operations (except as noted in bold below). When no work is being performed on site, non-essential lane closures will not be permitted. **Closure of Archibald Street to southbound traffic from Elizabeth Road to St. Catherine Street will be permitted on Saturday or Sunday to pave the southbound centre lane (Stage 5). The Contractor shall provide the Contract Administrator with a minimum of fourteen (14) calendar days notice for the closure of Archibald Street to southbound traffic from Elizabeth Road to St. Catherine Street. Multiple Saturday/Sunday southbound closures will be permitted provided the Contractor provides the required notice to the Contract Administrator.**

E7.1.3 A left turn lane shall be maintained for southbound traffic on Archibald Street at Elizabeth Road at all times, except during Stage 5A and Stage 5C.

E7.1.4 During Stage 5A and Stage 5C, the Contractor shall sign Gareau Street as one-way westbound from Archibald Street to the alley to the west and Guilbault Street as one-way eastbound from Archibald Street to the alley to the west.

E7.1.5 Intersecting local street, median opening and private approach access shall be maintained at all times unless excavation/concrete pavement operations require temporary closure. Temporary closures are to be staggered such that consecutive intersections are not closed at the same time.

E7.1.6 Flag persons may be necessary to maintain the flow of traffic during certain work operations.

E7.1.7 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he/she shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

E7.1.8 Pedestrian access must be maintained on one side of Archibald Street at all times. Pedestrian crossings in the east-west and north-south directions must be maintained as per the Construction Staging drawings.

E7.1.9 Ambulance/emergency vehicle access must be maintained at all times.

E8. REFUSE AND RECYCLING COLLECTION

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

E8.2 Collection Schedule:

Location	Collection Day	Collection Requirements
680 Archibald Street EJ Coutu	Tuesday	City Collection, curb side cart pickup
696 Archibald Street Fort Garry Curling Club		Private Collection, pickup is on as required basis, except during Folklorama which is daily pickup
730 Archibald Street Ken's Carpets	Tuesday & On As Required Basis	Private Collection, provide access to rear parking lot for full size bin pickup
740 Archibald Street Riverstone Heights	Monday & Thursday	City Collection, provide access to rear parking lot for full size bin pickup
750 Archibald Street Riverstone Heights	Monday & Thursday	City Collection, provide access to rear parking lot for full size bin pickup
778 Archibald Street Holy Family Parish	Thursday	City Collection, provide access to rear parking lot for full size bin pickup
800 Archibald Street Archwood School	Tuesday (Recycling) & Wednesday (Garbage)	Private Collection, recycling and garbage collection are on alternating weeks, provide access to rear parking lot for full size bin pickup
862, 864, 807, 878 Archibald Street	Tuesday	City Collection, curb side cart pickup
920 Archibald Street 7 Eleven		Private Collection, can be completed off Elizabeth Road
932 Archibald Street	Tuesday (Recycling) Monday & Thursday (Garbage)	City Collection, provide access to rear parking lot for full size bin pickup

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

E9. PEDESTRIAN SAFETY

E9.1 Upon commencement, temporary snow fence shall be installed along the full length of the project on the east and west sides of Archibald Street from the south project limit to the north project limit. The position of the snow fence shall be as per drawing CT-15 and the Contract Administrator's direction, and allow for access to properties and for pedestrians and cyclists. The Contractor shall be responsible for maintaining the snow fence in a proper working condition. The Contractor will be permitted to remove the fence when required to commence construction in an area, provided the Construction Staging plans are adhered to and with approval of the Contract Administrator. No measurement for payment shall be made for this work.

E10. WATER OBTAINED FROM THE CITY

E10.1 Further to clause 3.7 of CW 1120, the Contractor shall pay for all costs, including sewer charges, associated with obtaining water from the City in accordance with the Waterworks and Sewer By-laws.

E11. SURFACE RESTORATIONS

E11.1 Further to clause 3.3 of CW 1130, when Total Performance is not achieved in the year the Contract is commenced, the Contractor shall temporarily repair any Work commenced and not completed to the satisfaction of the Contract Administrator. The Contractor shall maintain the temporary repairs in a safe condition as determined by the Contract Administrator until permanent repairs are completed. The Contractor shall bear all costs associated with temporary repairs and their maintenance.

E12. INFRASTRUCTURE SIGNS

E12.1 The Contractor shall obtain infrastructure signs from the Traffic Services Sign Shop at 421 Osborne Street. The Contractor shall mount each sign securely to a rigid backing material approved by the Contract Administrator. The Contractor shall fasten each sign to a suitable support and erect and maintain one sign at each street as directed by the Contract Administrator. When the Contract Administrator considers the Work on the street complete, the Contractor shall remove and dispose of the signs and supports. No measurement for payment will be made for performing all operations herein described and all other items incidental to the work described.

E13. TEMPORARY ASPHALT PAVEMENT

DESCRIPTION

E13.1 This specification covers the construction and removal of temporary asphalt pavement for roadway detours.

E13.2 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

CONSTRUCTION METHODS

E13.3 Remove existing medians, curb, sidewalk and pavements to the limits shown on the drawings and as directed by the Contract Administrator. Sawcut existing sidewalk and pavements full depth prior to removal along the west gutter lane.

E13.4 Excavate existing material to allow for the placement of 350 mm of 50 mm Granular B sub-base and 75 mm of Type IA asphalt pavement.

E13.5 Supply and install temporary standard frames with grated covers (AP-006 and AP-008), concrete risers and bricks to adjust new catch basins to finished grade of the temporary asphalt pavement. The Contractor is responsible for salvaging these items (items remain property of the Contractor) upon removal of the temporary asphalt pavement and installing the frame and cover included with the catch basin installation pay item.

E13.6 Compact existing subgrade and place separation/filtration geotextile fabric.

E13.7 Place and compact 350 mm of 50 mm Granular B sub-base and 75 mm of Type IA asphalt pavement. Provide 2% crossfall to the west gutter line along the west side temporary pavement widening and positive drainage as required for temporary asphalt pavement in medians.

E13.8 Construct asphalt curb along the west edge of the west side temporary pavement widening. The height of the asphalt curb shall match the top of the adjacent saw cut sidewalk, unless otherwise directed by the Contract Administrator.

E13.9 Remove temporary asphalt pavement, including separation/geotextile fabric, 50 mm Granular B sub-base, Type IA asphalt and asphalt curb when no longer required to accommodate traffic and as directed by the Contract Administrator.

MEASUREMENT AND PAYMENT

E13.10 Construction of temporary asphalt pavement shall be measured on an area basis and paid for at the Contract Unit Price per square metre of “Construction of Temporary Asphalt Pavement”. The area to be paid for shall be the total square meters of temporary asphalt pavement constructed accordance with this specification (E13.3 to E13.8), accepted and measured by the Contract Administrator.

E13.11 Removal of temporary asphalt pavement shall be measured on an area basis and paid for at the Contract Unit Price per square metre of “Pavement Removal, Temporary Asphalt Pavement”. The area to be paid for shall be the total square meters of temporary asphalt pavement removed in accordance with this specification (E13.9), accepted and measured by the Contract Administrator.

E13.12 Construction of asphalt curb is incidental to “Construction of Temporary Asphalt Pavement”.

E14. PORTLAND CEMENT CONCRETE SIDEWALK WITH BLOCK OUTS FOR INDICATOR SURFACES

DESCRIPTION

E14.1 This specification shall supplement CW 3325-R5 “Portland Cement Concrete Sidewalks”.

CONSTRUCTION METHODS

E14.2 Add the following to section 9:

E14.2.1 As shown on the drawings and as directed by the Contract Administrator, construct sidewalk with block outs and/or monolithic curb and sidewalk with block outs, to allow for the installation of indicator surfaces.

E14.2.2 **Where 100 mm sidewalk with block outs is installed adjacent to the curb, install 10M deformed bars, 300 mm long and 600mm on centre in the curb during pouring. 10M bars are to penetrate the curb 75 mm.**

E14.2.3 Verify dimensions of paving stones (indicator surface) prior to construction of the block-outs. Gaps between paving stones and concrete pavement shall not exceed five (5) millimetres.

E14.2.4 Concrete curbs for monolithic curb and sidewalk with block outs shall be constructed in accordance with CW 3240.

MEASUREMENT AND PAYMENT

E14.3 Add the following to section 12:

E14.3.1 Construction of concrete sidewalks with block outs for indicator surfaces will be measured on surface area basis. The surface area to be paid for shall be the number of square metres constructed in accordance with this specification and accepted by the Contract Administrator, as computed by measurements made by the Contract Administrator.

BASIS OF PAYMENT

E14.4 Add the following to section 13:

E14.4.1 Construction of concrete sidewalks with block outs for indicator surfaces will be paid for at the Contract Unit Price per square meter for the "Items of Work" listed here below, measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this specification.

E14.4.2 Items of Work:

(a) 100 mm Sidewalk with Block Outs

(b) 150 mm Sidewalk with Block Outs

(c) Monolithic Curb and 100 mm Sidewalk with Block Outs*

(d) Monolithic Curb and 150 mm Sidewalk with Block Outs*

* - reveal height and type

E14.4.3 Concrete thickness greater than the specified sidewalk thickness as a result of shaping the base material to accommodate the block outs is incidental to the listed Items of Work.

E14.4.4 Installation of 10M deformed bars is incidental to the construction of 100 mm sidewalk with block outs.

E15. PAVING STONES FOR INDICATOR SURFACES

DESCRIPTION

E15.1 This specification shall supplement CW 3330-R5 "Installation of Interlocking Paving Stones"

MATERIALS

E15.2 Add the following to section 5:

E15.2.1 Paving Stones for indicator surfaces shall be as shown on the drawings.

E15.2.2 Paving Stones for indicator surfaces shall be:

Barkman Concrete paving stones -
Charcoal Holland Paver (60mm X 210 mm X 210 mm)
https://www.barkmanconcrete.com/

Endicott Clay Paver(92mm X 57mm X 194mm)- Dark Ironspot
https://endicott.com/

Yankee Hill Brick (92mm X 57mm X 194mm)- Dark Ironspot
http://yankeehillbrick.com/

CONSTRUCTION METHODS

E15.3 Add the following to section 9.2 "Preparation of Sub-grade, Sub-base and Sand-base" :

E15.3.1 Preparation of Sand-Base for Paving Stones in Sidewalk Block Outs.

E15.3.2 Place a 15mm layer of bedding sand in the blocked out sidewalk areas.

E15.3.3 The bedding sand shall be spread and levelled so that the paving stones when installed are 5 mm higher than the finished grade.

E15.3.4 No more sand shall be spread than can be covered in with paving stone on the same day.

E15.3.5 The bedding sand shall not be compacted or disturbed prior to laying the paving stones.

E15.4 Add the following to section 9.3 “Installation of Paving Stones”:

E15.4.1 For indicator surface paving stones, commence installation of paving stones against the long edge of the block out to obtain the straightest possible course of installation.

MEASUREMENT AND PAYMENT

E15.5 Add the following to section 12:

E15.6 Supply and Installation of Paving Stones for Indicator Surfaces

E15.6.1 Paving stones for indicator surfaces will be measured on surface area basis. The surface area to be paid for shall be the number of square metres constructed in accordance with this specification and accepted by the Contract Administrator, as computed by measurements made by the contract Administrator.

BASIS OF PAYMENT

E15.7 Add the following to section 13:

E15.7.1 The supply and installation of paving stones for indicator surfaces will be paid for at the Contract Unit Price per square meter for “Paving Stone Indicator Surface”, measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this specification.

E15.7.2 Concrete thickness greater than the specified sidewalk thickness as a result of shaping the base material to accommodate the block outs is incidental to the listed Items of Work.

E16. DOWELS AND TIE-BARS

E16.1 Further to Section 9.2.3 of CW 3310, no measurement or payment will be made for dowels or tie bars that are drilled along a joint between new sections of concrete constructed as part of this Contract. Dowels or tie bars that are drilled into new concrete pavement will be considered incidental to the construction of the concrete pavement.

E16.2 Installation of 10M deformed bars as noted in E14.2.2 shall be completed for construction of “100 mm Concrete Sidewalk” and no measurement or payment will be made.

E17. SUPPLY AND INSTALL WATERMAIN AND WATER SERVICE INSULATION

DESCRIPTION

E17.1 Notwithstanding 3.12 of CW 2110, this specification covers the supply and installation of insulation in roadway excavations over watermains and water services.

E17.2 Referenced Standard Construction Specifications

(a) CW 2030 – Excavation Bedding and Backfill

(b) CW 3110 – Sub –grade, Sub-base and Base Course Construction

E17.3 Referenced Standard Details

(a) SD-018 - Watermain and Water Service Insulation

MATERIALS

E17.4 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”

E17.5 Sand Bedding:

(a) In accordance with CW 2030

CONSTRUCTION METHODS

E17.6 Prior to the installation of any sub-base material or geotextile material, locate all existing water services. Further to SD-018, where directed by the Contract Administrator, excavate the sub-grade to allow the top of the insulation to be installed flush with the surrounding sub-grade. Install the insulation on a level surface centered over the located watermain or water service for the full width of the roadway excavation. Install sand bedding if required to level the surface. Stockpile and dispose of excavated material in accordance with CW 3110.

E17.7 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.

E17.8 Place insulation panels adjacent to each other over the specified area with no gaps between panels and less than 15mm of elevation difference along the adjoined edges. Where 2” thick panels are being used, offset the top layer to prevent the panel joints from aligning with the joints in the lower layer.

E17.9 Use full panels of insulation where possible. Where necessary cut insulation panels to obtain coverage to specified lengths. Insulation pieces shall be a minimum of dimension of 300 mm in width or length.

E17.10 Take appropriate measures to ensure panels are not displaced when installing geotextiles and during backfilling operations.

MEASUREMENT AND PAYMENT

E17.11 Watermain and Water Service Insulation shall be measured on an area basis and paid for at the Contract Unit Price per square metre of “Watermain and Water Service Insulation”. The area to be paid for shall be the total square meters of watermain and water service insulation supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

(a) Excavation of the roadway subgrade in accordance with E17.6 will not be measured for payment and will be included in the payment for “Watermain and Water Service Insulation”.

E18. INSULATION OF EXISTING WATER MAINS AND WATER SERVICES AT CATCH PITS AND CATCH BASINS

DESCRIPTION

E18.1 General

E18.1.1 This Specification covers all operations relating to the insulation of water mains or water services where a catch pit and/or catch basin will be installed in the vicinity of an existing water main or water service.

E18.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all

things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

CONSTRUCTION METHODS

E18.2 Install insulation where a catch pit or catch basin will be installed in the vicinity of an existing water main or water service in accordance with CW 2110-R11, SD-018 and E17, and as directed by the Contract Administrator.

E18.2.1 Place sand bedding 100 mm thick to support insulation to be placed at the bottom of the excavation.

E18.2.2 Install insulation against the walls and at the bottom of the excavation.

MEASUREMENT AND PAYMENT

E18.3 Catch Pit Insulation

E18.3.1 Catch Pit and Catch Basin Insulation will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Catch Pit and Catch Basin Insulation”, which price shall be payment in full for the supplying all materials and for completing all operations herein described and all other items incidental to the work included in this Specification, accepted and measured by the Contract Administrator.

E19. MATERIALS FOR TRAFFIC SIGNAL INSTALLATIONS

E19.1 Further to CW 3620 2.11, Anchor Bolt Templates and Top Rings:

(a) Master anchor bolt templates and Oversized D top rings are provided by the City and shall be used by the Contractor for all bases constructed under the provisions of this specification.

(b) When using anchor bolt templates and top rings for pouring concrete they must both be oiled (inside and out) for ease of removal and cleaning. Following the removal of anchor bolt template and top ring, both must be cleaned immediately.

(c) The templates shall be suitably cleaned by the Contractor at the end of the Contract and be returned to the City. The template shall be cleaned free of concrete residue and any other debris and returned to the City in a “like-new” condition.

(d) In the event of loss or damage to materials supplied by the City, the cost of replacement materials shall be borne by the Contractor.

(e) The Contractor shall contact the City of Winnipeg Stores Foreman to coordinate the pickup of the materials. Prior to pickup of the materials the Contractor will be required to obtain specific account information from the Traffic Signals Branch.

(i) Public Works Stores
Attn: Stores Foreman
1277 Pacific Ave
Winnipeg, MB R3E 1G7
Phone: (204) 794-4333

E19.2 Further to CW 3620 2.10, City Supplied Materials:

(a) If requested by the Contract Administrator, the Contractor shall submit in writing an account for all materials supplied by the City, showing in detail all materials drawn from the City's stores, quantities used at each work location, and materials on hand.

(b) The City will issue the Contractor a "float" quantity of the above noted City-supplied materials, for the purpose of expediting the daily work progress.

(c) The Contractor shall be obliged to requisition and withdraw those items which are City supplied material on the basis of the estimated quantity needed for a particular job.

(d) The Contractor shall account for the quantities of materials drawn to the satisfaction of the City. Any overdraw of materials in excess of required quantities shall be credited or returned to the City. At the end of the Contract, all surplus materials shall be returned to the City.

E20. INSTALLATION OF TRAFFIC SIGNAL SERVICE BOXES (PRE-CAST)

DESCRIPTION

E20.1 This specification covers the use and installation of a service box pre-cast (SD-322) 17” x 30” x18” and 13” x 24” x 18”.

MATERIALS

E20.2 Materials shall be as per Section 2 of CW 3620.

CONSTRUCTION METHODS

E20.3 Install pre-cast service box in grass boulevards/medians, and hard surfaced medians or as shown on the Drawings or as directed by the Contract Administrator.

E20.4 Fill bottom of excavation with compacted limestone base course material to set precast service box to grade.

E20.5 Install pre-cast service box on top of the compacted granular fill material to pavement, sidewalk or boulevard finish grade.

E20.6 All conduits must be bundled into a group in the centre of the pre-cast service box. Install plastic plugs prior to back fill.

E20.7 Backfill around pre-cast service box exterior. Back fill shall conform to requirements of SD-342.

E20.8 Pre-cast service box shall meet the grade of the sidewalk or boulevard provided by the Contract Administrator.

MEASUREMENT AND PAYMENT

E20.9 Installation of service boxes shall be measured on a unit basis and paid for at the Contract Unit Price per unit for “Items of Work” listed below. The number of units to be paid for shall be the total number of Service Boxes installed in accordance with this specification, accepted and measured by the Contract Administrator.

(a) Service Box Pre-Cast (17” x 30”)

E21. INSTALLATION OF EARLY OPEN CONCRETE TRAFFIC SIGNAL BASES

DESCRIPTION

E21.1 This specification shall cover the installation of early open concrete bases.

MATERIALS

E21.2 Supply concrete for bases in accordance with CW 2160, Table CW 2160.1 Design Requirements for Concrete Used for Underground Structures, for Type A Structures (monolithic sewers and reinforced structures).

E21.3 Further to E21.2, the supplied concrete shall achieve a minimum compressive strength of 22 MPa at 48 hours.

E21.4 City Supplied Materials shall be as per Section 2.10 of CW 3620 and E19.

CONSTRUCTION METHODS

E21.5 Construction methods for the installation of early open concrete bases shall be as per Section 3.7 or CW 3620.

MEASUREMENT AND PAYMENT

E21.6 Installation of Concrete Bases shall be measured on a unit basis and paid for at the Contract Unit Price per unit for "Items of Work" listed below. The number of units to be paid for shall be the total number of concrete bases installed in accordance with this specification, accepted and measured by the Contract Administrator.

(a) Signal Pole Base Early Open – Type G

(b) Signal Pole Base Early Open – Type OD

E21.7 Payment for the items of work in this Section includes the supply and installation of ready mix or mixed concrete on site.

E21.8 Payment for the items of work listed above includes the supply and installation of grounding rods (electrodes) installed with the concrete bases.

E21.9 Payment for the items of work listed above includes boring.

E21.10 Payment for the items of work listed above includes top ring forms.

E22. WORK WITHIN CN RAILWAY RIGHT-OF-WAY

GENERAL REQUIREMENTS

E22.1 The Contractor shall be responsible to meet all Canadian National (CN) constraints, requirements, and safety measures.

E22.2 The Contractor shall not enter into CN property at any time unless they have obtained an agreement from CN and adhere to CN safety measures. All employees must complete the contractor orientation course prior to working within the CN right-of-way.

E22.3 The Contractor shall arrange with CN to have CN supply a flag person for all activity on the CN right-of-way as required by CN.

E22.4 The Contractor shall assist the Contract Administrator and City to apply for a CN work permit. A sample form is attached in Appendix 'H'.

E22.5 The Contractor shall follow all construction and safety requirements while working within the CN right-of-way as specified within the current "CN Safety Guidelines for Contractors and Non-CN Personnel".

E22.6 The Contract Administrator will contact CN to commence the work permit and approvals process at:

Sara Lovegrove
Prairie Utility Coordinator
sara.lovegrove@CN.ca
Phone: (780) 643-7668

MEASUREMENT AND PAYMENT

E22.7 All works associated with this specification will be considered incidental to the contract and no payment will be made. Fees associated with the CN work permit and costs for flagging services at the CN crossing on Archibald Street south of Messier Street will be paid for by the City.

E23. WORKING AROUND MANITOBA HYDRO POLES

GENERAL REQUIREMENTS

E23.1 When completing roadway excavation around Manitoba Hydro wood poles, Manitoba Hydro Safety Watch will be required. The Contractor shall provide equipment capable of stabilizing the pole while excavation and placement of granular sub-base materials to full thickness is completed. Equipment shall be acceptable to Manitoba Hydro and the Contract Administrator.

E23.2 Manitoba Hydro personnel will be responsible for securing the Contractor's equipment to each wood pole, except where a primary dip is located on the wood pole. If the primary dip is present, Manitoba Hydro will complete the stabilization.

MEASUREMENT AND PAYMENT

E23.3 The Work described in this specification shall be considered incidental to "Excavation" and no measurement or payment will be made.

E24. INSTALLATION OF STREET LIGHTING AND ASSOCIATED WORKS

E24.1 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).

E24.2 DESCRIPTION

E24.2.1 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.

E24.3 WORK LOCATIONS

E24.3.1 The proposed street light installation (red) and removals (green) are shown on drawings SL-REF-01, SL-REF-02 and SL-REF-03 and are as follows:

(a) Archibald Street from Cottonwood Road to Elizabeth Road

E24.4 COORDINATION OF WORK

E24.4.1 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.

E24.4.2 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.

E24.4.3 Manitoba Hydro's CSC will provide the Limits of Approach applicable to the Contractor on the Work Clearance form.

E24.5 ORIENTATION

E24.5.1 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.

E24.6 PRE-CONSTRUCTION MEETING

E24.6.1 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.

E24.6.2 The Contractor's cost to attend this pre-construction meeting shall be incorporated into the unit prices for the work.

E24.7 QUALIFICATIONS AND CERTIFICATION

E24.7.1 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.

E24.7.2 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.

E24.7.3 Office of the Fire Commissioner Bulletin OFC 18 – 002 dated May 23, 2018 regarding Electrician Licenses discusses the requirements for a "Limited Specialized Trade Licence – 'M-P' Licence – Power Line".

For more information contact:
Office of the Fire Commissioner
500-401 York Avenue
Winnipeg, Manitoba R3C 0P8
Tel. 204-945-3373
Fax 204-948-2089
Toll Free: 1-800-282-8069
firecomm@gov.mb.ca

E24.7.4 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.

E24.7.5 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.

E24.8 REFERENCED STANDARD CONSTRUCTION SPECIFICATIONS

E24.8.1 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")

E24.8.2 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.

E24.8.3 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.

E24.9 TOOLS, EQUIPMENT AND MATERIALS

E24.9.1 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.

E24.9.2 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

E24.9.3 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.

E24.9.4 Alternative equipment manufacturers may be considered upon request by the Contractor and shall be approved for use by Manitoba Hydro prior to use.

E24.9.5 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.

E24.10 MATERIAL SUPPLIED BY MANITOBA HYDRO

E24.10.1 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:

E24.10.2 Manitoba Hydro Central Stores (contact personnel will be provided to the successful contractor).

E24.10.3 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.

E24.10.4 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.

E24.10.5 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.

E24.11 MATERIAL SUPPLIED BY CONTRACTOR

E24.11.1 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.

E24.12 SURPLUS, RECLAIM AND SCRAP MATERIAL

E24.12.1 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.

E24.12.2 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.

E24.12.3 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.

E24.13 DE-ENERGIZATION AND LOCKOUT

E24.13.1 **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.

E24.13.2 **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.

E24.13.3 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.

E24.14 TEMPORARY OVERHEAD FEEDS

E24.14.1 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.

E24.14.2 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.

E24.14.3 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.

E24.14.4 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.

E24.15 SAFE EXCAVATION

E24.15.1 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.

E24.16 SAFE HANDLING

E24.16.1 The Contractor shall apply handling techniques in accordance with Manitoba Workplace Health and Safety Regulation 217 (latest revision).

E24.17 ELECTRIC CABLES AND CONDUITS

E24.17.1 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.

E24.17.2 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.

E24.17.3 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.

E24.17.4 The Contractor shall provide Manitoba Hydro's inspector sufficient opportunity, in the sole discretion of Manitoba Hydro, to inspect the work.

E24.18 PRECAST CONCRETE BASES

E24.18.1 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.

E24.18.2 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.

E24.19 STREET LIGHT POLES AND ARMS

E24.19.1 The Contractor shall handle, store, transport, and provide proper load securement for the poles and arms in a manner to prevent damage.

E24.20 LUMINAIRES

E24.20.1 The Contractor shall handle, store, transport and unload the luminaires in their original packaging and in a manner to prevent damage.

E24.21 SMALL MATERIAL

E24.21.1 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.

E24.22 CARE OF MATERIALS

E24.22.1 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.

E24.23 WIRE AND CABLE REEL STORAGE

E24.23.1 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.

E24.23.2 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.

E24.24 REEL HANDLING

E24.24.1 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.

E24.24.2 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.

E24.24.3 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.

E24.24.4 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.

E24.25 PRESSURIZED WATER/VACUUM EXCAVATION

E24.25.1 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.

E24.25.2 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.

E24.26 REMOVAL STREET LIGHT POLE FROM EXISTING BASE

E24.26.1 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.

E24.26.2 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.

E24.26.3 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.

E24.27 REMOVAL OF BASE AND DIRECT BURIED STREET LIGHT POLE

E24.27.1 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.

E24.27.2 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.

E24.27.3 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.

E24.28 INSTALLATION OF FOUNDATION - CONCRETE BASE

E24.28.1 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.

E24.28.2 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.

E24.28.3 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.

E24.28.4 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.

E24.28.5 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.

E24.28.6 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.

E24.29 BASE MOUNTED STREET LIGHT POLES

E24.29.1 This shall include all work required to install the street light pole on the concrete base as set forth in this Specification.

E24.29.2 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.

E24.29.3 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.

E24.29.4 The Contractor shall level the street light pole in all 4 directions. Leveling shims may be used.

E24.29.5 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.

E24.29.6 Unless otherwise specified, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.

E24.29.7 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.

E24.30 LUMINAIRES AND ASSOCIATED WIRING

E24.30.1 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.

E24.30.2 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.

E24.30.3 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.

E24.31 BREAK AWAY BASES

E24.31.1 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.

E24.31.2 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.

E24.32 SPLICING/CONNECTING CABLES

E24.32.1 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.

E24.32.2 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).

E24.33 EXCAVATION

E24.33.1 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.

E24.33.2 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.

E24.34 LAYING CABLES

E24.34.1 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.

E24.34.2 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.

E24.34.3 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.

E24.34.4 During installation, under no circumstance is the cable to be subjected to a bending radius tighter than that detailed in the Standards.

E24.34.5 Where specified in the Standards or on the construction drawings, the Contractor shall install the street light cable in a conduit.

E24.35 INSTALLING CONDUIT AND CABLE BY BORING (HORIZONTAL DIRECTIONAL DRILLING)

E24.35.1 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.

E24.35.2 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.

E24.35.3 Drilling fluids and associated waste materials shall be disposed of in a manner that minimizes environmental effects.

E24.35.4 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.

E24.36 BURIED UTILITY CROSSINGS

E24.36.1 All buried obstructions are not necessarily shown on the reference drawings and the locations of those indicated are approximate only.

E24.36.2 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.

E24.36.3 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.

E24.36.4 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.

E24.37 BENDING CABLES/CONDUITS AND INSTALLATION INTO STANDARDS

E24.37.1 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.

E24.37.2 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.

E24.37.3 Unless otherwise directed, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.

E24.38 BACKFILL

E24.38.1 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.

E24.38.2 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.

E24.38.3 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.

E24.38.4 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.

E24.38.5 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.

E24.39 DEFECTIVE WORK & WARRANTY

E24.39.1 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.

E24.39.2 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.

E24.40 AS-BUILT DRAWING

E24.40.1 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.

E24.41 MEASUREMENT AND PAYMENT

E24.41.1 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.

E24.41.2 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.

E24.41.3 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.

E24.41.4 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.

E24.41.5 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.

E24.41.6 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.

E24.41.7 Installation of 45'/55’ 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'/55’ 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.

E24.41.8 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.

E24.41.9 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.

E24.41.10 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.

E24.41.11 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.

E24.41.12 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.

E24.41.13 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.

E24.41.14 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.

E24.41.15 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.

E24.41.16 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.

E24.41.17 Expose Underground Cable Entrance of Existing Streetlight Pole and Install New Streetlight Cable(s).

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

APPENDIX 'A'

MANITOBA HYDRO ELECTRICAL STANDARDS

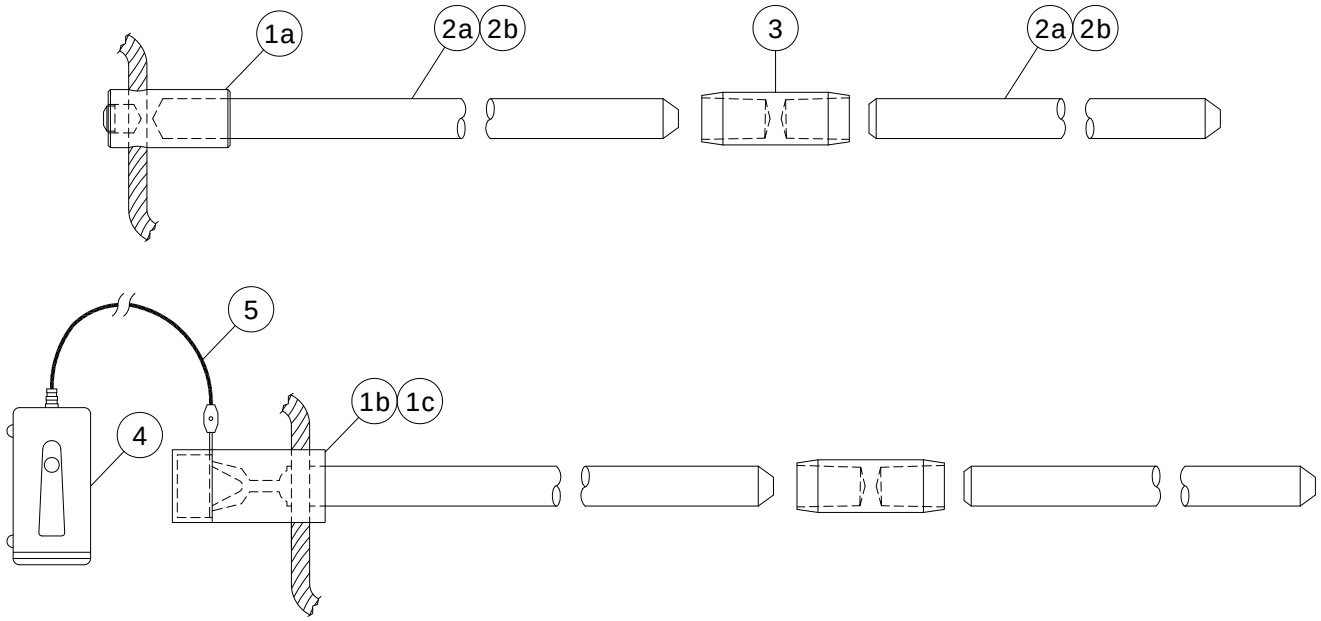
Appendix B

Electrical Standards
(2020 Streetlight Installations)

Refer to electronic copy issued under separate cover

Electric Standards for Streetlight Installations Table of Contents

Updated: March 20, 2020



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:

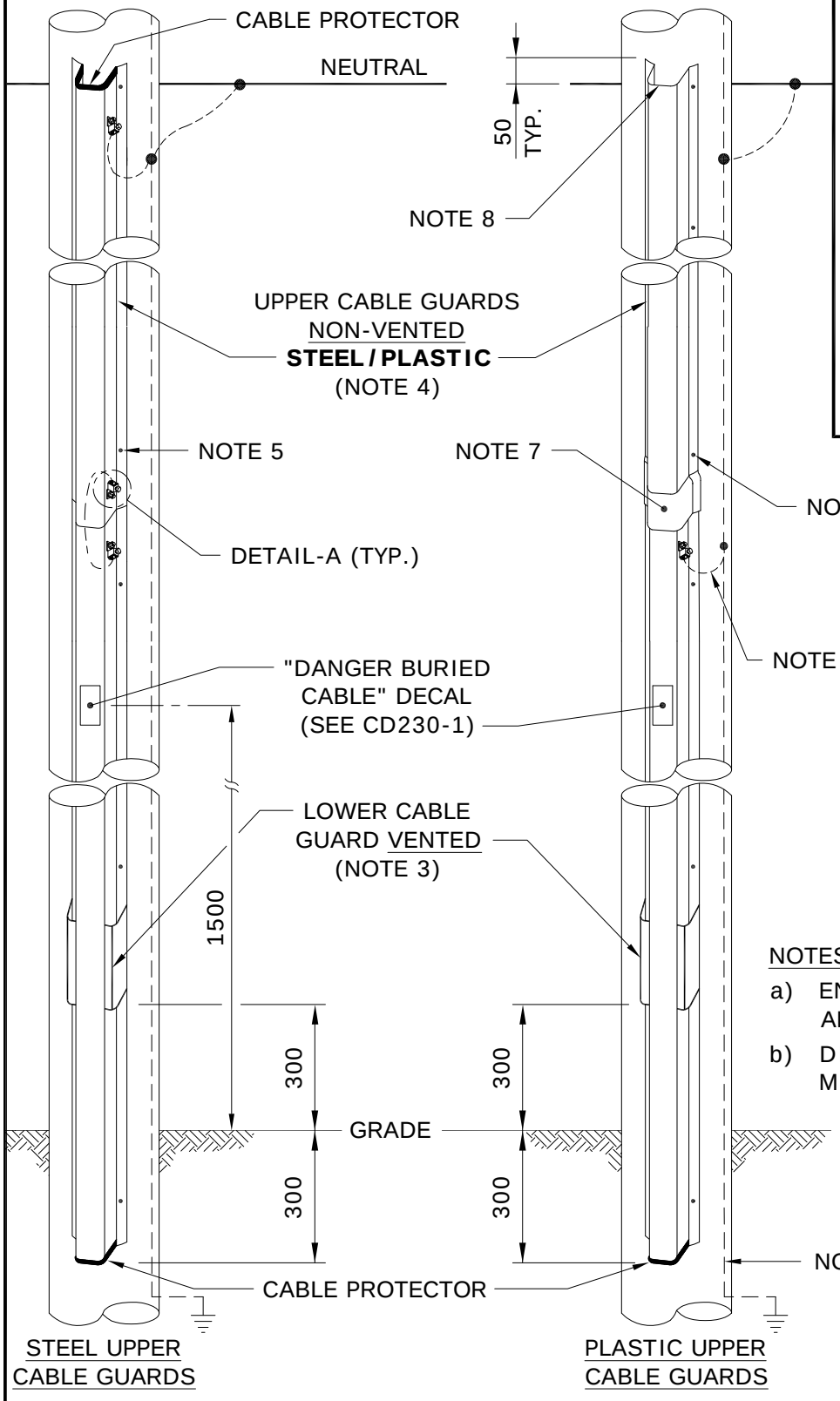
1. FOR 3/4" GROUND RODS. IF A 5/8" GROUND ROD IS ENCOUNTERED, IT IS TO BE REPLACED WITH A 3/4" ROD.

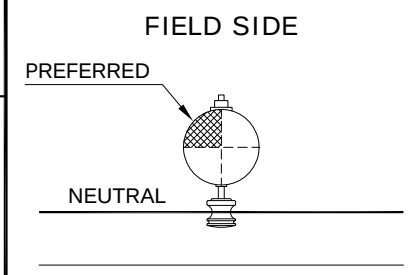
2. FIRST GROUND ROD SHALL BE A 10' ROD.

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	

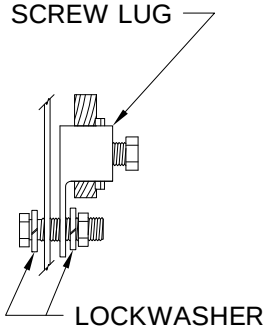
DRAWN	CHECKED	DATE		SHT	REV
R.L.B./CAD	D.F./D.O.	98-08	**CD 50-7**	0001 OF 1	03

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	CHECKED	DATE		SHT	REV
C.A.	J.R.	15-10	**CD 200-63**	0002 OF 2	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.

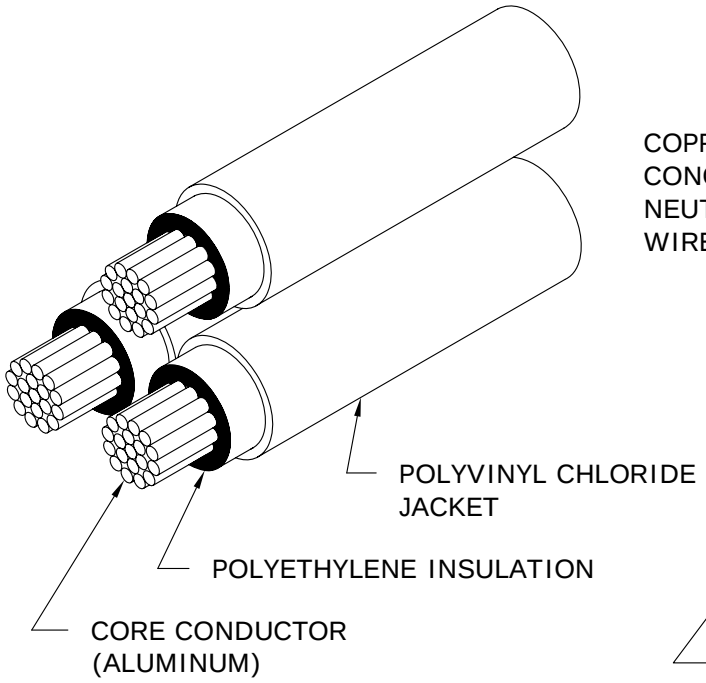
SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 88-03-29

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	

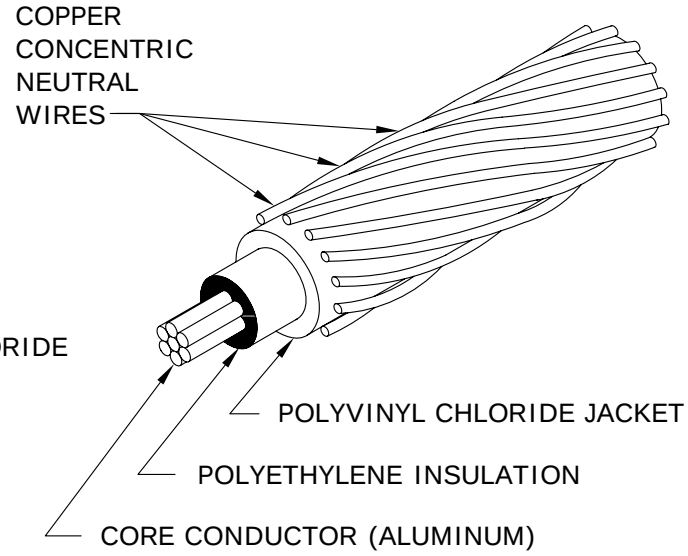
DRAWN	CHECKED	DATE		SHT	REV
C.A.	K.S.	17-01	**CD 210-12**	0001 OF 2	11

1-04431-DA-58041-0008

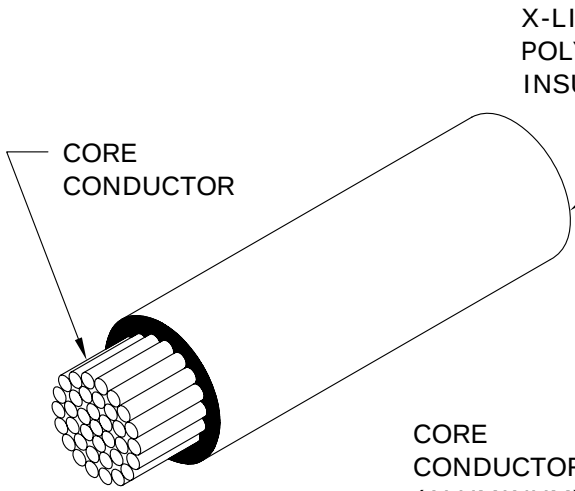
BASIC CONSTRUCTION OF UNDERGROUND SECONDARY CABLES



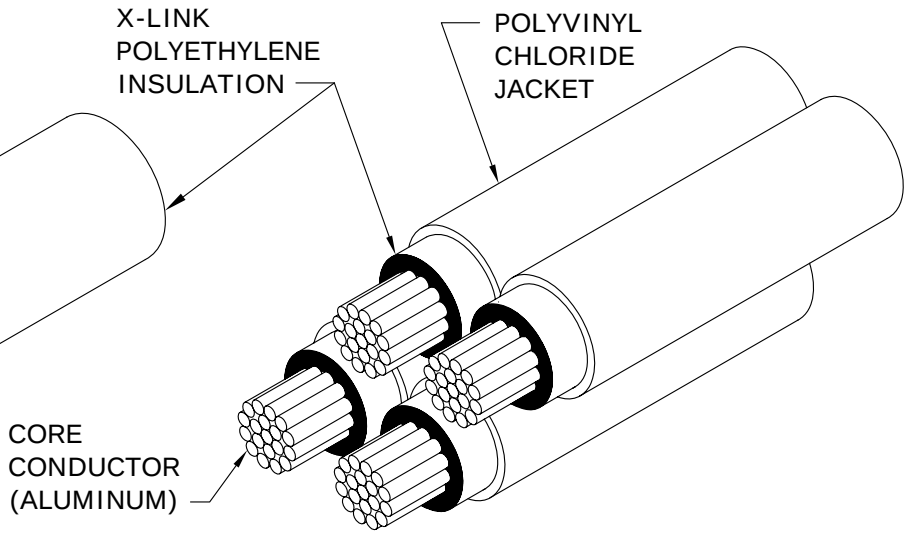
1/0 & 4/0 AND 350 TRIPLEX



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

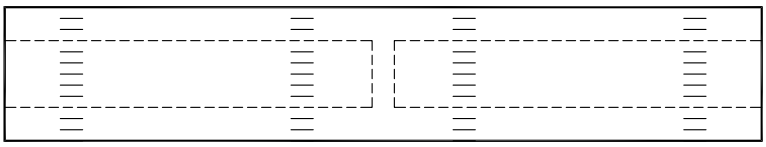
MANITOBA HYDRO DISTRIBUTION STANDARDS

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)	---

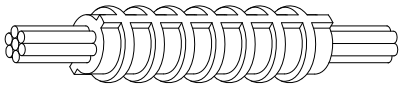
* FOR CONNECTING INSULATED ALUMINUM TO BARE COPPER, REFER TO DRAWING CD215-13.

** ROTATE MD6 TOOL 180° AFTER EVERY CRIMP.

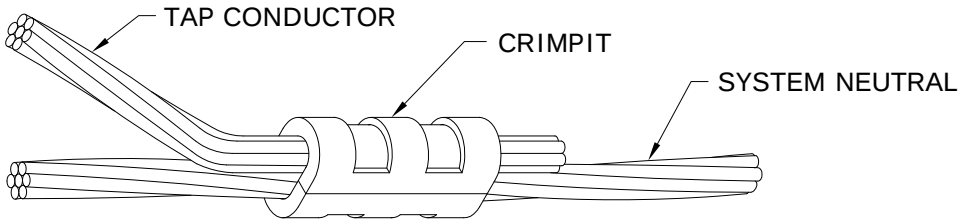
APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03				**UNDERGROUND SECONDARY CABLE COMPRESSION CONNECTORS**		
	95-09	2	350-4/0 CONNECTOR ADDED			
	95-01	1	NOTE ON MD6 TOOL ADDED			
DRAWN W.B./CAD	CHECKED G.W.		DATE 93-07	**CD 210-21**	SHT 0001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

1-04431-DA-58043-0017

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	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 17-10-11	17-08	4	REVISED TABLE, RESEALED	**SPLICES FOR UNDERGROUND SECONDARY CABLES**
	15-02	3	REMOVED RAYVOLVE SPLICE FROM TABLE	
	08-03	2	REVISED TABLE AND NOTE 6	

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

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.

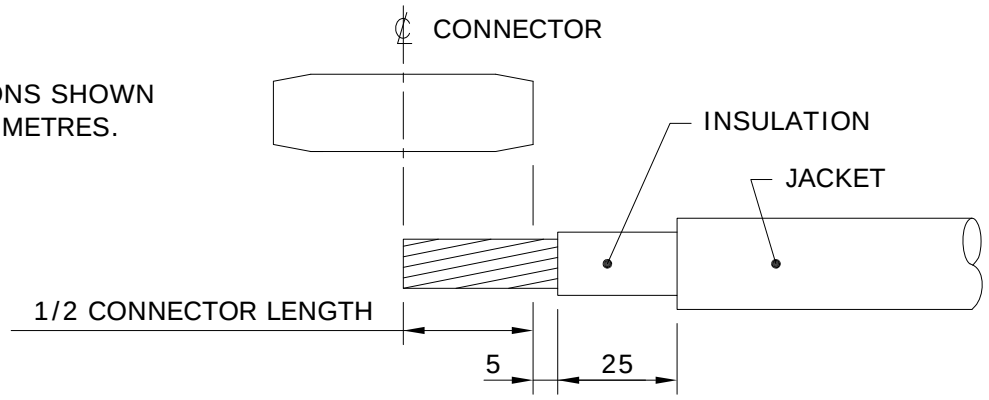


FIGURE 1

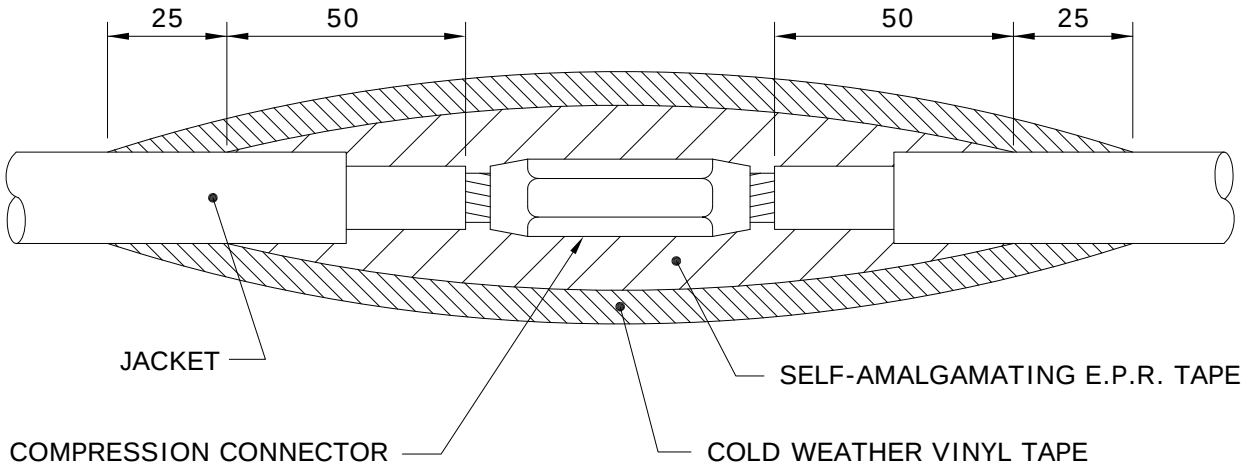


FIGURE 2

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	CHECKED	DATE		SHT	REV
C.A.	K.S.	17-10	**CD 215-12**	0003 OF 3	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

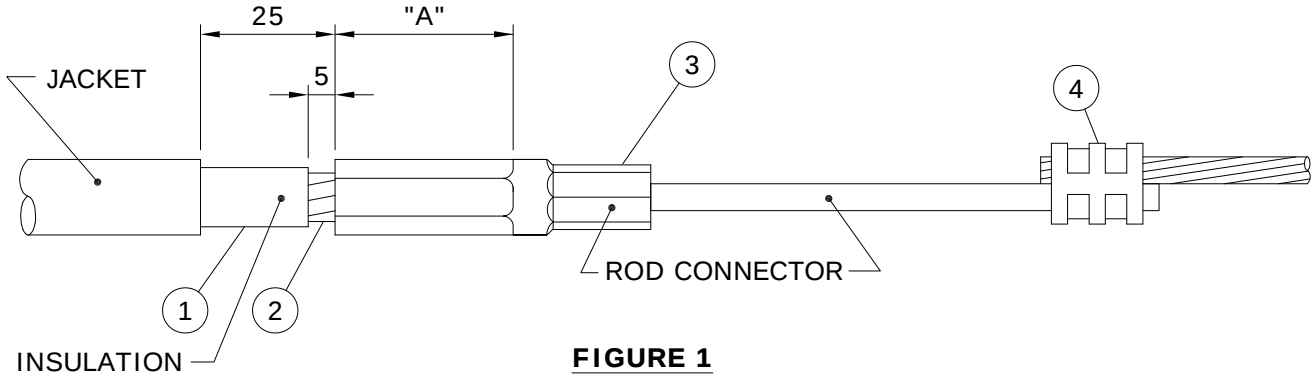


FIGURE 1

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.

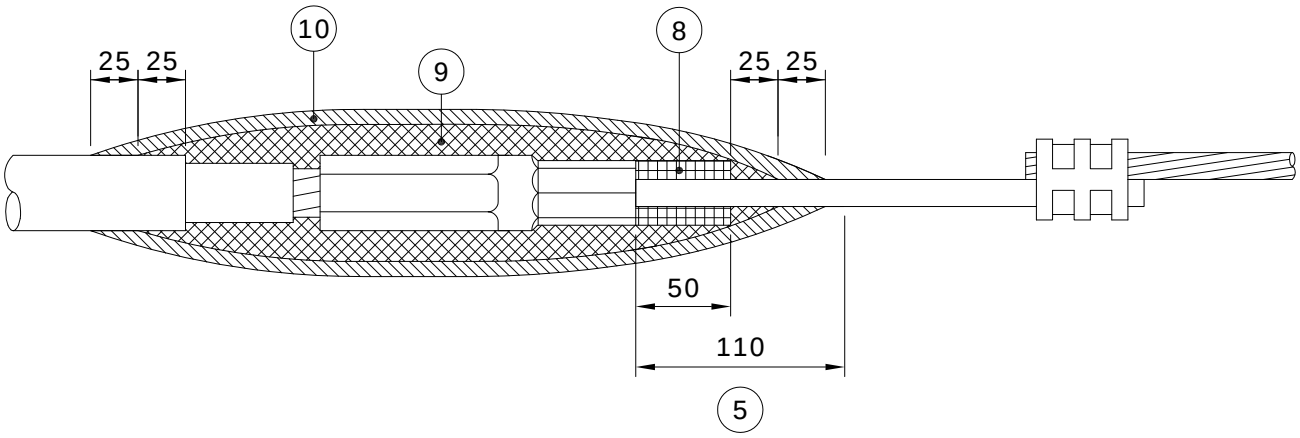
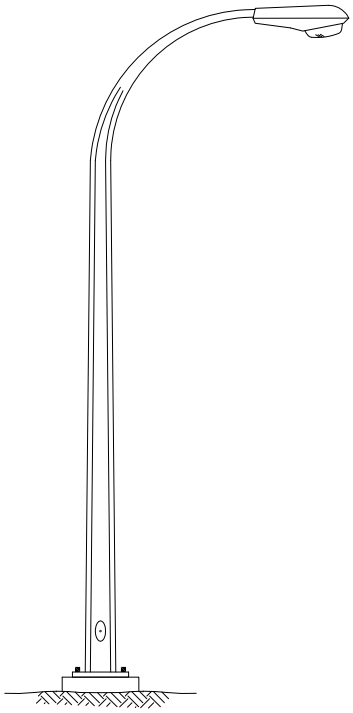


FIGURE 2

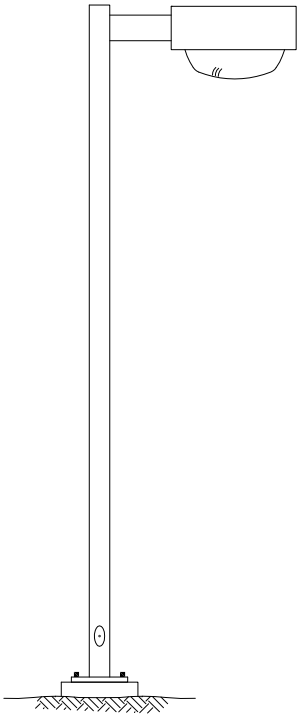
NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

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

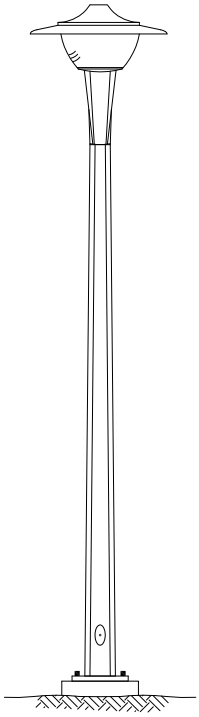
1-04431-DA-58043-0018



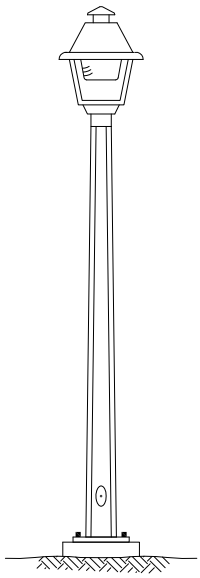
DAVIT BM
(BASE MOUNTED)



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

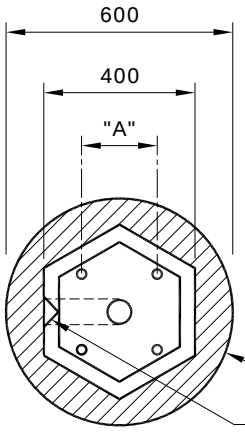
DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	L.D./D.O.	88-06	**CD 300-1**	0001 OF 1	03

1-04431-DA-25620-0001

7.7 - 10.7 STREET LIGHT POLES

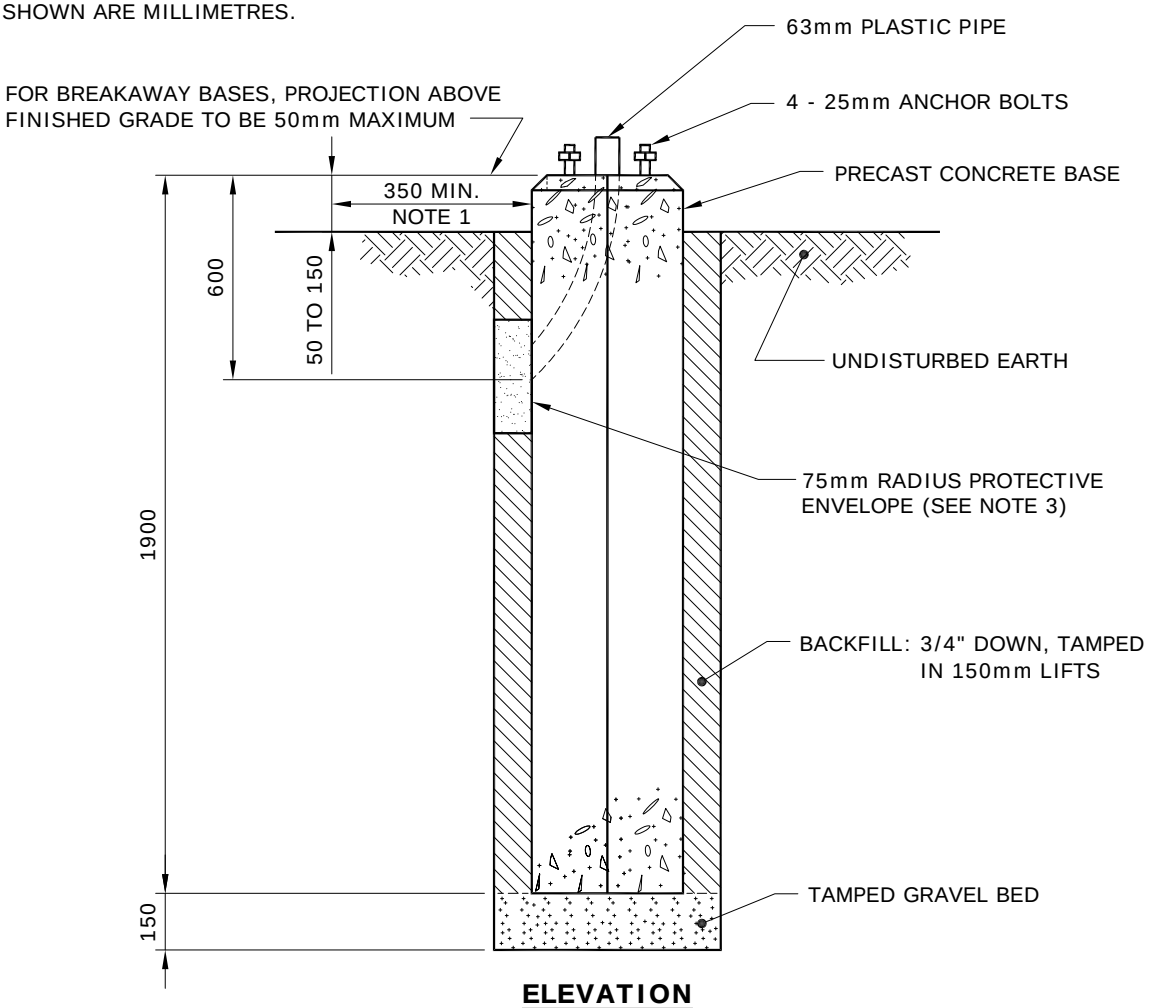
NOTES:

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	

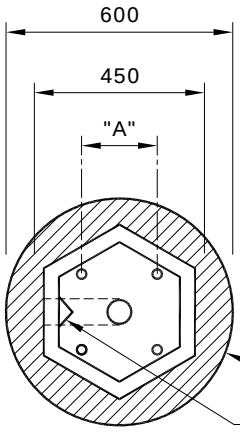
DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	L.D./K.C.H.	88-06	**CD 300-6**	0001 OF 3	03

1-04431-DA-24620-0001

13.7 STREET LIGHT POLE

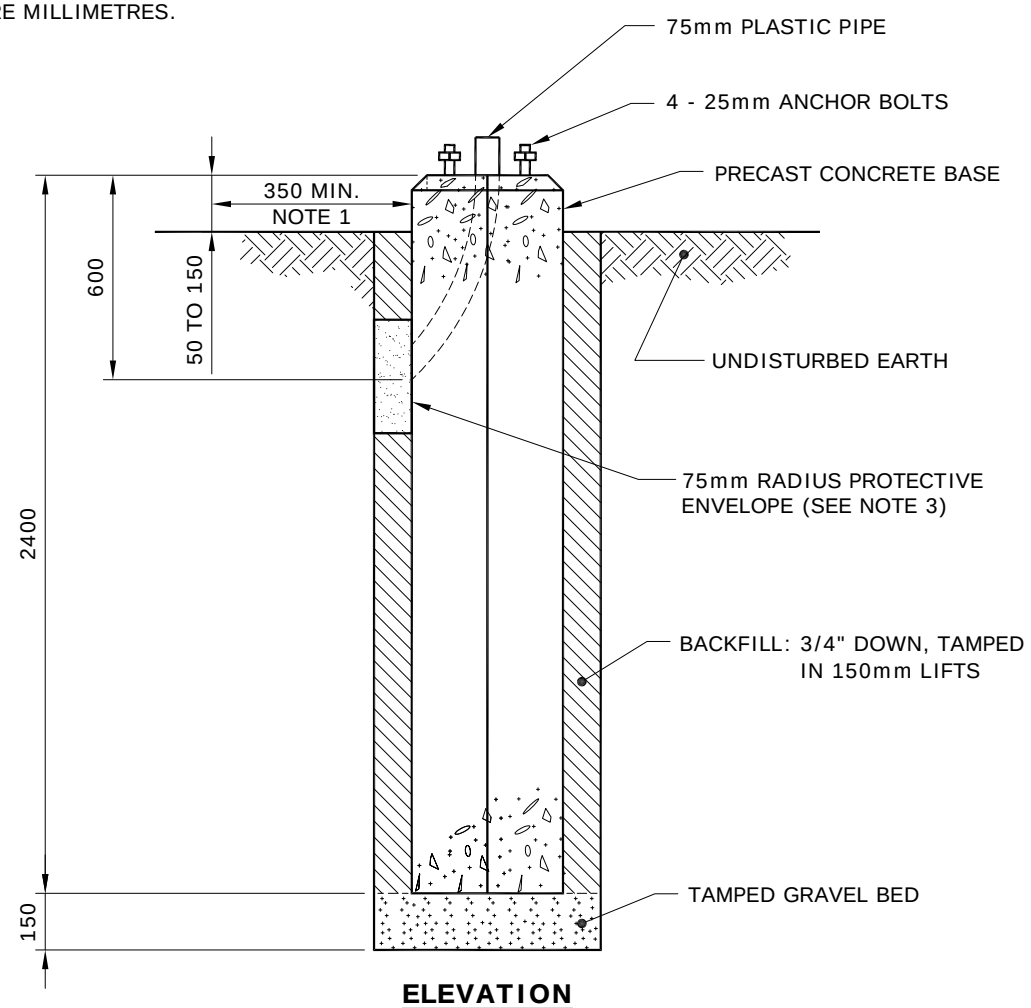
NOTES:

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.

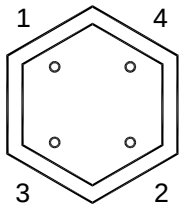
TURN-OF-NUT

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

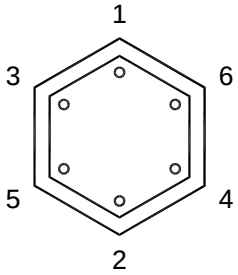
2. PLACE POLE ONTO CONCRETE PILE, INSTALL WASHERS AND NUTS AND TIGHTEN UNTIL DEVELOPING A SNUG-TIGHTENED CONNECTION.

   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

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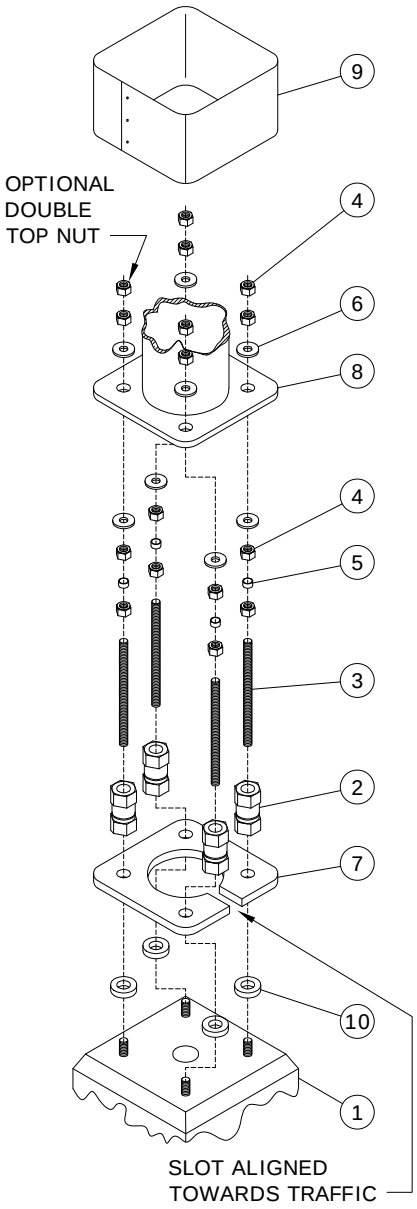


THE FOLLOWING INSTALLATION INSTRUCTIONS ARE APPLICABLE TO NEW OR EXISTING BREAKAWAY BASE INSTALLATIONS ON CONCRETE BASES.

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.

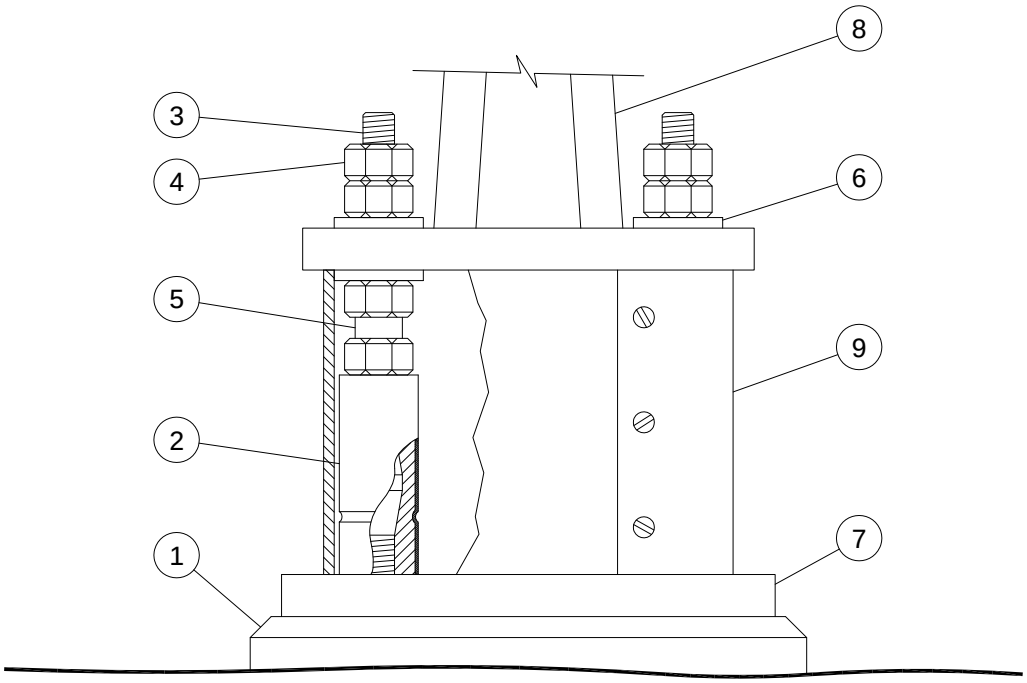
   NOTE: TIGHTENING THE COUPLER ON THE TOP HEX MAY WEAKEN THE COUPLER AT THE MACHINED GROOVE AND MAKE THE COUPLER UNUSEABLE.
8. BRING THE LEVELING NUTS (AND HENCE, THE LOWER WASHERS) INTO A LEVEL PLANE AS DESIRED MAKING CERTAIN THAT AT LEAST ONE PLASTIC SPACER REMAINS IN CONTACT WITH ITS LEVELING NUT AND 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.

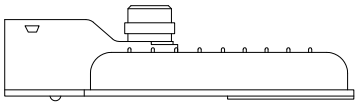
BASES

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**

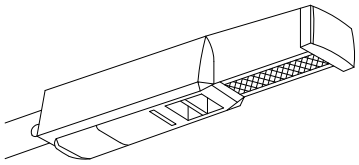
DRAWN	CHECKED	DATE		SHT	REV
C.A.	J.R.	16-01	**CD 300-18**	0001 OF 1	01

1-04431-DA-25620-0010



LED ROADWAY LUMINAIRE

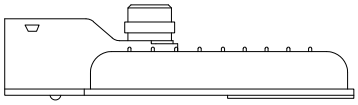
LED ROADWAY LUMINAIRES			
LUMINAIRE WATTAGE (NOMINAL)	REPLACES (HPS)	CIIC	
		GREY	BLACK
40 W LED	70 W HPS	05 15 44	05 15 71
60 W LED	100 W HPS	05 15 45	05 15 73
90 W LED	150 W HPS	05 15 47	05 15 74
150 W LED	250 W HPS	05 15 48	05 15 75
240 W LED	400 W HPS	05 15 49	05 15 76



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

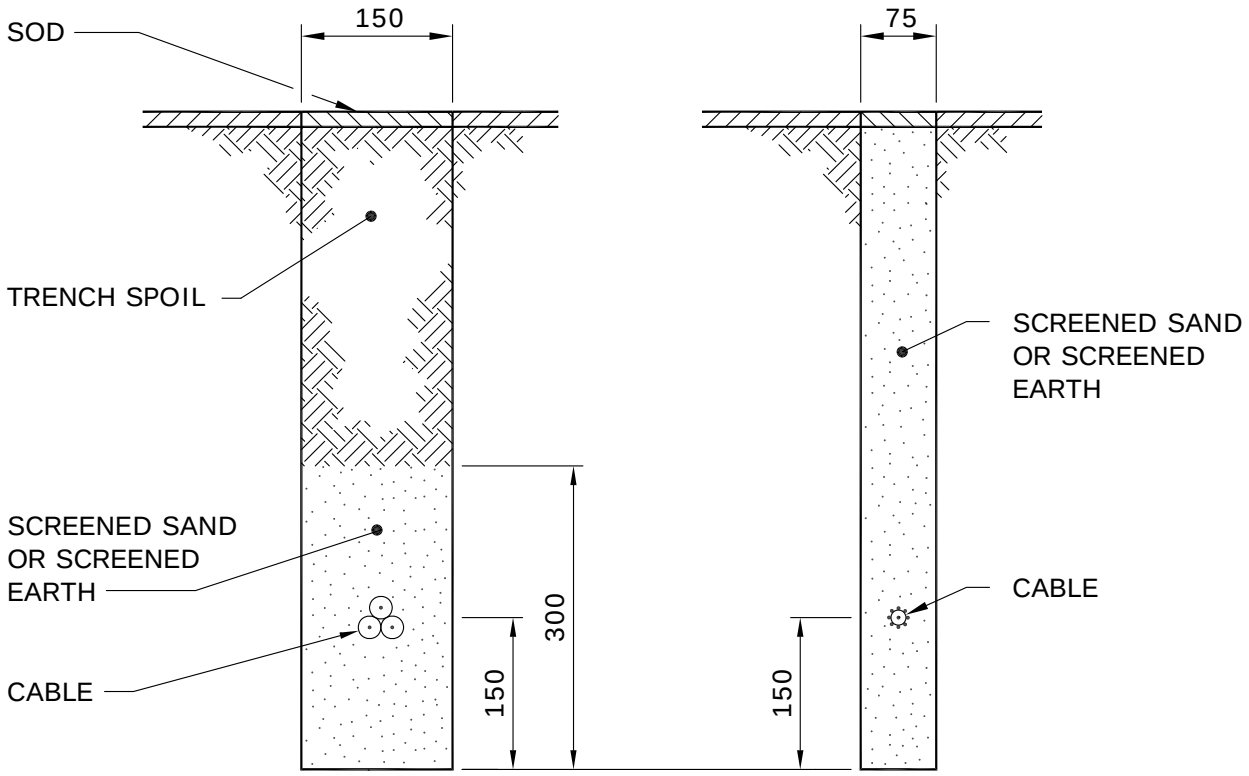
GENERALLY, THE TRENCH LOCATION WILL DICTATE THE LOCATION OF THE LIGHT STANDARDS. CONTACT SHALL BE MADE WITH THE GOVERNING MUNICIPAL AUTHORITY TO DETERMINE THEIR SET BACK REQUIREMENTS. CONTACT SHALL ALSO BE MADE WITH THE CITY OF WINNIPEG UNDERGROUND STRUCTURES OR THE INDIVIDUAL UTILITIES OUTSIDE WINNIPEG 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 W.B./CAD	CHECKED W.C.	DATE 88-07		**CD 310-1**	SHT 0001 OF 2	REV 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.

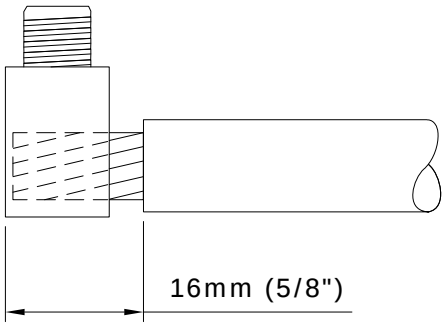
APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	94-04 | 1 | DWG. REFERENCE CHANGED	**INSTALLATION OF STREET LIGHT CABLES**

DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	W.C.	88-07	**CD 310-1**	0002 OF 2	01

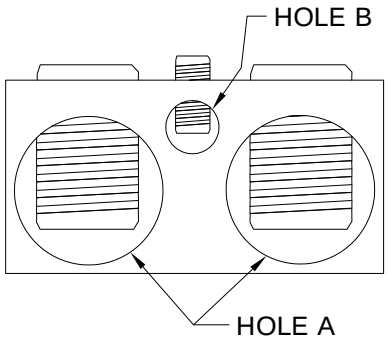
RAYCHEM GELCAP CIIC# 04-29-36

GENERAL INSTRUCTIONS:

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



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



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

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

DRAWN	CHECKED	DATE		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.

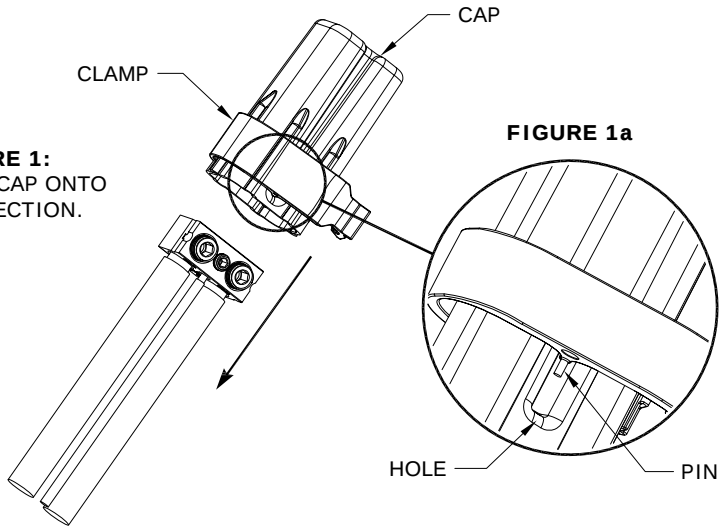


FIGURE 1:
PUSH CAP ONTO CONNECTION.

FIGURE 1a

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.

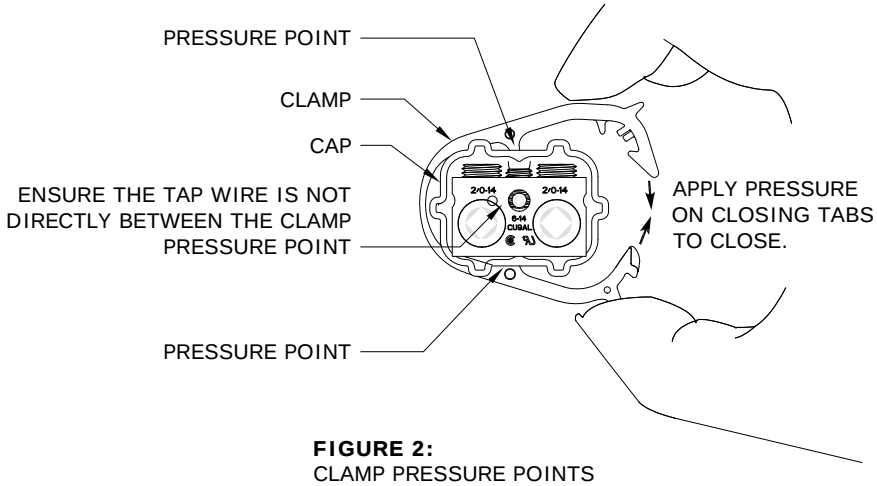
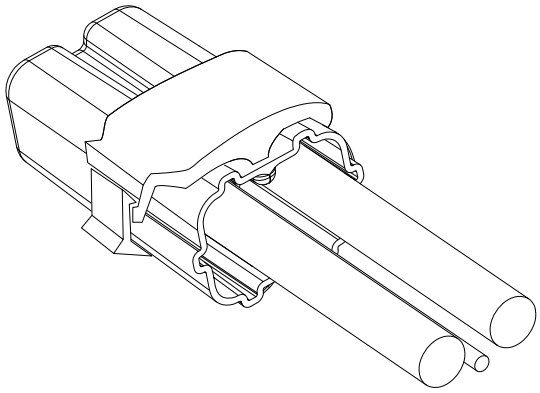


FIGURE 2:
CLAMP PRESSURE POINTS SHOULD FIT INTO OPPOSING GROOVES OF CAP AND APPLY PRESSURE BETWEEN CABLES. SNAP CLAMP CLOSED.

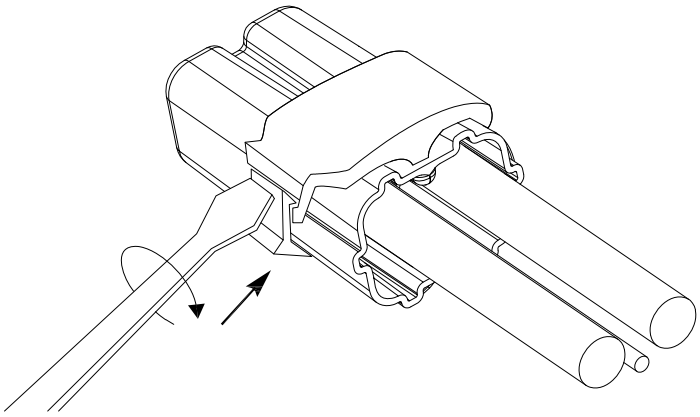
APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05		**RAYCHEM GELCAP SPLICE**

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	17-11	**CD 310-3**	0002 OF 3	00

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.

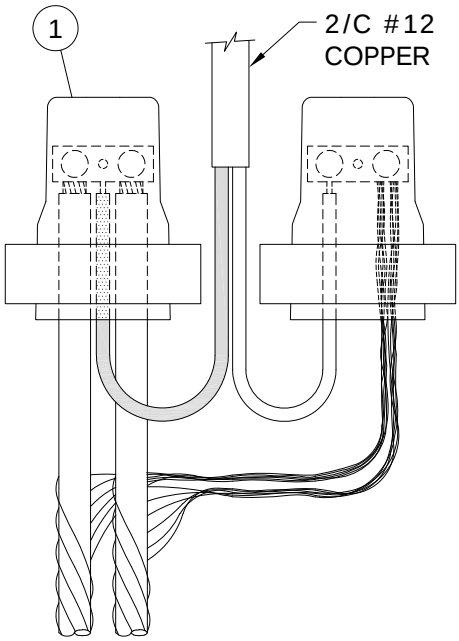


7. TO REMOVE, INSERT SCREWDRIVER BETWEEN THE CLOSING TABS AND TWIST TO OPEN THE CLAMP. REMOVE CAP SLOWLY FROM CONNECTION ALLOWING GEL TO REMAIN IN CAP.

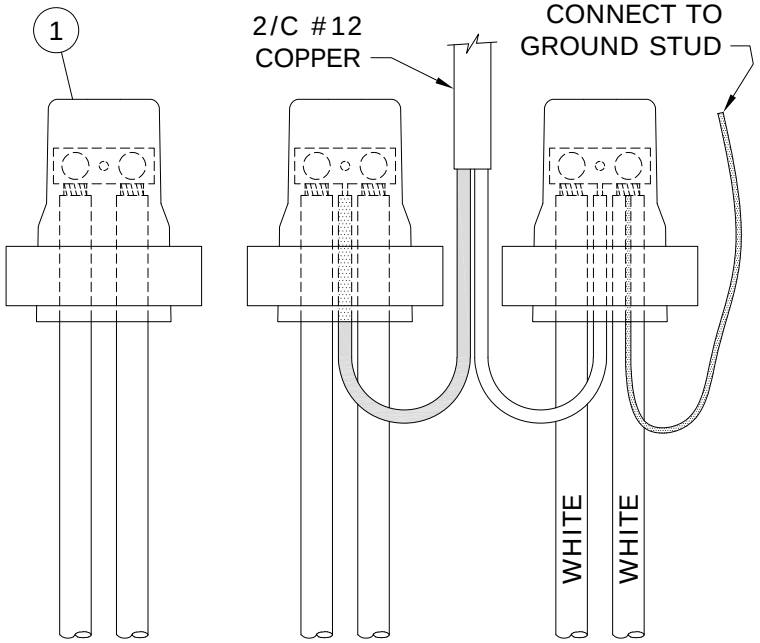


APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05		**RAYCHEM GELCAP SPLICE**

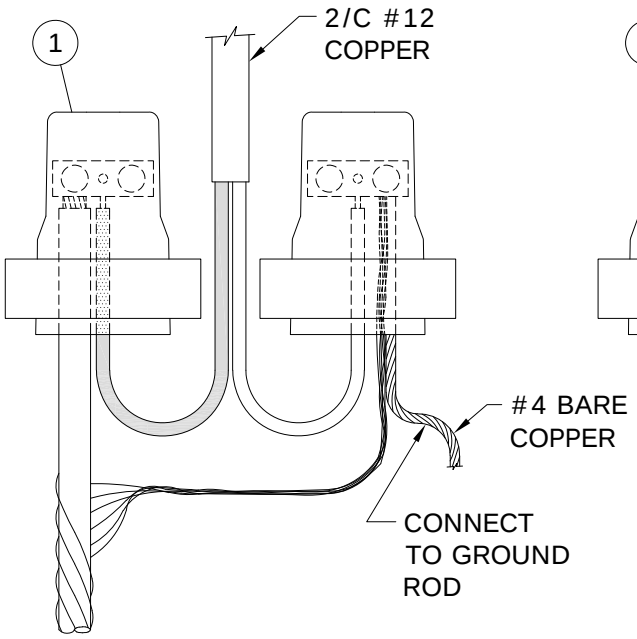
DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	17-11	**CD 310-3**	0003 OF 3	00



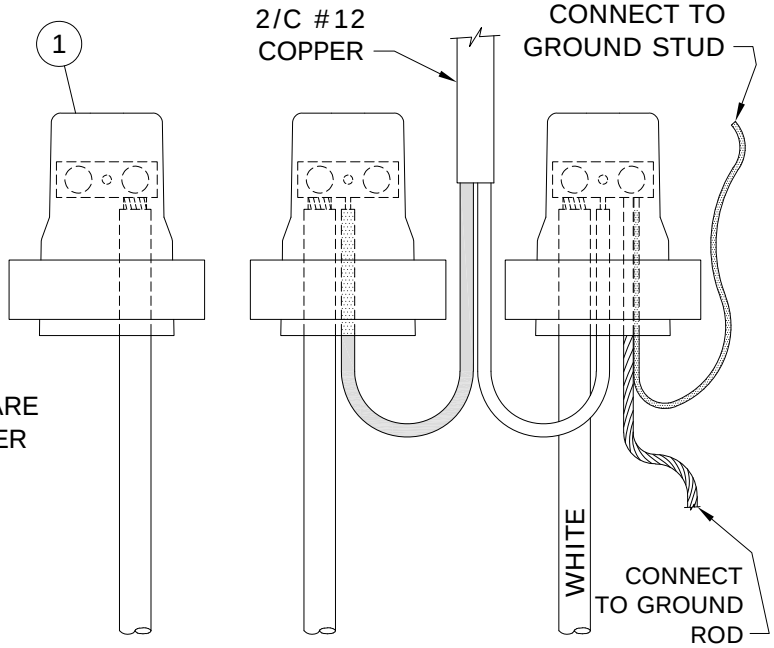
No. 4 ALUMINUM C/N CABLE
(TYPICAL FEED THROUGH)



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:

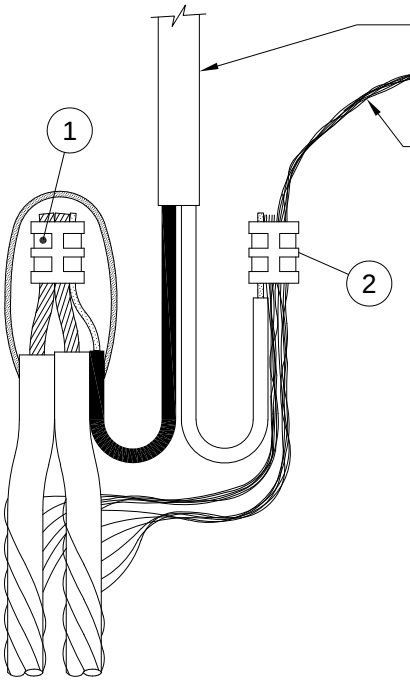
1. **LEAVE SUFFICIENT SLACK ON CONDUCTORS TO ALLOW REMOVAL FROM HANDHOLE FOR MAINTENANCE.**
2. REFER TO DRAWING CD310-3 FOR GEL CAP INSTALLATION INSTRUCTIONS.

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

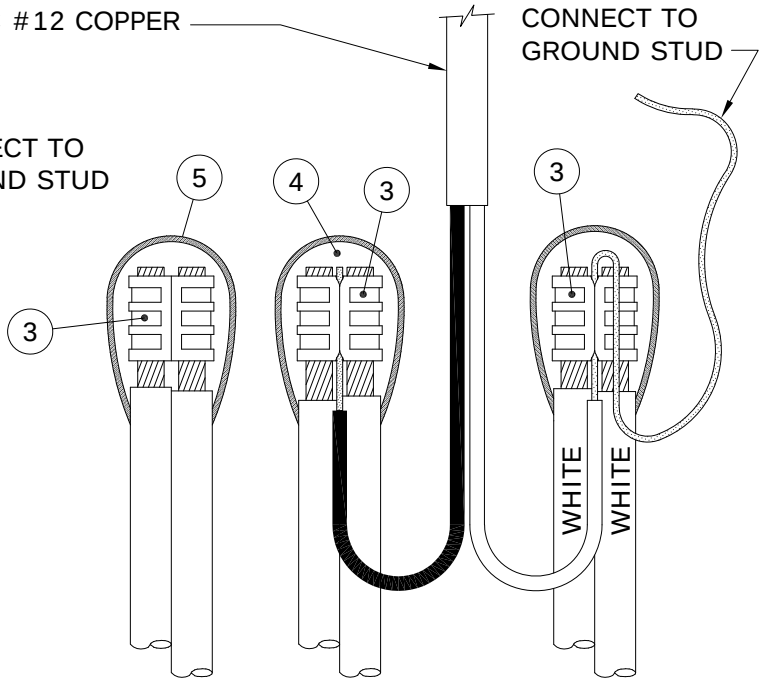
APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	18-04	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, REVISED TITLE, RESEALED	**CONNECTION DETAIL IN STREET LIGHT STANDARD**

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

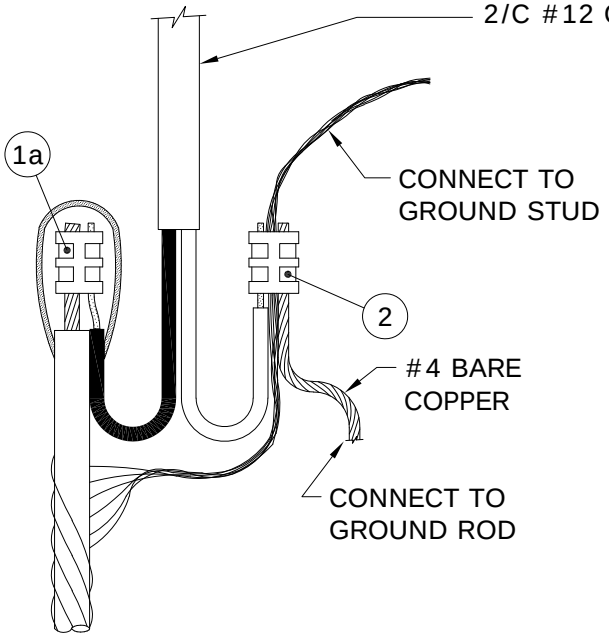
1-04431-DA-56200-0002



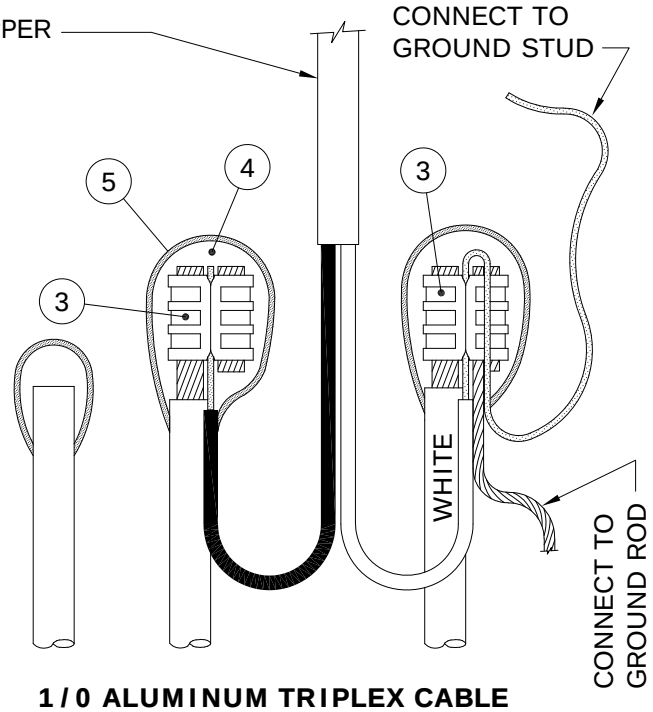
No. 4 ALUMINUM C/N CABLE
(TYPICAL FEED THROUGH)



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.

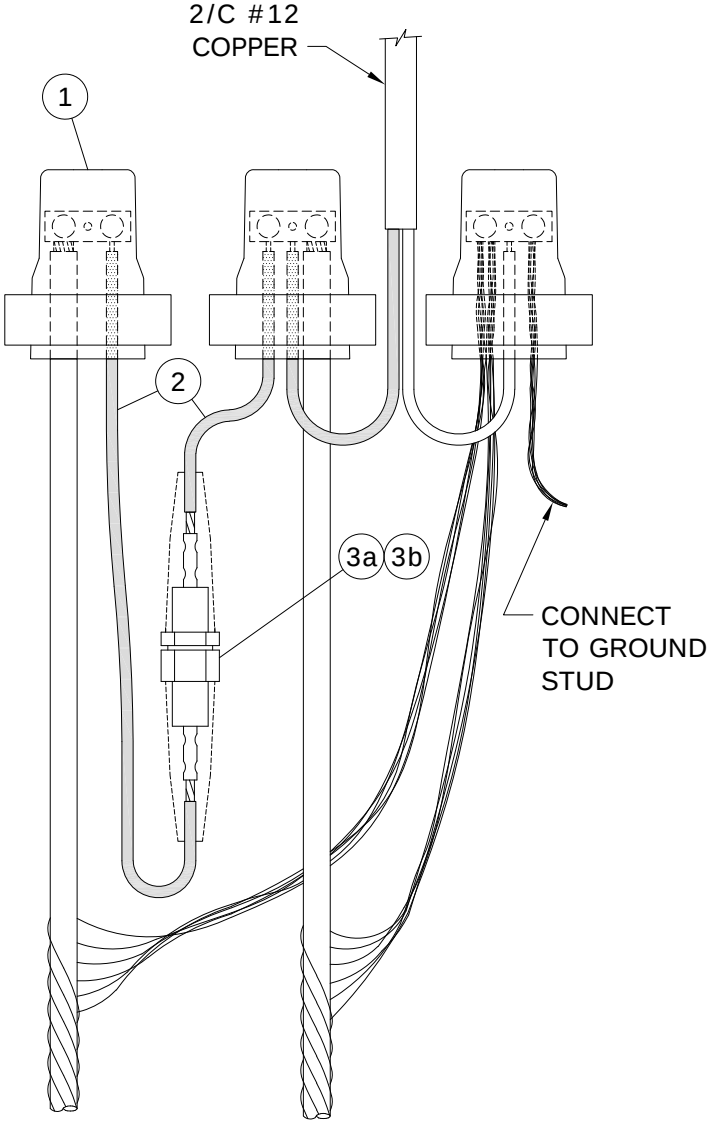
NOTES:

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

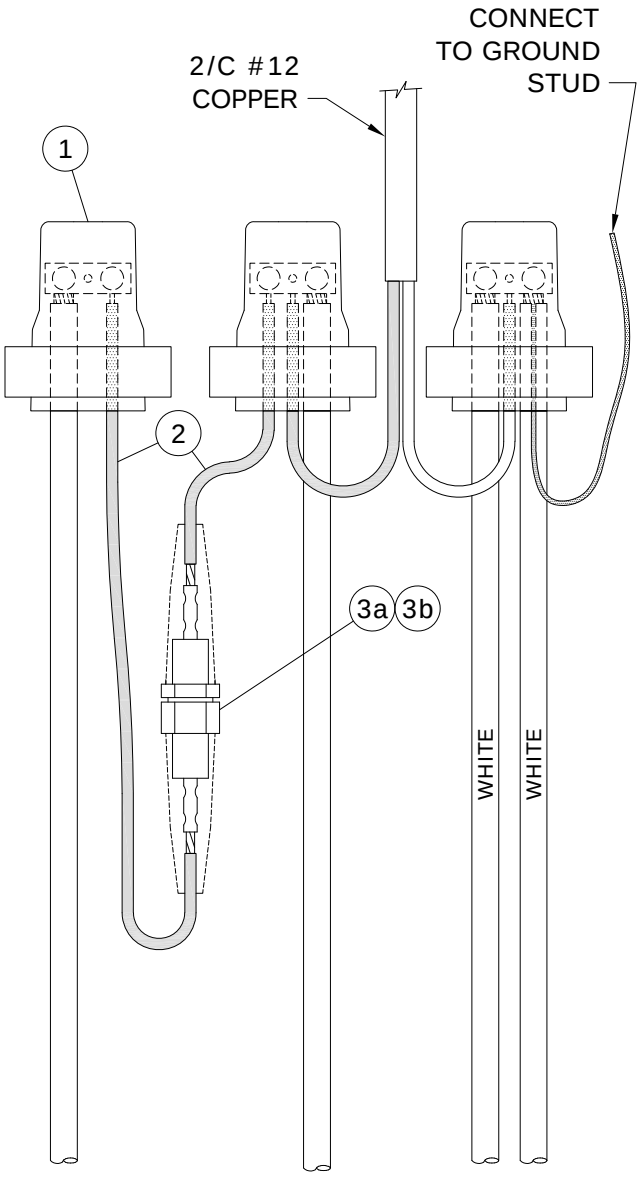
APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	18-04 | 0 | MOVED FROM SHEET 2	**CONNECTION DETAIL IN STREET LIGHT STANDARD**

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:

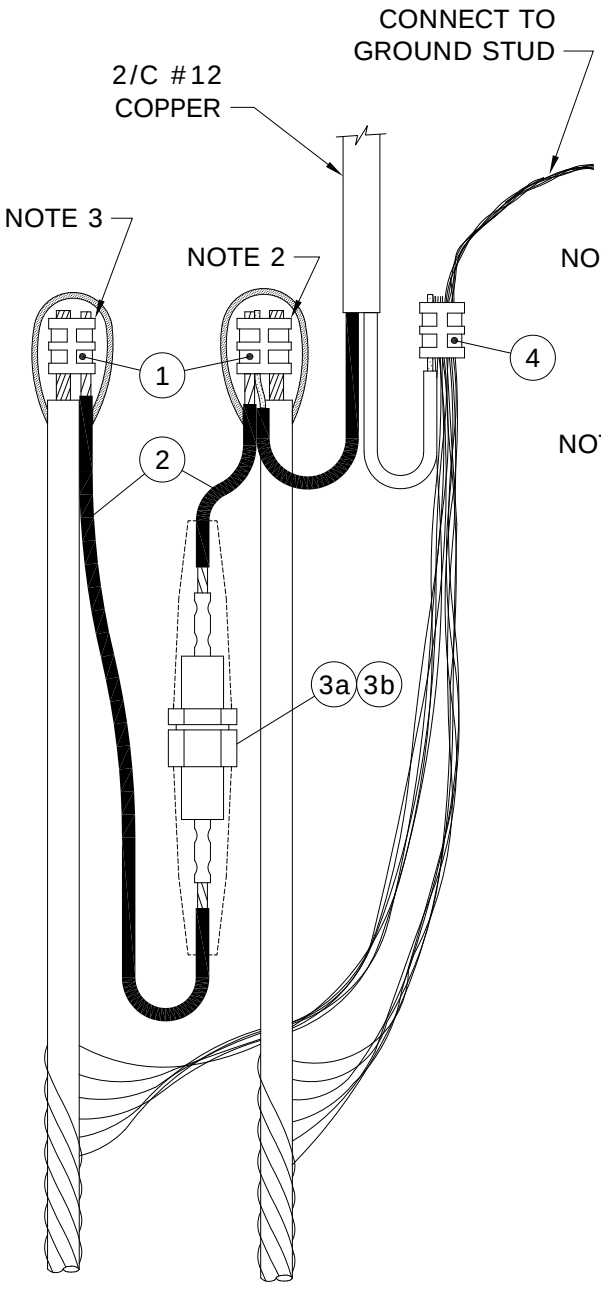
1. **LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
2. FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
3. FOR GEL CAP INSTALLATION INSTRUCTIONS, REFER TO DRAWING CD310-3.

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

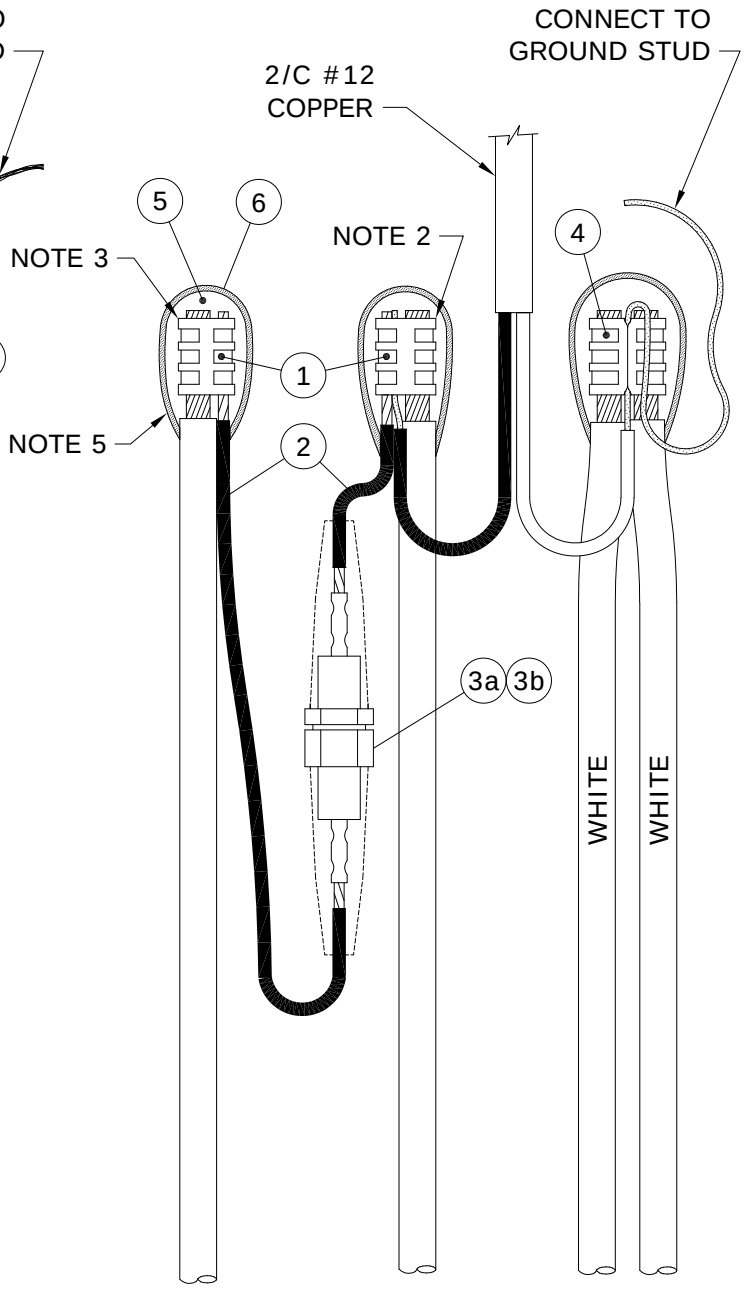
APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05				**STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD**
	17-11	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, RESEALED	

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.

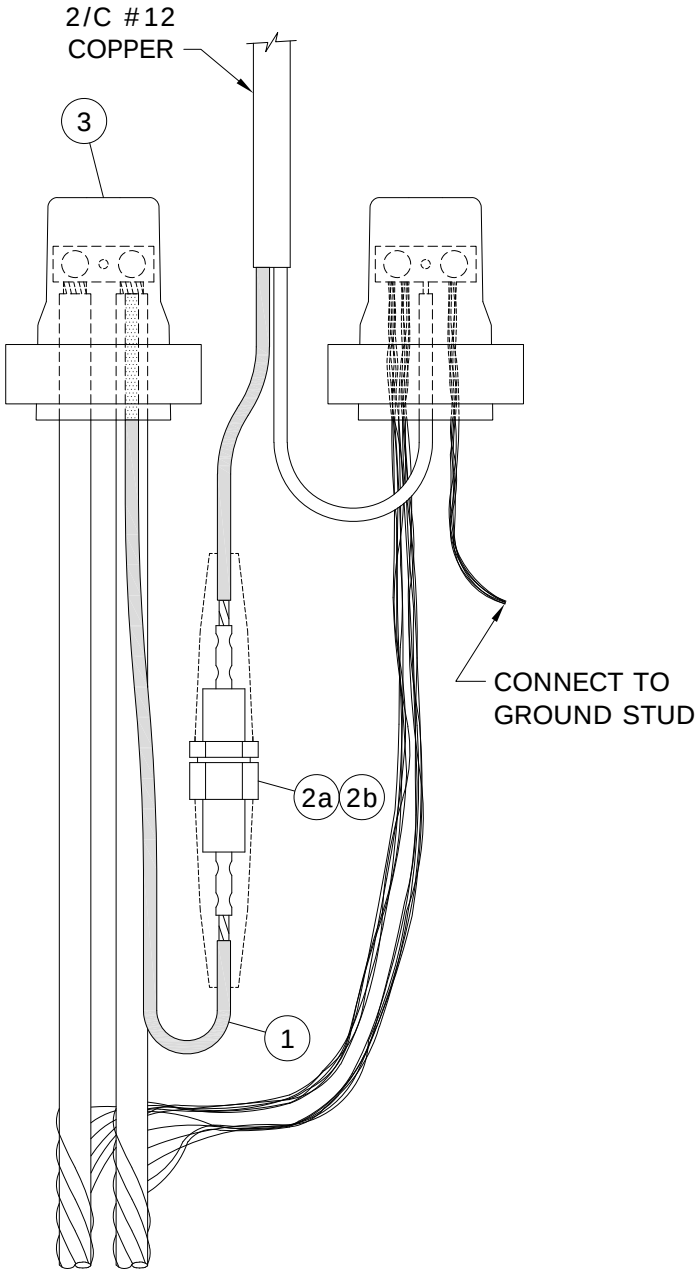
NOTES:

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.

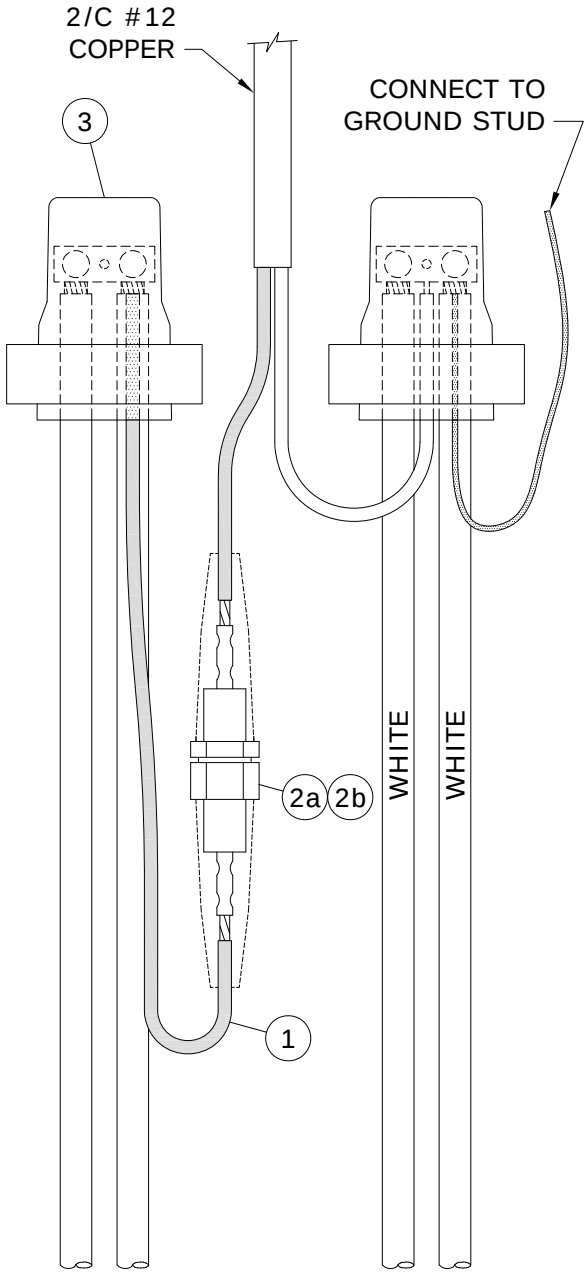
APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05	17-11 | 0 | MOVED FROM SHEET 2	**STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD**

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	CHECKED	DATE		SHT	REV
C.A.	L.D.	18-04	**CD 310-10**	0001 OF 4	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:

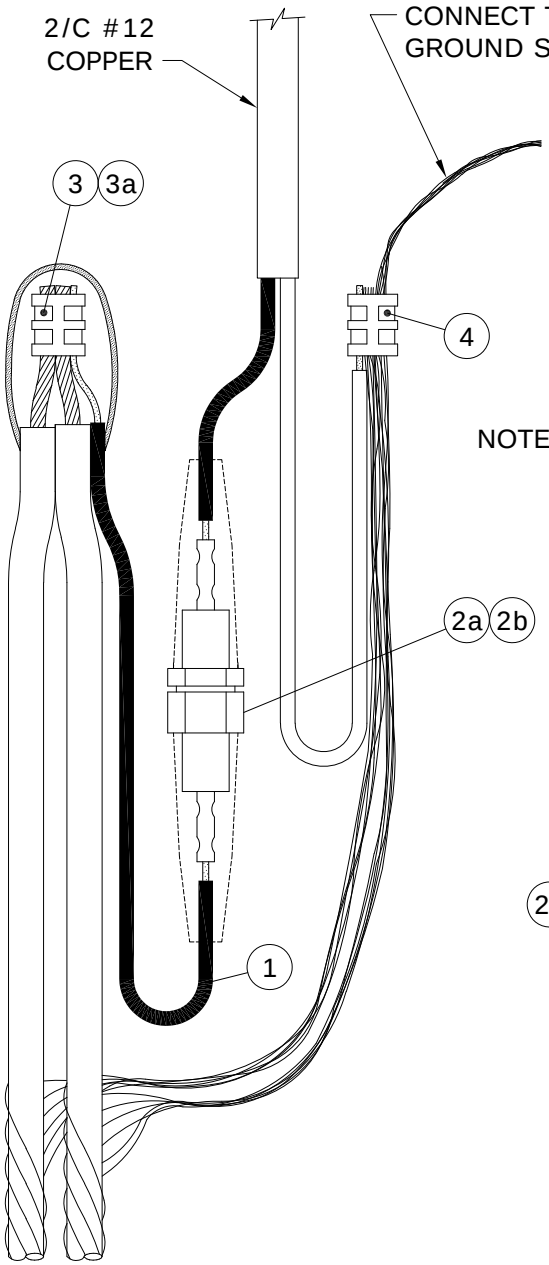
1. **LEAVE SUFFICIENT SLACK ON CONDUCTORS AND FUSE HOLDER TO ALLOW REMOVAL FROM HANDHOLE FOR FUSE REPLACEMENT AND MAINTENANCE.**
2. FOR SPLICING FEED THROUGH HOT LEG, REFER TO DRAWING CD310-4.
3. FOR END OF CIRCUIT, REFER TO DRAWING CD310-4.
4. FOR GEL CAP INSTALLATION INSTRUCTIONS, REFER TO DRAWING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

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

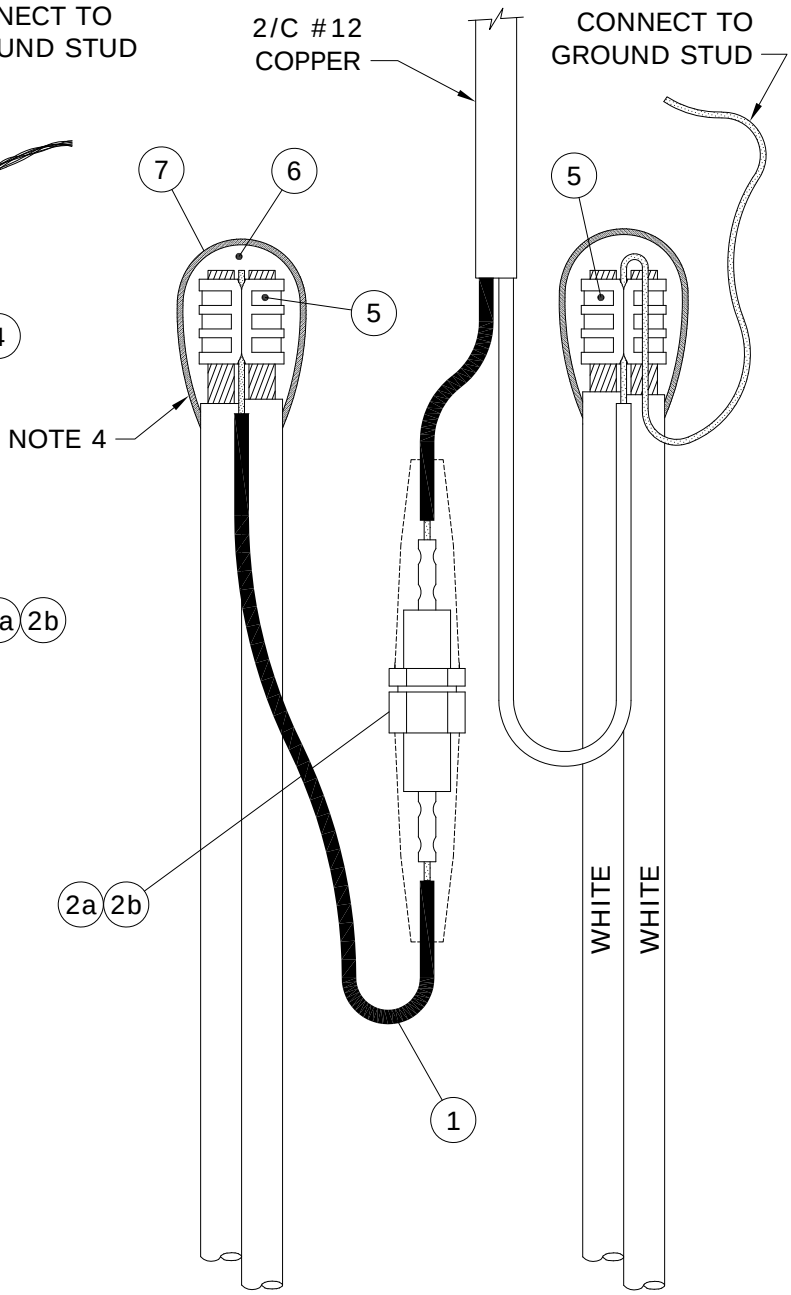
APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11	18-04	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, RESEALED	**INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD**

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.

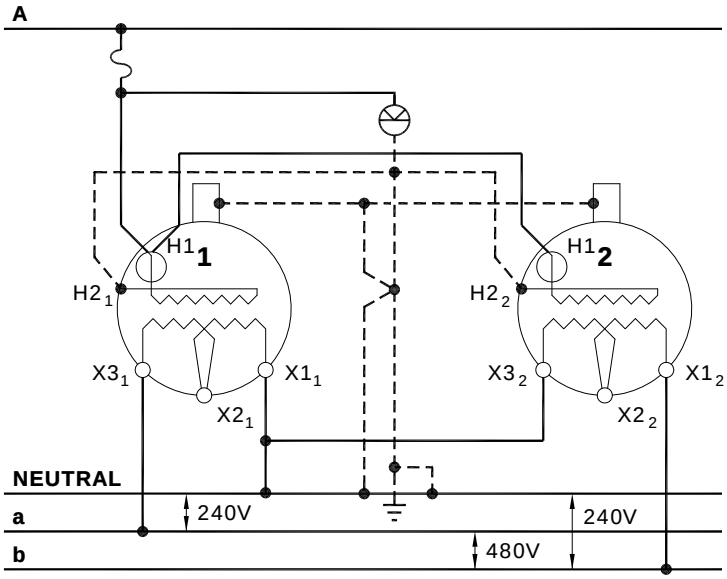
IN CASES WHERE EXCESSIVE VOLTAGE DROP IN A STREET LIGHTING CIRCUIT IS A PROBLEM, A SUPPLY VOLTAGE OF 240/480 MAY BE USED. A SUPPLY VOLTAGE OF 240/480 CAN BE OBTAINED FROM TWO SINGLE PHASE POLE-MOUNTED DISTRIBUTION TRANSFORMERS CONNECTED AS SHOWN ON DRAWING CD315-2. IF A SINGLE PHASE PAD-MOUNTED DISTRIBUTION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

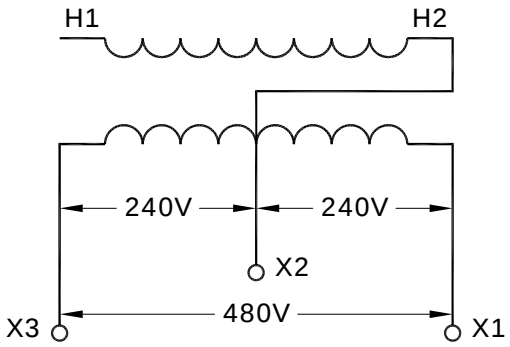
APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28		**SUPPLY VOLTAGES FOR STREET LIGHT CIRCUITS**

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

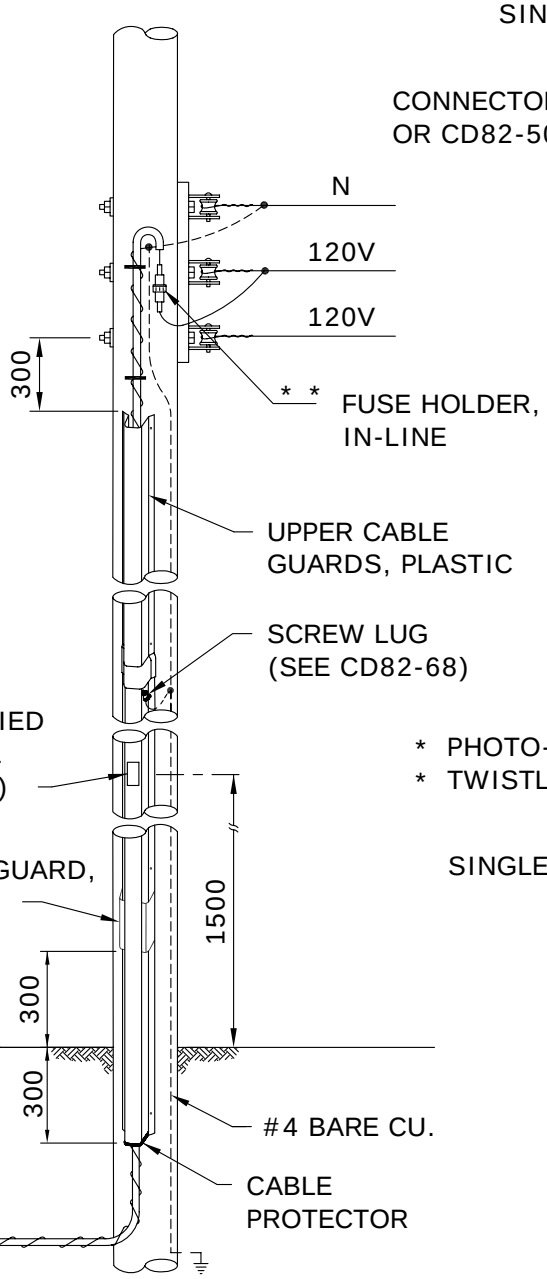
1. SINGLE PHASE PAD MOUNTED TRANSFORMERS WITH ABOVE SECONDARY VOLTAGES TO HAVE WARNING SIGN "**CAUTION - 240/480V SECONDARY - SEE NAMEPLATE**", STENCILLED ON THE OUTSIDE OF THE TRANSFORMER NEAR NAMEPLATE.
2. NAMEPLATES OF MODIFIED TRANSFORMERS TO BE REVISED.

PURCHASE OF 240/480 VOLT TRANSFORMER

1. INCLUDE ABOVE WARNING SIGN REQUIREMENT IN PURCHASE DESCRIPTION.

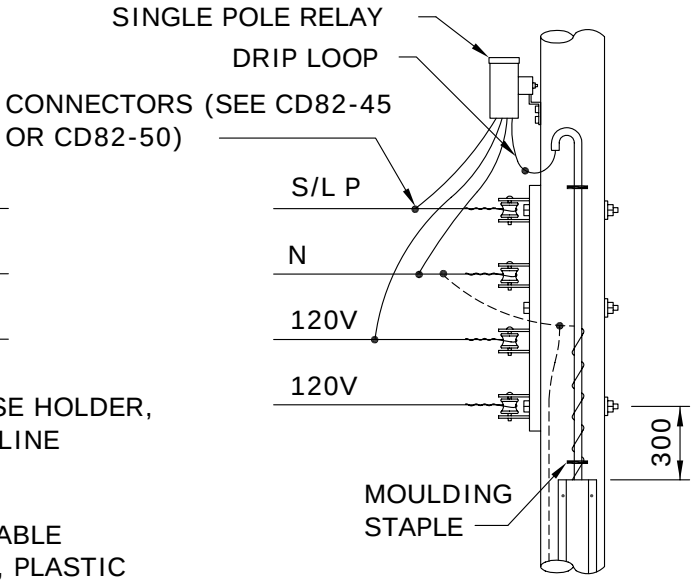
APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				**240/480 VOLT SUPPLY FOR STREET LIGHT CIRCUITS**		
	13-01	2	REVISED DIAGRAM			
	90-04	1	DROPOUT DELETED			
DRAWN W.B./CAD	CHECKED L.D./D.O.		DATE 88-08	**CD 315-2**	SHT 0001 OF 1	REV 02

1-04431-DA-65620-0002

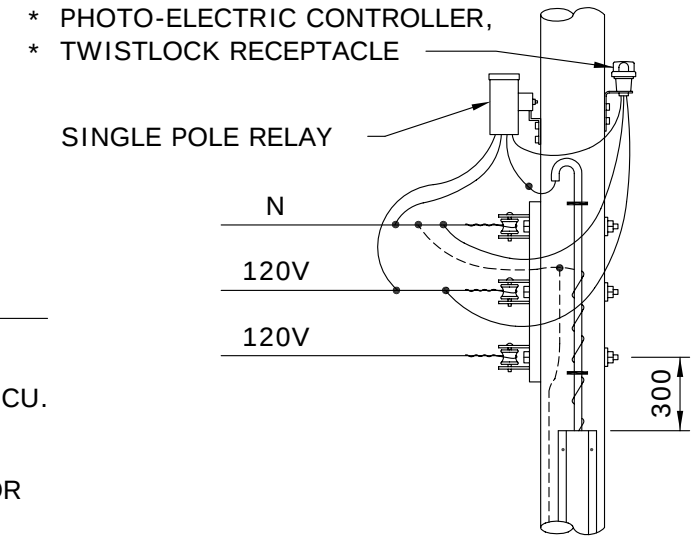


IN-LINE
FUSE PROTECTED

* * 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

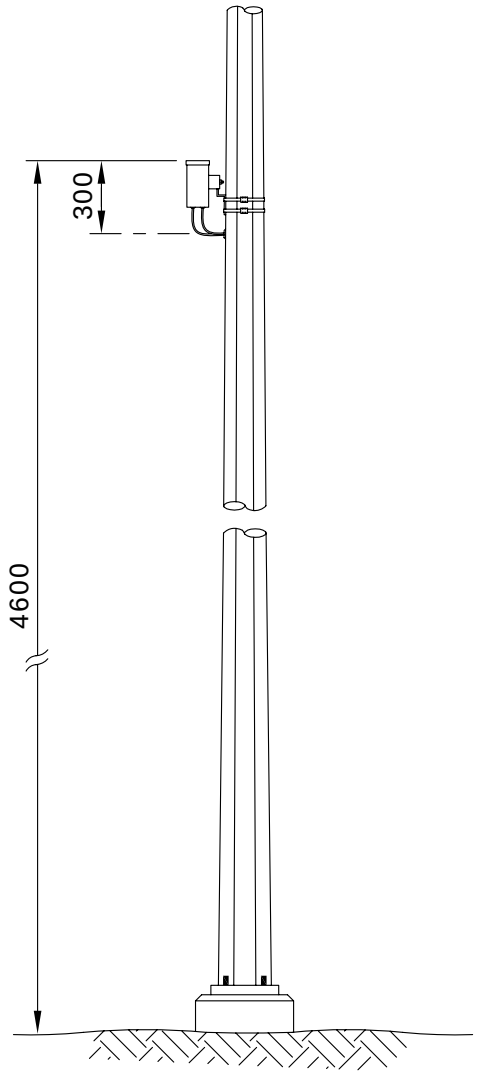
   PILOT WIRE CONTROL SYSTEMS ARE NO LONGER USED FOR NEW CONSTRUCTION. HOWEVER, SOME PILOT WIRE CONTROL SYSTEMS REMAIN IN SERVICE. THE CONNECTION DIAGRAMS FOR PILOT WIRE CONTROL SYSTEMS ARE SHOWN ON DRAWING CD315-15. DOUBLE POLE (DOUBLE CIRCUIT) RELAYS ARE NO LONGER PURCHASED. THEREFORE, DOUBLE POLE RELAYS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

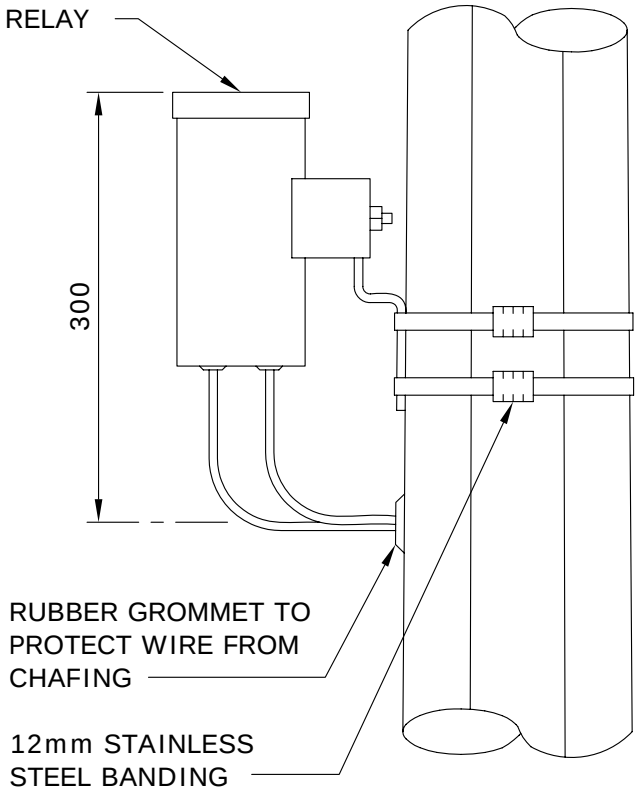
5. PHOTO-ELECTRIC CONTROLLED RELAY IN BASE OF STANDARD

   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
W.B./CAD	W.C.	88-08	**CD 315-10**	0001 OF 1	00





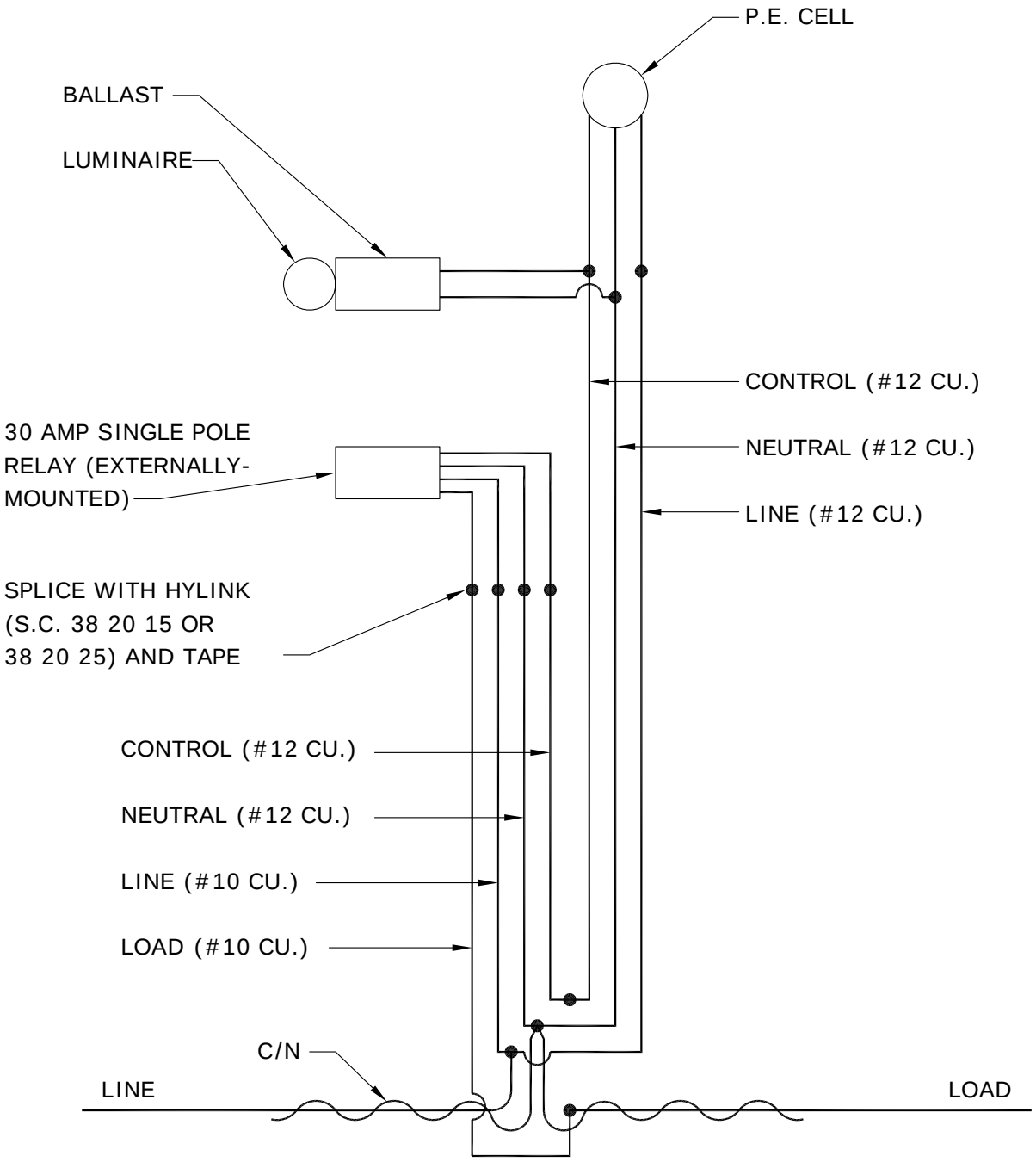
NOTES:

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

APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28		**INSTALLATION OF EXTERNALLY-MOUNTED RELAY**

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

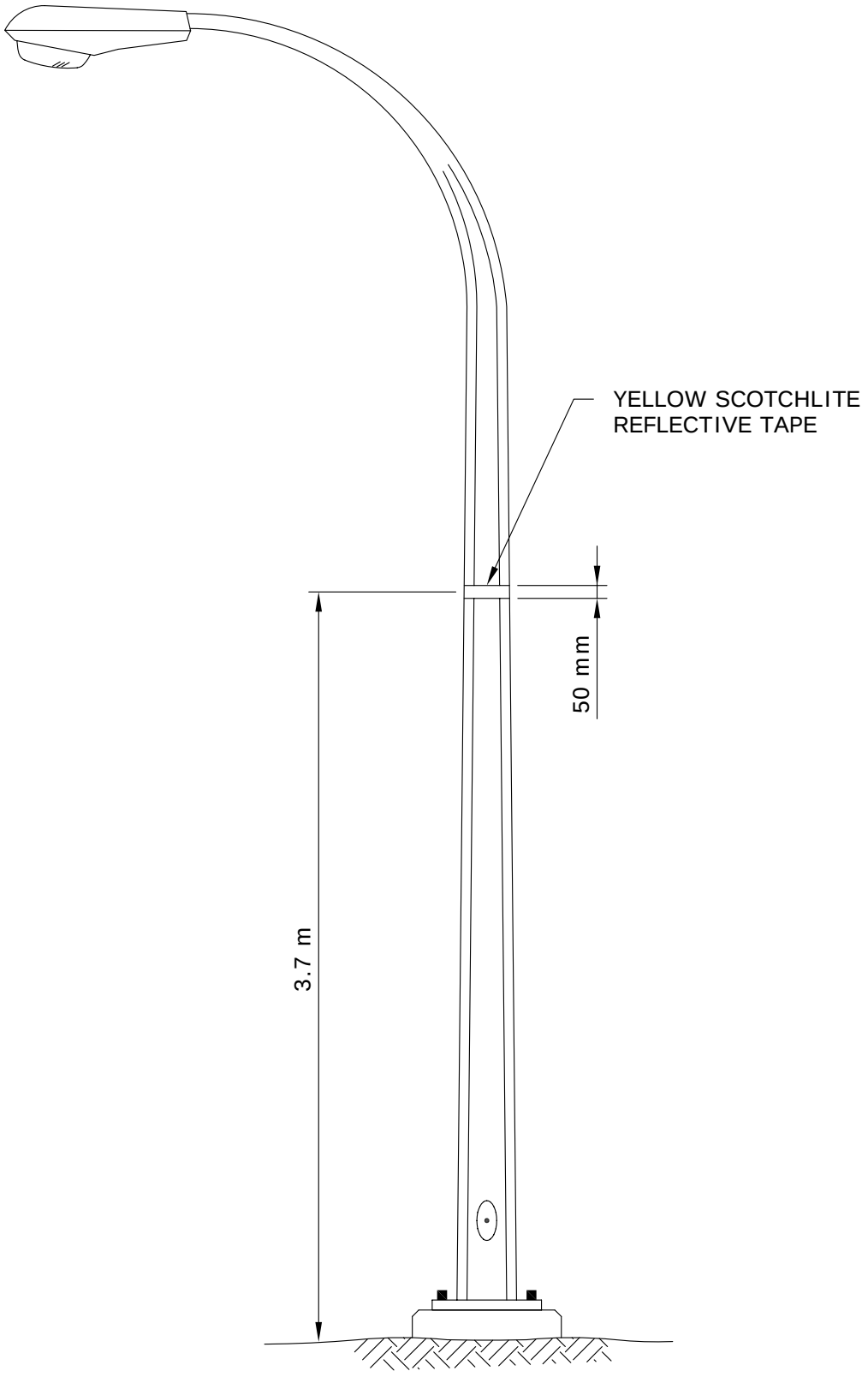
1-04431-DA-65620-0006



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**

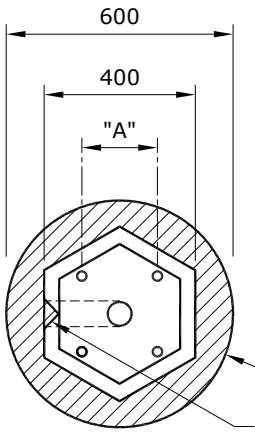
DRAWN	CHECKED	DATE		SHT	REV
W.B./CAD	W.C.	88-09	**CD 315-35**	0001 OF 1	00

1-04431-DA-65620-0014

7.7 - 10.7 STREET LIGHT POLES

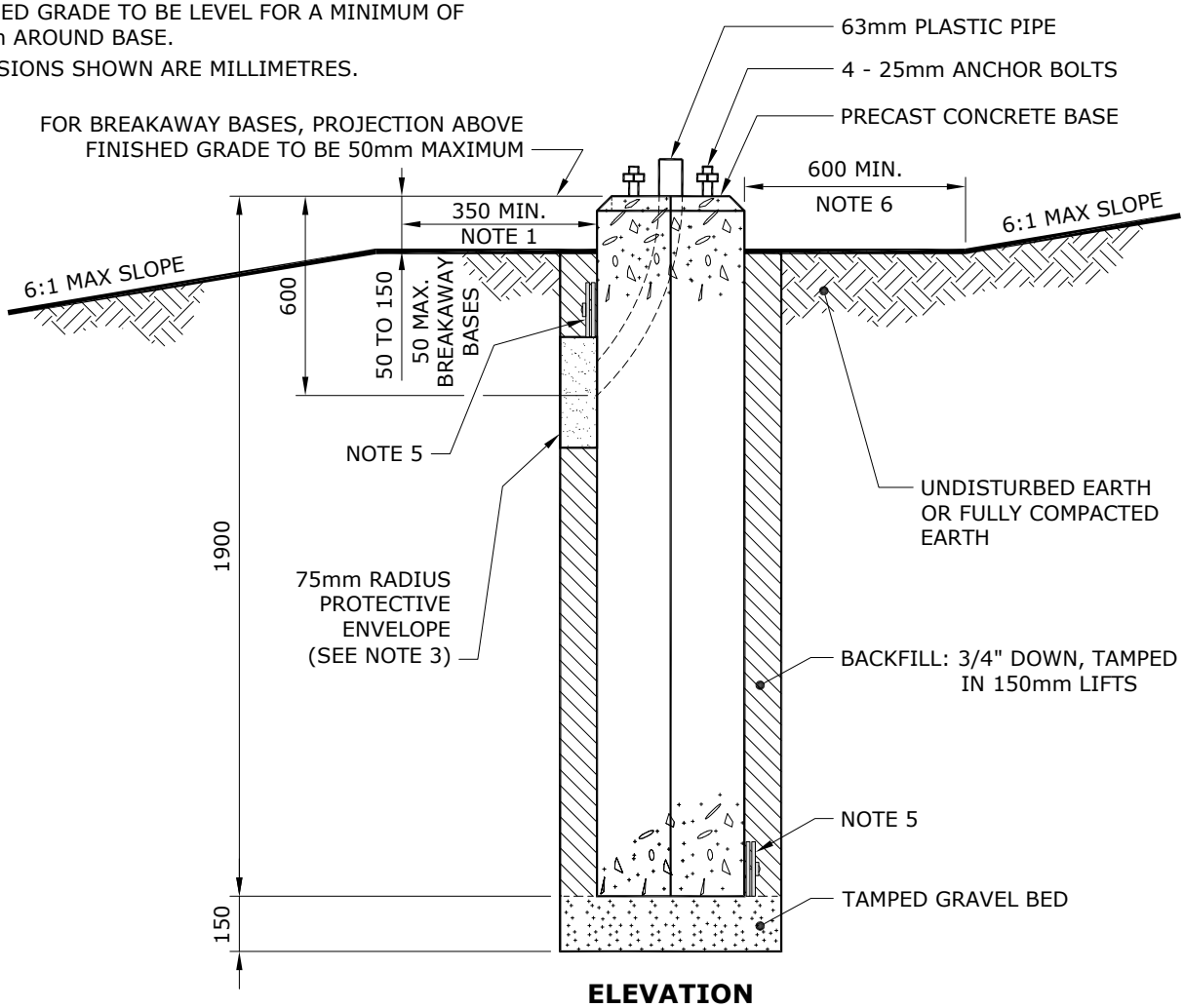
NOTES:

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. INSTALL EXPANDING POLE KEY ANCHOR PER CD44-30. ENSURE TOP ANCHOR DOES NOT OBSTRUCT CONDUIT ENTRY HOLE.
6. FINISHED GRADE TO BE LEVEL FOR A MINIMUM OF 600mm AROUND BASE.
7. 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
		INSTALLATION OF PRECAST CONCRETE BASE ON SLOPE

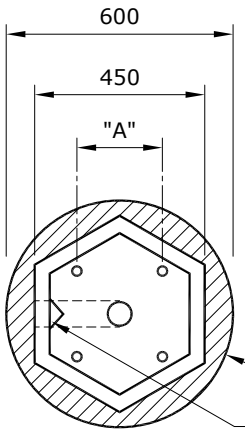
DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	19-10	**CD 300-7**	0001 OF 2	00

1-04431-DA-24620-0009

13.7 STREET LIGHT POLE

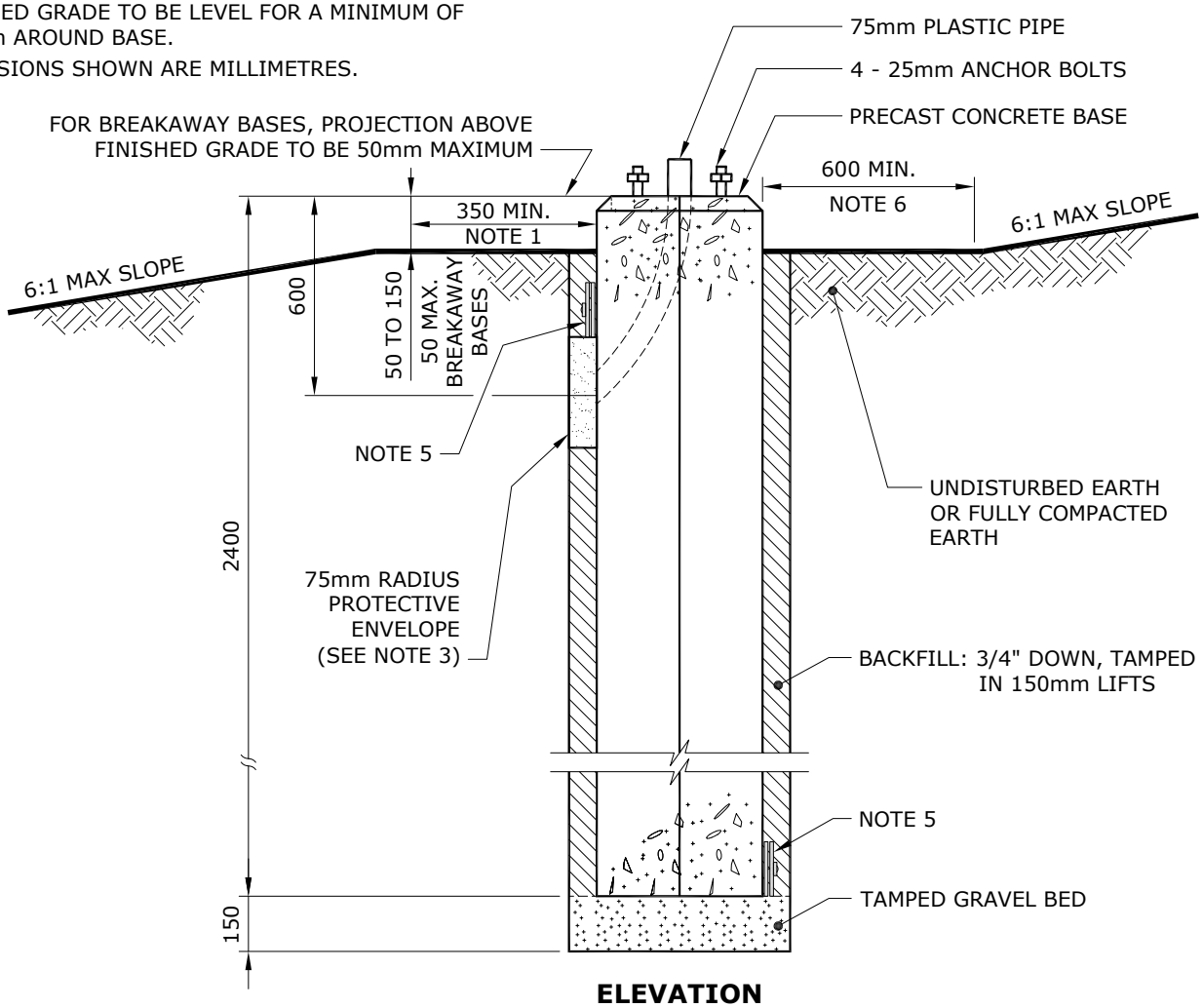
NOTES:

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. INSTALL EXPANDING POLE KEY ANCHOR PER CD44-30. ENSURE TOP ANCHOR DOES NOT OBSTRUCT CONDUIT ENTRY HOLE.
6. FINISHED GRADE TO BE LEVEL FOR A MINIMUM OF 600mm AROUND BASE.
7. DIMENSIONS SHOWN ARE MILLIMETRES.



PLAN

"A" BOLT SQUARE	STORES CODE
243	00 06 67



ELEVATION

APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS
		INSTALLATION OF PRECAST CONCRETE BASE ON SLOPE

DRAWN	CHECKED	DATE		SHT	REV
C.A.	L.D.	19-10	**CD 300-7**	0002 OF 2	00

1-04431-DA-24620-0009

APPENDIX ‘B’

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.

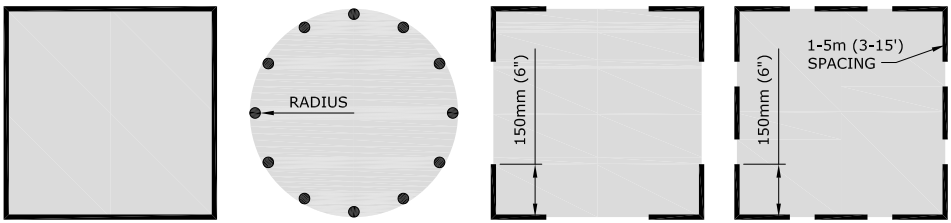
When using stakes or flags to mark the excavation work area, do not drive them into the ground deeper than 150 mm (6 inches). Any activity which disturbs more than 150 mm (6 inches) must have the facilities located.

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.

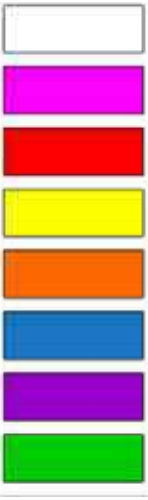
When the locator has completed locating the facilities, they will advise the excavator and indicate whether there is a conflict. The Facilities Locate form will be available and must be on site prior to excavating.

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.

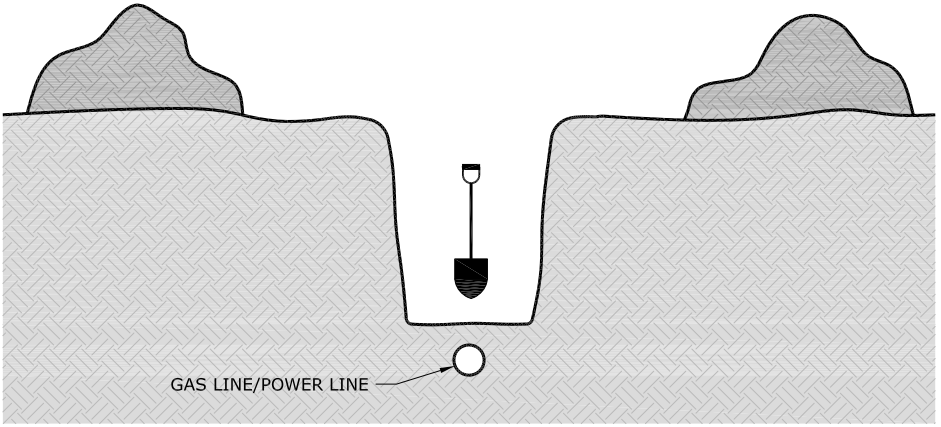
Water Pressure/Vacuum System (Hydrovac)

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.*

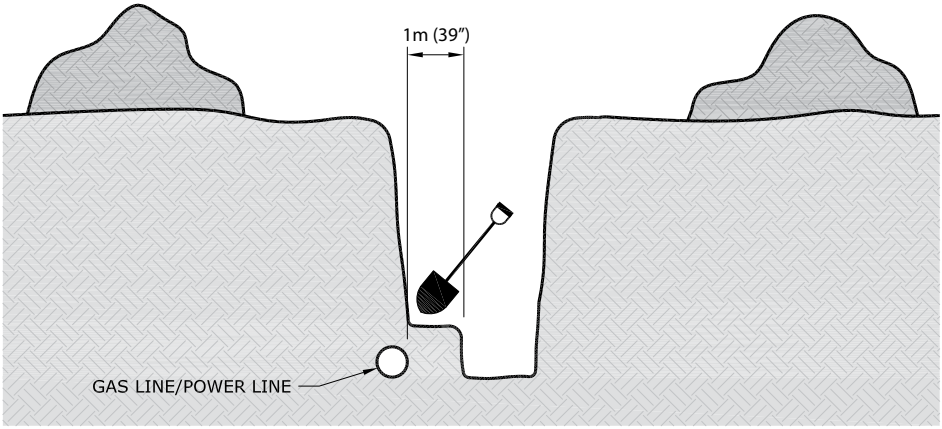
Some acceptable excavation methods:

a) Dig Vertically



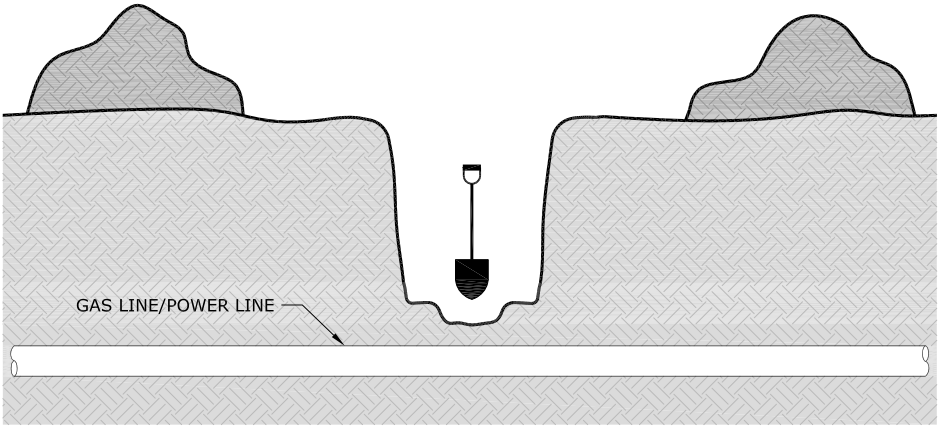
Dig a hole with a shovel directly above the line location until the line is exposed. Take care not to damage the line or coating. Mechanical excavation equipment MUST NOT be used to widen or deepen the hole before exposing the line.

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.

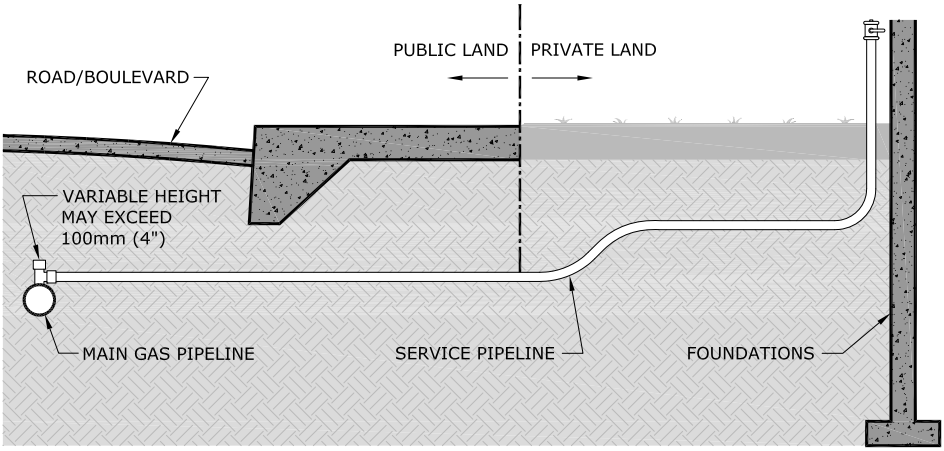
c) Dig Trench and excavate



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)

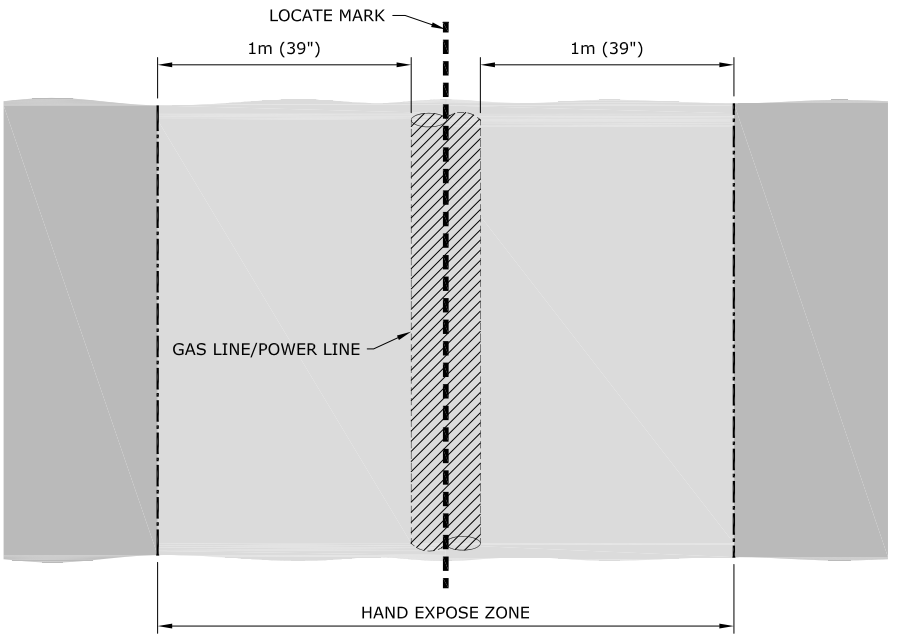


Fittings such as active or abandoned service tees may be present on gas pipelines, exercise care when excavating.

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.

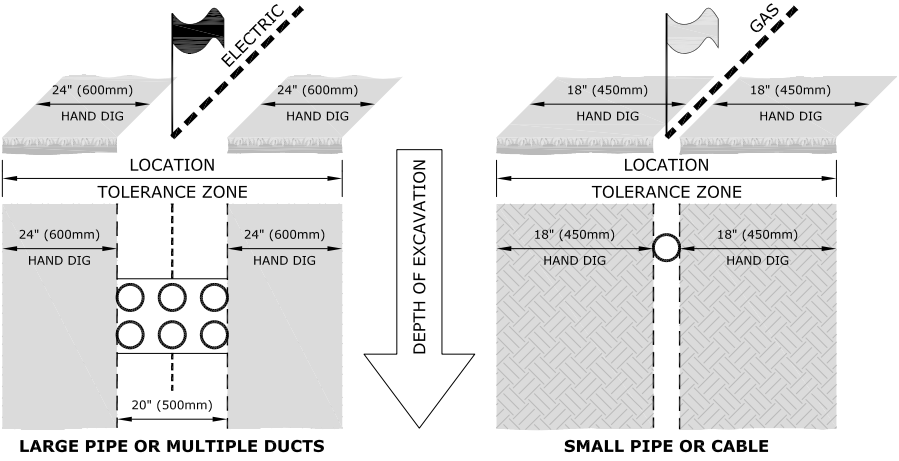
Working Parallel to Lines

- 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.

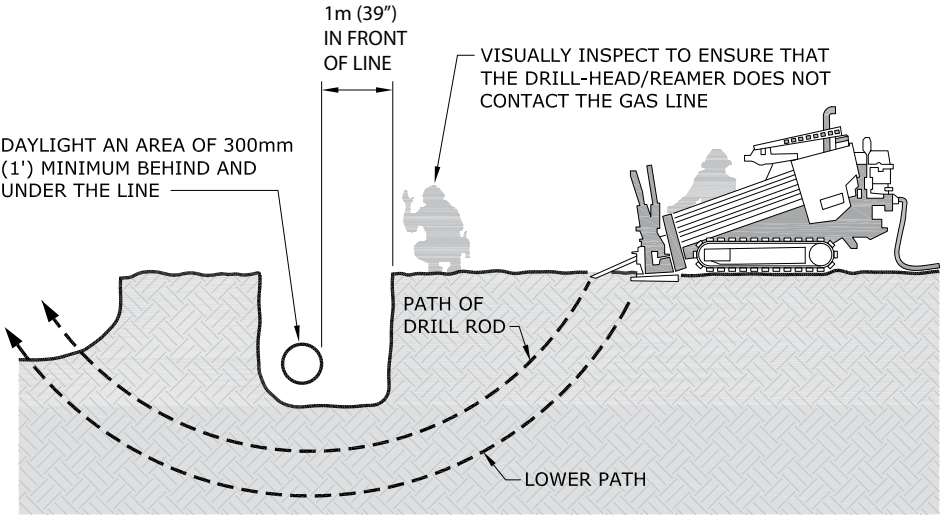
Electrical Conductors and Gas Pipelines

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.

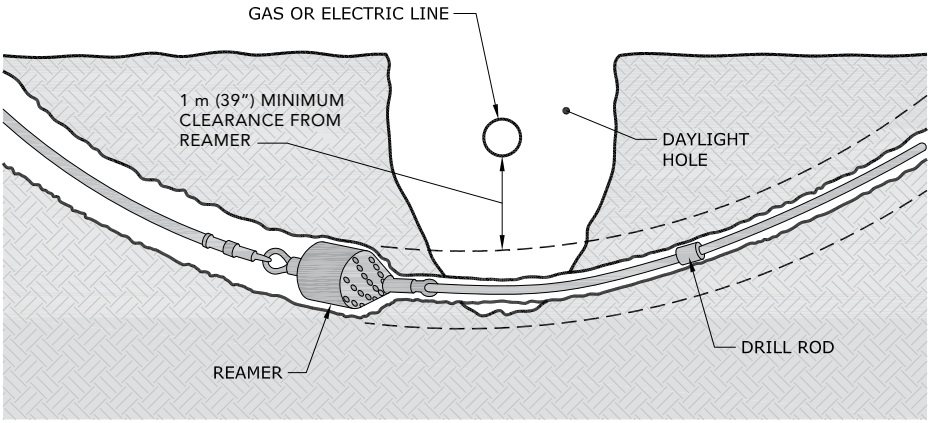
Acceptable practice for opening up the observation hole is using water pressure/vacuum or hand digging.

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 ‘C’

GELCAP KIT

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

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

APPENDIX ‘D’

ELECTRIC AND/OR NATURAL GAS FACILITIES LOCATE

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.*

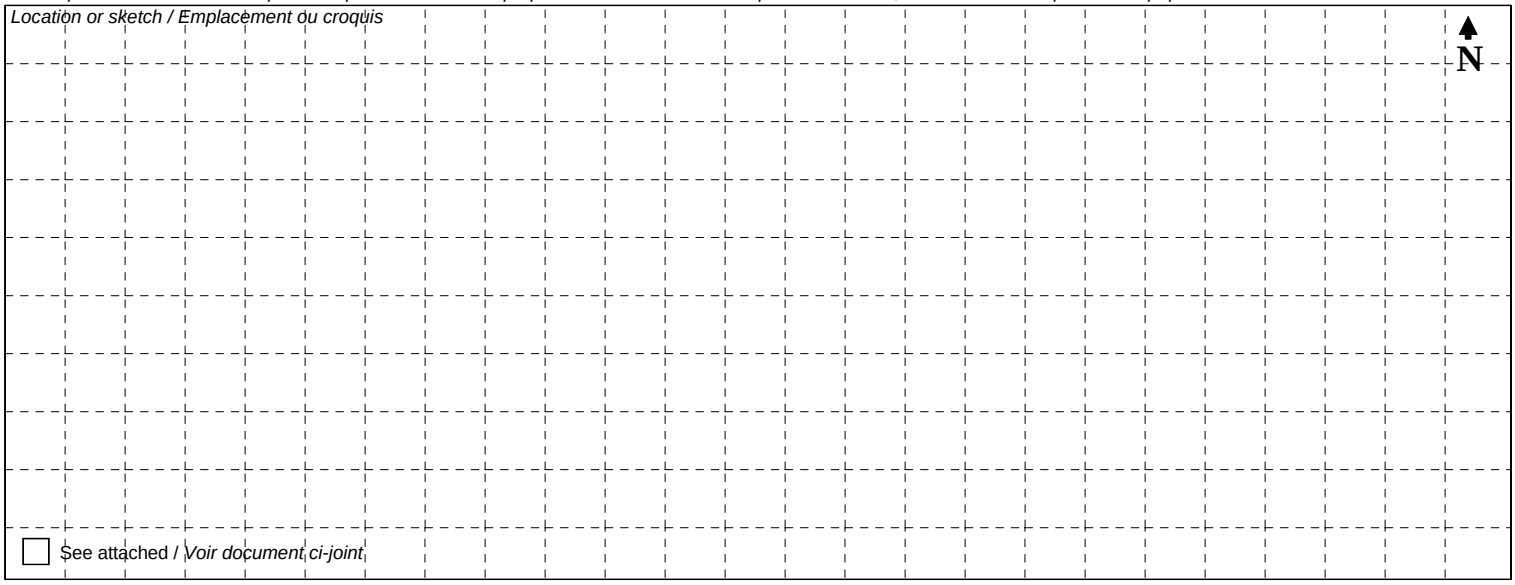
Only the following utilities have been marked / Les services suivants sont les seuls à avoir été marqués :

☐ **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 ‘E’

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

Dispatch - Daytime - Local CSC
After hours - Electric 204-360-2006 Radio #031
- Gas 204-360-2009 Radio #030
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 and classification 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 ‘F’

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

APPENDIX ‘G’

GEOTECHNICAL REPORT

APPENDIX 'G' – GEOTECHNICAL REPORT

The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure and/or soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. However, variations in pavement structure and/or soil conditions may exist between test holes and fluctuations in groundwater levels can be expected seasonally and may occur as a result of construction activities. The nature and extent of variations may not become evident until construction commences.

H. MANALO CONSULTING LTD.

1402 Notre Dame Avenue, Winnipeg, MB, R3E 3G5
Phone: (204) 697-3854; Cell (204) 997-1355
hmanalo@mts.net

2019 to 2022 Archibald Pavement Renewal Project

(St. Catherine Street to 100 m south of Elizabeth Road and
100 m south of Elizabeth Rd to 100 m south of Cottonwood Rd)

Prepared for:

Kevin Rae, P.Eng.
Senior Transportation Engineer
99 Commerce Dr, Winnipeg, MB R3P 0Y7

Project Number:**122-1913**

DECEMBER 30, 2019

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Introduction

H. Manalo Consulting Ltd. (HMCL) was retained by AECOM to perform a geotechnical investigation for the Archibald Street Pavement Renewal Project. The subject area was divided into Section A, from St. Catherine Street to 100 m south of Elizabeth Road and Section B, from 100 m south of Elizabeth Road to 100 m south of Cottonwood Road. The purpose of the investigation was to provide detailed pavement and sub-surface information to be used for the renewal of these two sections of Archibald Street which will take place in the 2020 to 2022 construction seasons.

Section A - St. Catherine Street to100 m south of Elizabeth Road

For this section of Archibald Street, thirteen (13) test hole locations spaced approximately 100 m apart were identified. The underground services were located prior to the pavement being cored. On November 22 and December 12, 2019, the test holes were augered to approximately 2 m below the pavement surface using a truck mounted geotechnical test hole drill rig. The soil profile was logged and a sample was collected every 0.3 m. The pavement and soil samples were returned to HMCL's laboratory for further review. The test holes were back filled with the auger cuttings and then gravel. The concrete section was backfilled with asphalt cold mix. ATS Traffic was used to provide traffic control during the coring and test hole drilling.

The asphalt pavement thickness ranged from 50 mm to 105 mm except for TH 1 and TH 3 which had a thickness of about 170 mm. The concrete pavement thickness ranged from 40 mm to 250 mm with several test hole locations appearing to have some loss of concrete section due to deteriorated concrete. Rebar was also noted in some cores. The soil profile below the pavement was generally clay, then silt, then clay to the depth explored. The exception to this was TH 4, TH 5, TH 12 and TH 13 which had a granular layer at the top and no silt layer. Appendix A includes the test hole locations in Figure 1 and a summary of the pavement and soil profile can be found in Table 1. Also included in Appendix A are photos of the pavement cores, the sub-surface test hole logs providing the soil profile and test reports for selected soil samples.

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Section B - 100 m south of Elizabeth Road to 100 m south of Cottonwood Rd.

This section of Archibald Street was identified by AECOM as requiring rehabilitation and therefore no sub-surface test holes were required. Thirteen (13) test locations spaced approximately 100 m apart were identified for recovery of pavement cores. The underground services were located in the vicinity of each location. On November 16, 27 and 28, 2019, pavement core samples were recovered using a portable coring machine equipped with a diamond tip hollow core drill bit. Traffic control was provided by ATS Traffic, to guide traffic and provide a safe working area. The core holes were backfilled using cold mix asphalt. The core samples were returned to our laboratory for visual inspection and thickness measurement.

The asphalt pavement thickness ranged from 40 mm to 210 mm and the concrete pavement thickness ranged from 160 mm to 250 mm. It was noted that the bond between the asphalt pavement and the concrete was generally good, and the concrete shows little to no deterioration or crumbling. Rebar was also noted in some cores. Appendix B includes the core locations in Figure 2 and provides the asphalt and concrete pavement thickness in Table 2. Photos of each core are also provided.

The pavement and sub-surface information provided in this report are in accordance with current engineering principles and practices (Standard of Practice). The findings of this report were based on the information provided from the field investigations. Conditions can be highly variable across a site.

We appreciate the opportunity to assist you in this project. Please contact the undersigned if you require further information.

Fieldwork completed by:

Navpreet Singh

Navpreet Singh, EIT
Civil Engineer

Reviewed by:

P. Bevel

Paul Bevel
Manager, Field and Laboratory Services

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TABLE 1

Archibald from St. Catherine Street to 100 m south of Elizabeth Road

Test hole Number	Material Type	Start Depth (m)	End Depth (m)	Sample Notes	Particle size Analysis			Atterberg Limits		
					Sand %	Silt %	Clay %	L.L	P.L	P.I
TH 1	Asphalt	0	0.175	-						
	Concrete	0.175	0.360	Upper 80 mm deteriorated						
	Silty Clay	0.36	0.50	Sample 35						
	Silt	0.50	1.52	Samples 36, 37, 38						
	Silty Clay	1.52	2.3	Samples 39, 40						
TH 2	Asphalt	0	0.080	-						
	Concrete	0.080	0.280	Upper 20 mm deteriorated						
	Silty Clay	0.28	0.80	Samples 41, 42	12	39	49	53	14	39
	Silt	0.80	1.52	Samples 43, 44						
	Silty Clay	1.52	2.3	Sample 45						
TH 3	Asphalt	0	0.170	-						
	Concrete	0.170	0.320	Upper 30 mm deteriorated						
	Silty Clay	0.320	0.48	Sample 30	18	38	44	56	16	40
	Clayey Silt	0.48	1.37	Samples 31, 32, 33	5	54	41	47	13	34
	Silty Clay	1.37	2.3	Sample 34						
TH 4	Asphalt	0	0.090	-						
	Concrete	0.090	0.300	-						
	Crushed Limestone	0.300	0.76	Sample 46						
	Silty Clay	0.76	2.3	Samples 48, 49, 50						
TH 5	Asphalt	0	0.180	-						
	Concrete	0.180	0.255	-						
	Sand & Gravel	0.26	0.46							

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Test hole Number	Material Type	Start Depth (m)	End Depth (m)	Sample Notes	Particle size Analysis			Atterberg Limits		
					Sand %	Silt %	Clay %	L.L	P.L	P.I
	Silty Clay	0.46	2.3	Samples 25, 26, 27, 28, 29	14	36	50	57	15	42
TH 6	Asphalt	0	0.075	-						
	Concrete	0.075	0.280	-						
	Silty Clay	0.28	0.76	Samples 51, 52						
	Silt	0.76	1.38	Sample 53	6	71	23	26	15	10
	Silty Clay	1.38	2.3	Sample 54, 55						
TH 7	Asphalt	0	0.105	-						
	Concrete	0.105	0.305	Upper 80 mm deteriorated						
	Silty Clay	0.31	0.91	Samples 18, 19						
	Silt	0.91	1.38	Samples 20, 21						
	Silty Clay	1.37	2.3	Samples 22, 23						
TH 8	Asphalt	0	0.075	-						
	Concrete	0.075	0.275	Sample 29						
	Clayey Silt	0.28	0.88	Samples 56, 57	11	52	37	43	12	31
	Silt	0.88	1.25	Sample 58						
	Silty Clay	1.25	2.3	Samples 59, 60						
TH 9	Asphalt	0	0.060							
	Concrete	0.060	0.310	Upper 40mm deteriorated						
	Silty Clay	0.31	0.76	Samples 12, 13						
	Silt	0.76	1.55	Samples 14, 15, 16						
	Silty Clay	1.55	2.3	Sample 17						
TH 10	Asphalt	0	0.080	-						
	Concrete	0.080	0.300	-						
	Silty Clay	0.30	0.76	Samples 61, 62						

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Test hole Number	Material Type	Start Depth (m)	End Depth (m)	Sample Notes	Particle size Analysis			Atterberg Limits		
					Sand %	Silt %	Clay %	L.L	P.L	P.I
	Silt	0.76	1.22	Sample 63						
	Silty Clay	1.22	2.3	Samples 64, 65						
TH 11	Asphalt	0	0.090	-						
	Concrete	0.090	0.290	-						
	Silty Clay	0.29	0.76	Samples 6, 7						
	Clayey Silt	0.76	1.55	Samples 8, 9, 10	17	54	29	33	13	21
	Silty Clay	1.55	2.3	Sample 11						
TH 12	Asphalt	0	0.050	-						
	Concrete	0.050	0.270	-						
	Crushed Limestone	0.27	1.22	Samples 66, 67, 68						
	Silty Clay	1.22	2.3	Samples 69, 70	10	33	57	62	17	45
TH 13	Asphalt	0	0.050	-						
	Concrete	0.050	0.300	-						
	Crushed Limestone	0.30	0.76	Samples 1, 2						
	Silty Clay	0.76	2.3	Samples 3, 4, 5						

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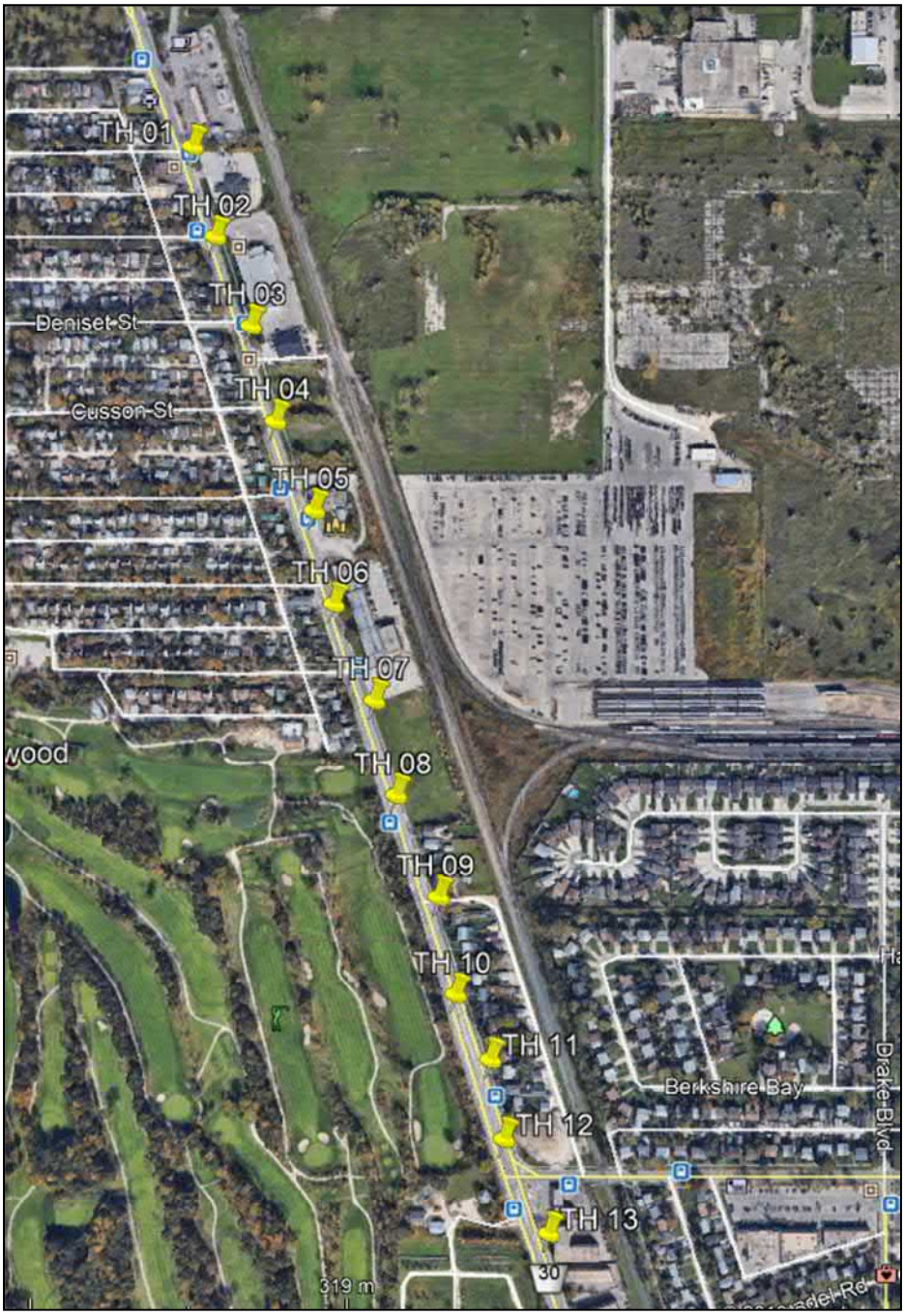
FIGURE 1

Archibald from St. Catherine Street to 100 m south of Elizabeth Road



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H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 636656 m E, 5527048 m N

TH 1

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Number	Type
0	0		Ground Surface		
			ASPHALT and CONCRETE		
1			***CLAY*** -silty, black, moist, firm	35	GS
2				36	GS
			SILT -some clay, light brown, soft, moist,	37	GS
3	1		-trace clay below 2.5 ft,	38	GS
4				39	GS
5			***CLAY*** -silty, greyish brown, firm, moist	40	GS
6					
7	2		-End of test hole -No seepage -Sloughing at silt layer		
8					
9					
10	3				

Shear Strength (kPa): 20 40 60 80 100 120 140 160 180

Water Content %: 20 40 60

Drill Method: Auger

Drill Date: Nov 22, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 636682 m E, 5526956 m N

TH 2

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Number	Type
0 / 0		Ground Surface		
0		***ASPHALT and CONCRETE***		
1		***CLAY*** -silty, trace fine sand, trace gravels, black, moist	41	GS
2			42	GS
3 / 1		***SILT*** -some clay, light brown, soft, moist,	43	GS
4			44	GS
5		***CLAY*** -some silt, greyish brown, firm, moist	45	GS
6 / 2				
7		-End of test hole -No seepage -Sloughing from silt layer		
8				
9				
10 / 3				

Shear Strength (kPa): 20 40 60 80 100 120 140 160 180

Water Content %: 20 40 60

Drill Method: Auger

Drill Date: Dec 12, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 636721 m E, 5526866 m N

TH 3

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Number	Type
0 / 0		Ground Surface		
		ASPHALT and CONCRETE -top 2" concrete crumbled		
1		***CLAY*** -silty, black, moist, firm	30	GS
2		***SILT*** -with clay, light brown, soft, moist,	31	GS
3 / 1		-some clay between 3.0 to 4.0 ft,	32	GS
4			33	GS
5		***CLAY*** -some silt, grey, firm, moist	34	GS
6 / 2				
7		-End of test hole -No seepage -Sloughing from silt layer		
8				
9				
10 / 3				

Shear Strength (kPa): 20 40 60 80 100 120 140 160 180

Water Content %: 20 40 60

Drill Method: Auger

Drill Date: Nov 22, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 6367221 m E, 5526770 m N

TH 4

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Number	Type
0	0		Ground Surface		
			ASPHALT and CONCRETE		
1				46	GS
			Limestone -sand and gravel sizes		
2				47	GS
3	1			48	GS
4			***CLAY*** -with silt, trace to some gravels, trace organic, -black, damp,	49	GS
5			-colour change from black to grey at 3.5 ft, -firm, some silt, moist,	50	GS
6	2				
7			-End of test hole -No seepage		
8					
9					
10	3				

Shear Strength (kPa): 20 40 60 80 100 120 140 160 180

Water Content %: 20 40 60

Drill Method: Auger

Drill Date: Dec 12, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 636791 m E, 5526680 m N

TH 5

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Number	Type
0	0		Ground Surface		
0	0		***ASPHALT and CONCRETE*** -top 2" concrete crumbled		
1			***SAND and GRAVEL*** -sand and gravel, 20 mm max size	24	GS
2				25	GS
3	1		***CLAY*** -silty, trace gravel, black, firm, trace organics, moist, -grey below 3 ft.	26	GS
4				27	GS
5				28	GS
6				29	SS
7	2		-End of test hole -No seepage		
8					
9					
10	3				

Shear Strength (kPa): 20 40 60 80 100 120 140 160 180

Water Content %: 20 40 60

Drill Method: Auger

Drill Date: Nov 22, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 636814 m E, 5526585 m N

TH 6

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Number	Type
0	0		Ground Surface		
			ASPHALT and CONCRETE		
1			***CLAY*** -silty, trace gravel, trace wood fibers, mottled brown and black, -firm, frozen,	51	GS
2				52	GS
3	1		***SILT*** -some clay, soft, light brown, moist,	53	GS
4					
5			***CLAY*** -some silt, firm, moist, greyish brown,	54	GS
6	2			55	GS
7			-End of test hole -No seepage -Sloughing from silt		
8					
9					
10	3				

Shear Strength (kPa): 20 40 60 80 100 120 140 160 180

Water Content %: 20 40 60

Drill Method: Auger

Drill Date: Dec 12, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 636858 m E, 5526488 m N

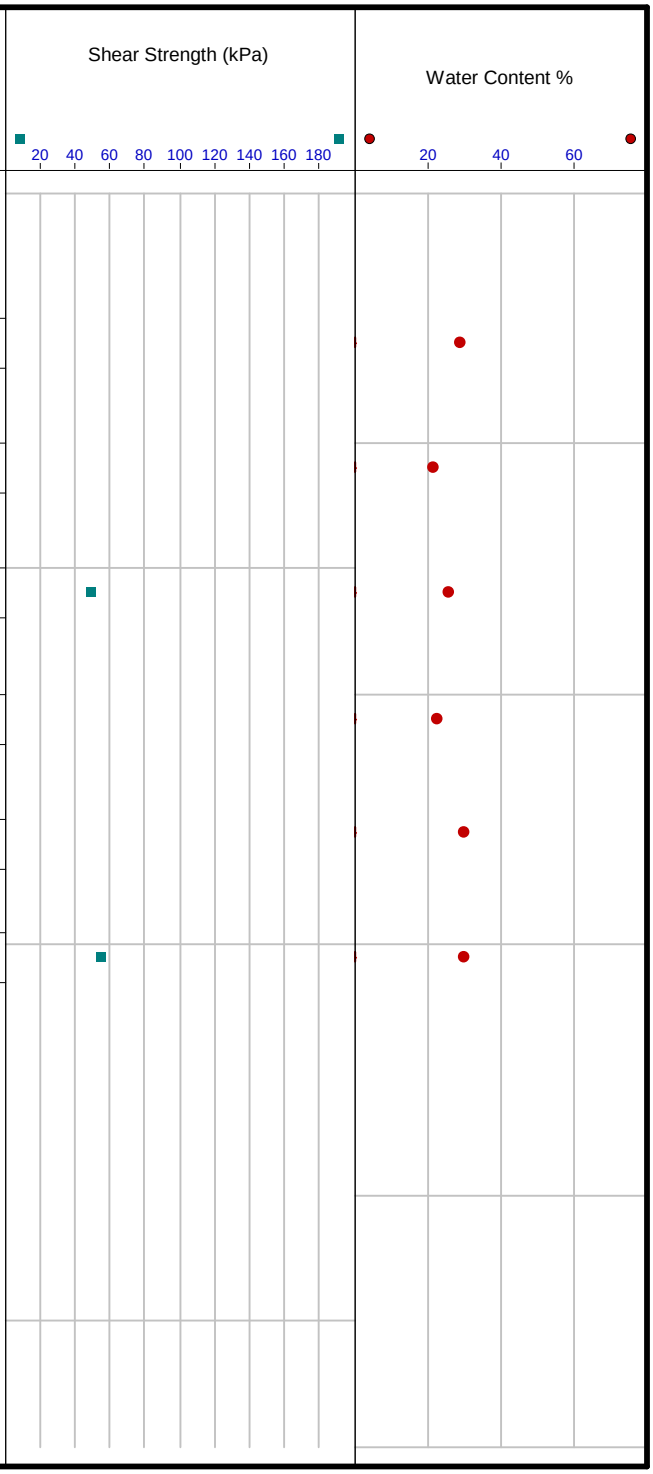
TH 7

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Number	Type
0 / 0		Ground Surface		
0		***ASPHALT and CONCRETE*** -top 2.5" concrete crumbled		
1		***CLAY*** -silty, some sand, trace organic material, black, moist, firm,	18	GS
2		-silt and clay, mottled brown and light brown below 2 ft.	19	GS
3 / 1		***SILT*** -some clay, light brown, moist, soft,	20	GS
4			21	GS
5		***CLAY*** - with silt, grey, stiff, moist,	22	GS
6 / 2			23	GS
7		-End of test hole -No seepage -Sloughin from silty layer		
8				
9				
10 / 3				



Drill Method: Auger

Drill Date: Nov 22, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 636883 m E, 5526393 m N

TH 8

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Number	Type
0	0		Ground Surface		
0			***ASPHALT and CONCRETE***		
1			***CLAY and SILT*** -trace sand, trace gravel, brown and black, -firm, frozen,	56	GS
2			-silty clay below 2 ft	57	GS
3	1		***SILT*** -some clay, soft, light brown, moist,	58	GS
4				59	GS
5			***CLAY*** -some silt, firm, moist, greyish brown,	60	GS
6	2				
7			-End of test hole -No seepage -Sloughing from silt		
8					
9					
10	3				

Shear Strength (kPa): 20 40 60 80 100 120 140 160 180

Water Content %: 20 40 60

Drill Method: Auger

Drill Date: Dec 12, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 636929 m E, 5526291 m N

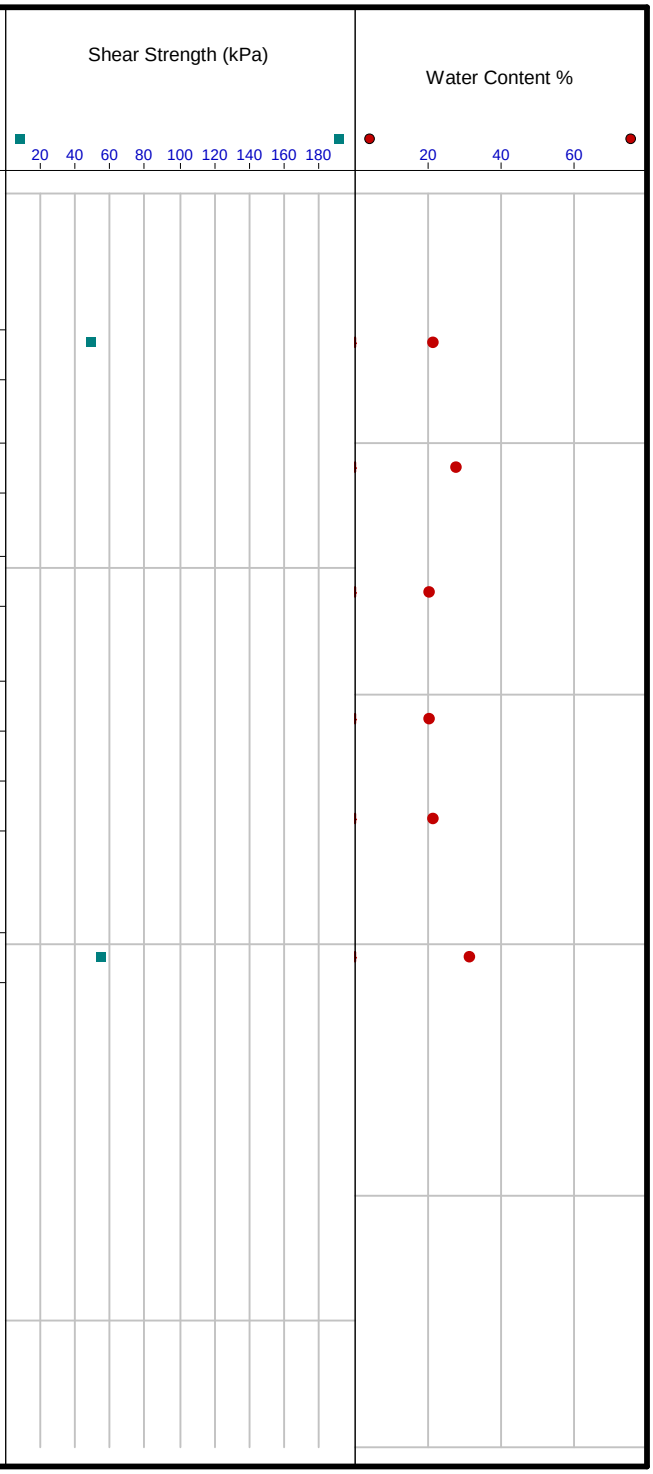
TH 9

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Number	Type
0 / 0		Ground Surface		
0		***ASPHALT and CONCRETE*** -top 1" concrete crumbled		
1		***CLAY*** -silty, some sand, trace wood fibers, black, moist, firm,	12	GS
2			13	GS
3 / 1		***SILT*** -some clay, light brown, moist, soft,	14	GS
4			15	GS
5			16	GS
6 / 2		***CLAY*** - some silt, grey, stiff, moist,	17	GS
7		-End of test hole -No seepage -Sloughing from silt		
8				
9				
10 / 3				



Drill Method: Auger

Drill Date: Nov 22, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 636949 m E, 5526193 m N

TH 10

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Number	Type
0 / 0		Ground Surface		
		ASPHALT and CONCRETE		
1		***CLAY*** -silty, trace sand, trace gravel, black, trace wood fibers, -firm, frozen,	61	GS
2			62	GS
		SILT -with clay, soft, light brown, moist,		
3 / 1			63	GS
4			64	GS
		CLAY -some silt, firm, moist, greyish brown,		
5			65	GS
6 / 2				
7		-End of test hole -No seepage -Sloughing from silt		
8				
9				
10 / 3				

Shear Strength (kPa): 20 40 60 80 100 120 140 160 180

Water Content %: 20 40 60

Drill Method: Auger

Drill Date: Dec 12, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 636986 m E, 5526129 m N

TH 11

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Number	Type
0	0		Ground Surface		
			ASPHALT and CONCRETE		
1			***CLAY*** -silty, trace to some sand, trace wood fibers, black, moist,	6	GS
				7	GS
2					
3	1		***SILT*** -with clay, light brown, moist, soft	8	GS
				9	GS
4					
5				10	GS
			CLAY - some silt, grey, stiff, moist		
6	2			11	GS
7			-End of test hole -No seepage -Sloughing from silt		
8					
9					
10	3				

Shear Strength (kPa): 20 40 60 80 100 120 140 160 180

Water Content %: 20 40 60

Drill Method: Auger

Drill Date: Nov 22, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

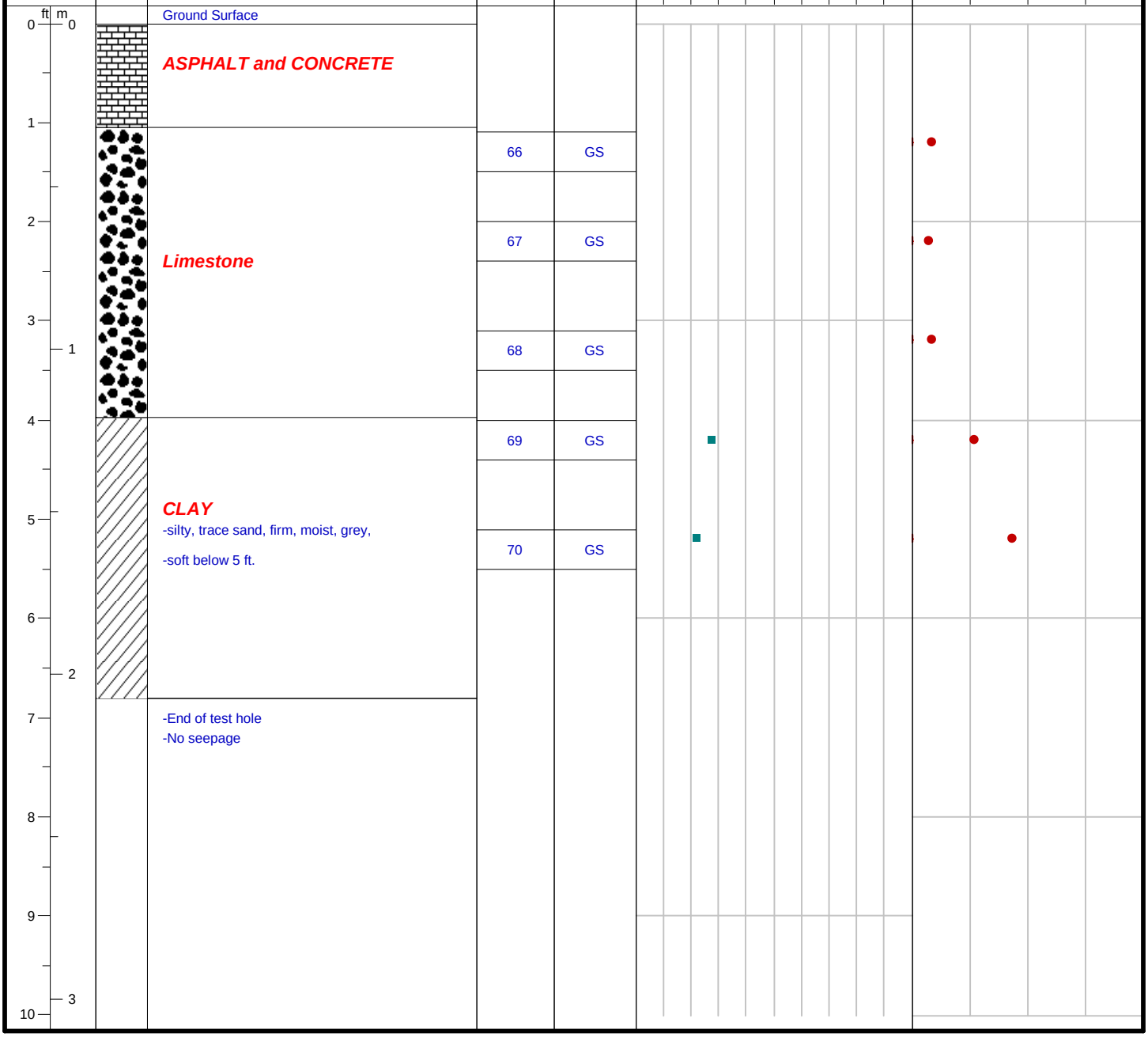
Location: 14U 637002 m E, 5526049 m N

TH 12

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE



Drill Method: Auger

Drill Date: Dec 12, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

H. MANALO CONSULTING LTD.

Project No: 112-1913

Project: 2019 to 2022 Archibald Pavement Renewal

Client: Aecom

Location: 14U 637050 m E, 5525955 m N

TH 13

Logged By: NS

Engineer: GP

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Number	Type
0	0		Ground Surface		
			ASPHALT and CONCRETE		
1			***LIMESTONE*** -gravels size 10mm, crushed, light brown,	1	GS
2				2	GS
3	1		***CLAY*** -some silt, black, firm, -mottled brown and black, clayey below 4ft. -trace silt layers below 5ft.	3	GS
4				4	GS
5				5	GS
6	2				
7			-End of test hole -No seepage		
8					
9					
10	3				

Shear Strength (kPa): 20 40 60 80 100 120 140 160 180

Water Content %: 20 40 60

Drill Method: Auger

Drill Date: Nov 22, 2019

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

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MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	AECOM	TEST NO:	19- 001	PROJECT NO:	112-1913
PROJECT:	2019 2022 Archibald Pavement Renewal	DATE SAMPLED:	22-Nov-2019	SAMPLED BY:	Navpreet Singh
PROJECT CONTACT:	Kevin Rae	DATE TESTED:	26-Nov-2019	TESTED BY:	Navpreet Singh
TEST LOCATION:	Archibald Street – St. Catherine to Elizabeth				

Description	TH 13	TH 13	TH 13	TH 13	TH 13
Sample	1	2	3	4	5
Wt Wet Sample + Tare	132.20	110.20	195.20	167.00	127.80
Wt Dry Sample + Tare	123.10	105.30	159.70	126.30	89.00
Wt Water	9.10	4.90	35.50	40.70	38.80
Wt Tare	4.30	5.10	4.50	4.80	4.00
Wt Dry Sample	118.80	100.20	155.20	121.50	85.00
Moisture Content (%)	**7.7**	**4.9**	**22.9**	**33.5**	**45.6**
Description	TH 11	TH 11	TH 11	TH 11	TH 11
Sample	6	7	8	9	10
Wt Wet Sample + Tare	109.30	148.30	129.10	145.50	212.90
Wt Dry Sample + Tare	86.80	114.20	99.80	116.20	173.70
Wt Water	22.50	34.10	29.30	29.30	39.20
Wt Tare	4.40	4.40	4.30	4.40	4.30
Wt Dry Sample	82.40	109.80	95.50	111.80	169.40
Moisture Content (%)	**27.3**	**31.1**	**30.7**	**26.2**	**23.1**
Description	TH 11	TH 9	TH 9	TH 9	TH 9
Sample	11	12	13	14	15
Wt Wet Sample + Tare	178.00	114.60	153.00	236.10	179.70
Wt Dry Sample + Tare	137.70	95.00	120.60	196.40	149.30
Wt Water	40.30	19.60	32.40	39.70	30.40
Wt Tare	4.60	4.20	4.30	3.80	3.90
Wt Dry Sample	133.10	90.80	116.30	192.60	145.40
Moisture Content (%)	**30.3**	**21.6**	**27.9**	**20.6**	**20.9**
Description	TH 9	TH 9	TH 7	TH 7	TH 7
Sample	16	17	18	19	20
Wt Wet Sample + Tare	195.30	179.70	145.60	168.30	197.40
Wt Dry Sample + Tare	160.20	137.20	113.20	138.20	156.10
Wt Water	35.10	42.50	32.40	30.10	41.30
Wt Tare	3.80	4.00	4.20	4.00	3.80
Wt Dry Sample	156.40	133.20	109.00	134.20	152.30
Moisture Content (%)	**22.4**	**31.9**	**29.7**	**22.4**	**27.1**

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MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	AECOM	TEST NO:	19- 001	PROJECT NO:	112-1913
PROJECT:	2019 2022 Archibald Pavement Renewal	DATE SAMPLED:	22-Nov-2019	SAMPLED BY:	Navpreet Singh
PROJECT CONTACT:	Kevin Rae	DATE TESTED:	26-Nov-2019	TESTED BY:	Navpreet Singh
TEST LOCATION:	Archibald Street – St. Catherine to Elizabeth				

Description	TH 7	TH 7	TH 7	TH 5	TH 5
Sample	21	22	23	24	25
Wt Wet Sample + Tare	171.80	186.50	175.30	173.50	169.70
Wt Dry Sample + Tare	140.40	144.20	136.50	161.60	138.30
Wt Water	31.40	42.30	38.80	11.90	31.40
Wt Tare	4.20	4.20	4.50	4.60	4.30
Wt Dry Sample	136.20	140.00	132.00	157.00	134.00
Moisture Content (%)	**23.1**	**30.2**	**29.4**	**7.6**	**23.4**
Description	TH 5	TH 5	TH 5	TH 5	TH 3
Sample	26	27	28	29	30
Wt Wet Sample + Tare	150.00	149.80	183.00	180.60	149.30
Wt Dry Sample + Tare	119.20	119.80	142.10	145.40	114.30
Wt Water	30.80	30.00	40.90	35.20	35.00
Wt Tare	4.40	4.40	4.30	4.40	4.20
Wt Dry Sample	114.80	115.40	137.80	141.00	110.10
Moisture Content (%)	**26.8**	**26.0**	**29.7**	**25.0**	**31.8**
Description	TH 3	TH 3	TH 3	TH 3	TH 1
Sample	31	32	33	34	35
Wt Wet Sample + Tare	166.00	146.20	149.50	176.50	178.30
Wt Dry Sample + Tare	129.30	112.90	116.10	135.10	128.30
Wt Water	36.70	33.30	33.40	41.40	50.00
Wt Tare	4.50	4.20	4.20	4.60	4.30
Wt Dry Sample	124.80	108.70	111.90	130.50	124.00
Moisture Content (%)	**29.4**	**30.6**	**29.8**	**31.7**	**40.3**
Description	TH 1	TH 1	TH 1	TH 1	TH 1
Sample	36	37	38	39	40
Wt Wet Sample + Tare	170.60	159.90	193.90	159.90	193.90
Wt Dry Sample + Tare	133.20	129.30	151.50	129.30	151.50
Wt Water	37.40	30.60	42.40	30.60	42.40
Wt Tare	4.40	4.20	4.10	4.20	4.10
Wt Dry Sample	128.80	125.10	147.40	125.10	147.40
Moisture Content (%)	**29.0**	**24.5**	**28.8**	**24.5**	**28.8**

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Phone: 204-697-3854 Cell: 204-997-1355
Email: hmanalo@mts.net

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	AECOM	TEST NO:	19- 001	PROJECT NO:	112-1913
PROJECT:	2019 2022 Archibald Pavement Renewal	DATE SAMPLED:	22-Nov-2019	SAMPLED BY:	Navpreet Singh
PROJECT CONTACT:	Kevin Rae	DATE TESTED:	26-Nov-2019	TESTED BY:	Navpreet Singh
TEST LOCATION:	Archibald Street – St. Catherine to Elizabeth				

Description	TH 2	TH 2	TH 2	TH 2	TH 2
Sample	41	42	43	44	45
Wt Wet Sample + Tare	151.10	154.50	183.80	151.80	185.00
Wt Dry Sample + Tare	110.90	118.60	145.30	125.00	146.80
Wt Water	40.20	35.90	38.50	26.80	38.20
Wt Tare	4.80	4.30	4.30	4.90	4.30
Wt Dry Sample	106.10	114.30	141.00	120.10	142.50
Moisture Content (%)	**37.9**	**31.4**	**27.3**	**22.3**	**26.8**
Description	TH 4	TH 4	TH 4	TH 4	TH 4
Sample	46	47	48	49	50
Wt Wet Sample + Tare	174.40	168.40	196.00	194.80	149.00
Wt Dry Sample + Tare	166.40	157.40	175.50	153.50	116.20
Wt Water	8.00	11.00	20.50	41.30	32.80
Wt Tare	4.20	4.30	4.40	4.10	4.20
Wt Dry Sample	162.20	153.10	171.10	149.40	112.00
Moisture Content (%)	**4.9**	**7.2**	**12.0**	**27.6**	**29.3**
Description	TH 6	TH 6	TH 6	TH 6	TH 6
Sample	51	52	53	54	55
Wt Wet Sample + Tare	186.60	165.70	174.40	167.50	181.90
Wt Dry Sample + Tare	156.30	136.00	147.00	131.10	137.30
Wt Water	30.30	29.70	27.40	36.40	44.60
Wt Tare	4.30	4.50	4.30	4.50	4.30
Wt Dry Sample	152.00	131.50	142.70	126.60	133.00
Moisture Content (%)	**19.9**	**22.6**	**19.2**	**28.8**	**33.5**
Description	TH 8	TH 8	TH 8	TH 8	TH 8
Sample	56	57	58	59	60
Wt Wet Sample + Tare	174.00	157.80	151.20	164.10	161.10
Wt Dry Sample + Tare	142.00	113.60	117.30	130.20	126.10
Wt Water	32.00	44.20	33.90	33.90	35.00
Wt Tare	4.70	4.30	4.20	4.80	4.30
Wt Dry Sample	137.30	109.30	113.10	125.40	121.80
Moisture Content (%)	**23.3**	**40.4**	**30.0**	**27.0**	**28.7**

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MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	AECOM	TEST NO:	19- 001	PROJECT NO:	112-1913
PROJECT:	2019 2022 Archibald Pavement Renewal	DATE SAMPLED:	22-Nov-2019	SAMPLED BY:	Navpreet Singh
PROJECT CONTACT:	Kevin Rae	DATE TESTED:	26-Nov-2019	TESTED BY:	Navpreet Singh
TEST LOCATION:	Archibald Street – St. Catherine to Elizabeth				

Description	TH 10	TH 10	TH 10	TH 10	TH 10
Sample	61	62	63	64	65
Wt Wet Sample + Tare	179.00	163.40	194.10	157.40	180.50
Wt Dry Sample + Tare	163.70	133.20	152.50	125.50	138.80
Wt Water	15.30	30.20	41.60	31.90	41.70
Wt Tare	4.40	4.40	4.70	4.60	4.30
Wt Dry Sample	159.30	128.80	147.80	120.90	134.50
Moisture Content (%)	**9.6**	**23.4**	**28.1**	**26.4**	**31.0**

Description	TH 12	TH 12	TH 12	TH 12	TH 12
Sample	66	67	68	69	70
Wt Wet Sample + Tare	155.60	173.80	235.00	181.70	197.20
Wt Dry Sample + Tare	145.80	164.50	220.50	149.60	147.50
Wt Water	9.80	9.30	14.50	32.10	49.70
Wt Tare	4.40	4.20	4.30	4.50	4.30
Wt Dry Sample	141.40	160.30	216.20	145.10	143.20
Moisture Content (%)	**6.9**	**5.8**	**6.7**	**22.1**	**34.7**

Description					
Sample					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					

Description					
Sample					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					

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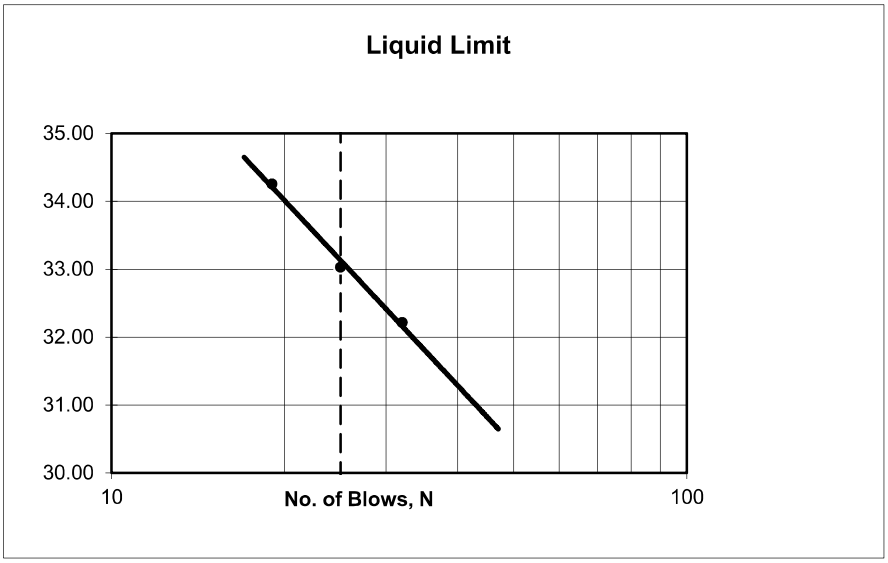
Atterberg Limits (ASTM D4318)

Client:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-1913
		PI Test No.:	1
		LAB No.:	HM 551
Attention.:	Kevin Rae, P.Eng	Date Received:	20-Nov-19
Project:	2019 to 2022 Archibald Pavement Renewal	Date Tested / By:	14-Dec-19 / RC

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	16.04	14.78	16.09		
Dry Soil + Dish:	13.17	12.25	13.12		
Moisture:	2.87	2.53	2.97		
Dish:	4.26	4.59	4.45		
Dry Soil:	8.91	7.66	8.67		
% Moisture:	32.21	33.03	34.26		
No. of Blows:	32	25	19		
Liquid Limits:	33.19	33.03	33.14		33.1



Material Identification:

T.H./B.H. No.	11
Sample:	G9
Liquid Limit, %:	33.1
Plastic Limit, %:	12.5
Plasticity Index: (LL-PL)	21

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	10.18	10.62	9.26		
Dry Soil + Dish:	9.53	9.92	8.70		
Moisture:	0.65	0.70	0.56		
Dish:	4.35	4.32	4.24		
Dry Soil:	5.18	5.60	4.46		
% Moisture:	12.55	12.50	12.56		
Average:					12.5

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

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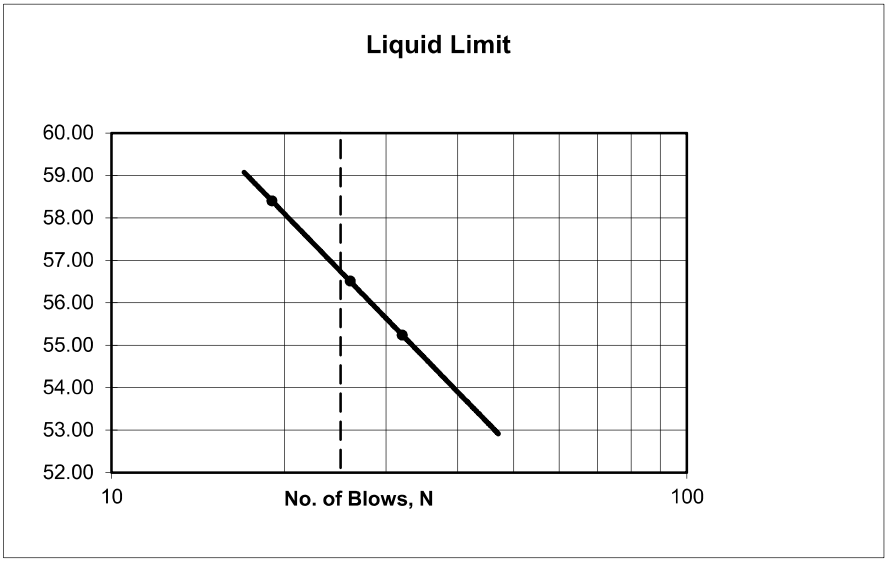
Atterberg Limits (ASTM D4318)

Client:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-1913
		PI Test No.:	2
		LAB No.:	HM 551
Attention.:	Kevin Rae, P.Eng	Date Received:	20-Nov-19
Project:	2019 to 2022 Archibald Pavement Renewal	Date Tested / By:	14-Dec-19 / RC

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit
Wet Soil + Dish:	13.37	12.74	13.27		25 Blows
Dry Soil + Dish:	10.31	9.83	10.00		
Moisture:	3.06	2.91	3.27		
Dish:	4.77	4.68	4.40		
Dry Soil:	5.54	5.15	5.6		
% Moisture:	55.23	56.50	58.39		
No. of Blows:	32	26	19		
Liquid Limits:	56.91	56.77	56.49		56.7



Material Identification:

T.H./B.H. No.	5
Sample:	G27
Liquid Limit, %:	56.7
Plastic Limit, %:	14.7
Plasticity Index: (LL-PL)	42

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	11.68	10.82	10.70		
Dry Soil + Dish:	10.76	9.98	9.90		
Moisture:	0.92	0.84	0.80		
Dish:	4.61	4.30	4.29		
Dry Soil:	6.15	5.68	5.61		
% Moisture:	14.96	14.79	14.26		
Average:					14.7

Test Method : ASTM: D4318, D2216

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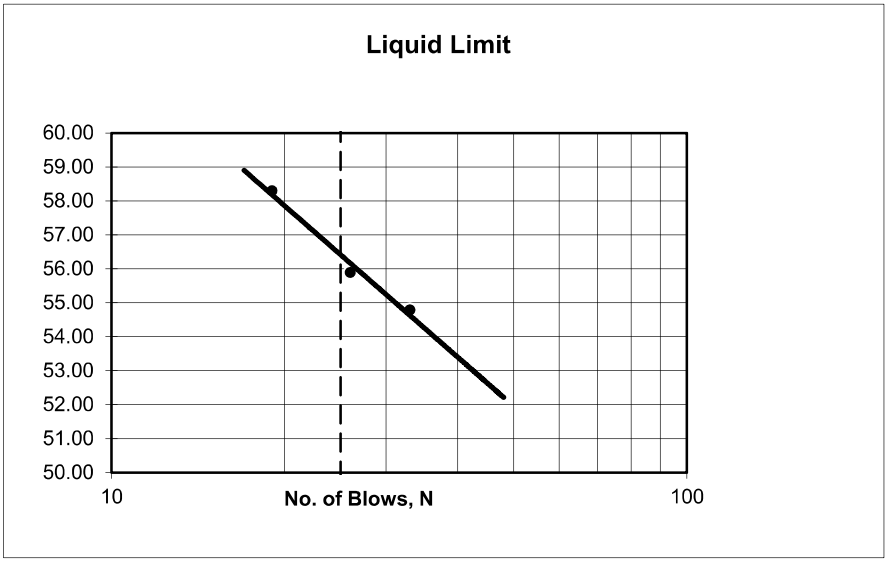
Atterberg Limits (ASTM D4318)

Client:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-1913
		PI Test No.:	3
		LAB No.:	HM 551
Attention.:	Kevin Rae, P.Eng	Date Received:	20-Nov-19
Project:	2019 to 2022 Archibald Pavement Renewal	Date Tested / By:	14-Dec-19 / RC

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit
Wet Soil + Dish:	12.18	13.41	11.88		25 Blows
Dry Soil + Dish:	9.43	10.18	9.21		
Moisture:	2.75	3.23	2.67		
Dish:	4.41	4.40	4.63		
Dry Soil:	5.02	5.78	4.58		
% Moisture:	54.78	55.88	58.30		
No. of Blows:	33	26	19		
Liquid Limits:	56.65	56.15	56.39		56.4



Material Identification:

T.H./B.H. No.	3
Sample:	G30
Liquid Limit, %:	56.4
Plastic Limit, %:	16.3
Plasticity Index: (LL-PL)	40

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	10.22	10.76	11.30		
Dry Soil + Dish:	9.42	9.87	10.27		
Moisture:	0.80	0.89	1.03		
Dish:	4.45	4.31	4.11		
Dry Soil:	4.97	5.56	6.16		
% Moisture:	16.10	16.01	16.72		
Average:					16.3

Test Method : ASTM: D4318, D2216

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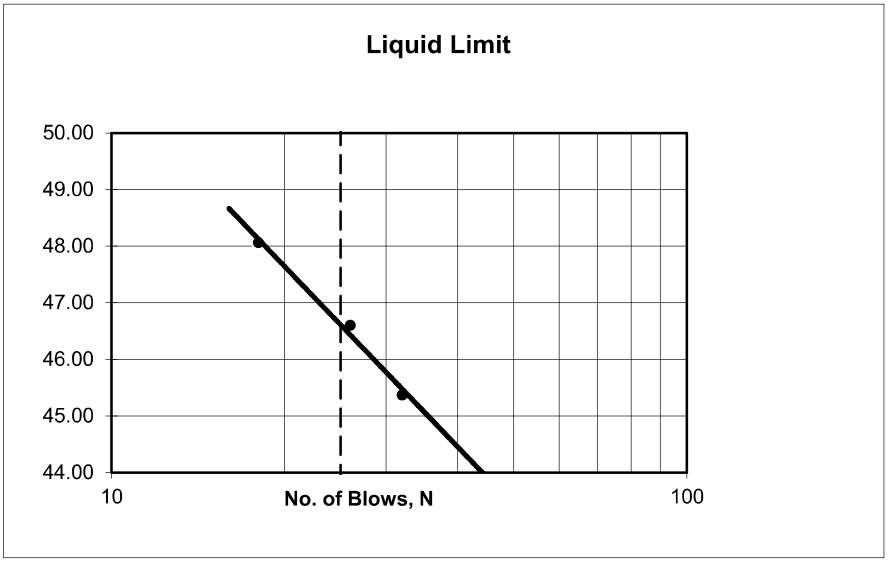
Atterberg Limits (ASTM D4318)

Client:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-1913
		PI Test No.:	4
		LAB No.:	HM 551
Attention.:	Kevin Rae, P.Eng	Date Received:	20-Nov-19
Project:	2019 to 2022 Archibald Pavement Renewal	Date Tested / By:	13-Dec-19 / RC

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	14.94	13.95	15.34		
Dry Soil + Dish:	11.71	10.87	11.75		
Moisture:	3.23	3.08	3.59		
Dish:	4.59	4.26	4.28		
Dry Soil:	7.12	6.61	7.47		
% Moisture:	45.37	46.60	48.06		
No. of Blows:	32	26	18		
Liquid Limits:	46.74	46.82	46.19		46.6



Material Identification:

T.H./B.H. No.	3
Sample:	G33
Liquid Limit, %:	46.6
Plastic Limit, %:	12.6
Plasticity Index: (LL-PL)	34

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	11.65	12.23	10.07		
Dry Soil + Dish:	10.86	11.41	9.43		
Moisture:	0.79	0.82	0.64		
Dish:	4.65	4.76	4.38		
Dry Soil:	6.21	6.65	5.05		
% Moisture:	12.72	12.33	12.67		
Average:					12.6

Test Method : ASTM: D4318, D2216

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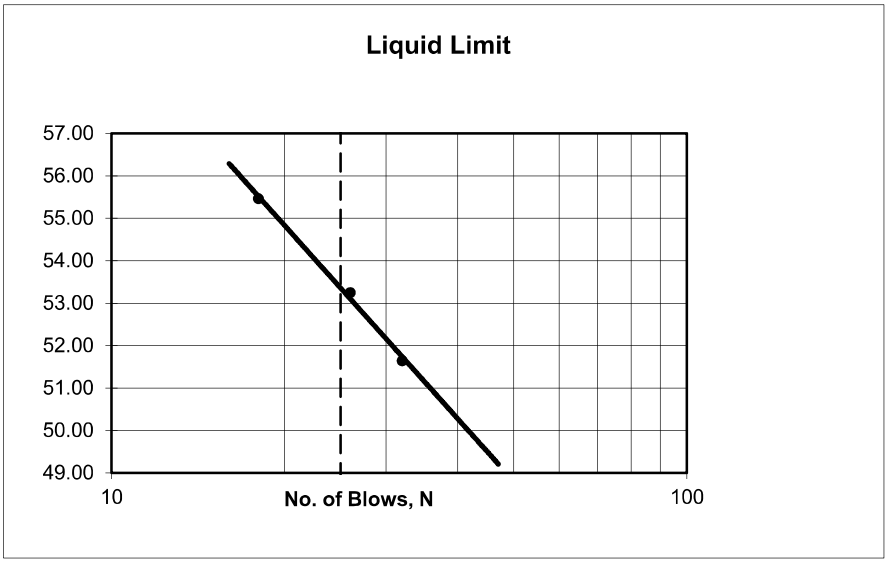
Atterberg Limits (ASTM D4318)

Client:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-1913
		PI Test No.:	5
		LAB No.:	HM 551
Attention.:	Kevin Rae, P.Eng	Date Received:	12-Dec-19
Project:	2019 to 2022 Archibald Pavement Renewal	Date Tested / By:	17-Dec-19 / RC

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	14.02	13.87	13.39		
Dry Soil + Dish:	10.71	10.59	10.14		
Moisture:	3.31	3.28	3.25		
Dish:	4.30	4.43	4.28		
Dry Soil:	6.41	6.16	5.86		
% Moisture:	51.64	53.25	55.46		
No. of Blows:	32	26	18		
Liquid Limits:	53.20	53.50	53.30		53.3



Material Identification:

T.H./B.H. No.	2
Sample:	G41 & 42
Liquid Limit, %:	53.3
Plastic Limit, %:	14.3
Plasticity Index: (LL-PL)	39

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	10.20	10.53	10.41		
Dry Soil + Dish:	9.48	9.79	9.62		
Moisture:	0.72	0.74	0.79		
Dish:	4.39	4.67	4.11		
Dry Soil:	5.09	5.12	5.51		
% Moisture:	14.15	14.45	14.34		
Average:					14.3

Test Method : ASTM: D4318, D2216

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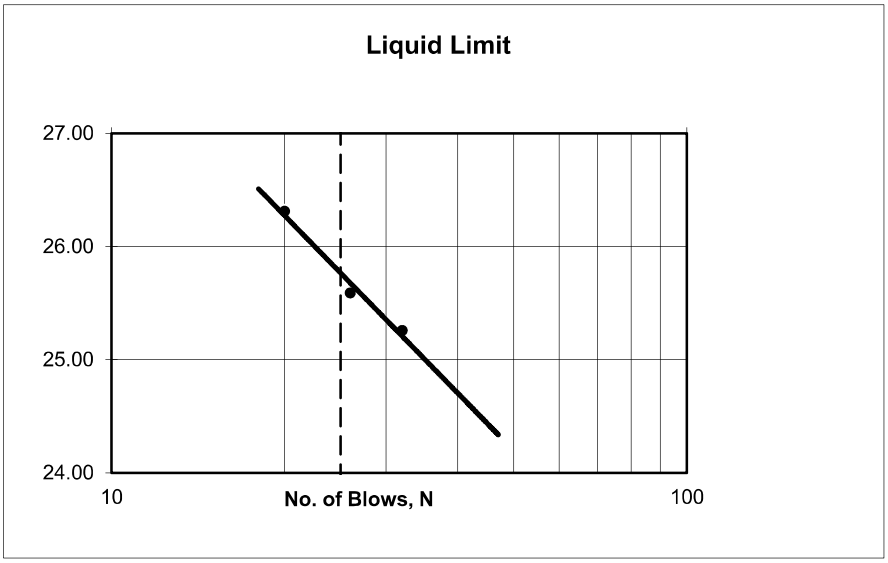
Atterberg Limits (ASTM D4318)

Client:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-1913
		PI Test No.:	6
		LAB No.:	HM 551
Attention.:	Kevin Rae, P.Eng	Date Received:	12-Dec-19
Project:	2019 to 2022 Archibald Pavement Renewal	Date Tested / By:	17-Dec-19 / RC

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	15.77	16.34	16.19		
Dry Soil + Dish:	13.55	13.95	13.73		
Moisture:	2.22	2.39	2.46		
Dish:	4.76	4.61	4.38		
Dry Soil:	8.79	9.34	9.35		
% Moisture:	25.26	25.59	26.31		
No. of Blows:	32	26	20		
Liquid Limits:	26.02	25.71	25.61		25.8



Material Identification:

T.H./B.H. No.	6
Sample:	G53
Liquid Limit, %:	25.8
Plastic Limit, %:	15.3
Plasticity Index: (LL-PL)	10

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	11.79	12.08	14.97		
Dry Soil + Dish:	10.81	11.08	13.54		
Moisture:	0.98	1.00	1.43		
Dish:	4.41	4.46	4.36		
Dry Soil:	6.40	6.62	9.18		
% Moisture:	15.31	15.11	15.58		
Average:					15.3

Test Method : ASTM: D4318, D2216

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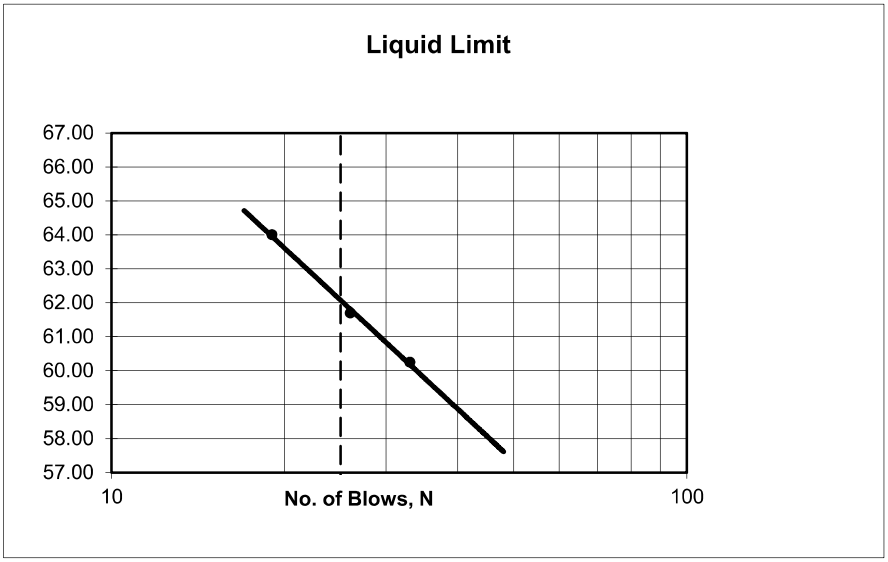
Atterberg Limits (ASTM D4318)

Client:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-1913
		PI Test No.:	7
		LAB No.:	HM 551
Attention.:	Kevin Rae, P.Eng	Date Received:	20-Nov-19
Project:	2019 to 2022 Archibald Pavement Renewal	Date Tested / By:	14-Dec-19 / RC

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	12.45	13.55	11.99		
Dry Soil + Dish:	9.45	10.04	9.11		
Moisture:	3	3.51	2.88		
Dish:	4.47	4.35	4.61		
Dry Soil:	4.98	5.69	4.5		
% Moisture:	60.24	61.69	64.00		
No. of Blows:	33	26	19		
Liquid Limits:	62.30	61.98	61.91		62.1



Material Identification:

T.H./B.H. No.	12
Sample:	G69
Liquid Limit, %:	62.1
Plastic Limit, %:	17.3
Plasticity Index: (LL-PL)	45

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	10.70	11.22	11.67		
Dry Soil + Dish:	9.72	10.25	10.53		
Moisture:	0.98	0.97	1.14		
Dish:	4.15	4.33	4.12		
Dry Soil:	5.57	5.92	6.41		
% Moisture:	17.59	16.39	17.78		
Average:					17.3

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

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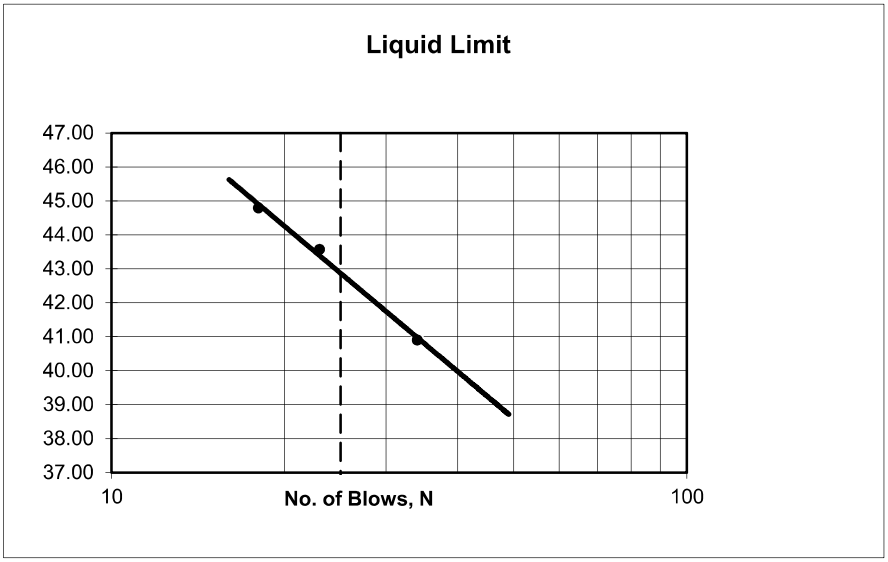
Atterberg Limits (ASTM D4318)

Client:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-1913
		PI Test No.:	8
		LAB No.:	HM 551
Attention.:	Kevin Rae, P.Eng	Date Received:	20-Nov-19
Project:	2019 to 2022 Archibald Pavement Renewal	Date Tested / By:	13-Dec-19 / RC

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	15.89	13.85	15.24		
Dry Soil + Dish:	12.61	10.94	11.85		
Moisture:	3.28	2.91	3.39		
Dish:	4.59	4.26	4.28		
Dry Soil:	8.02	6.68	7.57		
% Moisture:	40.90	43.56	44.78		
No. of Blows:	34	23	18		
Liquid Limits:	42.45	43.13	43.04		42.9



Material Identification:

T.H./B.H. No.	8
Sample:	G56
Liquid Limit, %:	42.9
Plastic Limit, %:	12.2
Plasticity Index: (LL-PL)	31

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	12.73	12.25	11.22		
Dry Soil + Dish:	11.86	11.47	10.44		
Moisture:	0.87	0.78	0.78		
Dish:	4.65	4.76	4.38		
Dry Soil:	7.21	6.71	6.06		
% Moisture:	12.07	11.68	12.87		
Average:					12.2

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

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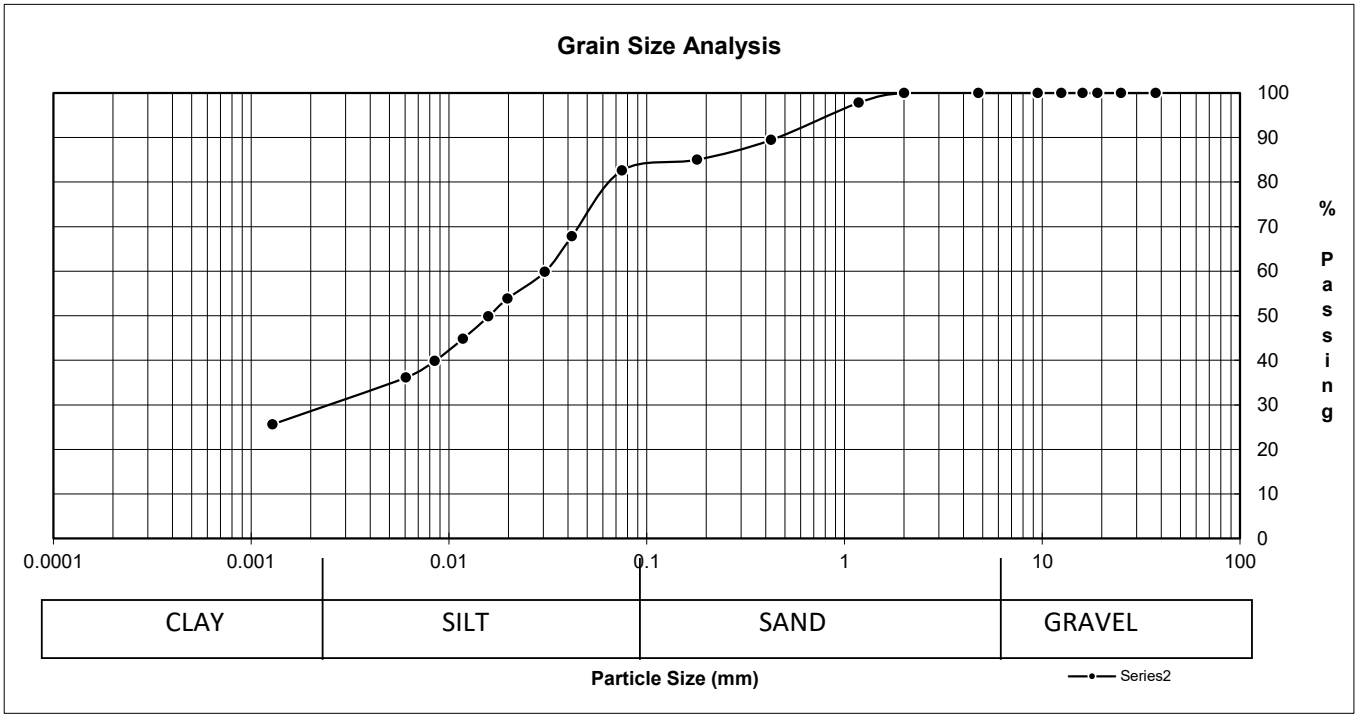
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM	PROJECT No.:	112-1913
	99 Commerce Drive	PSA Test No.:	1
	Winnipeg MB R3P 0Y7	LAB No.:	HM 551
ATTENTION:	Kevin Rae, P.Eng		
PROJECT:	2019 to 2022 Archibald Pavement Renewal		

Date Sampled:	20-Nov-19	Date Received:	20-Nov-19
Sampled By:	NS	Date Tested:	12-Dec-19
Material Identification			
B.H./T.H. No.		11	
Sample No.		G9	
Sample Source			
Specific Gravity of Material:		2.65	

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0419	67.8
9.50	100.0	0.0305	59.8
4.75	100.0	0.0198	53.8
2.00	100.0	0.0158	49.8
1.18	97.8	0.0118	44.8
0.425	89.4	0.0085	39.8
0.180	85.0	0.0061	36.1
0.075	82.6	0.0013	25.6



SOIL DESCRIPTION	% Composition		D10
		Gravel	D30
	17.4	Sand	D60
	53.6	Silt	Cu
	29.0	Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: RC

Reviewed by: Hermie Manalo

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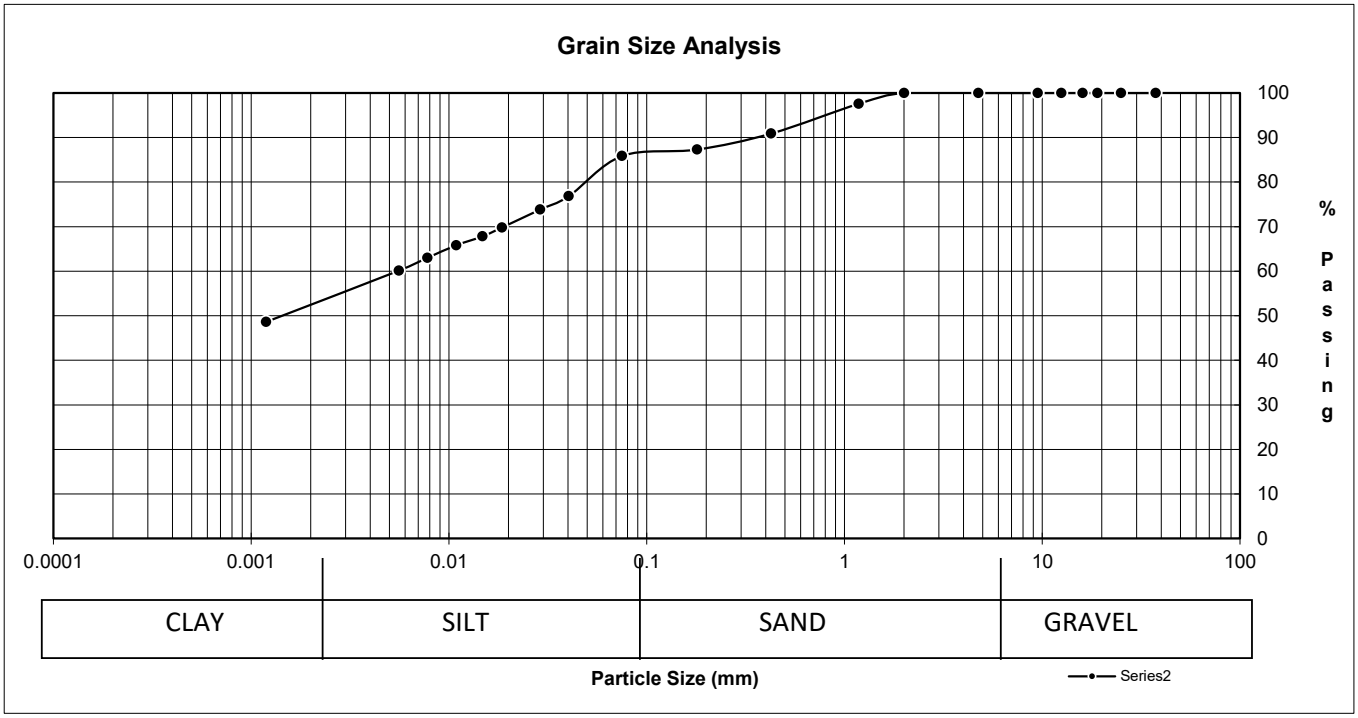
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM	PROJECT No.:	112-1913
	99 Commerce Drive	PSA Test No.:	2
	Winnipeg MB R3P 0Y7	LAB No.:	HM 551
ATTENTION:	Kevin Rae, P.Eng		
PROJECT:	2019 to 2022 Archibald Pavement Renewal		

Date Sampled:	20-Nov-19	Date Received:	20-Nov-19
Sampled By:	NS	Date Tested:	12-Dec-19
Material Identification			
B.H./T.H. No.		5	
Sample No.		G27	
Sample Source			
Specific Gravity of Material:		2.65	

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0403	76.8
9.50	100.0	0.0289	73.8
4.75	100.0	0.0186	69.8
2.00	100.0	0.0148	67.8
1.18	97.6	0.0109	65.8
0.425	90.9	0.0078	63.0
0.180	87.3	0.0056	60.1
0.075	85.9	0.0012	48.6



SOIL DESCRIPTION	% Composition		D10
		Gravel	D30
	14.1	Sand	D60
	35.9	Silt	Cu
	50.0	Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: RC

Reviewed by: Hermie Manalo

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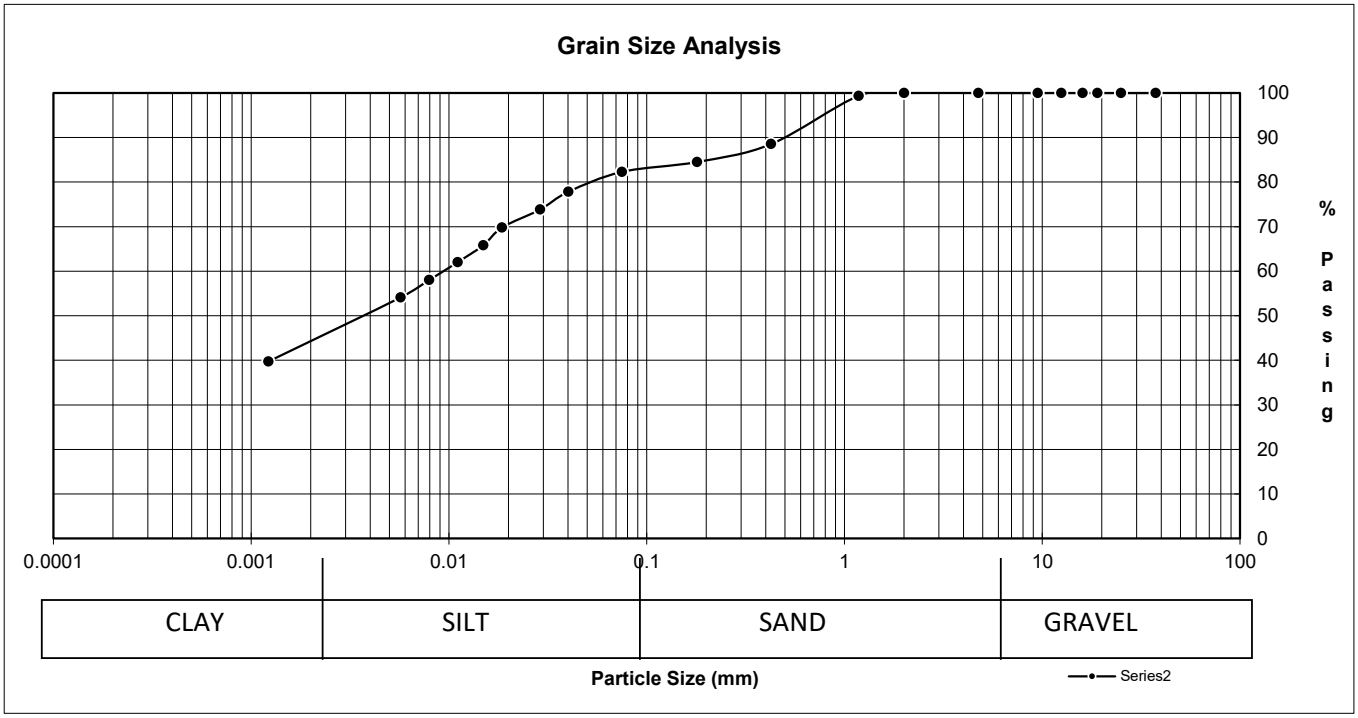
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM	PROJECT No.:	112-1913
	99 Commerce Drive	PSA Test No.:	3
	Winnipeg MB R3P 0Y7	LAB No.:	HM 551
ATTENTION:	Kevin Rae, P.Eng		
PROJECT:	2019 to 2022 Archibald Pavement Renewal		

Date Sampled:	20-Nov-19	Date Received:	20-Nov-19
Sampled By:	NS	Date Tested:	12-Dec-19
Material Identification			
B.H./T.H. No.		3	
Sample No.		G30	
Sample Source			
Specific Gravity of Material:		2.65	

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0402	77.8
9.50	100.0	0.0289	73.8
4.75	100.0	0.0186	69.8
2.00	100.0	0.0149	65.8
1.18	99.4	0.0111	62.0
0.425	88.5	0.0079	58.0
0.180	84.5	0.0057	54.1
0.075	82.3	0.0012	39.7



SOIL DESCRIPTION	% Composition		D10
		Gravel	D30
	17.7	Sand	D60
	38.3	Silt	Cu
	44.0	Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: RC

Reviewed by: Hermie Manalo

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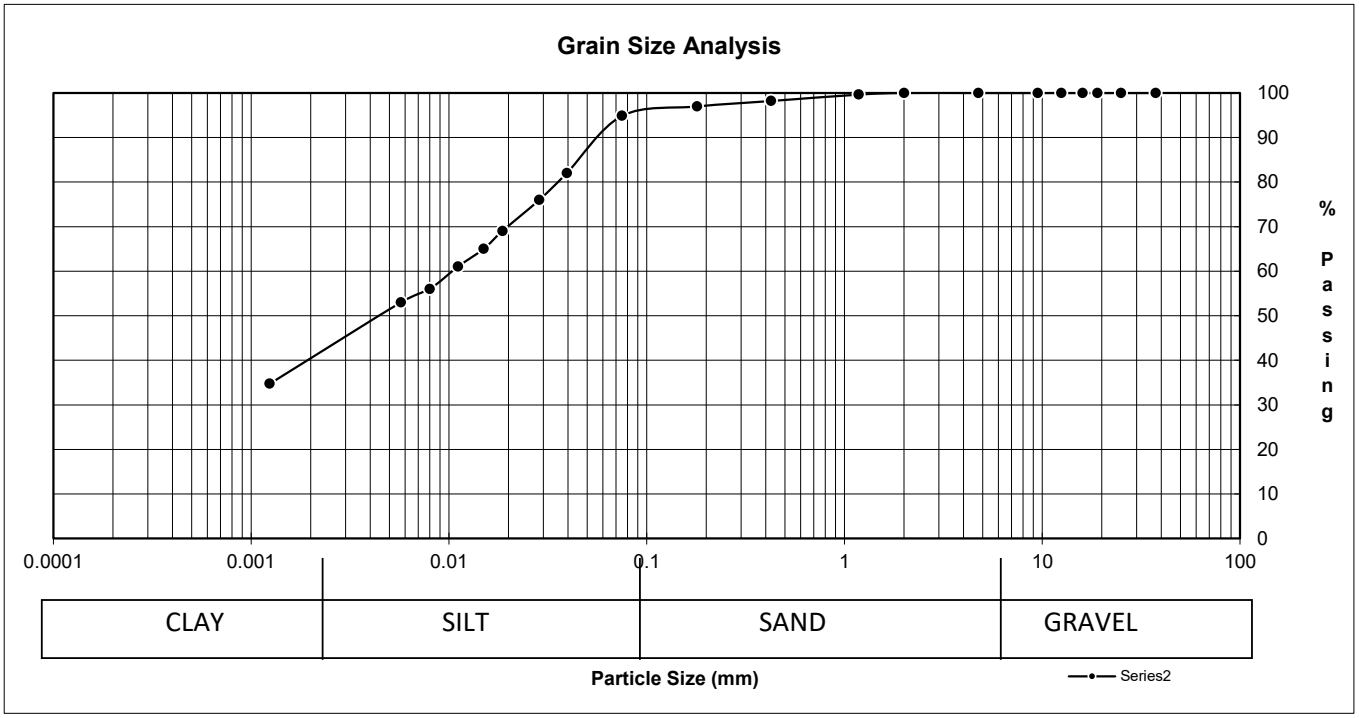
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM	PROJECT No.:	112-1913
	99 Commerce Drive	PSA Test No.:	4
	Winnipeg MB R3P 0Y7	LAB No.:	HM 551
ATTENTION:	Kevin Rae, P.Eng		
PROJECT:	2019 to 2022 Archibald Pavement Renewal		

Date Sampled:	20-Nov-19	Date Received:	20-Nov-19
Sampled By:	NS	Date Tested:	12-Dec-19
Material Identification			
B.H./T.H. No.		3	
Sample No.		G33	
Sample Source			
Specific Gravity of Material:		2.65	

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0394	82.0
9.50	100.0	0.0286	76.0
4.75	100.0	0.0187	69.0
2.00	100.0	0.0150	65.0
1.18	99.6	0.0111	61.0
0.425	98.2	0.0080	56.0
0.180	97.0	0.0057	53.0
0.075	94.9	0.0012	34.7



SOIL DESCRIPTION	% Composition		D10
		Gravel	D30
	5.1	Sand	D60
	53.9	Silt	Cu
	41.0	Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: RC

Reviewed by: Hermie Manalo

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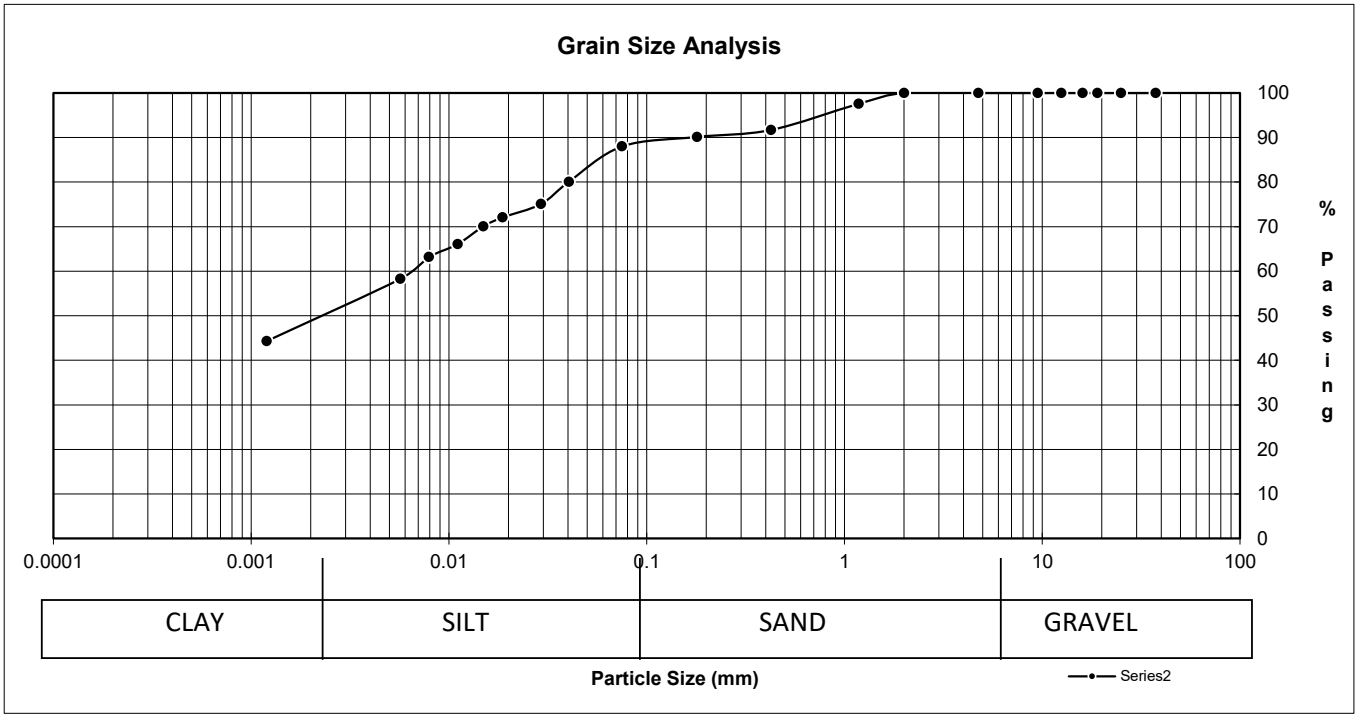
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM	PROJECT No.:	112-1913
	99 Commerce Drive	PSA Test No.:	5
	Winnipeg MB R3P 0Y7	LAB No.:	HM 551
ATTENTION:	Kevin Rae, P.Eng		
PROJECT:	2019 to 2022 Archibald Pavement Renewal		

Date Sampled:	12-Dec-19	Date Received:	12-Dec-19
Sampled By:	NS	Date Tested:	17-Dec-19
Material Identification			
B.H./T.H. No.		2	
Sample No.		G41 & G42	
Sample Source			
Specific Gravity of Material:		2.65	

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0404	80.1
9.50	100.0	0.0292	75.1
4.75	100.0	0.0187	72.1
2.00	100.0	0.0149	70.1
1.18	97.6	0.0111	66.1
0.425	91.7	0.0079	63.2
0.180	90.1	0.0057	58.3
0.075	88.0	0.0012	44.3



SOIL DESCRIPTION	% Composition		D10
		Gravel	D30
	12.0	Sand	D60
	39.0	Silt	Cu
	49.0	Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: RC

Reviewed by: Hermie Manalo

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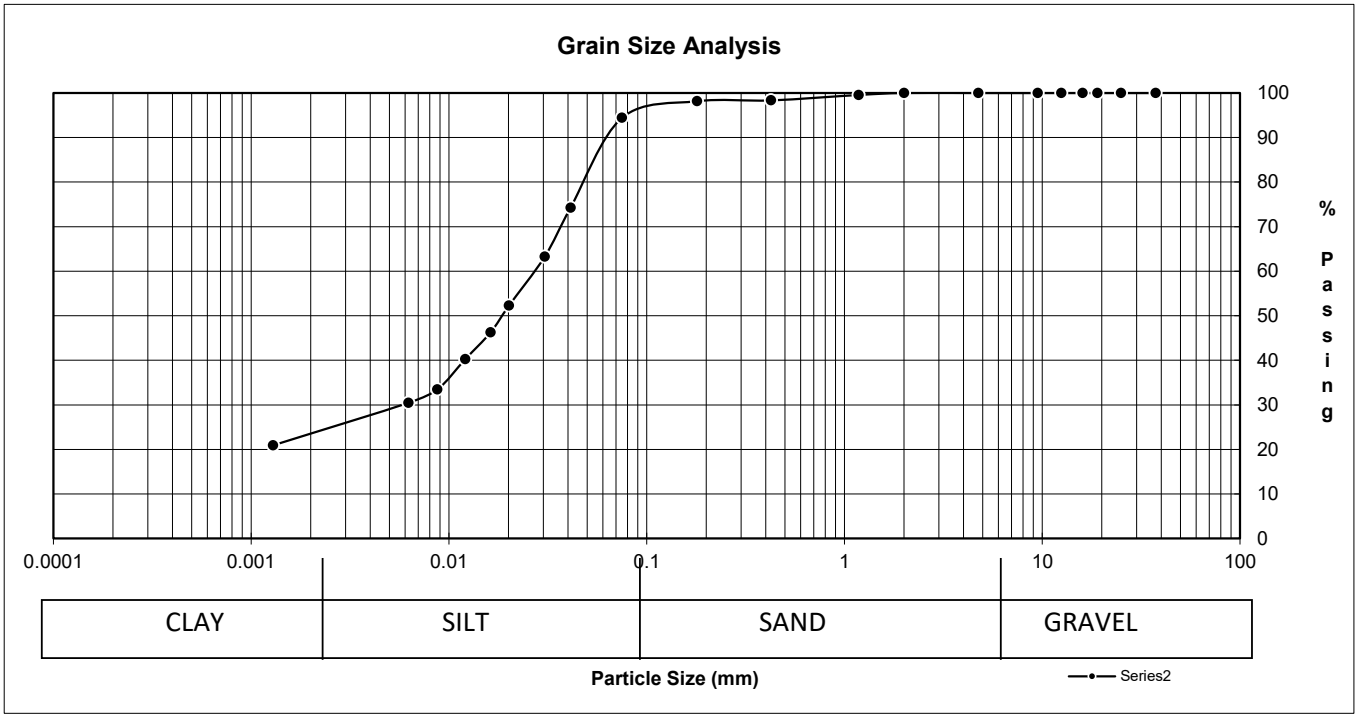
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM	PROJECT No.:	112-1913
	99 Commerce Drive	PSA Test No.:	6
	Winnipeg MB R3P 0Y7	LAB No.:	HM 551
ATTENTION:	Kevin Rae, P.Eng		
PROJECT:	2019 to 2022 Archibald Pavement Renewal		

Date Sampled:	12-Dec-19	Date Received:	12-Dec-19
Sampled By:	NS	Date Tested:	17-Dec-19
Material Identification			
B.H./T.H. No.		6	
Sample No.		G53	
Sample Source			
Specific Gravity of Material:		2.65	

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0412	74.3
9.50	100.0	0.0305	63.3
4.75	100.0	0.0201	52.3
2.00	100.0	0.0162	46.3
1.18	99.6	0.0121	40.3
0.425	98.3	0.0088	33.5
0.180	98.2	0.0062	30.5
0.075	94.4	0.0013	20.9



SOIL DESCRIPTION	% Composition		
		Gravel	D10
	5.6	Sand	D30
	71.4	Silt	D60
	23.0	Clay	Cu
			Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: RC

Reviewed by: Hermie Manalo

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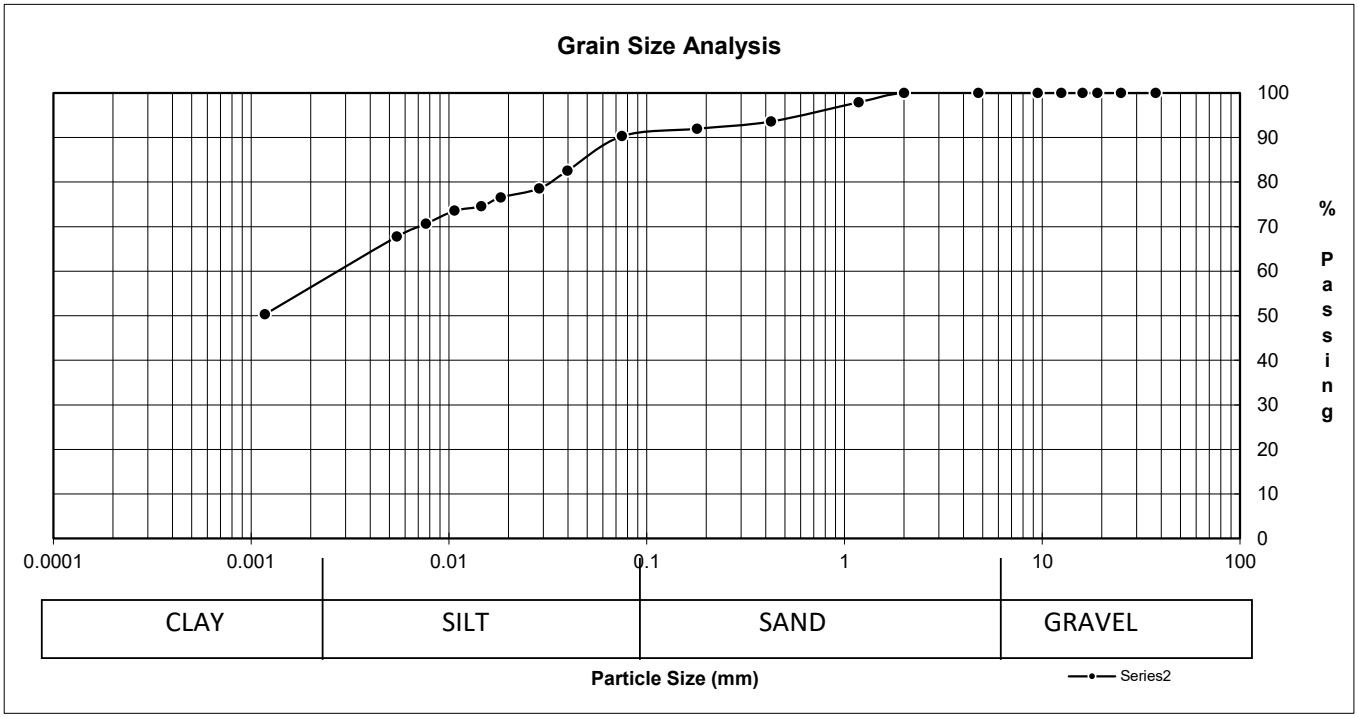
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM	PROJECT No.:	112-1913
	99 Commerce Drive	PSA Test No.:	7
	Winnipeg MB R3P 0Y7	LAB No.:	HM 551
ATTENTION:	Kevin Rae, P.Eng		
PROJECT:	2019 to 2022 Archibald Pavement Renewal		

Date Sampled:	12-Dec-19	Date Received:	12-Dec-19
Sampled By:	NS	Date Tested:	17-Dec-19
Material Identification			
B.H./T.H. No.		12	
Sample No.		G69	
Sample Source			
Specific Gravity of Material:		2.65	

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0398	82.6
9.50	100.0	0.0286	78.6
4.75	100.0	0.0183	76.6
2.00	100.0	0.0146	74.6
1.18	97.9	0.0107	73.6
0.425	93.6	0.0077	70.7
0.180	92.0	0.0054	67.8
0.075	90.3	0.0012	50.3



SOIL DESCRIPTION	% Composition		D10
		Gravel	D30
	9.7	Sand	D60
	33.3	Silt	Cu
	57.0	Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: RC

Reviewed by: Hermie Manalo

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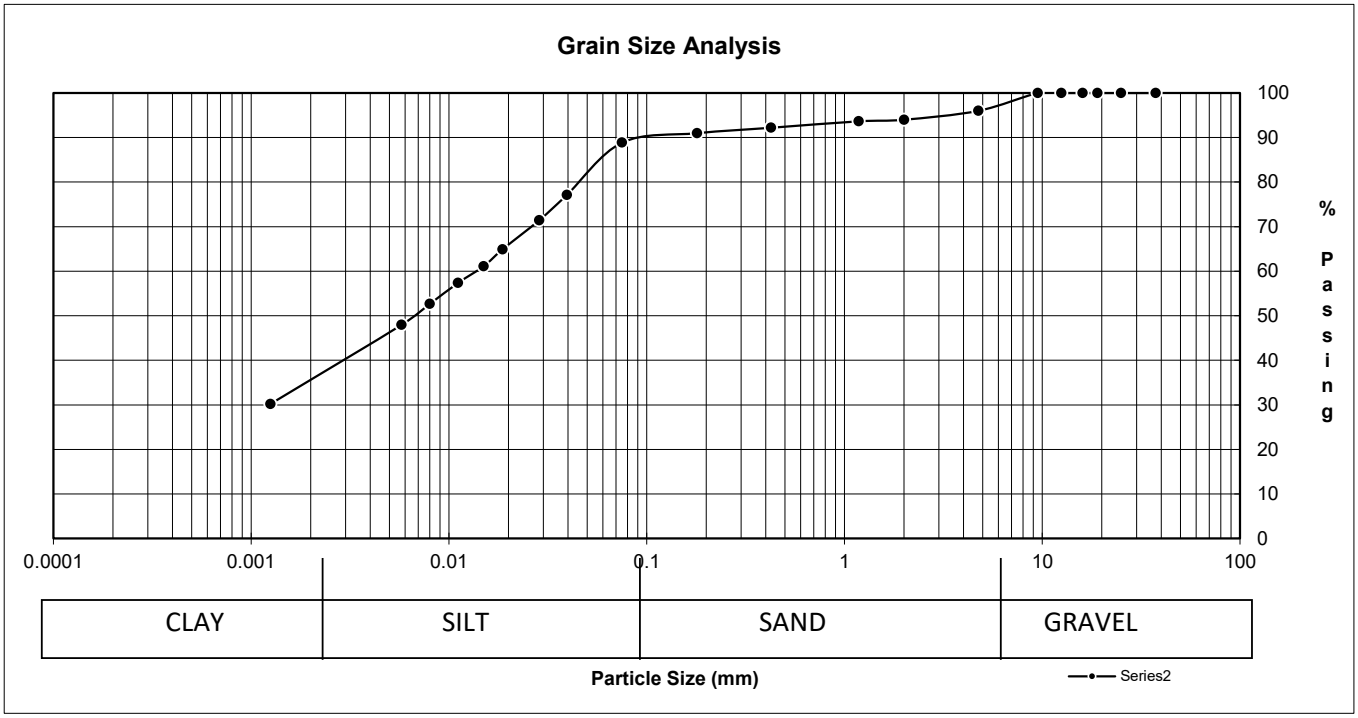
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM	PROJECT No.:	112-1913
	99 Commerce Drive	PSA Test No.:	8
	Winnipeg MB R3P 0Y7	LAB No.:	HM 551
ATTENTION:	Kevin Rae, P.Eng		
PROJECT:	2019 to 2022 Archibald Pavement Renewal		

Date Sampled:	20-Nov-19	Date Received:	20-Nov-19
Sampled By:	NS	Date Tested:	12-Dec-19
Material Identification			
B.H./T.H. No.		8	
Sample No.		G56	
Sample Source			
Specific Gravity of Material:		2.65	

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0394	77.1
9.50	100.0	0.0286	71.5
4.75	96.0	0.0187	64.9
2.00	94.0	0.0150	61.1
1.18	93.6	0.0111	57.4
0.425	92.2	0.0080	52.7
0.180	91.0	0.0058	48.0
0.075	88.9	0.0013	30.2



SOIL DESCRIPTION	% Composition		
	4.0	Gravel	D10
	7.1	Sand	D30
	51.9	Silt	D60
	37.0	Clay	Cu
			Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: RC

Reviewed by: Hermie Manalo

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MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM	PROJECT NO.:	112-1913
	99 Commerce Drive	TEST NO.:	1
	Winnipeg, MB R3P 0Y7	LAB NO.:	HM 551
ATTENTION:	Kevin Rae		
PROJECT:	2019 to 2020 Archibald Pavement		

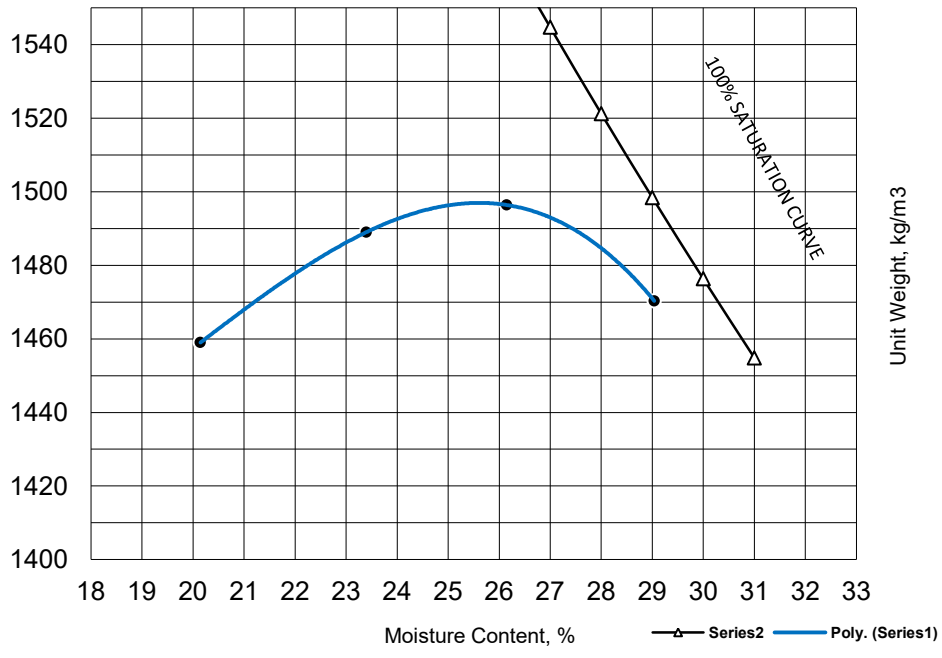
Date Sampled	12-Dec-19	Date Received:	12-Dec-19
Sampled By:	Client	Date Tested	16-Dec-19

MATERIAL INFORMATION

Material Type:	SILTY CLAY		
Material Use	-	Material Supplier	-
Maximum Size:	-	Material Source	G25, G30, G41 & G42

PROCEDURE	A
PREPARATION	Dry
COMPACTION METHOD	Manual
BLOWS PER LAYER	25
NO. OF LAYERS	3
MOLD SIZE	100 mm
MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg

Test No.	1	2	3	4	5
Wet Density	1753	1837	1888	1897	
Moisture Content	20.1	23.4	26.1	29.0	
Dry Density	1459	1489	1496	1470	



Maximum Dry Density (MDD): 1495 kg/m³

Optimum Moisture Content 25.3 %

STONE CORRECTION (ASTM D 4718

Retained on 19 mm sieve: ____ %

Corrected Moisture: 25.3 %

Corrected Maximum Dry Density: 1495 kg/m³

Remarks:

Tested by: ECS

Reviewed By: Hermie Manalo

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MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM	PROJECT NO.:	112-1913
	99 Commerce Drive	TEST NO.:	2
	Winnipeg, MB R3P 0Y7	LAB NO.:	HM 551
ATTENTION:	Kevin Rae		
PROJECT:	2019 to 2020 Archibald Pavement		

Date Sampled	12-Dec-19	Date Received:	12-Dec-19
Sampled By:	Client	Date Tested	16-Dec-19

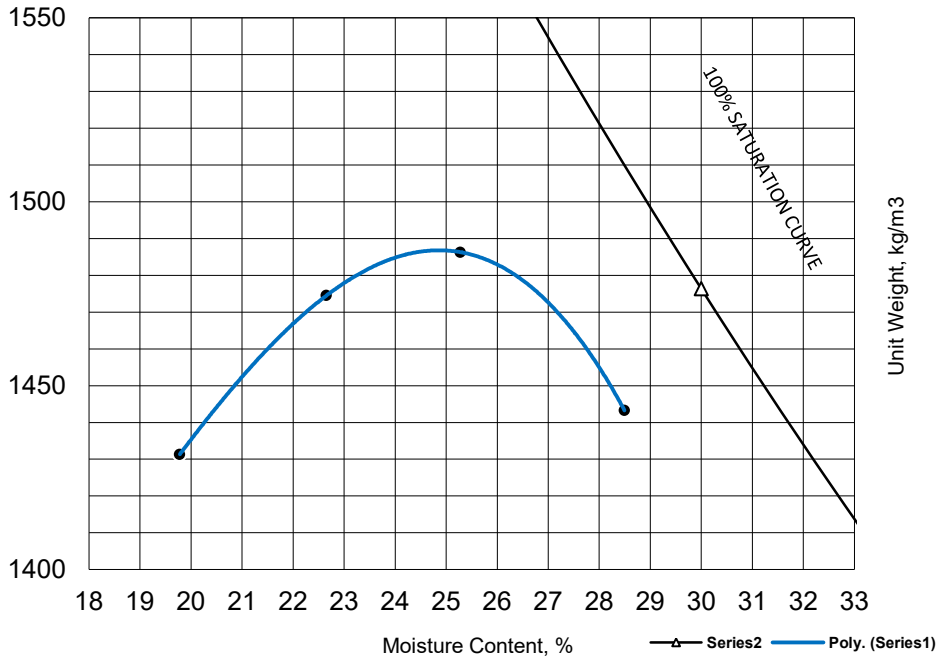
MATERIAL INFORMATION

Material Type:	CLAYEY SILT		
Material Use		Material Supplier	.
Maximum Size:	.	Material Source	G8,& G9, G31, G32 & G33

PROCEDURE	A
PREPARATION	Dry
COMPACTION METHOD	Manual
BLOWS PER LAYER	25
NO. OF LAYERS	3
MOLD SIZE	100 mm
MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg

Test No.	1	2	3	4	5
Wet Density	1714	1809	1862	1855	
Moisture Content	19.8	22.7	25.3	28.5	
Dry Density	1431	1475	1486	1443	

Moisture - Density Relationship



Maximum Dry Density (MDD): 1488 kg/m³

Optimum Moisture Content 24.8 %

STONE CORRECTION (ASTM D 4718

Retained on 19 mm sieve: ____ %

Corrected Moisture: 24.8 %

Corrected Maximum Dry Density: 1488 kg/m³

Remarks:

Tested by: ECS

Reviewed By: Hermie Manalo

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MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM	PROJECT NO.:	112-1913
	99 Commerce Drive	TEST NO.:	3
	Winnipeg, MB R3P 0Y7	LAB NO.:	HM 551
ATTENTION:	Kevin Rae		
PROJECT:	2019 to 2020 Archibald Pavement		

Date Sampled	12-Dec-19	Date Received:	12-Dec-19
Sampled By:	Client	Date Tested	16-Dec-19

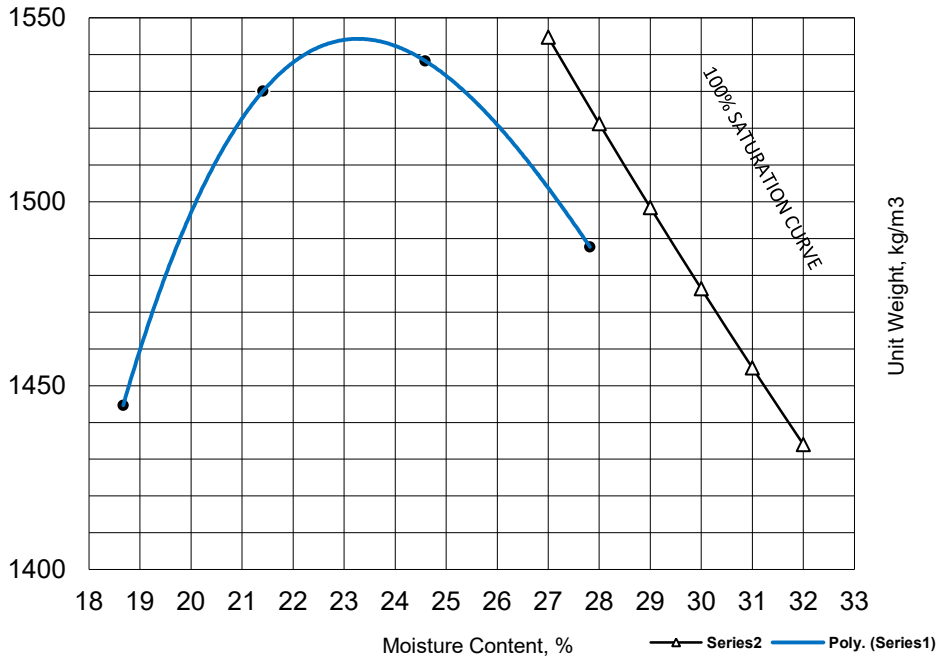
MATERIAL INFORMATION

Material Type:	CLAYEY SILT		
Material Use		Material Supplier	.
Maximum Size:	.	Material Source	G19, G56,

PROCEDURE	A
PREPARATION	Dry
COMPACTION METHOD	Manual
BLOWS PER LAYER	25
NO. OF LAYERS	3
MOLD SIZE	100 mm
MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg

Test No.	1	2	3	4	5
Wet Density	1714	1858	1917	1902	
Moisture Content	18.7	21.4	24.6	27.8	
Dry Density	1445	1530	1538	1488	

Moisture - Density Relationship



Maximum Dry Density (MDD): 1545 kg/m³

Optimum Moisture Content 23.5 %

STONE CORRECTION (ASTM D 4718

Retained on 19 mm sieve: ____ %

Corrected Moisture: 23.5 %

Corrected Maximum Dry Density: 1545 kg/m³

Remarks:

Tested by: ECS

Reviewed By: Hermie Manalo

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MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM	PROJECT NO.:	112-1913
	99 Commerce Drive	TEST NO.:	4
	Winnipeg, MB R3P 0Y7	LAB NO.:	HM 551
ATTENTION:	Kevin Rae		
PROJECT:	2019 to 2020 Archibald Pavement		

Date Sampled	12-Dec-19	Date Received:	12-Dec-19
Sampled By:	Client	Date Tested	16-Dec-19

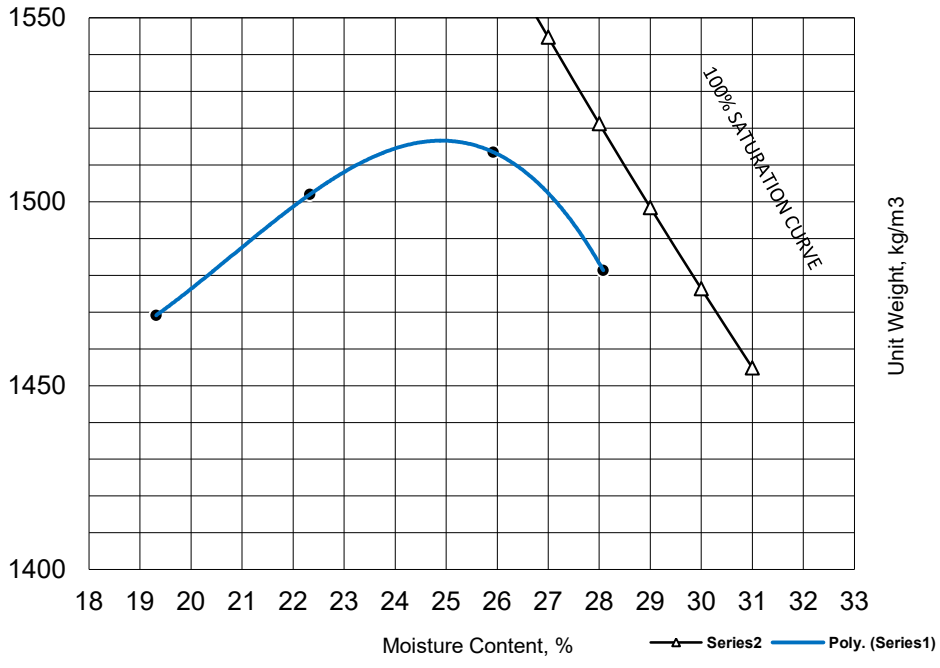
MATERIAL INFORMATION

Material Type:	SILTY CLAY		
Material Use		Material Supplier	.
Maximum Size:	.	Material Source	G3 & G4, G69 & G70

PROCEDURE	A
PREPARATION	Dry
COMPACTION METHOD	Manual
BLOWS PER LAYER	25
NO. OF LAYERS	3
MOLD SIZE	100 mm
MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg

Test No.	1	2	3	4	5
Wet Density	1753	1837	1906	1897	0
Moisture Content	19.3	22.3	25.9	28.1	0.0
Dry Density	1469	1502	1513	1481	0

Moisture - Density Relationship



Maximum Dry Density (MDD): 1519 kg/m³

Optimum Moisture Content 24.8 %

STONE CORRECTION (ASTM D 4718

Retained on 19 mm sieve: _____ %

Corrected Moisture: 24.8 %

Corrected Maximum Dry Density: 1519 kg/m³

Remarks:

Tested by: ECS

Reviewed By: Hermie Manalo

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CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

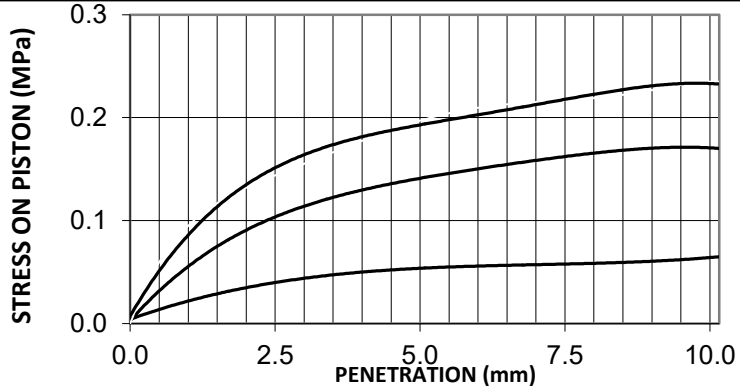
CLIENT:	AECOM	PROJECT NO.:	112-1913
	99 Commerce Drive	TEST NO.:	1
	Winnipeg, MB R3P 0Y7	LAB NO.:	HM 551
ATTENTION:	Kevin Rae	DATE RECEIVED :	12-Dec-19
PROJECT:	2019 to 2020 Archibald Pavement	DATE TESTED :	19-Dec-19
		TESTED BY:	IA /ECS

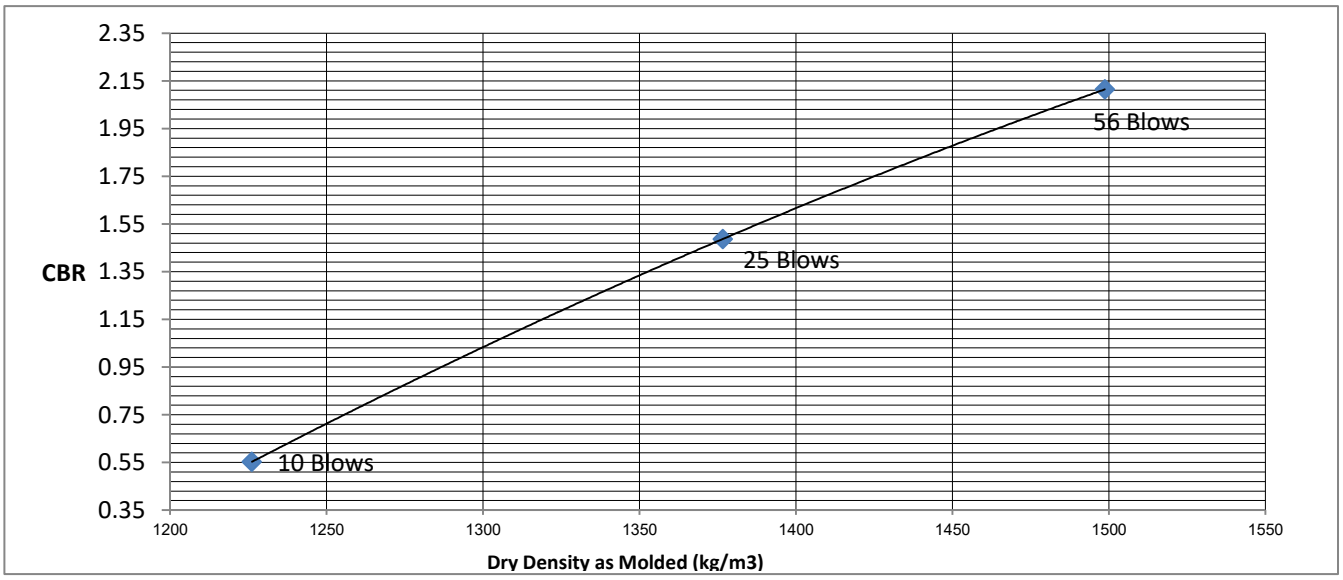
SAMPLE DATA	
Sample ID:	SILTY CLAY
Source:	G25, G30, G41 & G42
Sampled by:	Navi
Optimum Moisture Content:	25.3%
Maximum Dry Density kg/m^3:	1495
Method of Compaction:	Standard Proctor
Proctor Tested by:	ECS & IA

SPECIMEN DATA		
DESCRIPTION	Before Soaking	After Testing
Moisture Content (MC), %	25.6%	-
MC of top 25mm layer, %	-	33.7%
Dry Density, kg/m^3	1499	
Compaction,%		
Surcharge Weight, grams	4506	
Swell, %	4.80	

DISPLACEMENT mm	DISPLACEMENT in	STRESS MPa 10 Blows	25 Blows	56 Blows
0	0	0.000	0.000	0.000
0.64	0.025	0.019	0.042	0.072
1.27	0.050	0.028	0.068	0.106
1.91	0.075	0.038	0.089	0.131
2.54	**0.100**	**0.038**	**0.103**	**0.146**
3.81	0.150	0.044	0.123	0.171
5.08	0.200	0.053	0.144	0.199
6.35	0.250	0.057	0.156	0.214
7.62	0.300	0.059	0.163	0.216
8.89	0.350	0.061	0.167	0.226
10.16	0.400	0.063	0.171	0.235

LOAD PENETRATION CURVE





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Phone: 204-697-3854 Cell: 204-997-1355
Email: hmanalo@mts.net

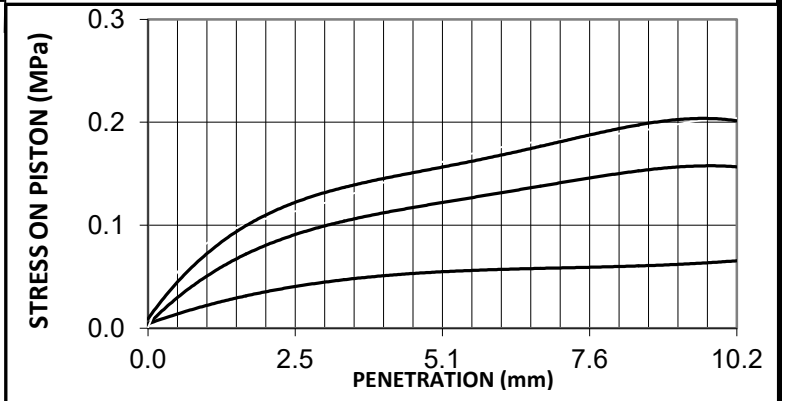
CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

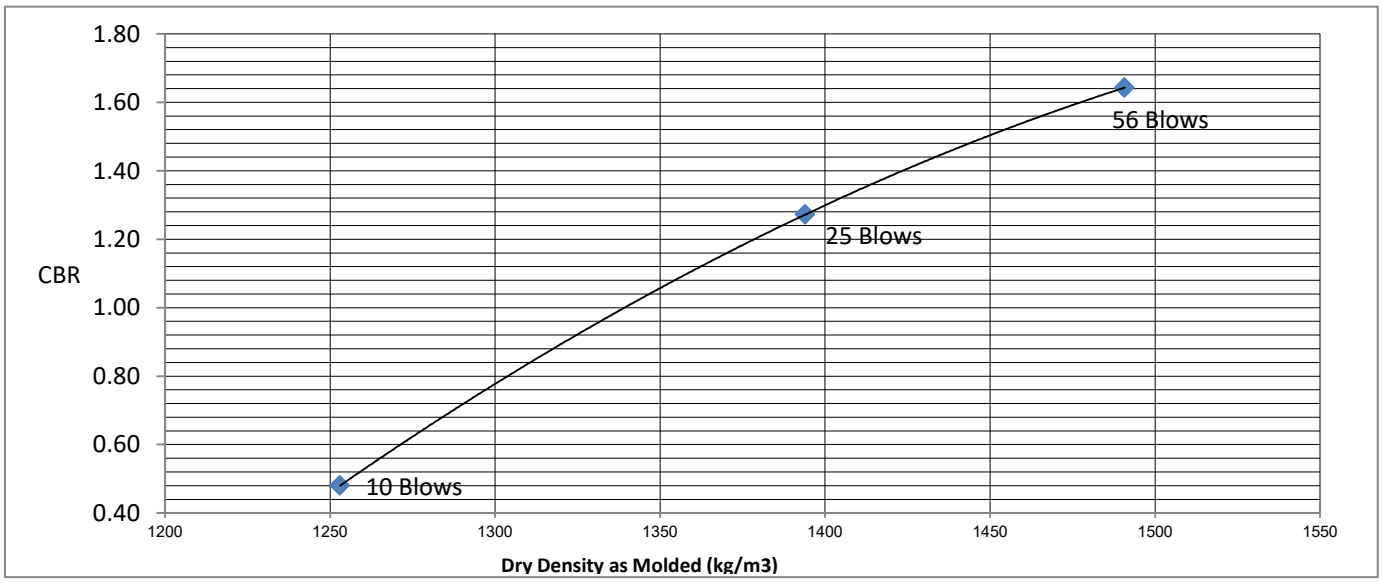
CLIENT:	AECOM	PROJECT NO.:	112-1913
	99 Commerce Drive	TEST NO.:	2
	Winnipeg, MB R3P 0Y7	LAB NO.:	HM 551
ATTENTION:	Kevin Rae	DATE RECEIVED :	12-Dec-19
PROJECT:	2019 to 2020 Archibald Pavement	DATE TESTED :	19-Dec-19
		TESTED BY:	IA /ECS

SAMPLE DATA		SPECIMEN DATA		
Sample ID:	**CLAYEY SILT**	DESCRIPTION	Before Soaking	After Testing
Source:	G8,& G9, G31, G32 & G33	Moisture Content (MC), %	25.0%	-
Sampled by:	Navi	MC of top 25mm layer, %	-	33.7%
Optimum Moisture Content:	24.8%	Dry Density, kg/m^3	1491	
Maximum Dry Density kg/m^3:	1488	Compaction,%		
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506	
Proctor Tested by:	ECS & IA	Swell, %	4.80	

DISPLACEMENT mm	DISPLACEMENT in	STRESS MPa 10 Blows	25 Blows	56 Blows
0	0	0.000	0.000	0.000
0.64	0.025	0.021	0.041	0.065
1.27	0.050	0.025	0.060	0.090
1.91	0.075	0.037	0.076	0.104
2.54	**0.100**	**0.039**	**0.088**	**0.113**
3.81	0.150	0.046	0.109	0.137
5.08	0.200	0.055	0.125	0.162
6.35	0.250	0.058	0.132	0.176
7.62	0.300	0.060	0.148	0.188
8.89	0.350	0.062	0.153	0.195
10.16	0.400	0.065	0.158	0.204

LOAD PENETRATION CURVE





H. MANALO CONSULTING LTD.
1402 Notre Dame Ave, Winnipeg MB R3E 3G5
Phone: 204-697-3854 Cell: 204-997-1355
Email: hmanalo@mts.net

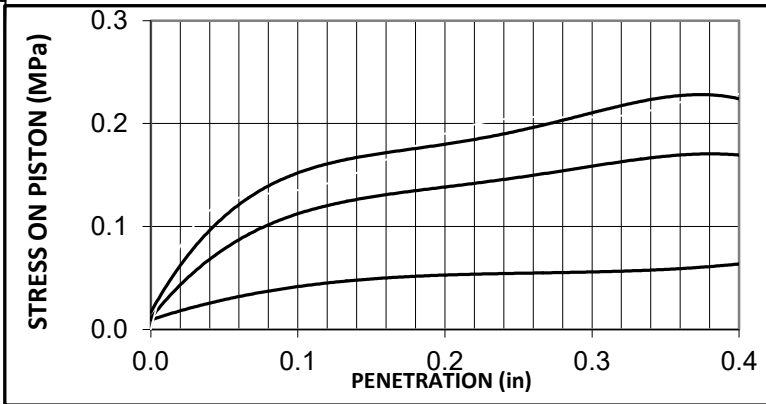
CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

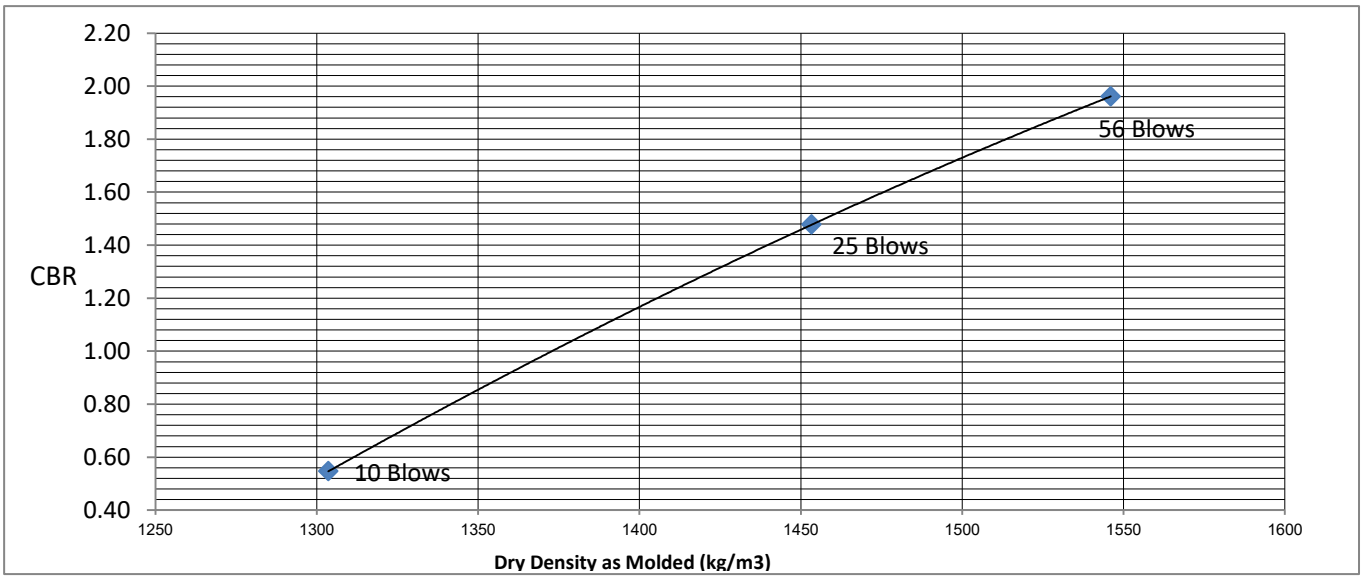
CLIENT:	AECOM	PROJECT NO.:	112-1913
	99 Commerce Drive	TEST NO.:	3
	Winnipeg, MB R3P 0Y7	LAB NO.:	HM 551
ATTENTION:	Kevin Rae	DATE RECEIVED :	12-Dec-19
PROJECT:	2019 to 2020 Archibald Pavement	DATE TESTED :	19-Dec-19
		TESTED BY:	IA /ECS

SAMPLE DATA		SPECIMEN DATA		
Sample ID:	**CLAYEY SILT**	DESCRIPTION	Before Soaking	After Testing
Source:	G19, G56,	Moisture Content (MC), %	23.5%	-
Sampled by:	Navi	MC of top 25mm layer, %	-	31.7%
Optimum Moisture Content:	23.5%	Dry Density, kg/m^3	1546	
Maximum Dry Density kg/m^3:	1545	Compaction,%		
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506	
Proctor Tested by:	ECS & IA	Swell, %	4.47	

DISPLACEMENT mm	DISPLACEMENT in	STRESS MPa 10 Blows	25 Blows	56 Blows
0	0	0.000	0.000	0.000
0.64	0.025	0.030	0.066	0.094
1.27	0.050	0.034	0.082	0.120
1.91	0.075	0.038	0.100	0.134
2.54	**0.100**	**0.038**	**0.102**	**0.135**
3.81	0.150	0.044	0.118	0.156
5.08	0.200	0.052	0.148	0.192
6.35	0.250	0.056	0.154	0.204
7.62	0.300	0.058	0.156	0.206
8.89	0.350	0.060	0.162	0.216
10.16	0.400	0.062	0.172	0.228

LOAD PENETRATION CURVE





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Phone: 204-697-3854 Cell: 204-997-1355
Email: hmanalo@mts.net

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

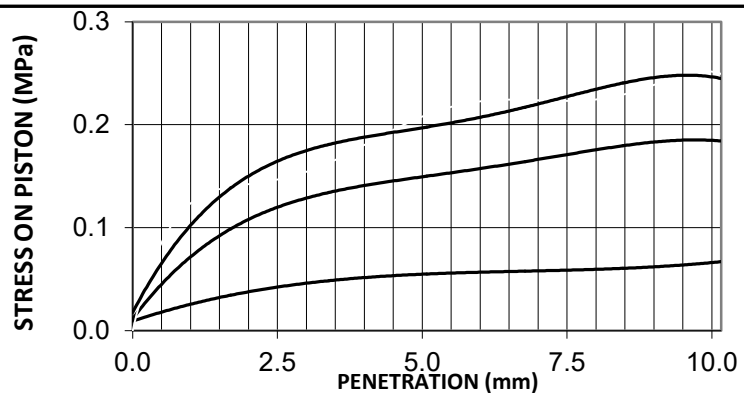
CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.: TEST NO.: LAB NO.:	112-1913 4 HM 551
ATTENTION:	Kevin Rae	DATE RECEIVED :	12-Dec-19
PROJECT:	2019 to 2020 Archibald Pavement	DATE TESTED :	23-Dec-19
		TESTED BY:	IA /ECS

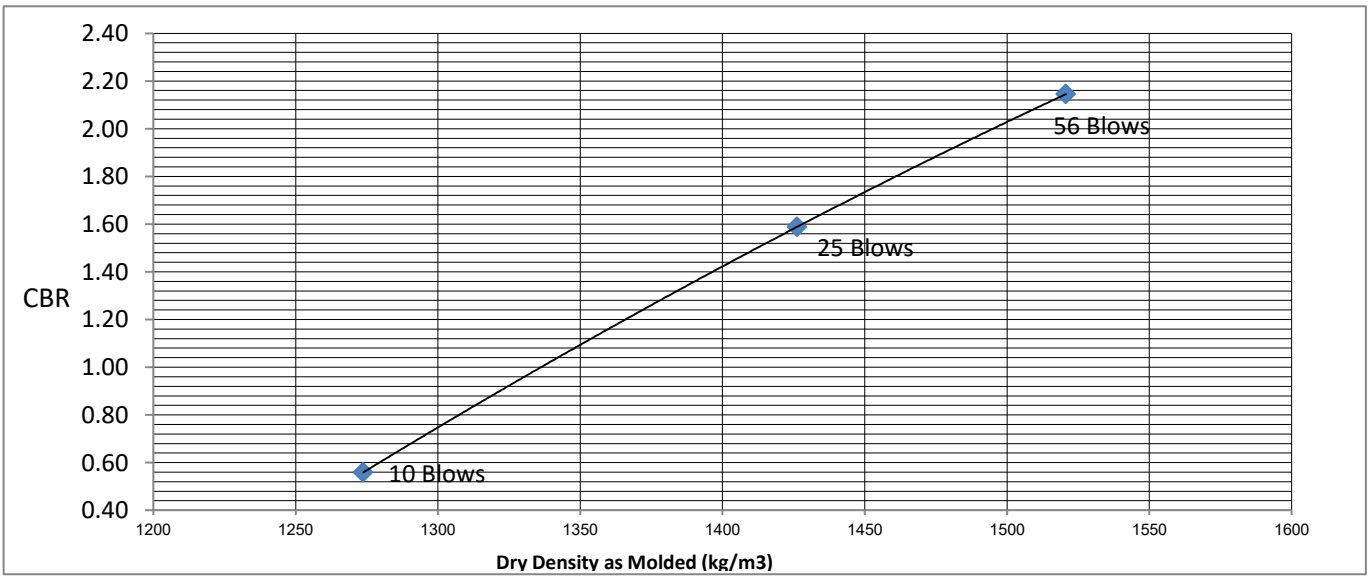
SAMPLE DATA	
Sample ID:	**SILTY CLAY**
Source:	G3 & G4, G69 & G70
Sampled by:	Navi
Optimum Moisture Content:	24.8%
Maximum Dry Density kg/m^3:	1519
Method of Compaction:	Standard Proctor
Proctor Tested by:	ECS & IA

SPECIMEN DATA		
DESCRIPTION	Before Soaking	After Testing
Moisture Content (MC), %	24.6%	-
MC of top 25mm layer, %	-	33.4%
Dry Density, kg/m^3	1521	
Compaction,%		
Surcharge Weight, grams	4506	
Swell, %	4.67	

DISPLACEMENT mm	DISPLACEMENT in	STRESS MPa 10 Blows	STRESS MPa 25 Blows	STRESS MPa 56 Blows
0	0	0.000	0.000	0.000
0.64	0.025	0.030	0.070	0.101
1.27	0.050	0.034	0.087	0.130
1.91	0.075	0.039	0.107	0.145
2.54	**0.100**	**0.039**	**0.110**	**0.148**
3.81	0.150	0.045	0.127	0.169
5.08	0.200	0.054	0.161	0.216
6.35	0.250	0.059	0.167	0.220
7.62	0.300	0.061	0.169	0.225
8.89	0.350	0.063	0.176	0.236
10.16	0.400	0.065	0.187	0.249

LOAD PENETRATION CURVE





APPENDIX ‘H’

2021 CN WORK PERMIT APPLICATION

Public Works - West

Building B Floor 2
10229 127 Ave NW
Edmonton, Alberta
T5E 0B9

WORK PERMIT APPLICATION
CTA - 2021

For Railway Use Only:

Mile: _____
Sub: _____
Location: _____

Valid: _____
Expiry: _____

START DATE OF PROPOSED WORK: _____

CONTENTS:

SECTION A: INSTRUCTIONS & PERMIT FEES

Instructions

Definitions:
"CN" and "Railroad" refers to Canadian National Railway Company or such of its affiliates or associates (within the meaning ascribed to those terms under the Canada Business Corporations Act) to whose property this Authorization and Consent relates.

"Applicant" refers to public road authority, company or individual that is requesting authorization and consent to perform work on or adjacent to CN property and/or requesting flagging services.

"Contractor" refers to authorized employees, servants, agents, contractors or sub-contractors representing or working on behalf of the Applicant.

Complete the Work Permit Application as follows:

1. Complete Section B, "Applicant & Work Information" (page 4)
2. Complete Section E, "Right of Entry for Contractors" (page 11)
3. Read and initial each page of the Work Permit Application (page 1 to 21)
4. Provide signature in Section F, "Agreement and Authorization" (page 21)

Return the following:

1. Pages 1 through 21 of the completed Work Permit Application
2. Required documents as per Section C, "Terms and Conditions" Paragraph 2
3. Plans as per Schedule B
4. Proof of Insurance, as per Paragraph 13 of Section E, "Right of Entry for Contractors"
5. **Please return all of the above to the following address:**

Name:	Sara Lovegrove
Title:	Prairie Utility Coordinator
Phone:	(780) 643-7668
Address:	Building B, Floor 2 10229 127 Ave NW Edmonton, Alberta T5E 0B9
Email:	sara.lovegrove@cn.ca

Upon receipt of the signed documents, CN will provide contact names and numbers to the Applicant to arrange for required work.

Rates & Billing Information (2021)

Where applicable, HST/PST/GST will be added to the prices described on this page.

Application Fees* - Will be invoiced to you.

Permit Fee	$875.00 plus applicable tax CN GST/HST Registration Number 10076 8779 RT0001 *** Additional review fees may apply, depending on the scope of work. You will be advised if additional fees apply ***

Flagging and Cable Locate/Protection Costs*

ROAD AUTHORITY (CTA) - REGIONAL PRICING*		
Service	**Hourly Rate**	**Daily Minimum**
Flagging Services	$ 154.00	8 hours
Cable Locate	$ 154.00	6 hours
N.B. Travel time exceeding 2 hours to travel to or 2 hours to travel from the work site is recoverable and will be charged in addition to the time spent on site at the above rates.		

FOR RECOVERABLE PROJECTS ONLY (R or M networks)– ACTUAL PRICING
Flagging and locates will be charged per hour based on actual labour rates plus applicable overheads and per diems. The time charged will consist of on-site hours (including set-up time) in addition to the travel time to and from the site.

The daily time invoiced per employee will be rounded up to the next full hour.

Disclaimer – The above rates are on a "per worker/ per day" basis.

Notification Delays

- CN requires minimum 10 working days' or as is confirmed in the letter of acceptance to schedule
- flagging / signal protection services / cable locates.
- **CN requires two (2) business days' notice to cancel scheduled work. Notice must be given in writing via email. Cancellations received without the required notice will be invoiced at the minimum daily rates.**

Penalties/Additional Fees*

If work is performed without any CN flagman being present or without proper locates, an amount of $5,000 per incident shall be billed to the Applicant as a penalty. Penalties will also be issued for any practices deemed as unsafe per railroad safety requirements. Safety is necessary to ensure that no worker and/or passerby is/or will be in any danger.

If one or more trains are delayed, Applicant must pay to CN, under title of Damages of Liquid Assets and not under title of penalties, the following amounts depending on the situation:

- Passenger Trains: $2,500 per delay + $25 per minute of delay
- Freight Trains: $625 per hour of delay or $706 per hour of delay (intermodal)
- Each train delay can lead to additional costs that you will be responsible to pay

Fees are subject to yearly changes without notification

CN Tax Registration Information

- CN GST/HST Registration Number 10076 8779 RT0001
- CN QST Registration Number 10000 43156 TQ0514

SECTION B: APPLICANT & WORK INFORMATION (to be completed by Applicant)

ROAD AUTHOURITY: _____
("Applicant")

BILLING ADDRESS: _____
_____
_____

BILLING EMAIL ADDRESS: _____
(Example: accountspayable@company.com)

CONTACT ADDRESS: _____
_____
_____

PHONE NO.: _____
FAX NO.: _____
EMAIL ADDRESS: _____

NAME OF SUB-CONTRATOR: _____
(if applicable)
FIELD CONTACT: _____
MOBILE PHONE: _____

1. DESCRIPTION AND LOCATION OF WORK (including details of *all excavations* on or adjacent to the CN right-of-way):

_____

_____

_____

WARNING - CN right-of-way contains buried communication, power and fibre optic lines. Cable locates by CN Signals and Communications personnel and implementation of appropriate protective measures are mandatory prior to all excavations.

DATE(S) WORK TO BE PERFORMED: from _____ to _____ .

N.B. Actual date(s) of work will be dependent upon availability of CN flagging and cable locates / protection.

If CN Project, the following information must be supplied:

CN Contact Name: _____
(CN Project Manager)

Project: _____

SECTION C: TERMS AND CONDITIONS

With reference to this submission and attached prints of drawing number _____, dated / revised _____, CN has no objections, in principle, to the proposed work subject to the following conditions.

Prior to the commencement of work:

1. The Applicant shall:

1.1. Execute the attached Application and submit the required documentation as per Section A "Instructions & Permit Fees" of this application.

1.2. Read and be aware of "CN Safety Guidelines for Contractors and Non-CN Personnel" (See Section D) and for underground installations only, "SCP-1005 Instructions to Excavators for the Protection of Underground S&C Cables" (See Section F).

2. The Applicant's shall:

2.1. Provide, in writing, the name and phone number of the Applicant's qualified site inspector who will be on the job site on a full time basis for the duration of construction.

2.2. A CN flagperson shall be present at all times when work progresses within the CN right-of-way, unless otherwise approved by CN. The presence of a flagperson in no way relieves the Applicant from liability for damage or disruption to CN property, infrastructure or operations caused by the actions of the Applicant, or the agent acting on its behalf.

2.2.1. At least one (1) flagperson per day shall be available for a maximum eight (8)-hour Contractor working day, which may be reduced at the discretion of CN. Overtime and weekend work shall not be permitted, unless otherwise approved by CN.

2.2.2. All personnel working within the CN right-of-way, including truck drivers, material supply drivers and service providers shall attend, record and acknowledge understanding of the daily briefing session with the CN flagperson prior to the commencement of any work within the right-of-way.

2.2.3. Work may be ceased under the authority of the CN flagperson at any time to accommodate train movements.

2.2.4. Once the installation is complete and the CN flagperson is discharged, the Applicant and its agents shall not be permitted on CN property for the purpose of collecting data for ground surface and subsurface monitoring. This monitoring shall be observed from outside the CN right-of-way.

3. The Applicant's site inspector shall:

3.1. Be responsible to act on behalf of the Applicant. CN reserves the right, at its sole discretion, to assign a full time site representative of its choice at the Applicant's expense, notwithstanding the requirement of the Applicant to assign their own, qualified inspector.

3.1.1. Installation is in compliance with the Contractor's procedures.

3.2. Any problems or issues related to the work, including changes in subsurface conditions, shall be reported to CN immediately.

4. During construction, the Applicant shall maintain positive drainage of Railway property. After construction is completed, the Railway's right-of-way shall be restored to its original condition and to the satisfaction of the Railway. Any fencing removed to facilitate construction shall be restored.

5. The Applicant shall be liable for all costs, direct and indirect, incurred by CN due to the settlement of track(s) or any other problems related to CN's operations, property or infrastructure, that occur as a result of this work, for a period of one (1) year from the date of completion of the work.

5.1. Should CN be unable to maintain normal operating speed during installation or within a period of one (1) year from the date of completion of the work, the Applicant shall be responsible for the cost of train delays resulting from the train slow order, and shall be assessed a daily penalty as per the rates established in calculated according to the rates in Section A until such time as normal operating speed is resumed.

5.2. CN, at its option, may undertake the necessary measures to ensure safety, at the risk and expense of the responsible party.

5.3. The Applicant shall be responsible for the cost of flagging and cable locates / protection work. The cost of flagging and cable locates / protection work shall be based on actual time on site, calculated according to the rates in Section A.

6. Payment terms and conditions:

6.1. Payments shall be made at CN's remittance address indicated on the invoice and is due 30 days after invoice date.

6.2. CN reserves the right to charge and be paid interest on all sums due from the Customer at the rate of 12% per annum compounded monthly, calculated from the date upon which payment is due until the date upon which it is received. Invoices are payable in full without set-off retention or counterclaim.

6.3. CN reserves the right to invoice Goods and Services upon delivery, regardless of whether other Goods or Services remain outstanding or not. The Applicant understands and accepts that failure to adhere to the payment terms and conditions may result in the termination of part or all services provided by CN, recuperation of goods sold, and escalated collection and legal procedures.

6.4. The Applicant acknowledges and agrees that all decisions with respect to the extension, continuation and termination of credit shall be at the sole discretion of CN.

6.5. Chargeable labour hours for CN personnel are tabulated through CN's time-keeping and payroll system, and are maintained electronically. The Applicant waives any right to acquire timesheets for labour hours charged.

SECTION D: SAFETY GUIDELINES FOR CONTRACTORS AND NON-CN PERSONNEL

Introduction

This document is a condensed version of CN's mandatory safety training for Contractors and non-CN personnel. It should be noted that this document is not a substitute for the mandatory safety training for Contractors and non-CN personnel including eRailsafe or Contractor Orientation as the case may be. For the purposes of this document "Contractor" may also apply to individuals on CN property, whether under contract to CN or not.

Contractor's employees or subcontractors performing work within the CN right-of-way must familiarize themselves with CN's Contractor Safety Package, complete a Contractor Orientation Course and must be registered on the Contractor Completion Database which can be found at the following website: www.contractororientation.com. If you have been contracted by CN and are completing work on behalf of CN, you are required to ensure anyone working on the project within CN right of way has completed eRailSafe. This can be found at the following website: www.erailsafecanada.com

These guidelines are not to be considered as a substitute for the applicable government regulations. These guidelines are the minimum requirement and must be exceeded where the hazard or government regulations warrant.

It is not possible to deal with every hazard in this one document. These guidelines are to be employed in conjunction with Government Acts, Regulations, local Ordinances, CN Safety and Operating Rules Standards, and good judgment to facilitate the safe completion of the work.

Additional information regarding safe work practices may be included in contract documents and specifications. In the event of a discrepancy between these guidelines and the contract, the contract shall govern.

GENERAL RULES AND INFORMATION

"Expect the movement of a train, engine, rail car or track unit at any time, on any track, in either direction. Protect yourself and others from the movement of trains, engines, railcars and track units and do not expect them to stop."

If any situation arises which affects the safe movement of trains, CN must be contacted immediately at:

1-800-465-9239.

Alternatively, contact CN's Network Operations Centre in Edmonton at:

1-800-661-3963.

Before any digging is performed on CN property, proper clearance and instructions must be obtained through the Information Technology Command Centre (ITCC Network Management Centre) at:

1-800-661-3687 or 1-800-NO1-FOTS.

In an emergency, any object waved violently by anyone on or near the track is a signal for trains to stop.

Violation of CN's mandatory Contractor Safety training or contravention of these guidelines may result in the immediate removal of the Contractor or the offending personnel from CN property.

Compliance with Government Regulations

Contractors shall follow all applicable Federal, Provincial, and Municipal Acts, Regulations, Laws and Codes, including but not limited to those related to the licensing of workers, occupational health and safety, transportation or handling of dangerous substances, inspection and certification of equipment. As CN is a federally regulated enterprise, Contractors are advised that work undertaken on CN right-of-way may be governed by Federal regulation.

The Contractor must become familiar with all applicable regulations and must ensure compliance by workers at the job site. Supplementary instructions may be issued by CN representatives from time to time.

Contractor's Responsibility

1. Before entering upon CN right-of-way, the Contractor must have all documentation properly executed and available for review by CN personnel at the working site. (i.e. Permits, Licenses, Contract Documents, Contractor Safety Approved identification card and/or Waivers).
2. Daily briefings must be held at every work site to review the contents of these guidelines and any unique conditions at the site relating to safety. A record must be kept of such briefings by the Contractor's responsible person at the work site. Work site briefings must be updated regularly as the job conditions change
3. Unless explicitly permitted by CN, no equipment or vehicle may enter upon the operated right-of-way.
4. Unless explicitly permitted by CN, no work shall take place within thirty (30) feet of the nearest rail except in the presence of a CN Protecting Foreman. The CN Protecting Foreman is concerned only with the safe movement of trains and will not be responsible for the safety of the Contractor, the Contractor's personnel or the Contractor's equipment.
5. Contractor's personnel must not crawl under, climb over or pass through standing railway equipment.
6. Contractor's personnel must not cross a track within thirty (30) feet, of standing railway equipment.
7. CN has many power and/or communication cables buried within the CN right-of-way. The Contractor shall be sure of their location before making any excavation, driving stakes or otherwise penetrating the ground surface. In the event of any excavation work that strikes an underground cable adjacent to CN's track, the contractor must make immediate contact with CN
8. In accordance with CN's safety standards, Contractor's personnel must wear CN required personal protective equipment at all times while on CN right-of-way. Such equipment will include hard hats, safety glasses, reflective apparel, safety footwear (protective footwear shall meet or exceed CSA Z195 and/or ASTM F2413, shall cover and support the ankle and have a defined heel. In Canada, the defined heel must be a minimum of 9 mm (3/8 inch) and shall not exceed 25 mm (1 inch). In the US, the defined heel must be a minimum of 12 mm (1/2 inch and shall not exceed 25mm (1 inch). Boots must be equipped with laces, which must be laced to the top and tied. Hearing and respiratory protection and fall arrest equipment shall be worn where signs are posted or when a potential hazard exists.
9. No CN plant, signal, structure, equipment or property of any kind may be tampered with, modified or removed.
10. "Hi-rail" equipment shall only be operated on the track by personnel qualified in the latest version of the "Canadian Rail Operating Rules".
11. Horseplay, practical jokes, fighting or any other activity that may create a hazard will not be tolerated.
12. Contractor's personnel must immediately abide by instructions from CN personnel.

Approaching Train

1. On the approach of a train, the Protecting Person will communicate to the Contractor's Responsible Person, either by radio or by personal contact that a train is approaching.
2. After receiving the train information from the Protecting Person, the Contractor's Responsible Person must ensure that all workers, equipment and materials are "Clear Of The Track" (as defined in 5.3.5. below) then communicate this to the Protecting Person.
3. The Protecting Person will not authorize any trains through the working limits nor authorize cancellation of protection before receiving confirmation that all workers have been alerted, stopped working and the track is clear of workers and machinery.
4. After the train has passed, no one is to foul or occupy the track until the Protecting Person has given the authorization. Authorization will be communicated to the Contractor's Responsible Person.

Clear Of The Track

To be clear of the Track shall be defined as:

1. All work has been stopped.
2. All workers are made aware of the approaching train and route to be followed.
3. All workers, equipment and material have been positioned beyond the clearance limits or at any other location deemed safe by CN. (at least 5 meters (15 feet) from the nearest rail of the track on which the train is to pass with additional allowances for curvature and super elevation).
4. All off-track equipment by special approval less than 5 (15 feet) meters of the nearest rail has stopped working and operators have left their equipment.
5. All off-track equipment more than 5 meters (15 feet) from the nearest rail has stopped working. Operators may remain in their cabs unless directed otherwise by the Contractor's Responsible Person. All equipment must be properly secured against unintentional movement
6. All on-track equipment has been moved into the siding or other track as per the Protecting Person's instruction. Operators will leave their equipment unless directed otherwise by the Contractor's Responsible Person. All unattended equipment must be properly secured against unintentional movement
7. Booms, cranes or other similar equipment have been immobilized and the boom is parallel to the railway track(s), and clear of the nearest rail be 5 meters (15 feet)
8. Provided there is no possible way for the worker to become unintentionally foul of a passing train, and at the discretion of the CN Supervisor, workers may continue working.

POLICY TO PREVENT WORKPLACE ALCOHOL AND DRUG PROBLEMS

Policy standards

The Contractor, subcontractors, employees, suppliers and visitors must remain free from any adverse effects of alcohol or other drugs and conduct themselves in an appropriate manner while on CN business or premises. The Contractor must ensure that all those having access to the site adhere to the following standards when on CN business or premises, including vehicles and equipment:

1. No use, possession, distribution or sale of illegal drugs or drug paraphernalia.
2. No use, possession, distribution or sale of beverage alcohol or any form of alcohol.
3. Responsible use of prescribed and over-the-counter medications.
4. No distribution, offering or sale of prescription medications.
5. To report for duty and remain during the entire period of duty free of the negative effects of alcohol and other drugs, including the after effects of such use.

Consequences of violation

Failure to meet these standards will be considered a breach of the contract. This may at CN's sole discretion, trigger the suspension or termination of the contract.

Policy violation procedures

Where CN has reasonable grounds to believe any individual in the employ of the Contractor or a supplier is on duty in an unsafe condition or otherwise in violation of the Policy, or where during the preliminary phase of any investigation such an

individual has been identified as being directly involved in the chain of acts or omissions leading up to an accident or incident:

1. CN will escort the individual(s) to a safe place.
2. CN will notify the Contractor or supplier.
3. The Contractor will investigate the situation.
4. The Contractor must satisfy CN that there has been no policy breach.
5. If a policy breach has occurred, the individual will not be allowed to continue providing services to CN without written permission from a CN official, and he/she will be required to adhere to any conditions governing his/her return.

Firearms

Firearms (loaded or empty) are not permitted on CN property, except for CN Police officers and other designated persons performing authorized work and when authorized to do so. In all cases, any firearms must be accompanied with a written authorization from the Chief of CN Police and the person should have in his possession all pertinent government permits.

Explosives

No explosives will be permitted on CN property without written CN approval.

Vehicles

Contractor's vehicles on the site must be in safe operating condition. Operators must observe all site speed limits. Unattended vehicles must not be left running unnecessarily. Where they must be left running, the parking brake must be applied. The operator is responsible for the safety of all passengers and the stability of materials being transported.

All vehicles will be parked in a pre-determined area and where required, a designated Contractor entrance shall be used.

Smoking in the Workplace

Smoking is not permitted in any CN interior workplace or motor vehicle.

Security

Contractor's personnel will proceed directly to the Contractor's work location. Contractor's employees must remain at their designated work site and must not wander about the site.

The Contractor shall not permit persons other than the Contractor's personnel to enter the site without the prior written authority of the CN representative.

Emergency Evacuation Procedures

Prior to commencing work, all Contractor's employees must be familiar with the emergency evacuation plan for that work site. The Contractor shall issue written emergency and rescue procedures to the Contractor's personnel and shall post such procedures on the job site.

Unsafe Conditions or Practices

Contractors shall correct or report any unsafe conditions or practices they observe. All such conditions or practices shall be reported to the CN representative at the work site as soon as practical.

Reporting Accidents/Incidents

All accidents/incidents occurring on CN property, that result in or had the potential of causing serious injury, lost work days, vehicle or property damage must be reported to the CN representative within twenty-four (24) hours. All such incidents will be fully investigated by the Contractor.

The Contractor shall subsequently provide a written report to CN (i.e. Company Officer assigned as Liaison to Contractor) within seven (7) days detailing the nature of the incident, the cause(s), regulatory authorities notified, and a specific action plan to prevent recurrence.

Treatment of Injured Personnel (Contractors)

Contractors shall ensure the following is provided for their personnel as required by CN and in accordance with applicable government regulations:

1. Adequate first-aid supplies and equipment.
2. Qualified personnel to render first-aid treatment.

Audio and Visual Recording Equipment

Cameras and audio-visual equipment are not permitted on CN property without prior approval. Use of personal electronic devices such as smart phones for the purpose of recording video, photographic or audio information is prohibited while on CN property.

Summary

In conclusion, CN requires the full cooperation of the Contractor and the Contractor's employees with these guidelines and all other applicable regulations. Should there be any doubt as to the meaning or interpretation of these guidelines, consult with the CN representative responsible for the worksite.

Contractor Acknowledgement

Contractor/Sub-contractor personnel must read and understand CN's "Safety Guidelines for Contractors and Non-CN Personnel". The Contractor/Sub-contractor must also follow the appropriate Contractor Safety training.

SECTION E: RIGHT OF ENTRY FOR CONTRACTORS

Right of Entry

General Conditions

1. "Railroad" refers to Canadian National Railway Company or such of its affiliates or associates (within the meaning ascribed to those terms under the *Canada Business Corporations Act*) to whose property this Right of Entry relates.

2. This Agreement is entered into as described in Section F "Agreement and Authorization" of this document (page 21).

3. The Railroad, solely to the extent of its right, title and interest, without any warranty, expressed or implied, at law, under contract or otherwise, hereby grants to Company and its authorized employees, servants, agents or contractors, authorization and consent to enter upon the property described under Schedule "A" hereto (the "Railroad property") for the sole purpose described under Schedule "A" hereto. This Right of Entry shall only extend to such actions as are necessary or required to fulfill the purpose described under Schedule "A" hereto.

4. This Right of Entry shall terminate forthwith upon expiration of the term noted in Schedule "A" hereto, it being understood that Railroad shall have entire discretion to revoke this Right of Entry at any time prior to the expiration of the term, upon notice to that effect to the Company, which notice shall be effective forthwith upon receipt by the Company or at such later date indicated by Railroad in the aforesaid notice.

5. The Railroad grants this consent subject to the understanding that Company and its authorized employees, servants, agents or contractors who enter upon Railroad property will:

   5.1. See that any activities conducted on said Railroad property are done in a good workmanlike manner, in compliance with applicable laws, statutes, regulations, policies, directives, orders, approvals and other legal requirements and in such manner and at such time as not to obstruct or interfere with Railroad's operation, trains or the functioning of its signal and communications systems or any fiber optic cable system or unduly delay the safe passage of Railroad's trains;

   5.2. For the purposes hereof, the following expressions shall have the meanings hereinafter noted:

      5.2.1. "Applicable Laws" means the applicable and enforceable statutes, regulations, policies, directives, orders, approvals and other legal requirements of an Authority or of the common law in effect from time to time, including, without limitation, those, together with the guidelines of an Authority, relating to the protection, conservation or restoration of the natural environment;

      5.2.2. "Authority" means the federal, provincial, municipal, state, county and, generally local governments, the courts, administrative and quasi-judicial boards and tribunals and any other organizations or entities with the lawful authority to regulate, or having a power or right conferred at law or by or under a statute;

   5.3. Observe, abide by and comply with any and all guidelines, directives and policies adopted from time to time by Railroad including, without limitation eRailsafe, Contractor Orientation (as the case may be).

   5.4. Take due precautions against injury and damage to persons or property located upon said Railroad property; and

   5.5. Unless otherwise agreed to, return said Railroad property to the same condition, reasonable wear and tear excepted, as existed prior to such work, failing which Railroad, after providing written notice to Company, and allowing Company a reasonable amount of time to return the Railroad property to the same condition, may do so at Company's sole cost and expense.

Work

6. Any work carried out by Company shall be carried out at those locations described in Schedule "A" or shown on the Plan attached hereto as Schedule "B" and, as the case may be, in the manner described therein.

7. Company agrees to advise Railroad's representative identified in Section "B" hereto (the "Representative") or such other representative designated from time to time by Railroad as to the dates and times when the work will be conducted on Railroad property and to provide him with at least ten (10) working days advance notice before entering upon Railroad property to commence any work or for any other purpose. Unless otherwise agreed to in writing, Company agrees to assume the costs of engineering services, Railroad's Representative's costs and its designee, signal locates, flagman, track labor and all other associated costs incurred by Railroad. Railroad shall, at its option, invoice Company directly for such costs or, if any of those services have been provided by a third party, Railroad may direct such third party to invoice directly Company, in which case Company undertakes and agrees to pay such third party forthwith upon receipt of (i) Railroad's direction to pay such third party; (ii) proper invoice for the relevant services.

8. The Railroad, its employees, agents or representatives shall have the right to view and inspect any activity or work on Railroad's property. If, in the sole opinion of Railroad, any activity or work is undesirable for any safety-related reason, Railroad shall notify Company, its authorized employees, servants, agents or contractors and if appropriate corrective action is not taken, Railroad shall have the right to terminate this Agreement at once.

9. Railroad shall have the right to restrict Company's activity on Railroad's property in any way that Railroad may deem necessary from time to time to assure normal railroad operations or for safety reasons and, after consultation with Company, shall also have the right to require Company, its authorized employees, servants, agents or contractors to comply with Railroad's instructions and take any safety precautions that Railroad may reasonably deem necessary from time to time. No work shall be performed or equipment located within thirty (30) feet of the centerline of the nearest railroad track without flagging protection being provided by Railroad, at the Company's expense or as otherwise agreed to in writing. Said work must be arranged no less than ten (10) business days in advance of starting work.

10. Company shall not suffer or permit any construction lien or similar lien to be filed or registered against Railroad property. If such a lien shall at any time be filed or registered, Company shall forthwith procure its discharge at its sole costs and expenses. Railroad shall have the right, if Company fails to forthwith procure such discharge, to discharge any lien filed or registered at any time against Railroad property, and any amount paid by Railroad in so doing together with all reasonable costs and expenses of Railroad including its legal fees and costs shall be paid to Railroad by Company on demand.

Confidentiality

11. Company covenants and agrees that any information of whatsoever nature (whether such information is written, verbal or otherwise), relating to Railroad, its operations, properties, business, assets, liabilities and financial condition (together with any and all memoranda, notes, reports, documents based upon and relating to such information, all copies and extracts thereof and all studies and data prepared on the basis of such information), is strictly confidential and Company represents and warrants that neither Company nor those for whom it is responsible at law will release the reports or any of the information contained therein (including to any Authority), without the express written consent of Railroad, and Company shall refuse all requests for such reports or information in the absence of Railroad's express written consent, unless compelled to do so by competent judicial or administrative authority and only to the extent that (i) Company gives Railroad timely notice of any proceeding and/or hearing related thereto; and (ii) Company has taken no action that would hinder Railroad from seeking a protective order to prevent such disclosure of its confidential information. Company further undertakes and agrees to share with Railroad, at no cost to Railroad, any and all conclusions, studies, reports or data incorporating, based upon or relying on any such information.

Indemnity

12. Company shall indemnify and hold harmless Railroad from any losses, liens, damages, liability, and expenses ("Damages") incurred by Railroad arising from Company's, or its employees, agents, contractors or sub-contractors', breach of its obligations or warranties under this Right of Entry; any third party claims associated with or arising under this Right of Entry; or Company's access to Railroad's or Railroad's affiliates' premises. In the event that Railroad has incurred Damages, Railroad shall notify Company and Company shall indemnify Railroad for the Damages and defend and hold harmless Railroad against any third party legal claims associated with the Damages. No third party claim may be settled without the consent of Railroad, which consent shall not be unreasonably withheld.

Insurance

13. Company, its contractors or any sub-contractors shall each provide and keep in force and effect throughout the term of this Right of Entry such insurance, in amounts and for risks as Railroad may prescribe from time to time including, if applicable, the kinds and minimum amounts of insurance set out under Schedule "C" – "General requirements".

14. If Company, its contractors or any sub-contractors shall perform sub-surface work, Company, its contractors or any sub-contractors shall also provide and keep in force and effect throughout the term of this Right of Entry the additional insurance specified under Schedule "C" – "Sub-Contractor Insurance Coverage".

    The Company, its contractors or any sub-contractors will not enter Railroad property without having obtained a certificate certifying that they have obtained all of the insurance coverage required hereunder. The Railroad may at any time require the Company to furnish said certificate and failure to so may result in removal from Railroad property, cancellation of agreement and other consequences including without limiting damages or consequential losses resulting from the non-completion of the work, as Railroad may determine. Said insurance shall state that no material changes will be made to the policies unless Railroad is given a prior written notice of thirty (30) days before such change or cancellation. Any insurance coverage required under the terms and conditions of this contract shall in no manner restrict or limit the liabilities assumed by Company nor shall they release Company from any of its obligations under this contract.

Exceptions

15. Any exception or variation to the terms and conditions of this Right of Entry shall be specifically identified in Schedule "A" hereto. No such exception or variation shall be binding upon Railroad unless Schedule "A" is properly initialed by Railroad's duly authorized representative(s).

Miscellaneous

16. Company shall not have the right to transfer and/or assign this Right of Entry or any of its rights hereunder without Railroad's prior written consent, which consent Railroad shall have entire discretion to withhold or delay.

17. All notices provided for under this Right of **En**try shall be in writing and sent by pre-paid registered mail, fax or hand-delivered to the other party at the addresses herein first noted or at such other address as either party may notify the other from time to time.
    Such notices, if given by mail, shall be deemed to have been received on the third business day following the postage thereof; if by fax or hand delivery, at the date and time the fax is sent or the hand delivery is made.

18. Either party's exercise or failure to exercise any rights under this Agreement shall not relieve the other party of any responsibility under this Agreement.

19. In the event of conflict between the terms hereof and the terms of any other agreement between Railroad and Company, the most stringent standards and conditions shall govern.

20. This Right of Entry shall be governed by the laws of the jurisdiction where Railroad property accessed under the authority hereof is located, as noted under Schedule "A" hereto.

Schedule A: Information (to be completed by Applicant)

Railroad Property

(Legal Land and/or CN Subdivision and Mileage of location of proposed works)

_____

_____

_____

GPS Coordinates

Latitude: _____

Longitude: _____

Limited Access Purpose

For the limited purpose of [insert detailed description]:

_____

_____

_____

_____

(Description of work to be done within Right of Way)

Term

A term of _____ [number of days / months / **up to maximum of 1 year**) beginning on [commencement date] _____ and terminating on _____ [termination date], unless sooner terminated as provided hereunder. ***(ENSURE YOU ARE ADDING EXTRA TIME ONTO THE TERM TO ALLOW FOR PROJECT DISTRUPTIONS)***

Exceptions/ Variations
(Variation in insurance coverage requires prior approval from Risk Management Department)

_____

_____

_____

Schedule B: Plans

(Appended hereto)

****

Schedule C: Insurance

General Requirements

To the extent Company carries out work on its behalf or on behalf of Railroad, the Contractors or the Sub-contractors shall, throughout the term of this Right of Entry agreement, maintain in force the following coverage. The insurance limits may be met by a combination of primary and umbrella insurance policies.

1) **Commercial General Liability Insurance** - occurrence based - in an amount no less than **$10,000,000** per occurrence, or such greater amount as Railroad may from time to time reasonably require, covering liability for bodily injury, including death, property damage or destruction of property (including loss of use), contingent employers liability, sudden and accidental pollution, product and completed operations, broad form property damage, non-owned automobile, blanket contractual liability, and unlicensed vehicles on and off premises owned or controlled by the owner.

   Company shall provide to Railroad a certificate of insurance evidencing the above and include:
   a) a waiver of subrogation in favour of CN and its subsidiaries;
   b) name CN and its subsidiaries as additional insured;
   c) contain a cross liability and severability of interest clause ;
   d) specifically include liability for operations within or around railroads and railway tracks;
   e) contain a clause stating that CN's interests will not be prejudiced in the event the First named insured breaches any warranty of the policy;
   f) provide a 30 days written notice of cancellation, modification or material change in coverage.

2) **Automobile Liability Insurance** on all licensed vehicles owned, hired, leased to or operated by or on behalf of the Company's contractor in the amount of not less than **$5,000,000** per occurrence. The certificate of insurance must include a waiver of subrogation in favour of CN and its subsidiaries.

3) **Workers' Compensation -** if available in the jurisdiction(s) covered by this Agreement, Company must be compliant with statutory Worker's Compensation and hold the relevant clearance letter(s). Otherwise, Company must provide Employer's Liability Insurance in an amount no less than **$5,000,000**.

WHERE APPLICABLE, THE FOLLOWING COVERAGES ARE TO BE PROVIDED IN ADDITION TO THE ABOVE

- **For professional advice or design (architects/engineers/inspectors/training, etc.)**

4) **Professional Liability Insurance/Errors and Omissions** (incl. Pollution Liability) with a limit of no less than **$5,000,000**.

- **For contractors leasing large machinery and equipment**

5) **All Risks Contractor's Equipment Insurance** covering construction machinery and equipment used by the Contractor and Sub-Contractors for the performance of the Work, as any structures being built or assembled, shall be in a form acceptable to the Contractor and Railroad and shall not allow subrogation claims by the Insurers against the Contractor and Railroad. The policy shall be endorsed to provide the Contractor with no less than 30 days written notice in advance of cancellation, change or amendment restricting coverage.

- **For building construction**

6) **All Risk Builders Insurance / Course of Construction Insurance** must be provided if required, in order to cover the construction of the building, the building foundations, fixtures, machinery, equipment used to service the building, building materials and supplies, and debris removal in the event of a loss.

- **For construction projects estimated at $5,000,000 and more (ex.: rail, bridges, roads, structures, buildings)**

7) **Project Wrap-Up Liability Insurance** subject to limits of not less than **$25,000,000** per occurrence. Such insurance shall be in the joint names of the owner and contractor and name as additional insures all subcontractors and consultants. The Wrap-Up Liability insurance shall include, but is not limited to: bodily injury including death and property damage including loss of use; personal injury; contractual liability; premises and operations; products and completed operations liability coverage extension of twenty-four (24) months; contingent employers liability; shoring, blasting, excavation, underpinning, demolition, pile driving, caisson work and work below ground surface including tunnelling and grading; non-owned automobile; limited pollution coverage (Insurance Bureau of Canada Form 2313); non-cancellable or at least 120 days notice of cancellation, contingent medical malpractice; and fire fighting expense. This insurance policy shall be the primary insurance coverage in all cases for all risks of liability associated with the operations of this project. The policy shall be in force from commencement of work until substantial completion and include coverage for unfinished construction, maintenance and repair for a period of 12 months following substantial completion.

Schedule D: Undertaking by Contractor (to be completed by Applicant)

I hereby undertake to respect the attached CN Policies and to ensure that they are respected by my workers, subcontractors and suppliers and visitors.

I also hereby acknowledge that I have received a copy of said documents.

WSIB/CSST EMPLOYER NUMBER:

CONTRACTOR'S NAME:

AUTHORIZED REPRESENTATIVE:

TITLE:

Signature: _____

Date: _____

Schedule E: Employer Information Sheet (to be completed by Applicant)

Contractor information

Name : _____

Address : _____

_____

Telephone (head office) : _____

(Work site) : _____

(Emergency) : _____

Fax (head office) : _____

Person in charge at work site

Name : _____

Title / Association : _____

Phone : _____

Safety and health representative

Name : _____

Title / Association : _____

Phone _____

Union representative

Name : _____

Title / Association : _____

Phone : _____

Signature: _____

Date: _____

SECTION F: Agreement and Authorization (to be completed by Applicant)

This Agreement is entered into as of this _____ day of _____, _____ between CN, having its registered office at 935 de la Gauchetière West, Montreal, Quebec, H3B 2M9, and

_____ ("Applicant"), having a place of business at:

_____

_____[Applicant Address].

For a term of _____ (number of days, MAX 1 year term),
Beginning on _____ (commencement date)
and terminating on _____ (termination date), unless sooner terminated as provided hereunder.

It is understood that this permit is not valid until signed by the CN Representative named below. Once approved, this permit MUST be available at all times while onsite during proposed work.

Once the permit is approved, work cannot commence until the Letter of Acceptance has been completed and returned to the CN Representative named below.

If the approved permit and letter of acceptance cannot be supplied upon request, the work will stop immediately and all persons will be removed from CN Property until such time the approved permit and letter of acceptance can be supplied.

CN

(Signature)_____

Print Name: SARA LOVEGROVE

Title: PRAIRIE UTILITIES COORDINATOR

APPLICANT

(Signature)_____

Print Name: _____

Title: _____

Proponent of the work

(Signature)_____

Print Name: _____

Title: _____