



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 704-2013

**2013 CAPITAL PROGRAM LOCAL STREET RENEWALS: AUBREY STREET AND
OTHER LOCATIONS**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2013 Capital Program Local Street Renewals: Aubrey Street and Other Locations

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, August 30, 2013.

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

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

B3. ENQUIRIES

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

B3.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, 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 Bid Opportunity 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 Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.

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

B4. CONFIDENTIALITY

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

- (a) was known to the Bidder before receipt hereof; or
- (b) becomes publicly known other than through the Bidder; or
- (c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

B4.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Bid Opportunity 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 Bid Opportunity, 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.
- B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/bidopp.asp>
- B5.2.2 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B6. SUBSTITUTES

- B6.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.
- 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, only to the Bidder who requested approval of the substitute.
- B6.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely 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 B15.
- 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.
- B6.10 Notwithstanding B6.2 to B6.9, in accordance with B7.6, deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B15.1(a).

B7. BID COMPONENTS

- B7.1 The Bid shall consist of the following components:
- (a) Form A: Bid;
 - (b) Form B: Prices, hard copy;
 - (c) Bid Security
 - (i) Form G1: Bid Bond and Agreement to Bond, or
Form G2: Irrevocable Standby Letter of Credit and Undertaking, or
a certified cheque or draft;
- B7.2 Further to B7.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B6.
- B7.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Bid.
- B7.4 The Bid shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.
- B7.4.1 Samples or other components of the Bid which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid.
- B7.4.2 A hard copy of Form B: Prices must be submitted with the Bid. If there is any discrepancy between the Adobe PDF version of Form B: Prices and the Microsoft Excel version of Form B: Prices, the PDF version shall take precedence.
- B7.5 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.
- B7.6 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B15.1(a).
- B7.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.
- B7.8 Bids shall be submitted to:
- The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg MB R3B 1J1

B8. BID

- B8.1 The Bidder shall complete Form A: Bid, making all required entries.
- B8.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;
 - (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
 - (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
 - (d) if the Bidder is carrying on business under a name other than his/her own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.
- B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.
- B8.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.
- B8.4 Paragraph 12 of Form A: Bid shall be signed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;
 - (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
 - (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers and the corporate seal, if the corporation has one, shall be affixed;
 - (d) if the Bidder is carrying on business under a name other than his/her own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.
- B8.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.
- B8.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B9. PRICES

- B9.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.
- B9.1.1 For the convenience of Bidders, and pursuant to B7.4.2 and B15.4.2, an electronic spreadsheet Form B: Prices in Microsoft Excel (.xls) format is available along with the Adobe PDF documents for this Bid Opportunity on the Bid Opportunities page at the Materials Management Division website at <http://www.winnipeg.ca/matmgt/>
- B9.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.
- B9.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.
- B9.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B9.5 Form B: Prices is organized into Parts: Part 1 of the Work and Part 2 of the Work. Bidders shall provide a total price for each Part and, on the summary sheet, a Total Bid Price consisting of the sum of prices for Part 1 and Part 2.

B10. QUALIFICATION

B10.1 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.

B10.2 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 <http://www.winnipeg.ca/matmgt/debar.stm>

B10.3 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);

B10.4 Further to B10.3(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) a valid COR certification number 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
- (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/>

B10.5 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.

B10.6 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.

B11. BID SECURITY

B11.1 The Bidder shall provide bid security in the form of:

- (a) a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in

Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or

- (b) an irrevocable standby letter of credit, in the amount of at least ten percent (10%) of the Total Bid Price, and undertaking issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or
- (c) a certified cheque or draft payable to "The City of Winnipeg", in the amount of at least fifty percent (50%) of the Total Bid Price, drawn on a bank or other financial institution registered to conduct business in Manitoba.

B11.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B11.1.2 All signatures on bid securities shall be original.

B11.1.3 The Bidder shall sign the Bid Bond.

B11.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.

B11.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B11.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B11.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B11.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B11.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

B12.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Division, or in such other office as may be designated by the Manager of Materials.

B12.1.1 Bidders or their representatives may attend.

B12.1.2 Bids determined by the Manager of Materials, or his/her designate, to not include the bid security specified in B11 will not be read out.

B12.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>

B12.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>

B12.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B13. IRREVOCABLE BID

- B13.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.
- B13.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly executed and the performance security 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.

B14. WITHDRAWAL OF BIDS

- B14.1 A Bidder may withdraw his/her Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.
- B14.1.1 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.
- B14.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.
- B14.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:
- (a) retain the Bid until after the Submission Deadline has elapsed;
 - (b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid; and
 - (c) if the notice has been given by any one of the persons specified in B14.1.3(b), declare the Bid withdrawn.
- B14.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B13.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B15. EVALUATION OF BIDS

- B15.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Bid Opportunity, or acceptable deviation therefrom (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);
 - (c) Total Bid Price;
 - (d) economic analysis of any approved alternative pursuant to B6.
- B15.2 Further to B15.1(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.
- B15.2.1 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.

- B15.3 Further to B15.1(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 responsible and qualified.
- B15.4 Further to B15.1(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.
- B15.4.1 Further to B15.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.
- B15.4.2 The electronic Form B: Prices and the formulas imbedded in that spreadsheet are only provided for the convenience of Bidders. The City makes no representations or warranties as to the correctness of the imbedded formulas. It is the Bidder's responsibility to ensure the extensions of the unit prices and the sum of Total Bid Price performed as a function of the formulas within the electronic Form B: Prices are correct.

B16. AWARD OF CONTRACT

- B16.1 The City will give notice of the award of the Contract or will give notice that no award will be made.
- B16.2 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 responsible and qualified, and the Bids are determined to be responsive.
- B16.2.1 Without limiting the generality of B16.2, 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.
- B16.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B15.
- B16.3.1 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.
- B16.4 As noted in D2 and identified in Form B: Prices, the Work of Part 2 will be contingent upon the Province approving funding for the Work. If sufficient funding for Part 2 Work is not approved by the Province the City shall have the right to eliminate all or any portion of Part 2 Work in accordance with D2.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C0.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. SCOPE OF WORK

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

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

Part 1 – City Funded Work

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

- (a) Pavement Reconstruction
 - (i) Nesbitt Bay from Crescent Dr and Pembina Highway
 - (ii) Aubrey St from Bus Loop to Palmerston Ave
 - (iii) Brentford Rd from Meadowood Dr to Wales Ave
- (b) Pavement Rehabilitation
 - (i) Fleet Ave from Rockwood St to Thurso St
 - (ii) Abrey St from Wolesley Ave to Bus Loop

Part 2 – Manitoba Hydro Funded Work

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

- (a) Street Lighting and Associated Works
 - (i) Nesbitt Bay from Crescent Dr and Pembina Highway
 - (ii) Aubrey St from Bus Loop to Palmerston Ave
 - (iii) Brentford Rd from Meadowood Dr to Wales Ave

D2.4 The City currently has no approved funding in the Capital Budget for Part 2 of the Work, but is anticipating receiving notification about funding from the Manitoba Hydro by the award date. Part 2 of the Work is contingent upon the Province approving sufficient funding.

D2.4.1 Further to C7.1, if notice of sufficient funding is not received, the City shall have the right to eliminate all or any portion of Part 2, and the Contract Price will be reduced accordingly.

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

D2.4.3 If all or any portion of Part 2 is eliminated pursuant to D2.4.1, the time periods stipulated in D19 for Substantial Performance of the Work and in D20 for Total Performance of the Work will be reduced proportionally by the Contract Administrator acting reasonably.

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

- (a) Pavement Reconstruction
 - (i) Removal of existing pavement
 - (ii) Excavation
 - (iii) Installation of subdrains
 - (iv) Compaction of existing sub-grade

- (v) Installation of catchbasins
 - (vi) Placement of separation/geotextile fabric
 - (vii) Installation of new light standards and street lighting cable
 - (viii) Placement of sub-base and base course materials
 - (ix) Construction of curb and gutter utilizing slip-form paving equipment
 - (x) Adjustment of existing manholes
 - (xi) Placement of asphalt pavement
 - (xii) Renewal of existing sidewalk
 - (xiii) Boulevard restoration
- (b) Pavement Rehabilitation
- (i) Planing of existing asphalt pavement
 - (ii) Renewal of miscellaneous pavement slabs
 - (iii) Renewal of existing curb
 - (iv) Renewal of existing sidewalk
 - (v) Adjustment of catchbasins and manholes
 - (vi) Installation of new catchbasins/catchpits
 - (vii) Placement of asphalt overlay
 - (viii) Boulevard restoration

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is GENIVAR Inc., represented by:

Mr. Scott Minty,
Manager of Transportation

Telephone No. 204-477-6650

Facsimile No. 204-474-2864

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

D3.3 Bids Submissions must be submitted to the address in B7.8

D4. CONTRACTOR'S SUPERVISOR

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

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

D5. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

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

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

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

- (a) information provided to the Contractor by the City or acquired by the Contractor during the course of the Work;
- (b) the Contract, all deliverables produced or developed; and
- (c) any statement of fact or opinion regarding any aspect of the Contract.

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

D6. NOTICES

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

D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D6.3 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the facsimile number identified in D3.1.

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 five (5) complete sets of the Bid Opportunity. If the Contractor requires additional sets of the Bid Opportunity, they will be supplied to him/her at cost.

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

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

D9. SAFE WORK PLAN

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

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

D10. INSURANCE

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

- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability, broad form property damage cover and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;
- (b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence;
- (c) an all risks Installation Floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.

D10.2 Deductibles shall be borne by the Contractor.

D10.3 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in the C4.1 for the return of the executed Contract.

D10.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D11. PERFORMANCE SECURITY

D11.1 The Contractor shall provide and maintain performance security 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; or
- (b) an irrevocable standby letter of credit issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form attached to these Supplemental Conditions (Form H2: Irrevocable Standby Letter of Credit), in the amount of fifty percent (50%) of the Contract Price; or
- (c) a certified cheque or draft payable to "The City of Winnipeg", drawn on a bank or other financial institution registered to conduct business in Manitoba, in the amount of fifty percent (50%) of the Contract Price.

D11.1.1 Where the performance security is in the form of a certified cheque or draft, it will be deposited by the City. The City will not pay any interest on certified cheques or drafts furnished as performance security.

D11.2 If the bid security provided in his/her Bid was not a certified cheque or draft pursuant to B11.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site and in no event later than the date specified in the C4.1 for the return of the executed Contract.

D12. SUBCONTRACTOR LIST

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

D13. DETAILED WORK SCHEDULE

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

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

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

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

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

SCHEDULE OF WORK

D14. COMMENCEMENT

D14.1 The Contractor shall not commence any Work until he/she is in receipt of a letter of intent from the Award Authority authorizing the commencement of the Work.

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

- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D8;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the twenty-four (24) hour emergency response phone number specified in D4.2.
 - (iv) the Safe Work Plan specified in D9;
 - (v) evidence of the insurance specified in D10;
 - (vi) the performance security specified in D11;
 - (vii) the subcontractor list specified in D12; and
 - (viii) the detailed work schedule specified in D13.
- (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D14.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the letter of intent.

D14.4 The Contractor shall not commence Part 2 of the Work as described in D2 and identified in Form B: Prices, unless, he/she has received notification from the Contract Administrator that the City has received notice of sufficient funding from Manitoba Hydro.

D14.5 The City intends to award this Contract two weeks from the Submission deadline

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

D15. WORKING DAYS

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

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 – Electrical supply and inspection of new street lighting hardware (to be installed by contractor) and the energizing of the new street lighting plant;
- (b) City of Winnipeg 2013 Supplemental Watermain Program – Contract on Nesbitt Bay (East Leg). Estimated construction date: April 2014.

D18. SEQUENCE OF WORK

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

D18.1.1 Providing that the Work on each street is completed in a similar order to the order that the Work was commenced in, the Contractor will be permitted to have a maximum of three (3) streets under construction at any one time. Completion of a street means that all of the necessary concrete, asphalt including approaches and landscaping Work is completed to the satisfaction of the Contract Administrator.

D18.1.2 Where the Contractor utilizes two (2) or more crews that work independently on the same major component of the Work as identified in D2, the Contract Administrator may approve an increase to the maximum number of streets under construction at any time.

D18.1.3 Placing the topsoil and finished grading of all boulevard and median areas shall be completed prior to commencing construction of asphaltic concrete overlays, including scratch courses.

D19. SUBSTANTIAL PERFORMANCE

D19.1 The Contractor shall achieve Substantial Performance within 50 (Fifty) consecutive Working Days of the commencement of the Work as specified in D14.

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

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

D20. TOTAL PERFORMANCE

D20.1 The Contractor shall achieve Total Performance within 60 (sixty) consecutive Working Days of the commencement of the Work as specified in D14.

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

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

D21. LIQUIDATED DAMAGES

D21.1 If the Contractor fails to achieve Total Performance in accordance with the Contract by the day fixed herein for Total Performance, the Contractor shall pay the City one thousand five hundred dollars (\$1500) per Working Day for each and every Working Day following the day fixed herein for Total Performance during which such failure continues.

D21.2 The amount specified for liquidated damages in D21.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Total Performance by the day fixed herein for same.

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

D22. SCHEDULED MAINTENANCE

D22.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

- (a) Reflective crack maintenance on Pavement Rehabilitations as specified in CW3250-R7.;
- (b) Sod maintenance as specified in CW3510-R9.;

D22.2 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

D23. JOB MEETINGS

D23.1 Regular weekly job meetings will be held at the Site . These meetings shall be attended by a minimum of one representative of the Contract Administrator, 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.

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

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

D24.1 Further to C6.24, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

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

D25.1 Further to B10.4, 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 B10.4.

MEASUREMENT AND PAYMENT

D26. PAYMENT

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

WARRANTY

D27. WARRANTY

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

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

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

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

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

BID OPPORTUNITY NO. 704-2013

2013 Capital Program Local Street Renewals: Aubrey Street and Other Locations
which is by reference made part hereof and is hereinafter referred to as the "Contract".

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

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

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

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

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

_____ day of _____, 20____.

SIGNED AND SEALED
in the presence of:

(Witness as to Principal if no seal)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

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

**FORM H2: IRREVOCABLE STANDBY LETTER OF CREDIT
(PERFORMANCE SECURITY)**
(See D11)

(Date)

The City of Winnipeg
Legal Services Department
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

RE: PERFORMANCE SECURITY – BID OPPORTUNITY NO. 704-2013
2013 Capital Program Local Street Renewals: Aubrey Street and Other Locations

Pursuant to the request of and for the account of our customer,

(Name of Contractor)

(Address of Contractor)

WE HEREBY ESTABLISH in your favour our irrevocable Standby Letter of Credit for a sum not exceeding in the aggregate

_____ Canadian dollars.

This Standby Letter of Credit may be drawn on by you at any time and from time to time upon written demand for payment made upon us by you. It is understood that we are obligated under this Standby Letter of Credit for the payment of monies only and we hereby agree that we shall honour your demand for payment without inquiring whether you have a right as between yourself and our customer to make such demand and without recognizing any claim of our customer or objection by the customer to payment by us.

The amount of this Standby Letter of Credit may be reduced from time to time only by amounts drawn upon it by you or by formal notice in writing given to us by you if you desire such reduction or are willing that it be made.

Partial drawings are permitted.

We engage with you that all demands for payment made within the terms and currency of this Standby Letter of Credit will be duly honoured if presented to us at:

(Address)

and we confirm and hereby undertake to ensure that all demands for payment will be duly honoured by us.

All demands for payment shall specifically state that they are drawn under this Standby Letter of Credit.

Subject to the condition hereinafter set forth, this Standby Letter of Credit will expire on

(Date)

It is a condition of this Standby Letter of Credit that it shall be deemed to be automatically extended from year to year without amendment from the present or any future expiry date, unless at least 30 days prior to the present or any future expiry date, we notify you in writing that we elect not to consider this Standby Letter of Credit to be renewable for any additional period.

This Standby Letter of Credit may not be revoked or amended without your prior written approval.

This credit is subject to the Uniform Customs and Practice for Documentary Credit (2007 Revision), International Chamber of Commerce Publication Number 600.

(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

FORM J: SUBCONTRACTOR LIST
 (See D12)

2013 Capital Program Local Street Renewals: Aubrey Street and Other Locations

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
SURFACE WORKS:		
Supply of Materials:		
Concrete		
Asphalt		
Base Course & Sub-Base		
Sod		
Geotextile		
Installation/Placement:		
Concrete		
Asphalt		
Base Course & Sub-Base		
Street Lighting		
Sod		
Joint Sealing		
UNDERGROUND WORKS:		
Supply of Materials:		
Drainage Pipe		
Subdrains		
Catchbasins and Catchpits		
Frames and Covers		
Installation/Placement:		
Catchbasins and Catchpits		

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 Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.

E1.3 The following are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>	<u>Drawing (Original) Sheet Size</u>
704-2013-00	Cover Sheet	24"X36"
704-2013-01	Aubrey Street - from Palmerston Ave. to Matchline at Sta. 2+15	24"X36"
704-2013-02	Aubrey Street - from Matchline at Sta. 2+15 to Wolsely Ave.	24"X36"
704-2013-03	Brentford Road - from Meadowood Dr. to Matchline at 1+95	24"X36"
704-2013-04	Brentford Road - from Matchline at Sta. 1+95 to Wales Ave.	24"X36"
704-2013-05	Fleet Avenue - from Thurso St. to Matchline at Sta. 2+20	24"X36"
704-2013-06	Fleet Avenue - from Matchline at Sta. 2+20 to Rockwood St.	24"X36"
704-2013-07	Nesbitt Bay - from Pembina Hwy. to Matchline at Sta.1+90	24"X36"
704-2013-08	Nesbitt Bay - from Matchline at Sta. 1+90 to Matchline at Sta.3+10	24"X36"
704-2013-09	Nesbitt Bay - from Matchline at Sta. 3+10 to Crescent Dr.	24"X36"
1-04707-DD-50000-0174-01	Street Lighting Project - Brentford Road	ISO B1
1-04707-DD-50000-0174-02	Street Lighting Project - Aubrey Street	ISO B1"
1-04707-DD-50000-0174-03	Street Lighting Project - Nesbitt Bay	ISO B1

E2. GEOTECHNICAL REPORT

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

E3. PROTECTION OF EXISTING TREES

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

- (a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.
- (b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400mm wood planks, or suitably protected as approved by the Contract Administrator.
- (c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.
- (d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.
- (e) Work on-site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.

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

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

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

E4. TRAFFIC CONTROL

E4.1 Further to clauses 3.6 and 3.7 of CW 1130:

- (a) Where directed, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planing drop-offs to the satisfaction of the Contract Administrator. Payment shall be in accordance with CW3410.
- (b) In accordance with the Manual of Temporary Traffic Control in Work Areas on City Streets, the Contractor ("Agency" in the manual) shall make arrangements with the Traffic Services Branch of the City of Winnipeg to place all temporary regulatory signs. The Contractor shall bear all costs associated with the placement of temporary traffic control devices by the Traffic Services Branch of the City of Winnipeg in connection with the works undertaken by the Contractor.

E5. TRAFFIC MANAGEMENT

E5.1 Further to clause 3.7 of CW 1130:

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

- (a) Aubrey Street (Rehabilitation), Brentford Road, Fleet Avenue, and Nesbitt Bay, will be closed to through traffic. Local access and/or bus traffic shall be maintained. The Contractor shall sign the street "Road Closed Local Access Only" in accordance with the Manual of Temporary Traffic Control.
- (b) Aubrey Street (Reconstruction) will be closed to all traffic. The Contractor shall sign the street "Road Closed " in accordance with the Manual of Temporary Traffic Control.

E5.1.2 Should the Contractor be unable to maintain an existing access to a residence or business, he/she shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

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

E6. REFUSE AND RECYCLING COLLECTION

E6.1 While access to refuse and/or recycling collection vehicles is restricted, on collection day(s) the Contractor shall move all of the affected property owners refuse and/or recycling materials to a nearby common area, prior to an established time, in accordance with E6.2 to permit the normal collection vehicles to collect the materials. Immediately following recycling collection the Contractor shall return recycling receptacles to the addresses marked on the receptacles.

E6.2 Collection Schedule:

Nesbitt Bay – East Leg

Collection Day(s): **Friday**

Collection Time: **12:00 pm (noon)**

Common Collection Area: **North East Corner of Crescent Drive & Nesbitt Bay**

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

E7. WATER OBTAINED FROM THE CITY

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

E8. SURFACE RESTORATIONS

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

E9. INFRASTRUCTURE SIGNS

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

E10. SUPPLY AND INSTALLATION OF MOISTURE BARRIER/STRESS ABSORPTION GEOTEXTILE FABRIC

DESCRIPTION

E10.1 General

E10.1.1 This specification covers the supply and installation of Moisture Barrier/Stress Absorption Geotextile.

E10.1.2 Referenced Standard Construction Specifications
.1 CW 3130 – Supply and Installation of Geotextile Fabrics.

.2 CW 3410 – Asphaltic Concrete Pavement Works.

MATERIALS

E10.2 Mill Certificate and Bill of Lading

E10.2.1 Provide mill certificate and bill of lading in accordance with Section 2 of CW 3130.

E10.3 Storage and Handling

E10.3.1 Store and handle material in accordance with Section 2 of CW 3130.

E10.4 Moisture Barrier/Stress Absorption Geotextile Fabric

E10.4.1 Geotextile fabric will be non-woven.

E10.4.2 All physical property requirements are minimum average roll values determined in accordance with ASTM 4759. The moisture barrier/stress absorption geotextile fabric will meet or exceed the standards as follows:

PROPERTY	STANDARD	TEST METHOD
GrabTensile Strength	0.40 kN	ASTM D4632
Grab Elongation	50%	ASTM D4632
Mullen Burst	1240 Kpa	ASTM D3786

E10.4.3 Acceptable products will be Amoco-petromat 4599, ARMTEC PF1, NILEX-9W99, Scaps GC-130 or an approved equal.

E10.5 Tack Coat

E10.5.1 Tack coat will be 150 – 200 asphalt cement supplied in accordance with Clause 5.4.2 of CW 3410.

CONSTRUCTION METHODS

E10.6 General

E10.6.1 Install moisture barrier/stress absorption geotextile fabric at the locations as shown on the Drawings or as directed by the Contract Administrator.

E10.6.2 Proceed with installation upon completion and acceptance of the asphalt levelling course.

E10.6.3 Ensure pavement surface is clean and free of all dirt, water, oil or foreign materials.

E10.6.4 Apply tack coat with a distribution truck in accordance with manufacturer's specifications and recommendations. Ensure uniform coverage of entire pavement surface.

E10.6.5 Install geotextile fabric in accordance with the manufacturer's specifications and recommendations.

E10.6.6 Only construction equipment required to place the final asphalt surface course will be allowed to travel on the exposed geotextile fabric.

E10.6.7 Replace damaged or improperly placed geotextile fabric.

E10.6.8 All fabric installed must be covered with asphalt the same day.

E10.6.9 Commence placement of asphalt material after the fabric has been placed over the full width of the pavement surface and accepted by the Contract Administrator.

E10.6.10 Ensure temperature of asphalt material does not exceed the melting point of the fabric.

MEASUREMENT AND PAYMENT

E10.7 Moisture Barrier/Stress Absorption Geotextile Fabric

- E10.7.1 Supply and installation of Moisture Barrier/Stress Absorption Geotextile Fabric will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Moisture Barrier/Stress Absorption Geotextile Fabric". The area to be paid for will be the total number of square metres of geotextile fabric supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- E10.7.2 The supply and application of the tack coat will be included in the payment for "Moisture Barrier/Stress Absorption Geotextile Fabric".

E11. PATCHING OF EXISTING PAVEMENT

DESCRIPTION

E11.1 General

- E11.1.1 This specification covers patching of existing concrete pavement in preparation for an asphalt overlay.
- E11.1.2 Referenced Standard Construction Specifications
- (a) CW 3110 – Sub-Grade, Sub-Base and Base Course Construction.
 - (b) CW 3130 – Supply and Installation of Geotextile Fabrics.
 - (c) CW 3410 – Asphaltic Concrete Pavement Works.

MATERIALS

E11.2 Crushed Sub-Base Material

- E11.2.1 Crushed Sub-base material will have a maximum aggregate size of 50 millimetre and be supplied in accordance with Section 2.1 of CW 3110.

E11.3 Geotextile Fabric

- E11.3.1 Geotextile fabric will be supplied in accordance with Section 2 of CW 3130.

E11.4 Asphalt Material

- E11.4.1 Asphalt material will be Type 1A and will be supplied in accordance with Sections 5 and 6 of CW 3410.

CONSTRUCTION METHODS

E11.5 General

- E11.5.1 Remove existing concrete pavement to a minimum width of 1.5 metres at locations as shown on the Drawings or as directed by the Contract Administrator in accordance with Section 3.1 of Specification CW 3110.
- E11.5.2 Excavate to a depth of 350 millimetres below the top of the existing pavement.
- E11.5.3 Compact existing sub-grade to a minimum of 95% Standard Proctor Density.
- E11.5.4 Place separation/reinforcement geotextile fabric in accordance with Specification CW 3130.
- E11.5.5 Place and compact crushed sub-base material in accordance with CW 3110 to a 300 millimetres compacted depth. Compact to a minimum of 100% Standard Proctor Density.
- E11.5.6 Place and compact asphalt material to a 50 millimetres compacted depth matching the top of the existing concrete pavement. Compact to an average of 95% percent of the 75 Blow Marshall Density of the paving mixture with no individual test being less than 90% percent.

- E11.5.7 Each layer must be levelled and accepted by the Contract Administrator before the succeeding layer may be placed.
- E11.5.8 Additional excavation and placement of sub-base material beyond the identified pavement structure will be completed in accordance with CW 3110 as directed by the Contract Administrator.

MEASUREMENT AND PAYMENT

- E11.6 Pavement Patching
- E11.6.1 Pavement patching will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Pavement Patching". The area to be paid for will be the total number of square metres of pavement patched in accordance with this specification, accepted and measured by the Contract Administrator.

E12. INSTALLATION OF STREET LIGHTING AND ASSOCIATED WORKS

DESCRIPTION

- E12.1 The Work shall consist of the supply of all supervision, labour, materials (except as indicated in E16.12) 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 remove existing street light poles and install new street light poles and associated underground cables/conduits, all in accordance with the requirements specified in the tender documents.
- E12.2 The proposed street light installation and removals are shown on construction drawings and are as follows:
- (a) Nesbitt Bay from Crescent Drive to Pembina Highway
 - (b) Aubrey Street from Bus Loop to Palmerston Avenue
 - (c) Brentford Road from Meadowood Drive to Wales Avenue
- E12.3 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. See the construction drawings for the proposed work sequence.
- E12.4 Prior to the proposed works The Contractor's crew foremen, electricians, and other key personnel shall attend one (1) day of training provided by Manitoba Hydro for various operations such as cable handling, cable splicing, 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. The Contractor personnel being trained are responsible to bring Contractor equipment for training purposes. The Contractor personnel will be certified on the equipment that they will be using in the field.
- E12.5 Licensed journeyman electricians, and/or, apprentices under the supervision of licensed electricians, are required to connect, terminate and splice. The Contractor shall be prepared to provide proof of licenses to the Contract Administrator upon request.
- E12.6 Referenced Standard Construction Specifications
- E12.6.1 In addition to these Specifications, the Work to be performed by the Contractor relative to the installation and/or replacement of street lighting poles and concrete bases shall be in accordance with the following:
- (a) Manitoba Hydro 66kV and Below Standards
 - (b) CSA C22.3 No. 7 (latest edition)
 - (c) Canadian Electrical Code (CEC) Part 1 (latest edition)

(d) Any other applicable codes

E12.6.2 Revisions and updates to the Manitoba Hydro 66kV 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 have been included as Appendix A.

E12.6.3 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

E12.7 Experienced and Trained Contractors

E12.7.1 The following contractors are experienced and trained vendors to complete all associated works for the proposed installation of street light standards :

(a) Tri-Star Traffic Inc.
 Attention: Mr. Joey Hydrochuk
 101 - 356 Furby Street
 Winnipeg, Manitoba
 R3B 2V5
 Phone: (204) 788-4006

(b) Lohr Underground Construction
 Attention: Mr. Charles Lohr
 PO Box 27
 Ile Des Chene, Manitoba
 R0A 0T0
 Phone: (204) 799-3581

TOOLS, EQUIPMENT AND MATERIALS

E12.8 The Contractor will be required to provide all tools and equipment as 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.

E12.9 The Contractor shall obtain the following specific Electrical Equipment including but not limited to:

E12.9.1 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).

E12.9.2 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

E12.9.3 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

(b) Indicator

- (c) Voltage meter – Fluke model #T3C
 - (d) Insulated wire cutters – used for cutting cable ends square.
- E12.10 Alternative equipment manufactures shall be considered upon request by the Contractor and shall be approved for use by the Contract Administrator prior to use.
- E12.11 The Contract Administrator will reject any tools or equipment that do not appear to be in good condition or fail to successfully provide the required function.
- E12.12 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 and all other materials noted in the Standards. The Contractor shall sign receipts indicating the part of the project on which the materials are to be used from the following locations which the materials are to be picked up from:
- E12.12.1 Manitoba Hydro's Waverley Service Centre - 1840 Chevrier Blvd - Winnipeg, Manitoba (contact personnel will be provided to the successful contractor).
 - E12.12.2 Manitoba Hydro Stores - 1315 Notre Dame Avenue- Winnipeg, Manitoba (contact personnel will be provided to the successful contractor).
- E12.13 Materials requested will be supplied to the Contractor by Manitoba Hydro upon presentation of Manitoba Hydro's Stores Material Order Form signed by Manitoba Hydro. The Contractor shall assume all responsibilities for the loading, 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.
- E12.14 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 the Contract Administrator.
- E12.15 The Contractor will be responsible to furnish gravel, sand, $\frac{3}{4}$ down limestone, $\frac{1}{4}$ down limestone, and pit-run material for backfilling around street light poles and around cables as required. The cost of furnishing materials shall be incorporated into the unit prices for the work.
- E12.16 Upon completion of the Work, the Contractor shall, at its own expense, deliver to the delivery point(s), depots, storage lots or warehouses designated by the Contract Administrator, all materials furnished by Manitoba Hydro and not used in the Work, regardless of the location of said material at that time.
- E12.17 In addition, the Contractor shall, at its own expense, deliver to the delivery point(s), depots, storage lots, storage lots or warehouses designated by the Contract Administrator, all reclaim materials from the Work including but not limited to concrete bases, steel poles, power installed bases and wire.
- E12.18 Reclaim material shall be sorted into the following categories and returned to:
- E12.18.1 Manitoba Hydro, 1840 Chevrier Blvd, Winnipeg, Manitoba
 - (a) copper - poly covered
 - (b) copper - bare (ground wire)
 - (c) control cable (2C - 12, #4 AL C/N)
 - (d) steel (street light poles, power installed screw bases)
 - E12.18.2 Rocky Road Recycling, 4154 McGillvary Blvd, Winnipeg, Manitoba Contact:
 - (a) concrete (precast, poured in place)
- E12.19 Reclaimed street light poles shall be disassembled by removing the davit arm and at all tenon joints. If street light poles cannot be disassembled at the tenon joints, the Contractor shall cut

the street light poles apart at the tenon joints prior to returning to the depot at 1840 Chevrier Boulevard, Winnipeg, Manitoba.

CONSTRUCTION METHODS

E12.20 Electric Cables and Conduits

E12.20.1 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 the Contract Administrator or will be charged the full cost of the damaged items.

E12.20.2 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 the Contract Administrator.

E12.20.3 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 Purchaser's inspection.

E12.21 Precast Concrete Bases

E12.21.1 The Contractor shall handle, store and transport the precast concrete bases in a manner to prevent damage to the threaded bolts and conduit casing.

E12.21.2 Precast Concrete Bases are extremely heavy. Approximate weight of pre-cast concrete base for 25'/35' pole is 680 kg. The Contractor shall only use equipment rated for such weight.

E12.22 Street Light Poles and Arms

E12.22.1 The Contractor shall handle, store and transport the poles and arms in a manner to prevent damage.

E12.23 Luminaires

E12.23.1 The Contractor shall handle, store and transport the luminaires in their original packaging and in a manner to prevent damage.

E12.24 Bulbs and Small Material

E12.24.1 Bulbs, 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. Bulbs and photo electric cells shall be transported and stored in such a manner as to prevent breakage.

E12.25 Care of Materials

E12.25.1 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.

E12.26 Wire and Cable Reel Storage

E12.26.1 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.

E12.26.2 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.

E12.27 Reel Handling

- E12.27.1 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.
- E12.27.2 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.
- E12.27.3 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.

E12.28 Pressurized Water/Vacuum Excavation

- E12.28.1 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
- E12.28.2 Work shall be performed in accordance with the requirements of the Manitoba Hydro safe excavation procedures and Manitoba Hydro Safety Circular 0065/07R included as Appendix B. The maximum water temperature shall be 38°C (100°F) and the maximum water pressure shall be 10,340 kPa (1500 psi). The end of the vacuum tube shall be neoprene or equivalent.

E12.29 Removal Street Light Pole From Existing Base

- E12.29.1 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. The Contractor shall apply handling techniques in accordance with Workplace Health and Safety Regulation 217/2006
- E12.29.2 Prior to Commencement of Construction Manitoba Hydro's staff shall be responsible to disconnect and isolate the street light pole or poles to be replaced. Manitoba Hydro WORKER PROTECTION CODE (Lockout) - 0147/08R shall be followed prior to the start of any Work to remove a street light standard or base.
- E12.29.3 The Contractor shall employ its own lockout procedure in addition to that required by Manitoba Hydro WORKER PROTECTION CODE (Lockout) - 0147/08R to comply with the lockout program stipulated in Manitoba Regulation 217, part 16. 14-18 and part 38.14-15. The Contractor shall ensure that a potential (voltage) check is conducted on each and every service conductor prior to any Work taking place to ensure that the service cables are de-energized. Some street light poles may have been temporarily fed from overhead. This overhead feed will be removed by Manitoba Hydro prior to the Contractor commencing with the Work.
- E12.29.4 The Contractor shall furnish all labour and supplies 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 Contract Administrator.
- E12.29.5 The Contractor shall be responsible to transport all salvaged poles, luminaires and appurtenances to a location specified by the Contract Administrator.

E12.30 Removal of Concrete Base and Direct Buried Street Light Pole

- E12.30.1 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 concrete base or direct buried street light pole. The concrete base may be poured in place concrete, steel power installed screw-in or precast concrete. The Contractor shall apply handling techniques in accordance with Workplace Health and Safety Regulation 217/2006.
- E12.30.2 Prior to Commencement of Construction Manitoba Hydro's staff shall be responsible to disconnect and isolate the street light pole or poles to be replaced. Manitoba Hydro WORKER PROTECTION CODE (Lockout) - 0147/08R shall be followed prior to the start of any Work to remove a street light standard, concrete base or direct buried street light pole.
- E12.30.3 The Contractor may employ its own lockout procedure in addition to that required by Manitoba Hydro WORKER PROTECTION CODE (Lockout) - 0147/08R. The Contractor shall ensure that a potential (voltage) check is conducted on each and every service conductor prior to any Work taking place to ensure that the service cables are de-energized.
- E12.30.4 The Contractor shall be responsible to transport all salvaged concrete bases and poles to a location specified by the Contract Administrator.
- E12.30.5 The Contractor is responsible to supply all backfill material and carry out all backfill, compacting and leveling of all excavations and voids for removed concrete bases and direct buried street light poles so as to be ready for top soil and seed or sod.
- E12.30.6 All excavation practices must conform to Manitoba Hydro safe excavating procedures and Manitoba Workplace Safety and Health Regulation 217/2006.

E12.31 Installation of Foundation - Concrete Base

- E12.31.1 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 Technical Specification. The Contractor shall apply handling techniques in accordance with Manitoba Workplace Health and Safety Regulation 217/2006.
- E12.31.2 The Contractor shall furnish all labour and supplies 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.
- E12.31.3 The concrete base shall be set on a bed of compacted gravel or $\frac{3}{4}$ down limestone. The concrete base backfill material shall be compacted in lifts of 150 mm. Backfill material may be spoil, pit run gravel or $\frac{3}{4}$ down limestone. Compacting of backfill material shall be done using a hydraulic tamper. Underground cables entering the concrete base shall be protected by a layer of sand surrounding the cables and protecting it from the limestone and/or use a section of fire hose for cable protection as directed by the Contract Administrator. The concrete base shall be installed level in all 4 directions. Final grade must be established prior to installing the concrete bases.
- E12.31.4 The completed backfill shall be at least equal in compaction to undisturbed soil or as required by Municipal authorities. Backfill material is to be placed and compacted in lifts not exceeding 150 mm. The Contractor shall level all excavations.
- E12.31.5 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 no cost.
- E12.31.6 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

E12.32 Base Mounted Street Light Poles

- E12.32.1 This shall include all Work required to install the street light pole on the concrete base as set forth in this Technical Specification. The Contractor shall apply handling techniques in accordance with Workplace Health and Safety Regulation 217/2006
- E12.32.2 The Contractor shall furnish all labour and supplies necessary for the installation of the pole (straight shaft or davit) on the concrete base.
- E12.32.3 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.
- E12.32.4 The Contractor shall level the street light pole in all 4 directions. Leveling shims may be used.
- E12.32.5 Tightening of bolts should 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. Nut covers are typically not supplied for the 55' and 65' street light poles.
- E12.32.6 Unless otherwise specified, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed for new street light pole installations in new areas.
- E12.32.7 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 the Contract Administrator of the location where the signs have been removed.

E12.33 Luminaires and Associated Wiring

- E12.33.1 The Contractor shall furnish labour and supplies 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.
- E12.33.2 The Contractor shall verify luminaire voltage matches source voltage as shown on the drawings. If luminaire voltage does not match the source voltage, the Contractor shall re-wire the luminaire in accordance with the wiring diagram provided.
- E12.33.3 As specified on the construction drawings, the luminaire will require either a photo electric cell (PEC) or shorting cap installed. The Contractor shall also install the appropriate wattage bulb in the luminaire.

E12.34 Break Away Bases

- E12.34.1 Break away bases shall be installed in accordance with Standard CD 300-10. The height of the concrete base above grade should 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.
- E12.34.2 The Contractor shall torque the couplers in accordance with Standard CD 300-10

E12.35 Splicing/Connecting Cables

- E12.35.1 The electric cable shall be spliced/connected as per Standards CD 215-12, CD 215-13, CD 310-4, CD 310-9 and CD 310-10
- E12.35.2 Prior to commencement of construction Manitoba Hydro's staff shall be responsible to disconnect and isolate the street light pole or poles to be replaced. Manitoba Hydro WORKER PROTECTION CODE (Lockout) - 0147/08R shall be followed prior to the start of any Work to splice/connect a cable.

E12.35.3 The Contractor shall employ its own lockout procedure in addition to that required by Manitoba Hydro WORKER PROTECTION CODE (Lockout) - 0147/08R to comply with the lockout program stipulated in Manitoba Regulation 217, part 16. 14-18 and part 38.14-15. The Contractor shall ensure that a potential (voltage) check is conducted on each and every service conductor prior to any Work taking place to ensure that the service cables are de-energized. Some street light poles may have been temporarily fed from overhead. This overhead feed will be removed by Manitoba Hydro prior to the Contractor commencing with the Work

E12.35.4 The Contractor shall furnish all labour and supplies necessary to splice/connect the street light conductor(s). Care shall be taken to ensure the conductors entering the street light from underground are not damaged

E12.36 Excavation

E12.36.1 The Contractor shall furnish all materials and labour and supplies 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 bottom of the street light cables and conduit so that the street light cables and conduit rest firmly on a smooth surface in the bottom throughout its length. All stones or other objects which, in the opinion of the Contract Administrator might damage the street light cables jacket and conduit during its installation 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. The spoil bank from trenching operations shall not be allowed to fall on loose debris or foreign matter that might become mixed with the soil to be used in backfilling the trench, and the spoil bank shall be placed so as not to hinder drainage, damage property, or obstruct traffic.

E12.36.2 Trenches shall be dug to such a depth as will provide a minimum cover of 600 mm from final grade in sodded areas and 1000 mm in roadways accordance with Standard CD 305-1.

E12.36.3 All excavation practices must conform to Manitoba Hydro safe excavating procedures and Manitoba Workplace Safety and Health Regulation 217/2006 .

E12.37 Laying Cables

E12.37.1 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 to drawings; and shall maintain the necessary separation, where required. All cables shall be of continuous runs and capped and sealed if they are not be installed in the standard at that time. Cables shall not be dragged over paved surfaces.

E12.37.2 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 standard at that time.

E12.37.3 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.

E12.37.4 During installation, under no circumstance is the cable to be subjected to a bending radius tighter than that detailed in the Standards. The minimum bending radius of #4CN street light cable is 125 mm per Electrical Standard CD 210-15.

E12.38 Installing Conduit and Cable by Boring (Horizontal Directional Drilling)

- E12.38.1 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 kelly grip in a manner so as to guard against damage.
- E12.38.2 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. The minimum allowable clearance between the proposed cable or conduit installation and existing facilities is 300 mm or as otherwise specified by the Contract Administrator. The pull back tension on all cables shall not be allowed to exceed the maximum cable pulling tension.
- E12.38.3 Drilling fluids and associated waste materials shall be disposed of in a manner that minimizes environmental effects.
- E12.38.4 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.
- E12.38.5 All horizontal directional drilling practices must conform to Manitoba Hydro Directional Boring Guidelines.

E12.39 Buried Utility Crossings

- E12.39.1 All buried obstructions are not necessarily shown on the reference drawings and the locations of those indicated are approximate only.
- E12.39.2 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 buried cable route crosses gas, water, sewer, telephone and hydro lines, etc., shall be hand exposed 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. The requirements of the Directional Boring Guidelines included in Appendix C shall be followed when crossing natural gas pipelines and electrical cables by the directional boring method.
- E12.39.3 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 Tenderer's bid prices. The Contractor shall not be entitled to extra compensation for the use of PW/VE on the Work. At a minimum; the Contractor will be required to use PW/VE when excavating within 1m horizontal distance to polyethylene mains or services when 12 inches (or greater) of frost is present in the local ground conditions. The Contractor shall also be required to use PW/VE when excavating within 1 m horizontal distance to high pressure or transmission pressure steel mains or services when 12 inches (or greater) of frost is present in the local ground conditions. PW/VE is also required when digging within 1m horizontal distance of an energized primary regardless whether frost is present in local ground conditions or not.
- E12.39.4 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.

E12.40 Bending Cables and Installation Into Standards

- E12.40.1 It is desired to reduce to a minimum the required number of bends to lay the cables 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.
- E12.40.2 Sharp bends of the cables shall be avoided at all times. All bends shall meet the requirements set out in this Technical Specification. If excessive bending was exerted on any cable, the cable shall be replaced at 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. The minimum bending radius of #4 AL C/N street light cable is 125 mm and 115mm for 1/0 AL Triplex as per Electrical Standard CD210-15.
- E12.40.3 At street light standards 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 layer of sand surrounding the cables and protecting it from the limestone and/or use a section of fire hose for cable protection as directed by the Contract Administrator. The cable shall be left long enough to extend one (1) metre beyond the hand hole.
- E12.40.4 Excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.

E12.41 Backfill

- E12.41.1 All backfilling material within 300 mm of the cables 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. 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 distance of at least 300 mm. The completed backfill shall be at least equal in compaction to undisturbed soil or as directed by the Contract Administrator. Backfill material is to be placed and compacted in lifts not exceeding 300 mm. All excess material is to be removed by the Contractor.
- E12.41.2 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. Should settlement occur in the excavation and cause a depression in the surface, the Contractor shall repair the surface to the satisfaction of the Contract Administrator.
- E12.41.3 Excavations remaining where standards have been removed shall be backfilled with spoil, pit run gravel or 3/4 down limestone and compacted in lifts of 150mm. The top 300 mm of the excavation shall be backfilled with topsoil.
- E12.41.4 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.

E12.42 As-Built Drawing

- E12.42.1 The Contractor shall provide an as-built drawing or mark-up drawing to the Contract Administrator which accurately displays the "as-built" location of the buried street light cables, conduits and street light standards.

MEASUREMENT AND PAYMENT

E12.43 Removal and Salvage Street Light Pole and Base

E12.43.1 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 for the total number of 25' to 35' street light poles and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire, complete with pressurized water/vacuum excavation and appurtenances removed in accordance with this specification, shall be verified and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described and all other items incidental to the work included in the specification.

E12.44 Installation of #4 AL C/N or 1/0 AL Triplex Streetlight Cable by Open Trench Method

E12.44.1 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 #4 AL C/N or 1/0 AL Triplex streetlight cable by open trench method." The number of meters to be paid for at the contract price for the Installation of #4 AL C/N or 1/0 AL Triplex streetlight cable by open trench method in accordance with this specification, shall be measured and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described complete with backfilling the trench, buried utility crossings and all other items incidental to the work included in the specification.

E12.45 Installation of 50 mm Conduit by Boring Method complete with Cable Insertion (#4 AL C/N or 1/0 AL Triplex).

E12.45.1 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 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 price for the Installation of 50mm conduit by boring method complete with cable insertion (#4 AL C/N or 1/0 AL Triplex) in accordance with this specification, shall be measured and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described complete with inserting #4 AL C/N or 1/0 AL Triplex streetlight cable into conduit, buried utility crossings and all other items incidental to the work included in the specification.

E12.46 Installation of cable (#4 AL C/N or 1/0 AL Triplex) by boring method.

E12.46.1 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 (#4 AL C/N or 1/0 AL Triplex) by boring method." The number of meters to be paid for at the contract price for the Installation of cable (#4 AL C/N or 1/0 AL Triplex) by boring method in accordance with this specification, shall be measured and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described complete with buried utility crossings and all other items incidental to the work included in the specification.

E12.47 Installation of 25'/35' Pole, Davit Arm and Precast Concrete Base Including Luminaire and Appurtenances

E12.47.1 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 price for the total number of 25' to 35' street light poles and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire complete with placing cable ends into concrete bases, pressurized water/vacuum excavation, and appurtenances installed in accordance with this specification, shall be verified and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described and all other items incidental to the work included in the specification.

E12.48 Installation of One (1) 10' Ground Rod at End of Street Light Circuit. Trench #4 Ground Wire up to 1 m From Rod Location to New Street Light and Connect (Hammerlock) to Top of Ground Rod

E12.48.1 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 end of street light circuit. 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 price for the total number of Installation of one (1) 10' ground rod at end of street light circuit. Trench #4 ground wire up to 1 m from rod location to new street light and connect (hammerlock) to top of the ground rod installed in accordance with this specification, shall be verified and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described and all other items incidental to the work included in the specification.

E12.49 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

E12.49.1 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 price for the total number of Installation of 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 installed in accordance with this specification, shall be verified and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described and all other items incidental to the work included in the specification.

E12.50 Installation and Connection of Externally-Mounted Relay Per Standards CD 315-12 and CD 315-13

E12.50.1 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 per Standards CD 315-12 and CD 315-13".The number of units to be paid for at the contract price for the total number of the externally-mounted relay per Standards CD 315-12 and CD 315-13 installed and connected in accordance with this specification, shall be verified and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described and all other items incidental to the work included in the specification.

E12.51 Connect 2/C #12 Copper Conductor Street Light Cables Per Standard CD310-4, CD310-9 or CD310-10

E12.51.1 This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Connect 2/C #12 copper conductor street light cables per Standard CD310-4, CD310-9 or CD310-10".The number of units to be paid for at the contract price for the total number of the Connect 2/C #12 copper conductor street light cables per Standard CD310-4, CD310-9 or CD310-10 in accordance with this specification, shall be verified and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described and all other items incidental to the work included in the specification.

E12.52 Splicing #4 AL C/N or 2 Single Conductor Street Light Cables

E12.52.1 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 price for the total number of the Splicing #4 Al C/N or 2 single conductor street light cables in accordance with this specification, shall be verified and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described and all other items incidental to the work included in the specification.

E12.53 Splicing 1/0 AL Triplex Cable or 3 Single Conductor Street Light Cables

E12.53.1 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 price for the total number of the Splicing 1/0 AL triplex cable or 3 single conductor street light cables in accordance with this specification, shall be verified and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described and all other items incidental to the work included in the specification.

E12.54 Installation of Break-Away Base and Reaction Plate on Base-Mounted Poles up to 35'

E12.54.1 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 price for the total number of the Installation of break-away base and reaction plate on base mounted poles up to 35' in accordance with this specification, shall be verified and accepted by the Contract Administrator. The Price shall be payment in full for performing all operations herein described and all other items incidental to the work included in the specification.

E13. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO THE AUBREY STREET FEEDERMAIN

DESCRIPTION

E13.1 General

- (a) This Section details operating constraints for all Work to be carried out in close proximity to the Aubrey Street Feedermain. Close proximity shall be deemed to be any construction activity within a 5 m offset from the centreline of the Feedermain.
- (b) The Aubrey Street Feedermain is a critical component of the City of Winnipeg Regional Water Supply System and work in close proximity to the pipeline shall be undertaken with an abundance of caution. The pipe cannot be taken out of service for extended periods to facilitate construction and inadvertent damage caused to the pipe would likely have catastrophic consequences.
- (c) Work around the Feedermain shall be planned and implemented to minimize the time period that work is carried out in close proximity to the pipe and to ensure that the pipeline is not subjected to excessive construction related loads, including excessive vibrations and/or concentrated or asymmetrical lateral loads during backfill placement.
- (d) The Aubrey Street Feedermain is constructed of Pre-stressed Concrete Cylinder Pipe and has limited ability to withstand increased earth and live loading. Therefore, every precaution must be undertaken to ensure that applied loading during all phases of construction is within accepted loading parameters.

CONSTRUCTION METHODS

E13.2 General

- (a) The section of the Feedermain affected by construction runs parallel to Aubrey Street (generally along the east curb) between Palmerston Ave and Wolseley Ave.

E13.3 Contractors carrying out repair Work or working in close proximity to the Feedermain shall meet the following conditions and technical requirements: As per City of Winnipeg Specification

- (a) Pre-work, Planning and General Execution
 - (i) No Work shall commence at the Site until the Construction Method Statement has been submitted and accepted, and the Feedermain location has been clearly delineated in the field. Work over the Feedermain shall only be carried out with equipment that has been reviewed and quantified in terms of its loading implications on the pipe.

- (ii) Contact the City of Winnipeg WWD Department, Construction Services Coordinator (Duane Baker) prior to construction.
 - (iii) Notify WWD well in advance of construction to coordinate required service interruptions.
 - (iv) Where Work is in close proximity to the Feedermain, utilize construction practices and procedures that do not impart excessive vibration loads on the Feedermain or that would cause settlement of the subgrade below the Feedermain.
 - (v) Crossing of the Feedermain is prohibited in the time period from removal of existing roadway structure until the completion of granular base construction. At all times prior to completion of final paving; reduce equipment speeds to levels that minimize the effects of impact loading to the pipe.
 - (vi) For construction Work activities either longitudinally or transverse to the alignment of the Feedermain, work only with equipment and in the manner stipulated in the accepted Construction Method Statement and the supplemental requirements noted herein.
 - (vii) Where Work is in proximity to the Feedermain, utilize construction practices and procedures that do not impart excessive vibration loads on the Feedermain or that would cause settlement of the subgrade below the Feedermain.
 - (viii) The pipeline elevation datum relative to the proposed roadway shall be adequately verified. Deviations from the elevations noted herein shall be reported to Contract Administrator for review prior to construction of the subgrade.
 - (ix) Construction operations should be staged in such a manner as to limit multiple construction loads at one time, (e.g. offset crossings sufficiently from each other, rollers should remain a sufficient distance behind spreaders to limit loads. A reasonable offset distance is 3m between loads).
 - (x) The Contractor and all Site supervisory personnel and equipment operators have to be formally briefed to ensure that they are fully cognizant of the associated restrictions, constraints, and risks associated with working adjacent to and over this pipeline. New personnel introduced after commencement of the project need to be formally orientated as to the significance and constraints associated with working over the Feedermain.
- (b) Demolition and Excavation
- (i) Use of pneumatic concrete breakers within 3 metres of the Feedermain is prohibited. Pavement shall be full depth saw-cut and carefully removed. Use of hand held jackhammers for pavement removal will be allowed.
 - (ii) Where there is less than 1.6 metres of earth cover over the Feedermain and further excavation is required either adjacent to or over the Feedermain, utilize only smooth edged excavation buckets, soft excavation or hand excavation techniques. Where there is less than 1 metre of cover over the Feedermain, carefully expose the Feedermain by hydro excavation to delineate the location and depth of the main, and provide full time supervision of the excavation.
 - (iii) Where there is less than 2.5 m of earth cover over the Feedermain, offset backhoe or excavation equipment from Feedermain, a minimum of 3 m from Feedermain centerline, to carry out excavation.
 - (iv) Equipment should not be allowed to operate while positioned directly over the Feedermain.
 - (v) For Feedermain inspection, expose the top 1/3 of the Feedermain by hand excavation, for a minimum length of 1 metre, to allow City to inspect condition of the main. Notify City a minimum of 24 hours in advance of exposure, and allow a minimum of 2 hours for City to complete inspection works. Backfill test excavation with bedding sand upon completion.
- (c) Subgrade Construction
- (i) Subgrade compaction shall be prohibited within 2 metres of the Feedermain. Subgrade compaction within 3 metres of the Feedermain shall be limited to non-vibratory methods only.

- (ii) Subgrade, sub-base and base course construction shall be kept in a rut free condition at all times. Construction equipment is prohibited from crossing pipelines if the grade is insufficient to support the equipment without rutting.
 - (iii) Subgrade conditions should be inspected by personnel with competent geotechnical experience (e.g. ability to adequately visually classify soils and competency of subgrade, sub-base, and base course materials). In the event of encountering unsuitable subgrade materials above the Feedermain, proposed design revisions shall be submitted to the Contract Administrator for review to obtain approval from the Water and Waste Department relative to any change in conditions.
 - (iv) Construction operations shall be staged to minimize the time period between excavation to subgrade and placement of granular sub-base materials. Should bare subgrade be left overnight, measures shall be implemented to protect the subgrade against inadvertent travel over it and to minimize the impact of wet weather.
- (d) Sub-base and Base Course Construction
- (i) Granular material, construction material, soil or other material shall not be stockpiled on the pipelines or within 5 metres of the pipe centerline.
 - (ii) Sub-base or base course materials shall not be dumped directly on pipelines but shall be stockpiled outside limits noted in these recommendations and shall be carefully bladed in-place.
 - (iii) Sub-base compaction within 3 metres of the centreline of the Feedermain shall be either carried out by static methods (without vibration) or with smaller approved equipment such as hand held plate packers or smaller roller equipment.

MEASUREMENT AND PAYMENT

- E13.4 Measurement and payment will be made for hydro excavation to verify forcemain depth which will be paid hourly. No measurement or payment will be made for any other works listed in this specification.

E14. EXCAVATION EQUIPMENT

- E14.1 During roadway excavation, excavation equipment must not travel on the exposed subgrade.
- E14.2 During sub drain excavation, light weight track excavation equipment may travel on the exposed subgrade.
- E14.3 Upon completion of excavation and installation of sub drains, any irregularities or unevenness in the subgrade shall be corrected to the satisfaction of the Contract Administrator, at the Contractor's expense, before commencement of compaction and sub-base construction.

E15. CONSTRUCTION PHASING

- E15.1 Construction phasing and resident parking plan to be determined prior to commencing construction, for approval by, and to the satisfaction of, the Contract Administrator.
- E15.2 Asphalt paving activities on Fleet Avenue Rehabilitation to be restricted to days that school is not in session.

APPENDIX 'A'

GEOTECHNICAL REPORT

APPENDIX 'A' - GEOTECHNICAL REPORT

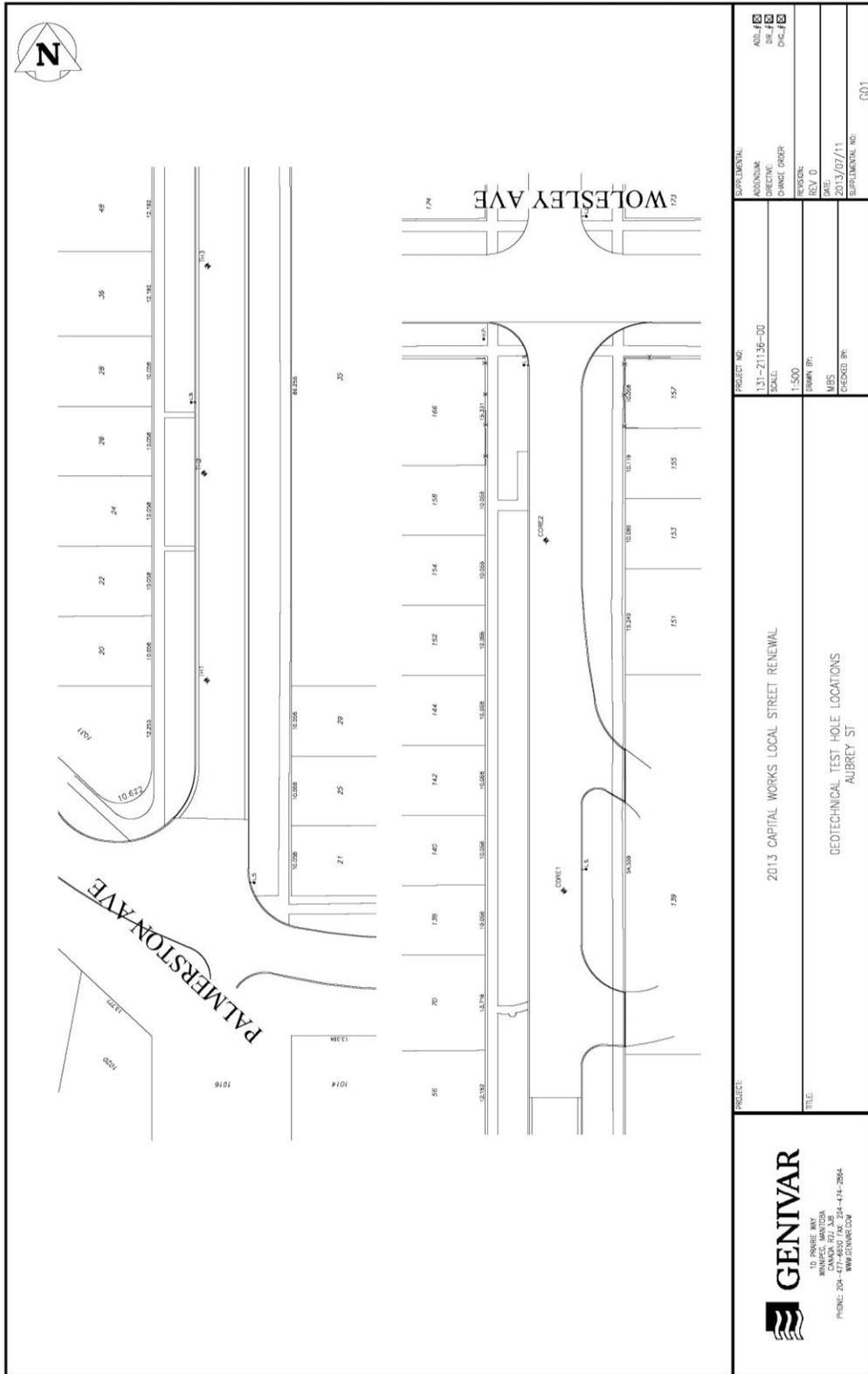
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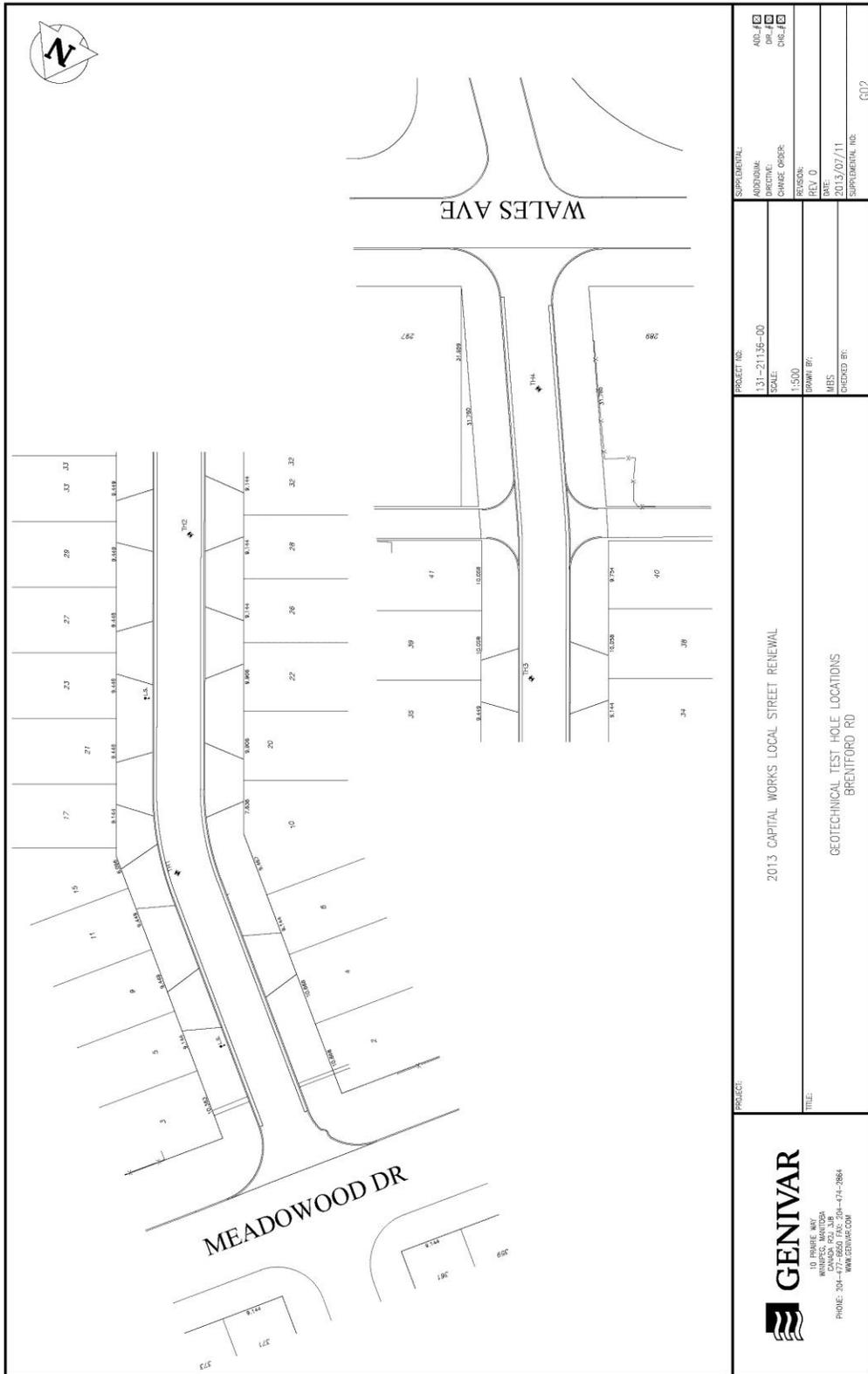
The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure and/or soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. However, variations in pavement structure and/or soil 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.

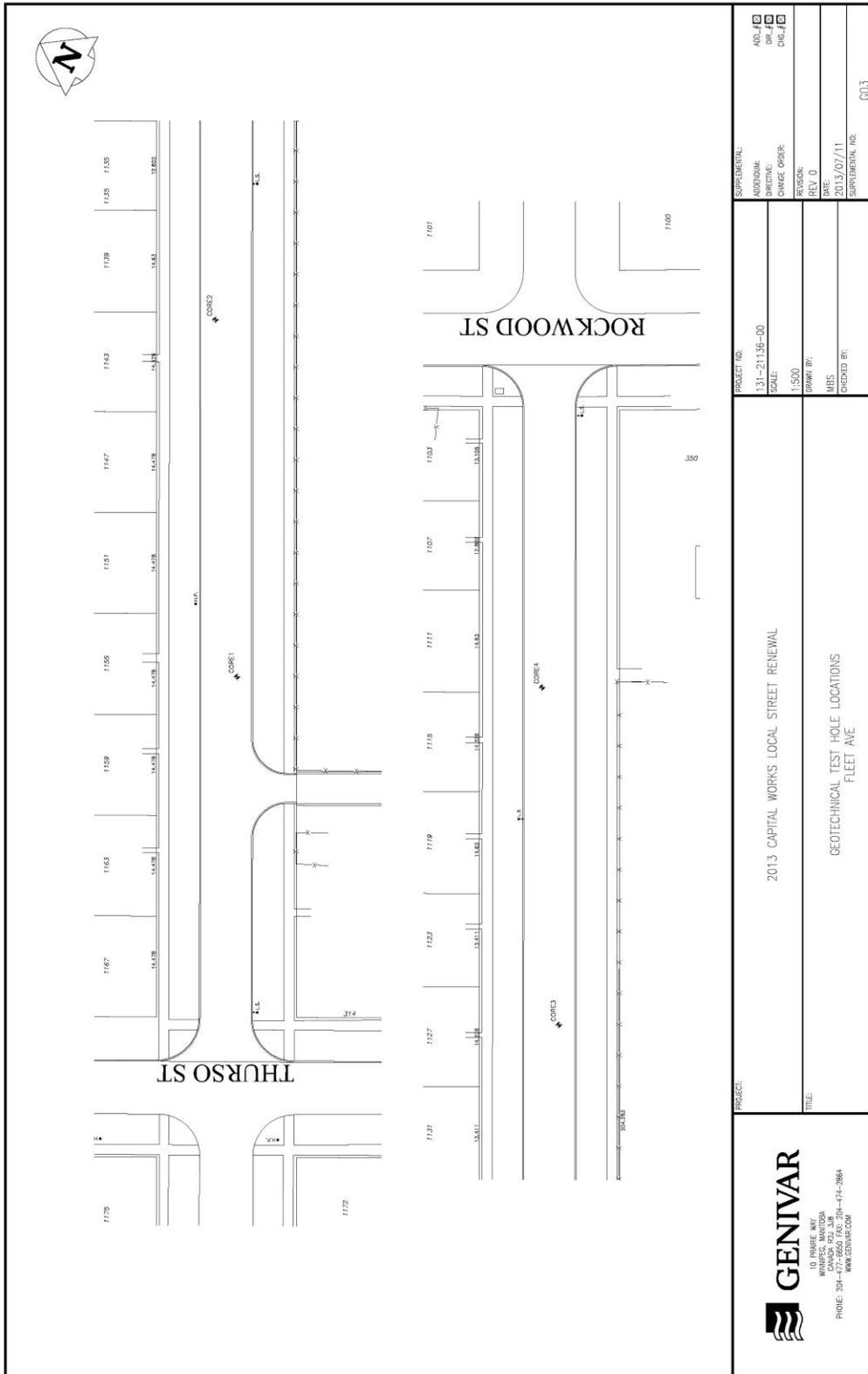
Geotechnical Report

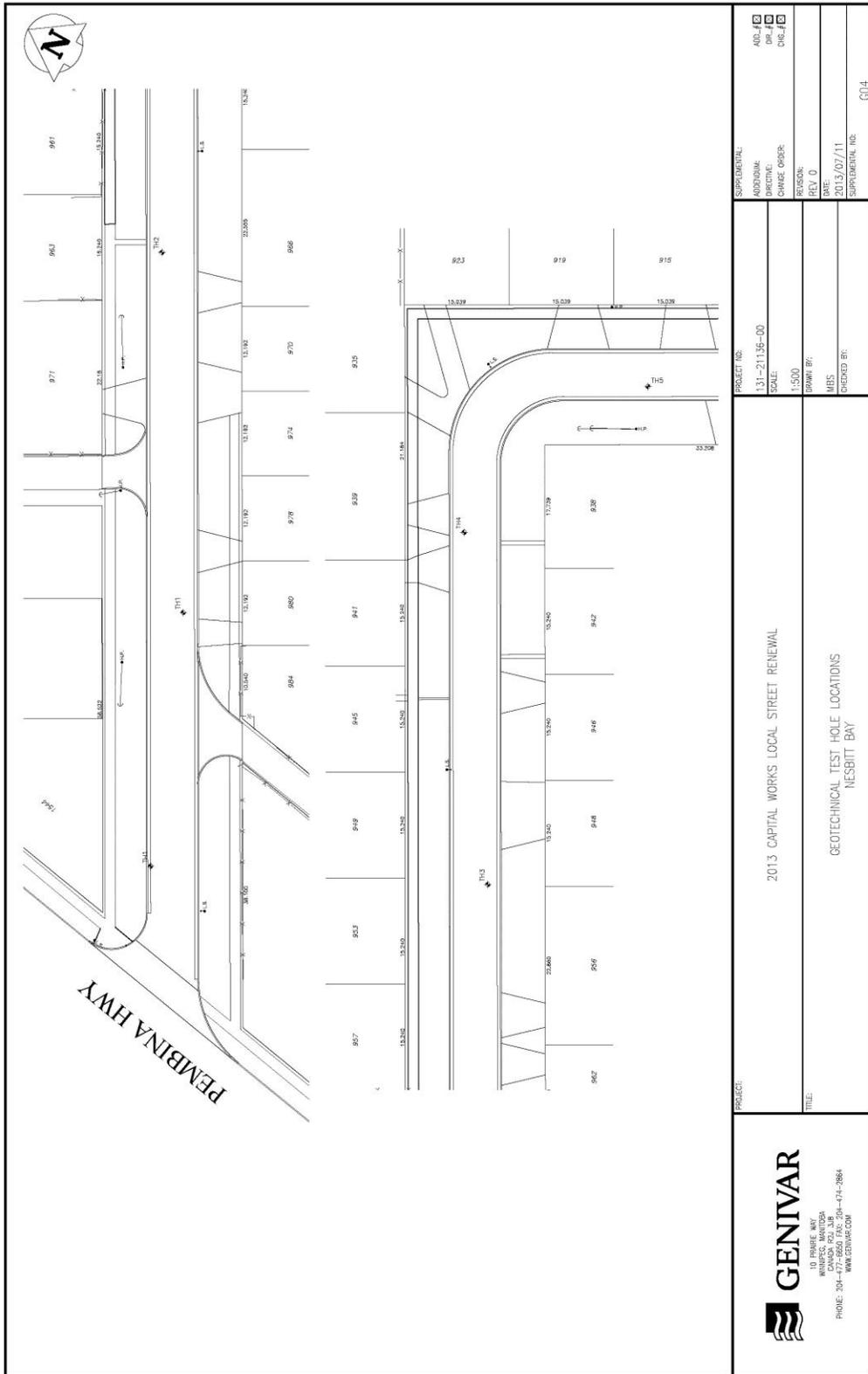
Test Hole Locations



<p>FIGURE:</p> <p>2013 CAPITAL WORKS LOCAL STREET RENEWAL</p>	<p>PROJECT NO:</p> <p>131-21136-00</p>	<p>SUPPLEMENTAL:</p> <p>ADDENDUM: <input type="checkbox"/></p> <p>DIRECTIVE: <input type="checkbox"/></p> <p>CHANGE ORDER: <input type="checkbox"/></p> <p>REVISION: <input type="checkbox"/></p>
	<p>SCALE:</p> <p>1:500</p>	<p>DATE:</p> <p>2013/07/11</p>
<p>TITLE:</p> <p>GEOTECHNICAL TEST HOLE LOCATIONS AUBREY ST</p>	<p>DRAWN BY:</p> <p>MRS</p>	<p>CHECKED BY:</p> <p></p>
<p>GENIVAR</p> <p>10 PRINCE AVE WINNIPEG, MANITOBA CANADA R2L 1A8 PHONE: 204-477-8507 FAX: 204-474-2864 WWW.GENIVAR.COM</p>		<p>STAMP:</p> <p>001</p>



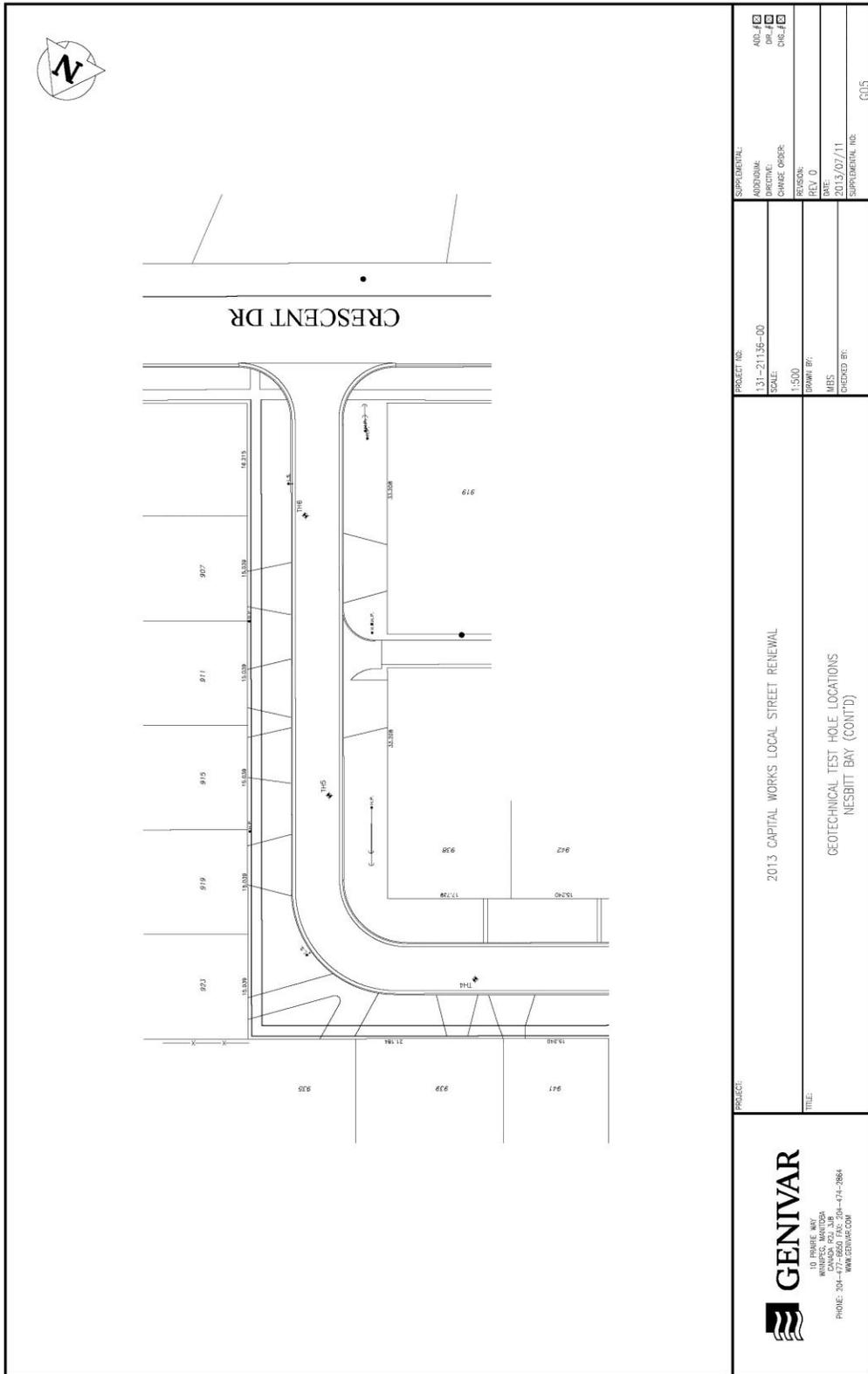




GENIVAR 10 PRINCE AVE WINNIPEG, MANITOBA CANADA R2L 1J6 PHONE: 204-477-8850 FAX: 204-477-2864 WWW.GENIVAR.COM	PROJECT: 2013 CAPITAL WORKS LOCAL STREET RENEWAL	PROJECT NO: 131-21135-00	SUPPLEMENTAL: ADD. F: <input type="checkbox"/> DIRECTIVE: <input type="checkbox"/> CHANGE ORDER: <input type="checkbox"/> REVISION: <input type="checkbox"/> REV 0
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GENIVAR 10 PRINCE AVE WINNIPEG, MANITOBA R2N 2Y5, CANADA PHONE: 204-477-8650 FAX: 204-477-2864 WWW.GENIVAR.COM	PROJECT: 2013 CAPITAL WORKS LOCAL STREET RENEWAL	SUPPLEMENT: ADDL: <input checked="" type="checkbox"/> DIRECTIVE: <input checked="" type="checkbox"/> CHANGE ORDER: <input checked="" type="checkbox"/> REVISION: <input type="checkbox"/> REV 0	PROJECT NO: 131-21135-00	ADDL: <input checked="" type="checkbox"/> DIR: <input checked="" type="checkbox"/> CHG: <input checked="" type="checkbox"/> REV: <input type="checkbox"/>
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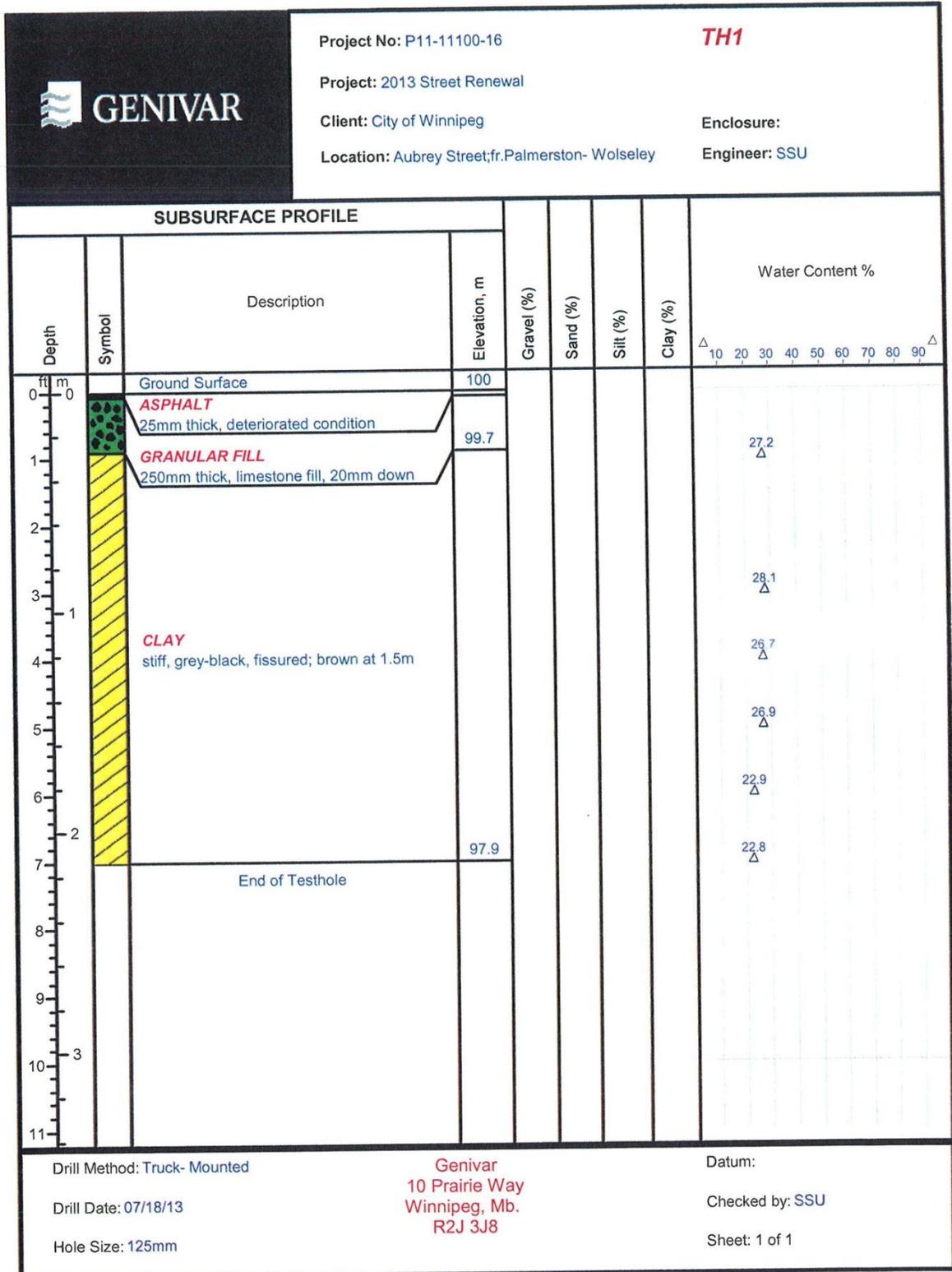
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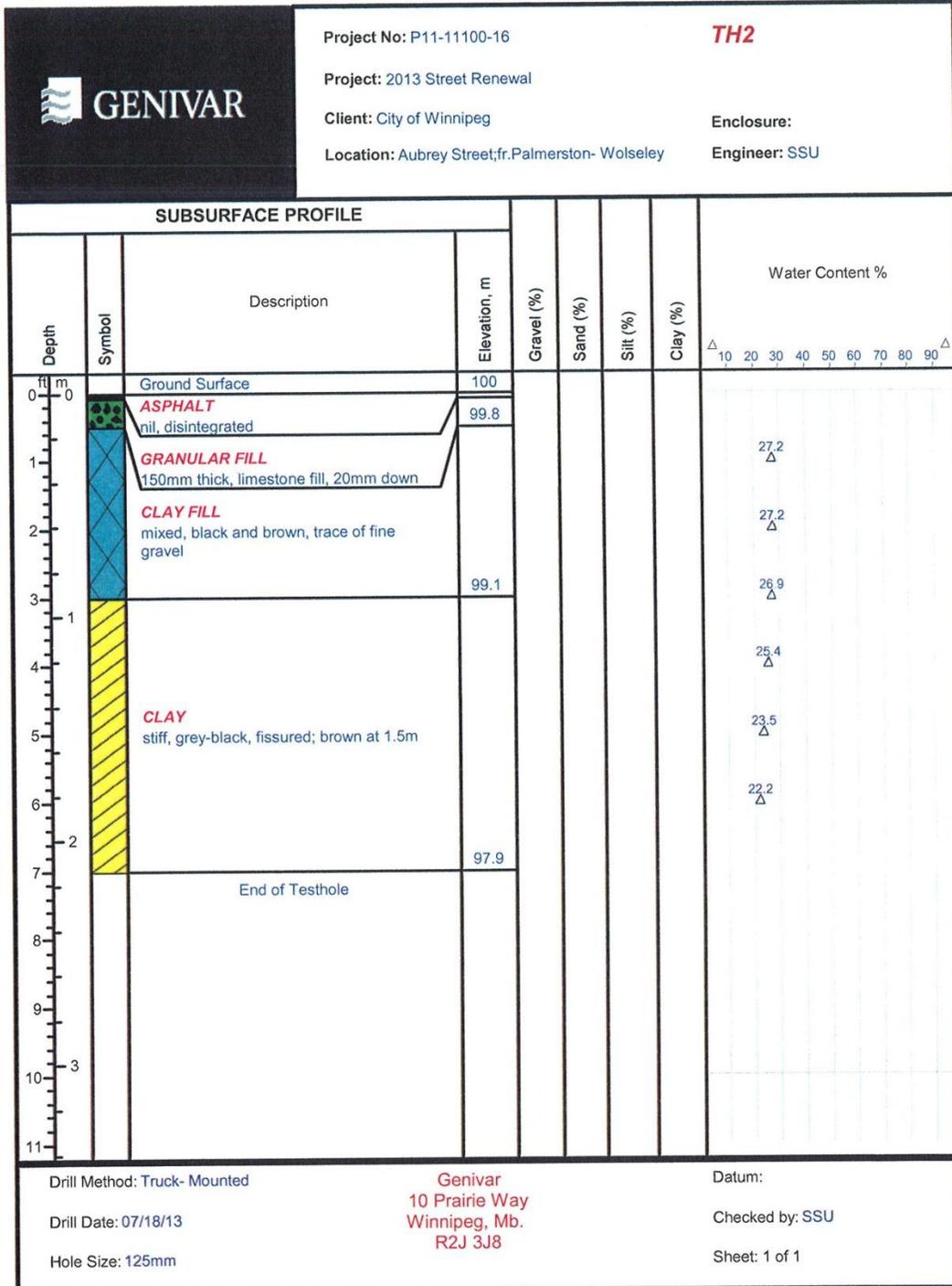
Summary of Core Samples

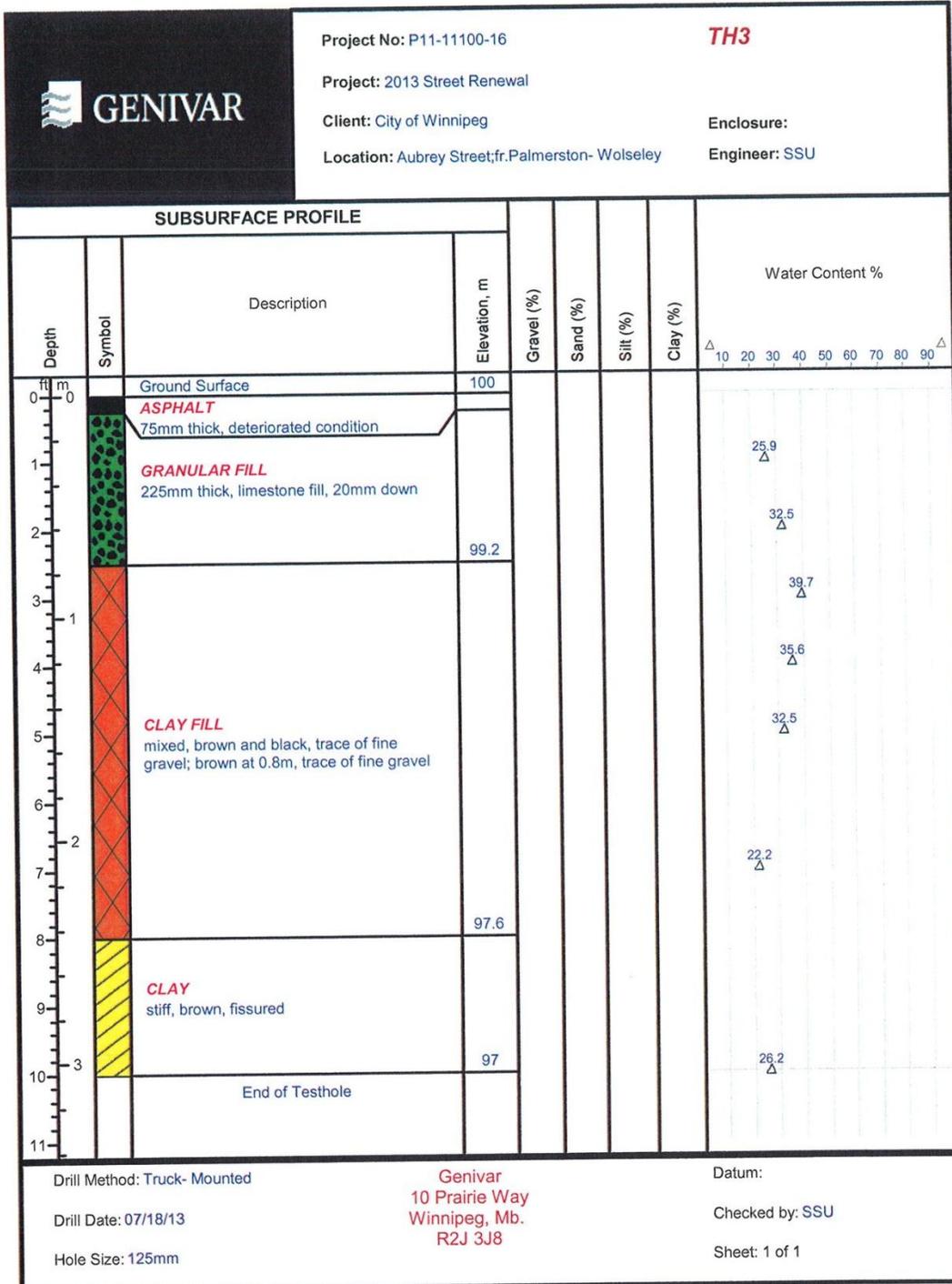
**City of Winnipeg
 2013 Capital Program Local Street Renewals
 Geotechnical Investigation
 Aubrey Street and Other Locations**

Test hole No.	Testhole Location	Pavement Structure		Pavement Structure Material		Subgrade Description	Sample Location	Moisture Content (%)	Hydrometer Analysis			Atterberg Limits	
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic Limit
TH 1	Aubrey St	Asphalt	25	20mm Down	250	Clay							
TH 2	Aubrey St	--	--	20mm Down	150	Clay Fill							
TH 3	Aubrey St	Asphalt	75	20mm Down	225	Clay Fill							
Core 1	Aubrey St	Concrete	225	--	--								
Core 2	Aubrey St	Concrete	225	--	--								
TH 1	Brentford Rd	Concrete	175	Granular Fill	25	Clay							
TH 2	Brentford Rd	Concrete	175	--	--	Silt/Clay							
TH 3	Brentford Rd	Concrete	150	--	--	Silt/Clay							
TH 4	Brentford Rd	Concrete	150	Granular Fill	25	Clay							
Core 1	Fleet Ave	Asphalt Concrete	38 165	-- --	-- --								
Core 2	Fleet Ave	Asphalt Concrete	44 175	-- --	-- --								
Core 3	Fleet Ave	Asphalt Concrete	38 163	-- --	-- --								
Core 4	Fleet Ave	Asphalt Concrete	50 200	-- --	-- --								
TH 1	Nesbitt Bay	Asphalt	50	Granular Fill	100	Clay Fill							
TH 2	Nesbitt Bay	Asphalt	50	Granular Fill	125	Clay Fill							
TH 3	Nesbitt Bay	Asphalt	50	Granular Fill	100	Clay Fill							
TH 4	Nesbitt Bay	Asphalt	50	Granular Fill	150	Clay Fill							
TH 5	Nesbitt Bay	Asphalt	38	Granular Fill	163	Clay Fill							
TH 6	Nesbitt Bay	Asphalt	63	Granular Fill	188	Clay Fill							

Test Hole Logs







SUBSURFACE PROFILE		Description	Elevation, m	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Water Content % <div style="text-align: center; font-size: small;"> Δ 10 20 30 40 50 60 70 80 90 Δ </div>
Depth	Symbol							
0	0	Ground Surface	100					
	CONCRETE	225mm thick; 150mm diameter, intact	99.8					
1		End of Testhole						
2								
3								
4								
5								

Drill Method: Truck- Mounted

Drill Date: 07/18/13

Hole Size: 125mm

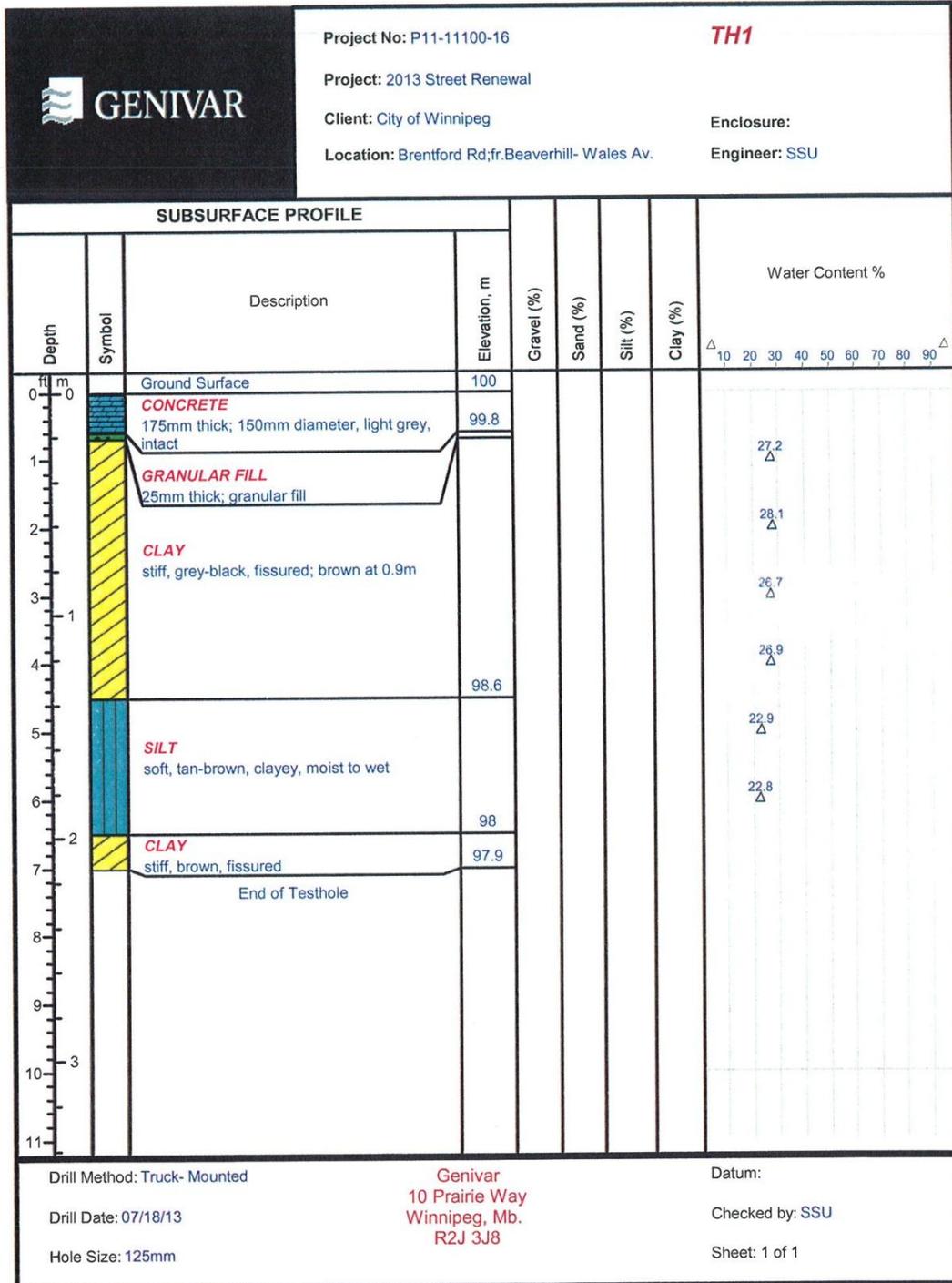
Genivar
 10 Prairie Way
 Winnipeg, Mb.
 R2J 3J8

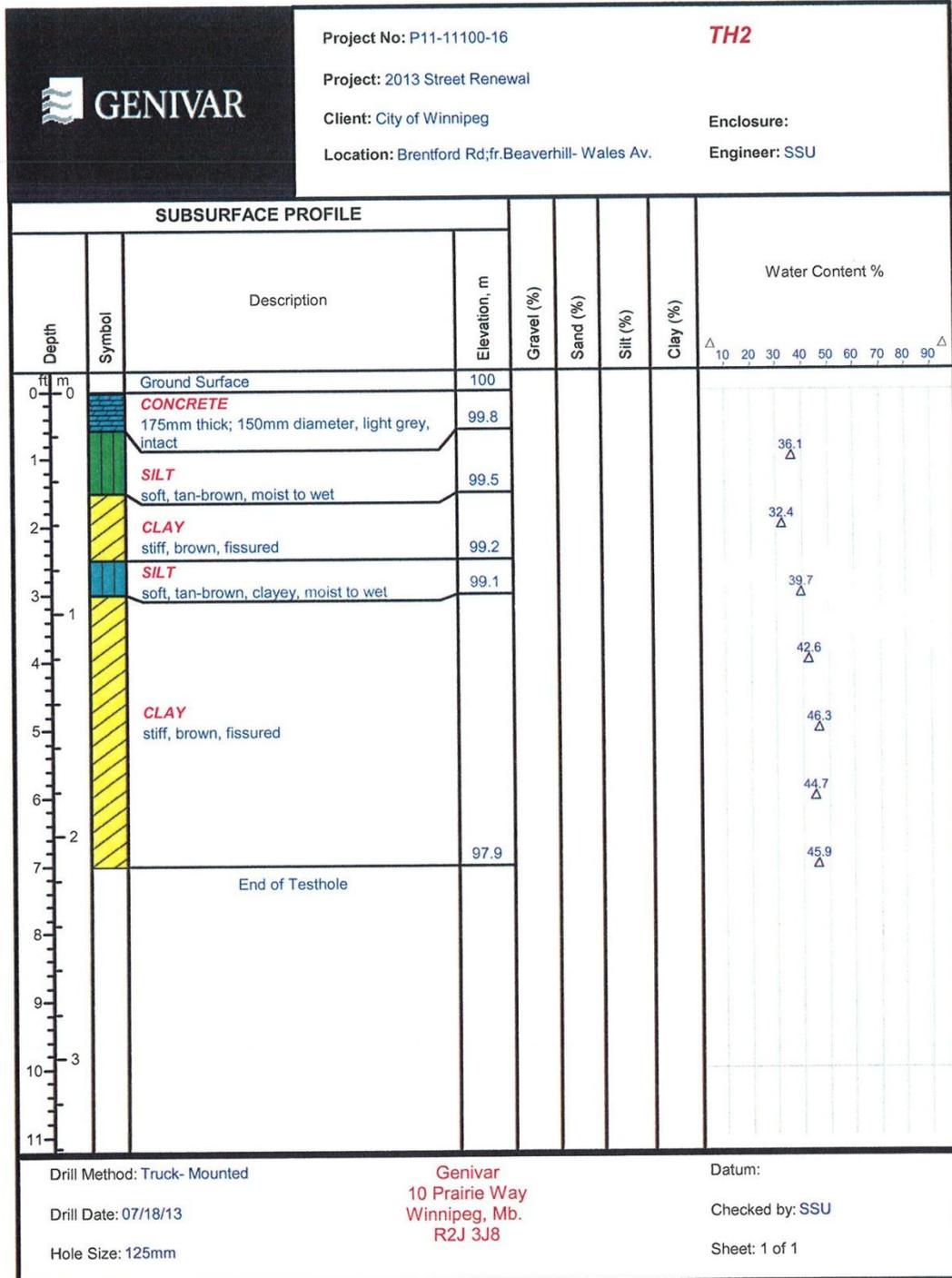
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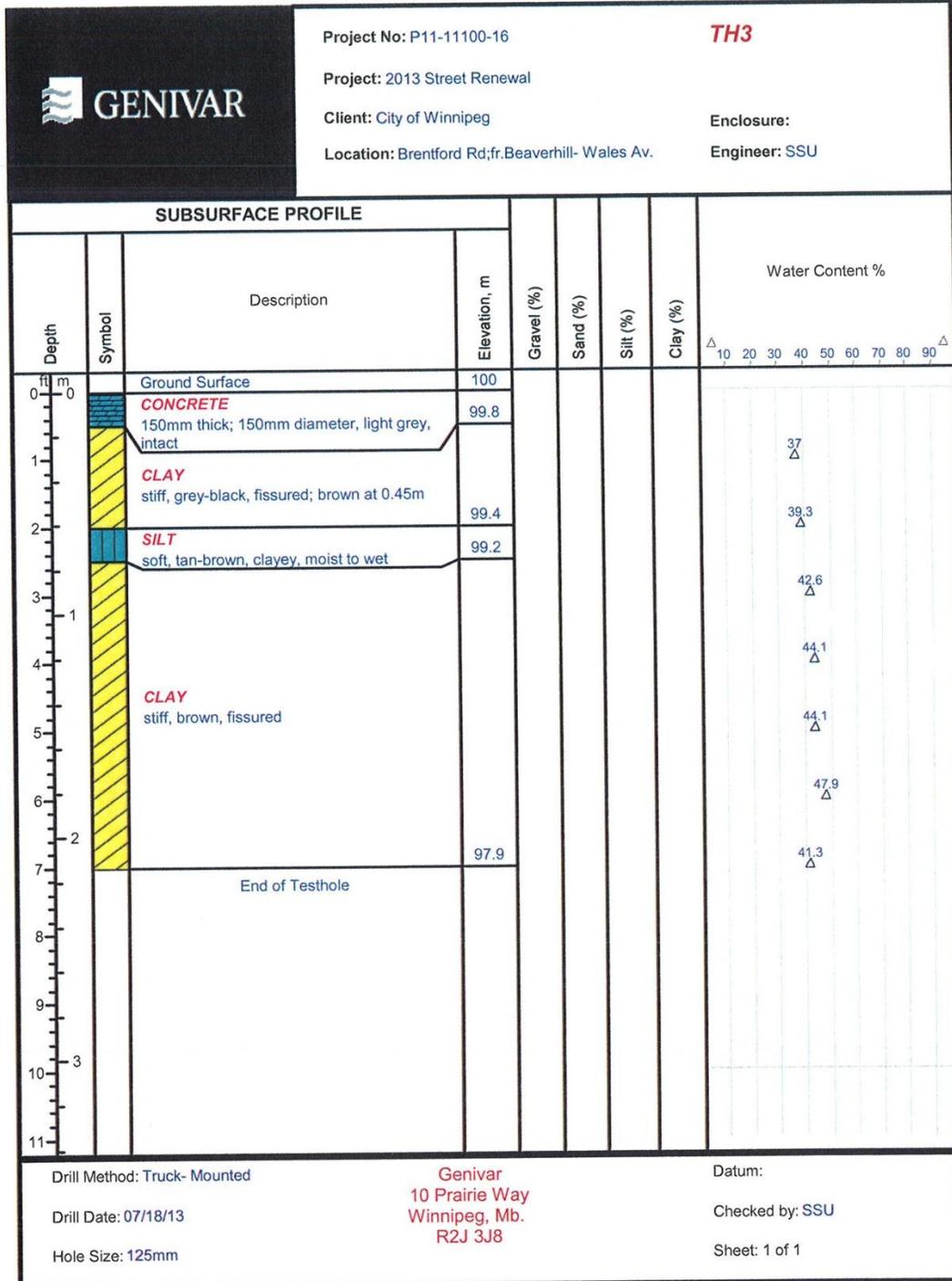
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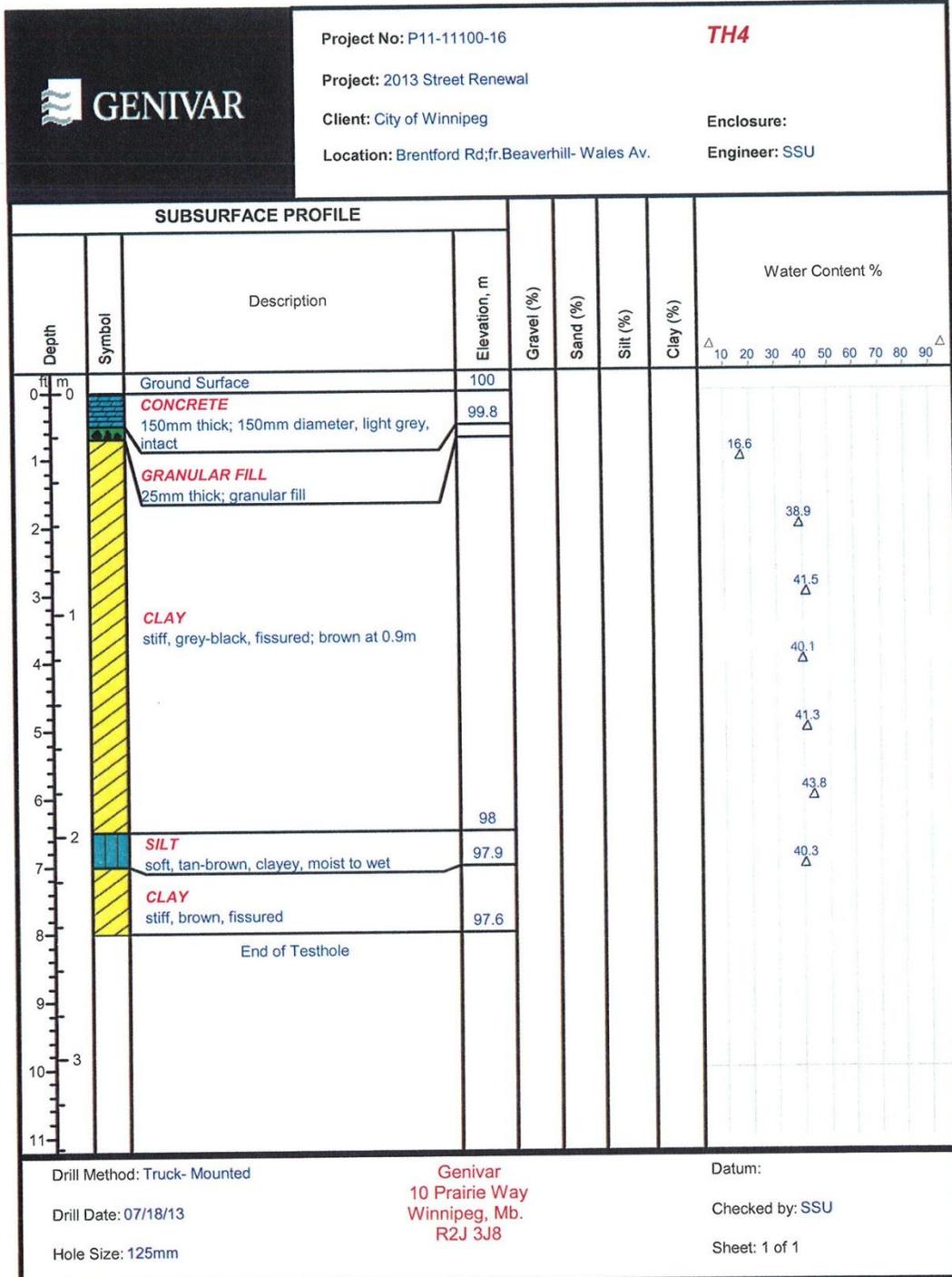
Sheet: 1 of 1

		Project No: P11-11100-16				CORE 2	
		Project: 2013 Street Renewal				Enclosure:	
		Client: City of Winnipeg				Engineer: SSU	
		Location: Aubrey Street;fr.Palmerston- Wolseley					
SUBSURFACE PROFILE							
Depth	Symbol	Description	Elevation, m	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
Water Content % △ 10 20 30 40 50 60 70 80 90 △							
0		Ground Surface	100				
0	■	CONCRETE 225mm thick; 150mm diameter, intact	99.8				
1		End of Testhole					
2							
3							
4							
5							
Drill Method: Truck- Mounted		Genivar 10 Prairie Way Winnipeg, Mb. R2J 3J8				Datum:	
Drill Date: 07/18/13						Checked by: SSU	
Hole Size: 125mm						Sheet: 1 of 1	

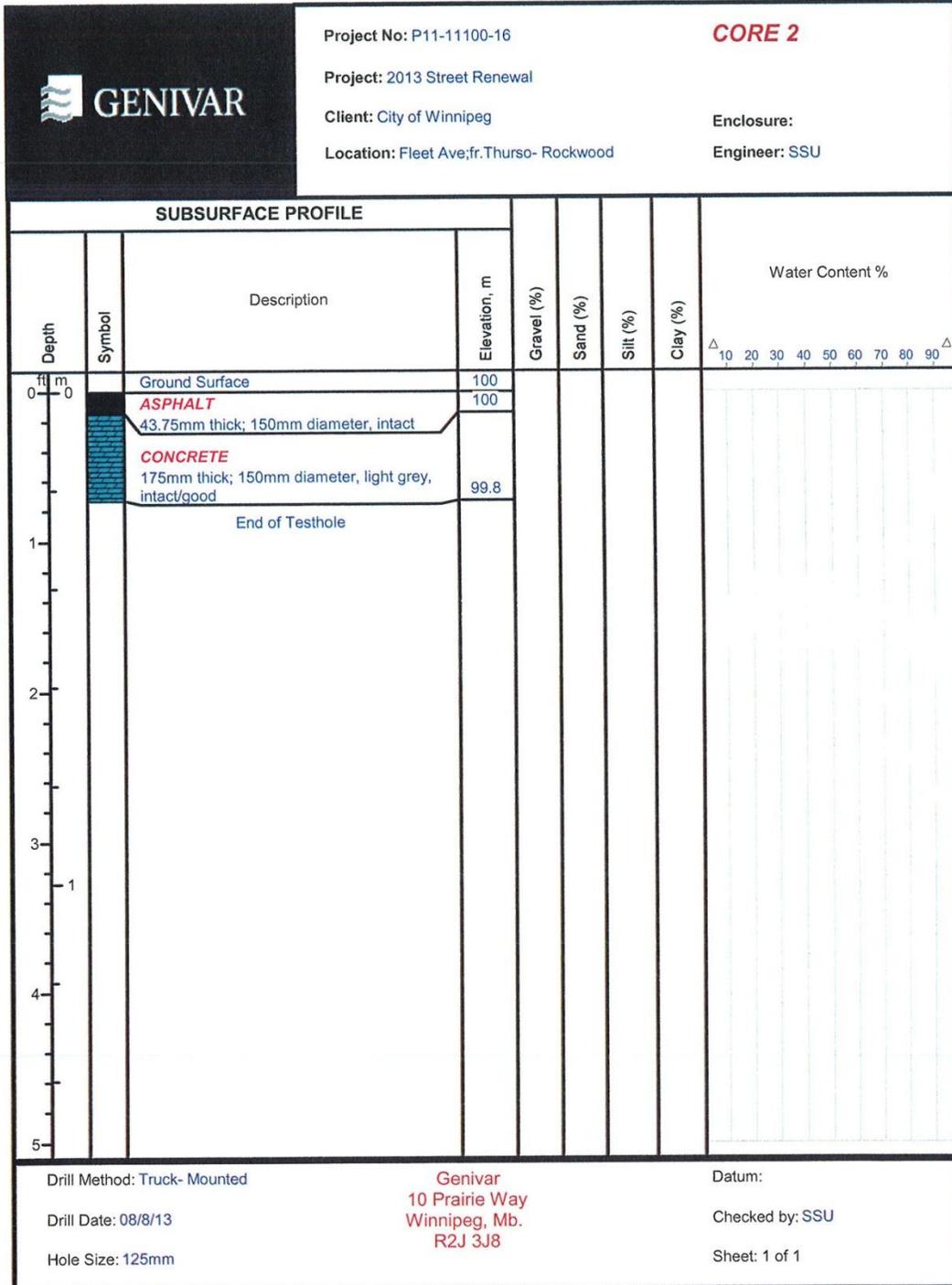








		Project No: P11-11100-16 CORE 1						
		Project: 2013 Street Renewal Client: City of Winnipeg Location: Fleet Ave, fr. Thurso- Rockwood		Enclosure: Engineer: SSU				
SUBSURFACE PROFILE								
Depth	Symbol	Description	Elevation, m	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Water Content %
ft m			100					Δ 10 20 30 40 50 60 70 80 90 Δ
0		Ground Surface						
	ASPHALT	37.5mm thick; 150mm diameter, intact						
	CONCRETE	165.5mm thick; 150mm diameter, light grey, intact/good	99.8					
1		End of Testhole						
2								
3								
4								
5								
Drill Method: Truck- Mounted		Genivar 10 Prairie Way Winnipeg, Mb. R2J 3J8			Datum:			
Drill Date: 08/8/13					Checked by: SSU			
Hole Size: 125mm					Sheet: 1 of 1			



SUBSURFACE PROFILE						Water Content %	
Depth	Symbol	Description	Elevation, m	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
0		Ground Surface	100				
	ASPHALT	37.5mm thick; 150mm diameter, intact	100				
	CONCRETE	162.5mm thick; 150mm diameter, light grey, intact/good	99.8				
1		End of Testhole					
2							
3							
4							
5							

Drill Method: Truck- Mounted

Drill Date: 08/8/13

Hole Size: 125mm

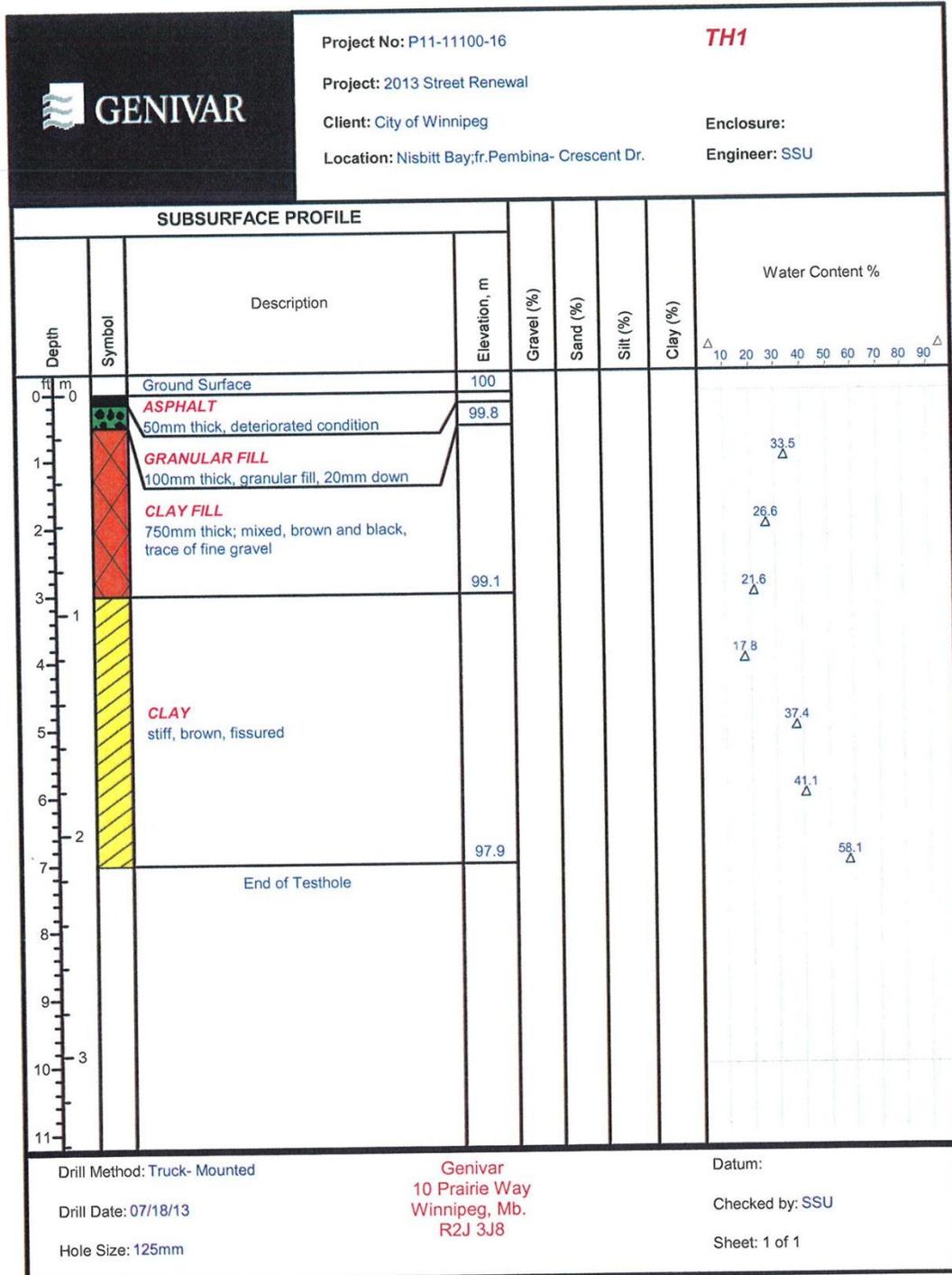
Genivar
 10 Prairie Way
 Winnipeg, Mb.
 R2J 3J8

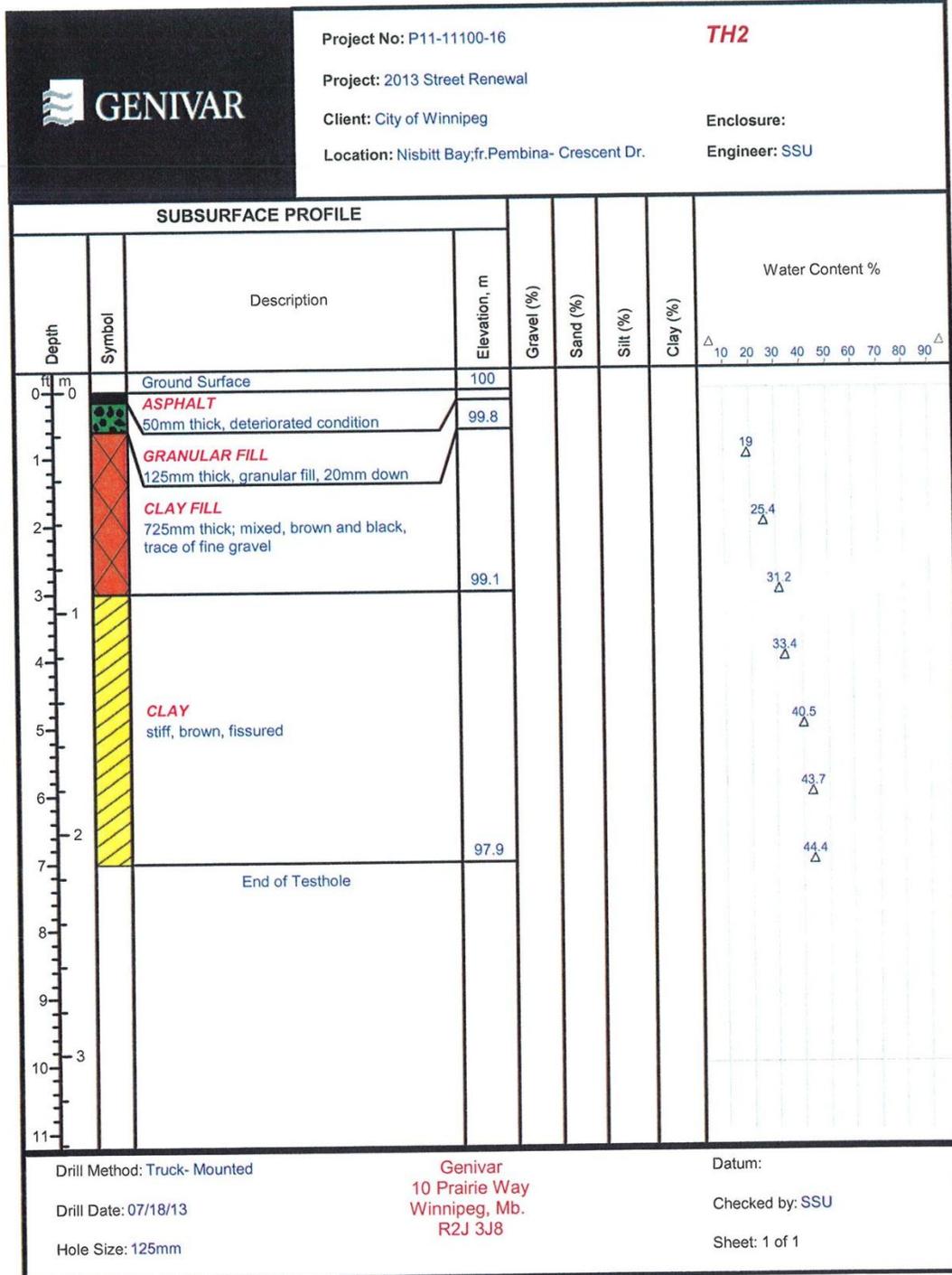
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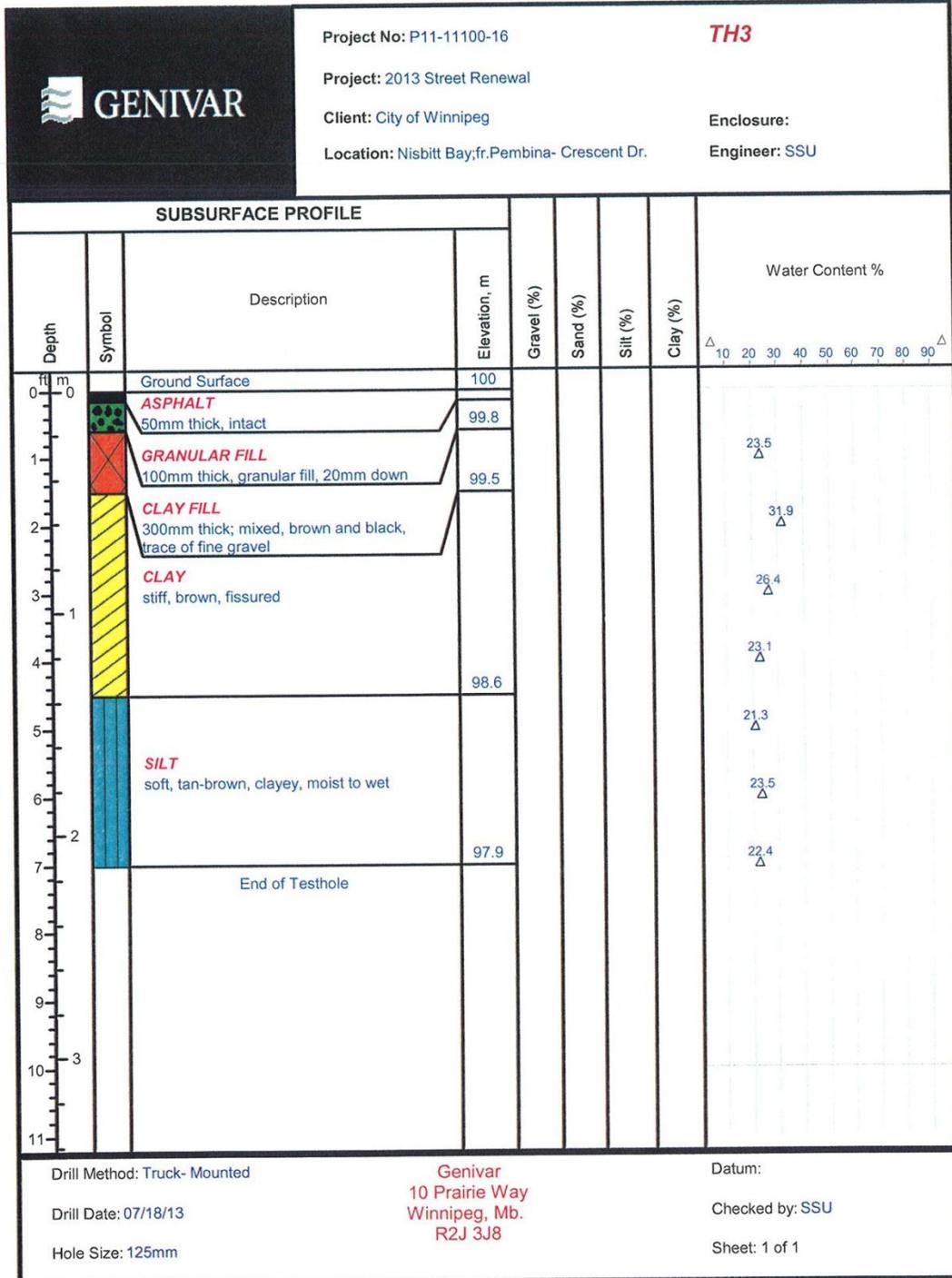
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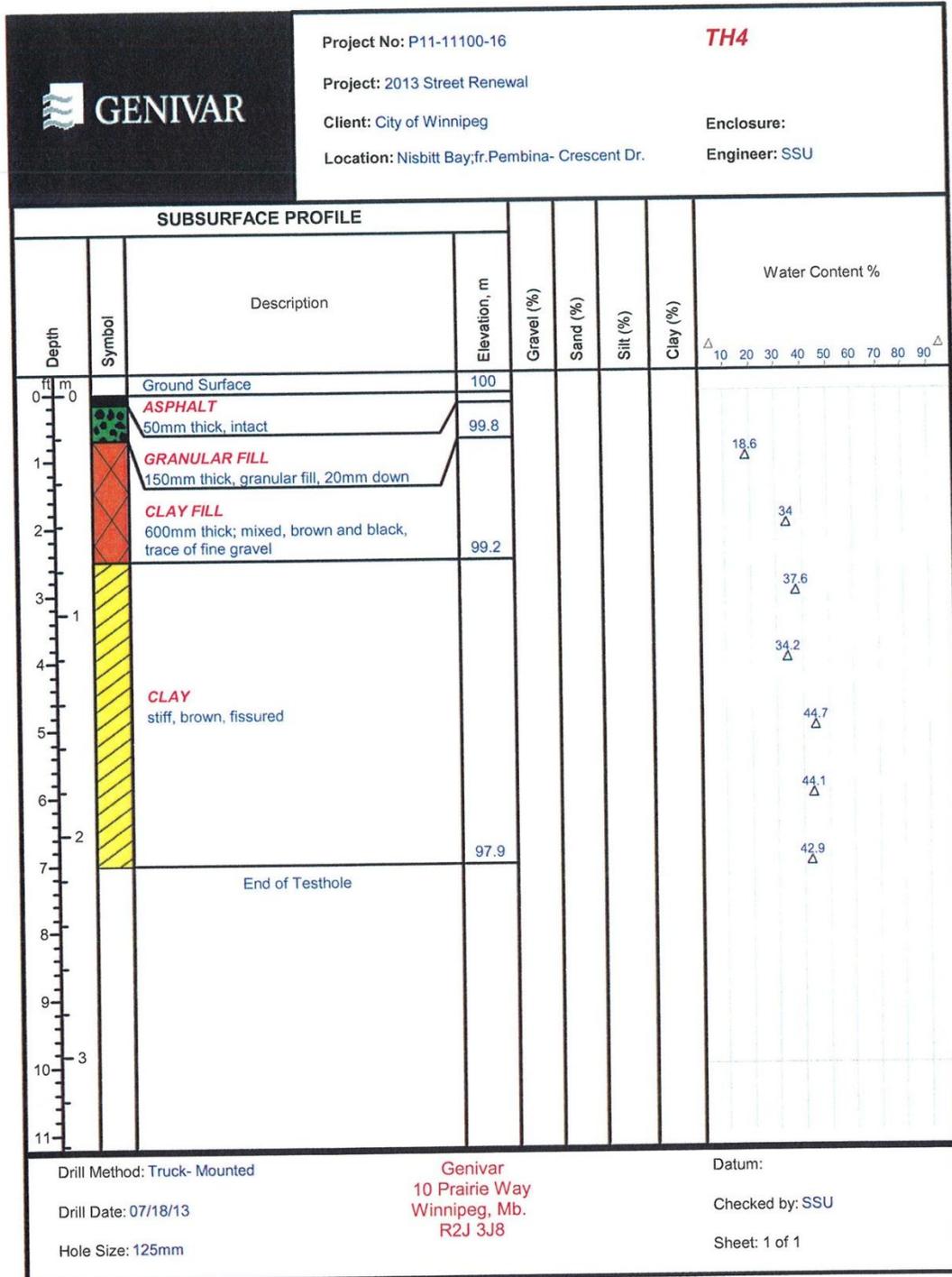
Sheet: 1 of 1

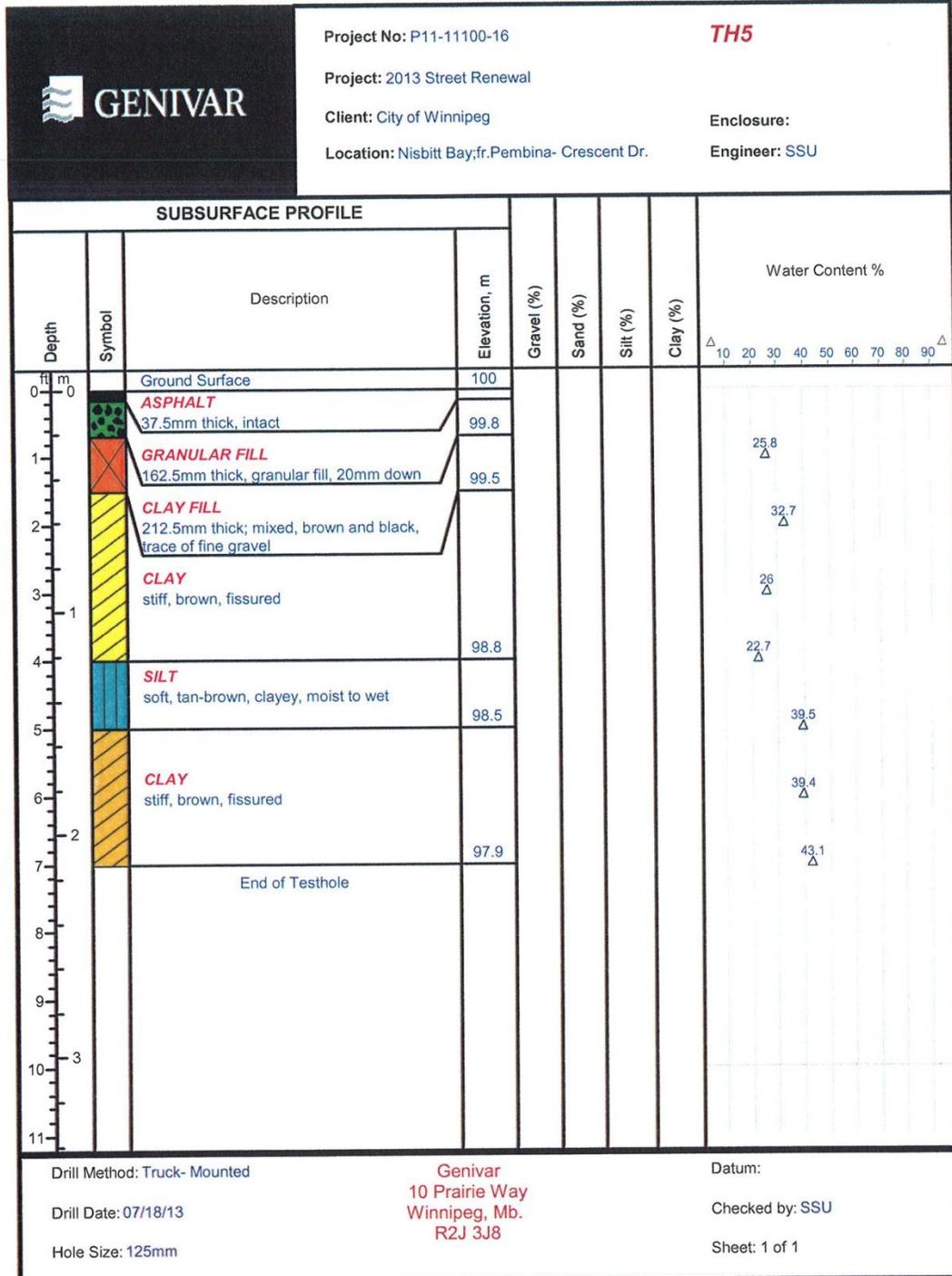
		Project No: P11-11100-16 CORE 4						
		Project: 2013 Street Renewal						
		Client: City of Winnipeg Enclosure:						
		Location: Fleet Ave;fr.Thurso- Rockwood Engineer: SSU						
SUBSURFACE PROFILE								
Depth	Symbol	Description	Elevation, m	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Water Content %
								Δ 10 20 30 40 50 60 70 80 90 Δ
0		Ground Surface	100					
		ASPHALT 50mm thick; 150mm diameter, intact	100					
		CONCRETE 200mm thick; 150mm diameter, light grey, intact/good	99.7					
1		End of Testhole						
2								
3								
4								
5								
Drill Method: Truck- Mounted		Genivar 10 Prairie Way Winnipeg, Mb. R2J 3J8		Datum:				
Drill Date: 08/8/13				Checked by: SSU				
Hole Size: 125mm				Sheet: 1 of 1				

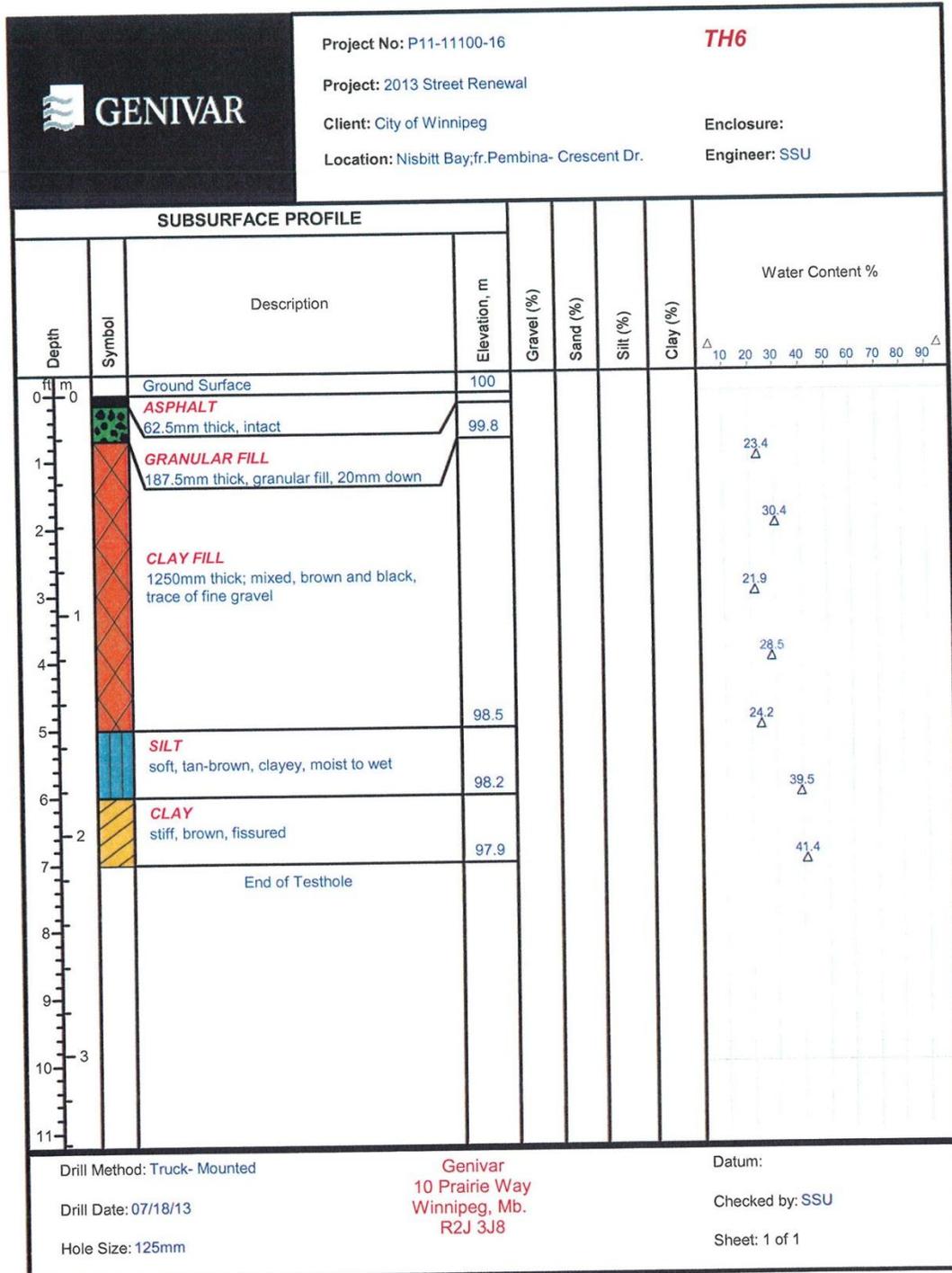












APPENDIX 'B'

MANITOBA HYDRO

STANDARD DRAWINGS

GROUNDING

1. USE OF COPPERWELD GROUND RODS

COPPERWELD GROUND RODS SHALL BE USED IN ALL AREAS OF THE PROVINCE ON THE DISTRIBUTION GROUNDING SYSTEM.

CADWELD CONNECTION TO GROUND RODS

ALL CONNECTIONS TO GROUND RODS SHALL BE MADE USING CADWELD CONNECTIONS. ALL CONNECTIONS SHALL BE INSPECTED TO ASSURE A PROPER CONNECTION HAS BEEN MADE.

2. SEASONAL VARIATIONS OF GROUND RESISTANCE

THE DEPTH OF ALL GROUND RODS SHALL BE SUFFICIENT TO ENSURE ADEQUATE GROUNDING RESISTANCE DURING ALL SEASONS OF THE YEAR.

GROUND RESISTANCE CAN INCREASE DUE TO VARIATIONS IN THE LEVEL OF THE WATER TABLE AND DUE TO THE DEPTH OF THE FROST IN THE EARTH. A ROD LENGTH OF 3 METERS IS MINIMUM.

3. EQUIPMENT, CASES AND CUBICLES

ALL CASES OF DISTRIBUTION APPARATUS INSTALLATIONS, SUCH AS TRANSFORMERS, VOLTAGE REGULATORS, CIRCUIT RECLOSERS, CAPACITORS, CONCENTRIC NEUTRAL/ CORRUGATED TAPE SHIELD DIPS AND RISERS, DISTRIBUTION CENTER CUBICLES, JUNCTION POINT CUBICLES, ETC., CONNECTED TO PRIMARY LINES SHALL BE GROUNDED.

4. OVERHEAD NEUTRAL, CONCENTRIC NEUTRAL/CONCENTRIC TAPE SHIELD OF CABLE AND GROUND INTERCONNECTION

THE PRINCIPLE OF RUNNING THE GROUNDING CONDUCTORS IN OPEN VIEW SHALL BE OBSERVED WHENEVER POSSIBLE. THIS APPLIES TO GROUND INTERCONNECTIONS BETWEEN SURGE ARRESTERS, OCRs, CONCENTRIC NEUTRAL/CONCENTRIC TAPE SHIELD OF CABLE, TRANSFORMER BANKS, ETC. IT IS DESIRABLE THAT THESE GROUNDING CONDUCTOR INTERCONNECTIONS BE PLAINLY SEEN BY PERSONS WORKING ON THE POLE IN ORDER THAT APPROPRIATE SAFETY MEASURES RELATING TO SECOND POINTS OF CONTACT MAY BE TAKEN. IT ALSO APPLIES WHERE GROUNDING CONDUCTORS ARE RUN TO THE NEUTRAL ON A Z OR XY TYPE LINE AND DIP AND RISER POLES OF THE RUD SYSTEM TAP OFF. REASONABLE SLACKNESS SHOULD BE MAINTAINED IN THESE CONDUCTORS TO PREVENT VIBRATION FAILURE.

5. GROUNDING IN ROCK AREAS

WHERE GROUND CONDITIONS ARE SUCH THAT GROUND RODS CANNOT BE DRIVEN AT TRANSFORMER INSTALLATIONS OR OTHER POINTS WHERE THEY ARE NORMALLY REQUIRED, GROUNDING POINTS SHALL BE ESTABLISHED IN THE NEAR VICINITY.

APPROVED	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-11	00-07	2	NOTE 1 REVISED TO INCLUDE CADWELD		
	98-11	1	ADDED COPPERWELD GROUNDS RODS		
	GROUNDING				
DRAWN R.L.B./CAD	CHECKED	DATE 93-11	CD 50-5		SHT 0001 OF 3
					REV 02

6. OVERHEAD MULTIPLE GROUNDED NEUTRAL DISTRIBUTION SYSTEM

AT THE TIME OF CONSTRUCTION USE GN1 ASSEMBLY. THE PREFERRED METHOD OF REDUCING THE GROUND RESISTANCE, IS TO USE DEEP GROUNDING WITH SECTIONAL RODS IN SERIES.

IF AFTER INSTALLATION AND TESTING THE GN1 ASSEMBLY USING DEEP GROUNDING, IT IS OBVIOUS THAT THE REQUIRED 25 OHM RESISTANCE CANNOT BE OBTAINED, USE GN2 OR GN3 ASSEMBLY USING DEEP GROUNDING TO REDUCE RESISTANCE.

IF THE RESISTANCE OF THE SYSTEM GROUND, INCLUDING THE CUSTOMER GROUND WHERE APPLICABLE, EXCEEDS 5 OHMS IN THE SUMMER, WITH ONE GROUND DISCONNECTED, REDUCE THE SYSTEM GROUND RESISTANCE.

7. OVERHEAD EARTH RETURN DISTRIBUTION SYSTEM (Q-LINE)

AT THE TIME OF CONSTRUCTION, USE GN1 AT THE TAP-OFF POLE AND GN1 AT THE TRANSFORMER POLE. IF THE TRANSFORMER IS LOCATED ON A LINE POLE USE GQ1. THE GROUNDING INSTALLATIONS SHALL BE THOROUGHLY INSPECTED TO ENSURE QUALITY OF WORKMANSHIP. THE PREFERRED METHOD OF REDUCING THE GROUND RESISTANCE IS TO USE DEEP GROUNDING WITH SECTIONAL RODS IN SERIES.

IF AFTER INSTALLATION AND TESTING OF THE ABOVE GROUND ROD INSTALLATIONS USING DEEP GROUNDING, IT IS OBVIOUS THAT THE REQUIRED 5 OHM RESISTANCE OF THE ASSEMBLIES CANNOT BE OBTAINED, INSTALL A THIRD GN1 ASSEMBLY ONE SPAN AWAY. (REFER TO CD50-15 AND CD50-20 FOR FURTHER DETAILS).

IF THE RESISTANCE OF THE SYSTEM GROUND, INCLUDING THE CUSTOMER GROUND WHERE APPLICABLE, EXCEEDS 5 OHMS IN THE SUMMER WITH ONE GROUND ROD DISCONNECTED, REDUCE THE SYSTEM GROUND RESISTANCE.

8. UNDERGROUND DISTRIBUTION SYSTEM AT TIME OF CONSTRUCTION

AT TIME OF CONSTRUCTION USE GU1 ASSEMBLY AT ALL UNDERGROUND CABLE POLES.

USE Q-LINE GROUNDING STANDARDS AT ALL OVERHEAD TRANSFORMER POLES SUPPLIED FROM THE RUD SYSTEM.

USE GROUND ROD LAYOUT SHOWN IN SECTION 220 OF THIS STANDARD FOR PADMOUNTED EQUIPMENT. THE RESISTANCE OF THE INSTALLATION SHALL BE 5 OHMS OR LESS. THE PREFERRED METHOD OF REDUCING THE GROUND RESISTANCE IS TO USE DEEP GROUNDING WITH SECTIONAL RODS IN SERIES.

THE GROUNDING INSTALLATIONS SHALL BE THOROUGHLY INSPECTED TO ENSURE QUALITY OF WORKMANSHIP.

IF THE RESISTANCE OF THE SYSTEM GROUND, INCLUDING THE CUSTOMER GROUND WHERE APPLICABLE, EXCEEDS 5 OHMS IN THE SUMMER WITH ONE GROUND ROD DISCONNECTED, REDUCE THE SYSTEM GROUND RESISTANCE.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-11				GROUNDING					
DRAWN R.L.B./CAD	CHECKED	DATE 93-11	CD 50-5		<table border="1"> <tr> <td>SHT</td> <td>REV</td> </tr> <tr> <td>0002 OF 3</td> <td>02</td> </tr> </table>	SHT	REV	0002 OF 3	02
SHT	REV								
0002 OF 3	02								

IF AFTER INSTALLATION AND TESTING OF THE ABOVE GROUND ROD INSTALLATIONS USING DEEP GROUNDING, IT IS OBVIOUS THAT THE REQUIRED 5 OHM RESISTANCE OF THE ASSEMBLIES CANNOT BE OBTAINED, INSTALL MULTI RODS IN PARALLEL USING USING GU2 OR GU3 ASSEMBLIES.

HOWEVER, IF THE SUMMER COMBINED GROUND RESISTANCE OF THE RODS ONLY EXCEED 5 OHMs, GROUNDING SHALL BE IMPROVED TO MEET THE REQUIRED STANDARDS. (REFER TO CD50-15 AND CD50-20 FOR FURTHER DETAILS).

9. REGULATOR NEUTRAL ON Q-LINES

ON 2 AND 3 PHASE LINES, INSTALL A NEUTRAL BETWEEN ALL REGULATORS AND GN1 ASSEMBLY AT EACH REGULATOR. ON SINGLE PHASE LINES, Q-LINES ONLY, INSTALL 1 SPAN OF NEUTRAL ON EACH SIDE OF REGULATOR AND USE GN1 AT EACH GROUNDING POLE AS PER DRAWING CD100-10.

10. INTERCHANGE TRANSFORMERS

AT TIME OF CONSTRUCTION, USE GN1 AT EACH END POLE. THE RESISTANCE OF THE GROUNDING ASSEMBLY AT EACH POLE MUST NOT EXCEED 5 OHMs.

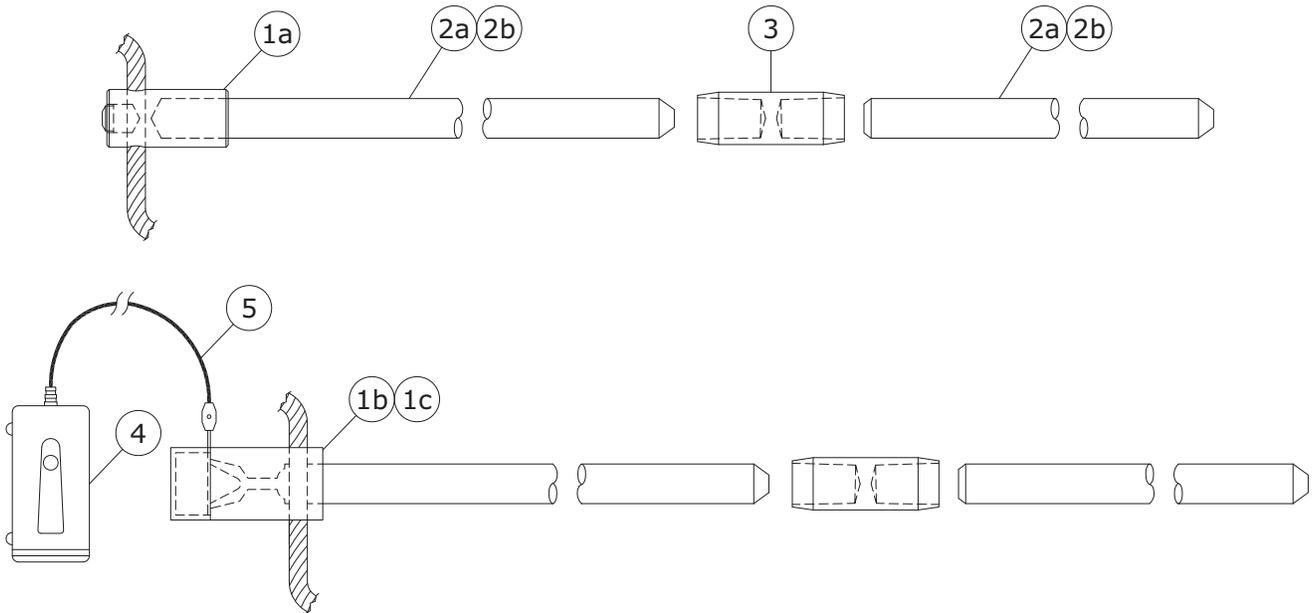
THE PREFERRED METHOD OF REDUCING THE GROUND RESISTANCE IS TO USE DEEP GROUNDING WITH SECTIONAL RODS IN SERIES.

IF AFTER INSTALLATION AND TESTING OF THE GN1 ASSEMBLIES USING DEEP GROUNDING AT EACH POLE, WITH THE OTHER DISCONNECTED, IT IS OBVIOUS THAT THE REQUIRED 5 OHM RESISTANCE OF THE ASSEMBLY CANNOT BE OBTAINED, USE A GN2 OR GN3 ASSEMBLY USING DEEP GROUNDING TO REDUCE RESISTANCE.

11. GROUND TESTING OF NEW AND UPGRADED INSTALLATIONS

ALL GROUND RODS SHALL BE TESTED AND MADE TO COMPLY WITH THIS STANDARD UPON INSTALLATION. TEST RESULTS SHALL BE RECORDED ON TLMS, (TRANSFORMER LOAD MANAGEMENT SYSTEM).

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-11				GROUNDING		
		00-07	2			NOTES REVISED SHEET 4 DELETED
		98-11	1			NOTES REVISED
DRAWN R.L.B./CAD	CHECKED	DATE 93-11	CD 50-5		SHT 0003 OF 3	REV 02



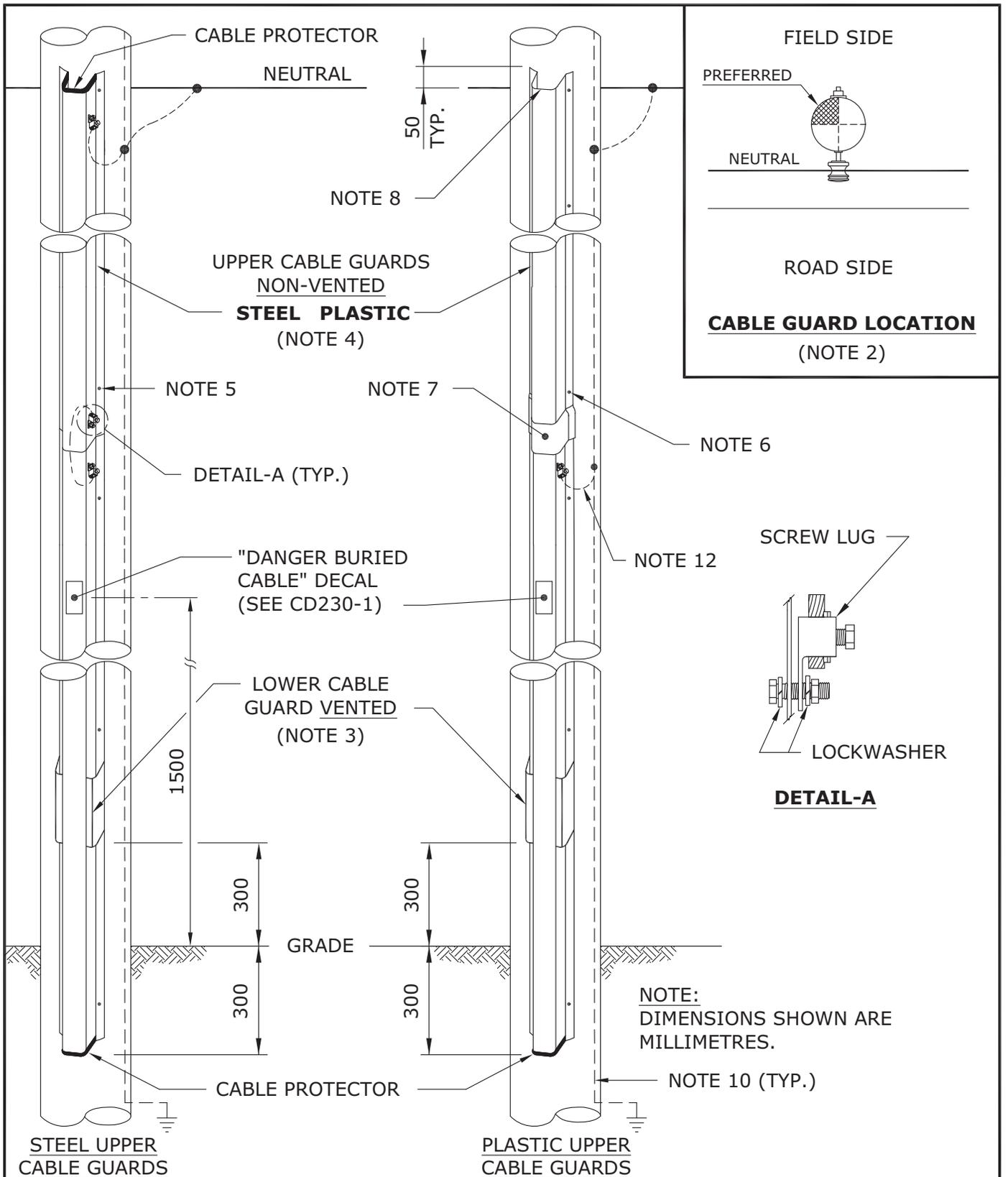
COPPERWELD - SECTIONAL

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

NOTES:

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

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



APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03				CABLE GUARD DETAILS ON DIP/RISER POLES		
		99-10	2			PLASTIC CABLE GUARD AND SHEET 2 ADDED
		95-07	1			CABLE GUARD LOCATION SHOWN,
DRAWN R.L.B./CAD	CHECKED G.W.	DATE 93-06	CD 200-63		SHT 0001 OF 2	
					REV 02	

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 (S.C. # 72 60 03).
6. ATTACH THE PLASTIC CABLE GUARD TO THE POLE WITH #16 x 2" WOOD SCREWS (S.C. # 72 95 10).
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.

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY E.H. WIEBE 99-11-03				CABLE GUARD DETAILS ON DIP/RISER POLES					
DRAWN R.L.B./CAD	CHECKED G.W./K.C.H.	DATE 99-10	CD 200-63		<table border="1"> <tr> <td>SHT</td> <td>REV</td> </tr> <tr> <td>0002 OF 2</td> <td>00</td> </tr> </table>	SHT	REV	0002 OF 2	00
SHT	REV								
0002 OF 2	00								

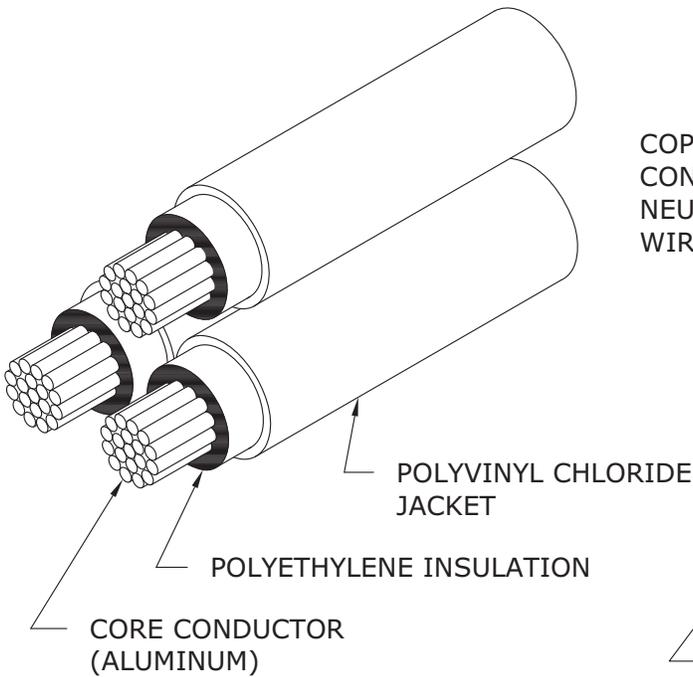
SECONDARY CABLE	TYPICAL USAGE
#4 AL. CONCENTRIC NEUTRAL	STREET LIGHT CIRCUITS
1/0 AL. TRIPLEX	SECONDARY RESIDENTIAL SERVICES AND HEAVILY LOADED STREET LIGHT CIRCUITS WHERE VOLTAGE DROP MAY BE A PROBLEM
4/0 AL. TRIPLEX	SECONDARY RESIDENTIAL SERVICES
350 TRIPLEX	SECONDARY RESIDENTIAL SERVICES
350 AL. QUADRAPLEX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

NOTE:

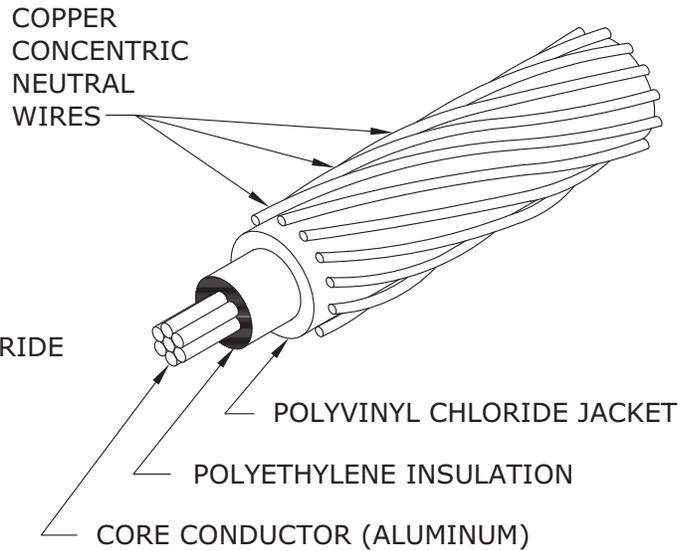
SEE CD225-4 FOR SIZING AND SPACING OF SINGLE AND THREE PHASE CONDUCTORS.

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 88-03-29	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS		
	06-03	10	ADDED NOTE AND 350 TRIPLEX	UNDERGROUND SECONDARY CABLE		
	99-04	9	4/0 AL. TRIPLEX, NOTE CHANGED			
	97-11	8	#4 AL. TRIPLEX NOW #4 AL. CONCENTRIC NEUTRAL			
DRAWN W.B./CAD	CHECKED B.H./K.H.	DATE 87-08	CD 210-12		SHT 0001 OF 2	REV 10

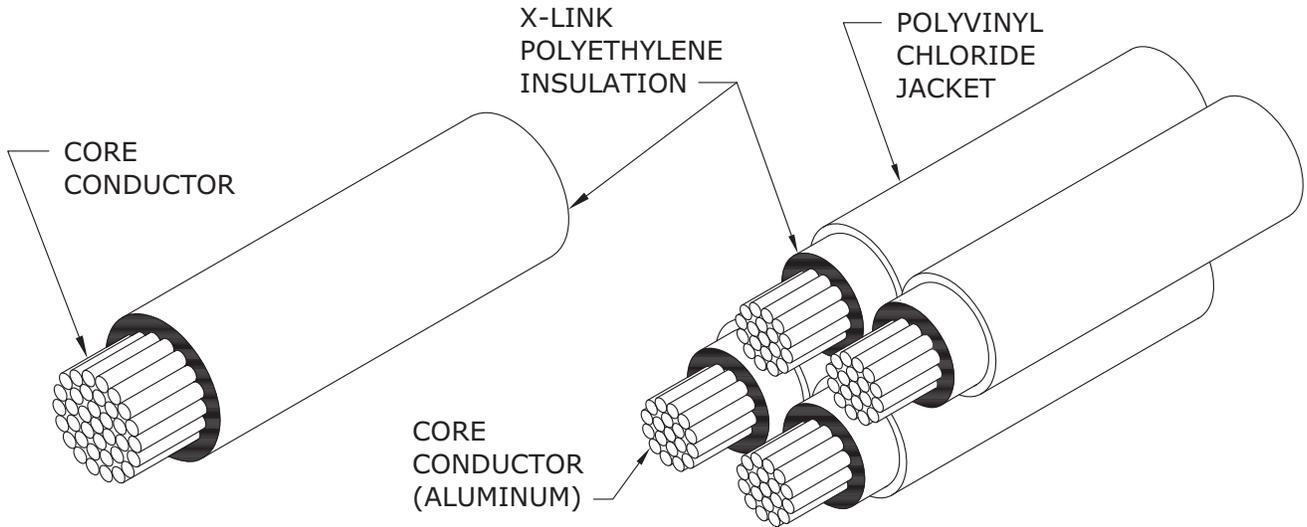
BASIC CONSTRUCTION OF UNDERGROUND SECONDARY CABLES



1/0 & 4/0 AND 350 TRIPLEX



4 CONCENTRIC NEUTRAL CABLE



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

350 kcmil QUADRAPLEX

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

UNDERGROUND SECONDARY CABLE

VOLTAGE RATING	600V	600V	600V	600V	1000V	1000V
CORE CONDUCTOR SIZE	#4	1/0	4/0	350 kcmil	750 kcmil	1000 kcmil
CORE CONDUCTOR MATERIAL	ALUM.	ALUM.	ALUM.	ALUM.	ALUM.	COPPER
TYPE OF CABLE	C/N	TRIPLEX	TRIPLEX	TRIPLEX OR QUADPLEX	1-COND.	1-COND.
NEUTRAL SIZE AND TYPE	#6 CU. Concentric Neutral	1/0 ALUM.	4/0 ALUM.	350 kcmil ALUM.	NONE	NONE
MIN. BENDING RADIUS (mm)	125	115	150	180	250	300
DC RESISTANCE @ 20°C (OHMS/km)	1.360	0.538	0.269	0.163	0.078	0.037
** DIRECT BURIED AMPACITY (@ 20°C ambient)	125	215	300	420	* 725	* 1080
VENTED CABLE GUARD AMPACITY (@ 20°C ambient)	100	175	250	330	575	855
*** BURIED DUCT AMPACITY (@ 20°C ambient)	70	130	195	265	425	630
CONDUCTOR DIAMETER (mm)	5.4	8.9	12.7	15.8	25	28.8
NOMINAL DIA. OVER INSUL. (mm)	8.6	12.5	16.5	21.6	31.4	35.3
NOMINAL DIA. OVER JACKET (mm)	12.74	14.7	17.8	22.8	N/A	N/A
LINEAL MASS (kg/km)	N/A	760	1320	2200/2900	1330	4983
COLD SHRINK END CAPS (MH CIIC)	N/A	15 31 40	15 31 40	15 31 60	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

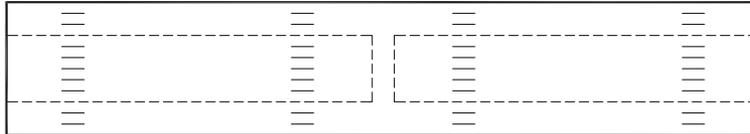
* PROVIDED MULTIPLE CONDUCTORS PER PHASE ARE SPACED AS SHOWN IN DRAWING CD225-4.

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

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

APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03	08-12	3	ADDED COLD & HEAT SHRINK CAPS AND LINEAL MASS TO TABLE	STANDARD UNDERGROUND SECONDARY CABLE DATA		
	06-03	2	REMOVED 1000V 500 kcmil COPPER 1-COND & ROTATED			
	95-01	1	1000V 4/0 ALUM. DELETED			
DRAWN W.B./CAD	CHECKED B.H./K.C.H.	DATE 93-07	CD 210-15		SHT 0001 OF 1	REV 03

1-04431-DA-58041-0009



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

*** UNDERGROUND SECONDARY CABLE COMPRESSION CONNECTORS**

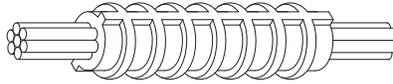
CONDUCTOR SIZE		STORES CODE	TOOL (DIES)	
FROM	TO		PREFERRED	ALTERNATE
#4	#4	74 27 64	Y35 (UCSA 22)	** MD6 (WCSA 22, BG)
1/0	#2	74 27 30		
1/0	1/0	74 27 65		
4/0	1/0	74 27 67	Y35 (UCSA 24)	** MD6 (WCSA 24, 249)
4/0	4/0	74 27 68		
350	4/0	74 27 78	Y35 (UCSA 28)	---
350	350	74 27 72		
750	500	74 27 27	Y46/ADPT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

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

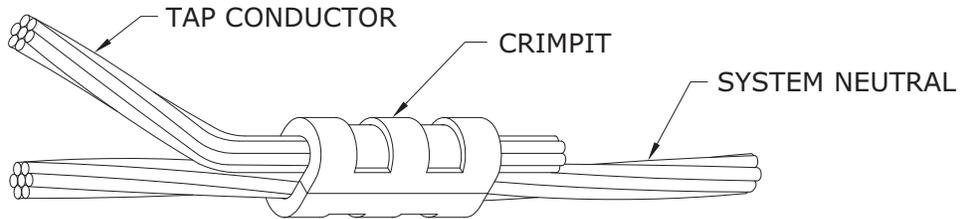
** ROTATE MD6 TOOL 180° AFTER EVERY CRIMP.

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

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



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



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

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

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

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

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

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03				SPLICES FOR UNDERGROUND SECONDARY CABLES					
		96-05	2					NOTES REVISED, SHEET 3 ADDED	
		95-01	1					NOTES 3, 7 & TABLE ADDED	
DRAWN W.B./CAD	CHECKED G.W.	DATE 93-07		CD 215-12		SHT 0001 OF 3	REV 02		

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	RAYVOLVE OR PRESTRETCHED	85 13 10
4/0	RAYVOLVE OR PRESTRETCHED	85 13 40
4/0 TO 350	HEAT SHRINK	85 13 50
350	PRESTRETCHED	03 31 80

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS							
	08-03	2	REVISED TABLE AND NOTE 6							
	96-05	1	FIGURES MOVED TO NEW SHEET 3							
	93-07	0	TOLERANCES REMOVED FORMERLY CD215-5							
DRAWN W.B./CAD			CHECKED K.C.H.		DATE 93-07		CD 215-12		SHT	REV
									0002	OF 3

FOR TAPED SPLICE

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

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

OR

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

NOTE:

DIMENSIONS SHOWN ARE MILLIMETRES.

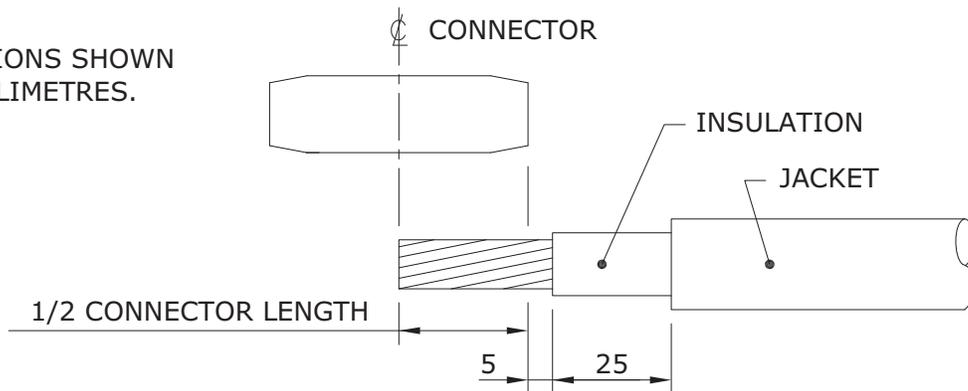


FIGURE 1

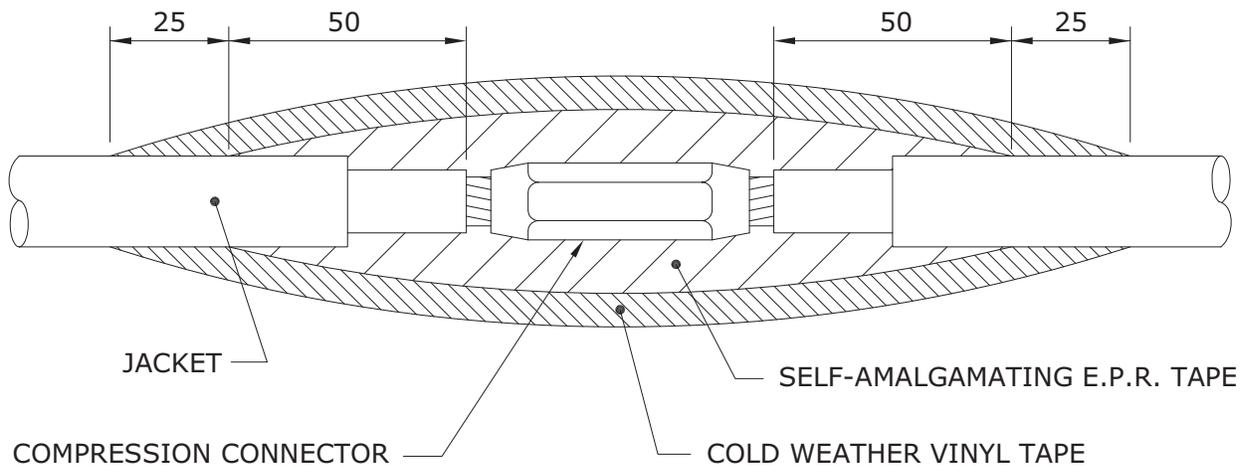


FIGURE 2

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 97-01-08		10-12 1 REVISED COMPRESSION CONNECTOR AND NOTE 2		SPLICES FOR UNDERGROUND SECONDARY CABLES	
DRAWN W.B./CAD	CHECKED K.C.H.	DATE 96-05	CD 215-12		SHT 0003 OF 3
				REV 01	

CABLE PREPARATION:

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

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

* ROD IS FACTORY CRIMPED INTO CONNECTOR

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

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

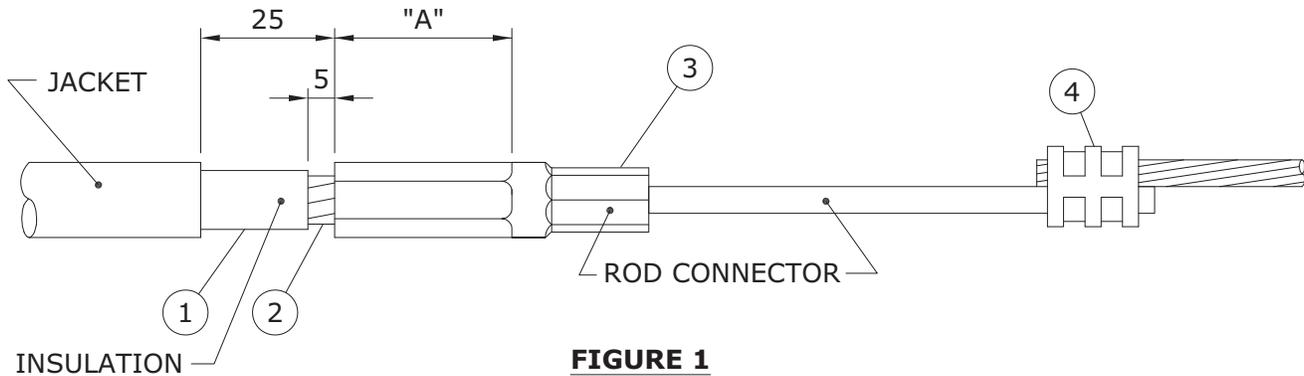


FIGURE 1

NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

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

TAPING:

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

NOTE:

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

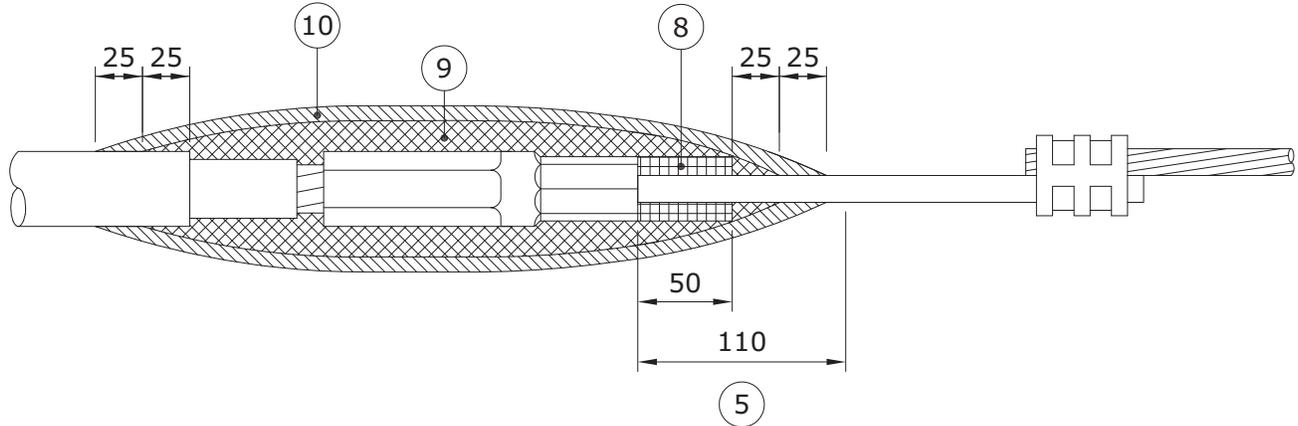


FIGURE 2

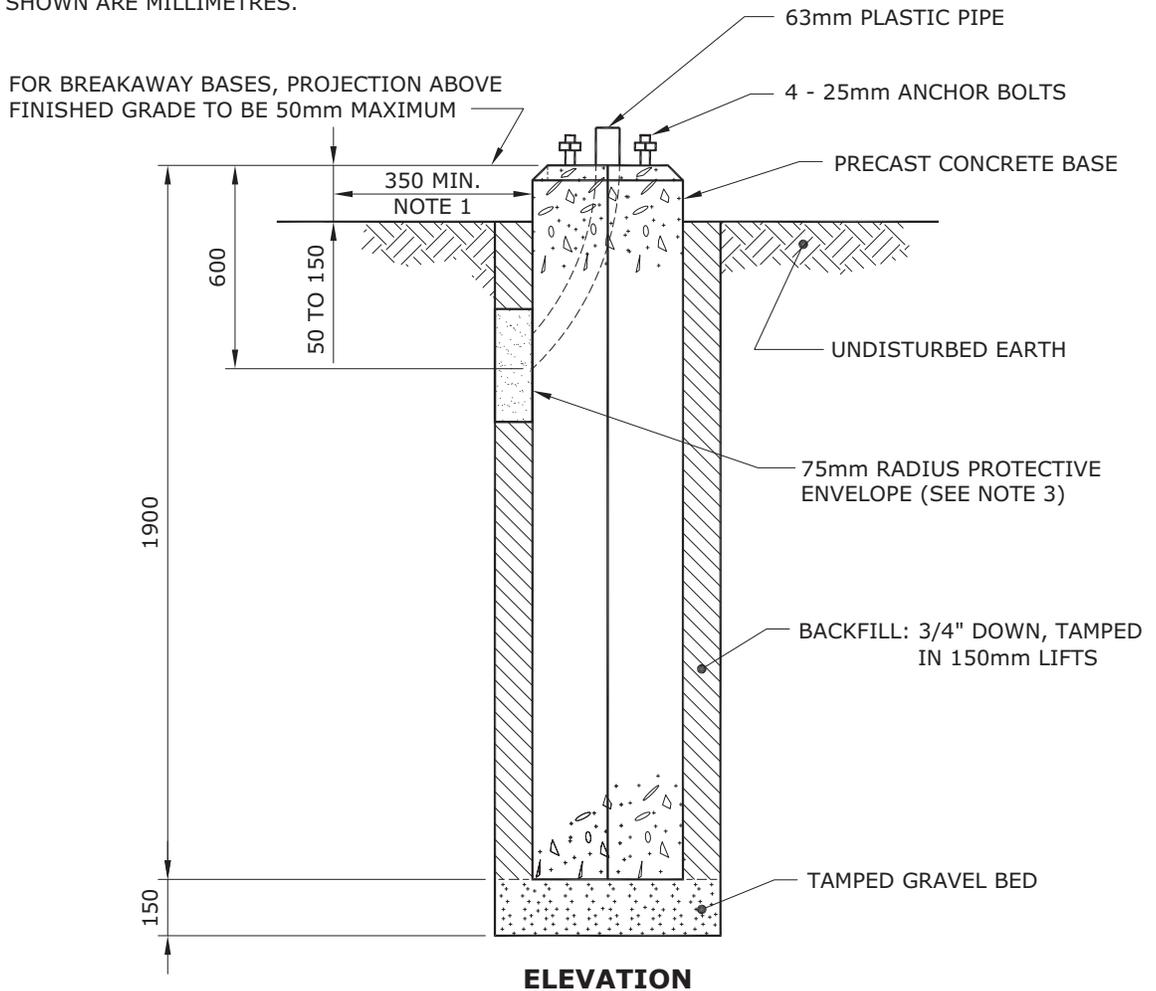
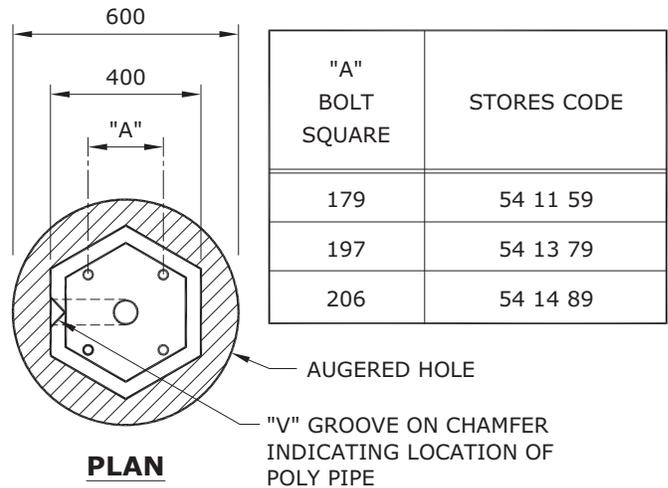
NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

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

7.7 - 10.7 STREET LIGHT POLES

NOTES:

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

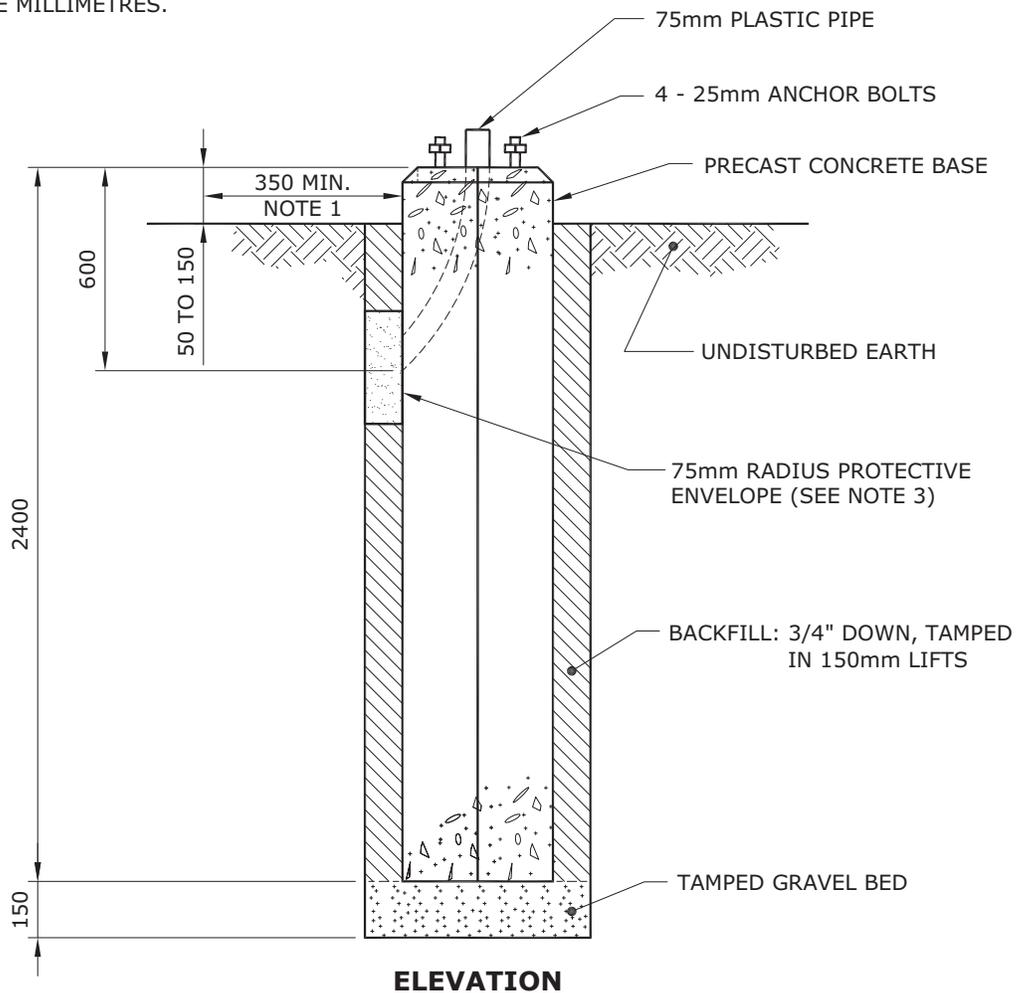
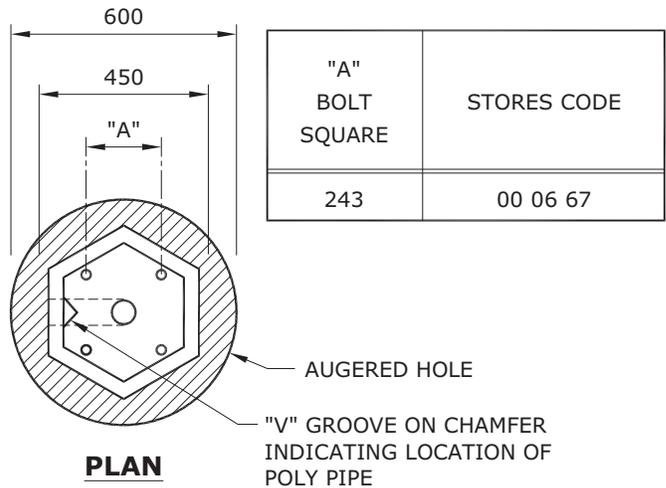


APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-29	10-08	3	CHANGED BACKFILL NOTES, AND ADDED SHEET 3	INSTALLATION OF PRECAST CONCRETE BASE			
	99-05	2	SHEET 2 of 2 ADDED, 7.7 - 10.7 STREET LIGHT ADDED				
	96-10	1	V-GROOVE LOCATION, POLY PIPE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

13.7 STREET LIGHT POLE

NOTES:

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

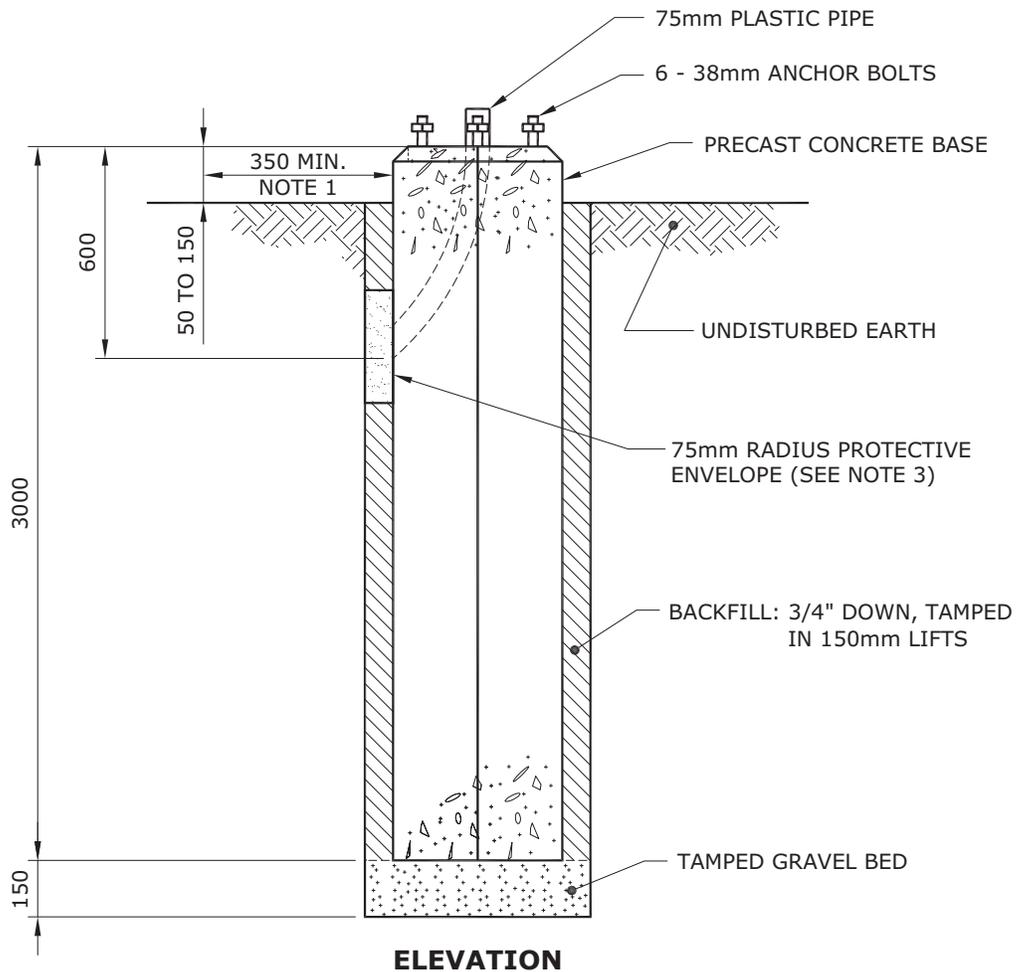
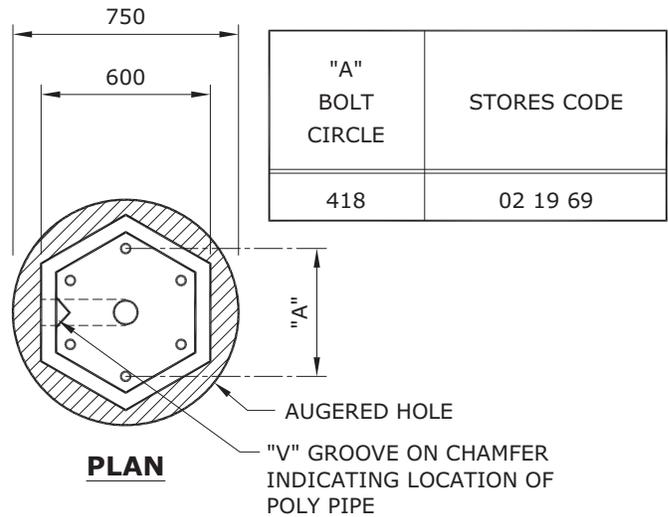


APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-29		INSTALLATION OF PRECAST CONCRETE BASE	
	10-08	1	CHANGED BACKFILL NOTES, AND ADDED SHEET 3
DRAWN R.L.B./CAD	CHECKED L.D./K.C.H.	DATE 99-05	CD 300-6
		SHT 0002 OF 3	REV 01

16.8m & 19.8m STREET LIGHT POLE

NOTES:

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



APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY K.C. HAMILTON 10-08-13		INSTALLATION OF PRECAST CONCRETE BASE	
DRAWN C.A.	CHECKED L.D./K.C.H.	DATE 10-08	CD 300-6
			SHT 0003 OF 3
			REV 00

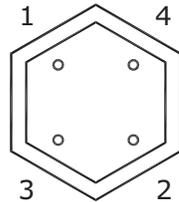
TO DEVELOP THE REQUIRED TENSION ON ANCHOR RODS, THE TURN-OF-NUT METHOD IS USED.

TURN-OF-NUT

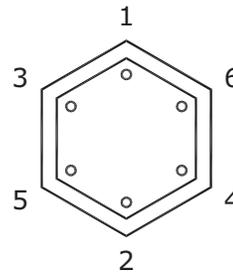
1. ENSURE ALL ANCHOR RODS AND NUTS ARE FREE OF DEBRIS AND THAT THE ANCHOR RODS ARE LUBRICATED.
2. PLACE POLE ONTO CONCRETE PILE, INSTALL WASHERS AND NUTS AND TIGHTEN UNTIL DEVELOPING A SNUG-TIGHTENED CONNECTION.

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

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



FOUR ANCHOR BOLT PATTERN
(13.7m AND BELOW)



SIX ANCHOR BOLT PATTERN
(16.8m AND 19.8m)

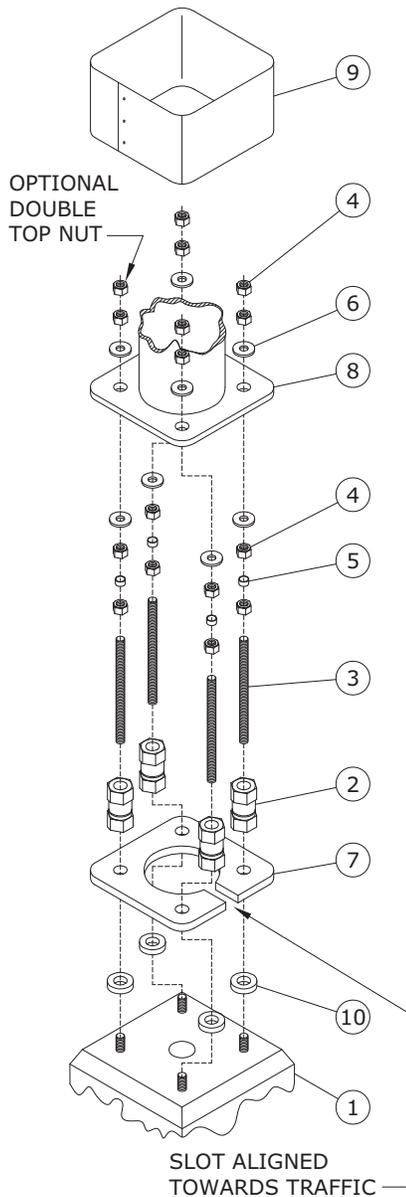
4. ENSURE THE POLE IS PLUMB AND ADD LEVELING SHIMS IF REQUIRED. SNUG-TIGHTEN THE ANCHOR BOLTS AGAIN.
5. BEVELED WASHERS ARE REQUIRED IF THE NUT CANNOT BE BROUGHT INTO FIRM CONTACT WITH THE BASE PLATE.
6. MARK THE REFERENCE LOCATION OF THE NUT AFTER SNUG-TIGHTENING THE PLUMB POLE.
7. FINAL TIGHTENING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

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

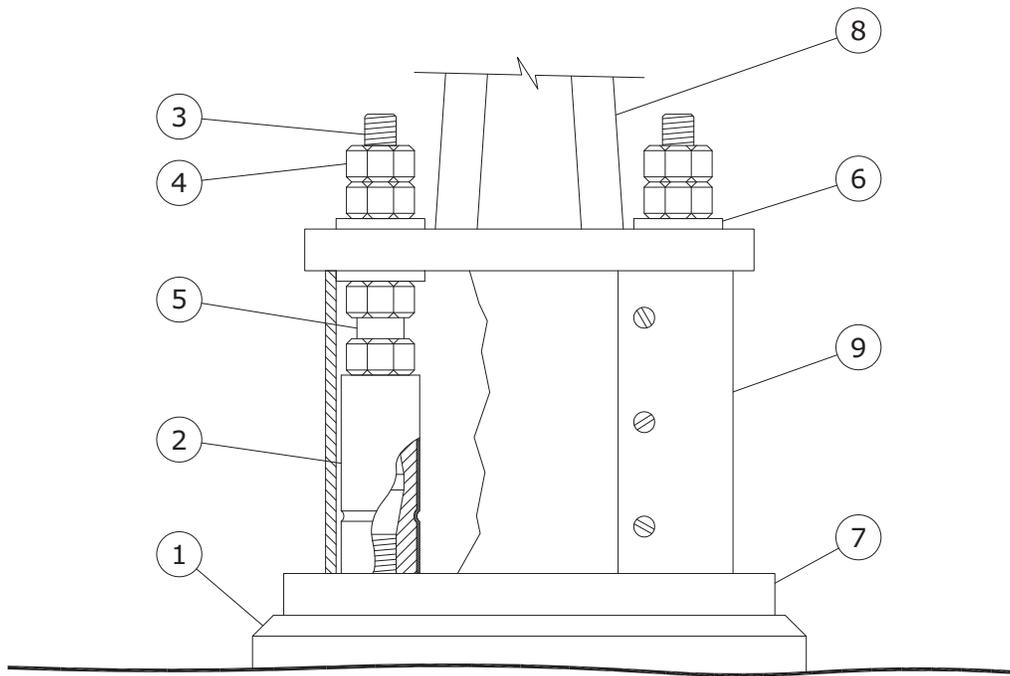
THE FOLLOWING INSTALLATION INSTRUCTIONS ARE APPLICABLE TO NEW OR EXISTING BREAKAWAY BASE INSTALLATIONS ON CONCRETE BASES.

PROCEDURE:

1. CLEAN THE TOP SURFACE OF THE CONCRETE BASE AND ENSURE SURFACE IS FLAT AND LEVEL WITH NO SPALLING OR OTHER SURFACE CONDITIONS THAT MAY AFFECT THE PERFORMANCE OF THE COUPLERS.
2. THE PREFERRED MAXIMUM HEIGHT ABOVE LEVEL GRADE TO THE BASE OF THE COUPLER IS 50mm OR LESS. THIS PROVIDES THE RECOMMENDED CLEARANCE IN THE EVENT OF A COLLISION WITH THE STRUCTURE.
3. MEASURE THE HEIGHT OF THE THREADED ANCHOR BOLTS ABOVE THE REACTION PLATE AND VERIFY THIS MEASUREMENT IS BETWEEN 1 1/4" AND 1 5/8".
4. IF THE EXPOSED LENGTH OF THE ANCHOR BOLT IS GREATER THAN THE RECOMMENDED LENGTH, OPTIONAL SPACERS MAY BE USED (ITEM 10).
5. IT IS RECOMMENDED THAT THE THREADED ANCHOR BOLT-COUPLER CONNECTION BE COATED WITH RUST-INHIBITING GREASE. THIS WILL FACILITATE REMOVAL OF THE COUPLER WHEN IT IS NECESSARY. A SUITABLE PRODUCT FOR THIS APPLICATION IS ARCAN 1, A WHITE, WATER RESISTANT GREASE MARKETED BY IMPERIAL OIL LTD.
6. THREAD THE COUPLER ASSEMBLY ON EACH ANCHOR BOLT (IF THE COUPLER ASSEMBLY UPPER STUD BECOMES LOOSE AS A RESULT OF HANDLING, ENSURE THAT THE STUD IS ENGAGED AT LEAST 38mm BUT NOT MORE THAN 44mm IN THE COUPLER BEFORE LOCKING WITH THE LOCK NUT.)
7. SUNG 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.



APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	10-08	3	UPDATED STANDARD, REVISED TITLE, AND ADDED SHEET 2	BREAKAWAY BASE INSTALLATION	
	07-06	2	REVISED NOTE 4 AND ADDED NOTE 5		
	94-07	1	REVISED NOTE 4		
DRAWN C.A.	CHECKED L.D./K.C.H.	DATE 88-06	CD 300-10		SHT 0001 OF 2
					REV 03



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 ORIGINAL DRAWING SEALED BY K.C. HAMILTON 10-08-13	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
			BREAKAWAY BASE INSTALLATION		
DRAWN C.A.	CHECKED L.D.	DATE 10-08	CD 300-10	SHT 0002 OF 2	REV 00

TRENCH AND PLOW-IN LOCATION

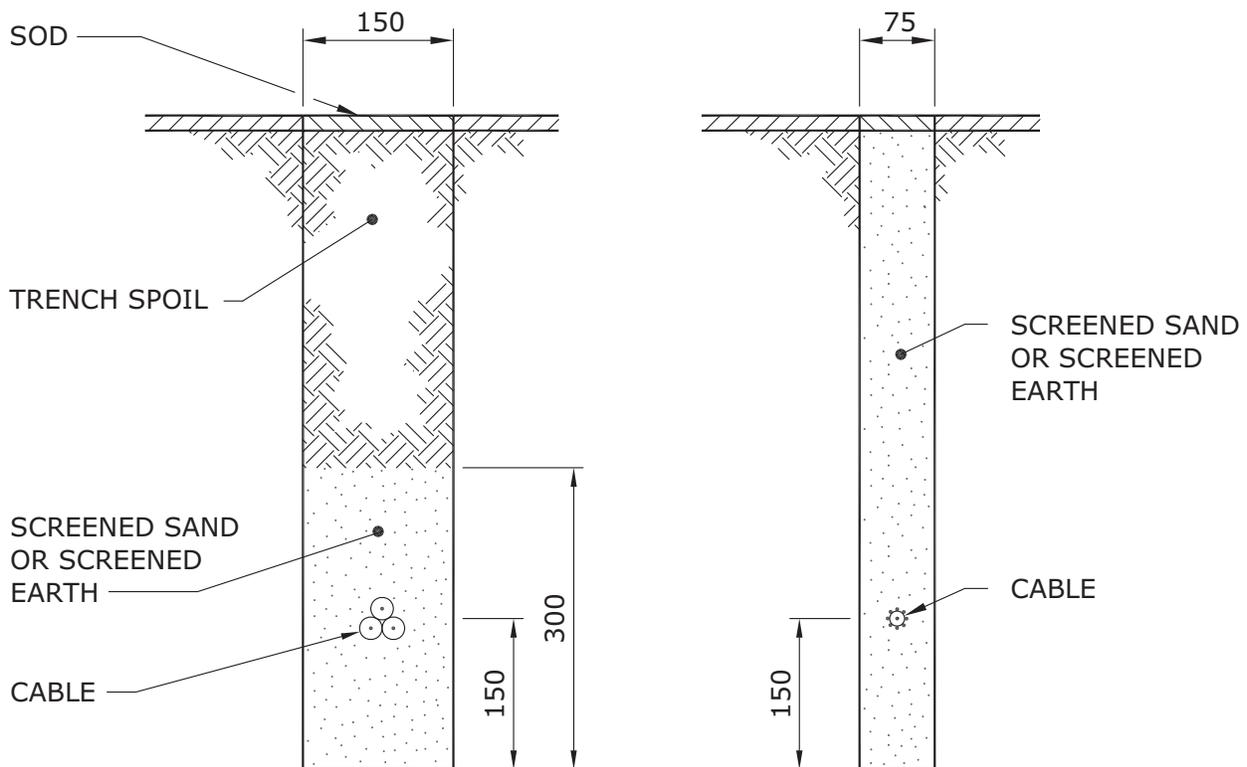
GENERALLY, THE TRENCH LOCATION WILL DICTATE THE LOCATION OF THE LIGHT STANDARDS. CONTACT SHALL BE MADE WITH THE GOVERNING MUNICIPAL AUTHORITY TO DETERMINE THEIR SET BACK REQUIREMENTS. CONTACT SHALL ALSO BE MADE WITH THE CITY OF WINNIPEG UNDERGROUND STRUCTURES OR THE INDIVIDUAL UTILITIES OUTSIDE WINNIPEG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

DEPTH OF BURIAL

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

TRENCH DETAILS

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



NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

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

NOTES:

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

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

1. **GENERAL**

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

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

2. **USE OF POLYETHYLENE PIPE**

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

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

3. **SPLICES - UNDERGROUND CABLES**

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

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

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

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

4. **CABLE END CAPS**

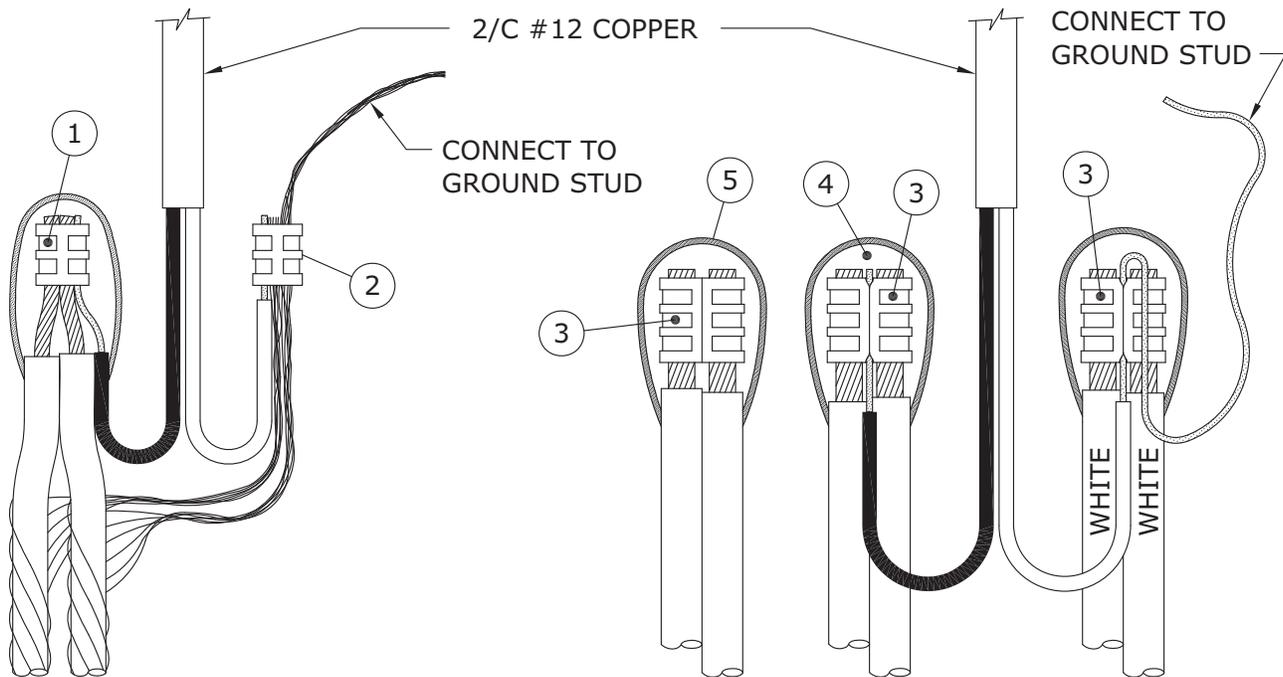
STREET LIGHT CABLES WHICH ARE NOT GOING TO BE SPLICED OR TERMINATED IMMEDIATELY FOLLOWING INSTALLATION SHALL BE CUT SQUARE AND SEALED WITH AN END CAP. REFER TO DRAWING CD215-21 FOR DETAILS.

5. **GROUNDING OF STREET LIGHT STANDARDS**

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

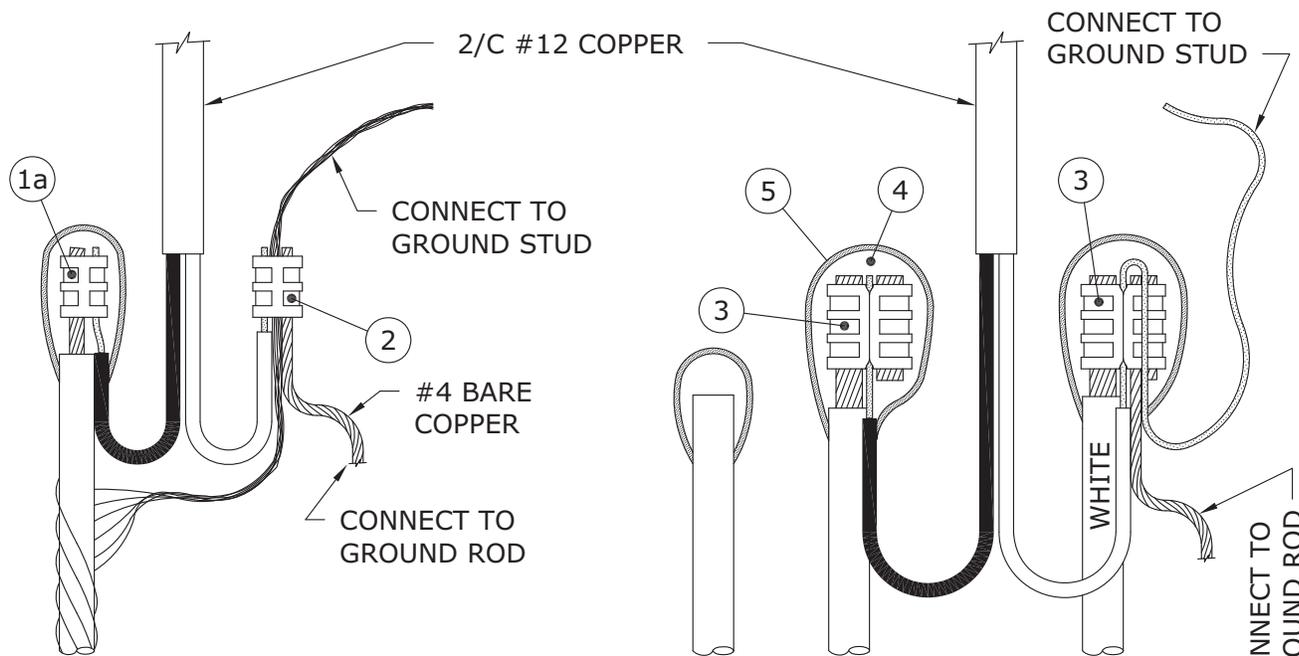
5.2 A GROUND ROD SHALL BE INSTALLED AND CONNECTED TO THE GROUND STUD AT THE LAST STANDARD ON THE STREET LIGHT CIRCUIT.

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



**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 E.H. WIEBE 89-04-28		94-04 1 CONN. REVISED DUE TO INSUL. NEUTRAL		CONNECTION DETAIL IN STEEL STREET LIGHT STANDARD	
		DATE 88-07		CD 310-4	
				SHT 0001 OF 2	
				REV 01	

BILL OF MATERIAL

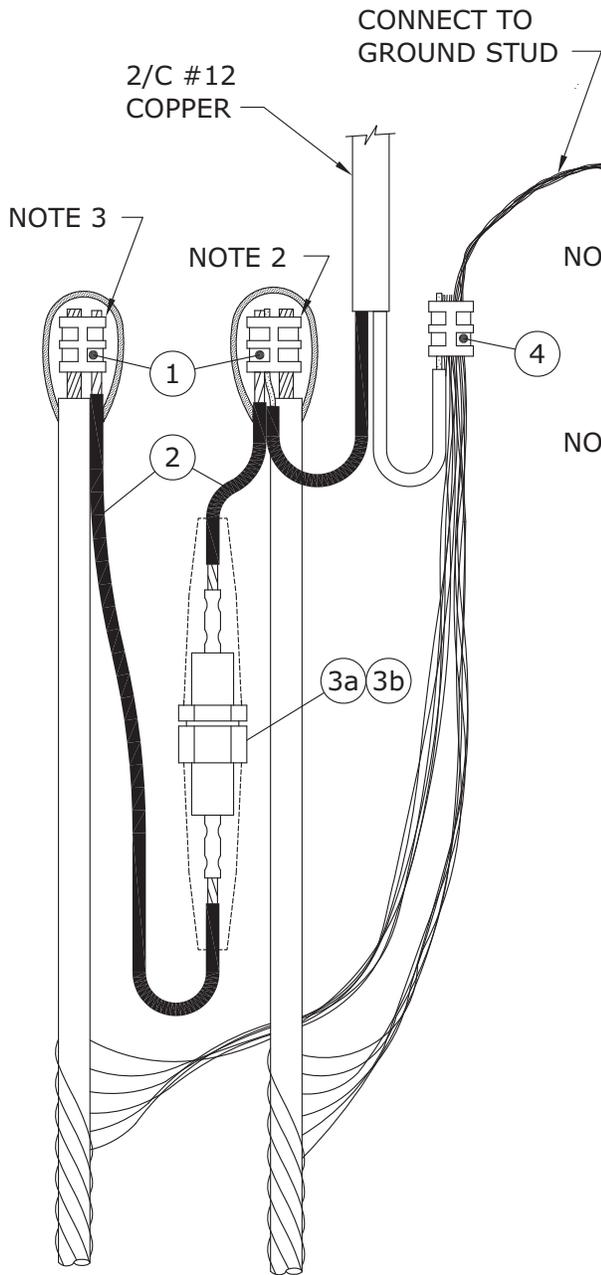
ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH # 4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	'C' TYPE AL. COMPRESSION TAP	74 41 30	---	1
1a	'H' TYPE AL. COMPRESSION TAP	74 40 10	---	1 *
2	'C' TYPE CU. COMPRESSION TAP	74 40 90	---	1
3	'H' TYPE AL. COMPRESSION TAP	---	74 40 60	3 **
4	TAPE, 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.

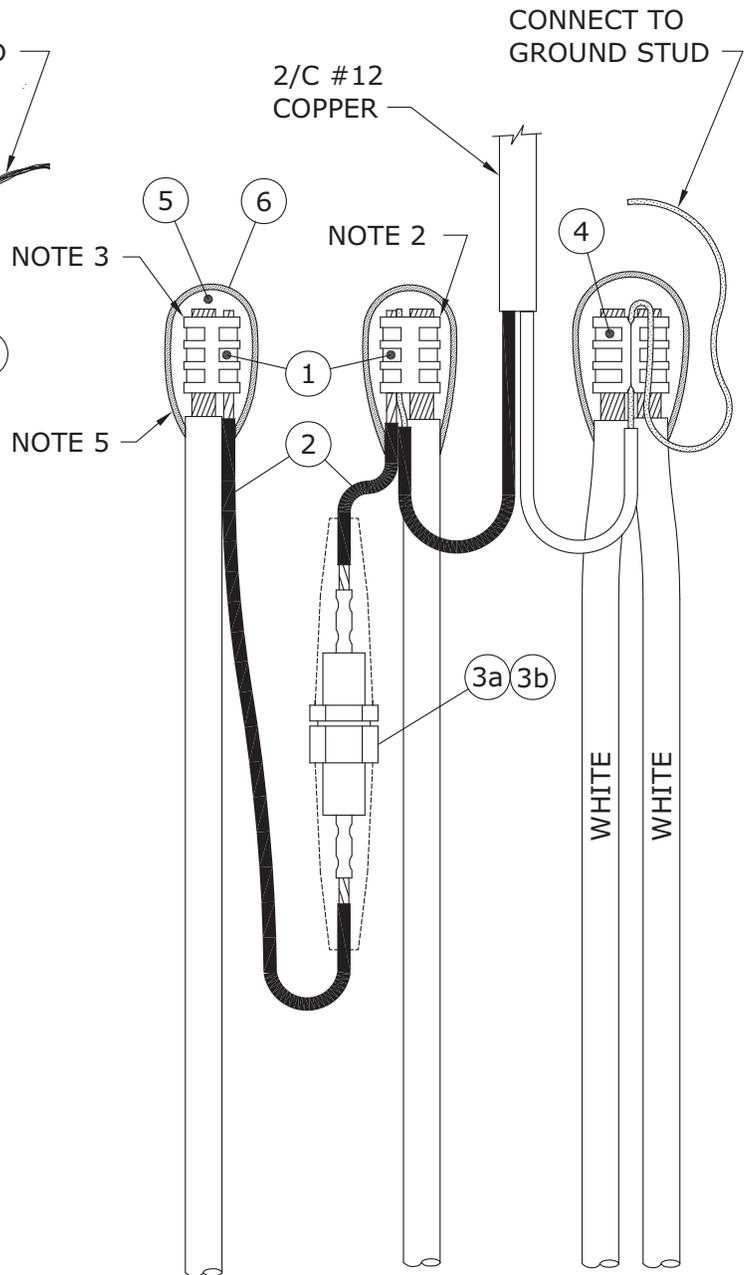
NOTES:

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 E.H. WIEBE 94-07-03				CONNECTION DETAIL IN STEEL STREET LIGHT STANDARD					
DRAWN W.B./CAD	CHECKED W.C.	DATE 94-05	CD 310-4		<table border="1"> <tr> <td>SHT</td> <td>REV</td> </tr> <tr> <td>0002 OF 2</td> <td>00</td> </tr> </table>	SHT	REV	0002 OF 2	00
SHT	REV								
0002 OF 2	00								



No. 4 ALUMINUM C/N CABLE



1/0 ALUMINUM TRIPLEX CABLE

APPROVED	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28			STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD	
	94-04	1		
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-07	CD 310-9	
			SHT 0001 OF 2	REV 01

BILL OF MATERIAL

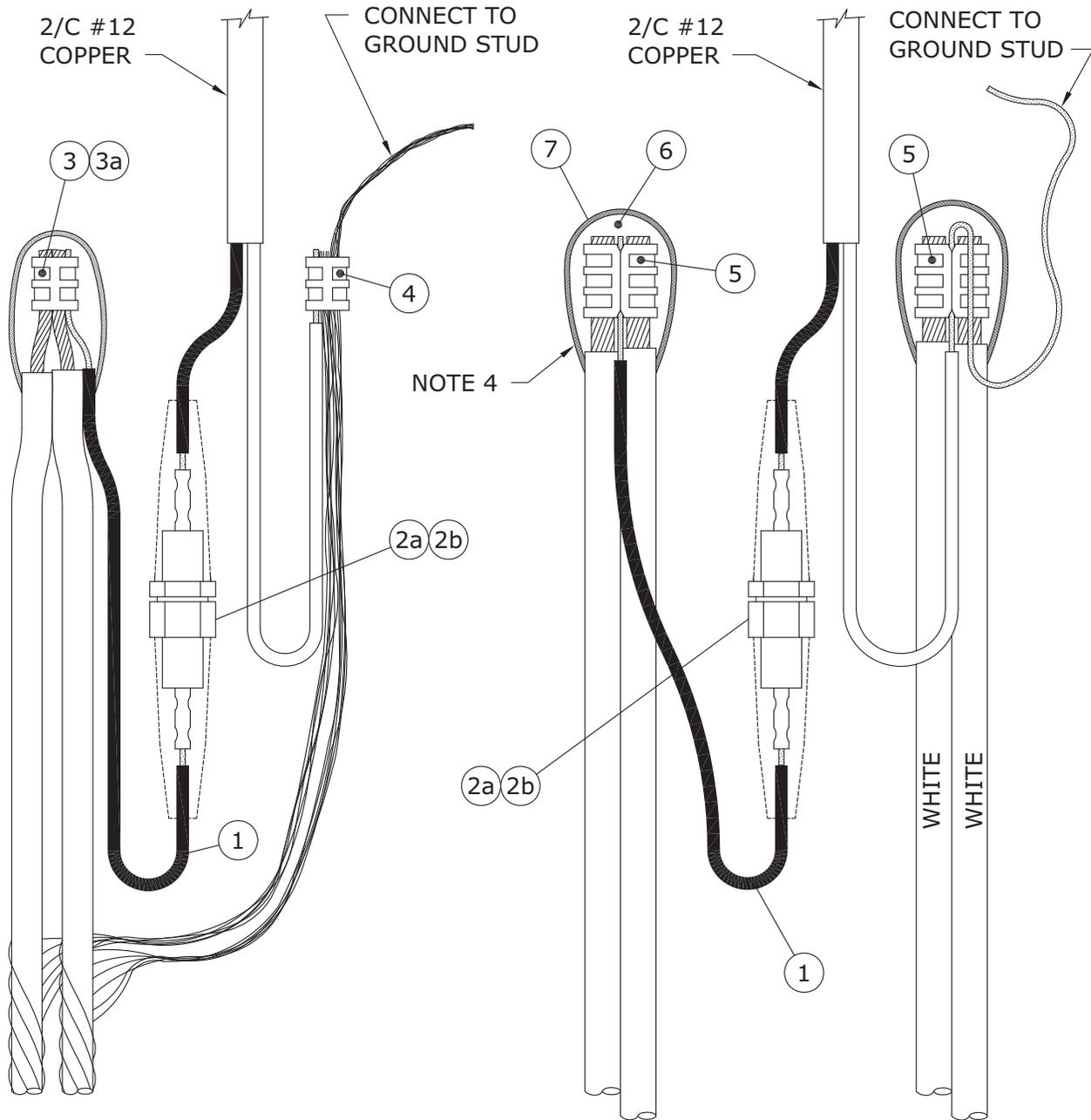
ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH # 4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	'H' TYPE COMPRESSION TAP	74 40 10	74 40 30	2
2	WIRE, # 8 CU., 600V, PVC	93 10 08	93 10 08	1m
3a	FUSEHOLDER, 15/30A C/W BOOTS	31 91 30	31 91 30	1
3b	FUSE, 30A	31 14 30	31 14 30	1
4	'C' TYPE COMPRESSION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

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

NOTES:

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

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03				STREET LIGHT CIRCUIT PROTECTED BY 30A FUSE IN STREET LIGHT STANDARD	
DRAWN W.B./CAD	CHECKED W.C.	DATE 94-05	CD 310-9		SHT 0002 OF 2
					REV 00



No. 4 ALUMINUM C/N CABLE

1/0 ALUMINUM TRIPLEX CABLE

NOTE:

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

APPROVED	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28			INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD		
	95-01	2			NOTE ADDED
	94-04	1			CONN. REVISED DUE TO INSUL. NEUTRAL
DRAWN W.B./CAD	CHECKED G.W.	DATE 88-07	CD 310-10		
			SHT 0001 OF 2	REV 02	

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 E.H. WIEBE 94-07-03				INDIVIDUAL LUMINAIRE PROTECTED BY 15A FUSE IN STREET LIGHT STANDARD					
DRAWN W.B./CAD	CHECKED W.C.	DATE 94-05	CD 310-10		<table border="1"> <tr> <td>SHT</td> <td>REV</td> </tr> <tr> <td>0002 OF 2</td> <td>00</td> </tr> </table>	SHT	REV	0002 OF 2	00
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SUPPLY VOLTAGES

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

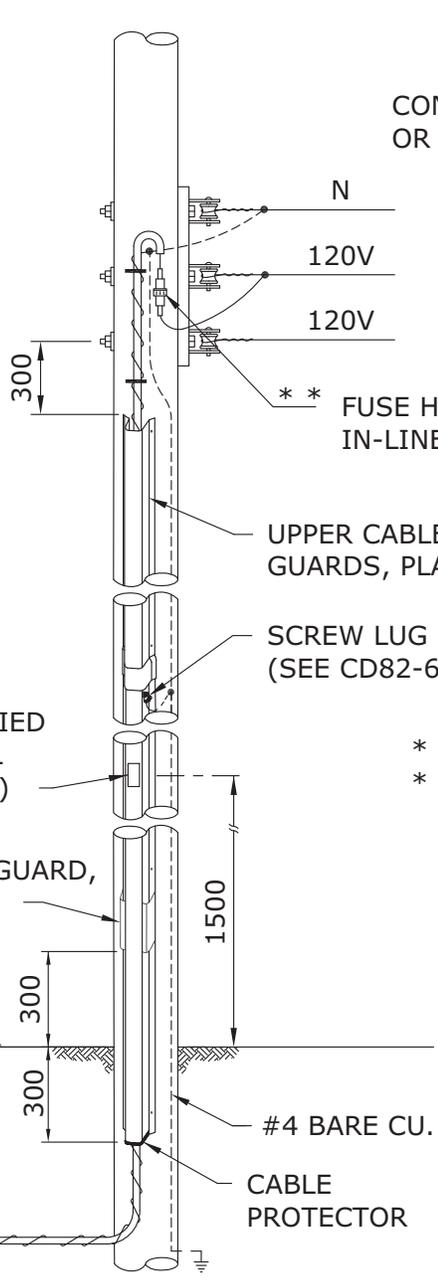
THE MAJORITY OF ROADWAY LUMINAIRES ARE RATED FOR OPERATION ON EITHER 120 VOLT OR 240 VOLT CIRCUITS AND ARE FACTORY WIRED FOR 120 VOLT OPERATION EXCEPT FOR 400 WATT H.P.S. LUMINAIRES WHICH ARE RATED FOR 120/240 VOLT OPERATION BUT ARE FACTORY WIRED FOR 240 VOLT OPERATION.

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

CAUTION:

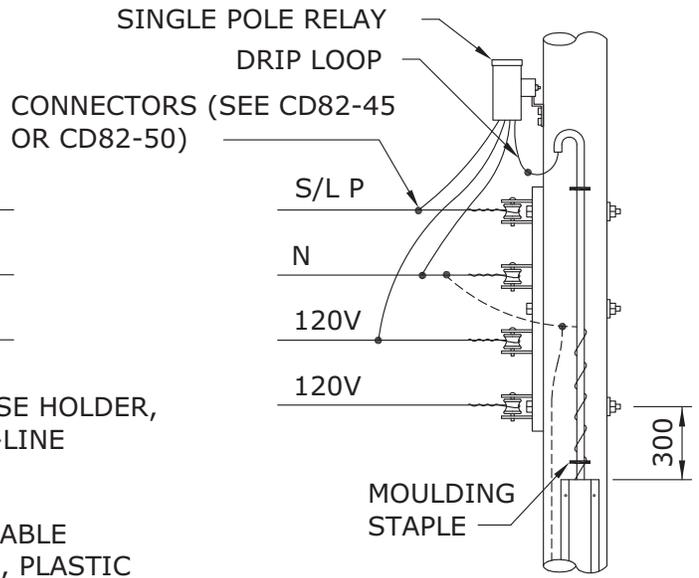
PRIOR TO CONNECTING LUMINAIRES TO A 240 VOLT SUPPLY CIRCUIT IT IS IMPORTANT TO CHECK THE INTERNAL CONNECTIONS TO THE TERMINAL BLOCK TO ENSURE THAT THE UNIT IS PROPERLY CONNECTED FOR 240 VOLT OPERATION.

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



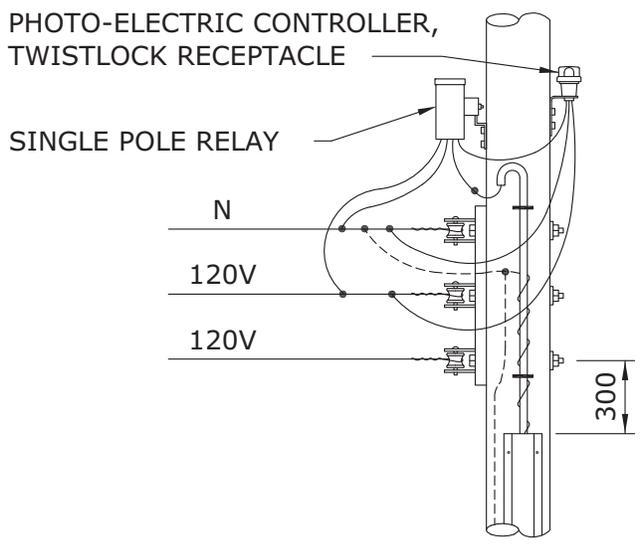
**IN-LINE
FUSE PROTECTED**

** USED WHERE POLY ISN'T USED



**STREET LIGHT PILOT WIRE
CONTROLLED RELAY**

* PHOTO-ELECTRIC CONTROLLER,
* TWISTLOCK RECEPTACLE



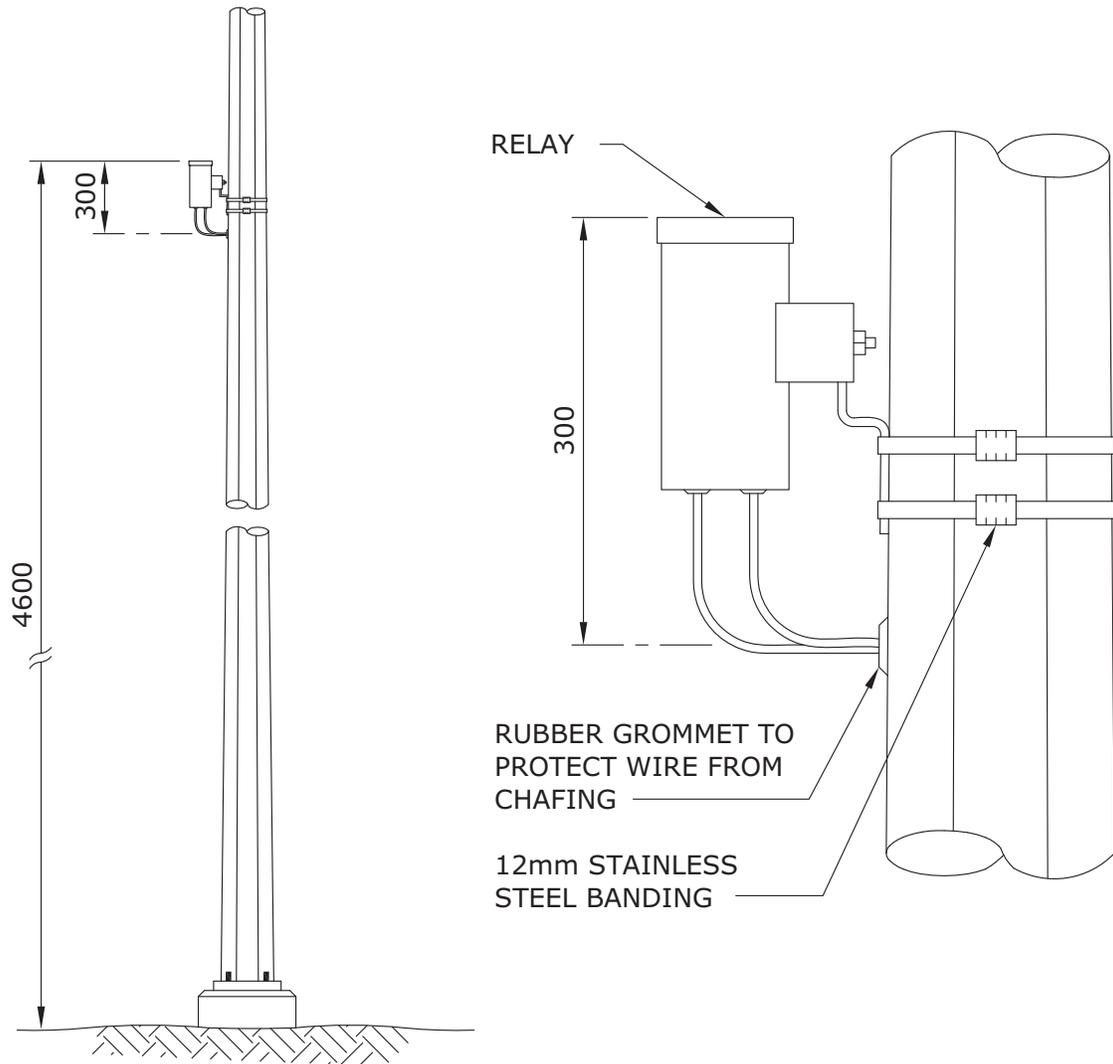
**P.E. CELL
CONTROLLED RELAY**

* 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.

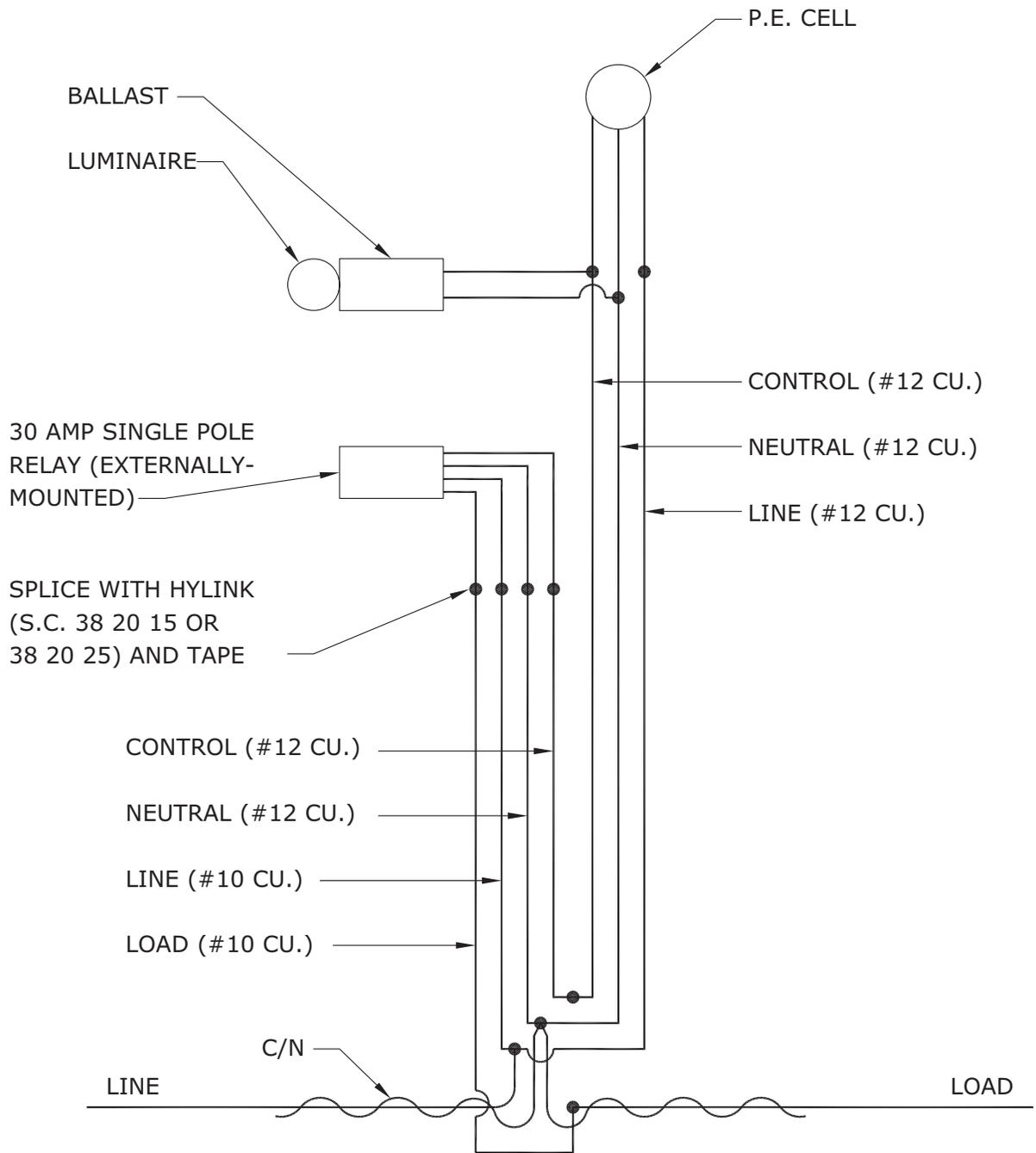
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28	99-08	3	SHOW VENTED CABLE GUARD, SHEET 2 DELETED	DIP POLE FOR UNDERGROUND STREET LIGHTING CIRCUIT	
	94-04	2	DWG. REFERENCE CHANGED		
	92-06	1	NOTE 1		
DRAWN R.L.B./CAD	CHECKED K.C.H.	DATE 88-08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



NOTES:

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

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS					
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				INSTALLATION OF EXTERNALLY-MOUNTED RELAY					
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-09	CD 315-12		<table border="1"> <tr> <td>SHT</td> <td>REV</td> </tr> <tr> <td>0001 OF 1</td> <td>00</td> </tr> </table>	SHT	REV	0001 OF 1	00
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APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS										
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28		<table border="1"> <tr> <td>94-03</td> <td>1</td> <td>MAXIMUM RELAY SIZE</td> </tr> </table>		94-03	1	MAXIMUM RELAY SIZE	<p style="text-align: center;">CONNECTION SCHEMATIC</p> <p style="text-align: center;">FOR</p> <p style="text-align: center;">EXTERNALLY-MOUNTED RELAY</p>							
				94-03	1	MAXIMUM RELAY SIZE								
<table border="1"> <tr> <td>DRAWN</td> <td>CHECKED</td> <td>DATE</td> <td colspan="2" rowspan="2" style="text-align: center;">CD 315-13</td> <td>SHT</td> <td>REV</td> </tr> <tr> <td>W.B./CAD</td> <td>W.C.</td> <td>88-09</td> <td>0001</td> <td>OF 1</td> <td>01</td> </tr> </table>		DRAWN	CHECKED	DATE	CD 315-13		SHT	REV	W.B./CAD	W.C.	88-09	0001	OF 1	01
DRAWN	CHECKED	DATE	CD 315-13				SHT	REV						
W.B./CAD	W.C.	88-09			0001	OF 1	01							

APPENDIX 'C'

MANITOBA HYDRO

**GUIDELINES FOR EXCAVATION OF
CABLES BY WATER
PRESSURE/VACUUM SYSTEMS**

**Corporate Safety & Health
Division**



**GUIDELINES FOR EXCAVATION OF CABLES
BY WATER PRESSURE/VACUUM SYSTEMS
(HYDRO-VAC)**

For further information, please contact:

Safety Policies, Publications and Training Department 204-474-3766

Disclaimer:

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For the most up-to-date version, refer to the CS&H website at:
<http://coil.hydro.mb.ca/esh/publications>

Forms are available at: <http://coil.hydro.mb.ca/esh/> ___N/A___

For any concerns or questions, please contact Safety Policies, Publications and Training Department at 204-474-3766

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Manitoba Hydro

GUIDELINES FOR EXCAVATION OF CABLES BY WATER PRESSURE/ VACUUM SYSTEMS (HYDRO-VAC)



Corporate Safety and Health Division

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EXCAVATION OF CABLES BY WATER PRESSURE/VACUUM SYSTEMS (HYDRO-VAC)

This publication provides the user of the water pressure/vacuum systems with operating limits for excavating within 3.0 m (10 ft.) of energized and de-energized cables.

1.0 BACKGROUND AND EXPLANATION

1.1 Process

An alternative to exposing cables by “hand digging” is to use a water pressure/vacuum system capable of exposing Manitoba Hydro cables without damage. This service is available from a number of companies using the same basic operating concept with variations in the capabilities of each machine.

All of the water pressure/vacuum systems presently available have a combination of water temperature and pressure that have the potential to damage Manitoba Hydro underground cables.

1.2 Legislative Requirements

To comply with Manitoba Regulation 217/2006 (26.6(1)), Manitoba Hydro will provide underground locations when a “Work Clearance Request” has been made and, where possible, de-energize underground cables prior to being exposed. Where de-energizing underground cables is not possible and the excavation is to be within 1 m (3 ft.) of locations, a Safety Watcher may be required during the excavation process. There are limitations to the types of cable and voltages that can be excavated while energized. This information is included in subsections “1.3 Voltages” and “1.4 Cables”. In all situations the Work Clearance Request form details any conditions for the excavation of Manitoba Hydro cables within 3.0 m (10 ft.) of the cable. This includes the time frame that the Work Clearance Request is valid and the lead time required if Manitoba Hydro is to provide a Safety Watcher.

Note: A hydro-vac operator previously approved and trained to Manitoba Hydro standards to recognize and mitigate all hazards associated with the excavation of energized or de-energized cables, will be permitted to expose cables using hydro-vac methods, provided they proceed as trained, and in accordance with the directions in this document.

1.3 Voltages

Manitoba Hydro cables energized at voltages above 25 kV must be de-energized and grounded prior to excavation.

Manitoba Hydro cables listed in subsection “1.4 Cables” cannot be excavated using the water/vacuum system while energized at any primary voltage.

1.4 Cables

The cables noted below are subject to damage at extremely low water pressures and **cannot** be exposed while energized. Districts that have these types of cables will find that they are concentrated in older installation areas. Distribution and “as built” prints will assist in identifying cable types prior to water/vacuum excavation commencing. When it is not possible to determine the cable type by the maps, on site visits by qualified staff to verify cable type will be necessary prior to excavation. These cables can be exposed using the water/vacuum system after they have been de-energized and grounded providing complete inspection of the cable is carried out prior to the cable being re-energized. If direct contact of the water stream is applied to these types of cables, damage can be expected.

Reason: These cables have a high failure rate due to long term moisture migration into the insulation through the jacket and conductor. Exposing this cable by any technique while energized will make these cables very susceptible to failure.

Cables subject to damage include:

Jacketed 5 kV & 15 kV Rated Cable installed 1970 and earlier

#2, 2/0 or 4/0 Copper 5 kV & 15 kV rated cable having a butyl rubber type insulation and the concentric neutral covered with a neoprene or PVC jacket (red or black in colour). Identified on the distribution maps as follows:

- * RINJ C/N **kV
- * RI/PVCJ C/N **kV

Jacketed 25 kV Rated Cable installed 1974 and earlier

All 25 kV rated cables having an XLPE type insulation with a copper taped shield covered with a red PVC jacket. Identified on the distribution maps as follows:

- * AL XLPE 25 kV PVC
- * CU XLPE 25 kV PVC

Unjacketed 15 kV Rated Cable installed 1972 and earlier

#2, 4/0, or 350 MCM Copper 15 kV rated cable having an XLPE type insulation, with the concentric neutral unjacketed (bare). Identified on the distribution maps as follows:

- * CU XLPE C/N 15 kV

* = any size conductor **= any voltage cable

1.5 Operating Temperatures and Pressures

The water/vacuum systems tested by Manitoba Hydro varied in operating temperatures and pressures to extremes of 65.5°C (150°F) and 3000 psi pressure.

When excavating within 1 m (3 ft.) of Manitoba Hydro cable locations for energized or de-energized cables, the water temperature shall be limited to 38°C (100°F) and 1500 psi pressure. Systems must be capable of constant monitoring of temperature and pressure to ensure these limits are not exceeded.

1.6 Wand Tips and Vacuum Tube Ends

Wand tips shall be the oscillating type to prevent a concentrated water stream. This type of tip can be identified by the circular pattern of the water stream evident as pressure is first applied to the wand.

Tests conducted by Manitoba Hydro resulted in cable damage when a single stream nozzle end was directed toward a specific location on the cable. Damage was also observed when the single stream nozzle end was used in a sweeping motion. Single stream nozzle ends must not be used to excavate Manitoba Hydro cables.

The vacuum end is capable of making direct contact with the cable as the excavation progresses and must have a neoprene or equivalent lip to eliminate any occurrence of mechanical damage to the cable.

1.7 Damage

Cable damaged by excessive water pressure will appear as a slice into the cable of unknown depth or as though the outer surface has been torn and pulled outward. Before backfilling an inspection of all exposed cables for damage must be completed by qualified Manitoba Hydro staff.

1.8 Cable Failure

Cable damaged by excessive water pressure can fail immediately or any time thereafter.

2.0 MANITOBA HYDRO RESPONSIBILITIES

2.1 Manitoba Hydro Responsibilities - All Situations

2.1.1 Ensure cable(s) are not energized if over 25 kV and ensure cable(s) listed below are excavated using water pressure/vacuum systems only when de-energized. Complete inspection of the cables listed below is required prior to re-energizing the cables. (See 1.4 Cables for additional information.)

- * RINJ C/N **kV
- * RI/PVCJ C/N **kV
- * AL XLPE 25 kV PVC
- * CU XLPE 25 kV PVC
- * CU XLPE C/N 15 kV

*** = any size conductor ** = any voltage cable**

- 2.1.2** Provide automatic circuit reclose blocking for any lines over 750 V prior to an excavation commencing.
- 2.1.3** Ensure protective barriers are installed by qualified Manitoba Hydro personnel prior to workers entering the excavation. At a minimum, the barrier selected will prevent worker contact with the cables.
- 2.1.4** Inspect all exposed cable before the excavation is backfilled.

2.2 Manitoba Hydro Responsibilities - When Manitoba Hydro Safety Watcher Is Required

In addition to the requirements stated in 2.0 the Manitoba Hydro shall:

- 2.2.1** Provide a qualified Safety Watcher for water/vacuum excavations within 1 m (3 ft.) of energized high voltage cables when required.

Manitoba Hydro Corporate Employee Safety and Health Rule Book - Rule 402 b states:

“If in the opinion of the person in charge of the job, the high voltage work to be undertaken requires special precautions, a qualified Safety Watcher shall be appointed. The person in charge may elect to serve as the Safety Watcher providing his/her undivided attention is given to this duty. The Safety Watcher shall:

1. Be at the immediate work location.
2. Be clearly identified to all workers at the site.
3. Be in clear sight and communication with the workers performing work and;
4. Have full authority to immediately stop the work at any time.”

- 2.2.2** Participate in a pre-job meeting to identify hazards prior to work commencing and ensure an underground location has been completed and is current.
- 2.2.3** Ensure that the water/vacuum system is capable of constant monitoring of pressure and temperature and is equipped with an oscillating tip. The Safety Watcher will ensure settings of 1500 psi water pressure and 38°C (100°F) water temperature are not exceeded when the excavation is 1 m (3 ft.) from energized cable.
- 2.2.4** Inspect all exposed cable. A visual inspection may lead to cable testing prior to any non Manitoba Hydro personnel entering the excavation.
- 2.2.5** Stop excavation if any damaged cable is sighted and notify the appropriate supervisor.
- 2.2.6** Stop excavation as soon as a splice is visibly located. All splices must be inspected by qualified staff prior to hydro-vac excavation resuming.

2.3. Manitoba Hydro Responsibilities - When the Contractors Supplies a Manitoba Hydro Trained Safety Watcher or Hydro-Vac Operator For Excavations Within 1M of Energized Cable

In addition to the requirements stated in 2.1 Manitoba Hydro shall:

- 2.3.1** Ensure that the contractor provided safety watcher or hydro-vac operator has been trained by and to Manitoba Hydro standards.

3.0 CONTRACTOR RESPONSIBILITIES

3.1 Contractor Responsibilities - Energized Cables

- 3.1.1** Ensure a Work Clearance Request is obtained and current.
- 3.1.2** No contractor safety watching shall be performed unless/until a Hot Dig Request has been issued by Manitoba Hydro by fax to the contractors fax number **and** the contractor has contacted the applicable Manitoba Hydro representative to request line blocking.
- 3.1.3** Ensure that the hydro-vac operator, (previously approved and trained to Manitoba Hydro standards to recognize and mitigate all hazards associated with the excavation of energized or de-energized, cables) exposes the cables using hydro-vac equipment.

Where a hydro-vac operator trained as noted is not available, ensure that an employee previously approved and trained to Manitoba Hydro standards to recognize and mitigate all hazards associated with the excavation of energized or de-energized, is provided to act as a safety watcher for the hydro-vac operator.

If staff (previously approved and trained to Manitoba Hydro standards) is not available ensure that a Manitoba Hydro Safety Watcher is provided.

- 3.1.4** Have the Hydro-Vac operator or Safety Watcher (previously approved and trained to Manitoba Hydro standards) attend a pre-job meeting with own staff, prior to commencing excavation work, to recognize and mitigate all hazards associated with the excavation of energized or de-energized, cables. If staff trained as noted are not available ensure that a Manitoba Hydro representative attends the pre-job meeting.
- 3.1.5** Ensure that the Hydro-Vac Operator or the Safety Watchers undivided attention is given to this duty as follows:
1. Be at the immediate work location.
 2. Be clearly identified to all workers at the site.
 3. Be in clear sight and communication with the workers performing work and;
 4. Have full authority to immediately stop the work at any time.”
- 3.1.6** Ensure personal protective equipment including dielectric footwear, rubber gloves, hard hats, appropriate safety eye wear, and hearing protection is worn.

- 3.1.7** Have a water pressure/vacuum system equipped with an oscillating tip on the wand.
- 3.1.8** Have a neoprene end or equivalent attached to the end of the vacuum tube.
- 3.1.9** Have a water pressure/vacuum system equipped with gauges to indicate water temperature and wand pressure settings. Maximum settings when excavating within 1 m (3 ft.) of cable locations will be 38°C (100°F) temperature and 1500 psi pressure.
- 3.1.10** Ensure the excavation vehicle is grounded with a minimum 2/0 copper temporary protective ground attached to a portable ground rod. Consult with the Manitoba Hydro representative completing the “Work Clearance Request” for an appropriate location to install the portable ground rod. If installation of a portable ground rod is not possible due to the type of surface (e.g. cement) consult with the Manitoba Hydro representative for alternatives.
- 3.1.11** Ensure the excavation truck is visibly barricaded at a distance great enough to prevent physical contact from outside the barricaded area to the truck prior to an excavation commencing. If required, emergency shutdown of the excavation equipment must be accomplished from outside the barricaded area.
- 3.1.12** Ensure the excavation area is barricaded prior to commencing work.
- 3.1.13** Ensure that personnel operating the wand and vacuum are wearing the appropriate classification of electrical rubber gloves for the voltage of cable being exposed. Body contact of the vacuum tube above the rubber gloves must be avoided.
- 3.1.14** Complete excavation of the cable by a sweeping motion until the cable is sighted. After the cable has been sighted, the cable shall not be contacted by spray or vacuum.
- 3.1.15** Stop excavation as soon as a splice is visibly located. All splices must be inspected by qualified Manitoba Hydro staff prior to hydro-vac excavation resuming.
- 3.1.16** Prevent the operators of excavation equipment from entering the excavation until barriers are installed by Manitoba Hydro.
- 3.1.17** Ensure protective barriers are installed by qualified Manitoba Hydro personnel prior to workers entering the excavation.
- 3.1.18** Prior to backfilling have Manitoba Hydro staff inspect all exposed cable. All exposed splices must be identified to the Manitoba Hydro representative.

3.2 Contractor Responsibilities - De-Energized And Grounded Cables:

- 3.2.1** Ensure that the Work Clearance Request submitted to and completed by Manitoba Hydro is complete and current.
- 3.2.2** Ensure personal protective equipment including dielectric footwear, hard hats, appropriate safety eye wear, and hearing protection is worn.
- 3.2.3** Have a water pressure/vacuum system equipped with an oscillating tip on the wand.
- 3.2.4** Have a neoprene end or equivalent attached to the end of the vacuum tube.
- 3.2.5** Have a water pressure/vacuum system equipped with gauges to indicate water temperature and wand pressure settings. Maximum settings when excavating within 1 m (3 ft.) of cable locations will be 38°C (100°F) temperature and 1500 psi pressure.
- 3.2.6** Complete excavation of the cable by a sweeping motion until the cable is sighted. After the cable has been sighted, the cable shall not be contacted by spray or vacuum.
- 3.2.7** Prior to backfilling have Manitoba Hydro staff inspect all exposed cable. All exposed splices must be identified to the Manitoba Hydro representative.



**WATER PRESSURE/VACUUM
EXCAVATION CHECKLIST**

Excavation location		
Excavation contractor		Excavation for
EXCAVATION DATE	YYYY mm dd	Feeder number

CHECKLIST	YES	NO	CHECKLIST	YES	NO
Work Clearance Request form current			Safety Watcher identified		
Hazards identified			Pre-job safety orientation meeting completed		
Excavation within 1 m (3 ft.) of location			Appropriate personal protective equipment worn		
Line cannot be de-energized			Operator is wearing the appropriate class rubber gloves		
Line recloser blocked			Oscillating tip is on wand		
Line is 25 kV or below if excavating while energized			Neoprene or equivalent end is on vacuum tube		
Cable must be de-energized			Pressure set to maximum 1500 psi		
All cables listed below must be de-energized prior to water pressure/vacuum excavation - check Distribution and As Built Prints).			Temperature set to maximum 38°C (100°F)		
*RINJ C/N **kV			Vehicle grounded if excavating within 1 m (3 ft.) of underground locations		
*R1/PVCJ C/N **kV			Vehicle barricaded if working within 1 m (3 ft.) of underground locations		
*AL XLPE 25 kV PVC			Excavation area barricaded		
*CU XLPE 25 kV PVC			Cable visually inspected after excavation completed		
*CU XLPE C/N 25 kV			Cables barricaded after inspection		
Any cable energized over 25 kV					
*any size conductor					
**any voltage cable					

Comments

In the event of an emergency requiring medical assistance contact the System Control Centre by radio at 040 or by phone at 477-7268.

Contractor Signature	YYYY mm dd	Safety Worker / Person in Charge Signature	YYYY mm dd
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APPENDIX "D" HOT DIG REQUEST

INSTRUCTIONS TO CONTRACTOR:

1. Line Location and Work Clearance Request forms must be filled out prior to any excavation. Prepare, Discuss, and Review the job plan with the excavator.
2. Complete all applicable fields and provide all required information.
3. Fax this completed form to the applicable Manitoba Hydro Office.

IMPORTANT: No Contractor Safety Watching shall be performed unless/until an Authorized Hot Dig Request has been issued by Manitoba Hydro by fax to the Contractor's fax no. listed below and Contractor has contacted the applicable Manitoba Hydro Representative to request line blocking.

TO BE COMPLETED BY CONTRACTOR:

Contractor's name		Phone no.	Fax no.
Work site location			Map no.
Safety Watcher's name		Phone no. at hot dig site	yyyy mm dd
Excavation being performed <input type="checkbox"/> Install <input type="checkbox"/> Remove <input type="checkbox"/> Repair Specify _____			
Location of work site identification on Work Clearance Request			Work Clearance Request no.
Comments			

EMERGENCY PLAN: call 911

Identify exact location and directions for emergency response

SCHEDULED START DATE AND TIME	yyyy mm dd	hh mm	SCHEDULED COMPLETION DATE AND TIME	yyyy mm dd	hh mm
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Contractor Information	Yes	No	Contractor Information	Yes	No
Safety watcher identified/person in charge			Underground locating equipment on site		
Line Location and Work Clearance Request current			Underground distribution print available		
Excavation within 1 m (3 feet) of location			Proper excavating procedures reviewed with excavator		
Will cables be exposed by soft dig (if Yes, form 303 Water Pressure/Vacuum Excavation Checklist required)			Barrier in place to protect exposed cables		
Hazards identified: Traffic			Public safety reviewed		
Barricade Excavation			Other Utilities located		

INSTRUCTIONS TO MANITOBA HYDRO:

1. Complete all applicable fields and provide all required information.
2. If Authorized, fax completed form to Contractor at fax no. above.

TO BE COMPLETED BY MANITOBA HYDRO:

Manitoba Hydro contact name		Phone no.	Fax no.
Work site location			Map no.
Feeder no.'s	Blocked <input type="checkbox"/> Yes <input type="checkbox"/> No	Removed <input type="checkbox"/> Yes <input type="checkbox"/> No	Voltage
Comments			

Manitoba Hydro Information	Yes	No	Manitoba Hydro Information	Yes	No
Line is 25 kV or below if excavating while energized			Exposed cables will be visually inspected after excavation is complete		
De-energize and ground underground plant					

DATE AND TIME FOR REQUESTED LINE BLOCKING	yyyy mm dd	hh mm	DATE AND TIME FOR REQUESTED REMOVAL OF LINE BLOCKING	yyyy mm dd	hh mm
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Authorized Hot Dig Request - To be signed by Manitoba Hydro Representative if authorized	yyyy mm dd
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Note: See Reverse for District Contacts for Safety Watch.

APPENDIX 'D'

MANITOBA HYDRO

DIRECTIONAL BORING GUIDELINES

**Corporate Safety & Health
Division**



Directional Boring Guidelines

For further information, please contact:
Safety Policies, Publications and Training Department 204-360-3766

Disclaimer:

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For the most up-to-date version, refer to the CS&H website at:
<http://coil.hydro.mb.ca/esh/publications/publications/publications.html>

Forms are available at: <http://coil.hydro.mb.ca/esh/services/>_____

For any concerns or questions, please contact Safety Policies, Publications and Training Department at 204-360-3766.

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Directional Boring - Contractor Guidelines

This guideline is intended to provide direction when directional boring in the Province of Manitoba. The 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.

Definitions

Ground Disturbance: Any activity that disturbs more than the top 15 cm of the ground.

Safety Hold-Off: A Manitoba Hydro procedure which affects a precaution to prohibit re-energizing (by either automatic or manual means) an electrical conductor in case of a trip-out. This procedure includes the application of protective cards. Requirement for a Safety Hold-Off is determined by Manitoba Hydro personnel.

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.

Consistency of Alignment: The uniformity of the alignment of the electrical conductor or natural gas pipeline as determined by the locate flags and marks and/or the repeatability of the physical location of the facility to property lines.

General

- 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's facilities.
- When boring within the tolerance zone of a high pressure gas pipeline or any critical distribution gas pipeline or electrical conductor, as identified by Manitoba Hydro's Facilities Locate personnel, a qualified natural gas or electric safety watcher is required.

Electrical Conductors

Prior to directional boring across Manitoba Hydro electrical conductors the burial depth must be confirmed. Acceptable practice to verify conductor depth is to:

- Expose the conductor by hand digging; or
- Expose the conductor by water pressure/vacuum excavation; or
- locating on the side wall of a trench that has been excavated one metre on either side of the surface locates; or
- by use of reference measurements that are known to be accurate, i.e. electrical duct lines

The drill head and/or back reamer must at all times maintain a minimum of one metre clearance from Manitoba Hydro electrical conductors.

Gas Pipeline

Prior to directional boring across a Manitoba Hydro natural gas pipeline the burial depth and location of all natural gas pipelines being crossed must be **visually** verified. Acceptable practice to verify pipeline depth is to:

- Expose the pipeline by hand digging; or
- Expose the pipeline by water pressure/vacuum excavation

Note: Mechanical excavating equipment cannot be used within 1.0 metre (3 ft) of a natural gas pipeline until the gas pipelines have been exposed. After visual confirmation of the pipelines location, mechanical excavating can be used to excavate no closer than 0.3 metre (1 ft) from a natural gas pipe line.

Note: The drill head and/or back reamer must at all times maintain a minimum of one metre clearance from Manitoba Hydro natural gas pipelines. Where underground facility congestion does not effectively allow a 1.0 metre clearance/separation from Manitoba Hydro facilities, 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 (Figure 1, 2 & 3)

The accuracy of the drill head location and depth must be visually verified 1 metre 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 boring head and/or back reamers path is crossing below a natural gas pipeline or electrical conductor an observer must verify the bore head and/or reamer does not enter the observation hole.
- The minimum dimensions of the observation/discovery hole shall be (see figure 1):
 - 1.0m (3ft) beside the natural gas pipeline or electrical conductor on the near side of the bore path
 - 0.3m (1ft) on the far side of the bore path
 - 0.3m (1ft) on each side of the bore path
 - 0.3m (1ft) below natural gas pipeline or electrical conductor

Figure 1 Observation Hole - Plan View

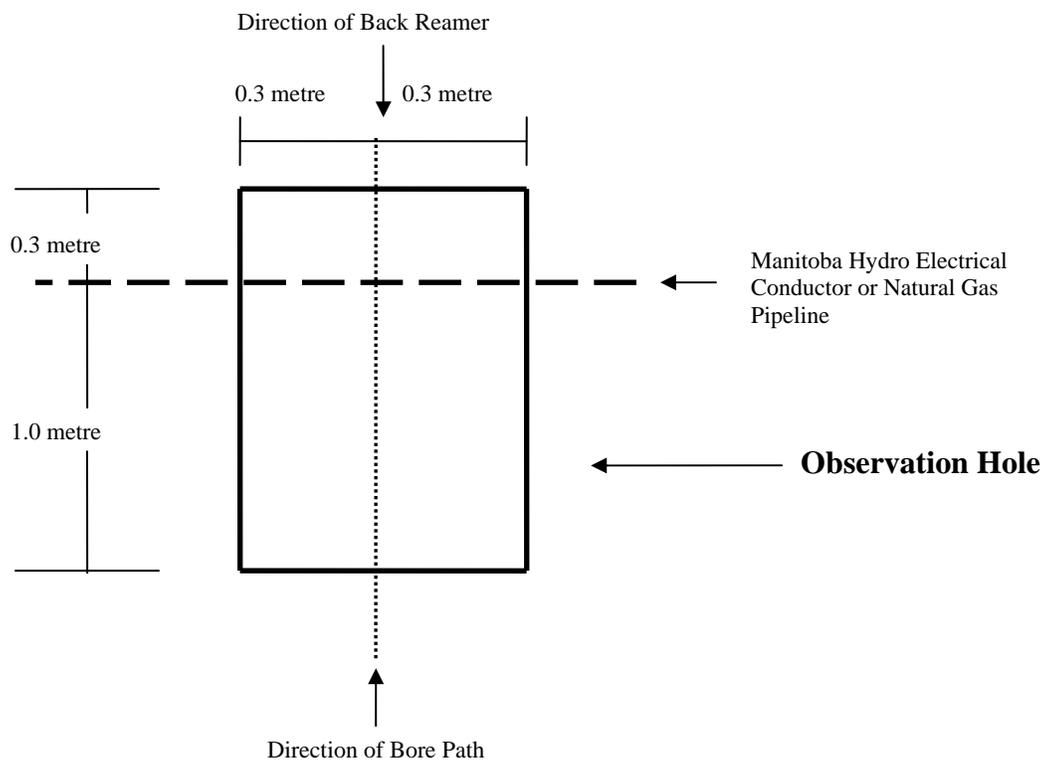


Figure 2 Observation Hole - Profile View

Drilling Below a Manitoba Hydro Electrical Conductor or Natural Gas Pipeline

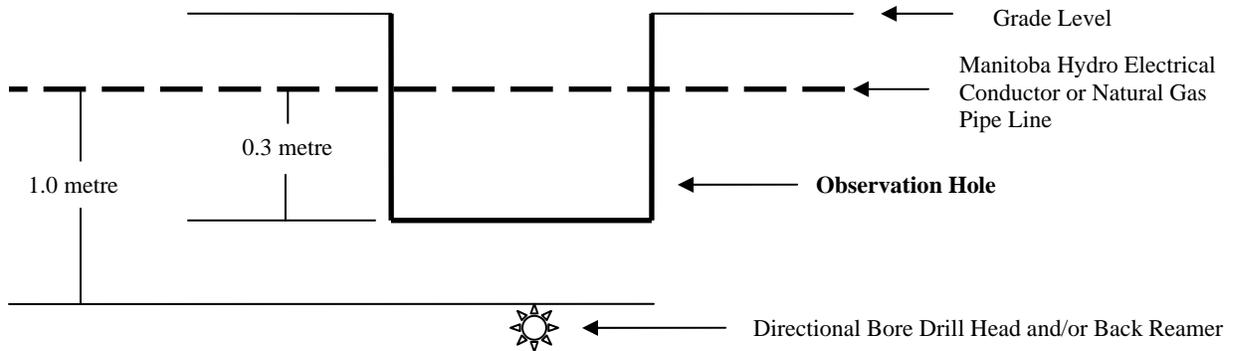
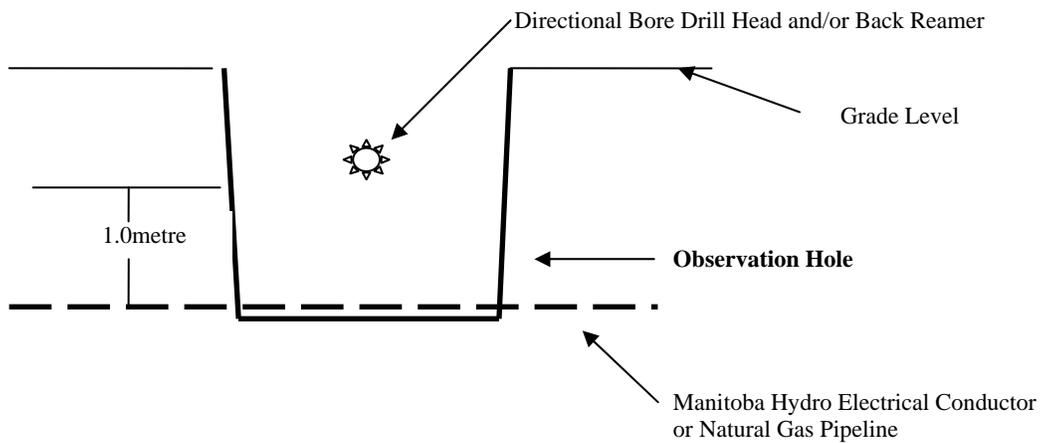


Figure 3 Observation Hole - Profile View

Drilling Above a Manitoba Hydro Electrical Conductor or Natural Gas Pipeline



Paralleling Electrical Conductors & Natural Gas Pipelines (Figures 4, 5 & 6)

- There must be 1.0 metre (3 ft) 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 1.0 metre (3 ft) **horizontally**, the drill must be kept at a depth either deeper or shallower than the existing electrical conductor or natural gas pipeline to maintain 1.0 metre (3 ft) separation when measured diagonally.

- If 1.0 metre (3 ft) **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 a qualified Safety Watcher must be on site.
- When suspected of drilling within 1.0 metre (3 ft) of any electrical conductors or natural gas pipelines 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 facility must be exposed once for each lot, or a minimum of once every 15 metres (50 ft), whichever is the shorter distance, 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.

Figure 4 Drilling Parallel to Manitoba Hydro Conductors and Pipelines - Plan View

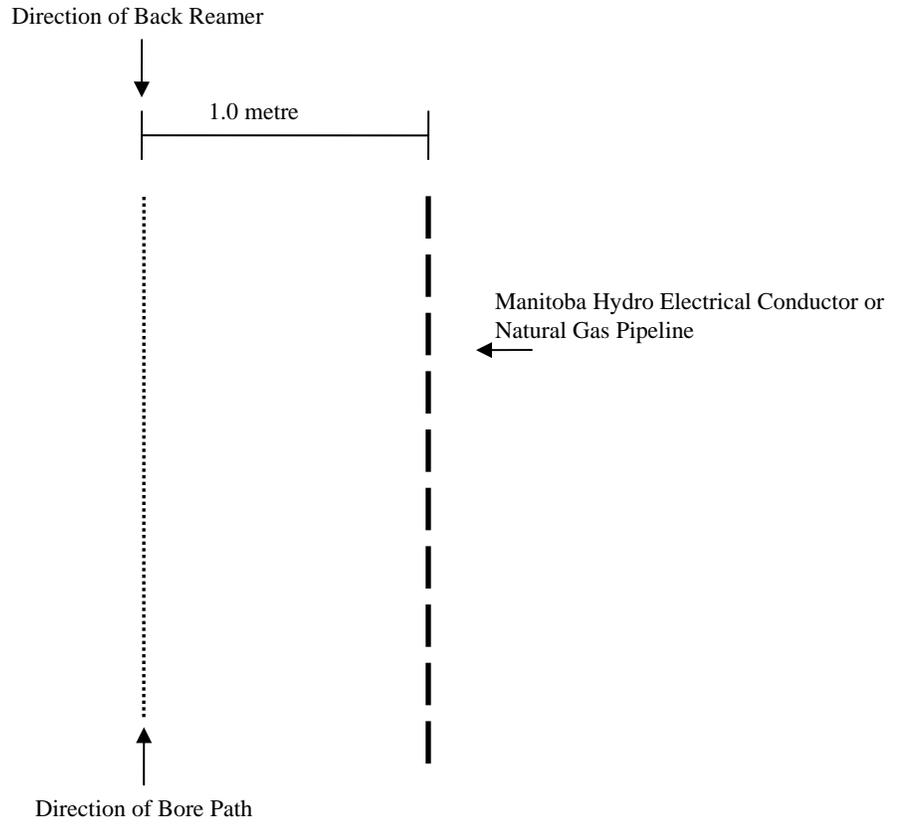


Figure 5 Drilling Parallel to Manitoba Hydro Conductors and Pipelines - Profile View

Observation hole required every 15 metres

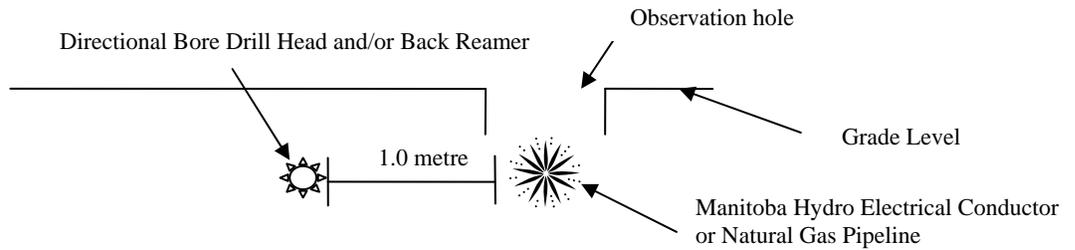


Figure 6 Drilling Parallel to Manitoba Hydro Conductors and Pipelines - Profile View

1.0 metre (3 ft) horizontal separation not maintained, conductor or pipeline continuously exposed

