



THE CITY OF WINNIPEG

TENDER

TENDER NO. 380-2021

**2021 REGIONAL STREET RENEWAL PROGRAM – UNIVERSITY CRESCENT
PAVEMENT RECONSTRUCTION**

TABLE OF CONTENTS

PART A - BID SUBMISSION

- Form A: Bid/Proposal
- Form B: Prices
- Form G1: Bid Bond and Agreement to Bond

PART B - BIDDING PROCEDURES

B1. Contract Title	1
B2. Submission Deadline	1
B3. Enquiries	1
B4. Confidentiality	1
B5. Addenda	1
B6. Substitutes	2
B7. Bid Components	3
B8. Bid	3
B9. Prices	4
B10. Disclosure	4
B11. Conflict of Interest and Good Faith	4
B12. Qualification	6
B13. Bid Security	7
B14. Opening of Bids and Release of Information	7
B15. Irrevocable Bid	8
B16. Withdrawal of Bids	8
B17. Evaluation of Bids	8
B18. Award of Contract	8

PART C - GENERAL CONDITIONS

C0. General Conditions	1
------------------------	---

PART D - SUPPLEMENTAL CONDITIONS

General

D1. General Conditions	1
D2. Form of Contract Documents	1
D3. Scope of Work	1
D4. Contract Administrator	3
D5. Contractor's Supervisor	3
D6. Notices	3
D7. Furnishing of Documents	3

Submissions

D8. Authority to Carry on Business	3
D9. Safe Work Plan	4
D10. Insurance	4
D11. Contract Security	4
D12. Subcontractor List	5
D13. Detailed Work Schedule	5

Schedule of Work

D14. Commencement	6
D15. Working Days	6
D16. Restricted Work Hours	7
D17. Work By Others	7
D18. Sequence of Work	7
D19. Substantial Performance	8
D20. Total Performance	9
D21. Liquidated Damages	9
D22. COVID-19 Schedule Delays	9

D23. Scheduled Maintenance	10
Control of Work	
D24. Job Meetings	10
D25. Prime Contractor – The Workplace Safety and Health Act (Manitoba)	10
D26. The Workplace Safety and Health Act (Manitoba) – Qualifications	10
Measurement and Payment	
D27. Payment	10
Warranty	
D28. Warranty	11
Third Party Agreements	
D29. Funding and/or Contribution Agreement Obligations	11
Form H1: Performance Bond	14
Form H2: Labour and Material Payment Bond	16
Form J: Subcontractor List	18

PART E - SPECIFICATIONS

General

E1. Applicable Specifications and Drawings	1
E2. Mobilization and Demobilization Payment	2
E3. Geotechnical Report	3
E4. Office Facilities	3
E5. Protection Of Existing Trees	3
E6. Traffic Control	4
E7. Traffic Management	5
E8. Pedestrian Safety	6
E9. Requirements For Events at IG Field	6
E10. Requirements for Manitoba Marathon	6
E11. Requirements for University of Manitoba – Mini University	7
E12. Water Obtained From the City	7
E13. Surface Restorations	7
E14. Infrastructure Signs	7
E15. Portland Cement Concrete Sidewalk With Block Outs For Indicator Surfaces	7
E16. Paving Stones for Indicator Surfaces	8
E17. Construction of Red Tinted Concrete for Transit Only Lanes	9
E18. Construction of Gray Tinted Concrete Bike Path	11
E19. Green Bike Path Treatment	12
E20. Dowels and Tie Bars	13
E21. Construction of Curb For Paving Stone Edger	14
E22. Supply and Install Watermain and Water Service Insulation	14
E23. Construction of Concrete Spillway	15
E24. Materials for Traffic Signal Installations	16
E25. Installation of Traffic Signal Service Boxes (Pre-Cast)	16
E26. Installation of Early Open Concrete Traffic Signal Bases	17
E27. Installation of Street Lighting and Associated Works	18

Appendix 'A' – Manitoba Hydro Electrical Standards

Appendix 'B' – Safe Excavation & Safety Watch Guidelines

Appendix 'C' – Gelcap Kit

Appendix 'D' – Electric and/or Natural Gas Facilities Locate

Appendix 'E' – Sample Job Plan

Appendix 'F' – Network Commissioning Report

Appendix 'G' - Geotechnical Report

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2021 REGIONAL STREET RENEWAL PROGRAM – UNIVERSITY CRESCENT PAVEMENT RECONSTRUCTION

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, June 11, 2021.

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

B3. ENQUIRIES

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

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

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

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

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

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

B4. CONFIDENTIALITY

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

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

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

B5. ADDENDA

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

- B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.
- B5.3 Addenda will be available on the MERX website at www.merx.com.
- B5.4 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the MERX website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B5.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid/Proposal. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.
- B5.6 Notwithstanding B3, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D4.

B6. SUBSTITUTES

- B6.1 The Work is based on the Plant, Materials and methods specified in the Tender.
- B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.
- B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;
 - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
 - (c) identify any anticipated cost or time savings that may be associated with the substitute;
 - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;
 - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.
- B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.
- B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.
- B6.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.

- B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B17.
- B6.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B7. BID COMPONENTS

- B7.1 The Bid shall consist of the following components:
- (a) Form A: Bid;
 - (b) Form B: Prices;
 - (c) Form G1: Bid Bond and Agreement to Bond.
- B7.2 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely.
- B7.3 The Bid shall be submitted electronically through MERX at www.merx.com.
- B7.3.1 Bids will **only** be accepted electronically through MERX.
- B7.4 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B17.1(a).

B8. BID

- B8.1 The Bidder shall complete Form A: Bid/Proposal, making all required entries.
- B8.2 Paragraph 2 of Form A: Bid/Proposal shall be completed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;
 - (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
 - (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
 - (d) if the Bidder is carrying on business under a name other than his/her own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.
- B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.
- B8.3 In Paragraph 3 of Form A: Bid/Proposal, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.
- B8.4 Paragraph 13 of Form A: Bid/Proposal shall be signed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;
 - (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
 - (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;

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

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

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

B9. PRICES

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

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

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

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

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

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

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

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

B10. DISCLOSURE

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

B10.2 The Persons are:

- (a) Maple Leaf Construction – Hydro-excavation of existing utilities

B11. CONFLICT OF INTEREST AND GOOD FAITH

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

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

- (a) other commitments;
(b) relationships;

- (c) financial interests; or
 - (d) involvement in ongoing litigation;
- that could or would be seen to:
- (i) exercise an improper influence over the objective, unbiased and impartial exercise of the independent judgment of the City with respect to the evaluation of Bids or award of the Contract; or
 - (ii) compromise, impair or be incompatible with the effective performance of a Bidder's obligations under the Contract;
- (e) has contractual or other obligations to the City that could or would be seen to have been compromised or impaired as a result of its participation in the Tender process or the Work; or
 - (f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the Tender process) of strategic and/or material relevance to the Tender process or to the Work that is not available to other bidders and that could or would be seen to give that Bidder an unfair competitive advantage.

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

- (a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Work;
- (b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the Tender process, promptly disclose a detailed description of the Conflict of Interest to the City in a written statement to the Contract Administrator; and
- (c) provide the City with the proposed means to avoid or mitigate, to the greatest extent practicable, any perceived, potential or actual Conflict of Interest and shall submit any additional information to the City that the City considers necessary to properly assess the perceived, potential or actual Conflict of Interest.

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

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

- (a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of its employees proposed for the Work;
- (b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in its sole discretion, determines cannot be avoided or mitigated;
- (c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B11.4 to avoid or mitigate a Conflict of Interest; and
- (d) disqualify a Bidder if the Bidder, or one of its employees proposed for the Work, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.

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

B12. QUALIFICATION

B12.1 The Bidder shall:

- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and
- (b) be financially capable of carrying out the terms of the Contract; and
- (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

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

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

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

- (a) have successfully carried out work similar in nature, scope and value to the Work; and
- (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
- (c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);

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

- (a) Written confirmation of a safety and health certification meeting SAFE Work Manitoba's SAFE Work Certified Standard (e.g., COR™ and SECOR™) in the form of:
 - (i) a copy of their valid Manitoba COR certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Certificate of Recognition (COR) Program administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or
 - (ii) a copy of their valid Manitoba SECOR™ certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Small Employer Certificate of Recognition Program (SECOR™) administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or
- (b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>).

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

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

B13. BID SECURITY

- B13.1 The Bidder shall include in its Bid Submission bid security in the form of a digital bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in Form G1: Bid Bond and Agreement to Bond, available on The City of Winnipeg, Corporate Finance, Materials Management Division website at <https://www.winnipeg.ca/MatMgt/templates/files/eBidsecurity.pdf>.
- B13.2 Bid security shall be submitted in a digital format meeting the following criteria:
- (a) The version submitted by the Bidder must have valid digital signatures and seals;
 - (b) The version submitted by the Bidder must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.
 - (c) The version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.
 - (d) The verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.
 - (e) The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B13.2(a).
- B13.3 Bonds failing the verification process will not be considered to be valid and the bid shall be determined to be non-responsive in accordance with B17.1(a).
- B13.4 Bonds passing the verification process will be treated as original and authentic.
- B13.4.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.
- B13.5 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly formed with the successful Bidder and the contract securities are furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.
- B13.6 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Tender.

B14. OPENING OF BIDS AND RELEASE OF INFORMATION

- B14.1 Bids will not be opened publicly.
- B14.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the MERX website at www.merx.com.
- B14.3 After award of Contract, the name(s) of the successful Bidder(s) and their Contract amount(s) will be available on the MERX website at www.merx.com.
- B14.4 The Bidder is advised that any information contained in any Bid may be released if required by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law or by City policy or procedures (which may include access by members of City Council).
- B14.4.1 To the extent permitted, the City shall treat as confidential information, those aspects of a Bid Submission identified by the Bidder as such in accordance with and by reference to Part 2, Section 17 or Section 18 or Section 26 of The Freedom of Information and Protection of Privacy Act (Manitoba), as amended.

B15. IRREVOCABLE BID

- B15.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid/Proposal.
- B15.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly formed and the contract securities have been furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B16. WITHDRAWAL OF BIDS

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

B17. EVALUATION OF BIDS

- B17.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Tender, or acceptable deviation therefrom (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B12 (pass/fail);
 - (c) Total Bid Price;
 - (d) economic analysis of any approved alternative pursuant to B6.
- B17.2 Further to B17.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.
- B17.2.1 Any bid with an apparent imbalance between the unit prices in Part 1 and Part 2 may be determined to be non-responsive and rejected by the Award Authority in its sole discretion, acting reasonably.
- B17.3 Further to B17.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is qualified.
- B17.4 Further to B17.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B17.4.1 Further to B17.1(a), in the event that a unit price is not provided on Form B: Prices, the City may determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.
- B17.4.2 Bidders are advised that the calculation indicated in B17.4 will prevail over the Total Bid Price entered in MERX.

B18. AWARD OF CONTRACT

- B18.1 The City will give notice of the award of the Contract or will give notice that no award will be made.
- B18.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be qualified, and the Bids are determined to be responsive.
- B18.2.1 Without limiting the generality of B18.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;

- (b) the prices are materially in excess of the prices received for similar work in the past;
- (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
- (d) only one Bid is received; or
- (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.

B18.3 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D29 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.

B18.4 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B17.

B18.4.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

B18.5 As noted in D3 and identified in Form B: Prices, the Work of Part 2 will be contingent upon Manitoba Hydro approving funding for the Work. If sufficient funding for Part 2 Work is not approved by Manitoba Hydro the City shall have the right to eliminate all or any portion of Part 2 Work in accordance with D3.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Construction* (Revision 2020-01-31) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C0.2 A reference in the Tender to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. FORM OF CONTRACT DOCUMENTS

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

D3. SCOPE OF WORK

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

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

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

- (a) Concrete Pavement Reconstruction
 - (i) University Crescent from Chancellor Matheson Road to Sifton Road
- (b) Traffic Signal Conduit and Base Installation and Associated Works
 - (i) University Crescent and Chancellor Matheson Road intersection
 - (ii) Pedestrian Corridor opposite IG Field
 - (iii) University Crescent and Dysart Road intersection

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

- (a) Street Lighting and Associated Works
 - (i) University Crescent from Chancellor Matheson Road to Dysart Road

D3.4 The City currently has no approved funding in the Capital Budget for Part 2 of the Work, but is anticipating receiving notification about funding from Manitoba Hydro by early July 2021. Part 2 of the Work is contingent upon Manitoba Hydro approving sufficient funding.

D3.4.1 Further to C7.1, if notice of sufficient funding is not received, the City shall have the right to eliminate all or any portion of Part 2, and the Contract Price will be reduced accordingly.

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

D3.4.3 If all or any portion of Part 2 is eliminated pursuant to D3.4.1, the time periods stipulated in 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.

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

- (a) Concrete Pavement Reconstruction
 - (i) Remove existing catch basins and curb inlets and abandon existing leads, sewers and manholes;
 - (ii) Complete point repairs to existing land drainage sewers and catch basin leads;
 - (iii) Installation of 1200 mm and 1800 mm catch basins and connection pipe;
 - (iv) Installation of temporary snow fencing;

- (v) Construction of temporary detour pavement;
 - (vi) Removal of existing composite pavement;
 - (vii) Excavation;
 - (viii) Compaction of existing subgrade;
 - (ix) Insulation of water mains located under roadway;
 - (x) Placement of separation/filtration geotextile fabric and Class A geogrid;
 - (xi) Placement of 50 mm and 100 mm Granular A sub-base materials;
 - (xii) Placement of Granular A base course material;
 - (xiii) Construction of 250 mm plain-dowelled concrete pavement (hand pour and slip-form);
 - (xiv) Construction of 250 mm plain-dowelled red concrete pavement for Transit lane and approach;
 - (xv) Construction of 200 mm reinforced concrete pavement approaches (hand pour);
 - (xvi) Construction and renewal of barrier curb (integral, separate and dowelled);
 - (xvii) Construction of 100 mm splash strip (separate);
 - (xviii) Construction of new 100 mm sidewalk with blockouts and paving stone indicator surfaces;
 - (xix) Renewal of existing sidewalk;
 - (xx) Construction of gray tinted bike path;
 - (xxi) Installation of detectable warning tiles;
 - (xxii) Installation of green paint on bike paths in roadway;
 - (xxiii) Regrading of existing paving stones;
 - (xxiv) Construction of concrete medians;
 - (xxv) Construction of safety curb;
 - (xxvi) Placement of asphalt for tie-ins and approaches;
 - (xxvii) Placement of asphalt for bike paths;
 - (xxviii) Adjustment of manholes and water valves;
 - (xxix) Ditch excavation and grading;
 - (xxx) Boulevard Grading; and
 - (xxxi) Sodding.
- (b) Traffic Signal Conduit and Base Installation and Associated Works
- (i) Installation of conduit;
 - (ii) Installation of cast-in-place concrete bases;
 - (iii) Installation of service boxes;
 - (iv) Removal of concrete bases;
 - (v) Installation of ground rods; and
 - (vi) Cutovers.
- (c) Street Lighting and Associated Works
- (i) Installation and removal of temporary overhead feeds;
 - (ii) Removal of existing street light poles and bases;
 - (iii) Installation of new pre-cast concrete bases including luminaire and appurtenances;
 - (iv) Installation of new street lighting cables in conduit (trenching and boring) and poles including cable termination; and
 - (v) Installation of ground rods.

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is AECOM Canada Ltd., represented by:
Ryan Cunningham, P.Eng.
Telephone No. (204) 928-8377
Email Address ryan.cunningham1@aecom.com

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

D5. CONTRACTOR'S SUPERVISOR

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

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

D6. NOTICES

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

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

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

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

D7. FURNISHING OF DOCUMENTS

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

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

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

D9. SAFE WORK PLAN

- D9.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.
- D9.2 The Safe Work Plan shall be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/safety/default.stm>
- D9.3 Notwithstanding B12.4 at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D10. INSURANCE

- D10.1 The Contractor shall provide and maintain the following insurance coverage:
- (a) commercial general liability insurance, in the amount of at least 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) 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 Documents, as applicable.
- 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.
- D10.5 All policies are to be taken out with insurers duly licensed to carry on business in the Province of Manitoba.

D11. CONTRACT SECURITY

- D11.1 The Contractor shall provide and maintain the performance bond and the labour and material payment bond until the expiration of the warranty period in the form of:
- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; and
 - (b) a labour and material payment bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H2: Labour and Material Payment Bond), in an amount equal to fifty percent (50%) of the Contract Price.

- D11.1.1 Where the contract security is a performance bond, it may be submitted in hard copy or digital format. If submitted in digital format the contract security must meet the following criteria:
- (a) the version submitted by the Contractor must have valid digital signatures and seals;
 - (b) the version submitted by the Contractor must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.
 - (c) the version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.
 - (d) the verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.
 - (e) the results of the verification must provide a clear, immediate and printable indication of pass or fail regarding D11.1(b).
- D11.1.2 Digital bonds failing the verification process will not be considered to be valid and may be determined to be an event of default in accordance with C18.1. If a digital bond fails the verification process, the Contractor may provide a replacement bond (in hard copy or digital format) within seven (7) Calendar Days of the City's request or within such greater period of time as the City in its discretion, exercised reasonably, allows.
- D11.1.3 Digital bonds passing the verification process will be treated as original and authentic.
- D11.2 The Contractor shall provide the City Solicitor with the required performance and labour and material payment bonds within seven (7) Calendar Days of notification of the award of the Contract by way of an award letter and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.
- D11.3 The Contractor shall, as soon as practicable after entering into a contract with a Subcontractor:
- (a) give the Subcontractor written notice of the existence of the labour and material payment bond in D11.1(b); and
 - (b) post a notice of the bond and/or a copy of that bond in a conspicuous location at the Site of the Work.

D12. SUBCONTRACTOR LIST

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

D13. DETAILED WORK SCHEDULE

- D13.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Conditions for the return of the executed Contract Documents, as applicable.
- D13.2 If, prior to submitting the Detailed Work Schedule, the Contractor does not receive notification pursuant to D14.4 that all or some portion of Part 2 of the Work may be commenced, he/she shall complete the Detailed Work Schedule for only Part 1 of the Work assuming that, if all of Part 2 is eliminated, the time periods stipulated in D19 for Substantial Performance of the Work and in D20 for Total Performance of the Work will be reduced by three (3) Working Days

- D13.3 If, after submitting the Detailed Work Schedule, the Contractor receives notification that all or any portion of Part 2 of the Work may be commenced, he/she shall submit a revised Detailed Work Schedule no later than two (2) Business Days from receipt of the notification.
- D13.4 The detailed work schedule shall consist of the following:
- (a) a Gantt chart for the Work;
acceptable to the Contract Administrator.
- D13.5 Further to D13.4(a), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

SCHEDULE OF WORK

D14. COMMENCEMENT

- D14.1 The Contractor shall not commence any Work until he/she is in receipt of an award letter from the Award Authority authorizing the commencement of the Work.
- D14.2 The Contractor shall not commence any Work on the Site until:
- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D8;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the twenty-four (24) hour emergency response phone number specified in D5.2.
 - (iv) the Safe Work Plan specified in D9;
 - (v) evidence of the insurance specified in D10;
 - (vi) the contract security specified in D11;
 - (vii) the subcontractor list specified in D12; and
 - (viii) the detailed work schedule specified in D13.
 - (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.
- D14.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the award letter.
- D14.4 The Contractor shall not commence Part 2 of the Work as described in D3 and identified in Form B: Prices, unless prior to July 9, 2021, he/she has received notification from the Contract Administrator that the City has received notice of sufficient funding from Manitoba Hydro.
- D14.5 The City intends to award this Contract by July 12, 2021.
- 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(tt);
- D15.1.1 The Contract Administrator will determine daily if a Working Day has elapsed and will record his/her assessment. On a weekly basis the Contract Administrator will provide the Contractor with a record of the Working Days assessed for the preceding week. The Contractor shall sign each report signifying that he/she agrees with the Contract Administrator's determination of the Working Days assessed for the report period.
- D15.1.2 Work done to restore the Site to a condition suitable for Work, shall not be considered "work" as defined in the definition of a Working Day.

D15.1.3 When the Work includes two or more major types of Work that can be performed under different atmospheric conditions, the Contract Administrator shall consider all major types of Work in determining whether the Contractor was able to work in assessing Working Days.

D16. RESTRICTED WORK HOURS

D16.1 Further to clause 3.10 of CW 1130, the Contractor shall require written permission forty-eight (48) hours in advance from the Contract Administrator for any work to be performed between 2000 hours and 0700 hours, or on Saturdays, Sundays, Statutory Holidays and or Civic Holidays.

D17. WORK BY OTHERS

D17.1 Work by others on or near the Site will include but not necessarily be limited to:

- (a) Manitoba Hydro (Street Lighting) – electrical supply and inspection of new street lighting hardware (to be installed by the Contractor) and the energizing of the new street light plant;
- (b) Manitoba Hydro (Gas) – lowering and/or rock wrapping of gas mains/services;
- (c) City of Winnipeg, Geomatics Branch – various works on survey monuments;
- (d) City of Winnipeg, Traffic Signals Branch – work associated with installation and hookup of traffic signals plant at Chancellor Matheson Road, pedestrian corridor opposite IG Field and Dysart Road that is not included in this Contract;
- (e) City of Winnipeg, Transit – Temporary relocation of bus stops;
- (f) City of Winnipeg, Water and Waste Department – Checking of water main valves;
- (g) Winnipeg Blue Bombers/Valour Football Club – Traffic, cyclist and pedestrian control during games at IG Field;
- (h) University of Manitoba Contractor – Underground works and pavement reconstruction of University Crescent south of Dafoe Road. Maintenance of infrastructure located within the University Crescent right-of-way as required. Installation of guide signs in boulevard within limits of the 380-2021 Contract.

D17.2 Further to D17.1, the Contractor shall cooperate and coordinate all activities with all parties performing required work by others. The Contractor must include the work by others identified in D17.1 in their construction schedule as per D13 and accommodate the necessary area on site required for the work by others.

D17.3 The Contractor's attention is directed to the fact that other Contractors, the personnel of utilities and the staff of the City may be working within the project limits, approach roadways, adjacent roadways or rights-of-way. The activities of these agencies may coincide with the Contractor's execution of the Work, and it will be the Contractor's responsibility to co-operate to the fullest extent with the other personnel working in the area, and such co-operation is an obligation of the Contractor under the terms of the Contract.

D18. SEQUENCE OF WORK

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

D18.1.1 The Work shall be divided into two stages. Stages are further subdivided into major items of work.

D18.1.2 Stage 1

(a) Construction of West Lanes

- (i) Remove existing medians, pavement, curb and sidewalk at the locations identified on the drawings and construct new temporary asphalt pavement;
- (ii) Remove existing catch basins and curb inlets and abandon existing leads;

- (iii) Abandon existing sewers;
- (iv) Complete catch basin lead repairs;
- (v) Install new catch basins and pipe and complete connections (**Installation of west side catch basin at station 0+363.960, east side catch basin at 0+365.474, along with leads and connection to main to be completed prior to traffic switch to one side of road. Temporarily adjust east side catch basin to match existing pavement elevation and restore northbound pavement as required**);
- (vi) Complete traffic signal works at Chancellor Matheson Road, pedestrian corridor opposite IG Field and Dysart Road;
- (vii) Complete street light works on the west side of University Crescent;
- (viii) Construct 250 mm plain-dowelled concrete pavement and 200 mm reinforced concrete pavement;
- (ix) Construct 100 mm sidewalk;
- (x) Construct medians;
- (xi) Construct curb and separate splash strip;
- (xii) Restore boulevards.

D18.1.3 **Stage 2**

(a) **Construction of East Lanes**

- (i) Remove existing catch basins and curb inlets and abandon existing leads;
- (ii) Abandon existing sewers and manholes;
- (iii) Complete sewer point repairs;
- (iv) Install new catch basins and pipe and complete connections;
- (v) Complete traffic signal works at pedestrian corridor opposite IG Field and Dysart Road;
- (vi) Complete street light works on the east side of University Crescent;
- (vii) Construct 250 mm plain-dowelled concrete pavement;
- (viii) Construct 100 mm sidewalk;
- (ix) Construct medians;
- (x) Construct curb and separate splash strip;
- (xi) Restore boulevards.

D18.1.4 Immediately following the completion of each stage, the Contractor shall clean up the Site and remove all plant, surplus material, waste and debris, other than that left by the City or other Contractors.

D19. SUBSTANTIAL PERFORMANCE

D19.1 The Contractor shall achieve Substantial Performance within sixty-five (65) 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 seventy (70) 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 Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:
- (a) Substantial Performance – three thousand dollars (\$3,000);
 - (b) Total Performance – one thousand dollars (\$1,000).
- D21.2 The amounts specified for liquidated damages in D21.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve Substantial Performance or Total Performance by the days fixed herein for same.
- D21.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D22. COVID-19 SCHEDULE DELAYS

- D22.1 The City acknowledges that the schedule for this Contract may be impacted by the COVID-19 pandemic. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the health and safety of workers and the public, directives from health authorities and various levels of government and in close consultation with the Contract Administrator.
- D22.2 If the Contractor is delayed in the performance of the Work by reason of the COVID-19 pandemic, the Work schedule may be adjusted by a period of time equal to the time lost due to such delay and costs related to such delay will be determined as identified herein.
- D22.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether COVID-19 will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to COVID-19, including but not limited to evidence related to availability of staff, availability of Material or work by others.
- D22.4 For any delay related to COVID-19 and identified after Work has commenced, the Contractor shall within seven (7) Calendar Days of becoming aware of the anticipated delay declare the additional delay and shall provide sufficient evidence as indicated in D22.3. Failure to provide this notice will result in no additional time delays being considered by the City.
- D22.5 The Work schedule, including the durations identified in D19 to D20 where applicable, will be adjusted to reflect delays accepted by the Contract Administrator. No additional payment will be made for adjustment of schedules except where seasonal work, not previously identified in the Contract, is carried over to the following construction season.

D22.6 Where Work not previously identified is being carried over solely as a result of delays related to COVID-19, as confirmed by the Contract Administrator, the cost of temporary works to maintain the Work in a safe manner until Work recommences, will be considered by the Contract Administrator. Where the Work is carried over only partially due to COVID-19, a partial consideration of the cost of temporary works will be considered by the Contract Administrator.

D22.7 Any time or cost implications as a result of COVID-19 and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

D23. SCHEDULED MAINTENANCE

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

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

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

CONTROL OF WORK

D24. JOB MEETINGS

D24.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, 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.

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

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

D25.1 Further to C6.26, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

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

D26.1 Further to B12.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B12.4.

MEASUREMENT AND PAYMENT

D27. PAYMENT

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

WARRANTY

D28. WARRANTY

- D28.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter, unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.
- D28.2 Notwithstanding C13.2 or D28.1, 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.
- D28.2.1 In such case the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

THIRD PARTY AGREEMENTS

D29. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

- D29.1 In the event that funding for the Work of the Contract is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, the following terms and conditions shall apply, as required by the applicable funding agreements.
- D29.2 Further to D29.1, in the event that the obligations in D29 apply, actual costs legitimately incurred by the Contractor as a direct result of these obligations ("Funding Costs") shall be determined by the actual cost to the Contractor and not by the valuation method(s) outlined in C7.4. In all other respects Funding Costs will be processed in accordance with Changes in Work under C7.
- D29.3 For the purposes of D29:
- (a) "**Government of Canada**" includes the authorized officials, auditors, and representatives of the Government of Canada; and
 - (b) "**Government of Manitoba**" includes the authorized officials, auditors, and representatives of the Government of Manitoba.
- D29.4 Modified Insurance Requirements
- D29.4.1 If not already required under the insurance requirements identified in D10, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars (\$2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and its Ministers, officers, employees, and agents shall be added as additional insureds.
- D29.4.2 If not already required under the insurance requirements identified in D10, the Contractor will be required to provide builders' risk insurance (including boiler and machinery insurance, as applicable) providing all risks coverage at full replacement cost, or such lower level of insurance that the City may identify on a case-by-case basis, such as an installation floater.
- D29.4.3 The Contractor shall obtain and maintain third party liability insurance with minimum coverage of two million dollars (\$2,000,000.00) per occurrence on all licensed vehicles operated at the Site. In the event that this requirement conflicts with another licensed vehicle insurance requirement in this Contract, then the requirement that provides the higher level of insurance shall apply.
- D29.4.4 Further to D10.3, insurers shall provide satisfactory Certificates of Insurance to the Government of Manitoba prior to commencement of Work as written evidence of the

insurance required. The Certificates of Insurance must provide for a minimum of thirty (30) days' prior written notice to the Government of Manitoba in case of insurance cancellation.

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

D29.5 Indemnification By Contractor

D29.5.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for Construction, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers, servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.

D29.6 Records Retention and Audits

D29.6.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.

D29.6.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for Construction, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total Performance, all records, documents, and contracts referred to in D29.6.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.

D29.7 Other Obligations

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

D29.7.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.

D29.7.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.

D29.7.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.

- D29.7.5 The Contractor represents and warrants that no current or former public servant or public office holder, to whom the Value and Ethics Code for the Public Sector, the Policy on Conflict of Interest and Post Employment, or the Conflict of Interest Act applies, shall derive direct benefit from this Contract, including any employment, payments, or gifts, unless the provision or receipt of such benefits is in compliance with such codes and the legislation.
- D29.7.6 The Contractor represents and warrants that no member of the House of Commons or of the Senate of Canada or of the Legislative Assembly of Manitoba is a shareholder, director or officer of the Contractor or of a Subcontractor, and that no such member is entitled to any benefits arising from this Contract or from a contract with the Contractor or a Subcontractor concerning the Work.

FORM H1: PERFORMANCE BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____ ,
(hereinafter called the "Principal"), and

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

_____ dollars (\$_____)

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

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

TENDER NO. 380-2021

2021 REGIONAL STREET RENEWAL PROGRAM – UNIVERSITY CRESCENT PAVEMENT
RECONSTRUCTION

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

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

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

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

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

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

_____ day of _____, 20____.

SIGNED AND SEALED
in the presence of:

(Witness as to Principal if no seal)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

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

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

KNOW ALL MEN BY THESE PRESENTS THAT

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

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

_____ dollars (\$_____)

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

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

TENDER NO. 380-2021

2021 REGIONAL STREET RENEWAL PROGRAM – UNIVERSITY CRESCENT PAVEMENT
RECONSTRUCTION

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

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

- (a) A claimant is defined as one having a direct contract with the Principal for labour, service and material, or any of them, used or reasonably required for use in the performance of the contract, labour, service and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment (but excluding rent of equipment where the rent pursuant to an agreement is to be applied towards the purchase price thereof) directly applicable to the Contract;
- (b) The above-named Principal and Surety hereby jointly and severally agree with the Obligee that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work, labour or service was done or performed, or materials were furnished by such claimant, may sue on this bond, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon;
- (c) No suit or action shall be commenced hereunder by any claimant
 - (i) unless claimant shall have given written notice to the Principal and the Surety above-named, within one hundred and twenty (120) days after such claimant did or performed the last of the work, labour or service, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work, labour or service was done or performed. Such notice shall be served by mailing the same by registered mail to the Principal, and Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the Province of Manitoba;

- (ii) after the expiration of one (1) year following the date on which Principal ceased work on said Contract; including work performed under the guarantees provided in the Contract;
 - (iii) other than in a court of competent jurisdiction in the Province of Manitoba.
- (d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.
- (e) The Surety shall not be liable for a greater sum than the specified penalty of this bond.

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

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

_____ day of _____, 20_____ .

SIGNED AND SEALED
in the presence of:

(Witness as to Principal if no seal)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

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

FORM J: SUBCONTRACTOR LIST
(See D12)

**2021 REGIONAL STREET RENEWAL PROGRAM – UNIVERSITY CRESCENT PAVEMENT
RECONSTRUCTION**

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

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

- E1.1 These Specifications shall apply to the Work.
- E1.2 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.
- E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/Spec/Default.stm>
- E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.2.3 Further to C2.4(d), Specifications included in the Tender shall govern over *The City of Winnipeg Standard Construction Specifications*.
- E1.3 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B6. In every instance where a brand name or design specification is used, the City will also consider approved equals and/or approved alternatives in accordance with B6.
- E1.4 The following are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>	<u>Drawing (Original) Sheet Size</u>
CT-00	Cover Sheet and Location Plan	A1
CT-01	Traffic Detour Stages 1A & 1B	A1
CT-02	Traffic Detour Stages 2A & 2B	A1
CT-03	Geometric Plan	A1
CT-04	Plan-Profile – Chancellor Matheson Road to Sta. 0+220 Southbound	A1
CT-05	Plan-Profile – Chancellor Matheson Road to Sta. 0+220 Northbound	A1
CT-06	Plan-Profile – Sta. 0+220 to Sta. 0+340	A1
CT-07	Plan-Profile – Sta. 0+340 to Sta. 0+430	A1
CT-08	Plan-Profile – Sta. 0+430 to Sta. 0+520 Southbound & Sta. 0+430 to Sta. 0+540 Northbound	A1
CT-09	Plan-Profile – Sta. 0+520 to Sifton Road	A1
CT-10	Cross Sections and Details	A1
S-1410	Traffic Signals – Bohemier Tr./Dysart Rd. & University Cres.	A1
S-1872	Traffic Signals – Chancellor Matheson Rd. & University Cres.	A1
S-2032	Pedestrian Corridor – University Cres. – 130m N. of Chancellor Matheson Rd.	A1
SD-315.A	Signal Pole Base – Type PM	
SD-315.C	Signal Pole Base – Type POD	

- E1.4.1 Traffic signals drawings (S-1410, S-1872 and S-2032) are provided for bidding purposes only. Sealed traffic signals drawings will be provided to the Contractor prior to commencement of construction.
- E1.4.2 Sealed street light drawings will be provided to the Contractor prior to commencement of construction.

E2. MOBILIZATION AND DEMOBILIZATION PAYMENT

DESCRIPTION

- E2.1 This Specification shall cover all operations relating to the mobilization and demobilization of the Contractor to the project location(s).
- E2.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.
- E2.3 The inclusion of a payment item for the Work under this Specification shall not release or reduce the responsibilities of the Contractor under any other specification in this Contract.

SCOPE OF WORK

- E2.4 Further to C12 of the General Conditions, where Mobilization and Demobilization is included as a bid item, it shall consist of the following, as applicable:
- (a) Mobilization shall include, but not be limited to:
 - (i) All activities and associated costs for transportation of the Contractor's personnel, equipment, and operating supplies to the site, and/or sites, and/or between sites;
 - (ii) Establishment of offices, buildings, other necessary general facilities and equipment parking/staging areas for the Contractor's operations at the site or sites;
 - (iii) Premiums paid for performance and payment bonds including coinsurance and reinsurance agreements as applicable;
 - (iv) General cleanup and housekeeping needed maintain a neat and orderly project site and/or sites;
 - (v) Other job related items.
 - (b) Demobilization shall include, but not be limited to:
 - (i) All activities and costs for transportation of personnel, equipment, and supplies not used in the project from the site, and/or sites, and/or between sites;
 - (ii) Disassembly, removal, and site cleanup and restoration of offices, buildings, and other facilities assembled on the site and/or sites;
 - (iii) Repair of access roads, temporary haul roads, and equipment parking areas leaving the project site in the same or better condition than at the start of the project;
 - (iv) General cleanup and housekeeping needed to restore a neat and orderly project site.
- E2.5 Access to the site, equipment parking, and staging areas are limited to that shown on the drawings or as approved by the Contract Administrator.

MEASUREMENT AND PAYMENT

- E2.6 The lump-sum price for the Mobilization and Demobilization bid item shall not exceed five percent (5.00%) of the total bid price for the Contract.
- E2.6.1 Further to B9, B17, C12 and E2.6, should the lump sum price exceed 5% of the Total Bid Price the lump sum price will be reduced to 5% of the Total Bid Price, the Total Bid Price will be determined using the reduced lump sum price and payment will be based on the reduced lump sum price.
- E2.7 Payment for Mobilization:
- (a) 60% of the lump-sum price will be paid to the contractor for Mobilization on the first Progress Estimate for the Contract.
- E2.8 Payment for Demobilization:

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

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

E3. GEOTECHNICAL REPORT

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

E4. OFFICE FACILITIES

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

- (a) The field office shall be for the exclusive use of the Contract Administrator.
- (b) The building shall be conveniently located near the site of the Work.
- (c) The building shall have a minimum floor area of 20 square metres, a height of 2.4 m with a window/two windows for cross ventilation and a door entrance with a suitable lock.
- (d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16-18 degrees C or 24-25 degrees C.
- (e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three wall outlets.
- (f) The building shall be furnished with one desk, one drafting table, one table 3 m X 1.2 m, one stool and a minimum of 8 chairs.
- (g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City.
- (h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each site meeting. The Contract Administrator may request additional cleaning when he/she deems it necessary.

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

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

E5. PROTECTION OF EXISTING TREES

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

- (a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.
- (b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400mm wood planks, or suitably protected as approved by the Contract Administrator.
- (c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.

- (d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.
- (e) Work on-site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.

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

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

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

E6. TRAFFIC CONTROL

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

- (a) Where directed by the Contract Administrator, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planing drop-offs to the satisfaction of the Contract Administrator. Payment shall be in accordance with CW 3410.
- (b) The Contractor shall be designated as the Authorized Construction Agency for this Contract.**
- (c) In accordance with the Manual of Temporary Traffic Control on City Streets (MTTC), the Contractor ("Construction Agency" in the manual) shall be responsible for supplying, placing, maintaining and removing the appropriate temporary traffic control devices as specified by the MTTC, the Traffic Management Branch of the City of Winnipeg Public Works Department and the drawings and specifications for this Contract. The Contractor shall bear all costs associated with the supply, placement maintenance and removal of temporary traffic control devices by their own forces or subcontractor.**
- (d) Restoration and/or installation of permanent signage will be completed by the Traffic Services Branch of the City of Winnipeg.**

E6.2 **Further to E6.1(b) and E6.1(c), in accordance with the MTTC, the Contractor shall be responsible for and bear all costs associated with supplying, placing, maintaining and removing all regulatory signage as indicated on the Traffic Detour plans approved by the Traffic Management Branch (Drawings CT-01 and CT-02). The Contractor shall also be responsible for supplying, placing, maintaining and removing the bicycle detour and bicycles yield to pedestrian signs indicated on the Traffic Detour plans.** In cases where the Contractor is unable to perform the responsibilities noted above, the Contract Administrator shall make arrangements with the Traffic Services Branch of the City of Winnipeg to supply, place, maintain and remove these traffic control devices. The Contractor is authorized and responsible to supply, place, maintain and remove the traffic control devices in the following situations for this Contract (as identified in Section 2.04 of the MTTC):

- (a) Parking restrictions,
- (b) Stopping restrictions,
- (c) Turn restrictions,
- (d) Full or directional closures on a Regional Street,
- (e) Traffic routed across a median,

- (f) Full or directional closure of a non-regional street where there is a requirement for regulatory signs (turn restrictions, bus stop relocations, etc.) to implement the closure.
- (g) Approved Designated Construction Zones with a temporary posted speed limit reduction. Traffic Services will be responsible for placing all of the advance signs and 'Construction Ends' (TC-4) signs. The Contractor is still responsible for all other temporary traffic control including but not limited to barricades, barrels and tall cones.

E6.2.1 Further to E6.1 and E6.2, where the Contract Administrator has determined that the services of the Traffic Services Branch are required, the City shall bear the costs associated with the placement of temporary traffic control devices by the Traffic Services Branch of the City of Winnipeg in connection with the works undertaken by the Contractor.

E6.3 The Contractor shall be responsible for supplying, placing, maintaining and removing the following information signs which are indicated on the Traffic Detour plans:

- (a) **'PEDESTRIAN CROSSING CLOSED USE DAFOE ROAD' – Two signs**
- (b) **'PEDESTRIAN CROSSING CLOSED USE PEDESTRIAN CORRIDOR TO NORTH' – Two signs**
- (c) **'ACCESS TO DYSART ROAD' – Two signs (one with left facing arrow and one with right facing arrow)**
- (d) **'CYCLISTS' YIELD TO PEDESTRIANS' – Two signs, the text 'CYCLISTS' represents a bicycle graphic**

E7. TRAFFIC MANAGEMENT

- E7.1.1 The Traffic Detour drawings include details on traffic management, pedestrian/cyclist access and signage placement and are identified in E1.4.
- E7.1.2 Maintain a minimum of one lane of northbound traffic and one lane of southbound traffic on University Crescent at all times, except during events at IG Field and the Manitoba Marathon (details are provided in E9 and E10). When no work is being performed on site, non-essential lane closures will not be permitted.
- E7.1.3 Maintain a minimum of one lane of eastbound traffic and one lane of westbound traffic on Chancellor Matheson Road at all times, except during the Manitoba Marathon (details are provided in E10). When no work is being performed on site, non-essential lane closures will not be permitted.
- E7.1.4 Maintain southbound left turns to Dysart Road at all times via the southbound left turn lane at Dysart Road or the temporary median detour constructed south of Dysart Road.
- E7.1.5 Maintain northbound left turns to Bohemier Trail for Rapid Transit buses, except when excavation, placement of base materials and paving is taking place. Provide the Contract Administrator with one week advance notice for reroute of Transit buses at this location.
- E7.1.6 Rapid Transit buses travelling eastbound on Bohemier Trail to southbound University Crescent will be rerouted during Stage 1.
- E7.1.7 Flag persons may be necessary to maintain the flow of traffic during certain work operations.
- E7.1.8 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he/she shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.
- E7.1.9 Pedestrian access must be maintained on one side of University Crescent at all times. Pedestrian crossings must be maintained as per the Traffic Detour plans.
- E7.1.10 Ambulance/emergency vehicle access must be maintained at all times.

E8. PEDESTRIAN SAFETY

E8.1 In each construction stage, temporary snow fence shall be installed along the median and gutter edges for the full length of the project, with access provided for pedestrians and cyclists at the crossings identified on the Traffic Detour drawings. The Contractor shall be responsible for maintaining the snow fence in a proper working condition. The Contractor is responsible for removing the snow fence after each stage. No measurement for payment shall be made for this work.

E9. REQUIREMENTS FOR EVENTS AT IG FIELD

E9.1 Winnipeg Blue Bomber Games and Valour Football Club Games are expected to take place at IG Field in 2021. The Contractor shall meet the following requirements for game days (this is in addition to the minimum requirements for traffic, pedestrians and cyclists included in the tender document and the Traffic Detour plans):

(a) Stage 1

- (i) Permit access in and out of Pinnacle Lot via median detour on game days. Provide temporary gravel ramp through southbound lanes under construction as required.
- (ii) Provide channelized north-south pedestrian/cyclist crossing on the west side of the University Crescent and Chancellor Matheson Road intersection with gravel ramping as necessary.
- (iii) Provide staff to relocate traffic control devices to allow for two lanes of southbound traffic on University Crescent to Dysart Road from 1.5 hours prior to game start to 1 hour following completion of game.
- (iv) Provide 1 lane on Sifton Road to make westbound right turns to University Crescent from 1.5 hours prior to game to end of game.
- (v) Provide 2 lanes on Sifton Road to make westbound right turns to University Crescent upon completion of game.
- (vi) Restore all temporary traffic control devices 1 hour following game.
- (vii) University Crescent from Chancellor Matheson Road to the south side of Dysart Road will be closed to all traffic except that requiring access to IG Field and Winnipeg Transit service. Winnipeg Transit buses will be directed through this section of University Crescent by IG Field staff or their designate.

(b) Stage 2

- (i) Provide staff to relocate traffic control devices to allow for two lanes of southbound traffic on University Crescent to Dysart Road from 1.5 hours prior to game start to 1 hour following completion of game. Provide temporary ramping as necessary for two southbound lanes of traffic at Dysart Road.
- (ii) Provide 1 lane on Sifton Road to make westbound right turns to University Crescent from 1.5 hours prior to game to end of game.
- (iii) Provide 2 lanes on Sifton Road to make westbound right turns to University Crescent upon completion of game.
- (iv) Restore all temporary traffic control devices 1 hour following game.
- (v) University Crescent from Chancellor Matheson Road to Dysart Road will be closed to all traffic except that requiring access to IG Field and Winnipeg Transit. Winnipeg Transit buses will be directed through this section of University Crescent by IG Field staff or their designate.

E9.2 No measurement or payment will be made for the work included in E9.1.

E10. REQUIREMENTS FOR MANITOBA MARATHON

E10.1 The Manitoba Marathon is scheduled to take place on September 4 and 5, 2021.

E10.2 The Contractor is required to provide a safe running surface on both sides of the roadway at the following locations that will be utilized by the event (locations will be fully closed to traffic):

- (a) University Crescent from Chancellor Matheson Road to Markham Road
- (b) Chancellor Matheson Road from Ken Ploen Way to University Crescent

E10.3 At minimum, the Contractor shall provide a compacted gravel surface acceptable to the contract administrator on the side of University Crescent under construction. If a transition between new/existing pavement and a gravel surface is required, the Contractor shall provide compacted gravel ramps between the two areas. The compacted gravel surfaces shall be in place by September 3, 2021 or one day prior to the event if the dates are revised.

E10.4 The Contractor shall provide barricades/delineation to ensure the safety of event participants/spectators, acceptable to the Contract Administrator.

E11. REQUIREMENTS FOR UNIVERSITY OF MANITOBA – MINI UNIVERSITY

E11.1 Mini University will take place at the University of Manitoba from July 5 to August 27, 2021. Drop-off and pick-up of children takes place in the parking lots off Dysart Road east of University Crescent. The Contractor is required to supply flagpersons on weekdays between the hours of 8:00am – 9:15am and 3:30pm – 4:45pm at the University Crescent and Chancellor Matheson Road intersection and the University Crescent and Dysart Road intersection to ensure consistent flow of traffic for Mini University drop-off and pickup, acceptable to the Contract Administrator.

E12. WATER OBTAINED FROM THE CITY

E12.1 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.

E13. SURFACE RESTORATIONS

E13.1 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.

E14. INFRASTRUCTURE SIGNS

E14.1 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

E15. PORTLAND CEMENT CONCRETE SIDEWALK WITH BLOCK OUTS FOR INDICATOR SURFACES

DESCRIPTION

E15.1 This specification shall supplement CW 3325-R5 "Portland Cement Concrete Sidewalks".

CONSTRUCTION METHODS

E15.2 Add the following to section 9:

- E15.2.1 As shown on the drawings and as directed by the Contract Administrator, construct sidewalk with block outs and/or monolithic curb and sidewalk with block outs, to allow for the installation of indicator surfaces.
- E15.2.2 Verify dimensions of paving stones (indicator surface) prior to construction of the block-outs. Gaps between paving stones and concrete pavement shall not exceed five (5) millimetres.
- E15.2.3 Concrete curbs for monolithic curb and sidewalk with block outs shall be constructed in accordance with CW 3240.

MEASUREMENT AND PAYMENT

E15.3 Add the following to section 12:

- E15.3.1 Construction of concrete sidewalks with block outs for indicator surfaces will be measured on surface area basis. The surface area to be paid for shall be the number of square metres constructed in accordance with this specification and accepted by the Contract Administrator, as computed by measurements made by the Contract Administrator.

BASIS OF PAYMENT

E15.4 Add the following to section 13:

- E15.4.1 Construction of concrete sidewalks with block outs for indicator surfaces will be paid for at the Contract Unit Price per square meter for the "Items of Work" listed here below, measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this specification.
- E15.4.2 Items of Work:
- (a) 100 mm Sidewalk with Block Outs
 - (b) 150 mm Sidewalk with Block Outs
 - (c) Monolithic Curb and 100 mm Sidewalk with Block Outs*
 - (d) Monolithic Curb and 150 mm Sidewalk with Block Outs*
- * - reveal height and type
- E15.4.3 Concrete thickness greater than the specified sidewalk thickness as a result of shaping the base material to accommodate the block outs is incidental to the listed Items of Work.

E16. PAVING STONES FOR INDICATOR SURFACES

DESCRIPTION

- E16.1 This specification shall supplement CW 3330-R5 "Installation of Interlocking Paving Stones"

MATERIALS

E16.2 Add the following to section 5 :

- E16.2.1 Paving Stones for indicator surfaces shall be as indicated on the drawings and as per below:

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

Barkman Concrete paving stones -
Transit Blue Holland Paver (60mm X 105 mm X 210 mm)
<https://www.barkmanconcrete.com/>

CONSTRUCTION METHODS

- E16.3 Add the following to section 9.2 "Preparation of Sub-grade, Sub-base and Sand-base" :
- E16.3.1 Preparation of Sand-Base for Paving Stones in Sidewalk Block Outs.
- E16.3.2 Place a 15mm layer of bedding sand in the blocked out sidewalk areas.
- E16.3.3 The bedding sand shall be spread and levelled so that the paving stones when installed are 5 mm higher than the finished grade.
- E16.3.4 No more sand shall be spread than can be covered in with paving stone on the same day.
- E16.3.5 The bedding sand shall not be compacted or disturbed prior to laying the paving stones.
- E16.4 Add the following to section 9.3 "Installation of Paving Stones" :
- E16.4.1 For indicator surface paving stones, commence installation of paving stones against the long edge of the block out to obtain the straightest possible course of installation.

MEASUREMENT AND PAYMENT

- E16.5 Add the following to section 12 :
- E16.6 Supply and Installation of Paving Stones for Indicator Surfaces
- E16.6.1 Paving stones for indicator surfaces will be measured on surface area basis. The surface area to be paid for shall be the number of square metres constructed in accordance with this specification and accepted by the Contract Administrator, as computed by measurements made by the contract Administrator.

BASIS OF PAYMENT

- E16.7 Add the following to section 13 :
- E16.7.1 The supply and installation of paving stones for indicator surfaces will be paid for at the Contract Unit Price per square meter for:
- (a) "Paving Stone Indicator Surfaces – Charcoal Holland Paver (210 mm x 210 mm x 60 mm)"
 - (b) "Paving Stone Indicator Surfaces – Transit Blue Holland Paver (105 mm x 210 mm x 60 mm)"
- E16.7.2 The price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this specification.
- E16.7.3 Concrete thickness greater than the specified sidewalk thickness as a result of shaping the base material to accommodate the block outs is incidental to the listed Items of Work.

E17. CONSTRUCTION OF RED TINTED CONCRETE FOR TRANSIT ONLY LANES

DESCRIPTION

- E17.1 General
- (a) This specification covers the construction of "red" tinted concrete pavement, intended to delineate Transit only lanes at various locations in the project. The tinted concrete is finished at grade as identified on the drawings. Care must be taken with

consistency in water/cement ratio and finishing as the color can be affected load to load.

- (b) Referenced Standard Construction Specifications
 - (i) CW 3310 – Portland Cement Concrete Pavement Works;

MATERIALS AND EQUIPMENT

E17.2 Materials

- (a) All other materials as per CW 3310, Clause 5.
- (b) The base mix design shall conform to Section 6 of CW 3310 with the following alterations:
 - (i) Type 1 mix as per Section 6.2 of CW 3310.
- (c) Slump for hand placement shall be 80 mm +/- 20 mm prior to adding superplasticizers (if needed) to facilitate finishing without adding water to the surface. Alterations to the base mix design will be considered by the Contract Administrator if necessary to account for the concrete tint material and finishing operations.

E17.3 Equipment

- (a) Equipment as per CW 3310 Clause 8.

E17.4 Concrete Tint

- (a) "Red" coloured metal oxide pigment used to permanently color ready-mix concrete. Approved Product List:
 - (i) Lafarge Red (Premium) – supplied through L.M. Scofield Company
 - (ii) SG160-2 Sunrise Red – supplied through L.M. Scofield Company
- (b) Contractor to cast one (1) sample of each coloured concrete sample minimum 200 mm by 200 mm in area using base concrete mix for approval by Contract Administrator.
- (c) Tinted concrete shall not be placed until sample color has been accepted by the Contract Administrator. The Contractor shall demonstrate that the sample will achieve the approximate color advertised by the pigment supplier using local concrete mix materials.

E17.5 Superplasticizers

- (a) Superplasticizers shall conform to the requirements of CSA CAN3-A266.5 and CAN3-A266.6, but must be compatible with the air-entraining agent. The agent shall be free of chlorides and shall not affect the air-entraining agent's ability to produce a satisfactory air void system.

E17.6 Liquid Membrane-Forming Curing Compound

- (a) Curing Compound shall be clear (no pigment), and water based conforming to the requirements of ASTM C309.

E17.7 Other Materials

- (a) All other materials as per CW 3310

E17.8 Floating and Finishing Equipment

- (a) Use only wood or magnesium floats. Bull floats used for initial finishing shall be constructed of wood only.

E17.9 Other Equipment

- (a) All other equipment as per CW 3310.

CONSTRUCTION METHODS

- E17.9.2 Red Tinted 250 mm Concrete Pavement (Plain-Dowelled)
- (a) Construction as per Contract Drawings and as per CW 3310.
 - (b) Clean finishing tools and equipment and let dry prior to finishing. Wet tools will fade the colouring. Wetting of tools during finishing operation is not permitted.
 - (c) Place concrete at a consistent slump. No water shall be added on Site. Superplasticizer may be added at a rate suggested by the concrete supplier if additional workability is needed.
 - (d) No localized water spray or fogging is permitted to assist in finishing as this will locally fade the colour.
 - (e) Clear curing compound only shall be used. The use of water curing or plastic film is not allowed. Plastic film for insulation in cold weather must be approved by the Contract Administrator.

MEASUREMENT AND PAYMENT

- E17.9.3 Construction of red tinted concrete for Transit only lanes will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Construction of Red Tinted 250 mm Concrete Pavement (Plain-Dowelled)". The area to be paid for will be the total number of square meters of 250 mm red tinted plain-dowelled concrete pavement supplied and placed at grade, in accordance with this specification and as measured and accepted by the Contract Administrator.

E18. CONSTRUCTION OF GRAY TINTED CONCRETE BIKE PATH

DESCRIPTION

- E18.1 General
- (a) This specification covers the construction of "Gray" tinted concrete sidewalk, intended to delineate the bike paths adjacent to paving stone installations at the University Crescent and Chancellor Matheson Road intersection. The tinted concrete is finished at grade as identified on the drawings. Care must be taken with consistency in water/cement ratio and finishing as the color can be affected load to load.
 - (b) Referenced Standard Construction Specifications
 - (i) CW 3310 – Portland Cement Concrete Pavement Works;
 - (ii) CW 3325 – Portland Cement Concrete Sidewalks.

MATERIALS AND EQUIPMENT

- E18.2 Materials
- (a) All other materials as per CW 3310, Clause 5.
 - (b) The base mix design shall conform to Section 6 of CW 3310 with the following alterations:
 - (i) Type 2 mix as per Section 6.2 of CW 3310.
 - (c) Slump for hand placement shall be 80 mm +/- 20 mm prior to adding superplasticizers (if needed) to facilitate finishing without adding water to the surface. Alterations to the base mix design will be considered by the Contract Administrator if necessary to account for the concrete tint material and finishing operations.
- E18.3 Equipment
- (a) Equipment as per CW 3310 Clause 8.
- E18.4 Concrete Tint
- (a) "Cloud Gray" coloured metal oxide pigment used to permanently color ready-mix concrete. Approved Product List:

- (i) Lafarge Cloud Gray - NR-5010R (2 bags) supplied through Interstar Materials.
- (b) Contractor to cast one (1) sample of each coloured concrete sample minimum 200 mm by 200 mm in area using base concrete mix for approval by Contract Administrator.
- (c) Tinted concrete shall not be placed until sample color has been accepted by the Contract Administrator. The Contractor shall demonstrate that the sample will achieve the approximate color advertised by the pigment supplier using local concrete mix materials.

E18.5 Liquid Membrane-Forming Curing Compound

- (a) Curing Compound shall be clear (no pigment), and water based conforming to the requirements of ASTM C309.

E18.6 Other Materials

- (a) All other materials as per CW 3310

E18.7 Floating and Finishing Equipment

- (a) Use only wood or magnesium floats. Bull floats used for initial finishing shall be constructed of wood only.

E18.8 Other Equipment

- (a) All other equipment as per CW 3310.

CONSTRUCTION METHODS

E18.8.2 100 mm Cloud Gray Tinted Concrete Bike Path

- (a) Construction as per Contract Drawings and as per CW 3310 and CW 3325.
- (b) Clean finishing tools and equipment and let dry prior to finishing. Wet tools will fade the colouring. Wetting of tools during finishing operation is not permitted.
- (c) Place concrete at a consistent slump. No water shall be added on Site. Superplasticizer may be added at a rate suggested by the concrete supplier if additional workability is needed.
- (d) No localized water spray or fogging is permitted to assist in finishing as this will locally fade the colour.
- (e) Clear curing compound only shall be used. The use of water curing or plastic film is not allowed. Plastic film for insulation in cold weather must be approved by the Contract Administrator.

MEASUREMENT AND PAYMENT

- E18.8.3 Construction of Cloud Gray Tinted Concrete Bike Path will be measured on an area basis and paid for at the Contract Unit Price per square metre for "100 mm Gray Tinted Concrete Bike Path". The area to be paid for will be the total number of square meters of 100 mm gray tinted concrete sidewalk supplied and placed at grade, in accordance with this specification and as measured and accepted by the Contract Administrator.

E19. GREEN BIKE PATH TREATMENT

DESCRIPTION

E19.1 General

- E19.1.1 This Specification covers all operations relating to the supply and installation of green bike path treatment at cycling corridor conflict points, as noted on the drawings.
- E19.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labor, materials, equipment, tools, supplies, and all

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

MATERIALS

E19.2 Green Bike Path Treatment

- E19.2.1 The Green Bike Path Treatment shall be Cycle Grip MMAX by Ennis-Flint color to be EF Bike Lane Green or equivalent, in accordance with B6 as approved by the Contract Administrator. A link to the manufacturer's specifications is provided:
www.ennisflintamericas.com/downloads/dl/file/id/83/product/945/product_data_sheet_cycle_gripmmax.pdf.

SUBMITTALS

- E19.3 Prior to construction submit the following to the Contract Administrator.
(a) Material data sheets for the product proposed to be supplied and installed.

CONSTRUCTION METHODS

E19.4 Surface Preparation

- (a) Surface preparation to be in accordance with the Manufacturer's instructions.

E19.5 Masking

- E19.5.1 Masking of the edges of all green bike path treatment areas to be in accordance with Manufacturer's instructions.

E19.6 Paint Mixing

- E19.6.1 Mix paint in accordance with manufacturer's instructions.

E19.7 Installation of Green Bike Path Treatment

- E19.7.1 Install Green Bike Path Treatment in accordance with Manufacturer's instructions.
E19.7.2 Any damage done to the Green Bike Path Treatment prior to completion of each marking area shall be rectified at the Contractor's expense.

MEASUREMENT AND PAYMENT

- E19.8 Supply and Installation of Green Bike Path Treatment shall be measured on an area basis and will be paid for at the contract Unit Price per square metre for "Supply and Installation of Green Bike Path Treatment" supplied and installed in accordance with this specification and accepted and measured by the Contract Administrator.

E20. DOWELS AND TIE BARS

- E20.1 Further to Section 9.2.3 of CW 3310, no measurement or payment will be made for dowels or tie bars that are drilled along a joint between new sections of concrete constructed as part of this Contract. Dowels or tie bars that are drilled into new concrete pavement will be considered incidental to the construction of the concrete pavement.
- E20.2 Where sidewalk or splash strip (separate) is constructed adjacent to the curb, install 10M epoxy coated deformed bars, 300 mm long and 600mm on centre at the mid-point of the back side of the curb during pouring. 10M bars are to penetrate the curb 75 mm. Installation of 10M epoxy coated deformed bars is considered incidental to the construction of the sidewalk and splash strip (separate).

E21. CONSTRUCTION OF CURB FOR PAVING STONE EDGER

- E21.1 Construction of 150 mm curb (total height) as a paving stone edger shall completed per SD-205 except that vertical 20M bars shall be 600 mm in length driven into the existing base/subgrade.

MEASUREMENT AND PAYMENT

- E21.1.1 Construction of barrier curb as a paving stone edger will be measured on a length basis and paid for at the Contract Unit Price per metre for "Construction of Barrier Curb as Paving Stone Edger (150mm ht, Dowelled)". The length to be paid for will be the total length of 150 mm barrier curb as paving stone edger constructed, in accordance with this specification and as measured and accepted by the Contract Administrator.

E22. SUPPLY AND INSTALL WATERMAIN AND WATER SERVICE INSULATION

DESCRIPTION

- E22.1 Notwithstanding 3.12 of CW 2110, this specification covers the supply and installation of insulation in roadway excavations over watermains and water services.
- E22.2 Referenced Standard Construction Specifications
- (a) CW 2030 – Excavation Bedding and Backfill
 - (b) CW 3110 – Sub –grade, Sub-base and Base Course Construction
- E22.3 Referenced Standard Details
- (a) SD-018 - Watermain and Water Service Insulation

MATERIALS

- E22.4 Acceptable insulation is:
- (a) Extruded Polystyrene rigid foam insulation – Type 4, 4" in thickness.
DOW - Roofmate or Highload 40
Owen's Corning - Foamular 350 or Foamular 400.
2" X 48" X 96", 2" X 24" X 96", 4" X 24" X 96"
- E22.5 Sand Bedding :
- (a) In accordance with CW 2030

CONSTRUCTION METHODS

- E22.6 Prior to the installation of any sub-base material or geotextile material, locate all existing water services. Further to SD-018, where directed by the Contract Administrator, excavate the sub-grade to allow the top of the insulation to be installed flush with the surrounding sub-grade. Install the insulation on a level surface centered over the located watermain or water service for the full width of the roadway excavation. Install sand bedding if required to level the surface. Stockpile and dispose of excavated material in accordance with CW 3110.
- E22.7 Thickness of insulation is 100 mm (4"). If using 50 mm (2") panels 2 layers are required. Total width of insulation to be as directed by the Contract Administrator. Place sufficient full width panels to meet or exceed the specified width.
- E22.8 Place insulation panels adjacent to each other over the specified area with no gaps between panels and less than 15mm of elevation difference along the adjoined edges. Where 2" thick panels are being used, offset the top layer to prevent the panel joints from aligning with the joints in the lower layer.

- E22.9 Use full panels of insulation where possible. Where necessary cut insulation panels to obtain coverage to specified lengths. Insulation pieces shall be a minimum of dimension of 300 mm in width or length.
- E22.10 Take appropriate measures to ensure panels are not displaced when installing geotextiles and during backfilling operations.

MEASUREMENT AND PAYMENT

- E22.11 Watermain and Water Service Insulation shall be measured on an area basis and paid for at the Contract Unit Price per square metre of "Watermain and Water Service Insulation". The area to be paid for shall be the total square meters of watermain and water service insulation supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- (a) Excavation of the roadway subgrade in accordance with E22.6 will not be measured for payment and will be included in the payment for "Watermain and Water Service Insulation".

E23. CONSTRUCTION OF CONCRETE SPILLWAY

DESCRIPTION

- E23.1 General
- E23.1.1 This specification covers the supply and installation of concrete spillways complete with curb inlet grates.
- E23.1.2 Referenced Standard Construction Specifications
- (a) CW 2160 – Concrete Underground Structures and Works;
- (b) CW 3110 – Sub-grade, Sub-base and Base Course Construction; and
- (c) CW 3210 – Adjustment of Pavement and Boulevard Structures.

MATERIALS

- E23.2 Concrete Spillway
- E23.2.1 Concrete and reinforcing steel shall be supplied and installed in accordance with the Drawings and CW 2160-R7.
- E23.2.2 Bedding shall be supplied and installed in accordance with the Drawings and for base course material as described in CW 3110-R21.
- E23.2.3 Curb inlet grates shall be supplied and installed in accordance with the Drawings and CW 3210-R8.

CONSTRUCTION METHODS

- E23.3 Concrete Spillway
- (a) Concrete spillways complete with curb inlet grates shall be constructed in accordance with the Drawings.

MEASUREMENT AND PAYMENT

- E23.4 The supply and installation of concrete spillways will be measured on a linear metre basis and paid for at the Contract Unit Price per unit for "Construction of Concrete Spillway". The length to be paid for shall be the total number of metres of concrete spillways supplied and installed in accordance with this Specification as measured and accepted by the Contract Administrator.
- E23.5 Payment for "Construction of Concrete Spillway" shall include all base course bedding material, concrete, reinforcing steel, curb inlet grate, labour, superintendence and all other incidental items necessary to complete the work described in this Specification.

E23.6 Measurement for length of spillway installed will be made horizontally at grade above the centreline of the spillway from the back of curb to the end of the spillway.

E24. MATERIALS FOR TRAFFIC SIGNAL INSTALLATIONS

E24.1 Further to CW 3620 2.11, Anchor Bolt Templates and Top Rings:

- (a) Master anchor bolt templates and Oversized D top rings are provided by the City and shall be used by the Contractor for all bases constructed under the provisions of this specification.
- (b) When using anchor bolt templates and top rings for pouring concrete they must both be oiled (inside and out) for ease of removal and cleaning. Following the removal of anchor bolt template and top ring, both must be cleaned immediately.
- (c) The templates shall be suitably cleaned by the Contractor at the end of the Contract and be returned to the City. The template shall be cleaned free of concrete residue and any other debris and returned to the City in a "like-new" condition.
- (d) In the event of loss or damage to materials supplied by the City, the cost of replacement materials shall be borne by the Contractor.
- (e) **The Contractor shall contact the City of Winnipeg Stores Foreman to coordinate the pickup of the materials. Prior to pickup of the materials the Contractor will be required to obtain specific account information from the Traffic Signals Branch.**
 - (i) Public Works Stores
Attn: Stores Foreman
1277 Pacific Ave
Winnipeg, MB R3E 1G7
Phone: (204) 794-4333

E24.2 Further to CW 3620 2.10, City Supplied Materials:

- (a) If requested by the Contract Administrator, the Contractor shall submit in writing an account for all materials supplied by the City, showing in detail all materials drawn from the City's stores, quantities used at each work location, and materials on hand.
- (b) The City will issue the Contractor a "float" quantity of the above noted City-supplied materials, for the purpose of expediting the daily work progress.
- (c) The Contractor shall be obliged to requisition and withdraw those items which are City supplied material on the basis of the estimated quantity needed for a particular job.
- (d) The Contractor shall account for the quantities of materials drawn to the satisfaction of the City. Any overdraw of materials in excess of required quantities shall be credited or returned to the City. At the end of the Contract, all surplus materials shall be returned to the City.

E25. INSTALLATION OF TRAFFIC SIGNAL SERVICE BOXES (PRE-CAST)

DESCRIPTION

E25.1 This specification covers the use and installation of a service box pre-cast (SD-322) 17" x 30" x 18" and 13" x 24" x 18".

MATERIALS

E25.2 Materials shall be as per Section 2 of CW 3620.

CONSTRUCTION METHODS

E25.3 Install pre-cast service box in grass boulevards/medians, and hard surfaced medians or as shown on the Drawings or as directed by the Contract Administrator.

- E25.4 Fill bottom of excavation with compacted limestone base course material to set precast service box to grade.
- E25.5 Install pre-cast service box on top of the compacted granular fill material to pavement, sidewalk or boulevard finish grade.
- E25.6 All conduits must be bundled into a group in the centre of the pre-cast service box. Install plastic plugs prior to back fill.
- E25.7 Backfill around pre-cast service box exterior. Back fill shall conform to requirements of SD-342.
- E25.8 Pre-cast service box shall meet the grade of the sidewalk or boulevard provided by the Contract Administrator.

MEASUREMENT AND PAYMENT

- E25.9 Installation of service boxes shall be measured on a unit basis and paid for at the Contract Unit Price per unit for "Items of Work" listed below. The number of units to be paid for shall be the total number of Service Boxes installed in accordance with this specification, accepted and measured by the Contract Administrator.
 - (a) Service Box Pre-Cast (17" x 30")

E26. INSTALLATION OF EARLY OPEN CONCRETE TRAFFIC SIGNAL BASES

DESCRIPTION

- E26.1 This specification shall cover the installation of early open concrete bases.

MATERIALS

- E26.2 Supply concrete for bases in accordance with CW 2160, Table CW 2160.1 Design Requirements for Concrete Used for Underground Structures, for Type A Structures (monolithic sewers and reinforced structures).
- E26.3 Further to E26.2, the supplied concrete shall achieve a minimum compressive strength of 22 MPa at 48 hours.
- E26.4 City Supplied Materials shall be as per Section 2.10 of CW 3620 and E24.

CONSTRUCTION METHODS

- E26.5 Construction methods for the installation of early open concrete bases shall be as per Section 3.7 or CW 3620.

MEASUREMENT AND PAYMENT

- E26.6 Installation of Concrete Bases shall be measured on a unit basis and paid for at the Contract Unit Price per unit for "Items of Work" listed below. The number of units to be paid for shall be the total number of concrete bases installed in accordance with this specification, accepted and measured by the Contract Administrator.
 - (a) Signal Pole Base Early Open – Type G
 - (b) Signal Pole Base Early Open – Type OD
- E26.7 Payment for the items of work in this Section includes the supply and installation of ready mix or mixed concrete on site.
- E26.8 Payment for the items of work listed above includes the supply and installation of grounding rods (electrodes) installed with the concrete bases.
- E26.9 Payment for the items of work listed above includes boring.

E26.10 Payment for the items of work listed above includes top ring forms.

E27. INSTALLATION OF STREET LIGHTING AND ASSOCIATED WORKS

E27.1 DEFINITIONS

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

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

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

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

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

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

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

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

E27.2 DESCRIPTION

E27.2.1 The work shall consist of the supply of all supervision, labour, materials (except as indicated under MATERIAL SUPPLIED BY MANITOBA HYDRO below) insurance, tools, backfill and equipment (and their maintenance), transportation, fuel, oil, meals and lodging, mobilization and de-mobilization, and warranty of workmanship as required to install and remove temporary Overhead Feeds, remove existing street light poles as required, install new street light poles and associated underground cables/conduits, all in accordance with the requirements specified in the tender documents.

E27.3 WORK LOCATIONS

E27.3.1 The proposed street light installation (red) and removals (green) are shown on drawings SL-REF-01, SL-REF-02 and SL-REF-03 and are as follows:
(a) Archibald Street from Cottonwood Road to Elizabeth Road

E27.4 COORDINATION OF WORK

E27.4.1 The Contractor shall provide a minimum of ten (10) working days notice to Manitoba Hydro prior to the start of construction. The work shall be conducted and coordinated with Manitoba Hydro in a manner to ensure street lighting is maintained at all times for the duration of the work. The construction drawings provide the Proposed Sequence of Construction.

E27.4.2 The Contractor shall obtain Work Clearance from Manitoba Hydro's Customer Service Centre(s) (CSC) affected prior to the work commencing. No additional compensation shall be paid to the Contractor for delays obtaining Work Clearance for any reason.

E27.4.3 Manitoba Hydro's CSC will provide the Limits of Approach applicable to the Contractor on the Work Clearance form.

E27.5 ORIENTATION

E27.5.1 Prior to the commencement of the proposed work, the Contractor's crew foremen, electricians, and other key personnel shall attend one (1) day of orientation provided by Manitoba Hydro for various operations such as cable handling, cable splicing/termination, installation of street light poles, concrete bases, luminaires and various other construction standards and procedures. The Contractor will be responsible for all costs associated with personnel salaries, travel, sustenance and overheads, etc., during training.

E27.6 PRE-CONSTRUCTION MEETING

E27.6.1 Prior to the commencement of the work, the Contractor shall attend a pre-construction meeting with Manitoba Hydro. The agenda for this meeting shall include but not be limited to the following:

- (a) Reference the Contractor's Safe work Procedures;
- (b) Prime Contractor;
- (c) materials;
- (d) sequence of construction;
- (e) communication plan;
- (f) any training requirements & qualifications;
- (g) Drawing and Project review;
- (h) a review of the Contractor's proposed work schedule; and
- (i) any and all other topics of clarification that the Contractor and the Contract Administrator may wish to discuss.

E27.6.2 The Contractor's cost to attend this pre-construction meeting shall be incorporated into the unit prices for the work.

E27.7 QUALIFICATIONS AND CERTIFICATION

E27.7.1 The Contractor's Crew Foreman, installers and other key Contractor's Personnel shall possess the necessary certification, licensing, training, experience and familiarity with safety rules, procedures and hazards relating to the work. Journeyman Power Line Technician (PLT), Journeyman Lineman, Journeyman Cableman or Journeyman Electricians shall be required to perform portions of this work.

E27.7.2 Journeyman Power Line Technician (PLT), Journeyman Cableman and Journeyman Lineman are also required to possess a "Limited Specialized Trade Licence – 'M-P' Licence – Power Line" issued by the Province of Manitoba.

E27.7.3 Office of the Fire Commissioner Bulletin OFC 18 – 002 dated May 23, 2018 regarding Electrician Licenses discusses the requirements for a "Limited Specialized Trade Licence – 'M-P' Licence – Power Line".

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

E27.7.4 Licensed Journeyman Electricians or Journeyman PLT or Journeyman Cableman or Journeyman Lineman ARE REQUIRED for all cable handling operations included but not limited to: disconnecting cables in the handhole, installation and removal of temporary overhead feeds, installation and connection of ground rods, streetlight cable splices, termination of streetlight cables in handholds and at luminaires. The Contractor shall employ sufficient qualified personnel on its crews to conform to the Electrician's Licensing Act. The Contractor shall be prepared to provide proof of licences to Manitoba Hydro upon request.

E27.7.5 The Contractor shall assess the hazards associated with the work and have documented Safe work Procedures to perform the work. It is the Contractor's responsibility to train employees on these procedures. The Contractor shall be prepared to provide proof of training to Manitoba Hydro upon request.

E27.8 REFERENCED STANDARD CONSTRUCTION SPECIFICATIONS

E27.8.1 In addition to these Specifications, the work to be performed by the Contractor relative to the installation and/or replacement of street lighting poles, concrete bases and associated cabling shall be in accordance with the following:

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

E27.8.2 Revisions and updates to the Manitoba Hydro 66kV and Below Standards are issued periodically and the latest issued version of the Standard will apply. For the convenience of the Contractor for bidding purposes, excerpts of the Manitoba Hydro 66kV and Below Standards have been included as Appendix A.

E27.8.3 In some cases, Municipal, Provincial or Federal laws or this Technical Specification may be more stringent than the CSA Standards. Whenever conflict exists, the Contractor shall comply with the most stringent requirements applicable at the place of the work.

E27.9 TOOLS, EQUIPMENT AND MATERIALS

E27.9.1 The Contractor shall be required to provide all tools and equipment required for performing the specified tasks. Equipment shall be in good operating condition, shall be properly maintained using original equipment manufacturer replacement parts and shall be provided with letters of testing/inspection from the manufacturer when requested. Where the equipment is provided as a kit with multiple parts and tools, the kit shall be complete with all parts required to perform the designed task. Contractor fabricated tools or equipment will not be accepted for use.

E27.9.2 The Contractor shall obtain the following specific Electrical Equipment including but not limited to:

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

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

E27.9.3 Dies shall be of the type shown in Standard CD210-21 and CD 210-24 only, must have identical markings, and compression tool die must match die number stamped on connector.

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

E27.9.4 Alternative equipment manufacturers may be considered upon request by the Contractor and shall be approved for use by Manitoba Hydro prior to use.

E27.9.5 Manitoba Hydro may reject any tools or equipment that do not appear to be in good condition or fail to successfully provide the required function.

E27.10 MATERIAL SUPPLIED BY MANITOBA HYDRO

E27.10.1 Manitoba Hydro shall supply all street light poles, concrete bases, breakaway bases, luminaires, street light arms, ground rods, compression sleeves, grommets, nuts, electrical cables, conduits, relays, cable guards, Gel-caps and all other materials noted in the Standards. The Contractor shall sign receipts indicating the location on which the materials are to be used. The material shall be picked up by the contractor from the following locations:

E27.10.2 Manitoba Hydro Central Stores (contact personnel will be provided to the successful contractor).

E27.10.3 Materials requested will be supplied to the Contractor by Manitoba Hydro upon presentation of Manitoba Hydro's Stores Material Order Form. The Contractor shall assume all responsibilities for the loading, unloading, transportation, proper handling, secure storage and working of the materials and shall make replacements at its own expense in case any material is damaged, stolen or lost due to improper handling, storage or poor workmanship.

E27.10.4 The Contractor shall, at the time of materials release, check and confirm the quantity of materials. Shortages, discrepancies, or damages to materials shall be immediately reported in writing to Manitoba Hydro.

E27.10.5 After commencing performance of the work, the Contractor shall continually monitor all material required for the timely completion of the work and shall report additional material requirements to Manitoba Hydro a minimum of 72 hours prior to materials being required to perform the work. No additional compensation shall be paid as a result of delays due to material shortages where additional material requirements were not reported a minimum of 72 hours prior to being required for the work on an active project.

E27.11 MATERIAL SUPPLIED BY CONTRACTOR

E27.11.1 The Contractor shall be responsible to furnish gravel, sand, ¾" down limestone, ¼" down limestone, protective hose (i.e. typically 2" fire hose), duct seal and pit-run material for backfilling around street light poles and around cables as per the Standards. The cost of furnishing the above listed materials shall be incorporated into the unit prices for the work.

E27.12 SURPLUS, RECLAIM AND SCRAP MATERIAL

E27.12.1 Upon completion of the work, the Contractor shall, at its own expense, deliver to Manitoba Hydro Central Stores, all Surplus materials furnished by Manitoba Hydro and not used in the work, regardless of the location of said material at that time.

E27.12.2 In addition, the Contractor shall, at its own expense, deliver to Manitoba Hydro Central Stores all Reclaim materials from the work specifically HPS luminaires. Manitoba Hydro shall be responsible for the proper disposal of Reclaim HPS luminaires. The HPS bulb shall remain installed and unbroken in the Reclaim luminaire. The Contractor shall handle the Reclaim luminaires with care and shall avoid breaking the bulb or refractor.

E27.12.3 Manitoba Hydro's preference is to recycle as much Scrap Material as practicable. The Contractor is responsible to remove the Scrap Material, transport to the recycler or Manitoba Hydro approved disposal site, pay for any disposal fees and may retain any recycling value.

E27.13 DE-ENERGIZATION AND LOCKOUT

E27.13.1 **Manitoba Hydro** - Where a standard is supplied from an Overhead Source, Manitoba Hydro's staff shall be responsible to disconnect and isolate the street light standard or standards between the standard and Overhead Source. Some street light standards may be temporarily fed from an Overhead Source. This Overhead Source shall be disconnected and removed by Manitoba Hydro staff prior to commencing with the work. The streetlight circuits will not be Locked Out by Manitoba Hydro.

E27.13.2 **The Contractor** - The Contractor shall assess the hazards associated with the work and employ its own Safe Work Procedure for the work to be performed. The Contractor's Safe Work Procedure shall include provisions that the street light circuits will not be Locked Out by Manitoba Hydro. The Contractor's Safe Work Procedure shall achieve Lock Out or techniques equivalent to Lock Out.

E27.13.3 The Contractor shall complete a job planning form (an example is included as Appendix E) on a daily basis before any work commences and provide Manitoba Hydro with copies of the job plans if requested.

E27.14 TEMPORARY OVERHEAD FEEDS

E27.14.1 Manitoba Hydro in consultation with the Contractor will determine if temporary lighting will be provided by the existing street lights or from the new street lights.

E27.14.2 When using the existing poles for temporary lighting, Manitoba Hydro shall remove an Overhead Source in accordance with DE-ENERGIZATION AND LOCKOUT section above, prior to the Contractor installing a #4 duplex overhead conductor between the existing poles. The #4 duplex overhead conductor will normally be attached to the tenon of the davit arm near the luminaire with a pre-form grip. Older poles may require a spool insulator be attached to the pole using a pre-form grip to support the #4 duplex overhead conductor. A short length of 2C/#12 copper conductor is connected to the terminals of the luminaire brought out and connected to the #4 duplex overhead conductor. The final span to the Overhead Source shall be installed by Manitoba Hydro.

E27.14.3 When using the new poles for temporary lighting, the Contractor shall install the new bases, poles and #4 duplex overhead conductor. The #4 duplex overhead conductor will be attached to the tenon of the davit arm near the luminaire with a pre-form grip. A short length of 2C/#12 copper conductor is connected to the terminals of the luminaire brought out and connected to the #4 duplex overhead conductor. The final span to the Overhead Source shall be installed by Manitoba Hydro.

E27.14.4 All material used to provide the temporary overhead feed shall be returned to Manitoba Hydro. Care shall be taken to coil and tag Reclaim conductor for reuse. If used, insulators shall be handled carefully to prevent breakage.

E27.15 SAFE EXCAVATION

E27.15.1 The work shall be performed in accordance with the requirements of Manitoba Hydro's Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B and Manitoba Workplace Safety and Health Regulation 217 latest revision.

E27.16 SAFE HANDLING

E27.16.1 The Contractor shall apply handling techniques in accordance with Manitoba Workplace Health and Safety Regulation 217 (latest revision).

E27.17 ELECTRIC CABLES AND CONDUITS

- E27.17.1 The Contractor shall use diligent care and proper equipment in handling of all cables, so as not to injure the jacket and avoid gouging, kinking, scratching or abrading the cables. If any material is damaged to any extent, the Contractor shall repair the damages at its own expense, in a manner approved by Manitoba Hydro or will be charged the full cost of the damaged items.
- E27.17.2 Cable reels shall not be dropped and must be handled and placed/stored in an upright position at all times and shall not be laid flat for any purpose or reason. Cable reels shall be adequately supported on hard surface to prevent the reel from sinking into the ground that can cause undue stress on the cables. Cable reels should be inspected for damages prior to use. If a cable reel is found to be defective, such defect shall be reported immediately to Manitoba Hydro.
- E27.17.3 The Contractor shall place all material and string the cables in such a manner as to cause the least interference with normal use of the land, street or roadway. All material shall be unloaded in a manner to preserve its condition, prevent loss and/or theft and permit easy access for Manitoba Hydro's inspection.
- E27.17.4 The Contractor shall provide Manitoba Hydro's inspector sufficient opportunity, in the sole discretion of Manitoba Hydro, to inspect the work.
- E27.18 PRECAST CONCRETE BASES**
- E27.18.1 The Contractor shall handle, store, transport and unload the precast concrete bases in a manner to prevent damage to the threaded bolts and conduit casing.
- E27.18.2 Precast Concrete Bases are extremely heavy. Approximate weight of pre-cast concrete bases are found in the Standards. The Contractor shall only use equipment rated for such weight.
- E27.19 STREET LIGHT POLES AND ARMS**
- E27.19.1 The Contractor shall handle, store, transport, and provide proper load securement for the poles and arms in a manner to prevent damage.
- E27.20 LUMINAIRES**
- E27.20.1 The Contractor shall handle, store, transport and unload the luminaires in their original packaging and in a manner to prevent damage.
- E27.21 SMALL MATERIAL**
- E27.21.1 Photo electric cells, shorting caps, shims, nut covers and associated supplies shall be kept in a suitable warehouse provided by the Contractor at its own expense. Photo electric cells shall be transported and stored in such a manner as to prevent breakage.
- E27.22 CARE OF MATERIALS**
- E27.22.1 The Contractor shall assume all responsibilities of all the materials and shall replace, at its own expense, any materials damaged, stolen or lost due to improper handling or poor workmanship.
- E27.23 WIRE AND CABLE REEL STORAGE**
- E27.23.1 Cable reels shall be stored with the flanges upright and resting on a hard surface. At temporary storage sites where the soil may be soft, preservative-treated plywood sheets may be used to keep the flanges from sinking into the ground.
- E27.23.2 If cable reels must be pancaked or stored on their side in vertical racks, do not lift the reel by the top flange. Spacers (two 2 X 4s placed wide side up) should be placed under the bottom flange and between the reels in order to create a space to insert the forks and lift the reels without damaging the cable.

E27.24 REEL HANDLING

- E27.24.1 When off-loading reels from a truck, reels shall be lowered using a hydraulic gate, hoist or forklift truck. When a reel is rolled from one point to another, care must be taken to see that the reel does not straddle objects such as rocks, pipes, curbs or wooden blocks which could damage the cable or protective covering. A reel should always be rolled on hard surfaces to avoid sinkage and in the opposite direction to the cable wraps to ensure that the reel is rolled in such a direction as to tighten the cable on the reel.
- E27.24.2 When using a hoist, install a mandrel through the reel arbour hole and attach a sling. Use a spreader bar approximately 6 inches longer than the overall reel width placed between the sling ends just above the reel flanges. This will prevent bending of the reel flanges and damage to the cable.
- E27.24.3 If a forklift is used to move a reel, the reel is to be approached from the flange side. Position the forks such that the reel is lifted by both reel flanges. The lift forks shall not contact the cable.
- E27.24.4 Returnable reels shall be returned promptly to Manitoba Hydro Central Stores and in no case later than three (3) days after the completion of the work unless otherwise mutually agreed between the Contractor and Manitoba Hydro.

E27.25 PRESSURIZED WATER/VACUUM EXCAVATION

- E27.25.1 Pressurized water/vacuum excavation (PW/VE) shall be used to daylight all buried utilities and structures where excavation by other mechanical means would be expected to provide a physical risk to that utility or structure.
- E27.25.2 The work shall be performed in accordance with the requirements of Manitoba Hydro's Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B.

E27.26 REMOVAL STREET LIGHT POLE FROM EXISTING BASE

- E27.26.1 This shall include all work required to remove a street light pole from an existing base as set forth in this Technical Specification. The pole may be on an existing precast concrete base, steel power installed screw base or poured in place concrete base.
- E27.26.2 The Contractor shall furnish all labour, supplies and materials (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary for the removal of the street light pole from the existing base. Care shall be taken to preserve the luminaire. The luminaire shall be reinstalled on the new street light pole or returned to Manitoba Hydro's stores as instructed by the Manitoba Hydro.
- E27.26.3 The Contractor shall be responsible to transport all Surplus and Reclaim materials to Manitoba Hydro Central Stores and transport and dispose of all Scrap material as set forth in this Specification.

E27.27 REMOVAL OF BASE AND DIRECT BURIED STREET LIGHT POLE

- E27.27.1 This shall include all excavation, whether by auger, pressurized water/vacuum excavation, by hand, or by other methods which may be necessary to remove a base or direct buried street light pole. The base may be poured in place concrete, steel power installed or precast concrete.
- E27.27.2 The Contractor shall be responsible to transport all Surplus and Reclaim materials to Manitoba Hydro Central Stores and transport and dispose of all Scrap material as set forth in this Specification.
- E27.27.3 The Contractor is responsible to supply all backfill material as specified in the Standards and carry out all backfill, compacting and leveling of all excavations and voids for removed bases and direct buried street light poles so as to be ready for top soil and seed or sod or as directed by Manitoba Hydro.

E27.28 INSTALLATION OF FOUNDATION - CONCRETE BASE

- E27.28.1 This shall include all excavation, whether by auger, pressurized water/vacuum excavation, by hand, or by other methods which may be necessary to replace or install a concrete base as set forth in this Specification.
- E27.28.2 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary to install a new or replace a concrete base. Excavation for the precast concrete base shall be to a diameter and depth specified in Standard CD 300-6. All excess material is to be removed by the Contractor.
- E27.28.3 The concrete base shall be set on a bed of $\frac{3}{4}$ " down limestone. The concrete base backfill material shall be compacted in lifts no more than 150 mm. Backfill material shall be $\frac{3}{4}$ " down limestone. Compacting of backfill material shall be done using a hydraulic tamper. Alternative tamping methods shall be approved by Manitoba Hydro. Underground cables entering the concrete base shall be protected by a length of protective hose supplied by the Contractor and a layer of sand surrounding the cables to protect it from the limestone. The concrete base shall be installed level in all 4 directions. Final grade must be established prior to installing the concrete bases.
- E27.28.4 The completed backfill shall be at least equal in compaction to undisturbed soil, as required by the Municipal authorities or elsewhere in this Specification. The Contractor shall level all excavations.
- E27.28.5 Should settlement occur in the excavation and cause a depression in the surface, the Contractor shall repair the surface. Placing of additional backfill material due to settlement shall be at the Contractor's expense.
- E27.28.6 The concrete base shall be oriented in the proper direction to allow the easy entrance of the underground cables into the plastic pipe preinstalled in the concrete base. Care shall be taken to prevent damage to the insulation or jacket of the conductors. The cable shall be left long enough to extend one (1) metre beyond the top of the hand hole.

E27.29 BASE MOUNTED STREET LIGHT POLES

- E27.29.1 This shall include all work required to install the street light pole on the concrete base as set forth in this Specification.
- E27.29.2 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary for the installation of the pole (straight shaft or davit) on the concrete base.
- E27.29.3 Unless otherwise specified on the construction drawings, the Contractor shall orient the poles so that the hand hole is on the left side of the pole when viewed from the road. A worker should be able to see oncoming traffic when working in the hand hole.
- E27.29.4 The Contractor shall level the street light pole in all 4 directions. Leveling shims may be used.
- E27.29.5 Tightening of bolts shall be performed in a manner that brings the surfaces up evenly. All nuts shall be tightened and torqued in accordance with Standard CD 300-9. The Contractor shall install the nut covers included with the pole.
- E27.29.6 Unless otherwise specified, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.
- E27.29.7 Existing street light poles may have street signs attached. The Contractor shall remove the signs from the existing pole and temporarily reattach the signs to the new pole. The Contractor shall notify Manitoba Hydro of the location where the signs have been removed.

E27.30 LUMINAIRES AND ASSOCIATED WIRING

- E27.30.1 The Contractor shall furnish labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary to install the

luminaire and associated wiring. Unless otherwise specified, the luminaire shall be installed with a tilt of zero (0) degrees. The Contractor shall install a length of 2 conductor No. 12 gauge (2C-12) wire from the terminals of the luminaire, through the arm (if applicable), down the pole to the hand hole. One (1) metre of 2C-12 wire shall be left at the hand hole. Impact equipment (air or electric) shall not be used to tighten luminaire mounting bolts. The Contractor shall be liable for damage due to over tightening.

E27.30.2 The Contractor shall verify the luminaire voltage matches the source voltage as shown on the construction drawings. If luminaire voltage does not match the source voltage, the Contractor shall re-wire the luminaire in accordance with the wiring diagram provided.
NOTE: Not applicable for LED luminaires.

E27.30.3 As specified on the construction drawings, the luminaire will require either a photo electric cell (PEC) or shorting cap installed. When installing the PEC the eye shall be oriented north. The Contractor shall also install the appropriate wattage bulb in the luminaire.
NOTE: Bulb installation not applicable for LED luminaires.

E27.31 BREAK AWAY BASES

E27.31.1 Break away bases shall be installed in accordance with Standard CD 300-10. The height of the concrete base above grade shall not exceed 50mm. The surface of the concrete base shall be flat and level. A reaction plate shall be installed between the concrete base and the break-away base.

E27.31.2 The Contractor shall torque the couplers in accordance with Standard CD 300-10. Impact tools shall not be used to tighten or torque couplers or nuts associated with a break away base.

E27.32 SPLICING/CONNECTING CABLES

E27.32.1 The electric cable shall be spliced/terminated as per Standards CD 215-12, CD 215-13, CD 310-1, CD 310-4, CD 310-9 and CD 310-10 with the exception that the Contractor will use a GELCAP-SL-2/0 splice kit (See Appendix C). Termination in the hand hole may include the installation of an inline fuse holder.

E27.32.2 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary to splice/terminate the street light conductor(s).

E27.33 EXCAVATION

E27.33.1 The Contractor shall furnish all labour, supplies and material (except as indicated in the Section "MATERIAL SUPPLIED BY MANITOBA HYDRO") necessary for the completion and maintenance of grade and line of the street light cables and conduit including water control if found to be necessary. The trench shall be graded to conform to the street light cables and conduit so that the street light cables and conduit rest firmly on a smooth surface throughout its length. All stones or other objects which, in the opinion of Manitoba Hydro might damage the street light cable jacket and conduit shall be removed. Where the presence of rock or other condition prevent a satisfactory bed for the cables, 150 mm of well-tamped, clean soil or ¼" down crushed limestone shall be placed in the bottom of the trench. In this case, the spoil bank from trenching operations shall not be allowed to fall into the trench or mix with the soil to be used in backfilling the trench. Loose debris or foreign matter and the spoil bank shall be placed so as not to hinder drainage, damage property, or obstruct traffic.

E27.33.2 Trenches shall be dug to such a depth that will provide a minimum cover of 600 mm from final grade in sodded areas and 1000 mm in roadways in accordance with Standard CD 305-1.

E27.34 LAYING CABLES

E27.34.1 Cables are to be lowered in the trench in an orderly fashion so as to maintain a consistent path and straight alignment. All cables shall be lowered in a continuous run (NO

SPLICING) and in accordance with the construction drawings; and shall maintain the necessary separation, where required. All cables shall be of continuous runs and capped and sealed if they are not being installed in the pole at that time. Cables shall not be dragged over paved surfaces.

- E27.34.2 Once a cable is cut its ends must be sealed immediately with an approved and appropriately sized, heat shrink or cold shrink sealing cap to prevent moisture ingress unless the cable is being installed in the pole at that time.
- E27.34.3 During the removal of the cable, the reels shall be placed on jacks, stands or trailers with a bar through the arbour holes which will allow the reel to be turned easily, and the cable to be paid out. Cables can be paid out from the bottom or the top of the reel. Cable in coils shall be handled in a similar manner. This can be achieved by supporting the coil in a vertical plane and rotating it by hand as the cable is carefully uncoiled. The cable shall never be pulled over the flange of a reel, or pulled off the side of a coil, since this will introduce a twist in the cable.
- E27.34.4 During installation, under no circumstance is the cable to be subjected to a bending radius tighter than that detailed in the Standards.
- E27.34.5 Where specified in the Standards or on the construction drawings, the Contractor shall install the street light cable in a conduit.

E27.35 INSTALLING CONDUIT AND CABLE BY BORING (HORIZONTAL DIRECTIONAL DRILLING)

- E27.35.1 The Contractor shall dig the approaches and openings necessary to install boring equipment, and the boring equipment used shall be of such a nature as to minimize the opening size required. The boring equipment shall produce a straight hole without unnecessary dips or bends. The bore hole shall be only slightly larger than the outside diameter of the conduits or cables to minimize possible settlement. Cables and conduits shall be pulled in with pulling eyes or using a kelly grip in a manner so as to guard against damage.
- E27.35.2 During construction as the drill bit crosses each existing facility a lookout shall be assigned by the Contractor to visually confirm the drill bit is maintaining a minimum 300 mm clearance from the existing facility all in accordance with Manitoba Hydro Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B. Maximum pulling tensions on any streetlight cable shall be limited to 2.9 kN/0.65 kips.
- E27.35.3 Drilling fluids and associated waste materials shall be disposed of in a manner that minimizes environmental effects.
- E27.35.4 The Contractor shall properly compact the backfill material and will be responsible for placing additional material should settlement occur for the duration of the warranty period.

E27.36 BURIED UTILITY CROSSINGS

- E27.36.1 All buried obstructions are not necessarily shown on the reference drawings and the locations of those indicated are approximate only.
- E27.36.2 The Contractor shall determine the location of all buried obstructions and shall notify the appropriate authorities and obtain all necessary permits prior to excavation, trenching and directional drilling near or across such obstructions. All buried obstructions where the new buried cable route crosses other utilities including but not limited to gas, water, sewer, telephone and electric lines shall be exposed as per each utilities guidelines by the Contractor, including the use of Pressurized Water/Vacuum Equipment (PW/VE) where necessary. Should any damage occur to such lines during the course of the work, the Contractor shall be responsible for the damage and the costs of repairs to buried obstructions caused by its operations and shall fully indemnify the City of Winnipeg and Manitoba Hydro from and against all claims arising out of such damage. Manitoba Hydro Safe Excavation and Safety Watch Guidelines (latest revision) included as Appendix B shall be followed when crossing natural gas pipelines and electrical cables by the directional boring method.

E27.36.3 The PW/VE technique, used to expose underground plant in certain conditions, must be performed in accordance with each utility's requirements, including but not limited to Manitoba Hydro, Manitoba Telecom Services, Shaw Cable, etc. PW/VE costs that the Contractor will incur during the work must be factored into the Contractor's bid prices. The Contractor shall not be entitled to extra compensation for the use of PW/VE on the work.

E27.36.4 The Contractor shall be responsible to supply all backfill material and carry out all backfill, compacting and leveling of all excavations so as to be ready for topsoil and seed or sod or as directed by Manitoba Hydro.

E27.37 BENDING CABLES/CONDUITS AND INSTALLATION INTO STANDARDS

E27.37.1 It is desired to reduce to a minimum the required number of bends and to lay the cables/conduits to conform to the contour of the ground and maintain a normal covering. This shall be accomplished by cutting the trench slightly deeper in approaches to road crossings and drainage ditches. It is intended that the Contractor shall eliminate unnecessary bending by operating the trenching machine at various depths rather than by finishing grading the trench by hand whenever practical.

E27.37.2 Sharp bends of the cables/conduits shall be avoided at all times. All bends shall meet the requirements set out in this Specification. If excessive bending was exerted on any cable, the cable shall be replaced at the Contractor's cost. During installation, under no circumstance is the cable to be subjected to a bending radius tighter than that detailed in the Standards. At street light poles the Contractor shall install the ends of the cables into the plastic pipe preinstalled in the concrete base. Care shall be taken to prevent damage to the insulation or jacket of the conductors. Underground cables entering the concrete base shall be protected by a length of protective hose supplied by the Contractor and by a layer of sand surrounding the cables to protect it from the limestone. The cable shall be left long enough to extend one (1) metre beyond the hand hole. The street light cable in the trench shall be installed in conduit for mechanical protection and the ends sealed with duct seal supplied by the Contractor. Care shall be taken to prevent damaging the cable where it exits the conduit. The conduit shall only be installed into the concrete base if conduit sizes make it practicable.

E27.37.3 Unless otherwise directed, excess underground cable and 2C-12 wire shall be left inside the hand hole with the hand hole cover loosely installed.

E27.38 BACKFILL

E27.38.1 All backfilling material within 300 mm of the cables/conduits shall be clean, free of sod, vegetation, organic material, stones or other debris, and of a consistency as to not create significant voids or air spaces around the cables/conduits. Other backfilling material shall be free of stones greater than 150 mm on their maximum dimension. Where cinders or very acid soil are encountered or where gravel or incompressible fill is required by Municipal authorities, ¼" down crushed limestone shall be placed all around the cables for a depth of at least 300 mm. The completed backfill shall be at least equal in compaction to undisturbed soil or as directed by Manitoba Hydro. Backfill material is to be placed and compacted in lifts not exceeding 300 mm. All excess material is to be removed by the Contractor.

E27.38.2 Tamping or flushing methods must be used where necessary to give the required compaction. Where tamping is used, hand tampers shall be used to at least 300 mm above the cable before machine tamping may be used. The Contractor shall level all excavations so as to be ready for topsoil and seed or sod or as directed by the Manitoba Hydro. Should settlement occur in the excavation and cause a depression in the surface, the Contractor shall repair the surface to the satisfaction of the Manitoba Hydro at the Contractor's cost.

E27.38.3 Excavations remaining where poles have been removed shall be backfilled with spoil, pit run gravel or ¾" down limestone and compacted in lifts of 150mm as directed by Manitoba Hydro. The top 300 mm of the excavation shall be backfilled with topsoil.

E27.38.4 Excavations remaining where utility crossings have been exposed shall be backfilled with sand or clean spoil and compacted in lifts of 150mm. The top 300 mm of the excavation shall be backfilled with topsoil.

E27.38.5 Backfill of all excavations shall be in accordance with City of Winnipeg Standard Construction Specification CW 2030 (latest revision), to the satisfaction of the authority having jurisdiction and Manitoba Hydro.

E27.39 DEFECTIVE WORK & WARRANTY

E27.39.1 If any portion of the work fails to comply with the requirements of this Specification, fails within the Warranty period, or if the final tests prove or indicate the existence of any fault or defect in the work, or any part thereof, Manitoba Hydro may forthwith re-execute or make good the faulty or defective work or alter the same to make it comply with requirements of the Specification at the Contractor's expense. Manitoba Hydro shall give the Contractor notice together with particulars of such failure, fault or defect, Manitoba Hydro's cost to re-execute or make good the faulty or defective work and the Cost shall be deducted from the Contract.

E27.39.2 At the completion of the work for each location, Manitoba Hydro shall prepare and issue a Network Commissioning Report, a sample of which is included as Appendix F, to the Contractor. The Network Commissioning Report shall be dated indicating the commencement of the Warranty period for the work performed at the location.

E27.40 AS-BUILT DRAWING

E27.40.1 The Contractor shall provide an as-built drawing or mark-up drawing to Manitoba Hydro which accurately displays the "as-built" location of the buried street light cables, conduits and street light poles.

E27.41 MEASUREMENT AND PAYMENT

E27.41.1 Removal of 25' to 35' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances

- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Removal of 25' to 35' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including removal of the pole, base, luminaire, appurtenances, use of pressurized water/vacuum excavation, transportation of Reclaim, Surplus and Scrap material, payment of associated disposal fees and all other items incidental to the work included in the Specification.

E27.41.2 Removal of 45' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances

- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Removal of 45' street light pole and precast, poured in place concrete, steel power installed base or direct buried including davit arm, luminaire and appurtenances". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including removal of the pole, base, luminaire, appurtenances, use of pressurized water/vacuum excavation, transportation of Reclaim, Surplus and Scrap material, payment of associated disposal fees and all other items incidental to the work included in the Specification.

E27.41.3 Installation of Conduit and #4 AL C/N or 1/0 AL Triplex Streetlight Cable in Conduit by Open Trench Method

- (a) This pay item will be measured on a linear metre basis and paid for at the Contract Unit Price per linear metre for "Installation of Conduit and #4 AL C/N or 1/0 AL Triplex streetlight cable in Conduit by open trench method." The number of meters to be paid

for at the Contract Unit Price shall be measured and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the conduit, pulling cable into the conduit, backfilling the trench, buried utility crossings, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.

- E27.41.4 Installation of 50 mm Conduit by Boring Method complete with Cable Insertion (#4 AL C/N or 1/0 AL Triplex)
- (a) This pay item will be measured on a linear metre basis and paid for at the Contract Unit Price per linear metre for "Installation of 50 mm conduit or conduits by boring method complete with cable insertion (#4 AL C/N or 1/0 AL Triplex)." The number of meters to be paid for at the Contract Unit Price shall be measured and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of 50mm conduit or conduits by boring method, inserting the #4 AL C/N or 1/0 AL Triplex streetlight cable into the conduit(s), buried utility crossings, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E27.41.5 Installation of cable (#4 AL C/N or 1/0 AL Triplex) by boring method.
- (a) This pay item will be measured on a linear metre basis and paid for at the Contract Unit Price per linear metre for "Installation of cable(s) (#4 AL C/N or 1/0 AL Triplex) by boring method." The number of meters to be paid for at the Contract Unit Price shall be measured and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the cable or cables by boring method, buried utility crossings, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E27.41.6 Installation of 25'/35' Pole, Davit Arm and Precast Concrete Base Including Luminaire and Appurtenances
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of 25'/35' pole, davit arm and precast concrete base including luminaire and appurtenances." The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the pole, davit arm, base, luminaire, appurtenances, placing the cable(s) into the base, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E27.41.7 Installation of 45'/55' Pole, Davit Arm and Precast Concrete Base Including Luminaire and Appurtenances
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of 45'/55' pole, davit arm and precast concrete base including luminaire and appurtenances." The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the pole, davit arm, base, luminaire, appurtenances, placing the cable(s) into the base, use of pressurized water/vacuum excavation and all other items incidental to the work included in the Specification.
- E27.41.8 Installation of One (1) 10' Ground Rod at Every Third Street Light, at the End of a Street Light Circuit or Anywhere Else as Shown on the Design Drawings. Trench #4 Ground Wire up to 1 m From Rod Location to New Street Light and Connect (Hammerlock) to Top of Ground Rod
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of one (1) 10' ground rod at every third street light, at the end of a street light circuit or anywhere else as shown on the design drawings. Trench #4 ground wire up to 1 m from rod location to new street light and connect (hammerlock) to top of the ground rod." The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full

for performing all operations herein described including install one (1) 10' ground rod, trench the #4 ground wire to the new streetlight pole, connect (hammerlock) ground wire to rod and all other items incidental to the work included in the Specification.

- E27.41.9 Installation of Lower 3 m of Cable Guard, Ground Lug, Cable Up Pole, and First 3 m Section of Ground Rod Per Standard CD 315-5
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Install/lower 3 m of Cable Guard, ground lug, cable up pole, and first 3 m section of ground rod per Standard CD 315-5". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installing the lower section of cable guard, ground lug, ground rod, coiling cable(s) up the pole and all other items incidental to the work included in the Specification.
- E27.41.10 Installation and Connection of Externally-Mounted Relay and PEC Per Standards CD 315-12 and CD 315-13
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation and connection of externally-mounted relay and PEC per Standards CD 315-12 and CD 315-13". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including mounting the relay, PEC, wiring as per the schematic and all other items incidental to the work included in the Specification.
- E27.41.11 Termination of 2/C #12 Copper Conductor to Street Light Cables Per Standard CD310-4, CD310-9 or CD310-10
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Terminate 2/C #12 copper conductor to street light cables per Standard CD310-4, CD310-9 or CD310-10". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including connection of the 2/C # 12 copper conductor to the #4 C/N or 1/0 Al Triplex cable(s) using a GELCAP-SL-2/0 splice kit and all other items incidental to the work included in the Specification.
- E27.41.12 Splicing #4 AL C/N or 2 Single Conductor Street Light Cables
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Splicing #4 Al C/N or 2 single conductor street light cables". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including splicing the #4 AL C/N or 2 single conductor cables in accordance with Standard CD 215-12 and CD 215-13 and all other items incidental to the work included in the Specification.
- E27.41.13 Splicing 1/0 AL Triplex Cable or 3 Single Conductor Street Light Cables
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Splicing 1/0 AL triplex cable or 3 single conductor street light cables". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including splicing the 1/0 Al triplex cable or set of 3 single conductor cables in accordance with Standard CD 215-12 and CD 215-13 and all other items incidental to the work included in the Specification.
- E27.41.14 Installation of Break-Away Base and Reaction Plate on Base-Mounted Poles up to 35'
- (a) This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Installation of break-away base and reaction plate on base mounted poles up to 35'". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including installation of the reaction plate,

break-away base and all other items incidental to the work included in the Specification.

- E27.41.15 Installation of Overhead Span of #4 Duplex Between New or Existing Streetlight Poles and Connect Luminaire to Provide Temporary Overhead Feed
- (a) This pay item will be measured on per span basis and paid for at the Contract Unit Price per span for "Installation of Overhead Span of #4 duplex Between New or Existing Streetlight Poles and Connect Luminaire to Provide Temporary Overhead Feed". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including attachment of the #4 duplex overhead conductor using a perform grip (c/w spool insulator(s) to davit arm if necessary), sagging conductor, connection of luminaire using 2C#12 copper conductor and all other items incidental to the work included in the Specification.
- E27.41.16 Removal of Overhead Span of #4 Duplex Between New or Existing Streetlight Poles to Remove Temporary Overhead Feed
- (a) This pay item will be measured on a per span basis and paid for at the Contract Unit Price per span for "Removal of Overhead Span of #4 duplex Between New or Existing Streetlight Poles to Remove Temporary Overhead Feed". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by the Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including removal of the #4 duplex overhead conductor, spool insulator(s) and all other items incidental to the work included in the Specification.
- E27.41.17 Expose Underground Cable Entrance of Existing Streetlight Pole and Install New Streetlight Cable(s).
- E27.41.18 This pay item will be measured on a unit basis and paid for at the Contract Unit Price per unit for "Expose Underground Cable Entrance of Existing Streetlight Pole and Install New Streetlight Cable(s)". The number of units to be paid for at the Contract Unit Price shall be verified and accepted by Manitoba Hydro. The Price shall be payment in full for performing all operations herein described including excavation and exposure of the underground cable entrance by any means necessary including use of pressurized water/vacuum excavation, installation of the new streetlight cables(s), backfill, compaction and all other items incidental to the work included in the Specification.

APPENDIX 'A'

MANITOBA HYDRO ELECTRICAL STANDARDS



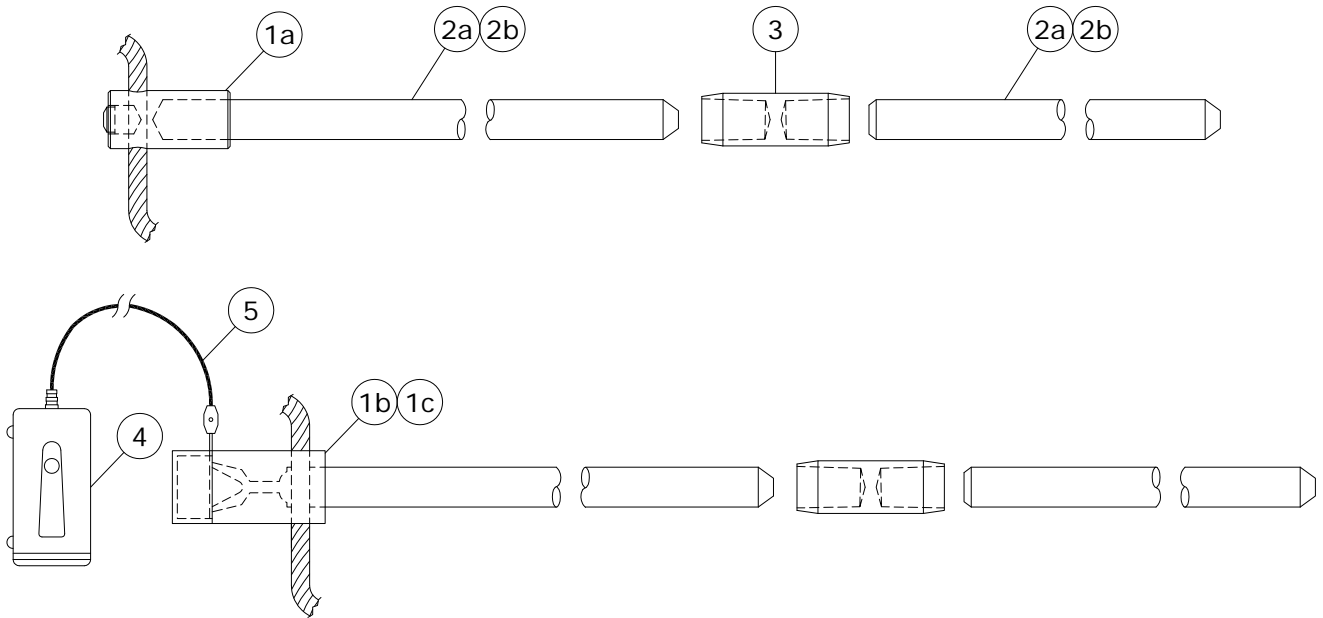
Appendix B
Electrical Standards
(2020 Streetlight Installations)

Refer to electronic copy issued under separate cover

Electric Standards for Streetlight Installations Table of Contents

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

Updated: March 20, 2020



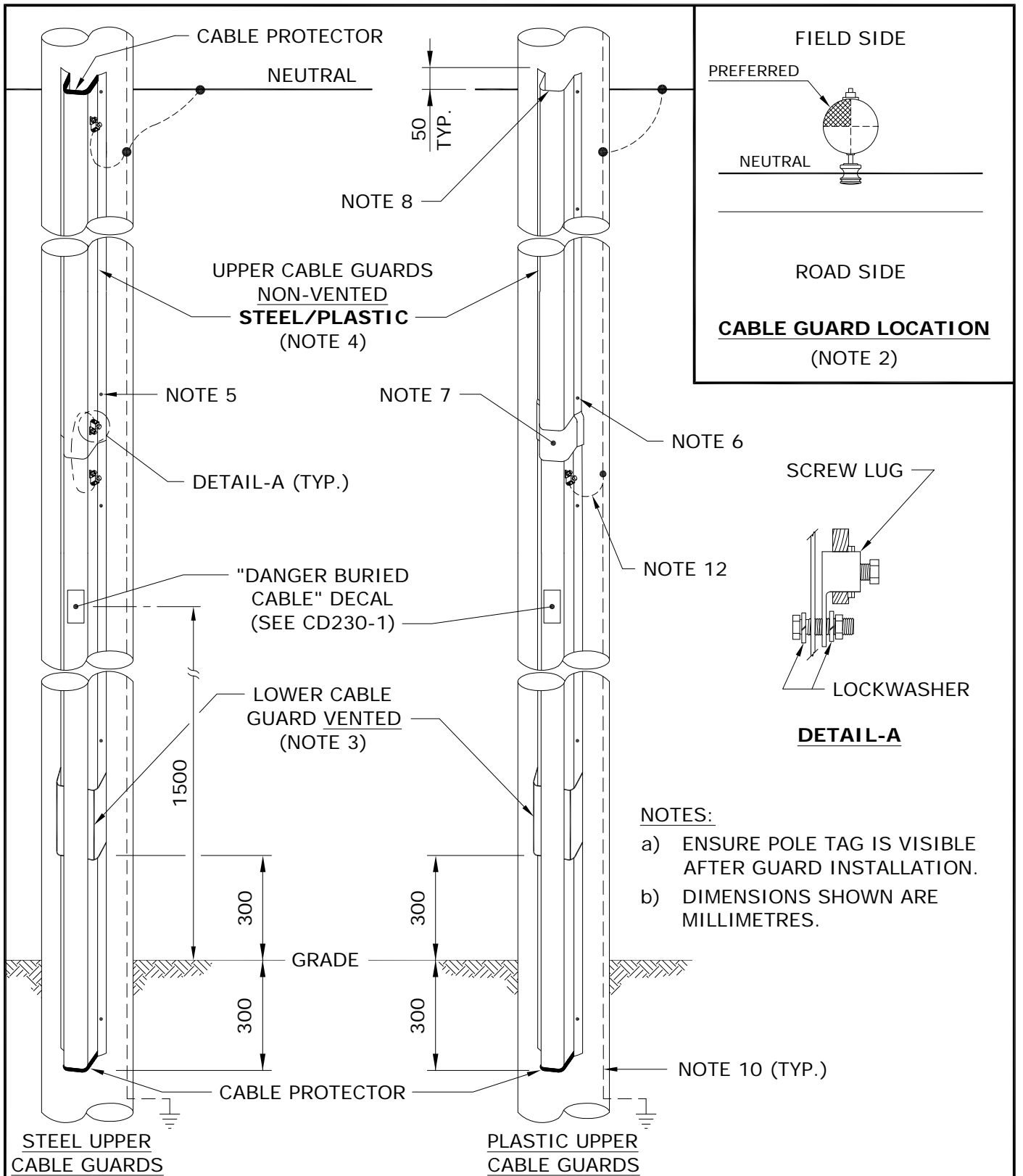
COPPERWELD - SECTIONAL

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	



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

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

NOTES:

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

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

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

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

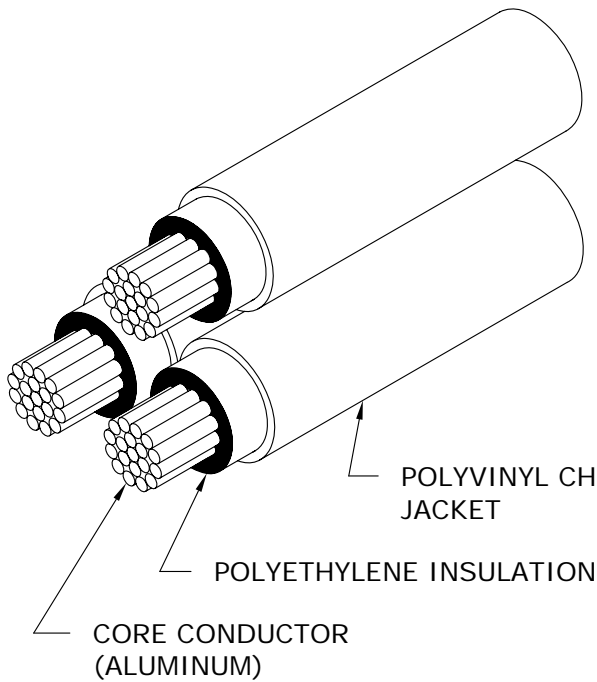
NOTE:

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

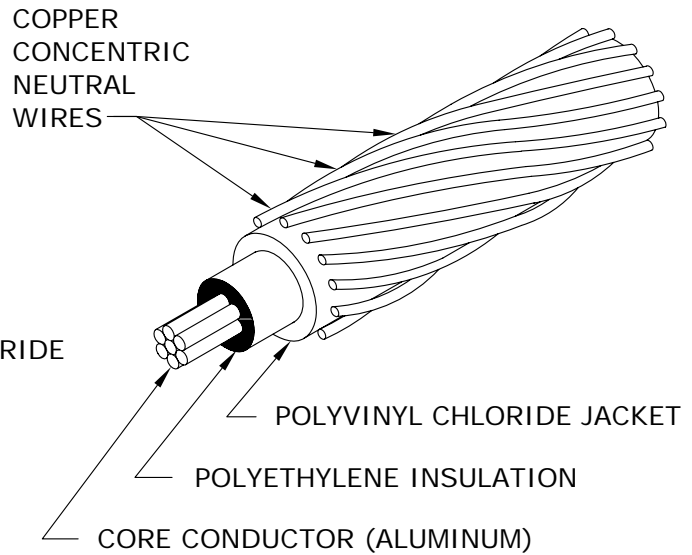
SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 88-03-29

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

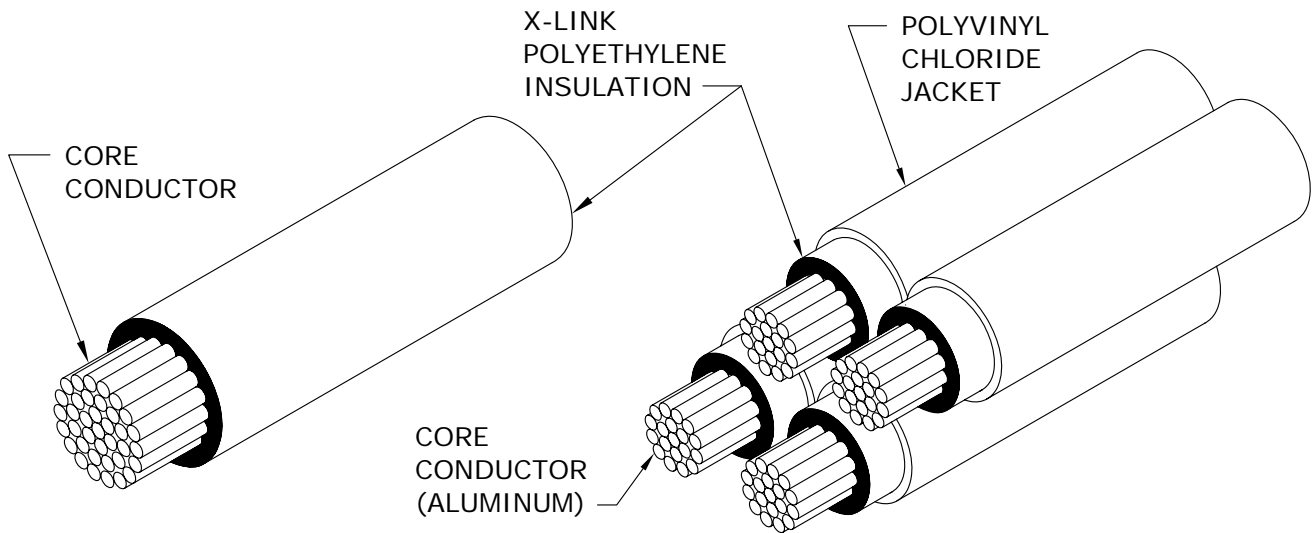
BASIC CONSTRUCTION OF UNDERGROUND SECONDARY CABLES



1/0 & 4/0 AND 350 TRIPLEX



4 CONCENTRIC NEUTRAL CABLE



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

350 kcmil QUADRAPLEX

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

UNDERGROUND SECONDARY CABLE

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

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

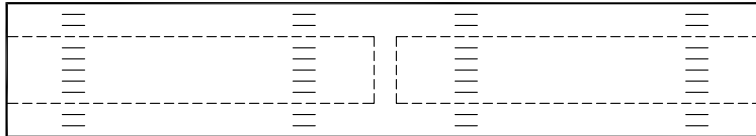
** CABLES DIRECTLY BURIED OUT OF PADMOUNT TRANSFORMERS OR PEDESTALS.

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

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

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

1-04431-DA-58041-0009



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

*** UNDERGROUND SECONDARY CABLE COMPRESSION CONNECTORS**

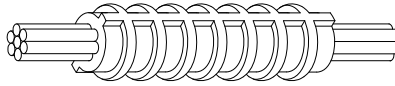
CONDUCTOR SIZE		STORES CODE	TOOL (DIES)	
FROM	TO		PREFERRED	ALTERNATE
#4	#4	74 27 64	Y35 (UCSA 22)	** MD6 (WCSA 22, BG)
1/0	#2	74 27 30		
1/0	1/0	74 27 65		
4/0	1/0	74 27 67	Y35 (UCSA 24)	** MD6 (WCSA 24, 249)
4/0	4/0	74 27 68		
350	4/0	74 27 78	Y35 (UCSA 28)	---
350	350	74 27 72		
750	500	74 27 27	Y46/ADPT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

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

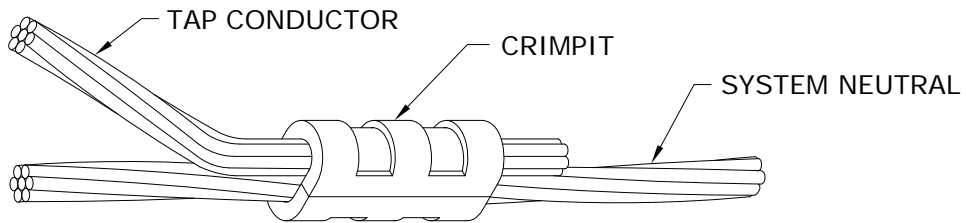
** ROTATE MD6 TOOL 180° AFTER EVERY CRIMP.

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

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



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



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

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

APPROVED ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
	10-12	2	ADDED CONNECTOR	
	95-01	1	NOTES REARRANGED	
			UNDERGROUND NEUTRAL COMPRESSION CONNECTORS	
93-07	0	CONNECTORS ADDED, FORMERLY CD210-8		
DRAWN W.B./CAD	CHECKED K.C.H.	DATE 93-07	CD 210-24	

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

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

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

GENERAL INSTRUCTIONS:

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

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

b) FOR #4 CONCENTRIC NEUTRAL CABLE:

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

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

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

NOTE:

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

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

5. CLEAN CONDUCTOR WITH WIRE BRUSH. INSTALL CONNECTOR.

NOTE:

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

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

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

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

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

NOTE:

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

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

- a) APPLY 1 LAYER OF 1/4 STRETCHED 50mm WIDE RUBBER MASTIC TAPE (S.C.#78 55 28) OVER CENTRE OF COMPLETED SPLICE.
- b) TRAIN TWISTED CONCENTRIC NEUTRAL WIRE (STEP 1b) INTO FINAL POSITION ALLOWING ADEQUATE CLEARANCE FOR MD6 PRESS.
- c) PLACE "C" TYPE COMPRESSION CONNECTOR OVER TWISTED WIRES AND CRIMP. REFER TO DRAWING CD210-24.
- d) TRIM OFF PROTRUDING WIRES AND COMPRESS WITH PLIERS ELIMINATING ANY SHARP ENDS.
- e) APPLY A 100mm STRIP OF 50mm WIDE RUBBER MASTIC TAPE OVER CONNECTOR AND PROTRUDING WIRES.

NOTE:

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

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

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

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

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

FOR TAPED SPLICE

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

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

OR

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

NOTE:
DIMENSIONS SHOWN ARE MILLIMETRES.

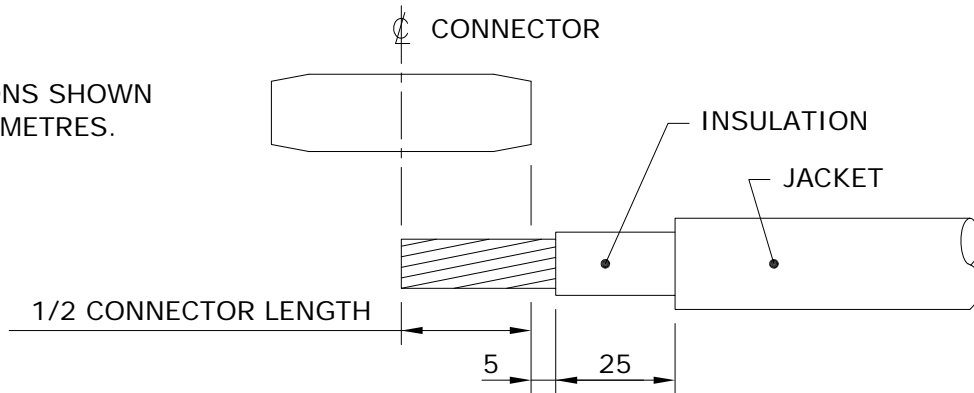


FIGURE 1

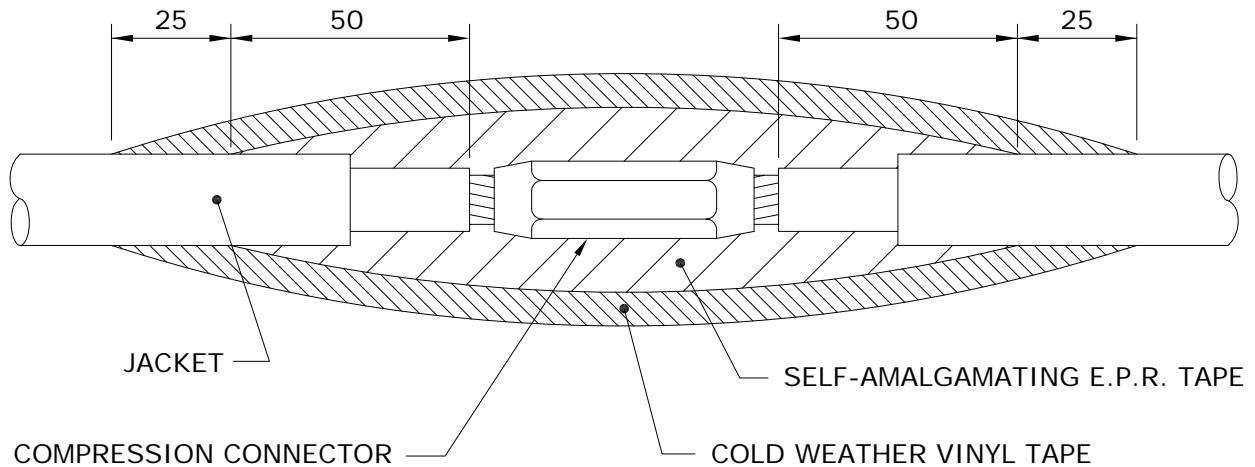


FIGURE 2

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

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 17-10-11				SPLICES FOR UNDERGROUND SECONDARY CABLES		
		17-10	2			RESEALED
		10-12	1			REVISED COMPRESSION CONNECTOR AND NOTE 2
DRAWN C.A.	CHECKED K.S.	DATE 17-10	CD 215-12		SHT 0003 OF 3	
					REV 02	

CABLE PREPARATION:

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

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

* ROD IS FACTORY CRIMPED INTO CONNECTOR

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

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

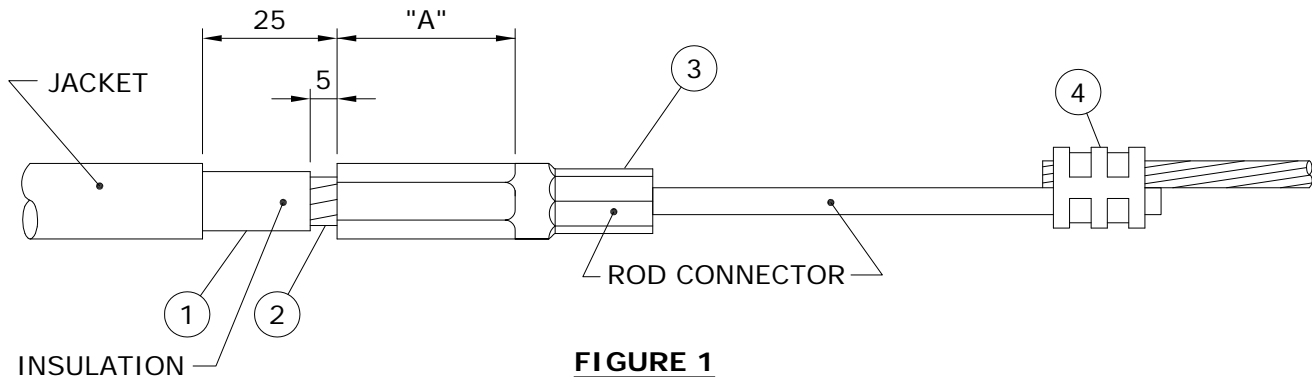


FIGURE 1

NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

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

TAPING:

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

NOTE:

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

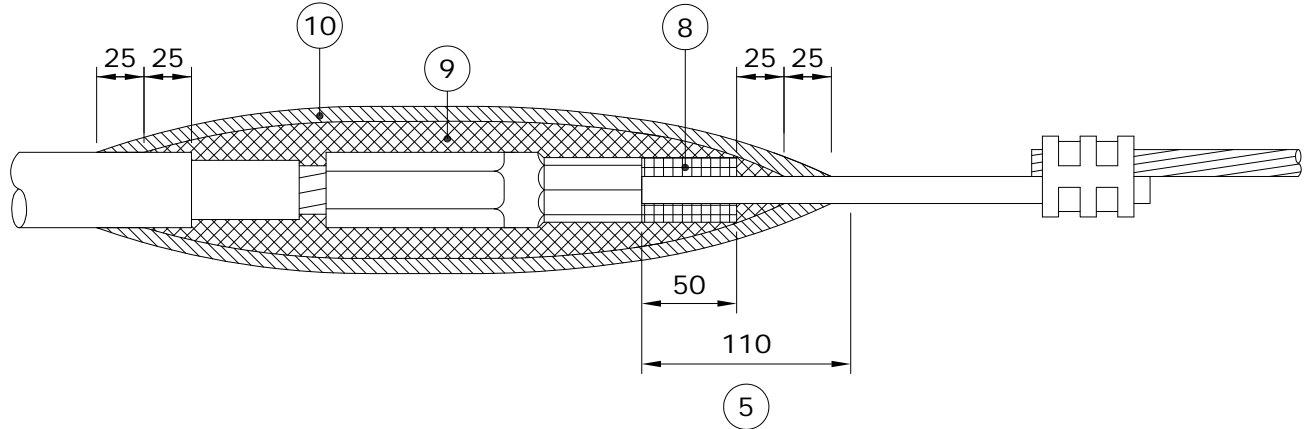
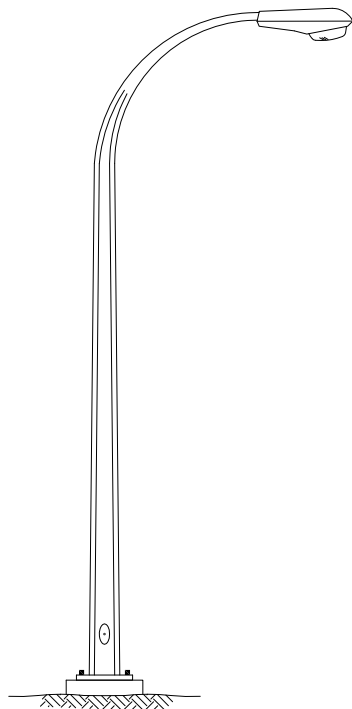


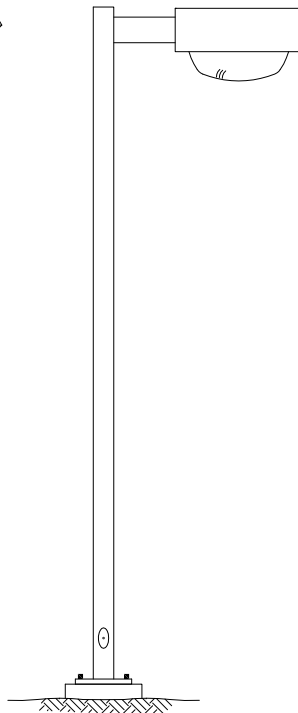
FIGURE 2

NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

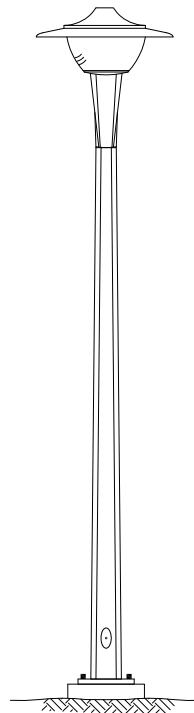
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 94-07-03				SPLICING SECONDARY NEUTRAL (BARE COPPER TO INSULATED ALUMINUM)		
		08-11	2			REVISED NOTE 6 & COMPRESSION CONNECTOR
		94-10	1			TAPING PROCEDURE REVISED
DRAWN W.B./CAD	CHECKED K.C.H.	DATE 94-06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



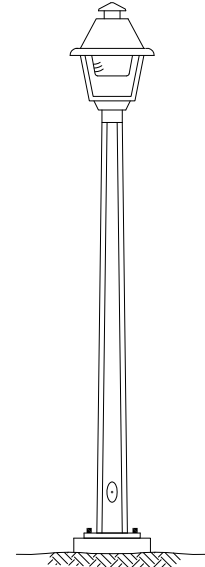
DAVIT BM
(BASE MOUNTED)



SQUARE BM
(BASE MOUNTED)



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



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

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

NOTES:

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

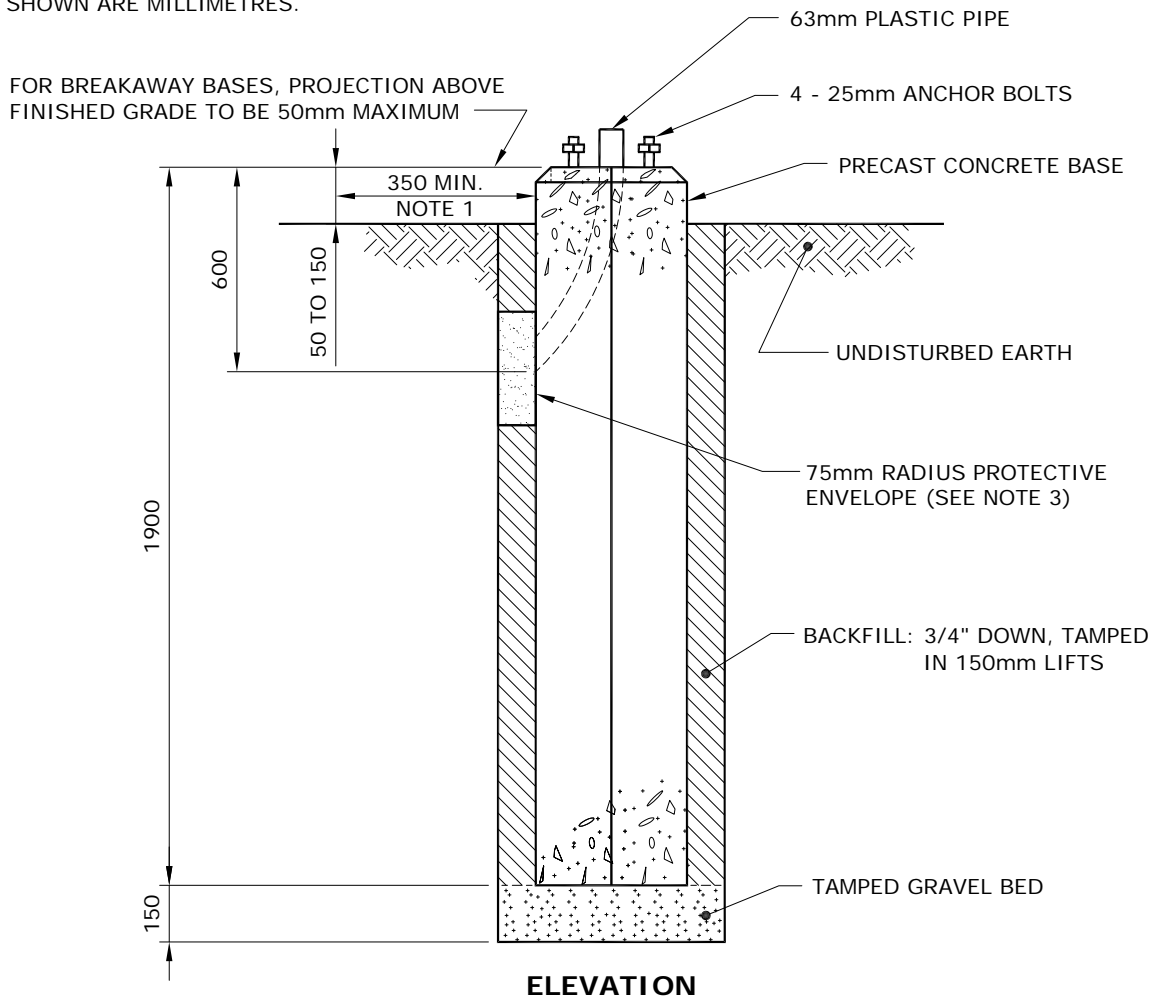
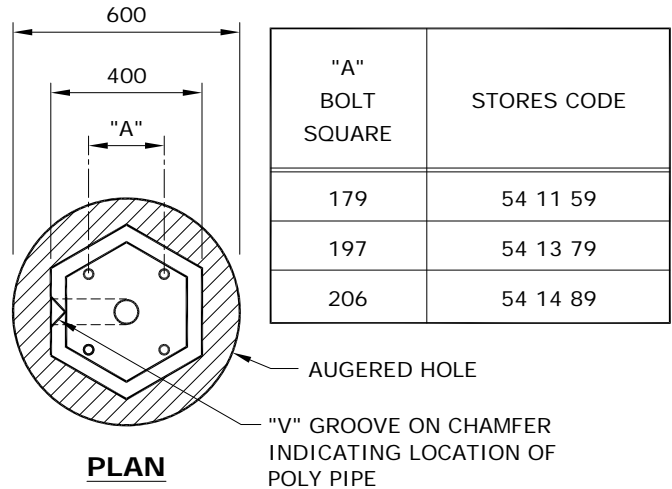
** LENGTH OF 2 CONDUCTORS #12 CABLE REQUIRED PER POLE.

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

7.7 - 10.7 STREET LIGHT POLES

NOTES:

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

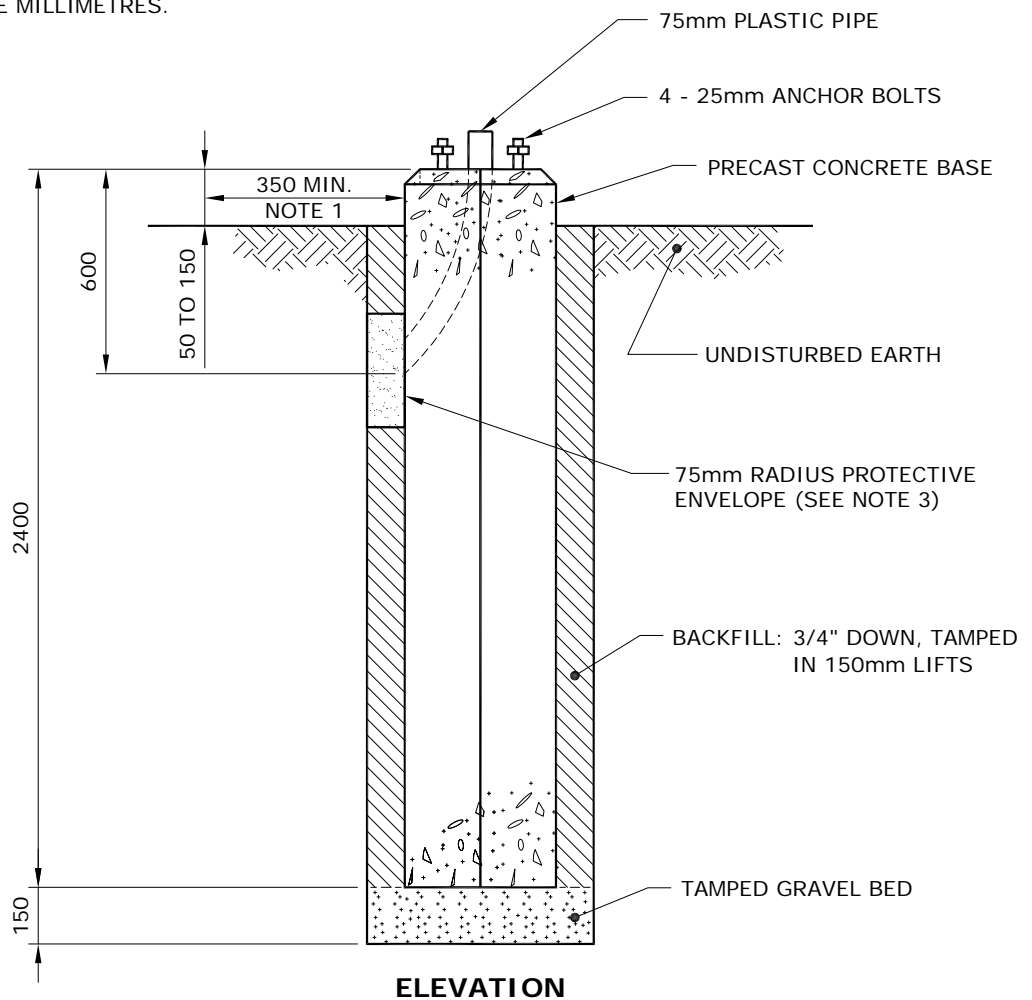
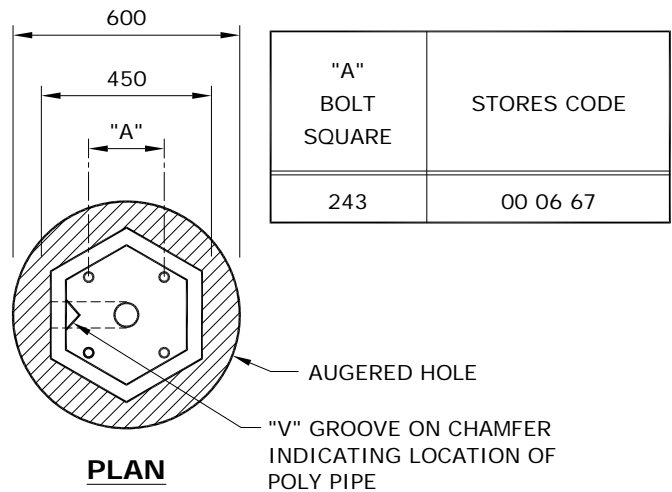


APPROVED	REVISIONS			MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-29	10-08	3	CHANGED BACKFILL NOTES, AND ADDED SHEET 3	INSTALLATION OF PRECAST CONCRETE BASE			
	99-05	2	SHEET 2 of 2 ADDED, 7.7 - 10.7 STREET LIGHT ADDED				
	96-10	1	V-GROOVE LOCATION, POLY PIPE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

13.7 STREET LIGHT POLE

NOTES:

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



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

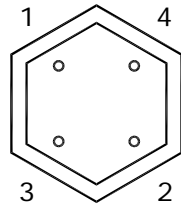
TO DEVELOP THE REQUIRED TENSION ON ANCHOR RODS, THE TURN-OF-NUT METHOD IS USED.

TURN-OF-NUT

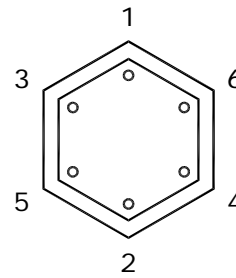
1. ENSURE ALL ANCHOR RODS AND NUTS ARE FREE OF DEBRIS AND THAT THE ANCHOR RODS ARE LUBRICATED.
2. PLACE POLE ONTO CONCRETE PILE, INSTALL WASHERS AND NUTS AND TIGHTEN UNTIL DEVELOPING A SNUG-TIGHTENED CONNECTION.

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

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



FOUR ANCHOR BOLT PATTERN
(13.7m AND BELOW)



SIX ANCHOR BOLT PATTERN
(16.8m AND 19.8m)

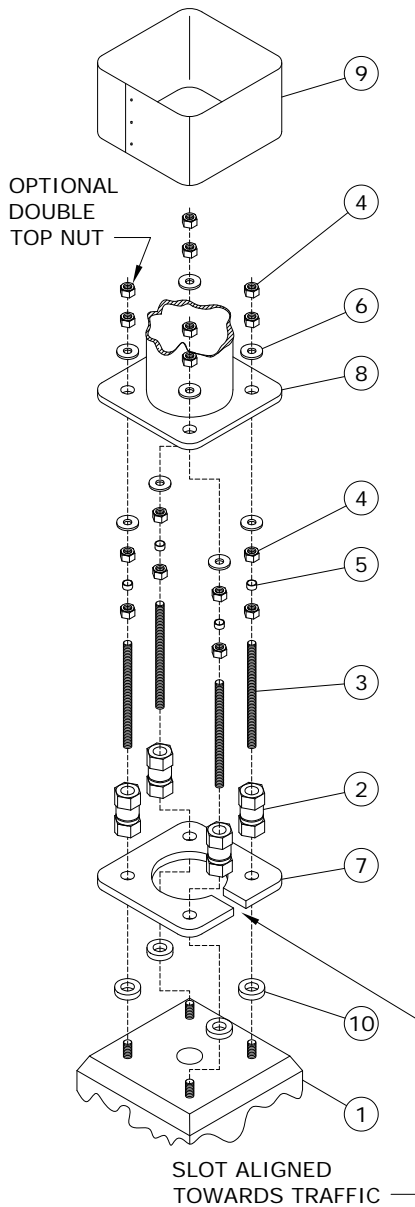
4. ENSURE THE POLE IS PLUMB AND ADD LEVELING SHIMS IF REQUIRED. SNUG-TIGHTEN THE ANCHOR BOLTS AGAIN.
5. BEVELED WASHERS ARE REQUIRED IF THE NUT CANNOT BE BROUGHT INTO FIRM CONTACT WITH THE BASE PLATE.
6. MARK THE REFERENCE LOCATION OF THE NUT AFTER SNUG-TIGHTENING THE PLUMB POLE.
7. FINAL TIGHTENING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

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

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

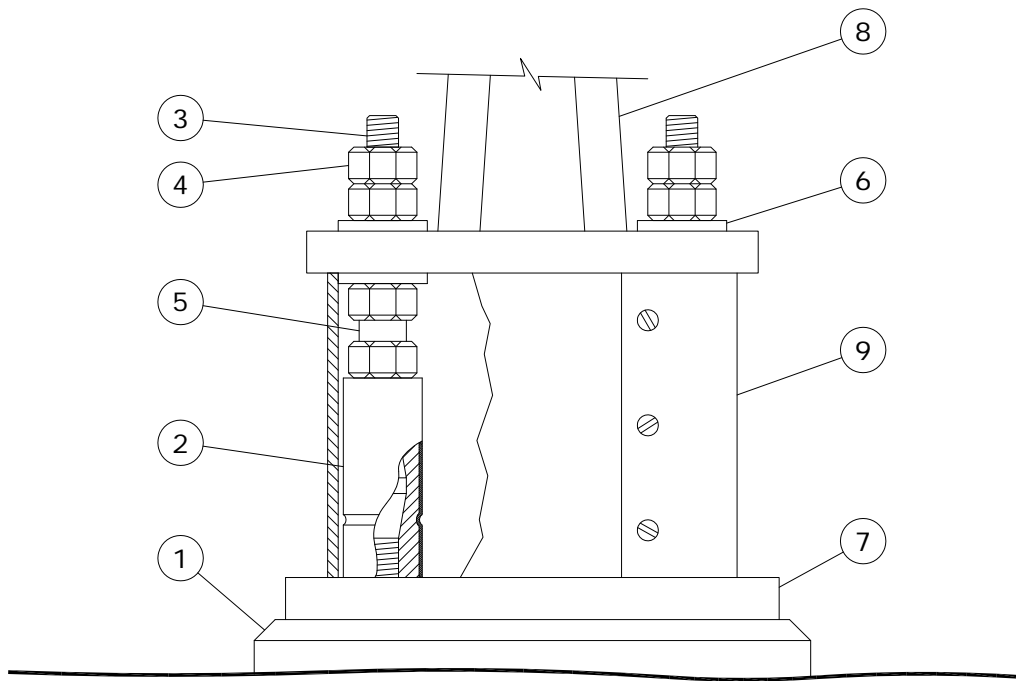
PROCEDURE:

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



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

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



BILL OF MATERIAL

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

APPROVED 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

STREET LIGHT POLES *

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

* ALL POLES ARE BASE MOUNTED EXCEPT CONCRETE.

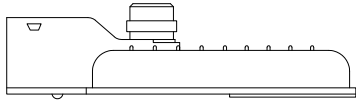
** WEIGHTS DO NOT INCLUDE ARMS OR LUMINAIRES.

*** WEIGHTS GATHERED FROM MANUFACTURER'S DRAWING.

BASES

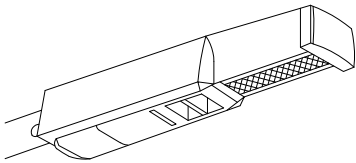
TYPE	WEIGHT kg (±10%)
179	605
197	605
206	605
243	970
418	2151

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



LED ROADWAY LUMINAIRE

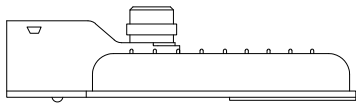
LED ROADWAY LUMINAIRES			
LUMINAIRE WATTAGE (NOMINAL)	REPLACES (HPS)	CIIC	
		GREY	BLACK
40 W LED	70 W HPS	05 15 44	05 15 71
60 W LED	100 W HPS	05 15 45	05 15 73
90 W LED	150 W HPS	05 15 47	05 15 74
150 W LED	250 W HPS	05 15 48	05 15 75
240 W LED	400 W HPS	05 15 49	05 15 76



LED LANE LUMINAIRE

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

LED LANE LUMINAIRES ARE AVAILABLE WITH GREY COATING ONLY.



LED DUSK-TO-DAWN LUMINAIRE

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

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

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

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

TRENCH AND PLOW-IN LOCATION

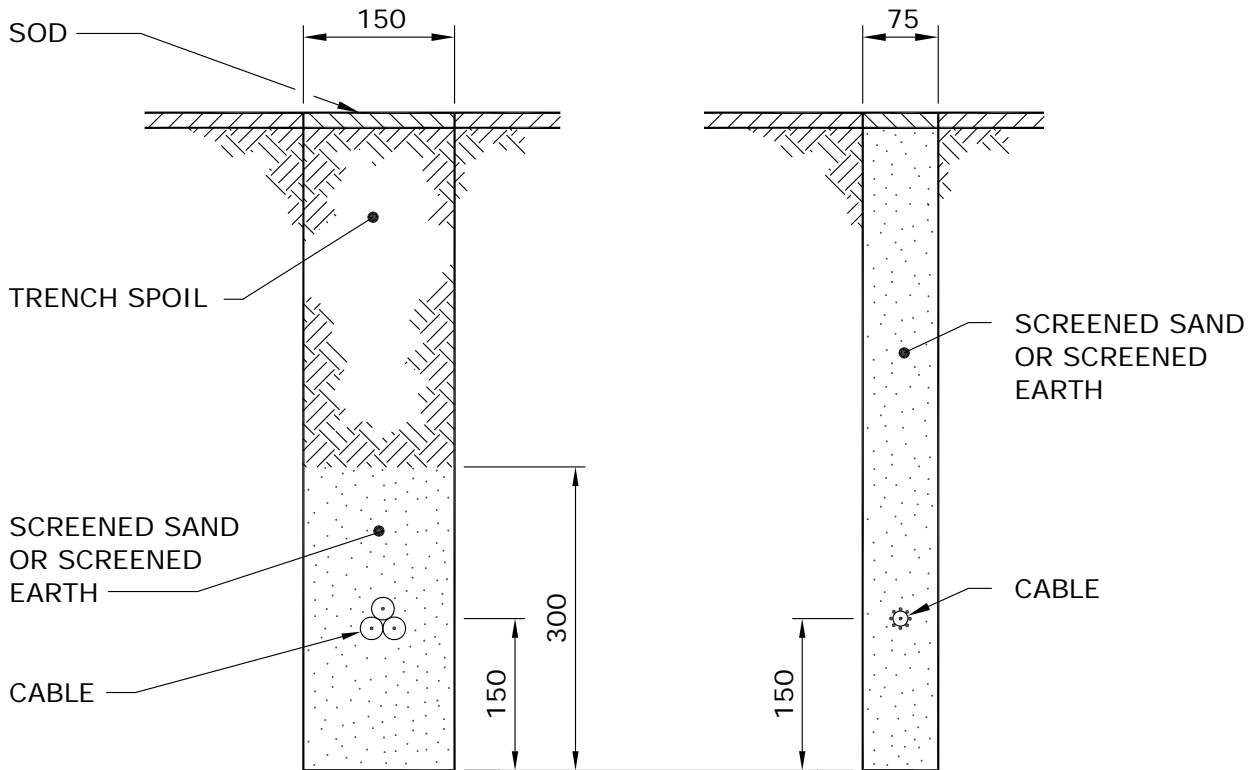
GENERALLY, THE TRENCH LOCATION WILL DICTATE THE LOCATION OF THE LIGHT STANDARDS. CONTACT SHALL BE MADE WITH THE GOVERNING MUNICIPAL AUTHORITY TO DETERMINE THEIR SET BACK REQUIREMENTS. CONTACT SHALL ALSO BE MADE WITH THE CITY OF WINNIPEG UNDERGROUND STRUCTURES OR THE INDIVIDUAL UTILITIES OUTSIDE WINNIPEG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

DEPTH OF BURIAL

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

TRENCH DETAILS

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



NOTE: DIMENSIONS SHOWN ARE MILLIMETRES.

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

NOTES:

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

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

1. **GENERAL**

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

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

2. **USE OF POLYETHYLENE PIPE**

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

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

3. **SPLICES - UNDERGROUND CABLES**

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

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

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

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

4. **CABLE END CAPS**

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

5. **GROUNDING OF STREET LIGHT STANDARDS**

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

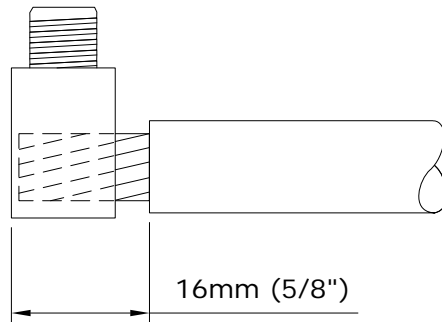
5.2 A GROUND ROD SHALL BE INSTALLED AND CONNECTED TO THE GROUND STUD AT THE LAST STANDARD ON THE STREET LIGHT CIRCUIT.

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

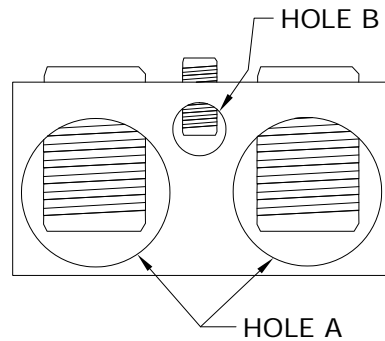
RAYCHEM GELCAP CIIC# 04-29-36

GENERAL INSTRUCTIONS:

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



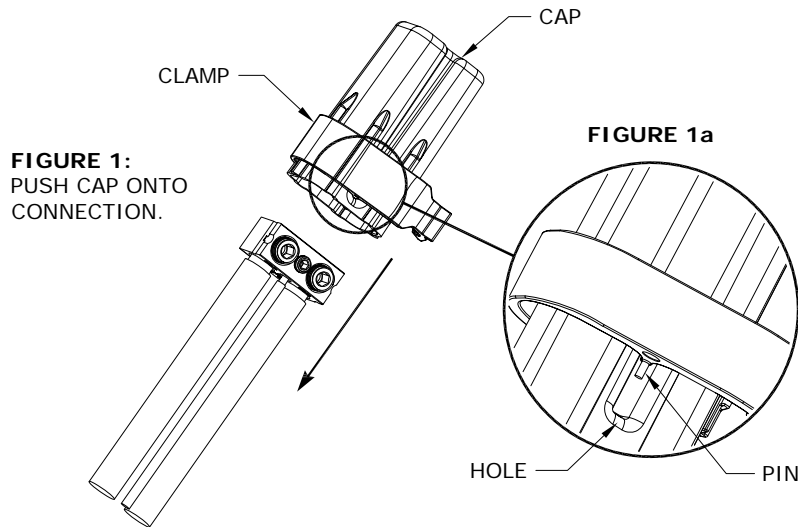
2. INSERT CONDUCTORS INTO CORRECT HOLES AND TORQUE AS SHOWN:



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

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

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



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

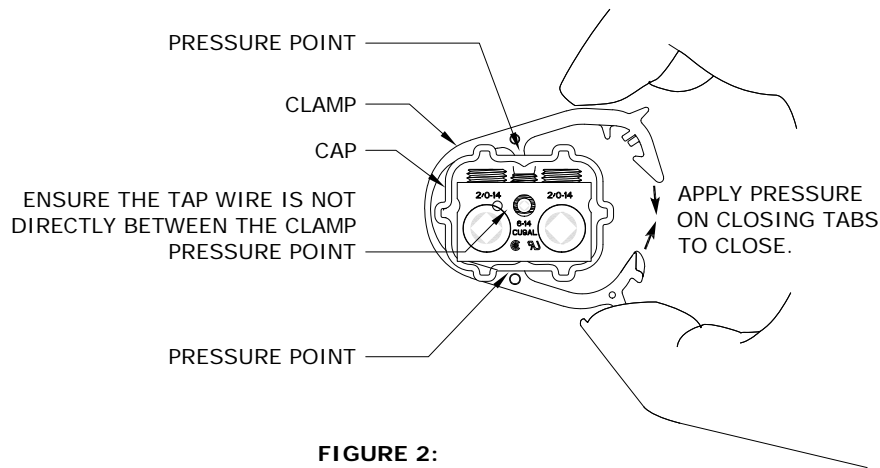
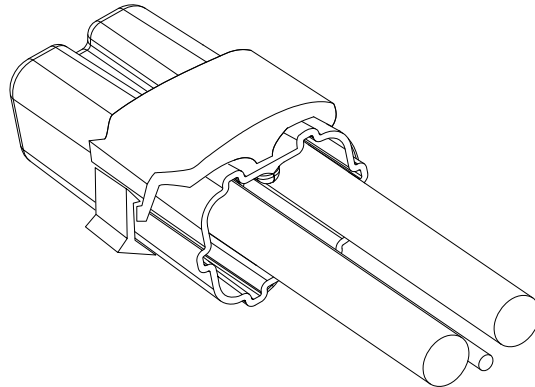


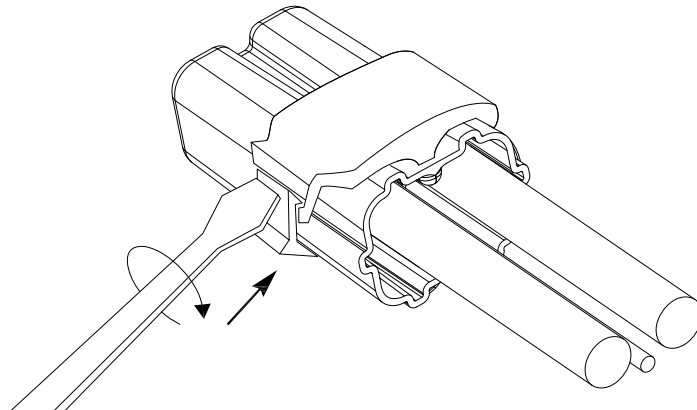
FIGURE 2:
CLAMP PRESSURE POINTS SHOULD FIT INTO OPPOSING GROOVES OF CAP AND APPLY PRESSURE BETWEEN CABLES. SNAP CLAMP CLOSED.

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

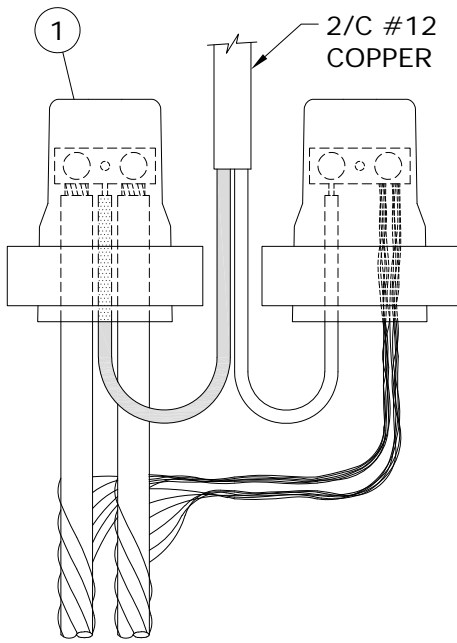
6. INSPECT THE INSTALLATION BY GENTLY PULLING ON THE CAP ENSURING IT IS LOCKED IN PLACE AND COVERS CONNECTOR AND BARE CONDUCTOR. THERE SHOULD BE NO EXPOSED METAL. ENSURE TAP CABLE IS NOT CAUGHT BETWEEN PRESSURE POINTS OF CLAMP. INSTALLATION IS COMPLETE.



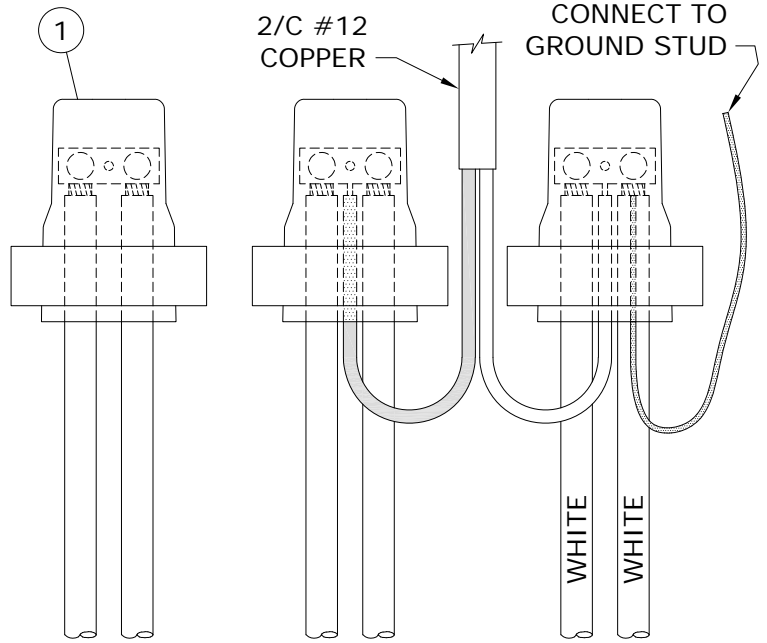
7. TO REMOVE, INSERT SCREWDRIVER BETWEEN THE CLOSING TABS AND TWIST TO OPEN THE CLAMP. REMOVE CAP SLOWLY FROM CONNECTION ALLOWING GEL TO REMAIN IN CAP.



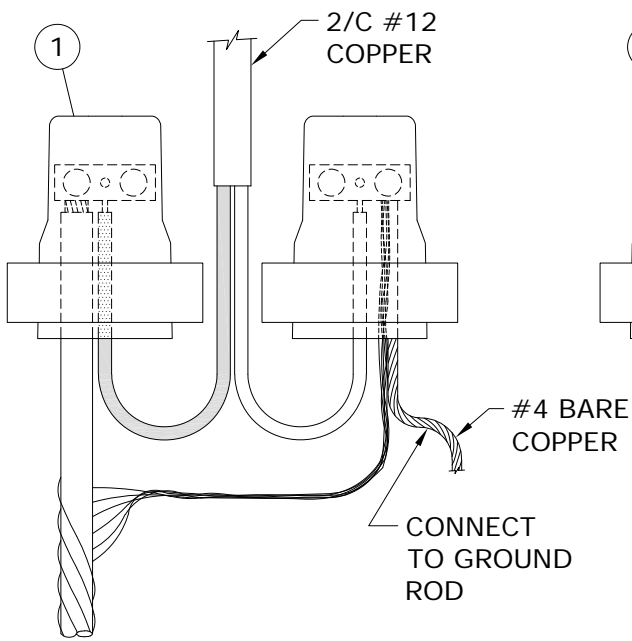
APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-03-05				RAYCHEM GELCAP SPLICE	
DRAWN C.A.	CHECKED L.D.	DATE 17-11	CD 310-3		
					SHT 0003 OF 3



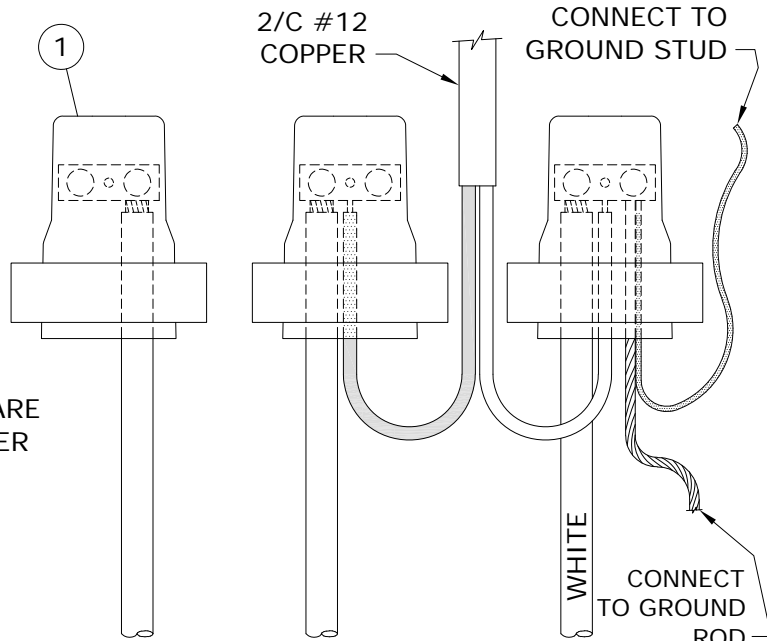
**No. 4 ALUMINUM C/N CABLE
(TYPICAL FEED THROUGH)**



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



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



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

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

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

BILL OF MATERIAL

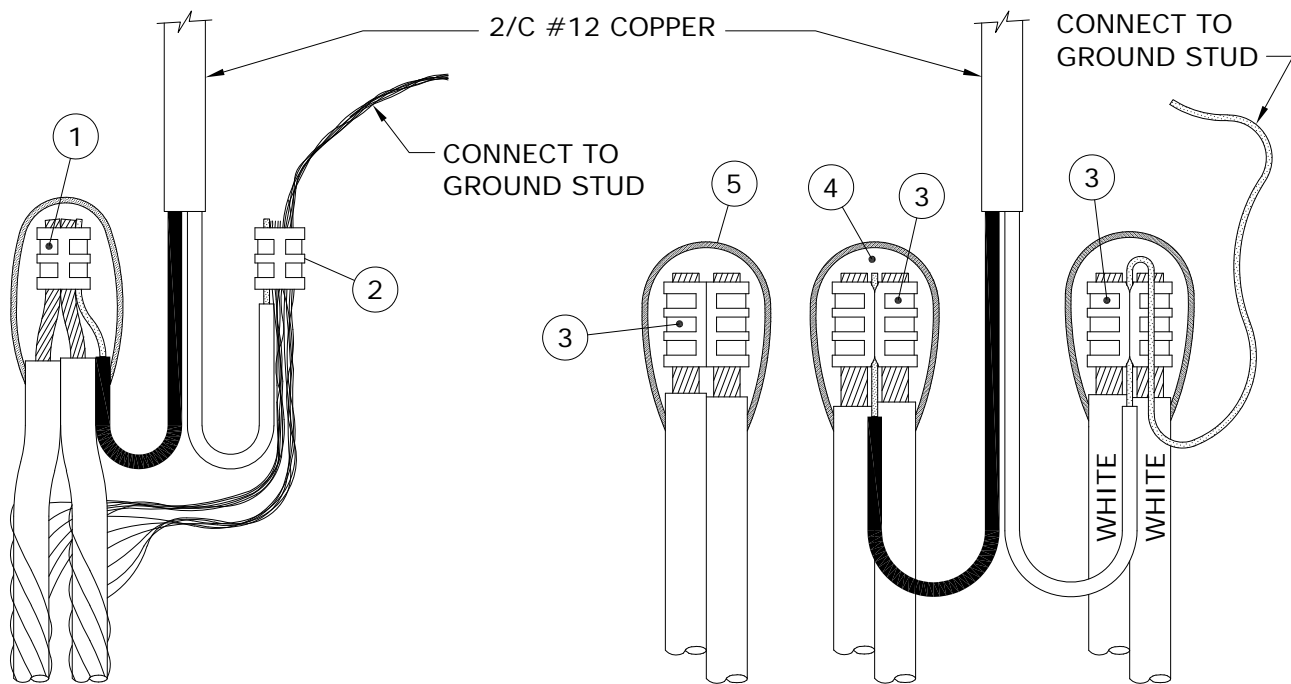
ITEM No.	DESCRIPTION	STORES CODE No.	
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX
1	GEL CAP	04-29-36 (2 REQUIRED)	04-29-36 (3 REQUIRED)

NOTES:

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

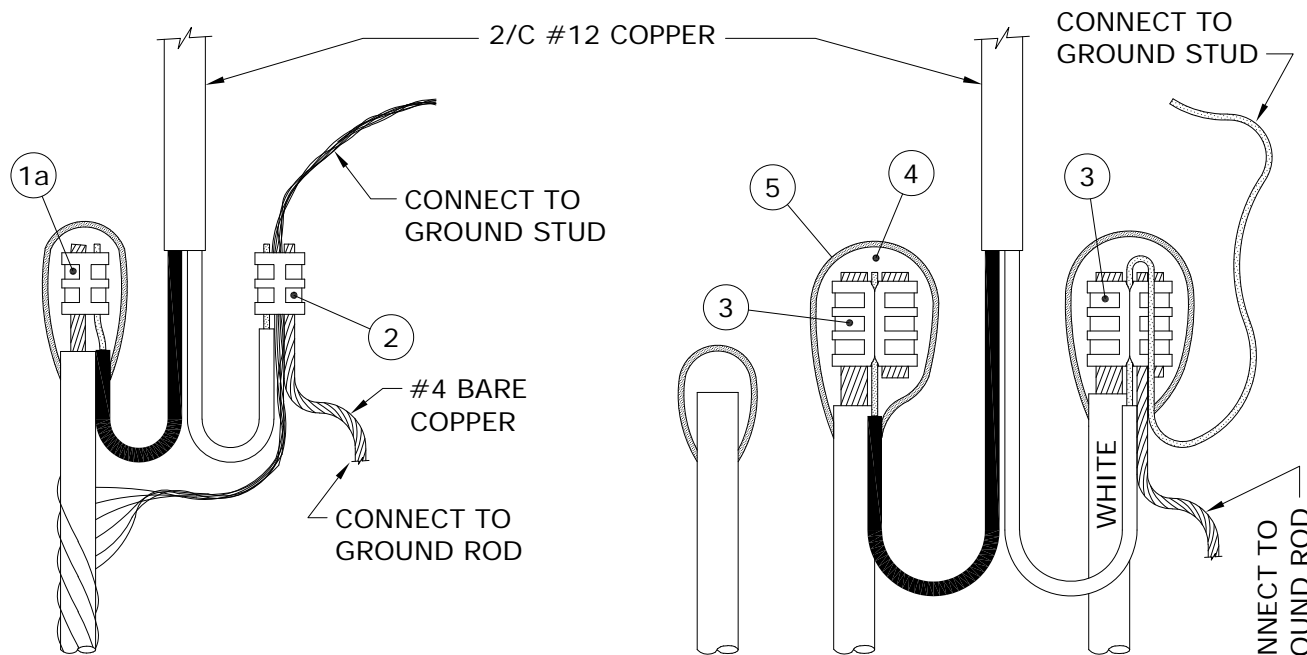
SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS				
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		<table border="1"> <tr> <td align="center">18-04</td> <td align="center">1</td> <td>ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, REVISED TITLE, RESEALED</td> </tr> </table>		18-04	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, REVISED TITLE, RESEALED	CONNECTION DETAIL IN STREET LIGHT STANDARD	
				18-04	1	ADDED SHT 3 & 4, MOVED PREVIOUS INFO FROM SHT2 TO SHT4, ADDED NEW BOM WITH GELCAP, REVISED TITLE, RESEALED		
DRAWN C.A.	CHECKED L.D.	DATE 18-04	CD 310-4	SHT 0002 OF 4	REV 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 J.J.D. RINGASH 18-05-11		18-04 0 MOVED FROM SHEET 1		CONNECTION DETAIL IN STREET LIGHT STANDARD	
		DATE 18-04		CD 310-4	
				REV 00	

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

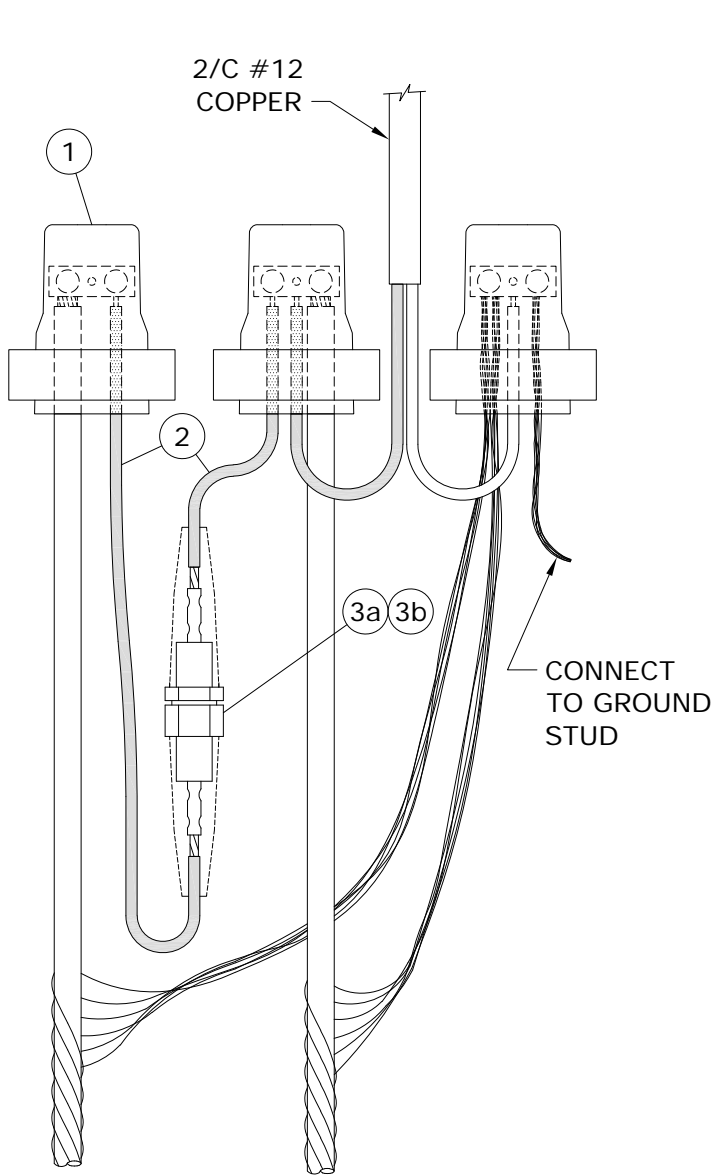
* FOR END OF CIRCUIT WHEN USING ONLY ONE CABLE.

** AT END OF CIRCUIT, QUANTITY MAY BE LESS THAN SHOWN.

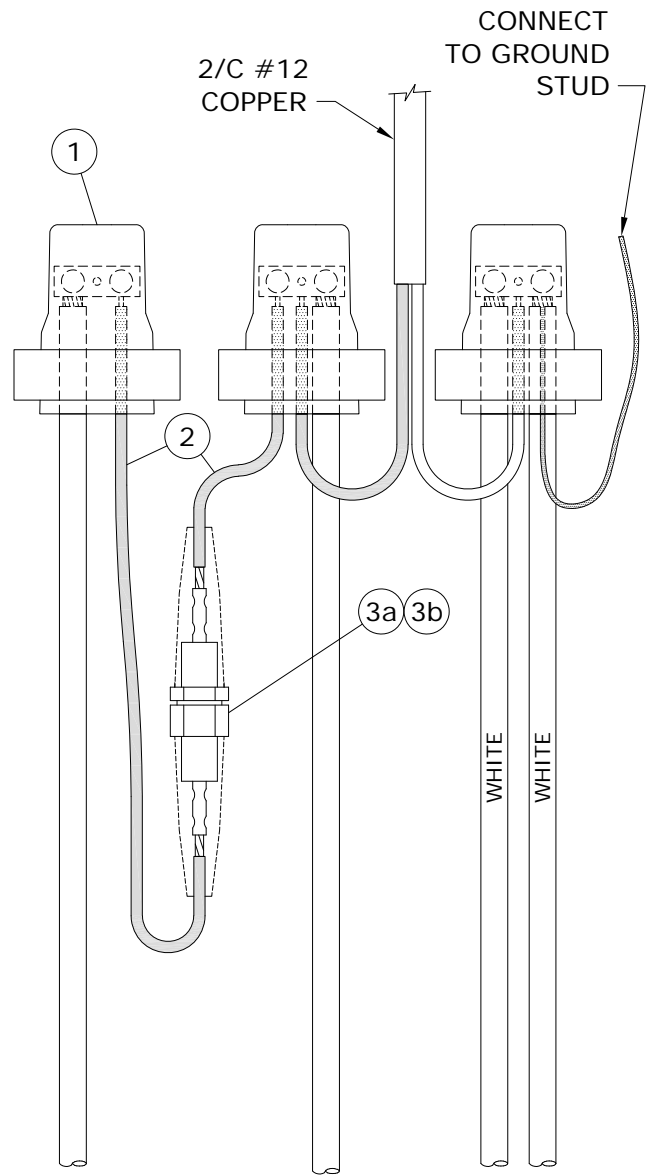
NOTES:

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

APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS			
ORIGINAL DRAWING SEALED BY J.J.D. RINGASH 18-05-11		18-04 0 MOVED FROM SHEET 2		CONNECTION DETAIL IN STREET LIGHT STANDARD			
				CD 310-4		SHT 0004 OF 4	REV 00



No. 4 ALUMINUM C/N CABLE



1/0 ALUMINUM TRIPLEX CABLE

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

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

BILL OF MATERIAL

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

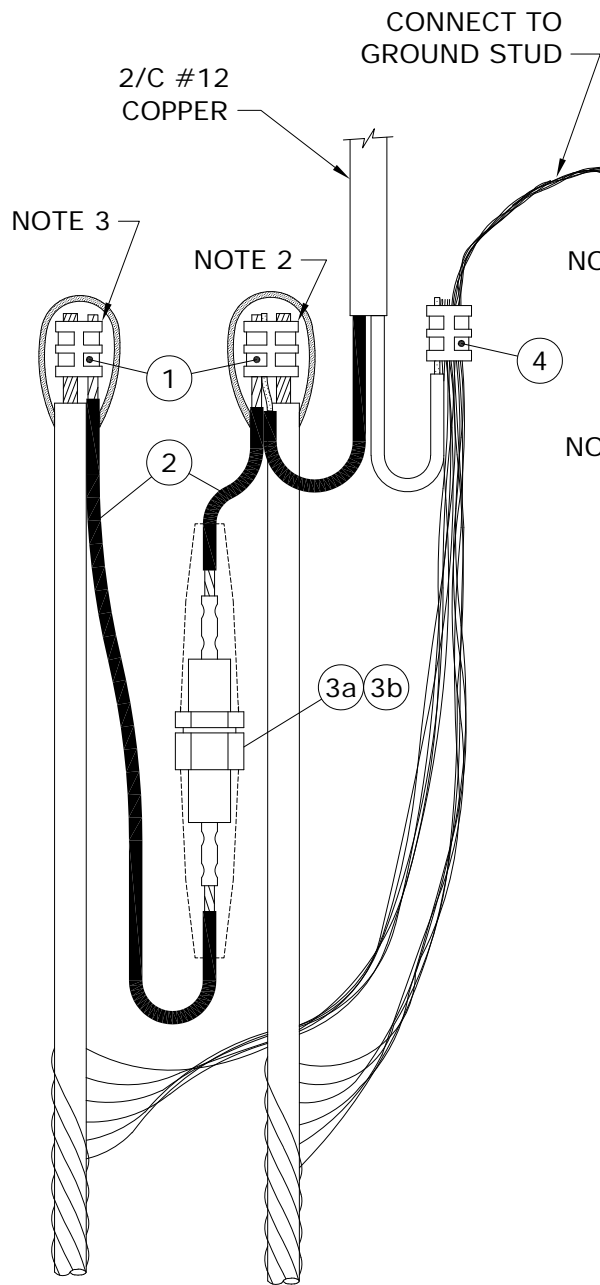
NOTES:

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

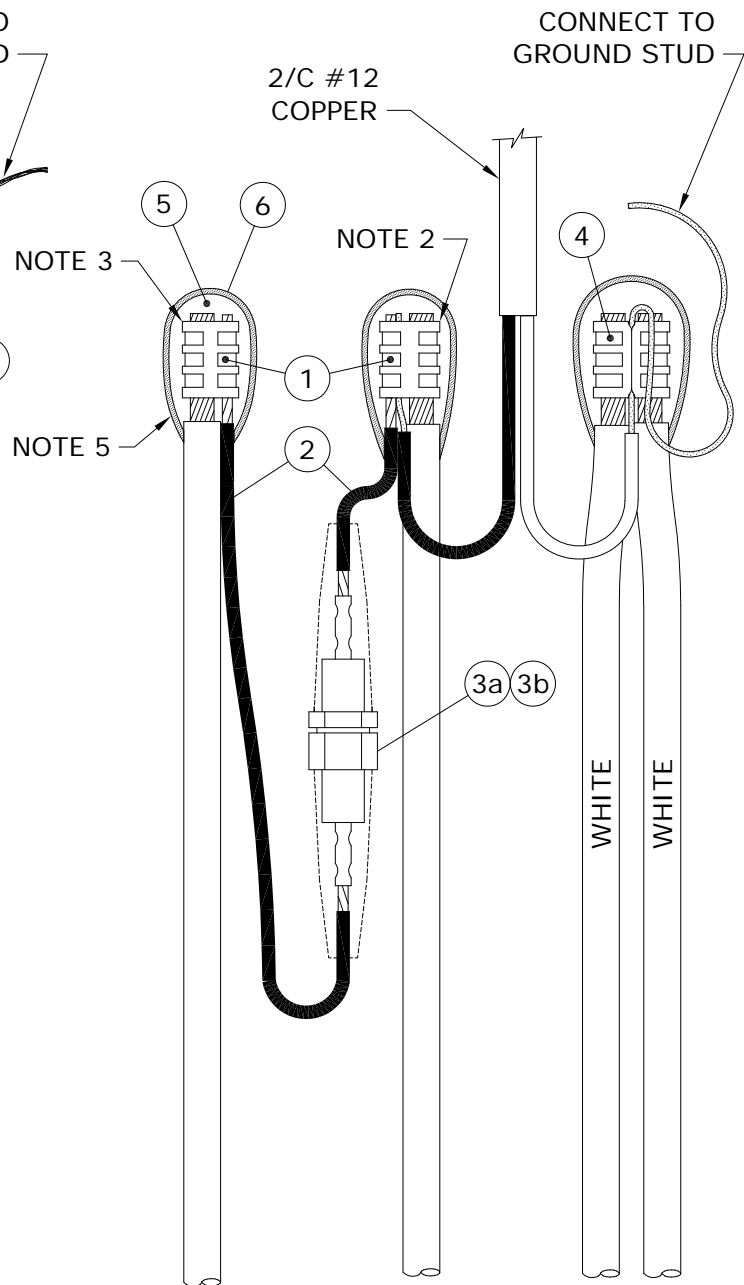
SUPERCEDES ORIGINAL SEALED BY E. WIEBE ON 94-07-03

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

CD 310-9



No. 4 ALUMINUM C/N CABLE



1/0 ALUMINUM TRIPLEX CABLE

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

BILL OF MATERIAL

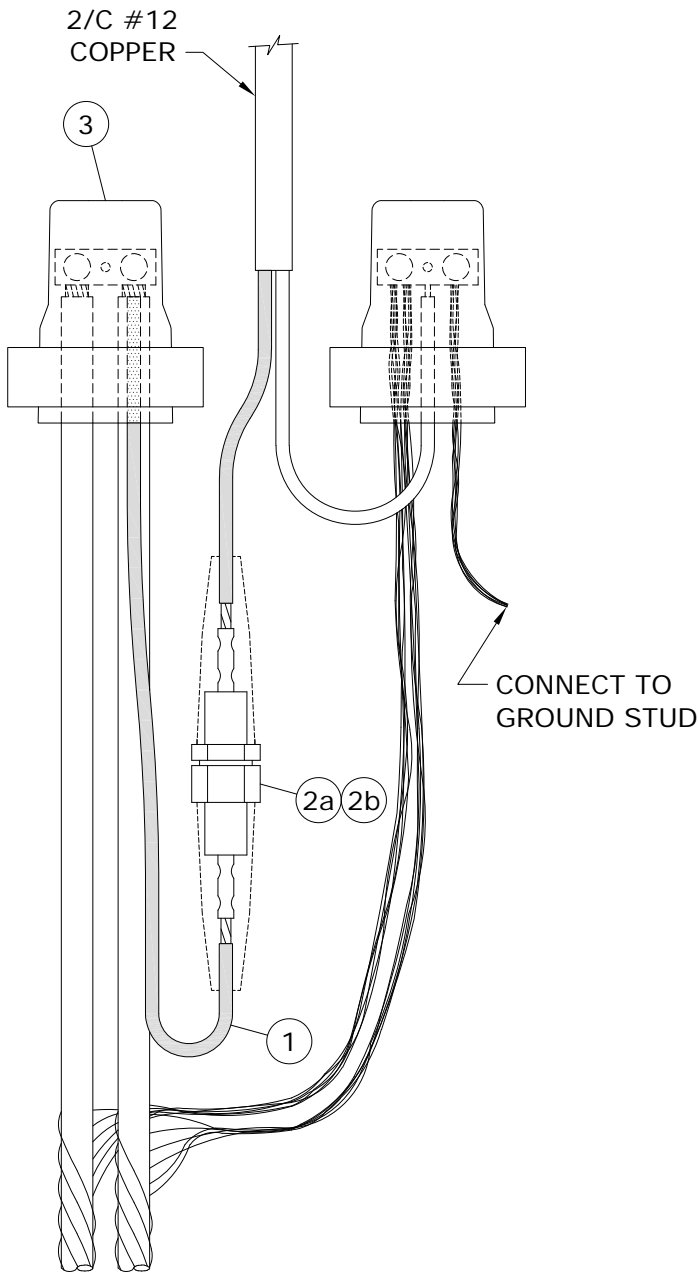
ITEM No.	DESCRIPTION	STORES CODE No.		QUANTITY
		FOR USE WITH #4 AL. C/N	FOR USE WITH 1/0 AL. TRIPLEX	
1	'H' TYPE COMPRESSION TAP	74-40-10	74-40-30	2
2	WIRE, # 8 CU., 600V, PVC	93-10-08	93-10-08	1m
3a	FUSEHOLDER, 15/30A C/W BOOTS	31-91-30	31-91-30	1
3b	FUSE, 30A	31-14-30	31-14-30	1
4	'C' TYPE COMPRESSION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

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

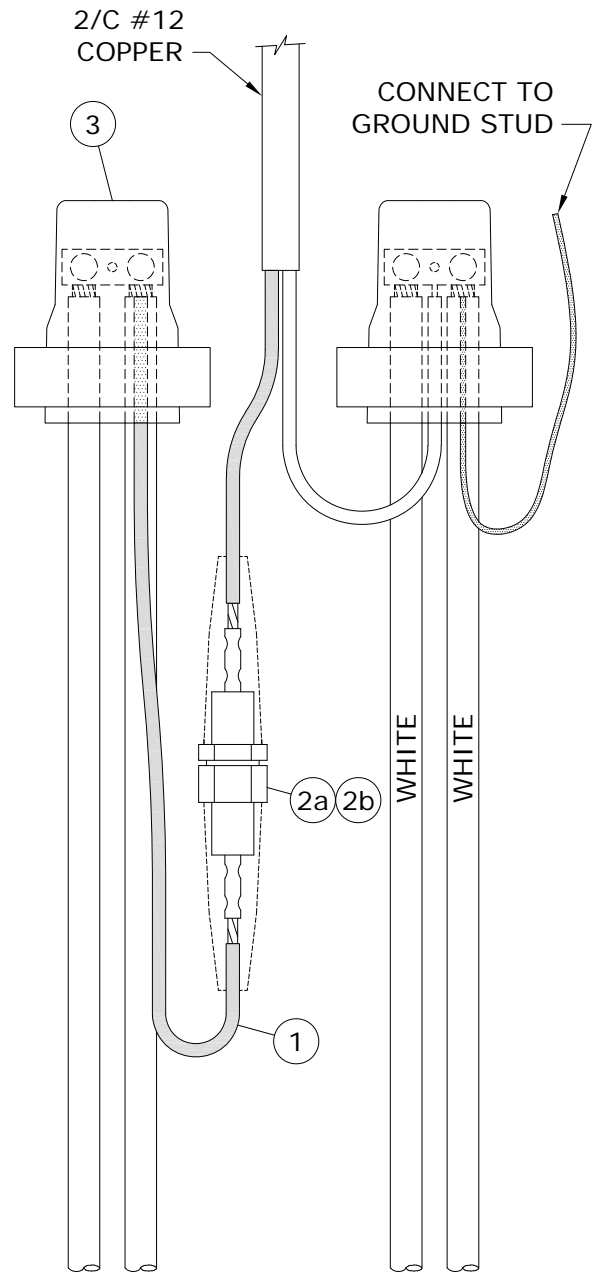
NOTES:

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

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



No. 4 ALUMINUM C/N CABLE



1/0 ALUMINUM TRIPLEX CABLE

NOTE:

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

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

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

BILL OF MATERIAL

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

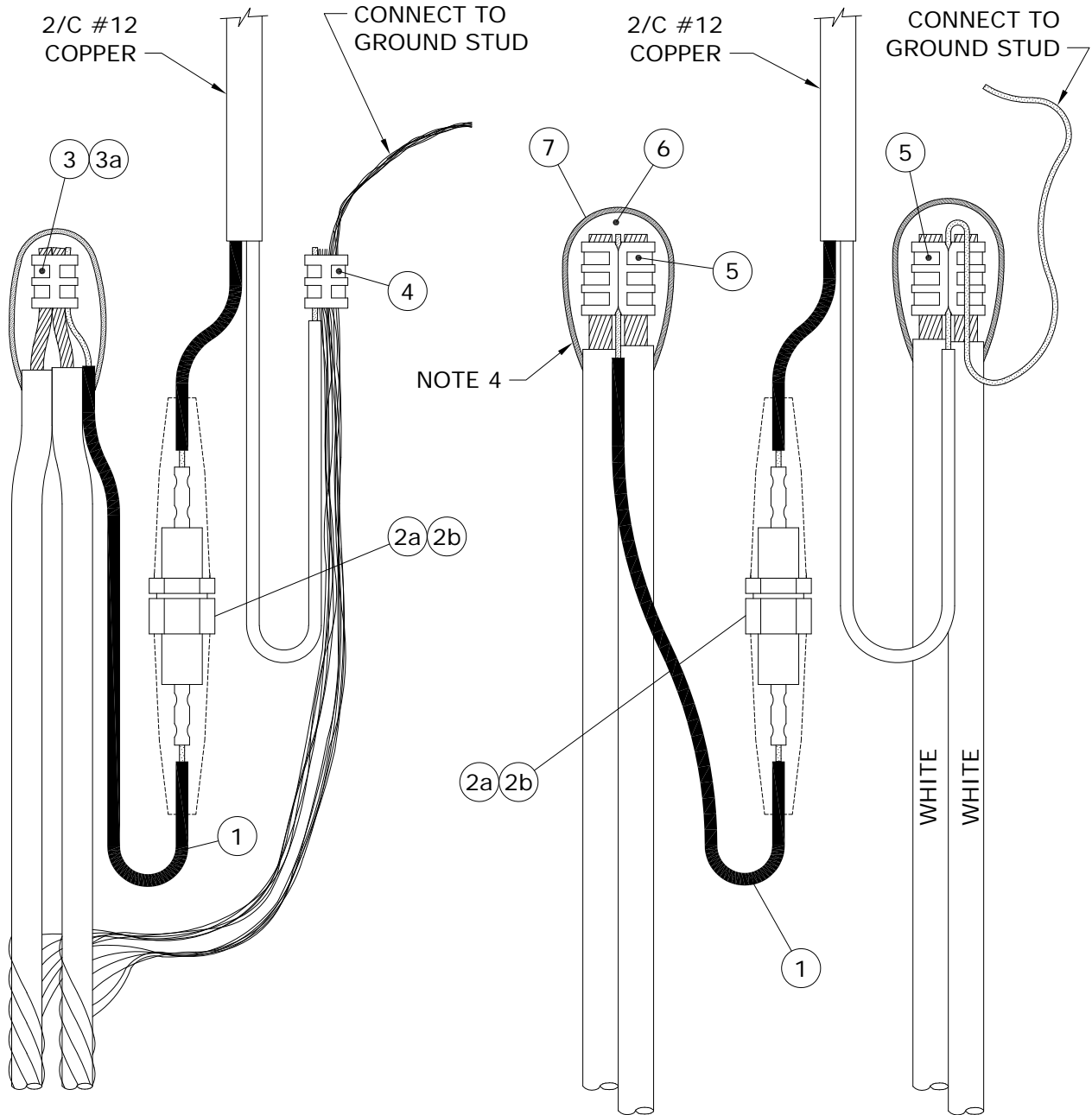
NOTES:

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

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

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

CD 310-10



No. 4 ALUMINUM C/N CABLE

1/0 ALUMINUM TRIPLEX CABLE

NOTE:

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

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

BILL OF MATERIAL

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

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

NOTES:

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

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

SUPPLY VOLTAGES

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

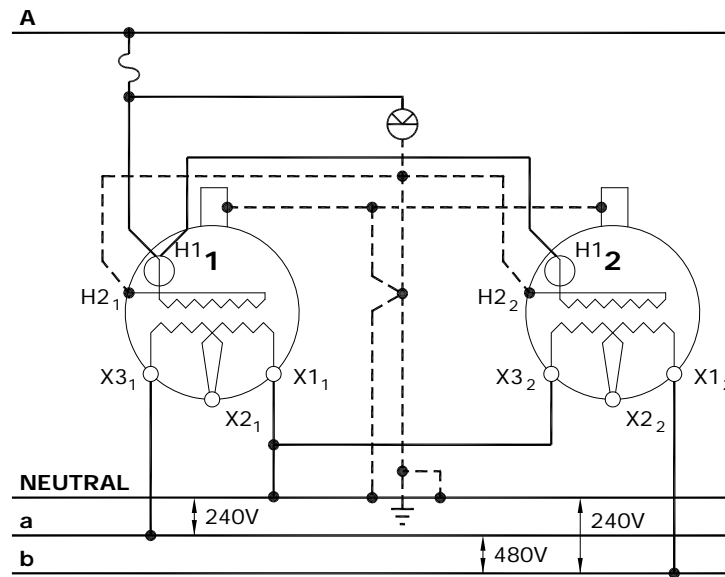
THE MAJORITY OF ROADWAY LUMINAIRES ARE RATED FOR OPERATION ON EITHER 120 VOLT OR 240 VOLT CIRCUITS AND ARE FACTORY WIRED FOR 120 VOLT OPERATION EXCEPT FOR 400 WATT H.P.S. LUMINAIRES WHICH ARE RATED FOR 120/240 VOLT OPERATION BUT ARE FACTORY WIRED FOR 240 VOLT OPERATION.

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

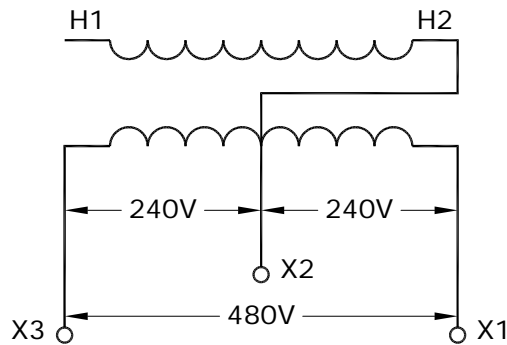
CAUTION:

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

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



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



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

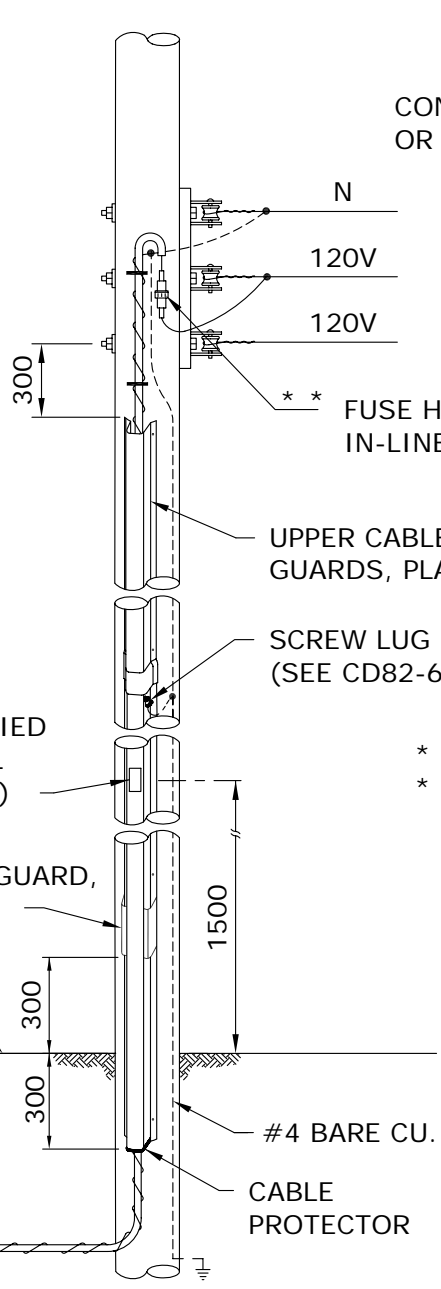
SAFETY PRECAUTION

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

PURCHASE OF 240/480 VOLT TRANSFORMER

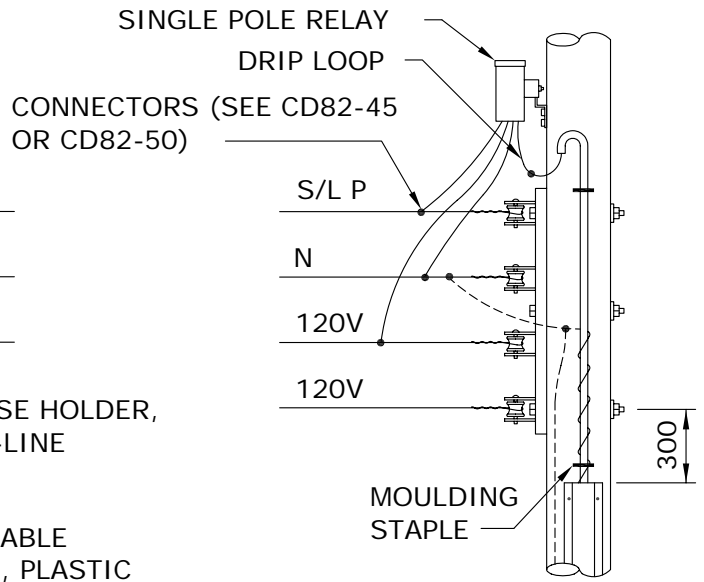
1. INCLUDE ABOVE WARNING SIGN REQUIREMENT IN PURCHASE DESCRIPTION.

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



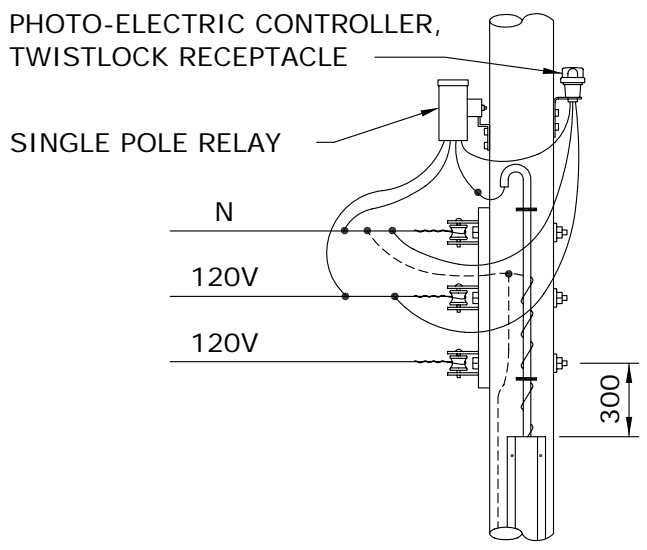
**IN-LINE
FUSE PROTECTED**

* * 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

CONTROL METHODS

1. LUMINAIRES CONTROLLED INDIVIDUALLY BY PHOTO-ELECTRIC CELL

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

2. PHOTO-ELECTRIC CONTROLLED EXTERNALLY-MOUNTED RELAY

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

3. STREET LIGHT RELAY USING STREET LIGHT CONTROL

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

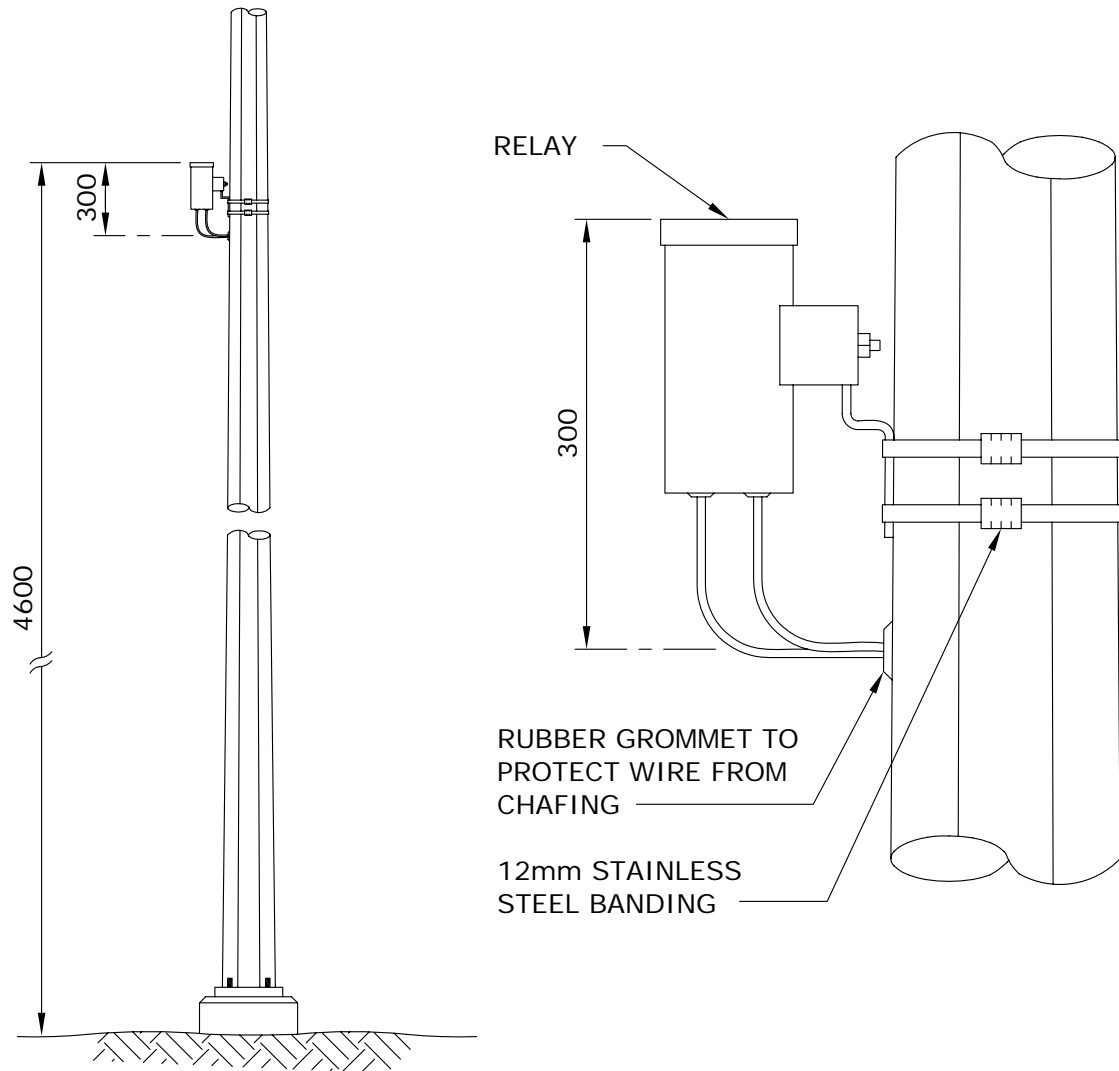
4. STREET LIGHT RELAY USING PILOT WIRE CONTROL

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

5. PHOTO-ELECTRIC CONTROLLED RELAY IN BASE OF STANDARD

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

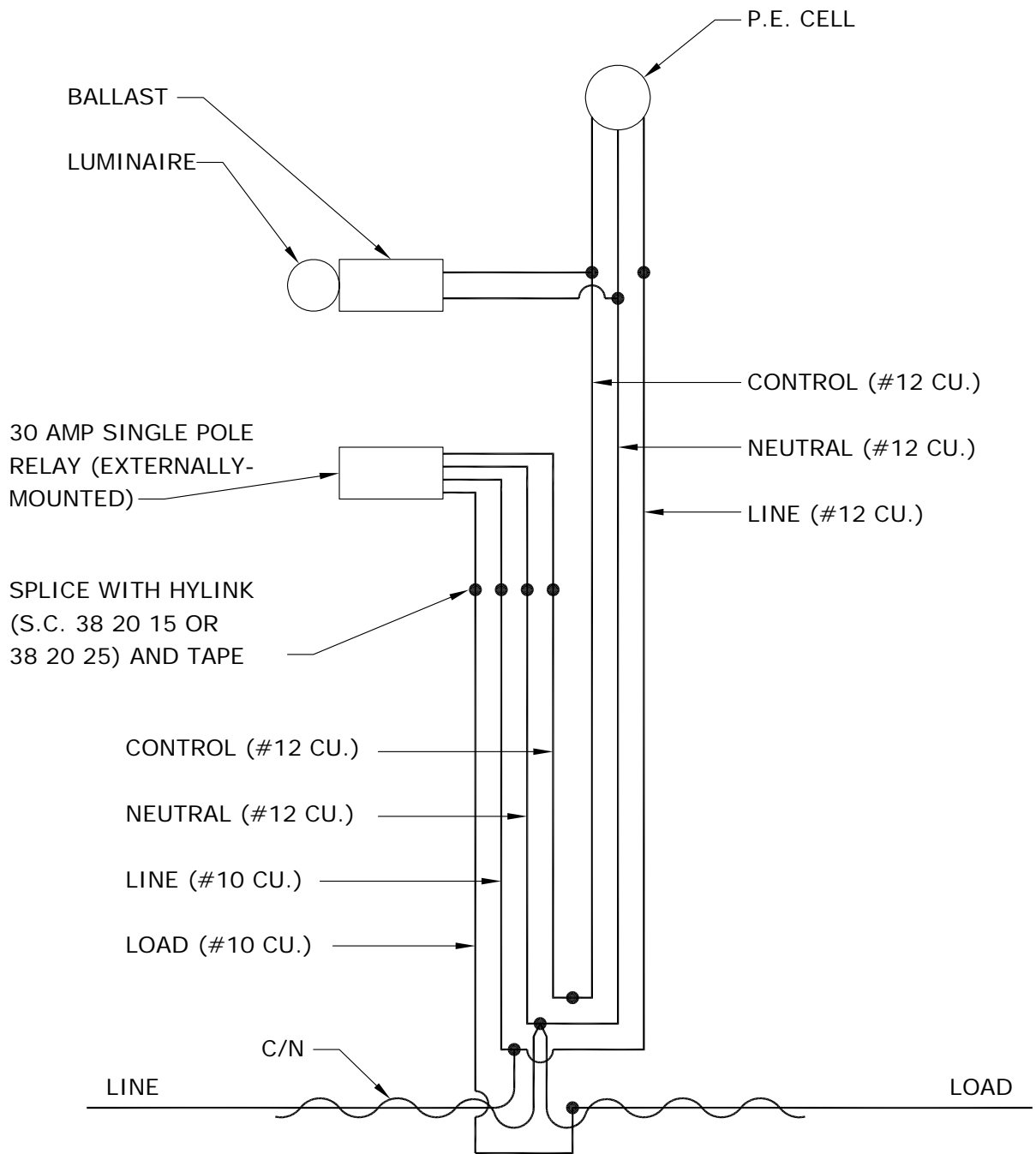
APPROVED	REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS		
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28			CONTROL METHODS FOR STREET LIGHT CONTROLS		
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-08	CD 315-10		SHT 0001 OF 1
					REV 00



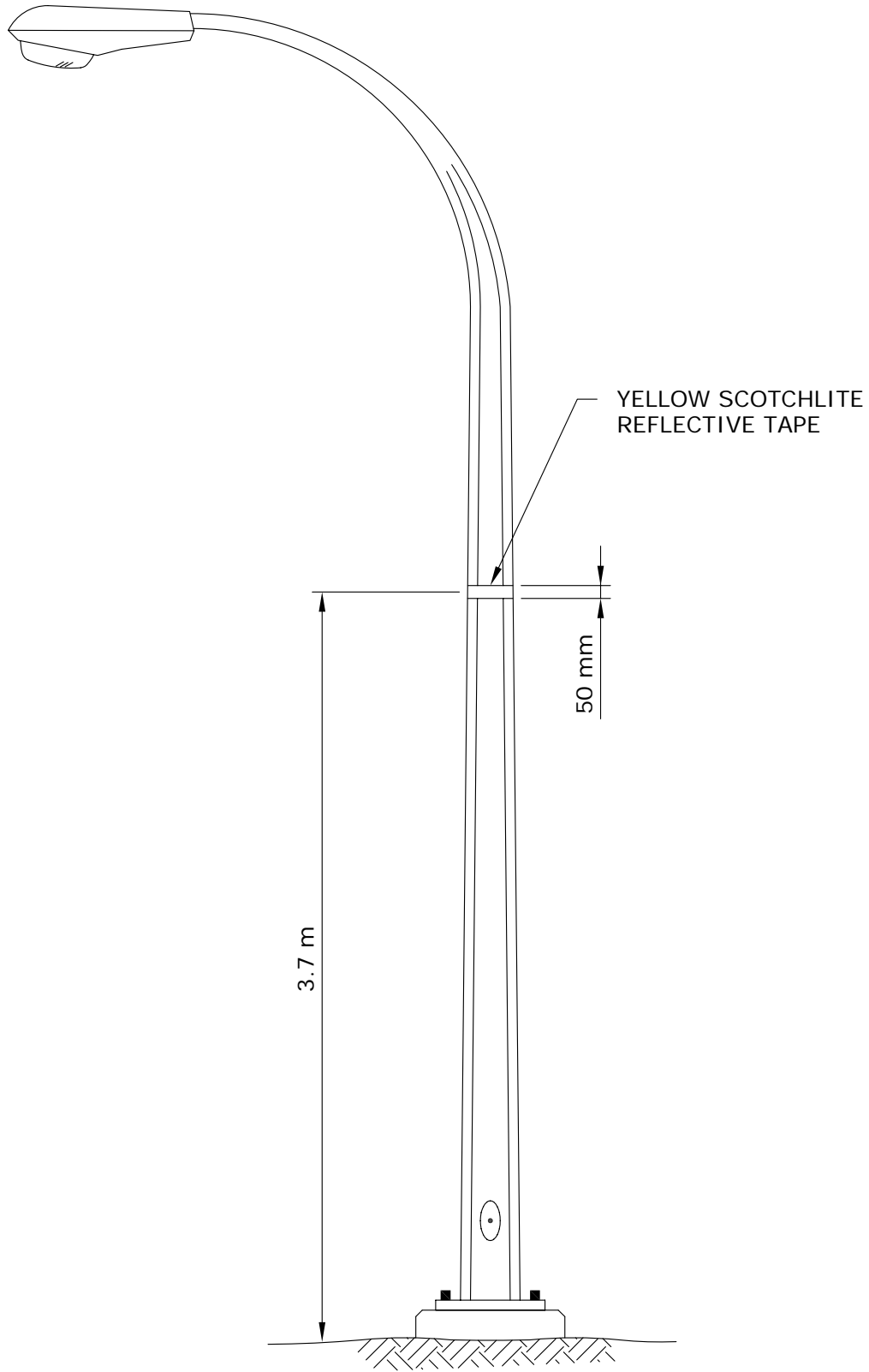
NOTES:

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

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



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

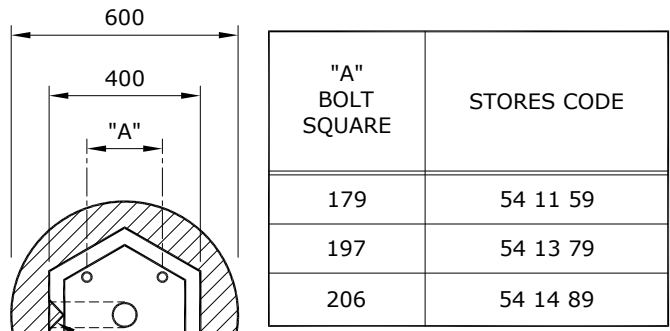


APPROVED		REVISIONS		MANITOBA HYDRO DISTRIBUTION STANDARDS	
ORIGINAL DRAWING SEALED BY E.H. WIEBE 89-04-28				IDENTIFICATION OF FIRST STREET LIGHT STANDARD CONNECTION TO CIRCUIT	
DRAWN W.B./CAD	CHECKED W.C.	DATE 88-09	CD 315-35		
			SHT		REV
			0001 OF 1		00

7.7 - 10.7 STREET LIGHT POLES

NOTES:

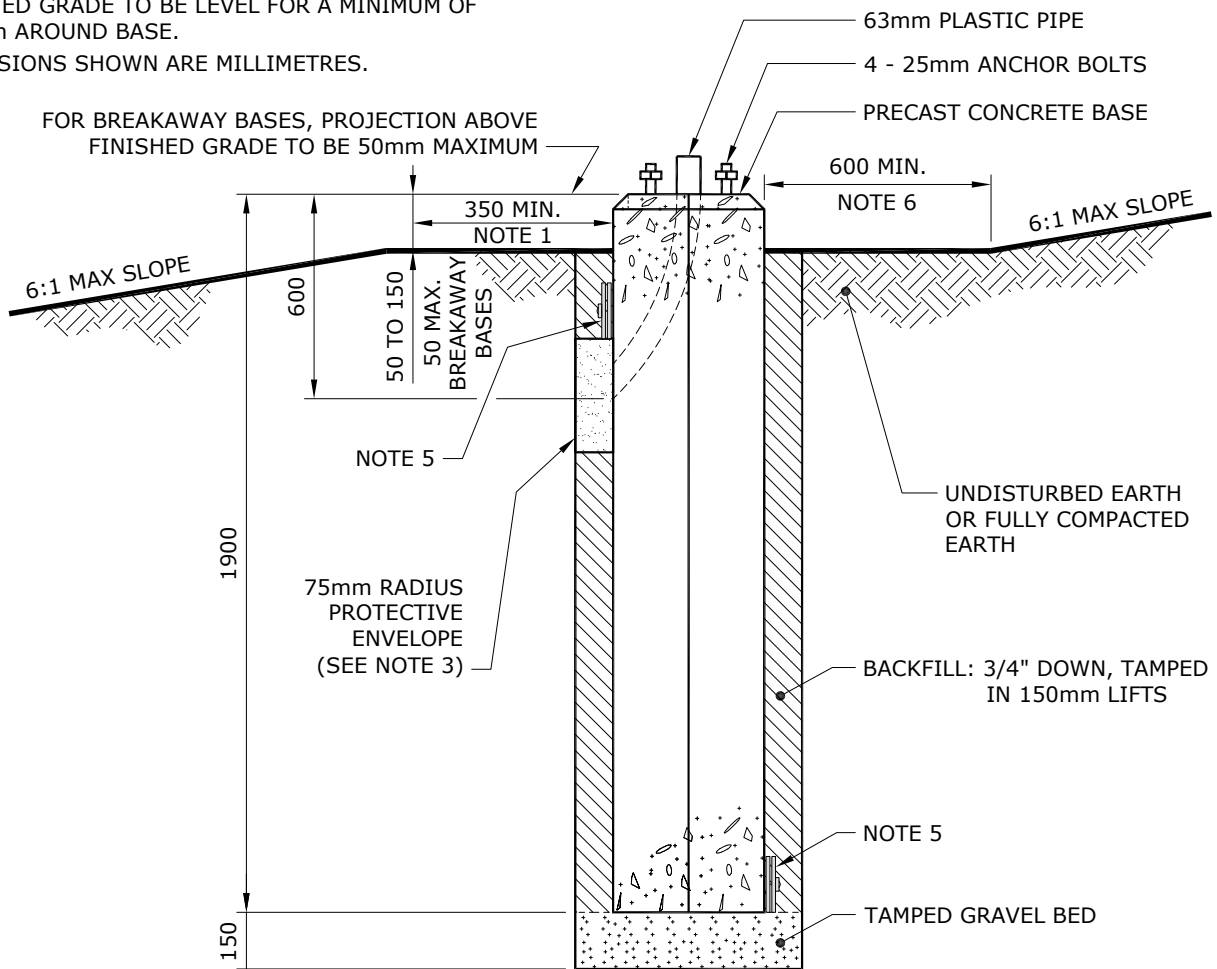
1. FOR FUTURE ACCESS TO LOWER PORTION OF PLASTIC PIPE, LOCATE "V" GROOVE SIDE OF BASE TO ROADWAY PROVIDED THAT:
 - a) A MIN. HORIZONTAL SEPARATION OF 350mm IS MAINTAINED TO ANY PAVED SURFACE OR STRUCTURE; OR
 - b) IF LESS THAN 350mm, ROTATE BASE 90°
2. ROUTE UNDERGROUND CABLES DIRECTLY INTO PLASTIC PIPE.
3. IN BACKFILL AREA, ENCASE UNDERGROUND CABLES IN A 75mm RADIUS ENVELOPE OF EXCAVATED MATERIAL OR SAND TO PROTECT CABLES. DO NOT BACKFILL WITH EXCAVATED MATERIAL OR SAND MORE THAN 1/6 OF THE WAY AROUND BASE.
4. SEE CD300-9 FOR ANCHOR ROD TIGHTENING METHOD.
5. INSTALL EXPANDING POLE KEY ANCHOR PER CD44-30. ENSURE TOP ANCHOR DOES NOT OBSTRUCT CONDUIT ENTRY HOLE.
6. FINISHED GRADE TO BE LEVEL FOR A MINIMUM OF 600mm AROUND BASE.
7. DIMENSIONS SHOWN ARE MILLIMETRES.



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

PLAN

AUGERED HOLE
"V" GROOVE ON CHAMFER INDICATING LOCATION OF POLY PIPE



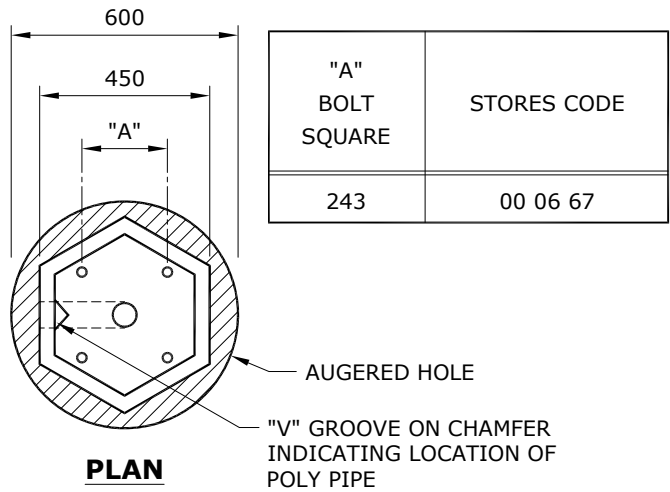
ELEVATION

APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS		
INSTALLATION OF PRECAST CONCRETE BASE ON SLOPE		CD 300-7		
DRAWN C.A.	CHECKED L.D.	DATE 19-10	SHT 0001 OF 2	REV 00

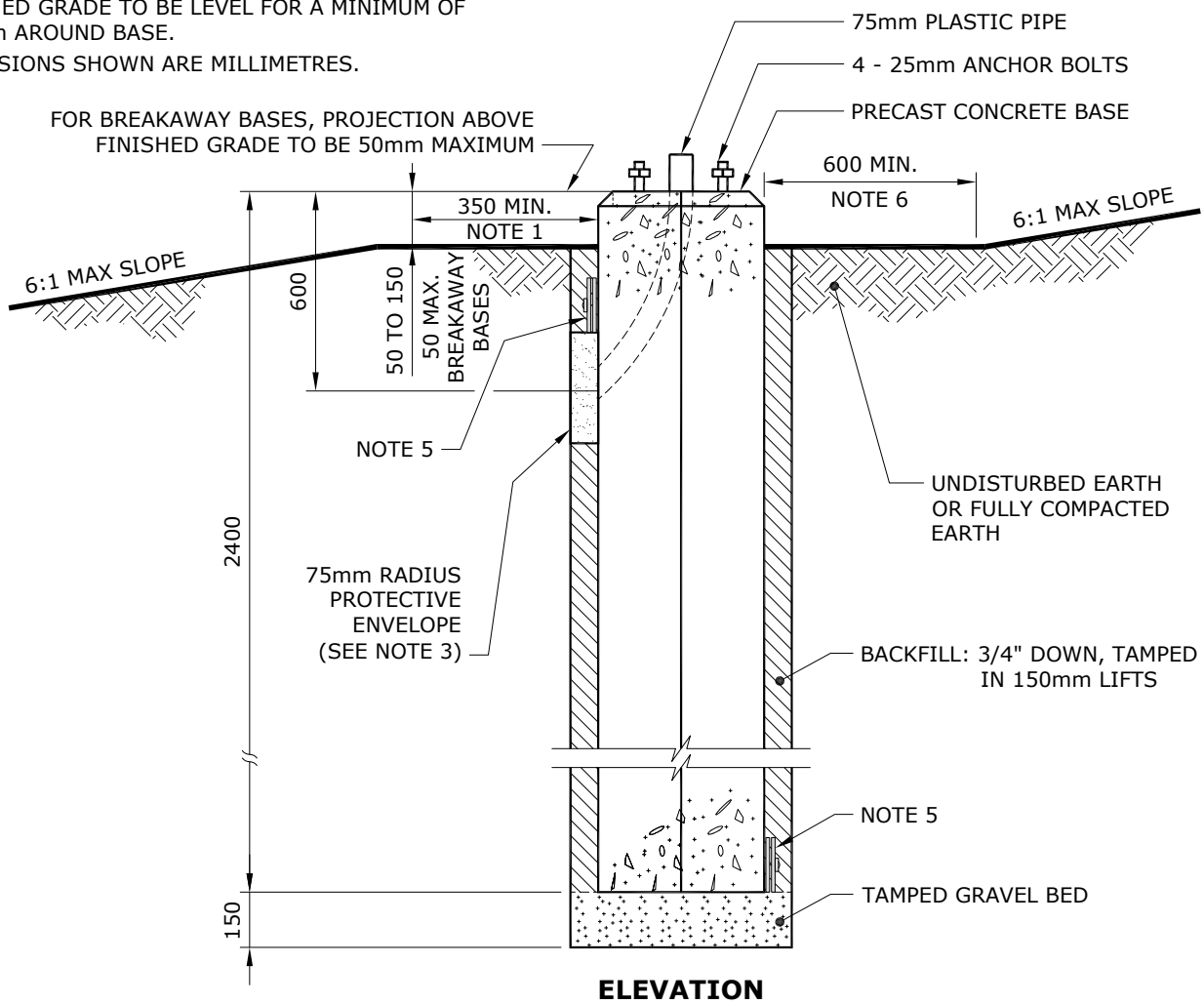
13.7 STREET LIGHT POLE

NOTES:

1. FOR FUTURE ACCESS TO LOWER PORTION OF PLASTIC PIPE, LOCATE "V" GROOVE SIDE OF BASE TO ROADWAY PROVIDED THAT:
 - a) A MIN. HORIZONTAL SEPARATION OF 350mm IS MAINTAINED TO ANY PAVED SURFACE OR STRUCTURE; OR
 - b) IF LESS THAN 350mm, ROTATE BASE 90°
2. ROUTE UNDERGROUND CABLES DIRECTLY INTO PLASTIC PIPE.
3. IN BACKFILL AREA, ENCASE UNDERGROUND CABLES IN A 75mm RADIUS ENVELOPE OF EXCAVATED MATERIAL OR SAND TO PROTECT CABLES. DO NOT BACKFILL WITH EXCAVATED MATERIAL OR SAND MORE THAN 1/6 OF THE WAY AROUND BASE.
4. SEE CD300-9 FOR ANCHOR ROD TIGHTENING METHOD.
5. INSTALL EXPANDING POLE KEY ANCHOR PER CD44-30. ENSURE TOP ANCHOR DOES NOT OBSTRUCT CONDUIT ENTRY HOLE.
6. FINISHED GRADE TO BE LEVEL FOR A MINIMUM OF 600mm AROUND BASE.
7. DIMENSIONS SHOWN ARE MILLIMETRES.



"A" BOLT SQUARE	STORES CODE
243	00 06 67



APPROVED	REVISIONS	MANITOBA HYDRO DISTRIBUTION STANDARDS					
INSTALLATION OF PRECAST CONCRETE BASE ON SLOPE		CD 300-7					
DRAWN C.A.	CHECKED L.D.	DATE 19-10	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">SHT</td> <td style="text-align: center;">REV</td> </tr> <tr> <td style="text-align: center;">0002 OF 2</td> <td style="text-align: center;">00</td> </tr> </table>	SHT	REV	0002 OF 2	00
SHT	REV						
0002 OF 2	00						

APPENDIX 'B'

SAFE EXCAVATION & SAFETY WATCH GUIDELINES



Safe Excavation & Safety Watch Guidelines



For your **SAFETY**

Click Before
YouDig**MB.com**

Or call 1-800-940-3447

 **Manitoba
Hydro**

RELEASE OF NATURAL GAS

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

In case of damage causing a release of natural gas:

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

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

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

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

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

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

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

Table of Contents

RELEASE OF NATURAL GAS	2
WHY YOU SHOULD PLAN AHEAD	4
PLANNING LARGE PROJECTS.....	4
REGULATIONS	5
DEFINITIONS	6
EXCAVATOR PRE-MARKING.....	7
Guidelines for excavation marking.....	8
After the area is Pre-Marked.....	9
APWA UNIFORM COLOUR CODE.....	10
GUIDELINES FOR EXCAVATION NEAR ELECTRICAL AND NATURAL GAS LINES.....	10
Hand Digging to Expose Lines	10
Water Pressure/Vacuum System (Hydrovac).....	11
Typical Gas Service Installation	13
General Approach	13
Crossing Lines.....	14
Working Parallel to Lines	14
Hard Surface Removal	15
Line Exposed.....	16
No Relocation.....	16
Inspect for Damage.....	16
Backfilling	16
Access	17
Project Closeout	17
SAFETY WATCH.....	17
When is a Safety Watch required?	17
Why is a Safety Watch done?.....	18
Who pays for a Safety Watch?.....	18
How to arrange for a Safety Watch.....	18
DIRECTIONAL BORING – CONTRACTOR GUIDELINES	19
Electrical Conductors and Gas Pipelines.....	19
Observation Hole Required When Crossing Any Manitoba Hydro Facility	20
Drilling Parallel to Manitoba Hydro Facilities	21
UNPLANNED CONTACT WITH ELECTRIC OR NATURAL GAS LINES	22

WHY YOU SHOULD PLAN AHEAD

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

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

PLANNING LARGE PROJECTS

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

Gas

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

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

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

Electric

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

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

REGULATIONS

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

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

DEFINITIONS

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

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

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

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

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

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

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

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

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

EXCAVATOR PRE-MARKING

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

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

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

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

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

White Line

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

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

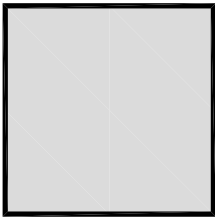
When using stakes or flags to mark the excavation work area, do not drive them into the ground deeper than 150 mm (6 inches). Any activity which disturbs more than 150 mm (6 inches) must have the facilities located.

Guidelines for excavation marking

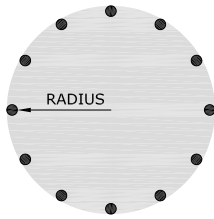
The following marking illustrations are examples of how excavators may choose to mark their area of proposed excavation. The use of white marking products (e.g. paint, flags, stakes, or a combination of these) may be used to identify the excavation site.

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

SINGLE POINT EXCAVATION MARKINGS

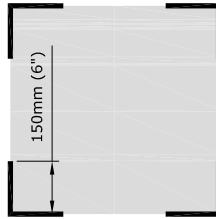


FULL LINE

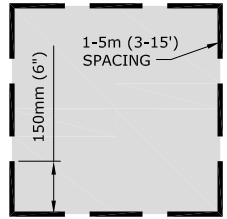


STAKE IN CENTRE WITH
COMPANY NAME & RADIUS
OF CIRCLE

RADIUS OR ARC



FOUR CORNERS



DASH LINE

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

After the area is Pre-Marked

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









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

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

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

APWA UNIFORM COLOUR CODE

Underground utility marking

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

GUIDELINES FOR EXCAVATION NEAR ELECTRICAL AND NATURAL GAS LINES

Hand Digging to Expose Lines

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

There are several things to remember when hand exposing:

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

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

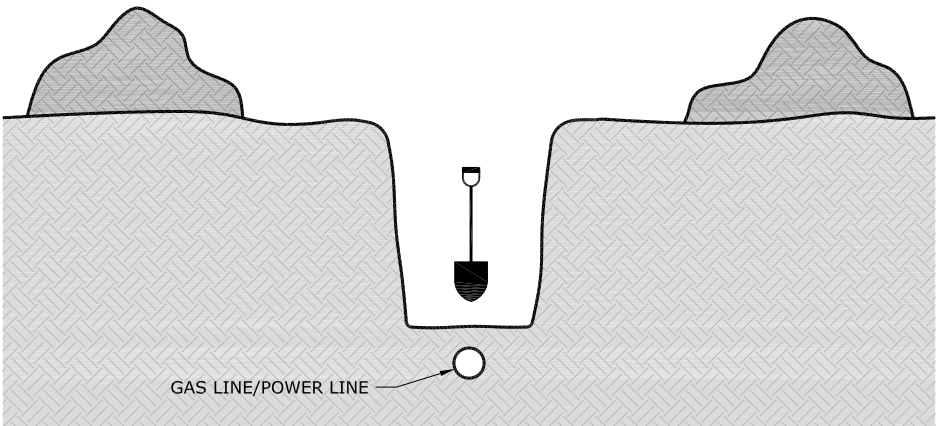
Water Pressure/Vacuum System (Hydrovac)

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

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

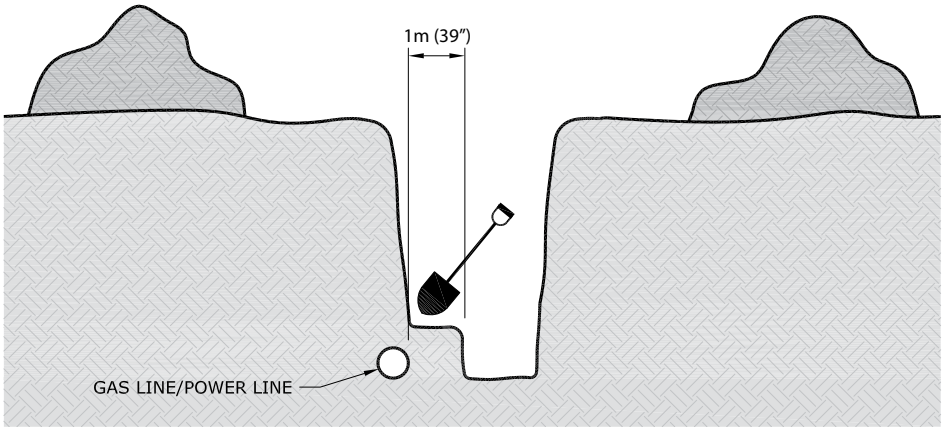
Some acceptable excavation methods:

a) Dig Vertically



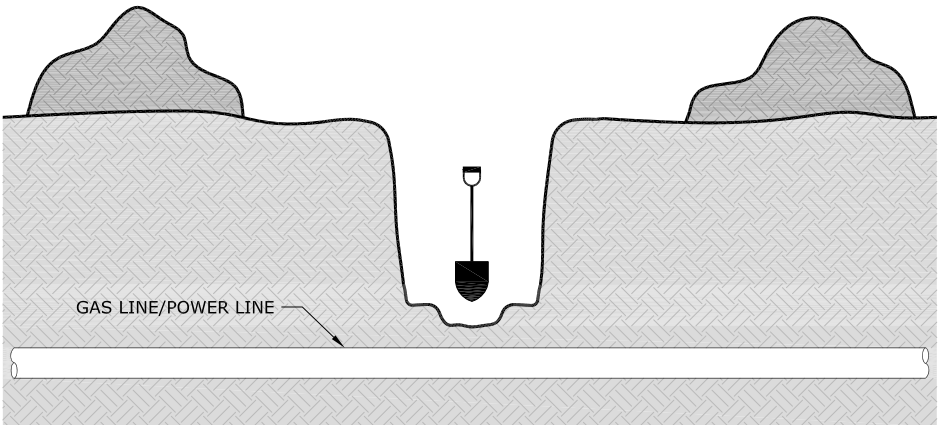
Dig a hole with a shovel directly above the line location until the line is exposed. Take care not to damage the line or coating. Mechanical excavation equipment **MUST NOT** be used to widen or deepen the hole before exposing the line.

b) Dig Laterally



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

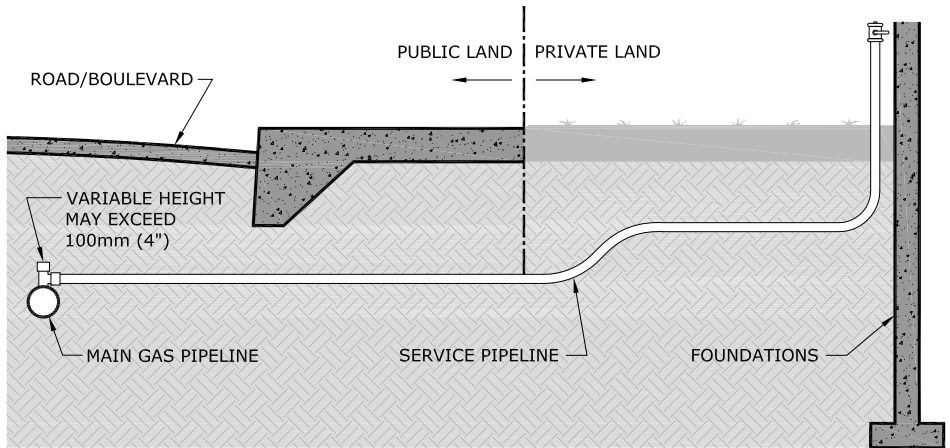
c) Dig Trench and excavate



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

Typical Gas Service Installation

(example only does not represent all installations)

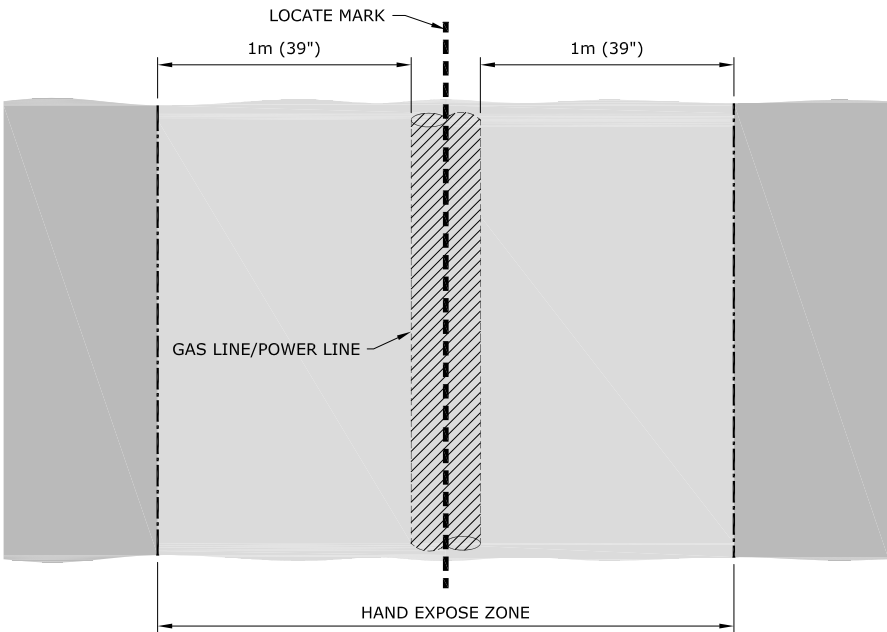


Fittings such as active or abandoned service tees may be present on gas pipelines, exercise care when excavating.

General Approach

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

Before line is exposed



Crossing Lines

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

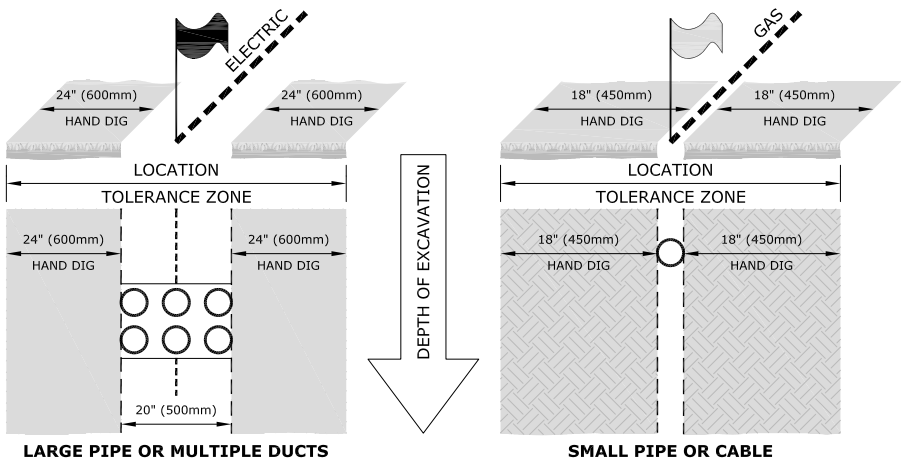
Working Parallel to Lines

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

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

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

Once line is exposed



Hard Surface Removal

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

Line Exposed

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

No Relocation

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

Inspect for Damage

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

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

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

Backfilling

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

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

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

Access

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

Project Closeout

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

SAFETY WATCH

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

Safety Watch personnel work with the excavator to check that:

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

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

When is a Safety Watch required?

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

Why is a Safety Watch done?

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

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

Who pays for a Safety Watch?

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

How to arrange for a Safety Watch.

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

DIRECTIONAL BORING – CONTRACTOR GUIDELINES

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

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

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

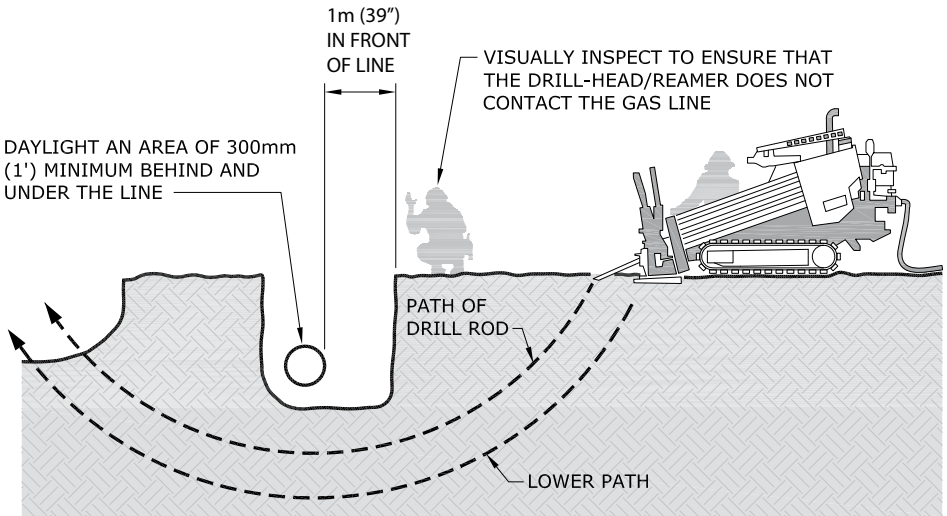
Electrical Conductors and Gas Pipelines

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

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

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

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



Observation Hole Required When Crossing Any Manitoba Hydro Facility

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

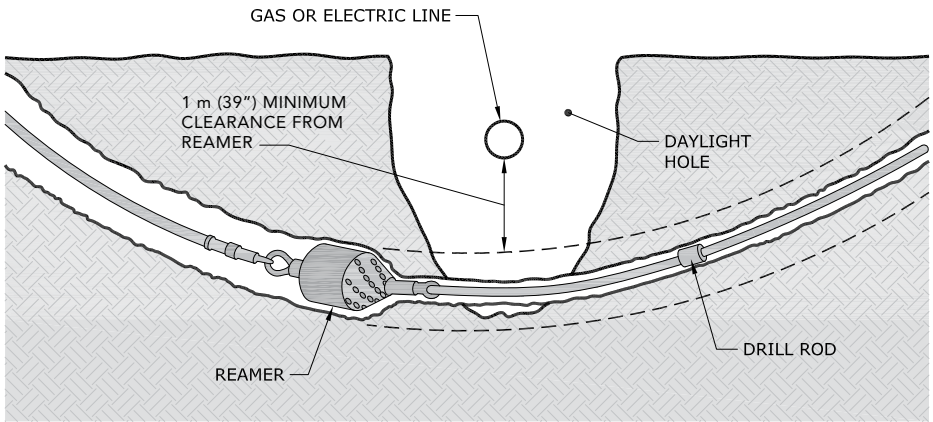
Acceptable practice for opening up the observation hole is using water pressure/vacuum or hand digging.

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

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

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

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



Drilling Parallel to Manitoba Hydro Facilities

Paralleling Electrical Conductors & Natural Gas Pipelines

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

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

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

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

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

UNPLANNED CONTACT WITH ELECTRIC OR NATURAL GAS LINES

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

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

Abrasions

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

Aerial

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

Stop Work

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

Call It In

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

Click  **Before**
YouDigMB.com[®]

Or call 1-800-940-3447

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

For more information visit
hydro.mb.ca

APPENDIX 'C'

GELCAP KIT



My Cart | My Part Lists | Sign In/Register

English (Change)

What can we help you find?

Submit

Products Industries Resources About TE My Account Innovation Support Center

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

Share Print Email



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

TE Internal Number: F40658-000



Power Cable Splices, Repair Sleeves and End Seals

Always EU RoHS/ELV Compliant (Statement of Compliance)

Product Highlights:

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

[View all Features](#)

Quick Links

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

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

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

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

Corporate Information

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

Quick Links

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

Customer Support

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

Keep Me Informed



APPENDIX 'D'

**ELECTRIC AND/OR NATURAL GAS
FACILITIES LOCATE**



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

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



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

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

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

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

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

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

Location or sketch / Emplacement ou croquis

See attached / Voir documents ci-joint

<input type="checkbox"/> SAFETY WATCH REQUIRED / EXIGENCE DE SURVEILLANCE DE SÉCURITÉ : <input type="checkbox"/> Electricity / Électricité <input type="checkbox"/> Natural Gas / Gaz naturel Notify the Utility at least 2 business days in advance of excavation to request a Safety Watch / Avertir l'entreprise 2 jours ouvrables avant les travaux d'excavation pour demander une surveillance de sécurité.	<input type="checkbox"/> Work area is within three metres of overhead line. / La zone de travail est à moins de 3 mètres de distance d'une ligne aérienne.	Utility contact name / Personne-ressource (entreprise)	Tel. no. / N° de tél.
	<input type="checkbox"/> Excavation area is within three metres but at least one metre away from power cable or gas line location. / La zone d'excavation est à moins de 3 mètres et à plus d'un mètre d'un câble électrique ou d'une conduite de gaz.	<input type="checkbox"/> Hand dig within one metre of all markings/staking. / Creusez manuellement à moins d'un mètre des marques et des piquets.	<input type="checkbox"/> Contact the Utility for further instructions before working/digging. / Communiquez avec le service public avant de commencer à travailler ou à creuser pour obtenir des instructions additionnelles.

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

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

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

TERMS AND CONDITIONS:

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

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

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

INSTRUCTIONS:

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

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

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

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

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

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

CAUTION:

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

If natural gas leaks, you must do the following:

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

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

BACKFILLING PRECAUTIONS:

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

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

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

CONDITIONS GÉNÉRALES

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

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

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

INSTRUCTIONS

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

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

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

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

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

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

ATTENTION

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

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

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

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

PRÉCAUTIONS RELATIVES AU REMBLAYAGE

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

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

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

APPENDIX 'E'

SAMPLE JOB PLAN

1. EMERGENCY RESPONSE PLAN

<p>Identify exact location for emergency response:</p> <p>How will you execute a rescue?</p>	<p>Emergency phone numbers:</p> <p>911</p> <p>204-360-HELP (4357)</p> <p>SCC: 204-474-3369, 204-474-3007, 204-474-3327</p> <p>VHF: 040</p> <p>Spill Response no./FSO: Jeff Breakey - 204-871-2003</p>	<p>Dispatch - Daytime - Local CSC</p> <p>After hours - Electric 204-360-2006 Radio #031</p> <p>- Gas 204-360-2009 Radio #030</p> <p>Blowing Gas - Wpg. 204-480-5900</p> <p>Blowing Gas - Rural 1-888-624-9376</p>
---	--	---

INSTRUCTION: Prepare, discuss and review the job plan with the crew daily and whenever a change is introduced to the job.

2.	CURRENT DATE	yyyy mm dd	Project name	Work Order no.	Description		
	CSC and Radio Channel	Line or feeder	Blocked <input type="checkbox"/> Yes <input type="checkbox"/> No	Upstream protective device	Blocking received from	Time	Phone no.

3. HAZARD IDENTIFICATION LIST

1. Mechanical	2. Electricity	3. Gravity	4. Applicable
1.1 Equipment failure 1.2 Lifting with a boom 1.3 Max work loads 1.4 Vehicle stability 1.5 Moving parts/Sharp objects 1.6 Tension loads/Springs	2.1 Live contact HV 2.2 Live contact LV 2.3 Induction/backfeed HV 2.4 Induction/backfeed LV 2.5 Static charge 2.6 Step potential 2.7 ARC Flash potential 2.8 Clothing ignition hazard/ FRC required 2.9 Lockout/Tagout	3.1 Falling from a height 3.2 Falling objects 3.3 Falling structures 3.4 Rigging failure 3.5 Working over water	4.1 Vehicular 4.2 Kenetic 4.3 Thermal 4.4 Chemical 4.5 Confined Space 4.6 Excavations 4.7 Vehicle or pedestrian traffic 4.8 Underground Utilities 4.9 Other, specify: 4.9.1 -----

Hand contact:	Incident energy -	ARC flash boundary -	ARC Flash PPE Level -
Hot stick Work:	Incident energy -	ARC flash boundary -	ARC Flash PPE Level -

4. JOB STEPS	MAJOR HAZARDS	REQUIRED BARRIERS	PPE: Minimum Hard Hat and Safety Footwear LIST ALL OTHER REQUIRED PPE including eyewear.	TIMES (LO/TO)
			FRC: <input type="checkbox"/> Yes <input type="checkbox"/> No	

REVIEWED BY	DATE yyyy mm dd

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

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

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

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

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

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

APPENDIX 'F'

NETWORK COMMISSIONING REPORT

NETWORK COMMISSIONING REPORT

FIELD INSTRUCTIONS: Preferred Best Practice

1. Construction Foreman to contact Customer Service Center Supervisor upon completion of project.
2. Customer Service Center Supervisor to provide a delegate that will review project details with Construction Foreman in the field.
3. Delegate to identify deficiencies and record on report. If project is accepted as complete proceed to Step 5.
4. Construction to complete deficiencies and review with delegate.
5. Once project deemed acceptable delegate to sign under "Accepted as complete by Customer Service Center Representative"
6. One copy of report to be attached to working file.
7. One copy of report to be forwarded to Customer Service Center Supervisor with close out package.
8. Construction Manager to sign under "Accepted as Complete by Construction Manager" and file with final close out package.

Network number		Description			
Foreman name (line)		Foreman name (pole)		Foreman name (underground)	
IN-SERVICE DATE	yyyy mm dd	Plan attached <input type="checkbox"/> Yes <input type="checkbox"/> No	Built as estimated <input type="checkbox"/> Yes <input type="checkbox"/> No	Field Supervisor responsible for work	

GENERAL COMMENTS

Prepared by (Construction Coordinator/Foreman) : Network Authenticated Signature	yyyy mm dd
--	------------

Network number

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

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

APPENDIX 'G'

GEOTECHNICAL REPORT

APPENDIX 'G' - GEOTECHNICAL REPORT

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

2021 to 2022 University Crescent Pavement Renewal Project

AECOM 60648764, 05-0049/City of Wpg File No. 21-C-02

Prepared for

Ryan Cunningham, P.Eng.
Senior Transportation Engineer
99 Commerce Dr, Winnipeg, MB R3P 0Y7

Date

March 29, 2021

HMCL Project Number: 112-2101

Table of Content

1) Introduction.....3
2) Field Work Program.....3
3) Sample Review and Data Reporting.....3
4) Closure.....4

Attachments

- 5) Site Plan
- 6) Compressive Strength & Photos for Mid-slab Cores
- 7) Transverse and Longitudinal Joint Cores
- 8) Pavement cores at Test Holes
- 9) Test Holes Logs
- 10) Lab Testing Summary & Lab Test Reports

Introduction

On February 11th, 2021, H. Manalo Consulting Ltd. (HMCL) received authorization from Mr. Ryan Cunningham, representing AECOM, to proceed with the scope of work as described in the email dated February 5th, 2021. The purpose of the work is to gather information about the existing subsurface soil conditions as well obtain pavement cores to help assess the existing pavement.

Field Work Program

The investigation program was performed following the guidelines listed in the City of Winnipeg document titled Site Investigation Requirements for Public Works Street Projects, dated January 2021. Prior to any subsurface work, the underground services were located. At some locations, the desired test hole location had to be moved based on the underground utilities. Pavement core samples were obtained between February 18 and March 2, 2021. The test holes were augered using a truck mounted geotechnical test hole drill rig on March 1 and 2, 2021, with the soil profile logged and samples collected at every 0.3 m. The test holes were back filled with bentonite clay, auger cuttings and then gravel. The pavement section was backfilled with asphalt cold mix. All pavement and soil samples were returned to HMCL's laboratory for further review.

Sample Review and Data Reporting

The asphalt pavement thickness ranges from 50 mm to 225 mm and the concrete pavement thickness was typically 200 mm. The general sub surface profile below the concrete generally consisted of minimal layer of granular fill, followed by a silty high plastic clay. There was typically a silt layer at a depth of approximately between 1 m to 2 m depth. The thickness of the silt layer ranged from 0.2 m to 0.5 m, the details can be found on the test hole logs. All samples were tested for moisture content, and selected samples were test for Atterberg limits, Grain size analysis (mechanical sieve and hydrometer methods) and CBR testing. A lab summary is attached as well as the lab testing reports.

The nine cores recovered at pavement transverse and longitudinal joints were used to help assess the condition of the concrete at the transverse and longitudinal joints. In general based

on what was observed at each location, the concrete condition at one or both sides of the joints was deteriorated. Retrieving a complete core was difficult at some locations with several attempts made. In some cases only the upper part of the slab was recovered as an intact or partially intact core and the lower section had to be chipped out to measure the slab thickness.

Closure


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

Fieldwork completed by:

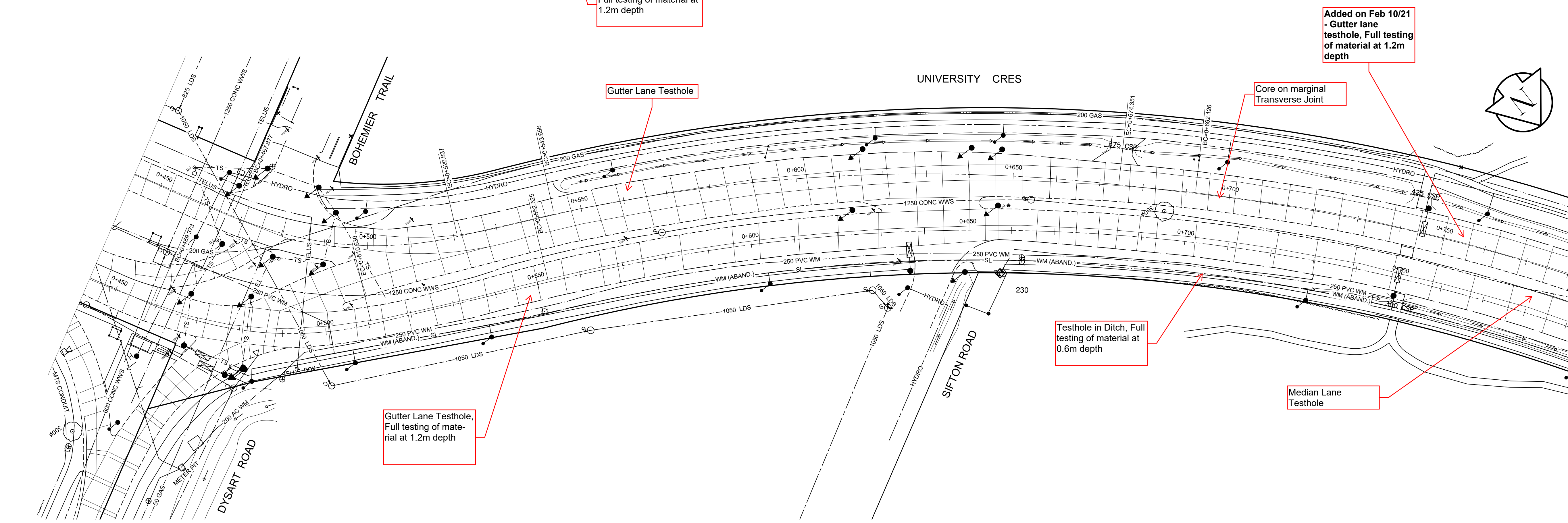
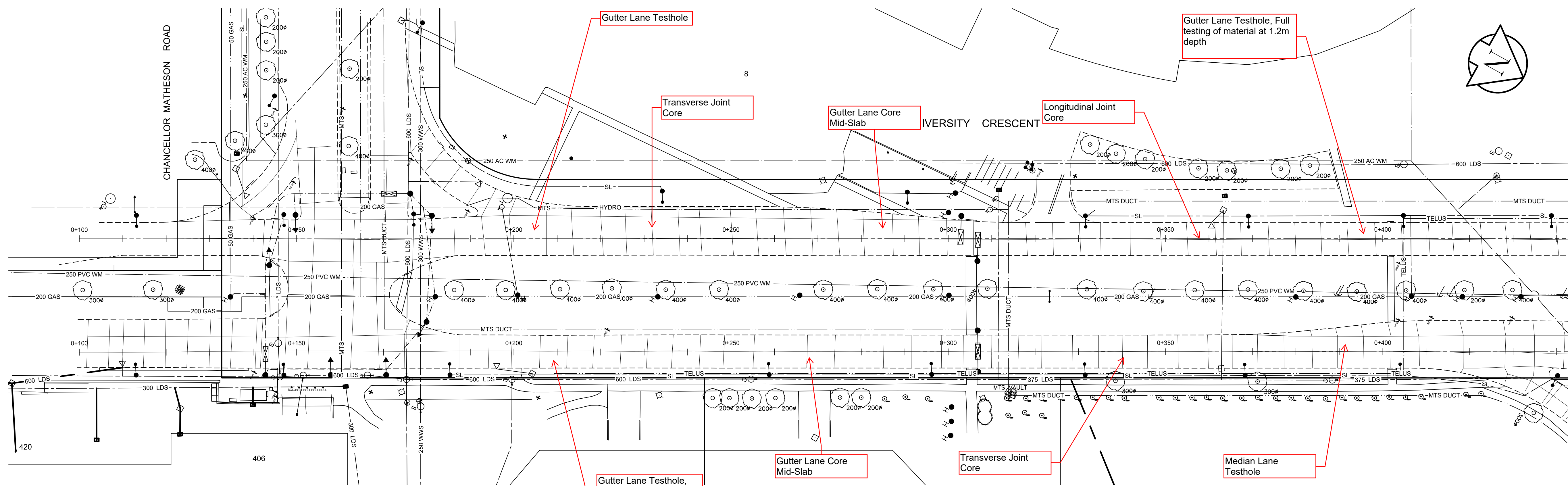


Edwin Timtiman, EIT
Materials Technologist

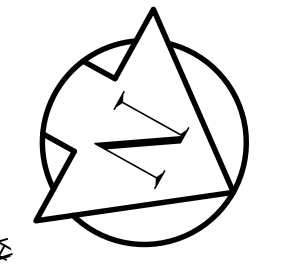
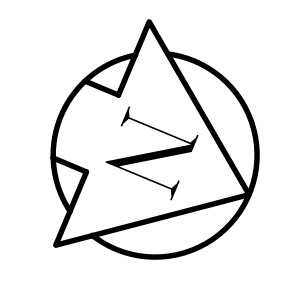
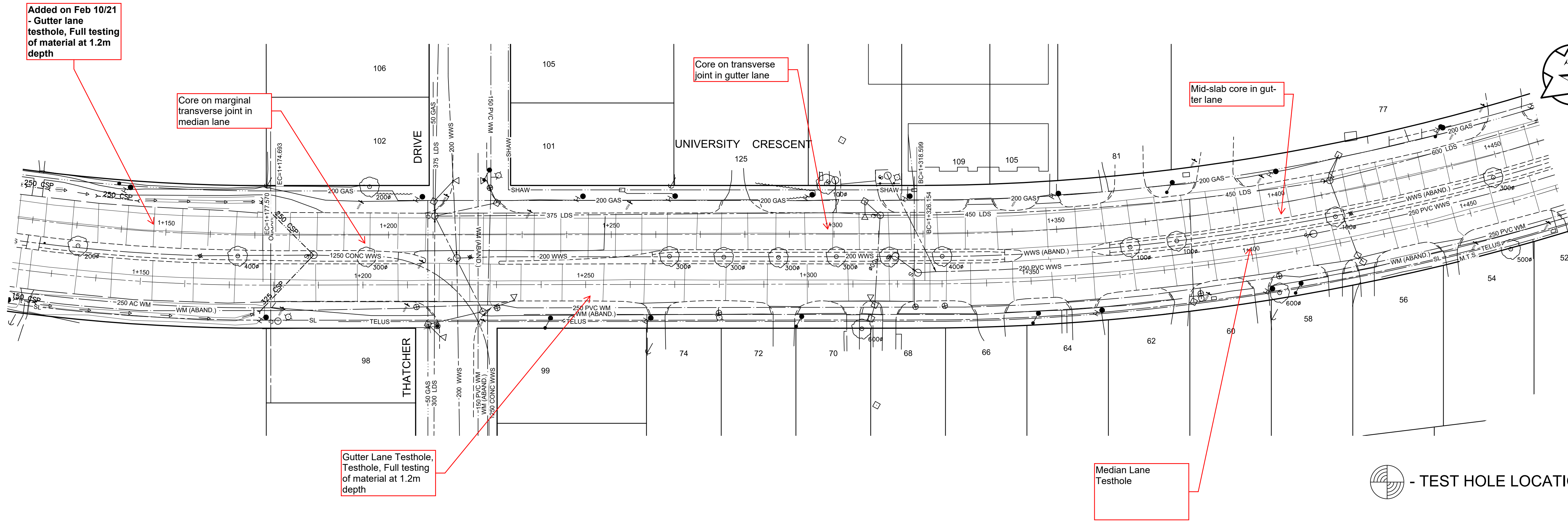
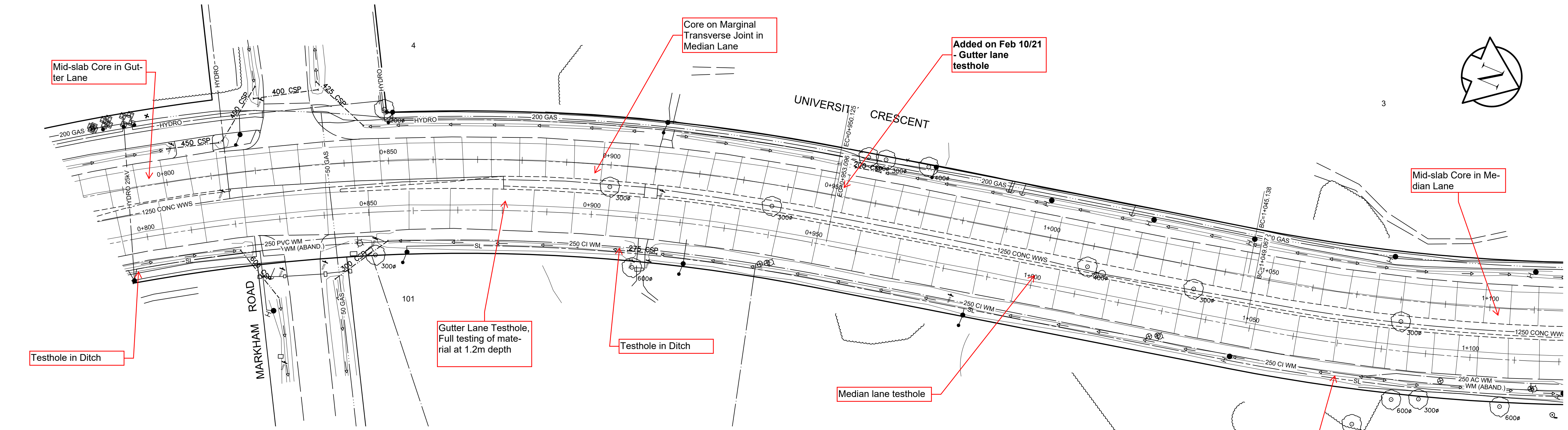
Reviewed by:



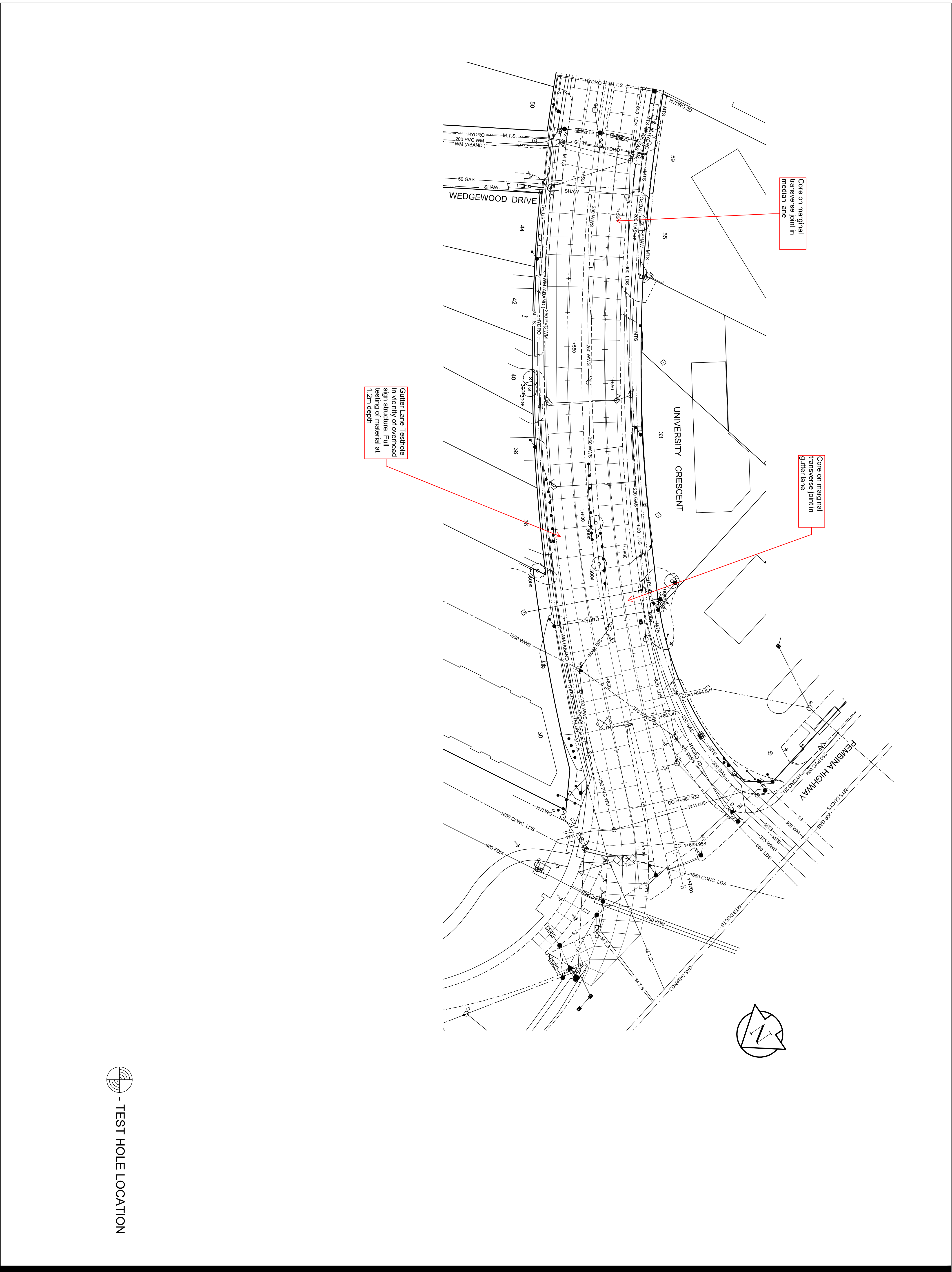
Paul Bevel
Manager, Field and Laboratory Services

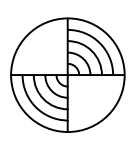


TEST HOLE LOCATION



 - TEST HOLE LOCATION



 - TEST HOLE LOCATION

CONCRETE CORE COMPRESSIVE STRENGTH TEST REPORT (CSA A23.2-14C)

CLIENT:	AECOM 99 Commerce Drive, Winnipeg MB R3P 0Y7	DATE:	February 21, 2021
ATTENTION:	Ryan Cunningham	FILE NO:	112-2101
PROJECT:	2021-2022 University Crescent Pavement Renewals University Crescent from Chancellor Matheson Road to Pembina Highway	REPORT NO:	21-001
STRUCTURE:	N/P	TECHNOLOGIST:	I.A.
		DATE CORES TAKEN:	February 18, 2021
		DOCUMENT NO:	HM-014
		DATE RECEIVED IN LAB:	February 18, 2021

Core Location	Length as Drilled (mm)	Core Diameter (mm)	Core Length (mm)	Length / Diameter (mm)	Correction Factor	Mass (grams)	Age at Break (days)	Date of Break	Type of Fracture	Comp. Strength as Calculated (MPa)	Comp. Strength as Corrected (MPa)
Core C1, STA 1+400 SB. GUTTER LANE	141.16	69.64	136.47	1.96	1.00	1191.7		21-Feb	1	23.2	23.2
Core C2, STA 1+100 SB. MEDIAN LANE	199.85	69.64	139.00	1.99	1.00	1218.8		21-Feb	1	38.0	38.0
Core C3, STA 0+795 SB. GUTTER LANE	213.31	97.92	194.29	1.98	1.00	3381.1		23-Feb	1	27.8	27.8
Core C4, STA 0+285 SB. GUTTER LANE	198.40	97.92	180.00	1.83	1.00	3240.0		23-Feb	1	20.6	20.6
Core C5, STA 0+268 NB. GUTTER LANE	185.34	97.92	166.80	1.70	1.00	2926.8		23-Feb	1	22.3	22.3

Remarks:

Tested in accordance with CSA A23.2-14C, Wet condition

Reviewed by:



Irvin Araquil
Senior Technologist

Approved by:



Hermie Manalo
Principal

COMPRESSIVE STRENGTH CORES







South bound transverse joint cores



South bound transverse joint, Sta. 1+560



South bound transverse joint, Sta. 1+515



South bound transverse joint, Sta. 1+300



South bound transverse joint, Sta. 1+200



South bound transverse joint, Sta. 0+896



South bound transverse joint, Sta. 0+700



South bound longitudinal joint, Sta. 0+357



South bound transvers joint, Sta. 0+233. Could not extract concrete core due to crumbling



North bound transverse joint, Sta. 1+200

TEST HOLE PAVEMENT CORES



TH 1, south bound Sta. 1+150



TH 2, south bound Sta. 0+950



TH 3, south bound Sta. 0+756



TH 4, south bound Sta. 0+561



TH 5, south bound Sta. 0+395



TH 6, south bound Sta. 0+205



TH 7, north bound Sta. 0+210



TH 8, north bound Sta. 0+383



TH 9, north bound Sta. 0+547



TH 10, north bound Sta. 0+780



TH 11, north bound Sta. 0+870



TH 12, north bound Sta. 1+000, lower part of concrete core could not be recovered



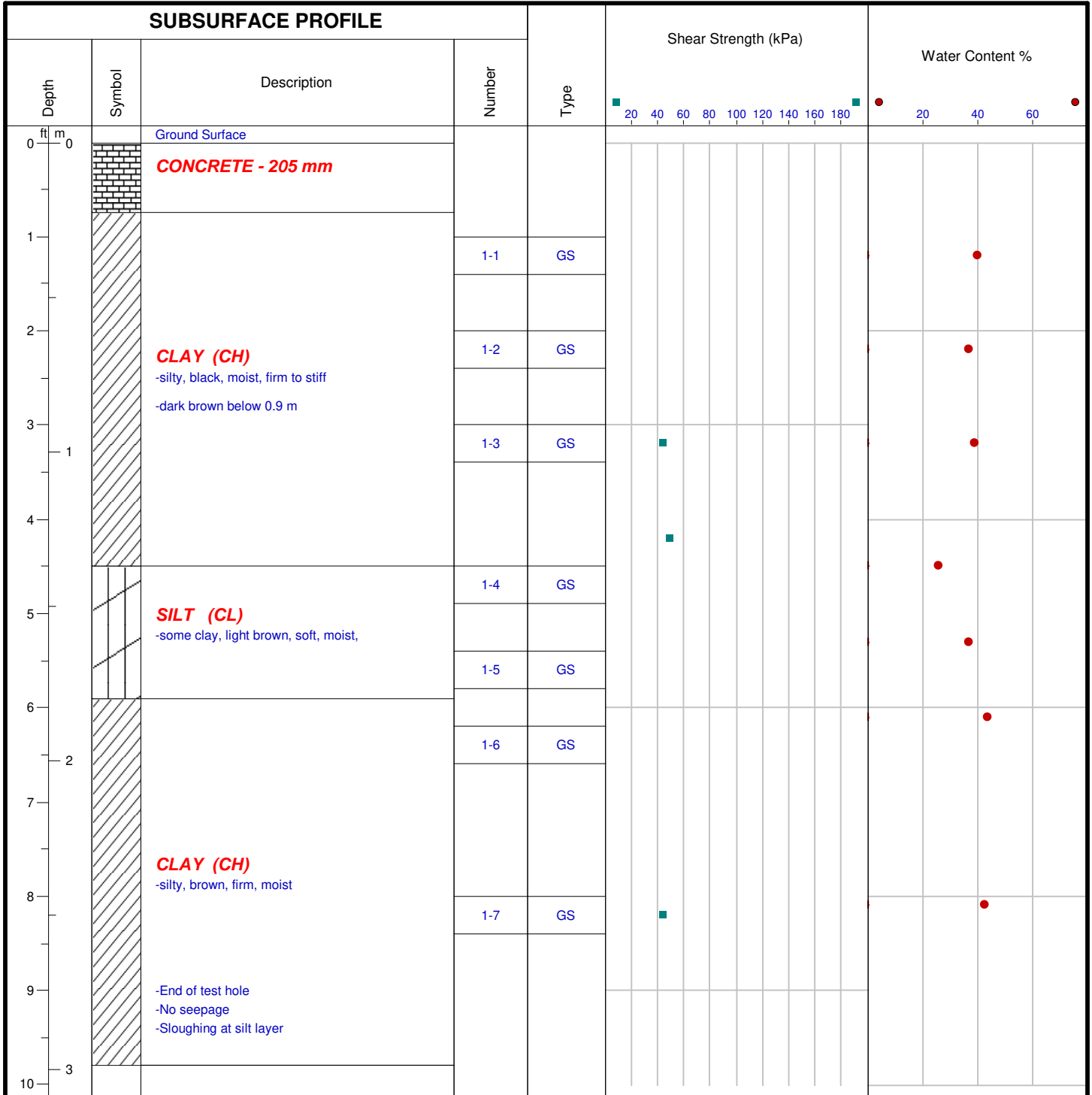
TH 13, north bound Sta. 1+250, concrete could not be recovered



TH 14, north bound Sta. 1+400



TH 15, north bound Sta. 1+605



Drill Method: Auger

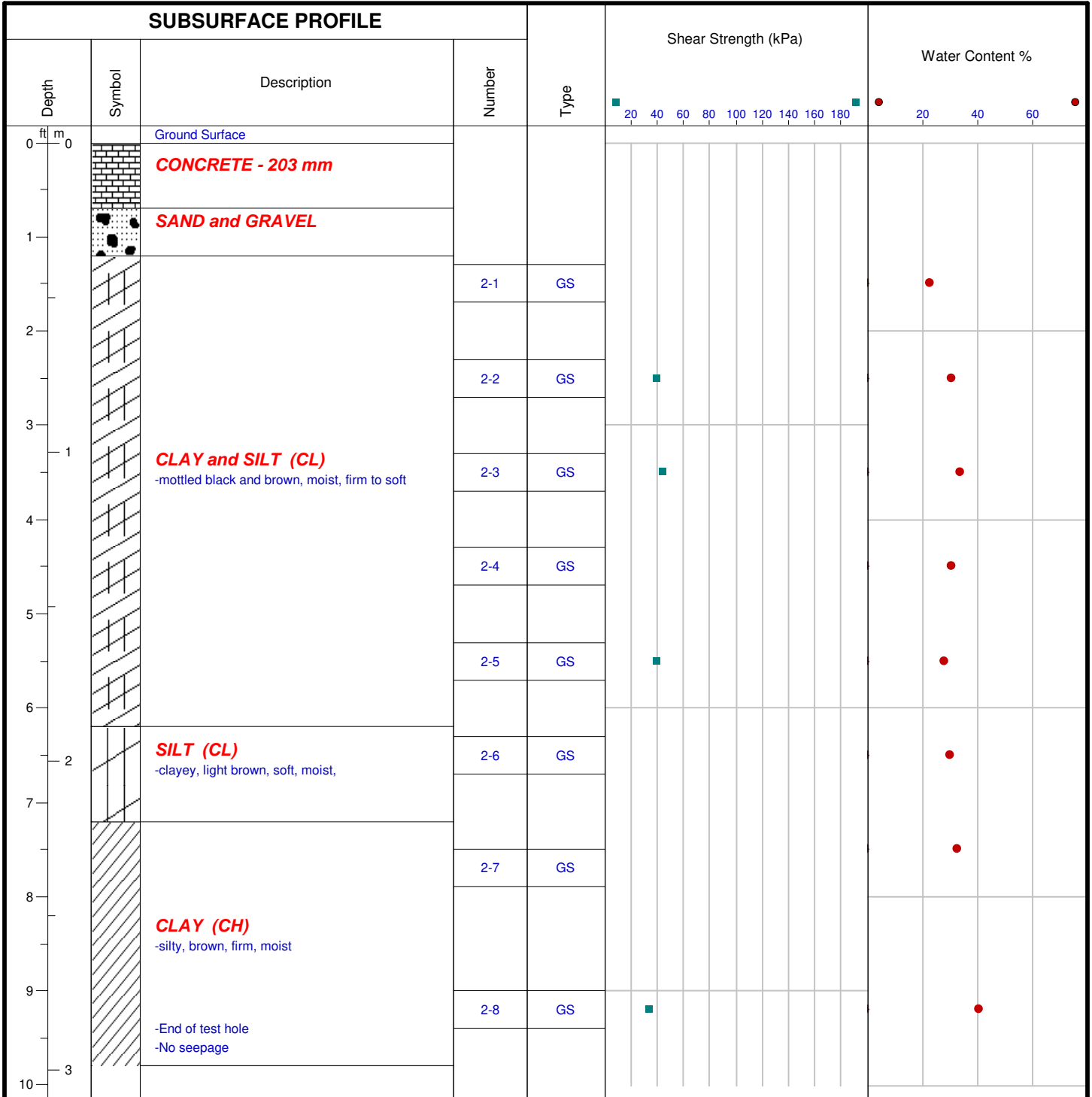
Drill Date: March 1, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

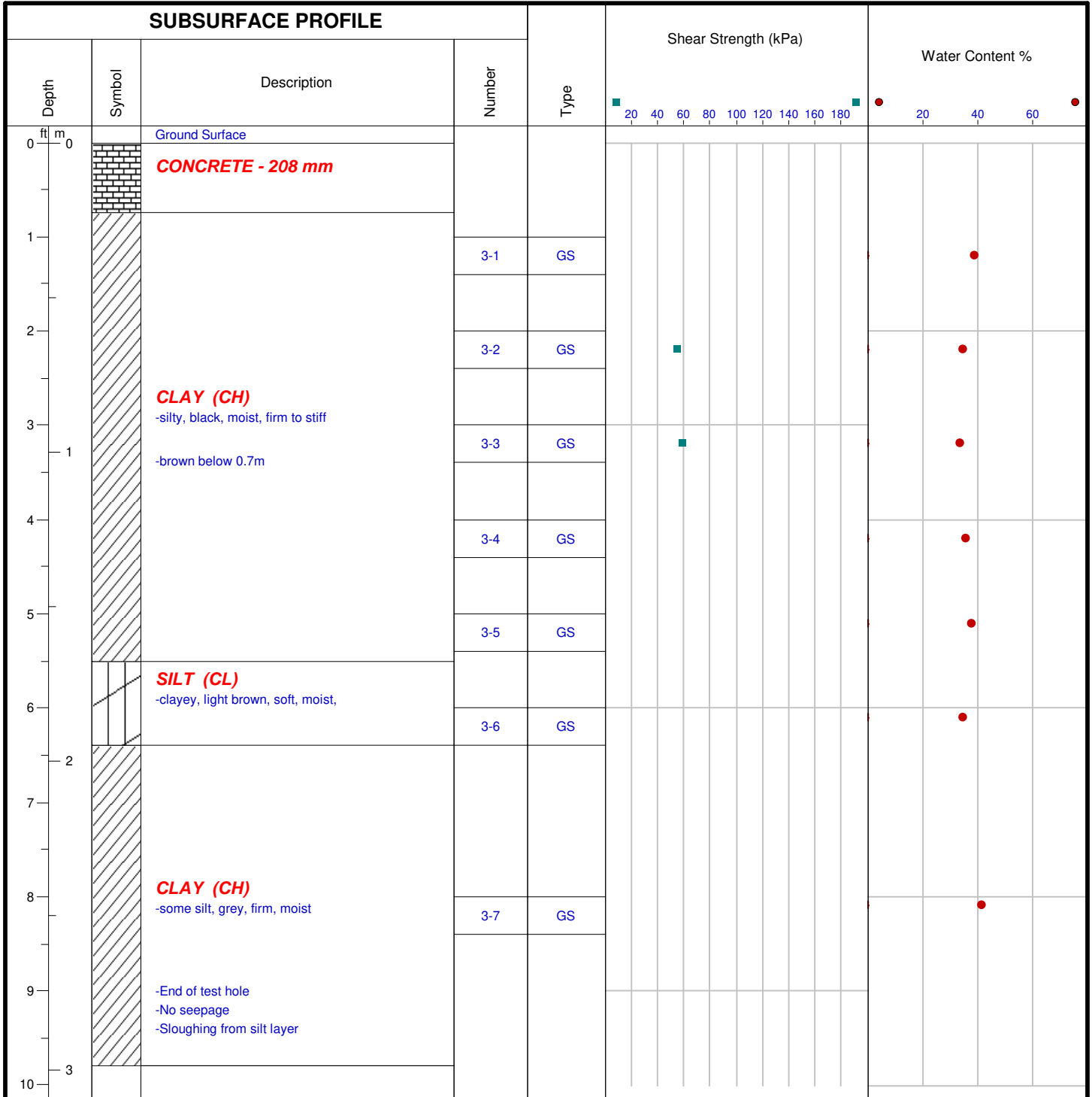
Drill Date: March 1, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

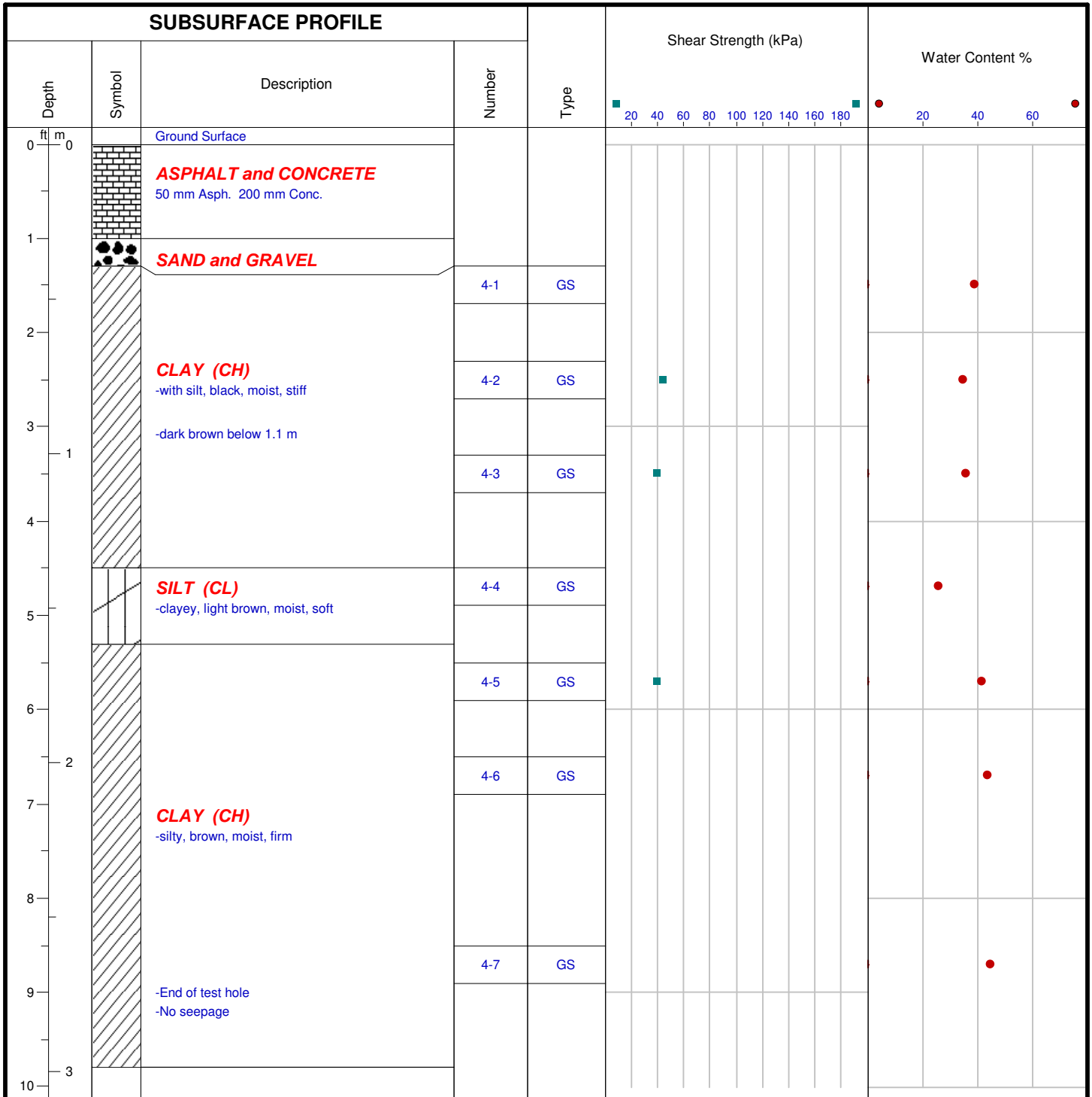
Drill Date: Mar 1, 021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

Drill Date: Mar 1, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Project No: 112-2101

Project: University Crescent

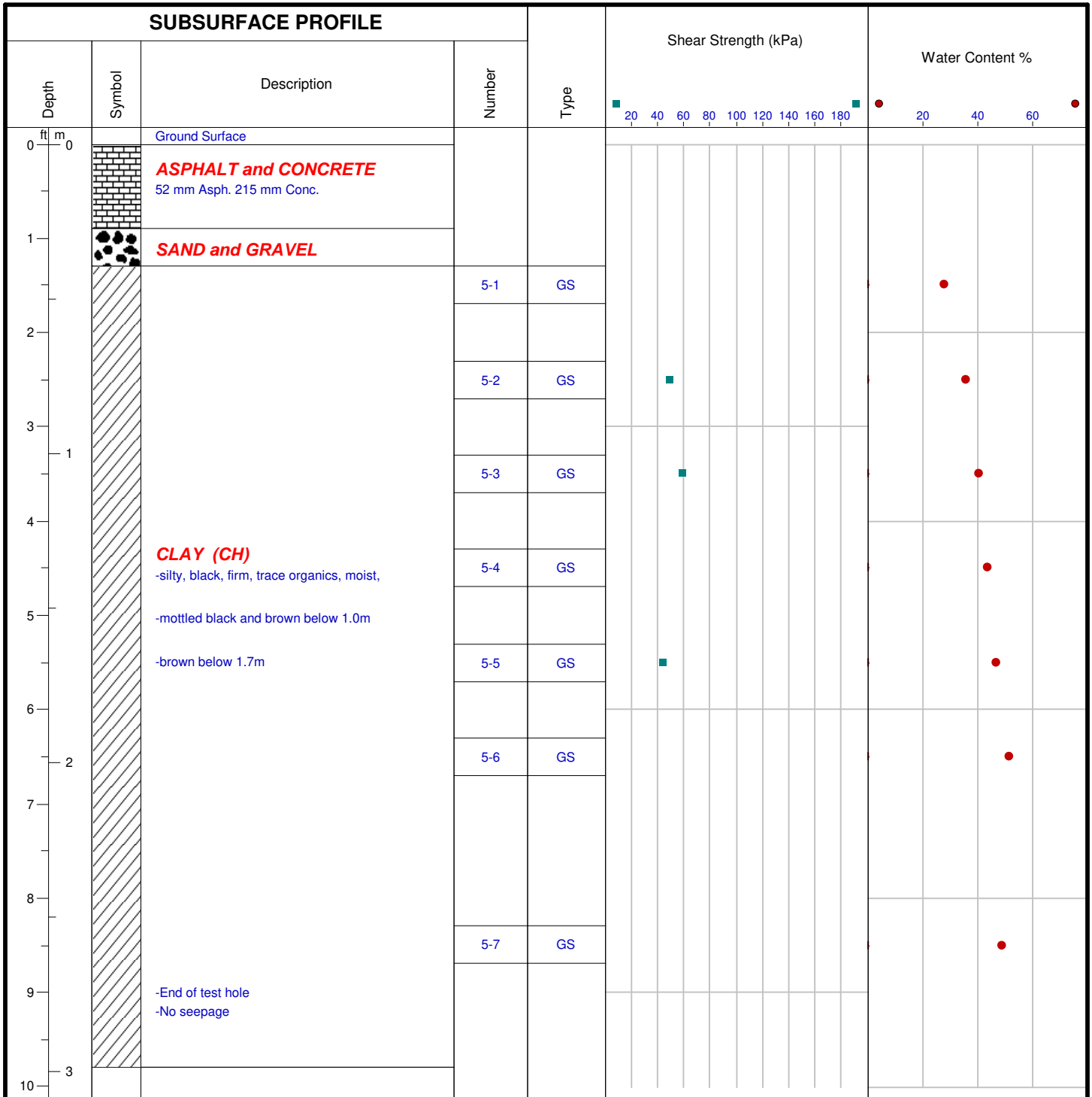
Client: AECOM

Location: 14U 633710 m E, 5519052 m N

TH 5

Logged By: ET

Engineer: GP



Drill Method: Auger

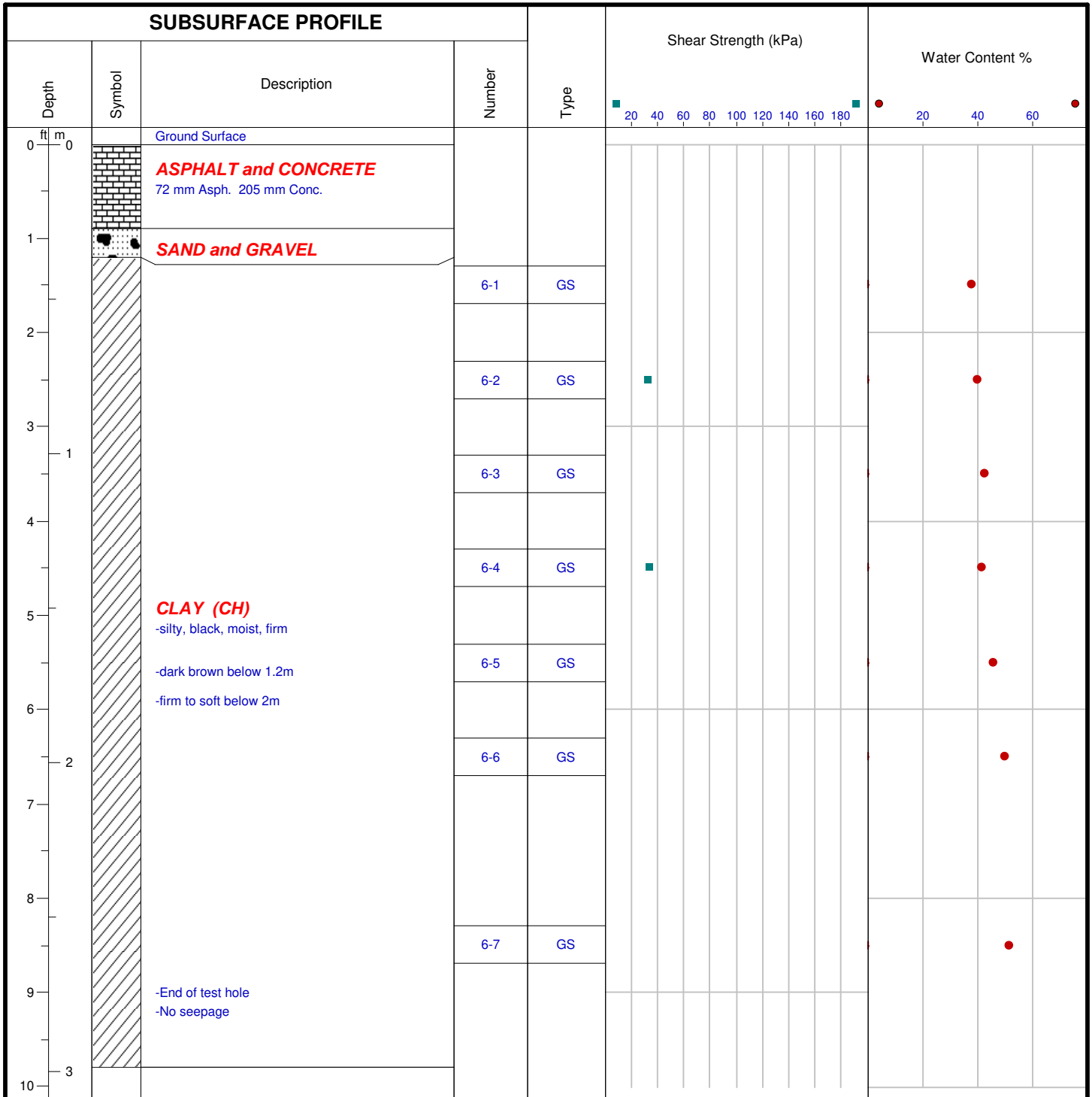
Drill Date: Mar 1, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

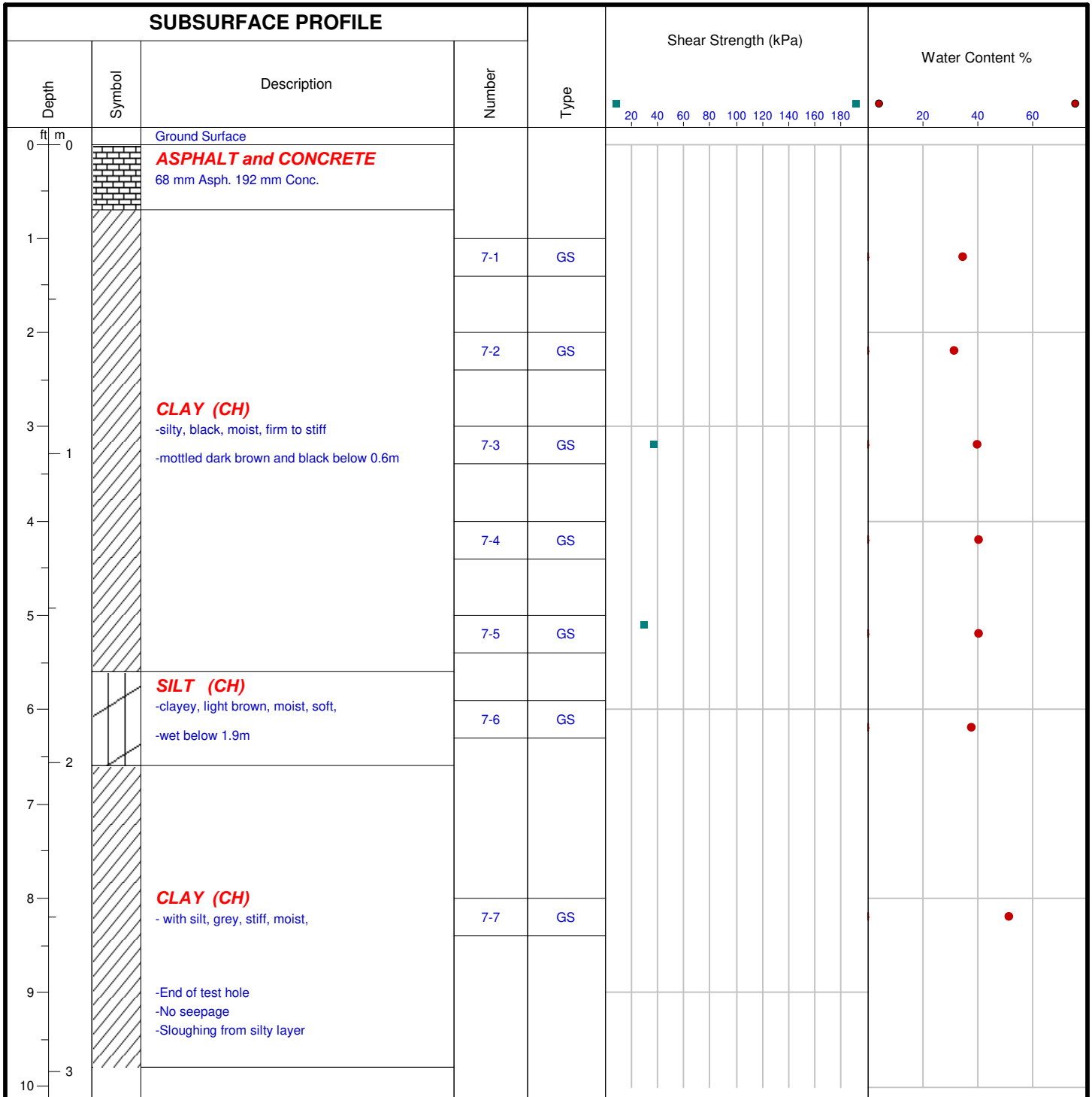
Drill Date: Mar 1, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

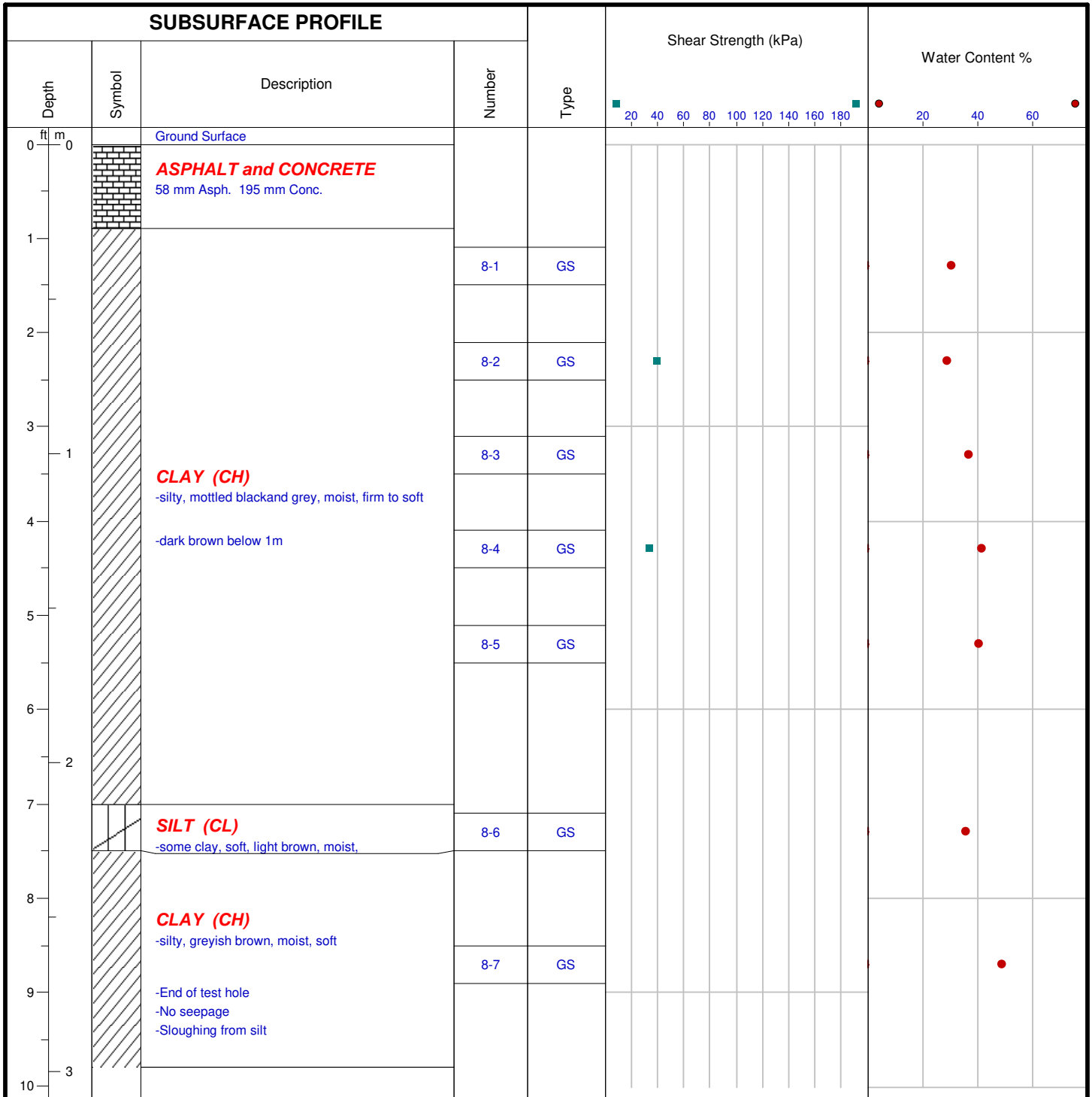
Drill Date: Mar 1, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

Drill Date: Mar. 1, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Project No: 112-2101

Project: University Crescent

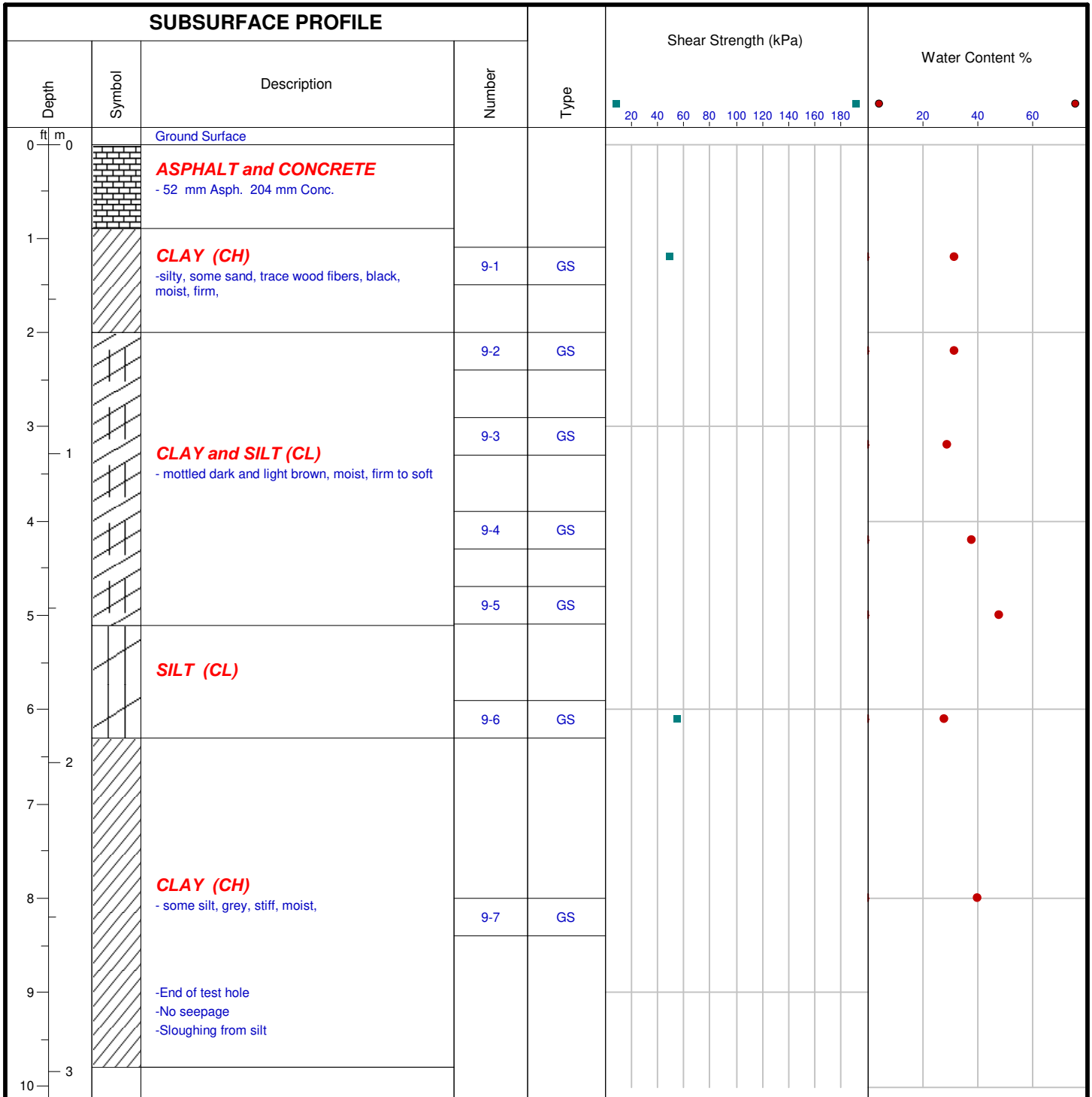
Client: AECOM

Location: 14U 633642 m E, 5519171 m N

TH 9

Logged By: ET

Engineer: GP



Drill Method: Auger

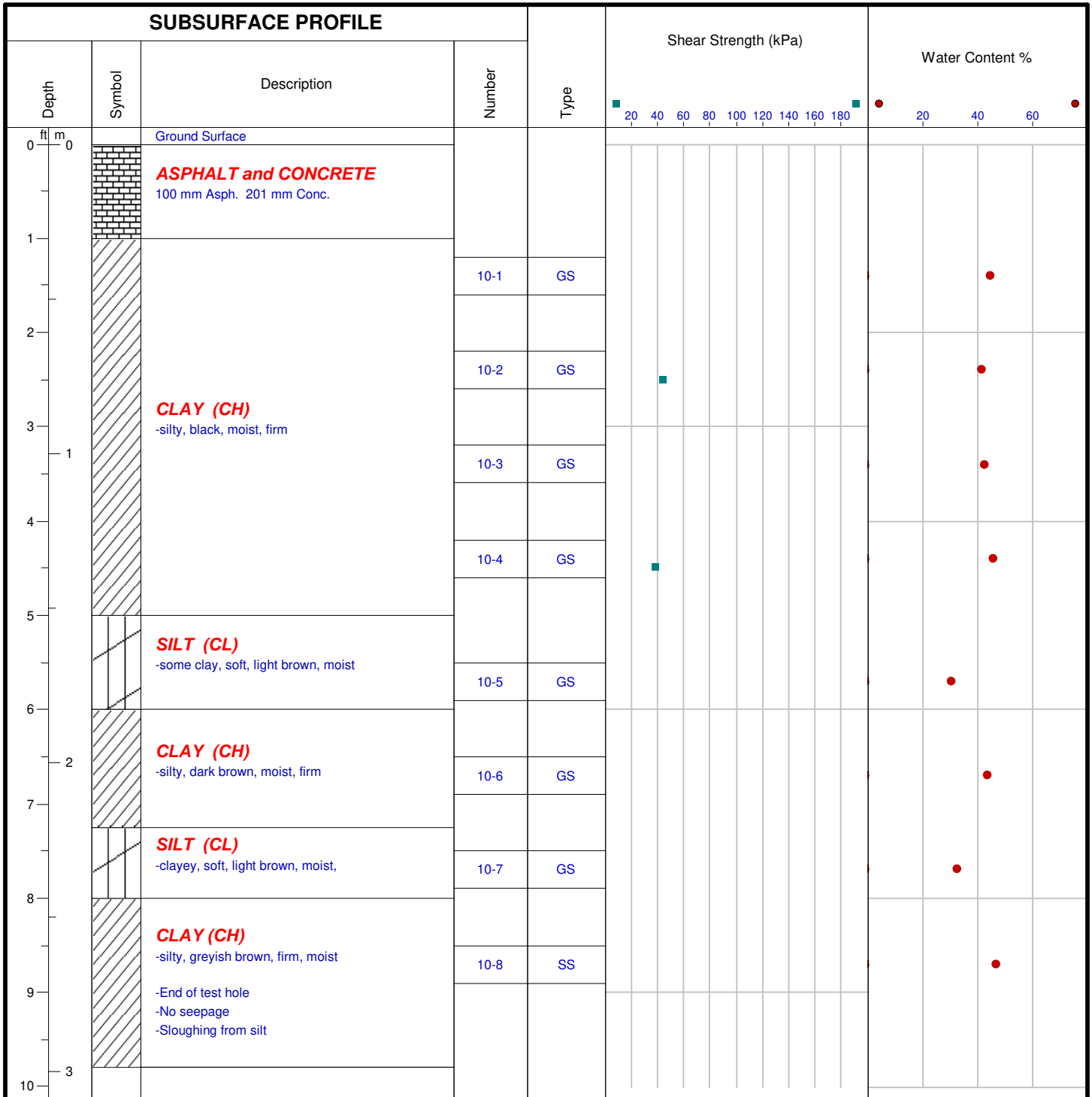
Drill Date: Mar 1, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

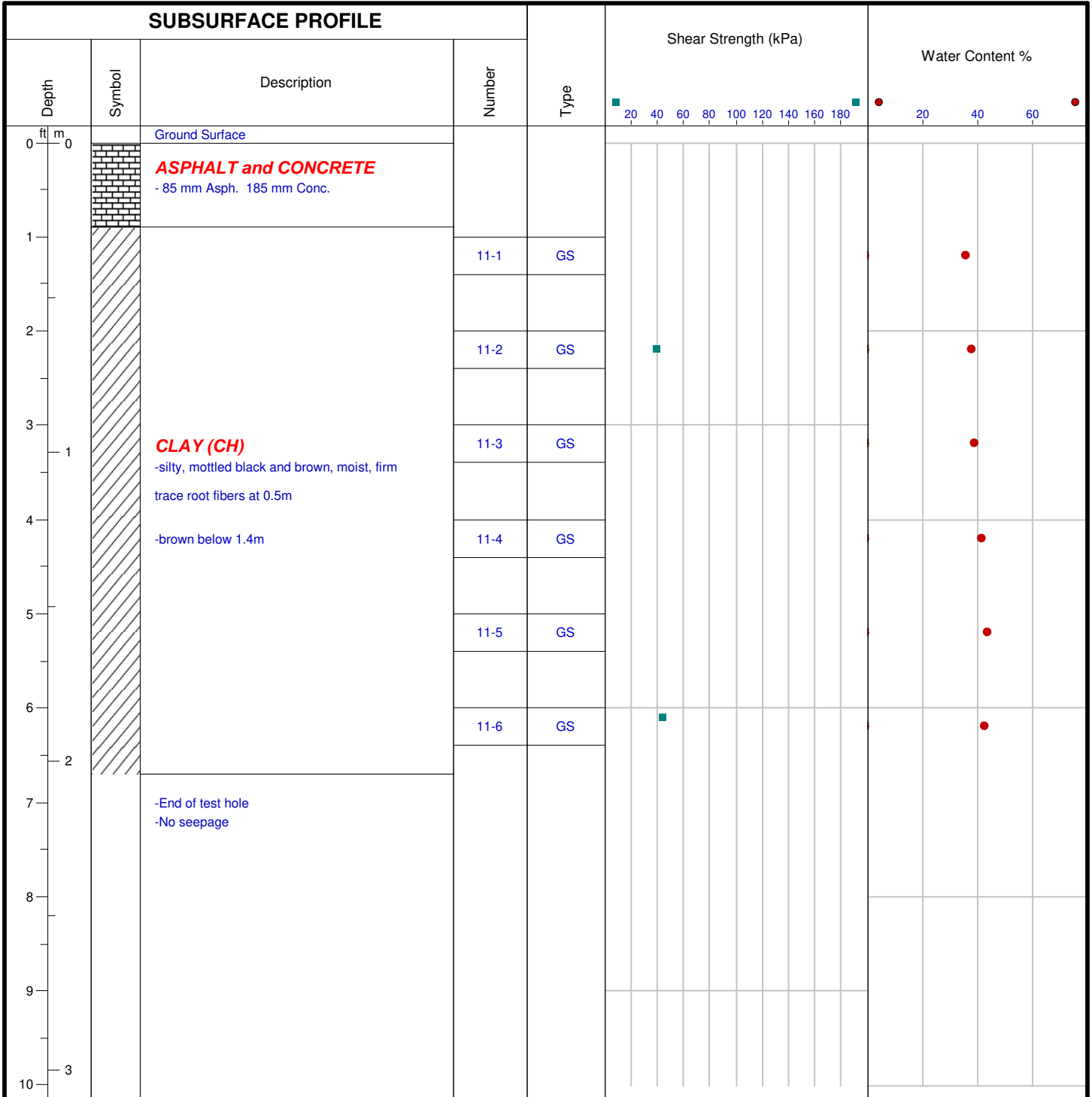
Drill Date: Mar 2, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

Drill Date: Mar 2, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Project No: 112-2101

Project: University Crescent

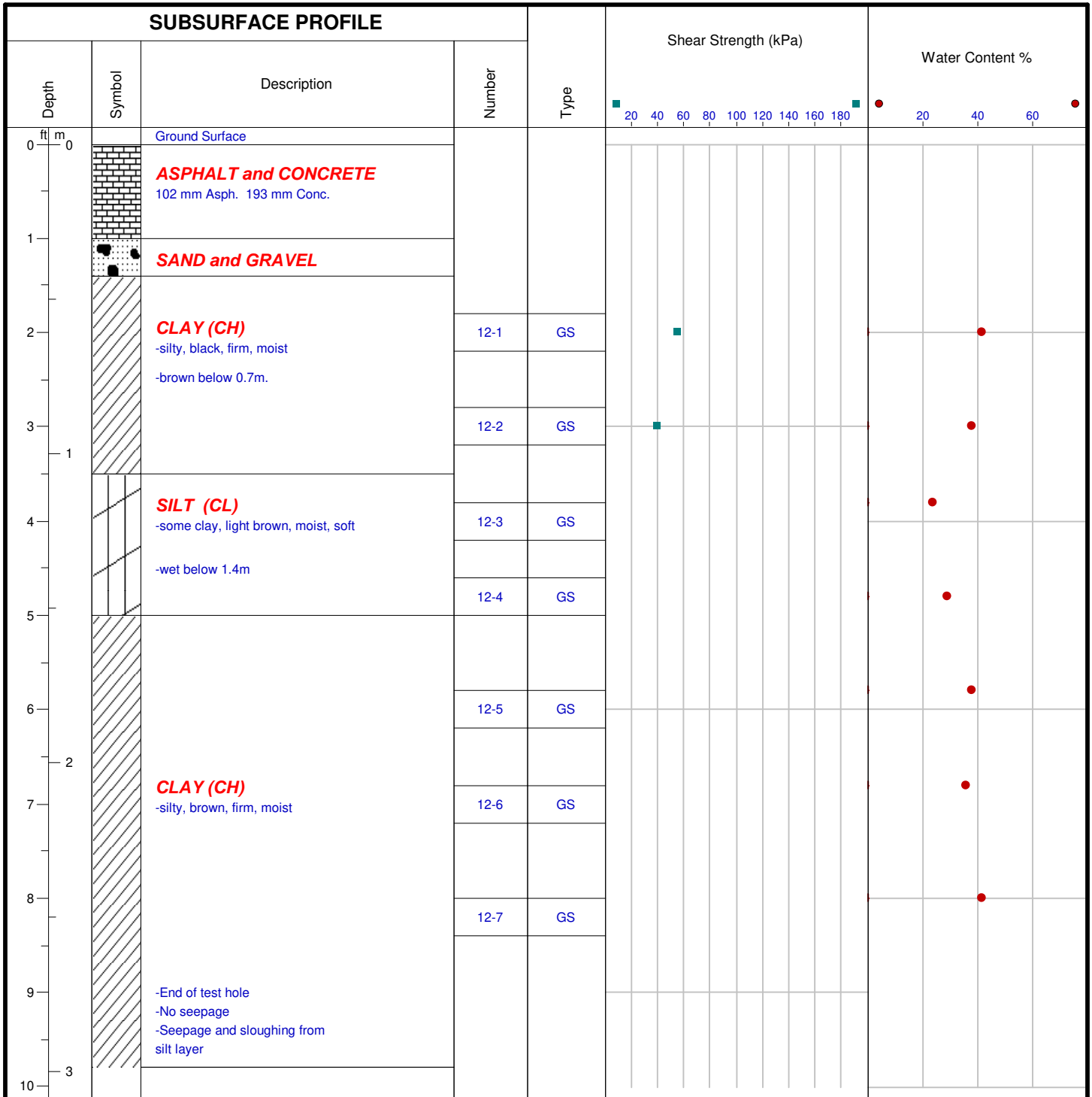
Client: AECOM

Location: 14U 633372 m E, 5519528 m N

TH 12

Logged By: ET

Engineer: GP



Drill Method: Auger

Drill Date: Mar 2, 2021

Hole Size: 5 inch

Datum:

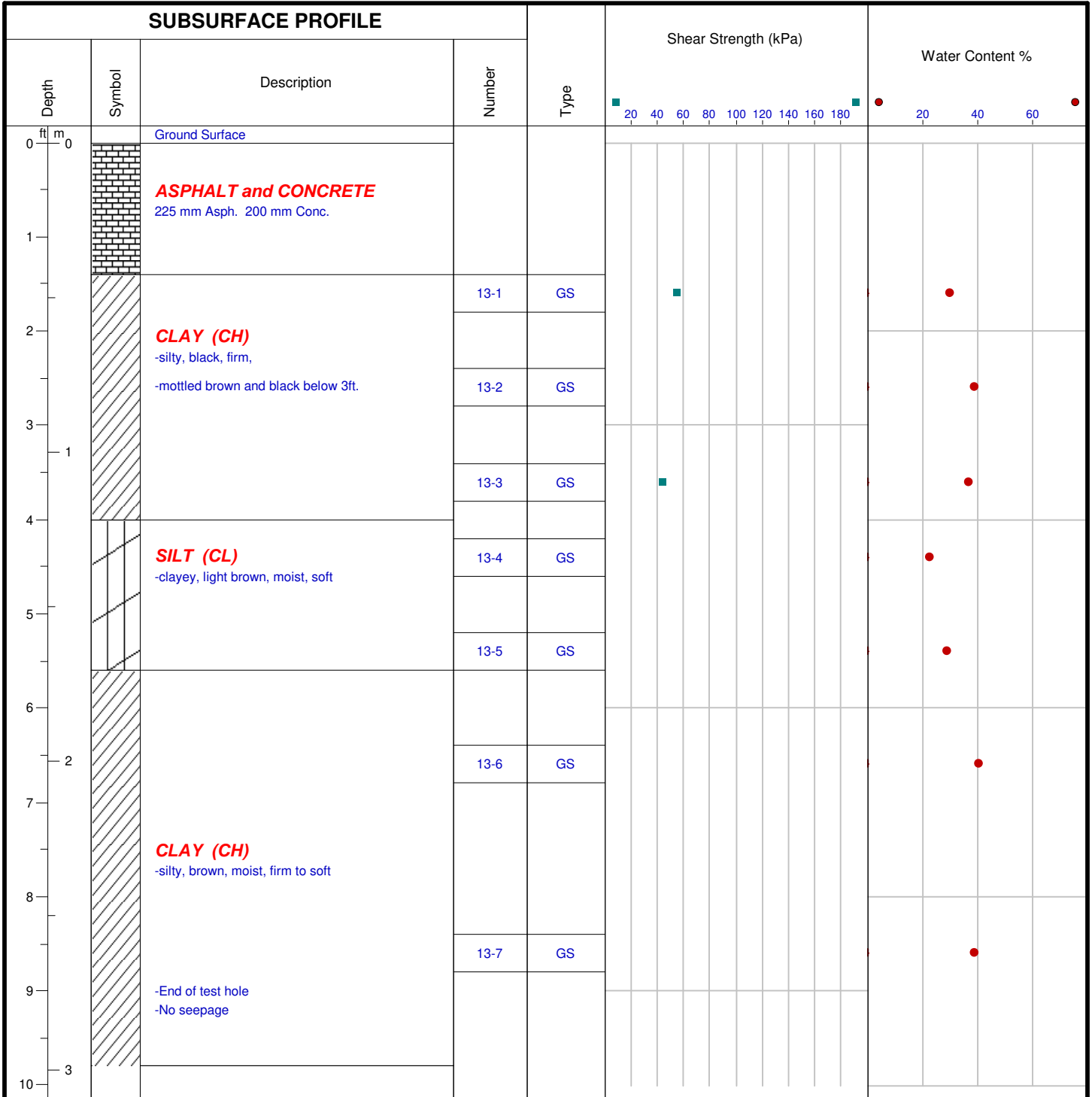
Checked by: PB

Sheet: 1 of 1



Project No: 112-2101
Project: University Crescent
Client: AECOM
Location: 14U 633289 m E, 5519752 m N

TH 13
Logged By: ET
Engineer: GP



Drill Method: Auger

Drill Date: Mar 2, 2021

Hole Size: 5 inch

Datum:

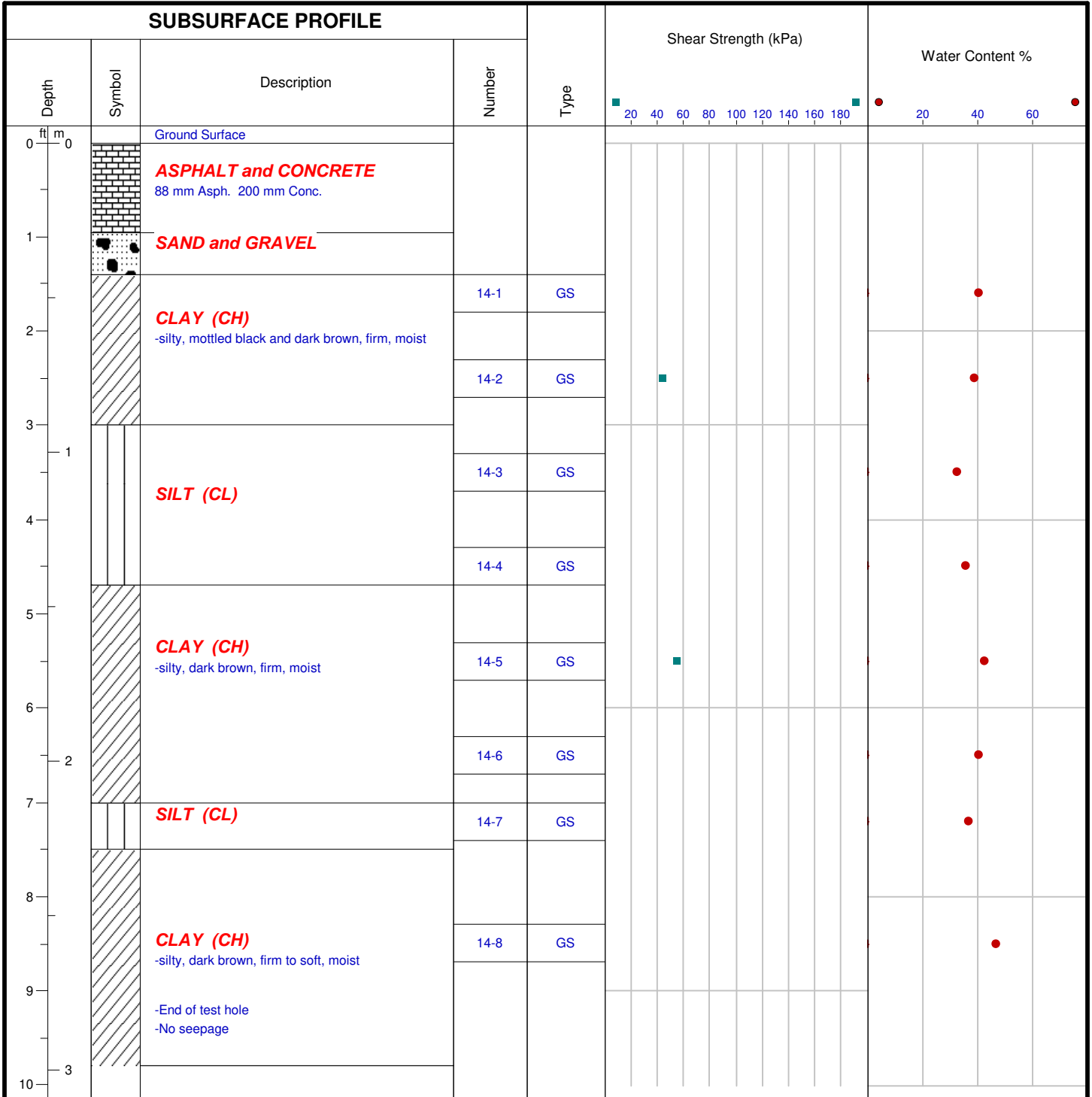
Checked by: PB

Sheet: 1 of 1



Project No: 112-2101
 Project: University Crescent
 Client: AECOM
 Location: 14U 633226 m E, 5519871 m N

TH 14
 Logged By: ET
 Engineer: GP



Drill Method: Auger

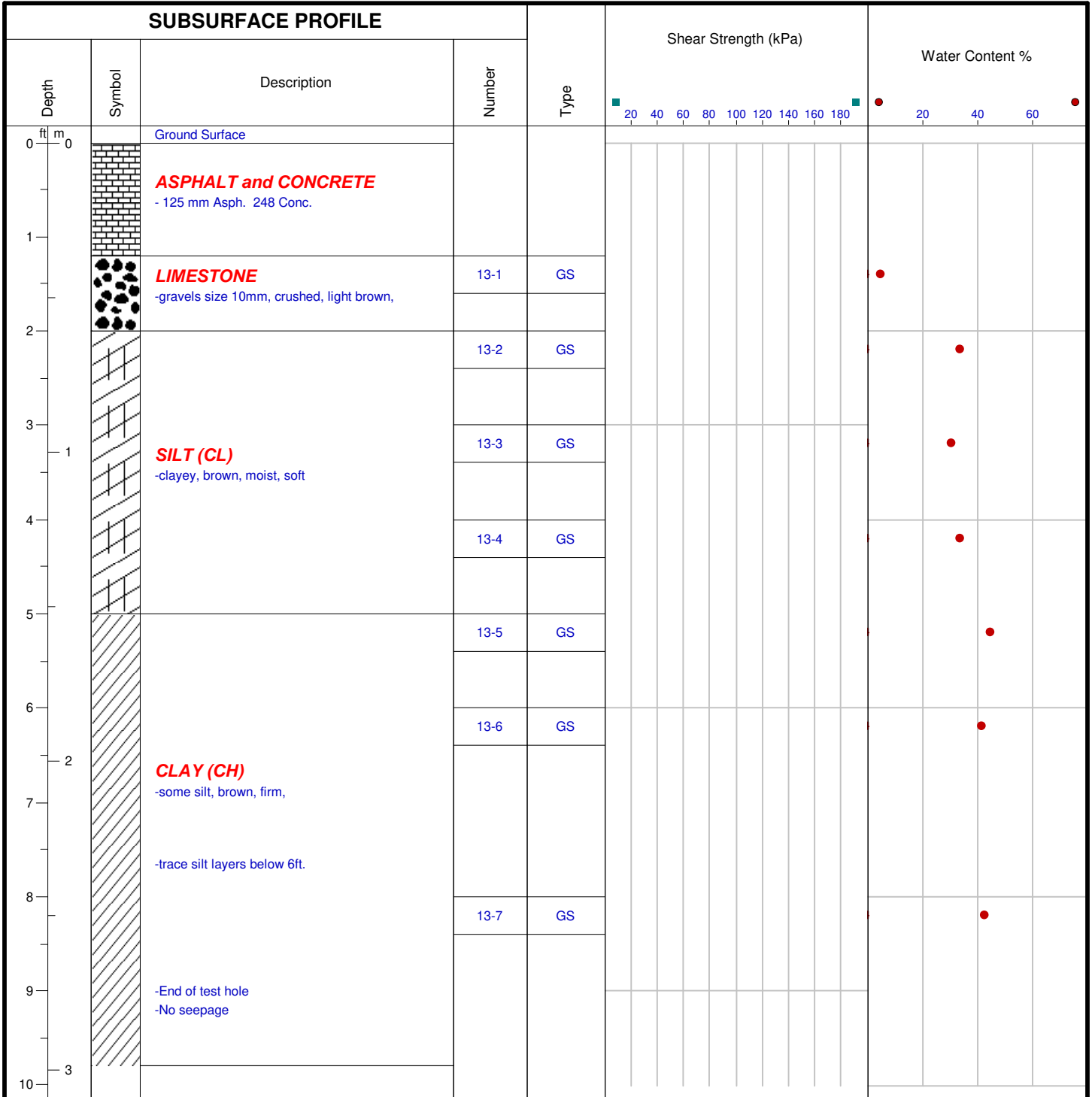
Drill Date: Mar 2, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

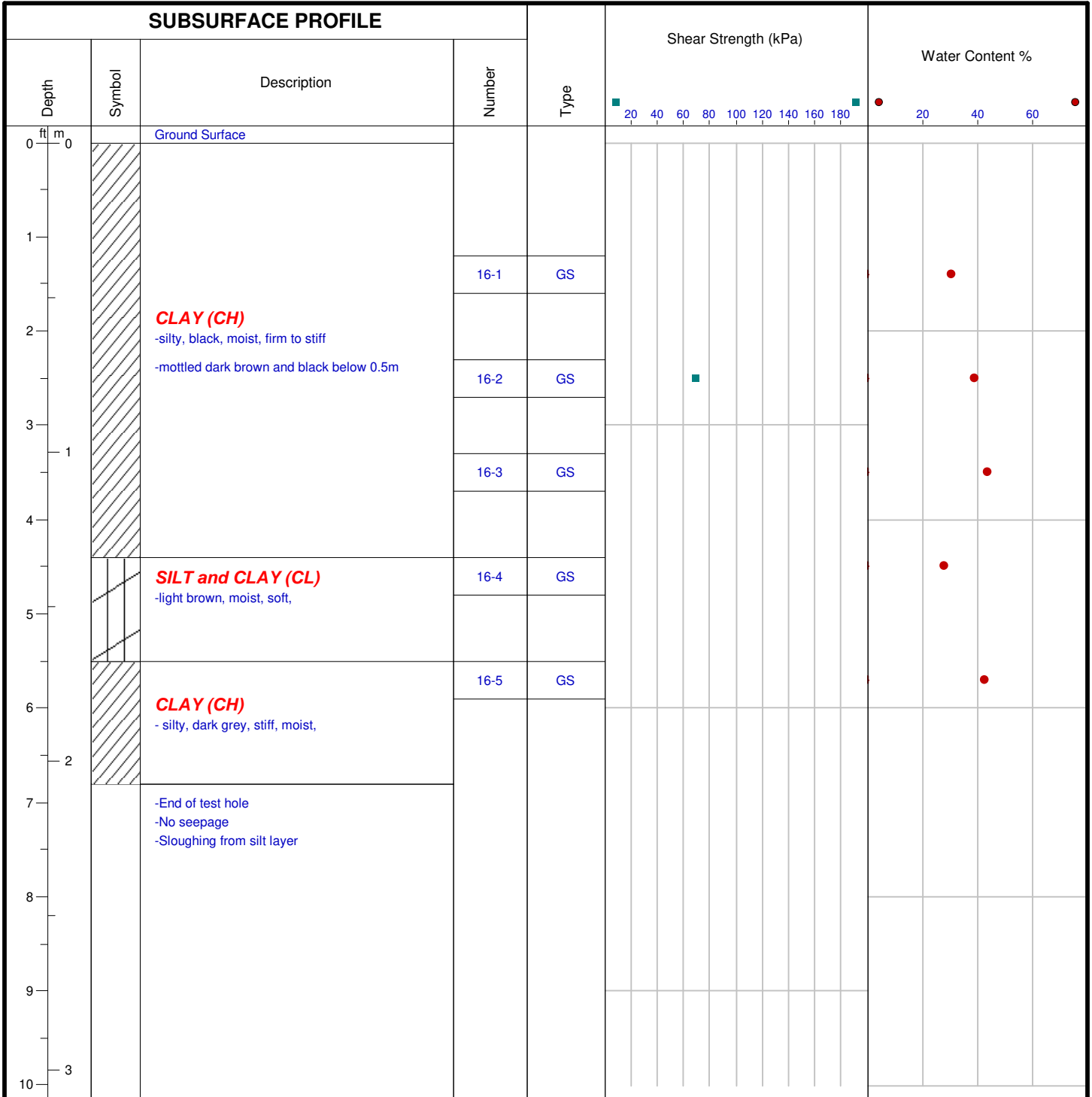
Drill Date: Mar 2, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

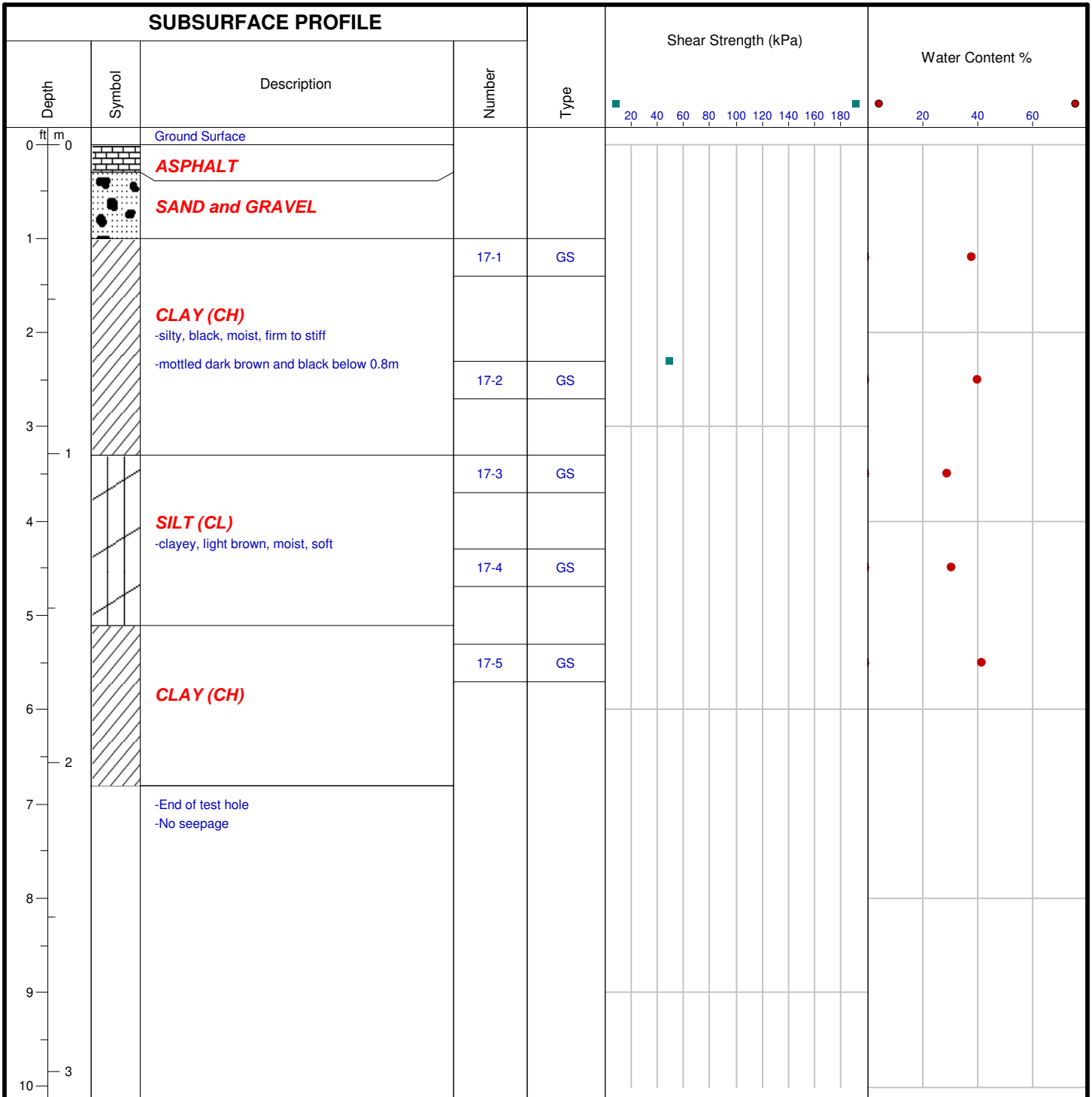
Drill Date: Mar 2, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

Drill Date: Mar 2, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Project No: 112-2101

Project: University Crescent

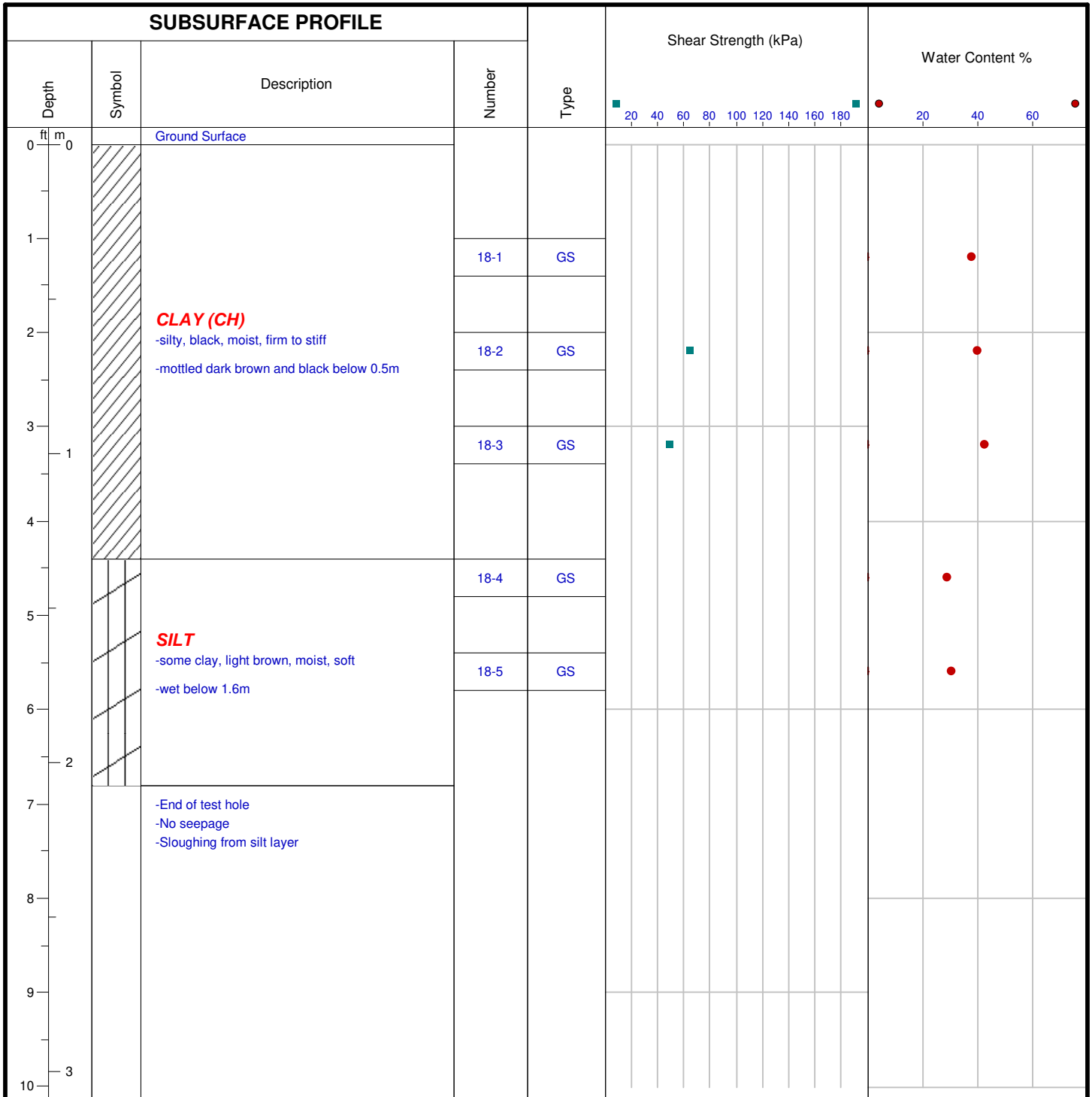
Client: AECOM

Location: 14U 633407 m E, 5519430 m N

TH 18

Logged By: ET

Engineer: GP



Drill Method: Auger

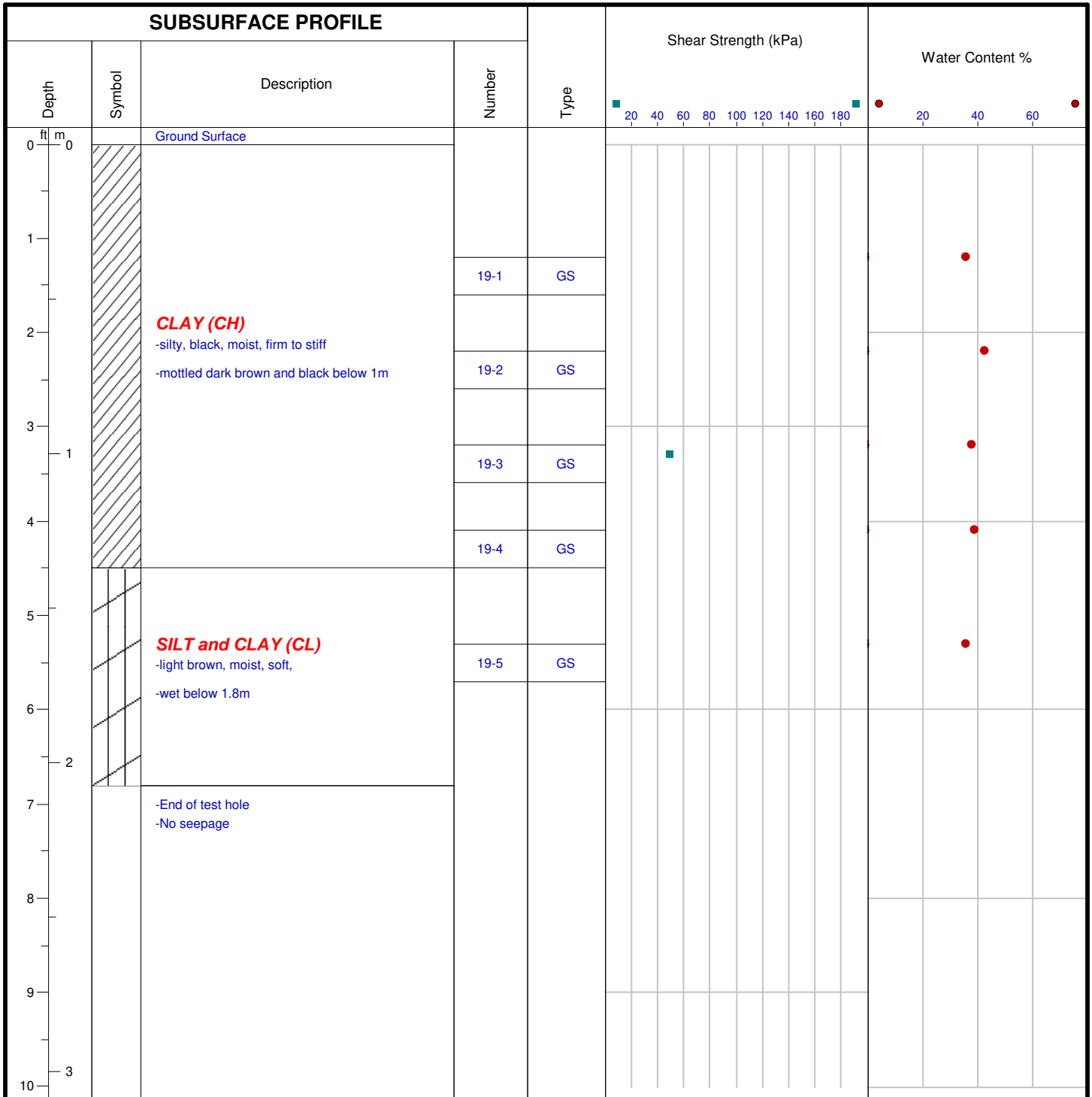
Drill Date: Mar 2, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1



Drill Method: Auger

Drill Date: Mar 2, 2021

Hole Size: 5 inch

Datum:

Checked by: PB

Sheet: 1 of 1

SUMMARY OF LAB TEST DATA

Test Hole Number	Material Zone		CBR At 95%	Grain Size				Atterberg Limits		
	Start Depth (m)	End Depth (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL	PL	PI
TH 1	0.5	1.4	3.9	0	3	32	65	65	26	39
TH 3	0.5	1.6	4.1	0	2	30	68	69	29	41
TH 5	0.5	1.6	2.8	0	1	33	66	66	28	38
TH 7	0.5	1.6	3.8	0	2	27	71	78	31	47
TH 9	0.6	1.5	1.8	0	5	38	57	55	23	32
TH 11	0.5	1.6	3.1	0	2	35	63	67	26	41
TH 13	0.6	1.5	2.0	0	3	43	54	57	20	37
TH 15	0.3	1.5	1.6	0	8	59	33	38	13	26
TH 16	0.3	1.4	4.4	0	5	35	60	74	29	45
TH 19	0.3	1.2	3.3	0	6	37	57	71	28	43

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT: Aecom	TEST NO: 1		PROJECT NO: 112-2101		
PROJECT: University Crescent	DATE SAMPLED: Mar 1 & 2		SAMPLED BY: ET		
PROJECT CONTACT: Ryan Cunningham	DATE TESTED: Mar 03, 2021		TESTED BY: GM/EI		
Test Hole No.	1	1	1	1	1
ID	1-1	1-2	1-3	1-4	1-5
Tare No.					
Wt Wet Sample + Tare	181.1	217.8	200.9	265.9	190
Wt Dry Sample + Tare	132.3	160	145.7	211.2	139.7
Wt Water	48.8	57.8	55.2	54.7	50.3
Wt Tare	4.9	4.3	4.6	4.2	4.5
Wt Dry Sample	127.4	155.7	141.1	207.0	135.2
Moisture Content (%)	38.3	37.1	39.1	26.4	37.2
Test Hole No.	1	1	2	2	2
ID	1-6	1-7	2-1	2-2	2-3
Tare No.					
Wt Wet Sample + Tare	179.1	253.6	157	188	211.7
Wt Dry Sample + Tare	126.2	178.3	128.5	144.2	159.7
Wt Water	52.9	75.3	28.5	43.8	52.0
Wt Tare	4.8	4.2	4.3	4.4	4.7
Wt Dry Sample	121.4	174.1	124.2	139.8	155.0
Moisture Content (%)	43.6	43.3	22.9	31.3	33.5
Test Hole No.	2	2	2	2	2
ID	2-4	2-5	2-6	2-7	2-8
Tare No.					
Wt Wet Sample + Tare	188	208.7	271.3	216.7	228.6
Wt Dry Sample + Tare	144.2	164.8	210.2	164	163.8
Wt Water	43.8	43.9	61.1	52.7	64.8
Wt Tare	4.3	5.3	4.5	4.4	4.4
Wt Dry Sample	139.9	159.5	205.7	159.6	159.4
Moisture Content (%)	31.3	27.5	29.7	33.0	40.7
Test Hole No.	3	3	3	3	3
ID	3-1	3-2	3-3	3-4	3-5
Tare No.					
Wt Wet Sample + Tare	224.4	194.4	204.3	194.4	209.3
Wt Dry Sample + Tare	162.8	144.3	153.2	144.3	153.2
Wt Water	61.6	50.1	51.1	50.1	56.1
Wt Tare	4.3	4.7	4.7	4.3	4.3
Wt Dry Sample	158.5	139.6	148.5	140.0	148.9
Moisture Content (%)	38.9	35.9	34.4	35.8	37.7

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT: Aecom	TEST NO: 1	PROJECT NO: 112-2101
PROJECT: University Crescent	DATE SAMPLED: Mar 1 & 2	SAMPLED BY: ET
PROJECT CONTACT: Ryan Cunningham	DATE TESTED: Mar 03, 2021	TESTED BY: GM/EI

Test Hole No.	3	3	4	4	4
ID	3-6	3-7	4-1	4-2	4-3
Tare No.					
Wt Wet Sample + Tare	209.2	199.8	136.2	205.5	219.5
Wt Dry Sample + Tare	155.1	141.7	99.4	153.9	162.9
Wt Water	54.1	58.1	36.8	51.6	56.6
Wt Tare	4.1	4.2	4.7	4.3	4.2
Wt Dry Sample	151.0	137.5	94.7	149.6	158.7
Moisture Content (%)	35.8	42.3	38.9	34.5	35.7
Test Hole No.	4	4	4	4	5
ID	4-4	4-5	4-6	4-7	5-1
Tare No.					
Wt Wet Sample + Tare	175.4	207.2	205.2	199.6	233.1
Wt Dry Sample + Tare	139.4	147.8	143.8	139.3	183.2
Wt Water	36.0	59.4	61.4	60.3	49.9
Wt Tare	4.3	5.2	4.3	4.3	4.3
Wt Dry Sample	135.1	142.6	139.5	135.0	178.9
Moisture Content (%)	26.6	41.7	44.0	44.7	27.9
Test Hole No.	5	5	5	5	5
ID	5-2	5-3	5-4	5-5	5-6
Tare No.					
Wt Wet Sample + Tare	158.3	176.2	208.7	205.7	202.7
Wt Dry Sample + Tare	117.2	126.2	146.6	141.6	134.5
Wt Water	41.1	50.0	62.1	64.1	68.2
Wt Tare	4.3	4.3	4.3	4.3	4.6
Wt Dry Sample	112.9	121.9	142.3	137.3	129.9
Moisture Content (%)	36.4	41.0	43.6	46.7	52.5
Test Hole No.	5	6	6	6	6
ID	5-7	6-1	6-2	6-3	6-4
Tare No.					
Wt Wet Sample + Tare	233.3	155	161.2	236.4	161.2
Wt Dry Sample + Tare	157.6	112.9	116.3	166.4	115
Wt Water	75.7	42.1	44.9	70.0	46.2
Wt Tare	4.6	4.2	4.4	4.3	4.4
Wt Dry Sample	153.0	108.7	111.9	162.1	110.6
Moisture Content (%)	49.5	38.7	40.1	43.2	41.8

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT: Aecom	TEST NO: 1			PROJECT NO: 112-2101	
PROJECT: University Crescent	DATE SAMPLED: Mar 1 & 2			SAMPLED BY: ET	
PROJECT CONTACT: Ryan Cunningham	DATE TESTED: Mar 03, 2021			TESTED BY: GM/EI	
Test Hole No.	6	6	6	7	7
ID	6-5	6-6	6-7	7-1	7-2
Tare No.					
Wt Wet Sample + Tare	229.5	214	177.5	245.6	206
Wt Dry Sample + Tare	158	144.3	118.8	183.5	157.4
Wt Water	71.5	69.7	58.7	62.1	48.6
Wt Tare	4.9	5.1	4.8	4.6	4.4
Wt Dry Sample	153.1	139.2	114.0	178.9	153.0
Moisture Content (%)	46.7	50.1	51.5	34.7	31.8
Test Hole No.	7	7	7	7	7
ID	7-3	7-4	7-5	7-6	7-7
Tare No.					
Wt Wet Sample + Tare	235.1	264.3	208.1	228.1	201.3
Wt Dry Sample + Tare	169.6	187.9	149.1	166	134.3
Wt Water	65.5	76.4	59.0	62.1	67.0
Wt Tare	4.3	4.1	4.3	4.3	5.1
Wt Dry Sample	165.3	183.8	144.8	161.7	129.2
Moisture Content (%)	39.6	41.6	40.7	38.4	51.9
Test Hole No.	8	8	8	8	8
ID	8-1	8-2	8-3	8-4	8-5
Tare No.					
Wt Wet Sample + Tare	160.6	168.7	144.7	214	191.2
Wt Dry Sample + Tare	124	132	106.7	151.5	137.1
Wt Water	36.6	36.7	38.0	62.5	54.1
Wt Tare	4.2	4.2	4.4	4.5	5.5
Wt Dry Sample	119.8	127.8	102.3	147.0	131.6
Moisture Content (%)	30.6	28.7	37.1	42.5	41.1
Test Hole No.	8	8	9	9	9
ID	8-6	8-7	9-1	9-2	9-3
Tare No.					
Wt Wet Sample + Tare	167.4	189.8	195.5	200	197.7
Wt Dry Sample + Tare	124.1	128.1	149.5	153.2	154.7
Wt Water	43.3	61.7	46.0	46.8	43.0
Wt Tare	4.5	4.8	4.6	4.6	4.2
Wt Dry Sample	119.6	123.3	144.9	148.6	150.5
Moisture Content (%)	36.2	50.0	31.7	31.5	28.6

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT: Aecom	TEST NO: 1		PROJECT NO: 112-2101		
PROJECT: University Crescent	DATE SAMPLED: Mar 1 & 2		SAMPLED BY: ET		
PROJECT CONTACT: Ryan Cunningham	DATE TESTED: Mar 03, 2021		TESTED BY: GM/EI		
Test Hole No.	9	9	9	9	16
ID	9-4	9-5	9-6	9-7	16-1
Tare No.					
Wt Wet Sample + Tare	158.7	172.1	192.1	143.7	209.7
Wt Dry Sample + Tare	115.9	118	150.7	104	161.2
Wt Water	42.8	54.1	41.4	39.7	48.5
Wt Tare	4.3	4.2	4.2	4.3	4.6
Wt Dry Sample	111.6	113.8	146.5	99.7	156.6
Moisture Content (%)	38.4	47.5	28.3	39.8	31.0
Test Hole No.	16	16	16	16	13
ID	16-2	16-3	16-4	16-5	13-1
Tare No.					
Wt Wet Sample + Tare	143.7	157.9	205.7	264.9	164.1
Wt Dry Sample + Tare	104	110.5	161.2	186.2	127.7
Wt Water	39.7	47.4	44.5	78.7	36.4
Wt Tare	4.4	4.8	4.3	4.2	4.8
Wt Dry Sample	99.6	105.7	156.9	182.0	122.9
Moisture Content (%)	39.9	44.8	28.4	43.2	29.6
Test Hole No.	13	13	13	13	13
ID	13-2	13-3	13-4	13-5	13-6
Tare No.					
Wt Wet Sample + Tare	187.5	142.4	227.1	154.6	148.8
Wt Dry Sample + Tare	136.4	104.7	185.3	121.1	107.1
Wt Water	51.1	37.7	41.8	33.5	41.7
Wt Tare	4.9	5.0	4.3	4.4	4.5
Wt Dry Sample	131.5	99.7	181.0	116.7	102.6
Moisture Content (%)	38.9	37.8	23.1	28.7	40.6
Test Hole No.	13	15	15	15	15
ID	13-7	15-1	15-2	15-3	15-4
Tare No.					
Wt Wet Sample + Tare	232.4	185.6	169.4	149.1	189.1
Wt Dry Sample + Tare	168.5	176.7	127.7	114.6	141.8
Wt Water	63.9	8.9	41.7	34.5	47.3
Wt Tare	4.4	4.3	4.5	4.2	4.4
Wt Dry Sample	164.1	172.4	123.2	110.4	137.4
Moisture Content (%)	38.9	5.2	33.8	31.3	34.4

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT: Aecom	TEST NO: 1			PROJECT NO: 112-2101	
PROJECT: University Crescent	DATE SAMPLED: Mar 1 & 2			SAMPLED BY: ET	
PROJECT CONTACT: Ryan Cunningham	DATE TESTED: Mar 03, 2021			TESTED BY: GM/EI	
Test Hole No.	15	15	15	10	10
ID	15-5	15-6	15-7	10-1	10-2
Tare No.				g79	
Wt Wet Sample + Tare	135.6	141.1	137.7	135.6	233.1
Wt Dry Sample + Tare	94.8	100.5	98.2	94.8	165.9
Wt Water	40.8	40.6	39.5	40.8	67.2
Wt Tare	4.4	4.3	5.9	4.5	4.3
Wt Dry Sample	90.4	96.2	92.3	90.3	161.6
Moisture Content (%)	45.1	42.2	42.8	45.2	41.6
Test Hole No.	10	10	10	10	10
ID	10-3	10-4	10-5	10-6	10-7
Tare No.					
Wt Wet Sample + Tare	142.1	219.9	153.6	186.4	175.9
Wt Dry Sample + Tare	100.5	152.7	124.3	131.2	134.6
Wt Water	41.6	67.2	29.3	55.2	41.3
Wt Tare	4.2	5.2	5.0	4.6	4.3
Wt Dry Sample	96.3	147.5	119.3	126.6	130.3
Moisture Content (%)	43.2	45.6	24.6	43.6	31.7
Test Hole No.	10	17	17	17	17
ID	10-8	17-1	17-2	17-3	17-4
Tare No.					
Wt Wet Sample + Tare	176.7	153.4	171.6	168.3	174.8
Wt Dry Sample + Tare	126.8	112.2	124	131.9	135
Wt Water	49.9	41.2	47.6	36.4	39.8
Wt Tare	4.2	4.4	4.4	4.2	4.3
Wt Dry Sample	122.6	107.8	119.6	127.7	130.7
Moisture Content (%)	40.7	38.2	39.8	28.5	30.5
Test Hole No.	17	18	18	18	18
ID	17-5	18-1	18-2	18-3	18-4
Tare No.					
Wt Wet Sample + Tare	169.9	241.2	268.2	252.9	159.6
Wt Dry Sample + Tare	120.6	175.8	192.8	178.1	125.1
Wt Water	49.3	65.4	75.4	74.8	34.5
Wt Tare	4.3	4.1	4.6	4.5	4.5
Wt Dry Sample	116.3	171.7	188.2	173.6	120.6
Moisture Content (%)	42.4	38.1	40.1	43.1	28.6

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT: Aecom	TEST NO: 1	PROJECT NO: 112-2101
PROJECT: University Crescent	DATE SAMPLED: Mar 1 & 2	SAMPLED BY: ET
PROJECT CONTACT: Ryan Cunningham	DATE TESTED: Mar 03, 2021	TESTED BY: GM/EI

Test Hole No.	18	12	12	12	12
Depth	18-5	12-1	12-2	12-3	12-4
Tare No.					
Wt Wet Sample + Tare	214.4	169.9	168.4	161.4	186.5
Wt Dry Sample + Tare	164.9	120.6	122.9	125.1	150.9
Wt Water	49.5	49.3	45.5	36.3	35.6
Wt Tare	4.2	4.5	4.2	4.4	4.5
Wt Dry Sample	160.7	116.1	118.7	120.7	146.4
Moisture Content (%)	30.8	42.5	38.3	30.1	24.3
Test Hole No.	12	12	12	19	19
Depth	12-5	12-6	12-7	19-1	19-2
Tare No.					
Wt Wet Sample + Tare	209.4	234.2	249.9	161.9	282.3
Wt Dry Sample + Tare	154.7	172.3	175.3	120.2	184.8
Wt Water	54.7	61.9	74.6	41.7	97.5
Wt Tare	4.3	3.3	4.3	4.4	4.2
Wt Dry Sample	150.4	169.0	171.0	115.8	180.6
Moisture Content (%)	36.4	36.6	43.6	36.0	54.0
Test Hole No.	19	19	19	14	14
Depth	19-3	19-4	19-5	14-1	14-2
Tare No.					
Wt Wet Sample + Tare	228.4	301.2	154.4	145.4	168
Wt Dry Sample + Tare	157.7	198.6	115.3	104.2	122.2
Wt Water	70.7	102.6	39.1	41.2	45.8
Wt Tare	4.3	4.4	4.3	4.3	4.2
Wt Dry Sample	153.4	194.2	111.0	99.9	118.0
Moisture Content (%)	46.1	52.8	35.2	41.2	38.8
Test Hole No.					
Depth	14-3	14-4	14-5	14-6	14-7
Tare No.					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					

MOISTURE CONTENT OF SOIL (ASTM D2216)

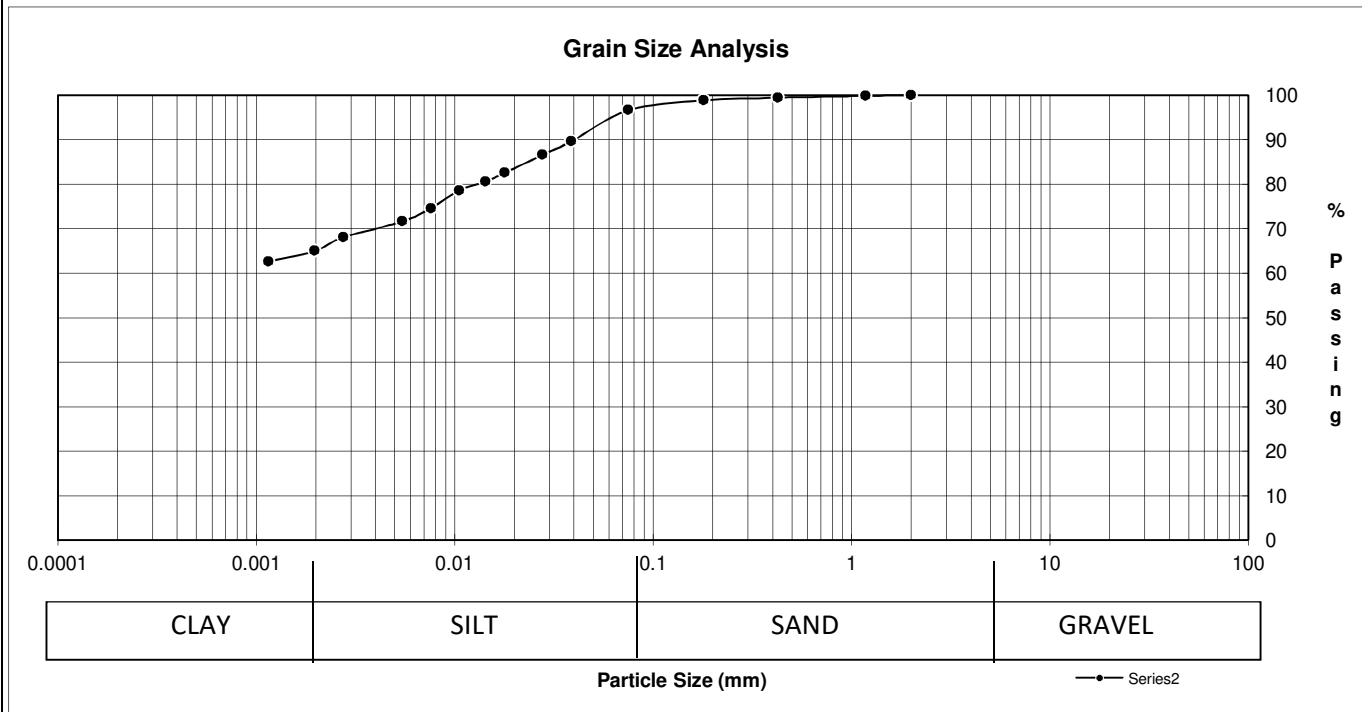
CLIENT: Aecom	TEST NO: 1	PROJECT NO: 112-2101
PROJECT: University Crescent	DATE SAMPLED: Mar 1 & 2	SAMPLED BY: ET
PROJECT CONTACT: Ryan Cunningham	DATE TESTED: Mar 03, 2021	TESTED BY: GM/EI

Test Hole No.	14	11	11	11	11
Depth	14-8	11-1	11-2	11-3	11-4
Tare No.					
Wt Wet Sample + Tare	214.4	238.1	168.4	294.3	246.2
Wt Dry Sample + Tare	164.9	176.9	122.9	213.2	175.1
Wt Water	49.5	61.2	45.5	81.1	71.1
Wt Tare	4.2	4.5	4.2	4.4	4.5
Wt Dry Sample	160.7	172.4	118.7	208.8	170.6
Moisture Content (%)	30.8	35.5	38.3	38.8	41.7
Test Hole No.	11	11			
Depth	11-5	11-6			
Tare No.					
Wt Wet Sample + Tare	218.4	239.2			
Wt Dry Sample + Tare	153.3	168.3			
Wt Water	65.1	70.9			
Wt Tare	4.3	3.3			
Wt Dry Sample	149.0	165.0			
Moisture Content (%)	43.7	43.0			
Test Hole No.					
Depth					
Tare No.					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					
Test Hole No.					
Depth					
Tare No.					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-2101
ATTENTION:	Ryan Cunningham	PSA Test No.:	1
PROJECT:	2021-22 University Cr. Pavement Renewals University Crescent from Chancellor Matheson to Pembina Highway		
Date Sampled:	1-Mar-21	Date Received:	1-Mar-21
Sampled By:	PB/ET	Date Tested:	11-Mar-21

Material Identification	Sieve (mm)	% Passing	Hydrometer Analysis	
			Diameter	% Finer
B.H./T.H. No.	50.00	100.0		
Depth	37.50	100.0		
Sample Source	25.00	100.0		
Specific Gravity of Material:	19.00	100.0		
	16.00	100.0		
	12.50	100.0	0.0387	89.6
	9.50	100.0	0.0278	86.6
	4.75	100.0	0.0179	82.6
	2.00	100.0	0.0143	80.6
	1.18	99.8	0.0105	78.6
	0.425	99.4	0.0076	74.6
	0.180	98.8	0.0054	71.6
	0.075	96.6	0.0012	62.6



SOIL DESCRIPTION	% Composition		D10
		3.4	Gravel
	31.6	Sand	D60
	65.0	Silt	Cu
		Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: IA

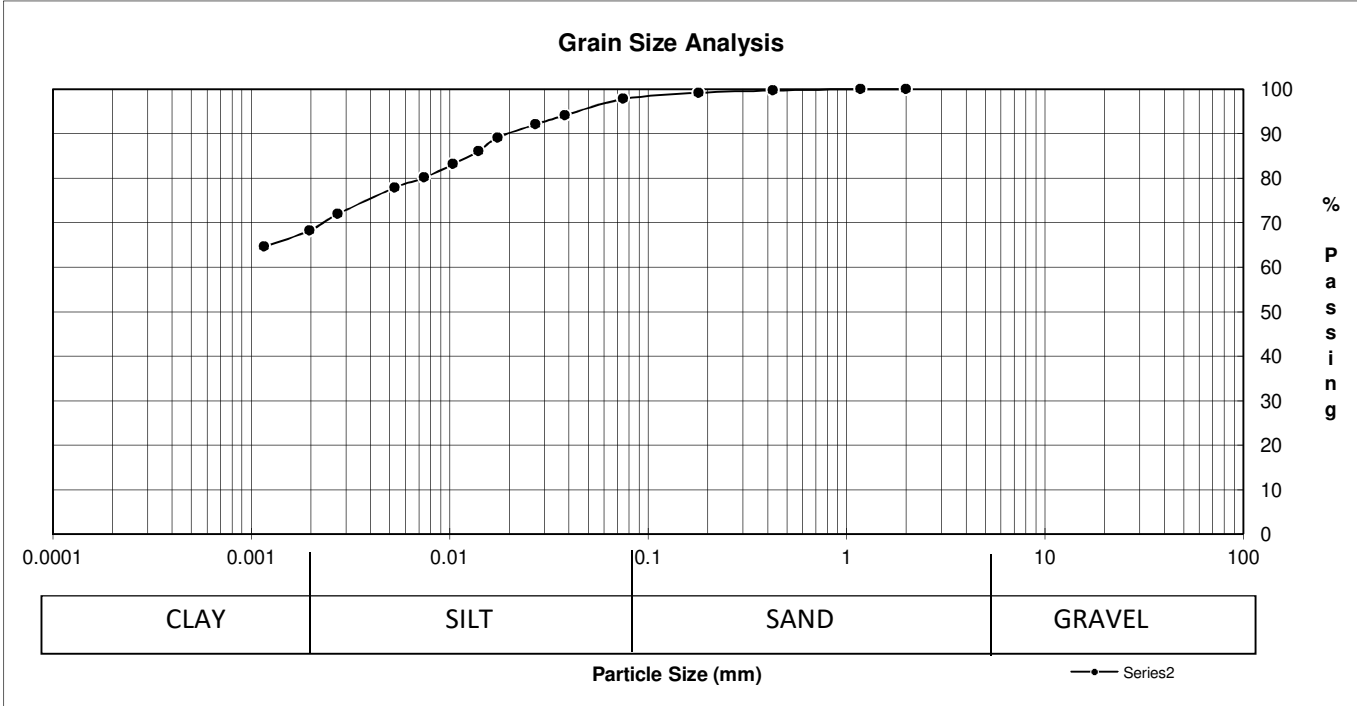
P. Bevel

Reviewed by: Paul Bevel

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-2101
ATTENTION:	Ryan Cunningham	PSA Test No.:	2
PROJECT:	2021-22 University Cr. Pavement Renewals University Crescent from Chancellor Matheson to Pembina Highway		
Date Sampled:	1-Mar-21	Date Received:	1-Mar-21
Sampled By:	PB/ET	Date Tested:	11-Mar-21

Material Identification B.H./T.H. No. Depth Sample Source Specific Gravity of Material:	Sieve Analysis Sieve (mm) % Passing	Hydrometer Analysis	
		Diameter	% Finer
TH 3 0.5-1.6 m	50.00 100.0 37.50 100.0 25.00 100.0 19.00 100.0 16.00 100.0 12.50 100.0 9.50 100.0 4.75 100.0 2.00 100.0 1.18 100.0 0.425 99.7 0.180 99.2 0.075 97.8	0.0380 0.0272 0.0174 0.0140 0.0104 0.0074 0.0053 0.0012	94.1 92.1 89.1 86.1 83.1 80.1 77.9 64.5



SOIL DESCRIPTION	% Composition		D10
		2.22	Gravel
	29.78	Sand	D60
	68.00	Silt	Cu
		Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: IA

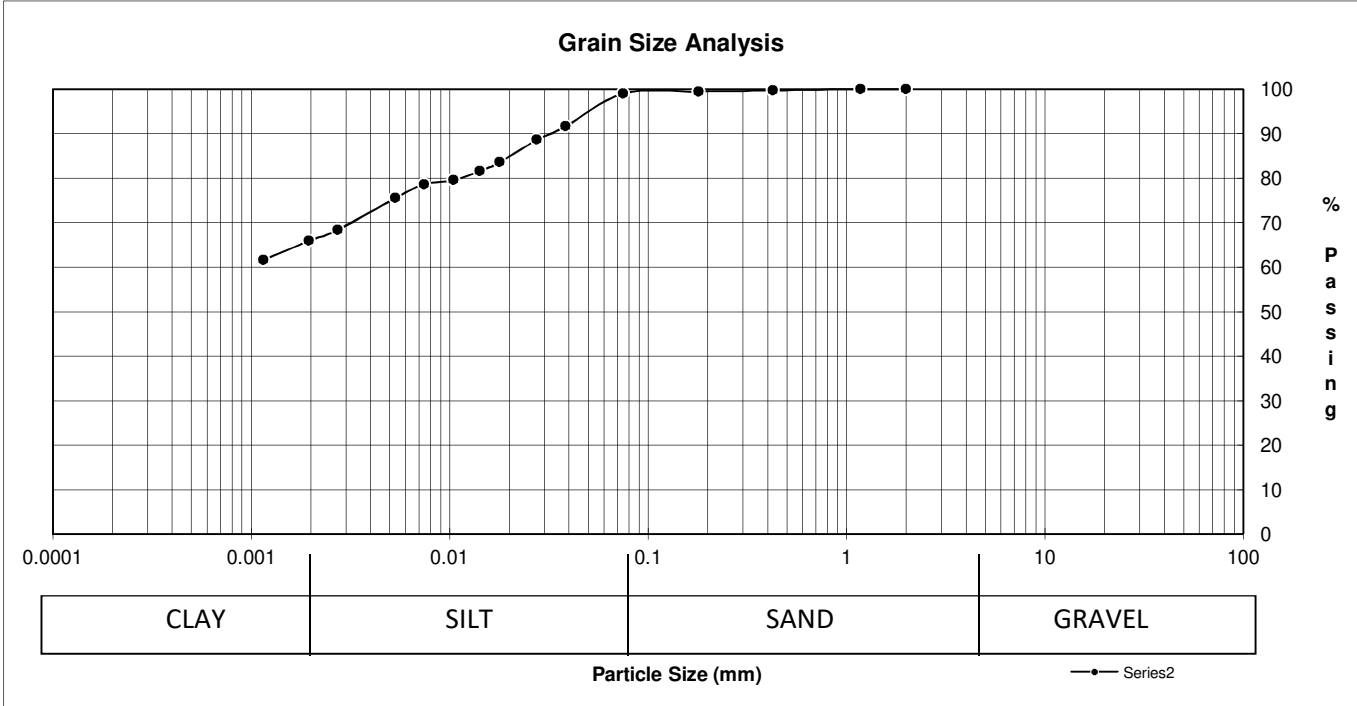
P. Bevel

Reviewed by: Paul Bevel

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-2101
ATTENTION:	Ryan Cunningham	PSA Test No.:	3
PROJECT:	2021-22 University Cr. Pavement Renewals University Crescent from Chancellor Matheson to Pembina Highway		
LAB No.:			HM 021

Date Sampled:	1-Mar-21	Date Received:	1-Mar-21	Sieve Analysis		Hydrometer Analysis	
Sampled By:	PB/ET	Date Tested:	11-Mar-21	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH 5 Depth 0.5-1.6 m Sample Source Specific Gravity of Material: 2.65				50.00	100.0		
				37.50	100.0		
				25.00	100.0		
				19.00	100.0		
				16.00	100.0		
				12.50	100.0	0.0384	91.6
				9.50	100.0	0.0275	88.6
				4.75	100.0	0.0178	83.6
				2.00	100.0	0.0142	81.6
				1.18	100.0	0.0105	79.6
			0.425	99.7	0.0075	78.6	
			0.180	99.5	0.0053	75.6	
			0.075	99.0	0.0012	61.6	



SOIL DESCRIPTION	% Composition		D10
		1.0	Gravel
	33.0	Sand	D60
	66.0	Silt	Cu
		Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: IA

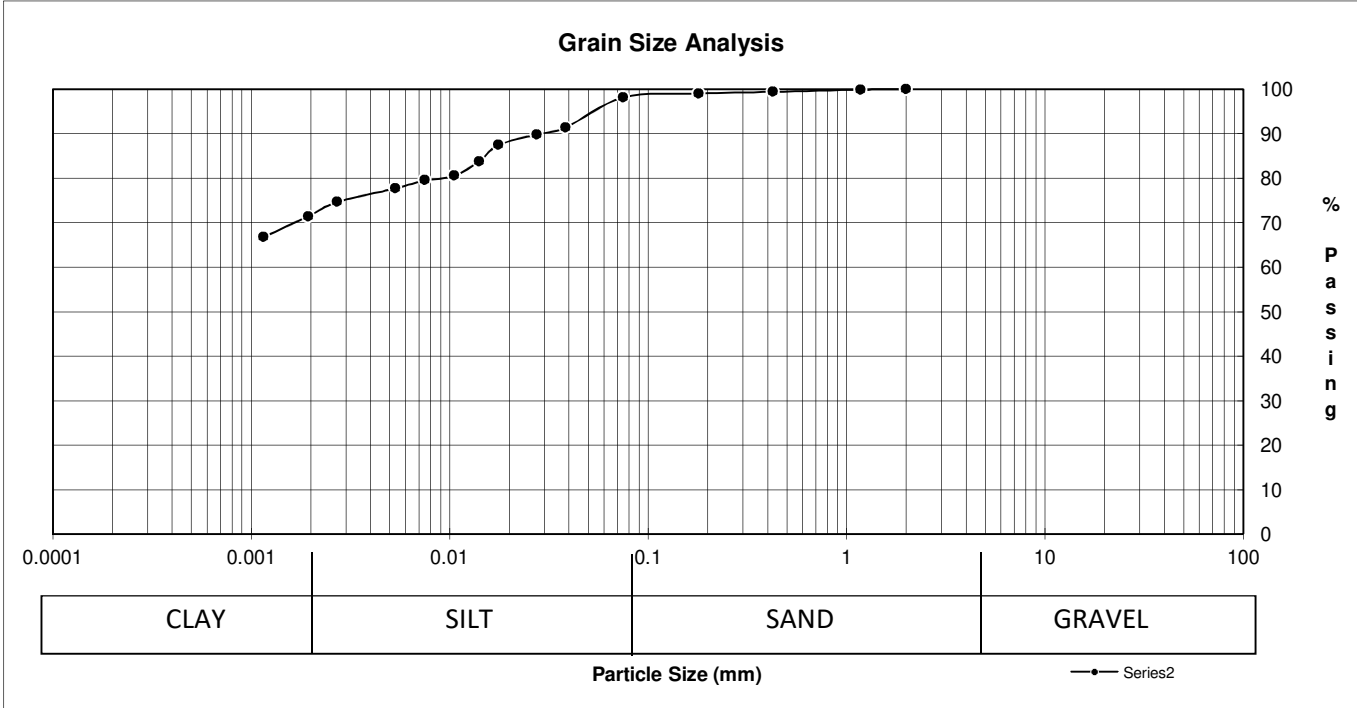
P. Bevel

Reviewed by: Paul Bevel

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-2101
ATTENTION:	Ryan Cunningham	PSA Test No.:	4
PROJECT:	2021-22 University Cr. Pavement Renewals University Crescent from Chancellor Matheson to Pembina Highway		
Date Sampled:	1-Mar-21	Date Received:	1-Mar-21
Sampled By:	PB/ET	Date Tested:	11-Mar-21

Material Identification B.H./T.H. No. Depth Sample Source Specific Gravity of Material:	Sieve Analysis Sieve (mm) % Passing	Hydrometer Analysis	
		Diameter	% Finer
TH 7 0.5-1.5	50.00 100.0 37.50 100.0 25.00 100.0 19.00 100.0 16.00 100.0 12.50 100.0 9.50 100.0 4.75 100.0 2.00 100.0 1.18 99.9 0.425 99.4 0.180 99.0 0.075 98.1	0.0385 0.0274 0.0176 0.0141 0.0105 0.0075 0.0053 0.0012	91.4 89.8 87.4 83.8 80.5 79.5 77.7 66.7



SOIL DESCRIPTION	% Composition		D10
		Gravel	D30
	1.9 Sand	D60	
	26.7 Silt	Cu	
	71.4 Clay	Cc	

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: IA

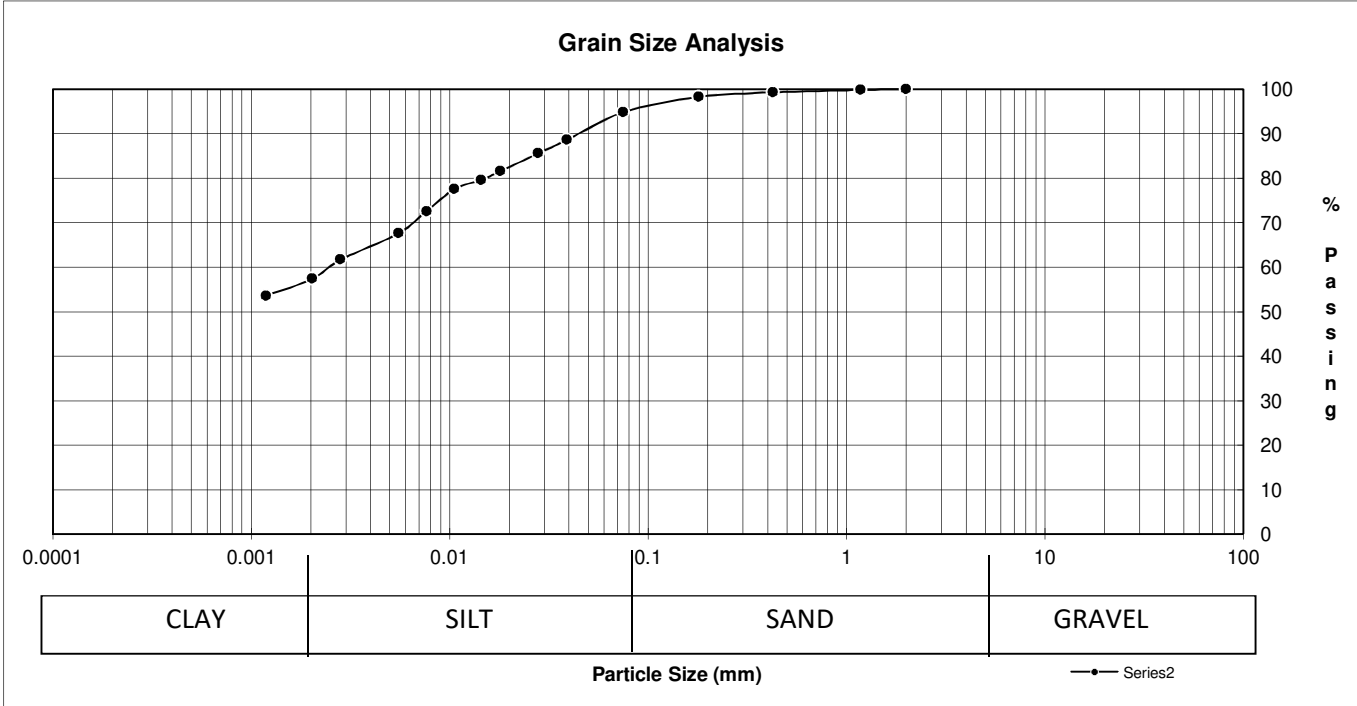
P. Bevel

Reviewed by: Paul Bevel

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-2101
ATTENTION:	Ryan Cunningham	PSA Test No.:	5
PROJECT:	2021-22 University Cr. Pavement Renewals University Crescent from Chancellor Matheson to Pembina Highway		
Date Sampled:	1-Mar-21	Date Received:	1-Mar-21
Sampled By:	PB/ET	Date Tested:	11-Mar-21

Material Identification	B.H./T.H. No.	Depth	Sample Source	Specific Gravity of Material:	Sieve Analysis		Hydrometer Analysis	
					Sieve (mm)	% Passing	Diameter	% Finer
					50.00	100.0		
					37.50	100.0		
					25.00	100.0		
					19.00	100.0		
					16.00	100.0		
					12.50	100.0	0.0389	88.6
	TH 9				9.50	100.0	0.0279	85.6
	0.6-1.5 m				4.75	100.0	0.0180	81.6
					2.00	100.0	0.0144	79.6
					1.18	99.8	0.0106	77.6
	2.65				0.425	99.3	0.0077	72.6
					0.180	98.3	0.0055	67.6
					0.075	94.8	0.0012	53.6



SOIL DESCRIPTION	% Composition		D10	D30	D60
		5.2	Gravel		
	37.5	Sand			
	57.3	Clay			
			Cu		
			Cc		

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: IA

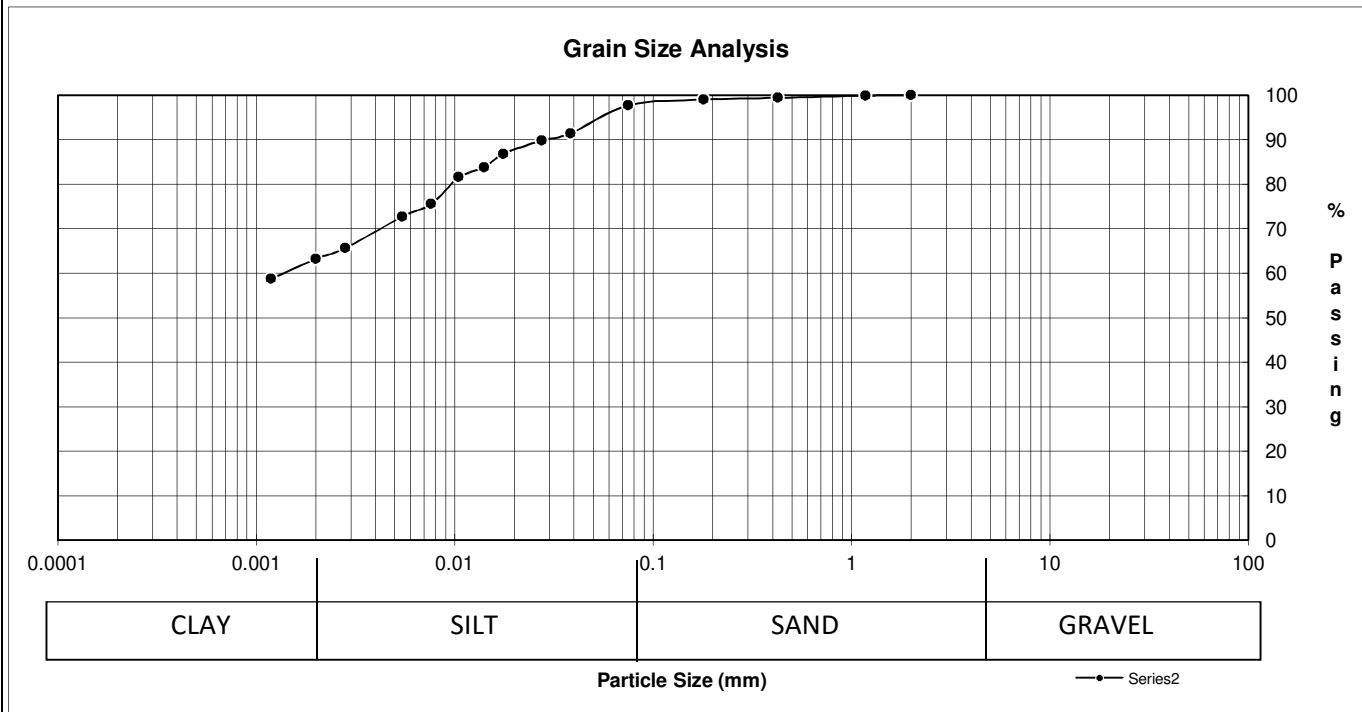
P. Bevel

Reviewed by: Paul Bevel

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-2101
ATTENTION:	Ryan Cunningham	PSA Test No.:	6
PROJECT:	2021-22 University Cr. Pavement Renewals University Crescent from Chancellor Matheson to Pembina Highway		
Date Sampled:	2-Mar-21	Date Received:	2-Mar-21
Sampled By:	PB/ET	Date Tested:	11-Mar-21

		Sieve Analysis		Hydrometer Analysis	
		Sieve (mm)	% Passing	Diameter	% Finer
		50.00	100.0		
		37.50	100.0		
		25.00	100.0		
		19.00	100.0		
		16.00	100.0		
Material Identification		12.50	100.0	0.0385	91.4
B.H./T.H. No.	TH 11	9.50	100.0	0.0274	89.8
Depth	0.6-1.6	4.75	100.0	0.0176	86.8
Sample Source		2.00	100.0	0.0141	83.8
Specific Gravity of Material:	2.65	1.18	99.9	0.0105	81.5
		0.425	99.4	0.0076	75.5
		0.180	99.0	0.0055	72.7
		0.075	97.7	0.0012	58.7



SOIL DESCRIPTION	% Composition		D10
		Gravel	D30
	2.3 Sand	D60	
	34.5 Silt	Cu	
	63.2 Clay	Cc	

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: IA

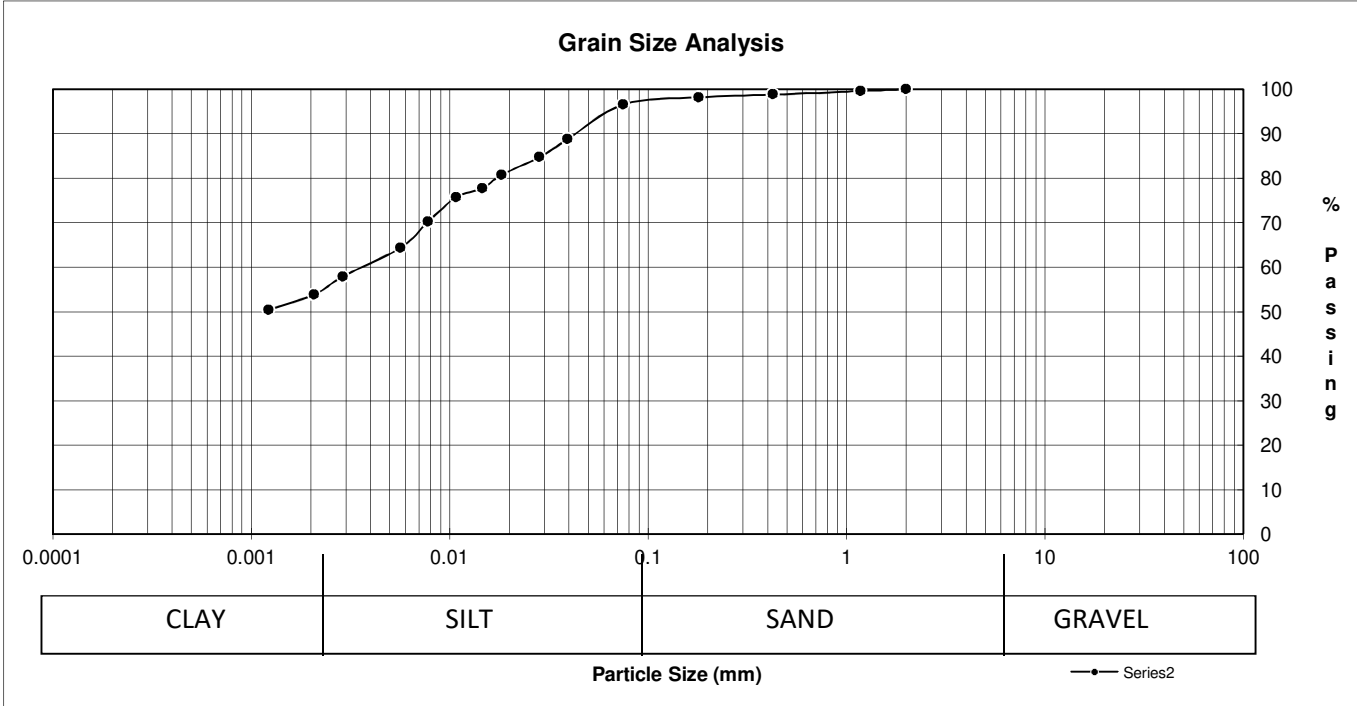
P. Bevel

Reviewed by: Paul Bevel

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-2101
ATTENTION:	Ryan Cunningham	PSA Test No.:	7
PROJECT:	2021-22 University Cr. Pavement Renewals University Crescent from Chancellor Matheson to Pembina Highway		
Date Sampled:	2-Mar-21	Date Received:	2-Mar-21
Sampled By:	PB/ET	Date Tested:	11-Mar-21

Material Identification B.H./T.H. No. Depth Sample Source Specific Gravity of Material:	Sieve Analysis Sieve (mm) % Passing	Hydrometer Analysis	
		Diameter	% Finer
TH 13	50.00 100.0		
0.5-1.5	37.50 100.0		
	25.00 100.0		
	19.00 100.0		
	16.00 100.0		
	12.50 100.0	0.0392	88.7
	9.50 100.0	0.0283	84.7
	4.75 100.0	0.0182	80.7
	2.00 100.0	0.0146	77.7
	1.18 99.6	0.0108	75.7
	0.425 98.8	0.0078	70.2
	0.180 98.2	0.0056	64.3
	0.075 96.6	0.0012	50.4



SOIL DESCRIPTION	% Composition		D10
		3.4	Gravel
	42.6	Sand	D60
	54.0	Silt	Cu
		Clay	Cc

0.00203

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: IA

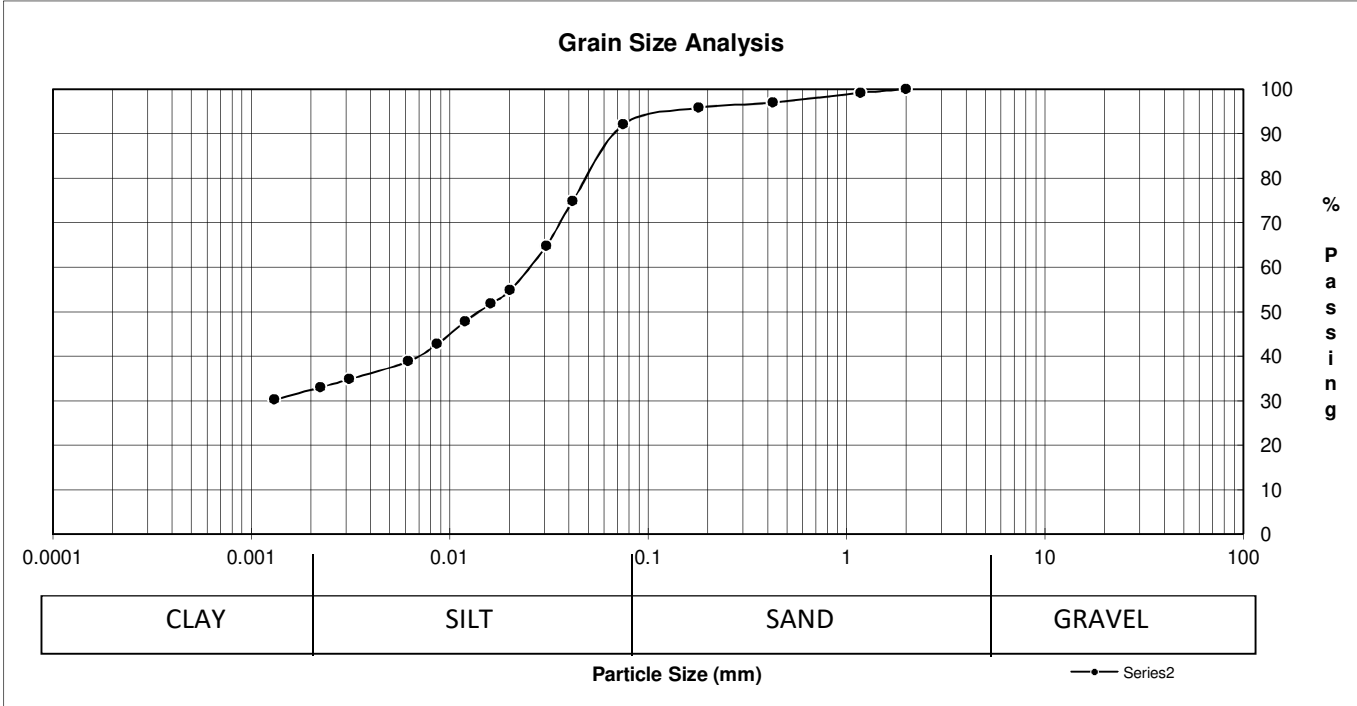
P. Bevel

Reviewed by: Paul Bevel

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-2101
ATTENTION:	Ryan Cunningham	PSA Test No.:	8
PROJECT:	2021-22 University Cr. Pavement Renewals University Crescent from Chancellor Matheson to Pembina Highway		
Date Sampled:	2-Mar-21	Date Received:	2-Mar-21
Sampled By:	PB/ET	Date Tested:	11-Mar-21

Material Identification B.H./T.H. No. Depth Sample Source Specific Gravity of Material:	Sieve Analysis Sieve (mm) % Passing	Hydrometer Analysis	
		Diameter	% Finer
TH 15	50.00 100.0		
0.6-1.5 m	37.50 100.0		
	25.00 100.0		
	19.00 100.0		
	16.00 100.0		
	12.50 100.0	0.0416	74.8
	9.50 100.0	0.0307	64.8
	4.75 100.0	0.0202	54.8
	2.00 100.0	0.0161	51.8
	1.18 99.2	0.0119	47.8
	0.425 97.0	0.0087	42.7
	0.180 95.8	0.0062	38.8
	0.075 92.0	0.0013	30.2



SOIL DESCRIPTION	% Composition		D10
		8.0	Gravel
	59.2	Sand	D60
	32.8	Silt	Cu
		Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: IA

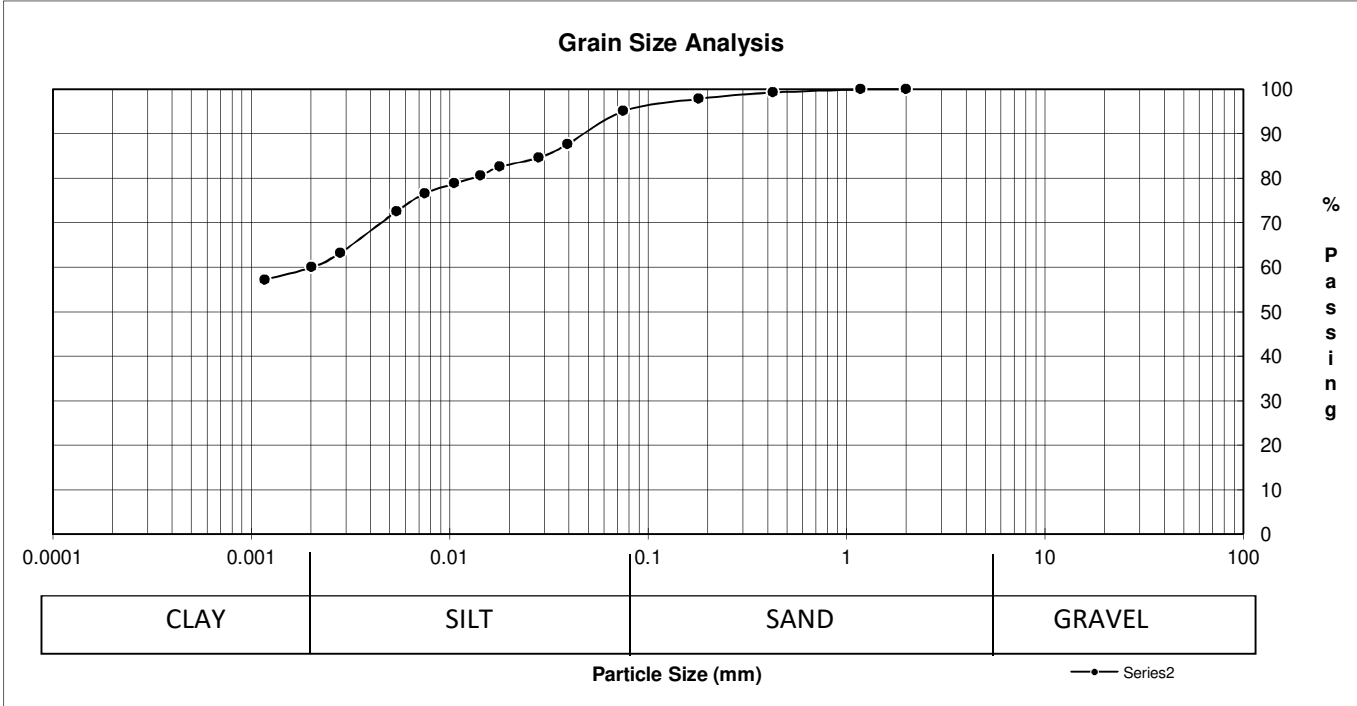
P. Bevel

Reviewed by: Paul Bevel

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-2101
ATTENTION:	Ryan Cunningham	PSA Test No.:	9
PROJECT:	2021-22 University Cr. Pavement Renewals University Crescent from Chancellor Matheson to Pembina Highway		
Date Sampled:	2-Mar-21	Date Received:	2-Mar-21
Sampled By:	PB/ET	Date Tested:	11-Mar-21

		Sieve Analysis	Hydrometer Analysis		
		Sieve (mm) % Passing	Diameter	% Finer	
Material Identification B.H./T.H. No. TH 16 Depth 0.3-1.4 m Sample Source Specific Gravity of Material: 2.65		50.00	100.0		
		37.50	100.0		
		25.00	100.0		
		19.00	100.0		
		16.00	100.0		
		12.50	100.0	0.0391	87.6
		9.50	100.0	0.0281	84.6
		4.75	100.0	0.0179	82.6
		2.00	100.0	0.0143	80.6
		1.18	99.9	0.0105	78.8
	0.425	99.2	0.0075	76.6	
	0.180	97.8	0.0054	72.6	
	0.075	95.0	0.0012	57.2	



SOIL DESCRIPTION	% Composition	D10	
	Gravel	D30	
	5.0 Sand	D60	
	35.0 Silt	Cu	
	60.0 Clay	Cc	

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: IA

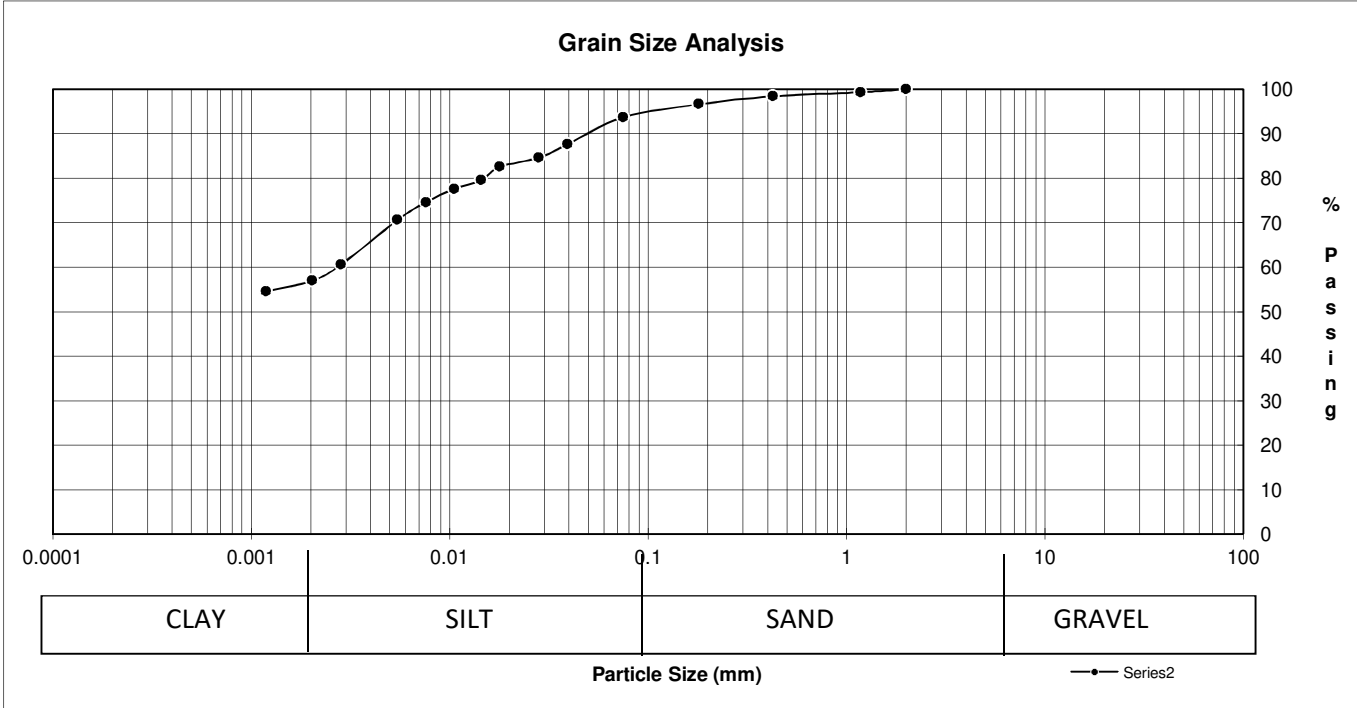
P. Bevel

Reviewed by: Paul Bevel

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	PROJECT No.:	112-2101
ATTENTION:	Ryan Cunningham	PSA Test No.:	10
PROJECT:	2021-22 University Cr. Pavement Renewals University Crescent from Chancellor Matheson to Pembina Highway		
Date Sampled:	2-Mar-21	Date Received:	2-Mar-21
Sampled By:	PB/ET	Date Tested:	11-Mar-21

Material Identification B.H./T.H. No. Depth Sample Source Specific Gravity of Material:	Sieve Analysis Sieve (mm) % Passing	Hydrometer Analysis	
		Diameter	% Finer
TH 19	50.00 100.0		
0.3-1.2 m	37.50 100.0		
	25.00 100.0		
	19.00 100.0		
	16.00 100.0		
	12.50 100.0	0.0391	87.6
	9.50 100.0	0.0281	84.6
	4.75 100.0	0.0179	82.6
	2.00 100.0	0.0144	79.6
	1.18 99.3	0.0106	77.6
	0.425 98.4	0.0076	74.6
	0.180 96.6	0.0055	70.6
	0.075 93.7	0.0012	54.6



SOIL DESCRIPTION	% Composition		D10
		6.3	Gravel
	36.5	Sand	D60
	57.2	Silt	Cu
		Clay	Cc

Remarks: Test Method: ASTM D7928, D2216, D4318

Technician: IA

P. Bevel

Reviewed by: Paul Bevel

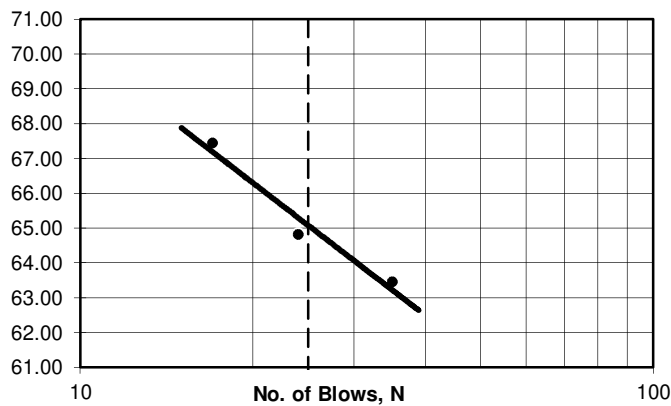
Atterberg Limits (ASTM D4318)

Client: AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7 Attention.: Ryan Cunningham Project: 2021-22 University Cr. Pavement Renewal University Crescent from Chancellor Matheson to Pembina Highway	Project No.: 112-2101 Test No. 3 Lab No.: HM 021 Date Received: 1-Mar-21 Date Tested / By: 15-Mar-21 / GM
---	---

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	13.44	14.32	14.41		
Dry Soil + Dish:	9.95	10.45	10.35		
Moisture:	3.49	3.87	4.06		
Dish:	4.45	4.48	4.33		
Dry Soil:	5.5	5.97	6.02		
% Moisture:	63.45	64.82	67.44		
No. of Blows:	35	24	17		
Liquid Limit:					65

Liquid Limit



Material Identification:

T.H./B.H. No. **TH 1**

Depth:

Liquid Limit, %: **65**
 Plastic Limit, %: **26**
 Plasticity Index: **39**
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	13.79	13.58	13.95		
Dry Soil + Dish:	11.85	11.73	12.03		
Moisture:	1.94	1.85	1.92		
Dish:	4.33	4.46	4.71		
Dry Soil:	7.52	7.27	7.32		
% Moisture:	25.80	25.45	26.23		
Average:					

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

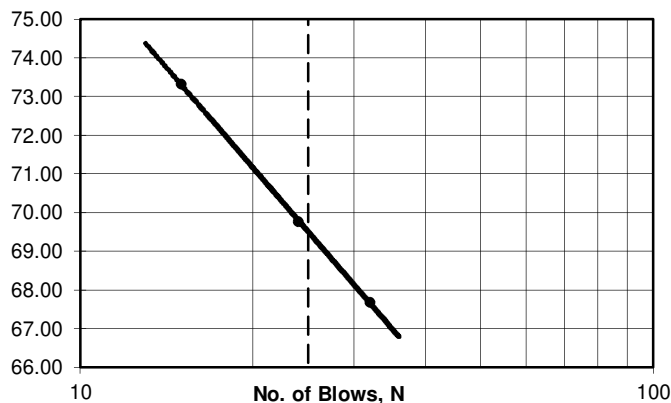
Atterberg Limits (ASTM D4318)

Client: AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7 Attention.: Ryan Cunningham Project: 2021-22 University Cr. Pavement Renewal University Crescent from Chancellor Matheson to Pembina Highway	Project No.: 112-2101 Test No. 2 Lab No.: HM 021 Date Received: 1-Mar-21 Date Tested / By: 15-Mar-21 / GM
---	---

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	12.98	12.58	12.01		
Dry Soil + Dish:	9.44	9.14	8.74		
Moisture:	3.54	3.44	3.27		
Dish:	4.21	4.21	4.28		
Dry Soil:	5.23	4.93	4.46		
% Moisture:	67.69	69.78	73.32		
No. of Blows:	32	24	15		
Liquid Limit:					69

Liquid Limit



Material Identification:

T.H./B.H. No. **TH 3**

Depth:

Liquid Limit, %: **69**
 Plastic Limit, %: **29**
 Plasticity Index: **41**
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	10.85	11.26	11.04		
Dry Soil + Dish:	9.38	9.72	9.52		
Moisture:	1.47	1.54	1.52		
Dish:	4.27	4.29	4.32		
Dry Soil:	5.11	5.43	5.2		
% Moisture:	28.77	28.36	29.23		
Average:					29

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

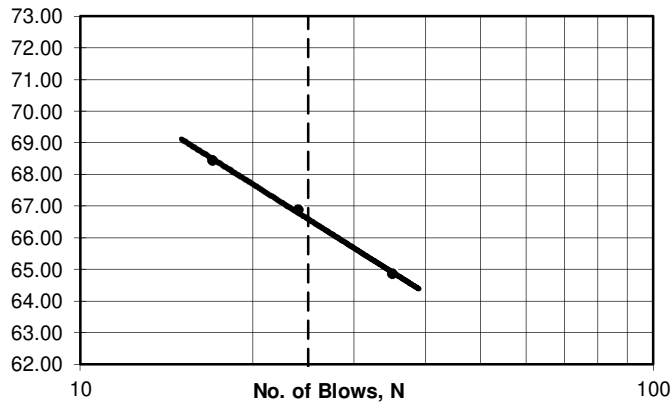
Atterberg Limits (ASTM D4318)

Client: AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7 Attention.: Ryan Cunningham Project: 2021-22 University Cr. Pavement Renewal University Crescent from Chancellor Matheson to Pembina Highway	Project No.: 112-2101 Test No. 3 Lab No.: HM 021 Date Received: Feb. 2021 Date Tested / By: 2021-03-15/GM
---	---

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	12.82	14.56	12.23		
Dry Soil + Dish:	9.57	10.52	9.02		
Moisture:	3.25	4.04	3.21		
Dish:	4.56	4.48	4.33		
Dry Soil:	5.01	6.04	4.69		
% Moisture:	64.87	66.89	68.44		
No. of Blows:	35	24	17		
Liquid Limit:					66

Liquid Limit



Material Identification:

T.H./B.H. No. **TH 5**

Depth:

Liquid Limit, %: **66**
 Plastic Limit, %: **28**
 Plasticity Index: **38**
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	12.77	12.92	13.32		
Dry Soil + Dish:	10.91	10.99	11.44		
Moisture:	1.86	1.93	1.88		
Dish:	4.25	4.31	4.74		
Dry Soil:	6.66	6.68	6.7		
% Moisture:	27.93	28.89	28.06		
Average:					28

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

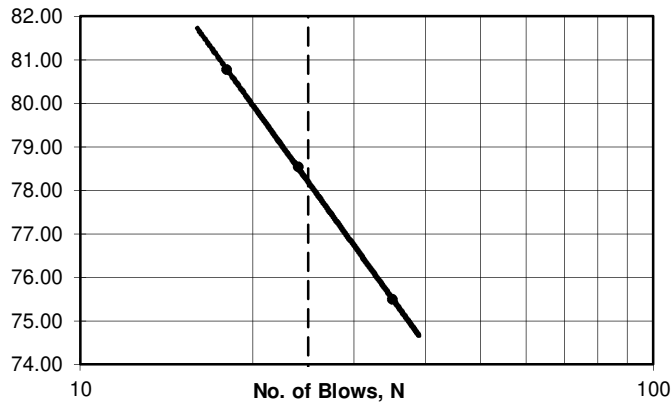
Atterberg Limits (ASTM D4318)

Client: AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7 Attention.: Ryan Cunningham Project: 2021-22 University Cr. Pavement Renewal University Crescent from Chancellor Matheson to Pembina Highway	Project No.: 112-2101 Test No. 4 Lab No.: HM 021 Date Received: 1-Mar-21 Date Tested / By: 15-Mar-21 /GM
---	--

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	11.20	13.31	11.31		
Dry Soil + Dish:	8.21	9.54	8.16		
Moisture:	2.99	3.77	3.15		
Dish:	4.25	4.74	4.26		
Dry Soil:	3.96	4.8	3.9		
% Moisture:	75.51	78.54	80.77		
No. of Blows:	35	24	18		
Liquid Limit:					78

Liquid Limit



Material Identification:

T.H./B.H. No. **TH 7**

Depth:

Liquid Limit, %: **78**
 Plastic Limit, %: **31**
 Plasticity Index: **47**
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	10.93	11.55	11.42		
Dry Soil + Dish:	9.37	9.8	9.76		
Moisture:	1.56	1.75	1.66		
Dish:	4.25	4.47	4.25		
Dry Soil:	5.12	5.33	5.51		
% Moisture:	30.47	32.83	30.13		
Average:					31

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

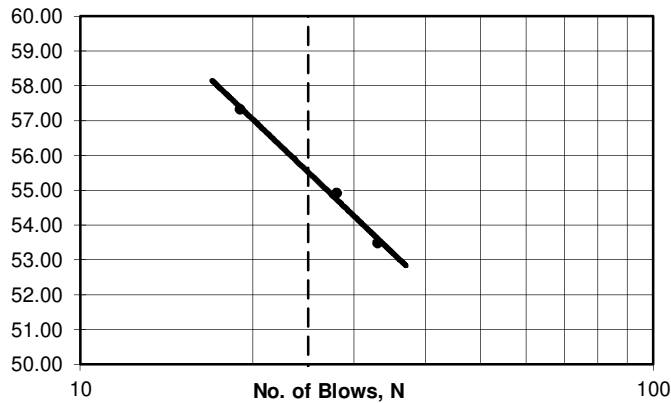
Atterberg Limits (ASTM D4318)

Client: AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7	Project No.: 112-2101 Test No. 5 Lab No.: HM 021
Attention.: Ryan Cunningham	Date Received: 1-Mar-21
Project: 2021-22 University Cr. Pavement Renewal University Crescent from Chancellor Matheson to Pembina Highway	Date Tested / By: 15-Mar-21 / GM

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	15.32	13.54	12.49		
Dry Soil + Dish:	11.64	10.25	9.48		
Moisture:	3.68	3.29	3.01		
Dish:	4.76	4.26	4.23		
Dry Soil:	6.88	5.99	5.25		
% Moisture:	53.49	54.92	57.33		
No. of Blows:	33	28	19		
Liquid Limit:					55

Liquid Limit



Material Identification:

T.H./B.H. No. **TH 9**

Depth:

Liquid Limit, %: **55**

Plastic Limit, %: **23**

Plasticity Index: **32**

(LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	10.25	10.27	10.55		
Dry Soil + Dish:	9.15	9.11	9.37		
Moisture:	1.1	1.16	1.18		
Dish:	4.28	4.27	4.2		
Dry Soil:	4.87	4.84	5.17		
% Moisture:	22.59	23.97	22.82		
Average:					23

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

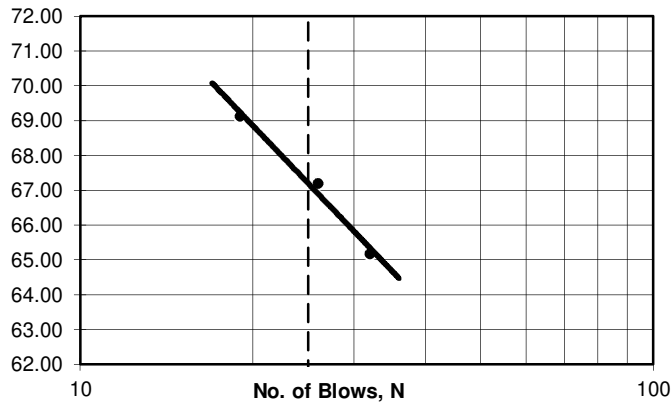
Atterberg Limits (ASTM D4318)

Client: AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7 Attention.: Ryan Cunningham Project: 2021-22 University Cr. Pavement Renewal University Crescent from Chancellor Matheson to Pembina Highway	Project No.: 112-2101 Test No. 6 Lab No.: HM 021 Date Received: 2-Mar-21 Date Tested / By: 15-Mar-21 / GM
---	---

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	12.46	11.55	11.88		
Dry Soil + Dish:	9.41	8.60	8.88		
Moisture:	3.05	2.95	3		
Dish:	4.73	4.21	4.54		
Dry Soil:	4.68	4.39	4.34		
% Moisture:	65.17	67.20	69.12		
No. of Blows:	32	26	19		
Liquid Limit:					67

Liquid Limit



Material Identification:

T.H./B.H. No. **TH 6**

Depth:

Liquid Limit, %: **67**
 Plastic Limit, %: **26**
 Plasticity Index: **41**
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	11.34	11.47	12.05		
Dry Soil + Dish:	9.91	10.03	10.53		
Moisture:	1.43	1.44	1.52		
Dish:	4.55	4.32	4.77		
Dry Soil:	5.36	5.71	5.76		
% Moisture:	26.68	25.22	26.39		
Average:					26

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

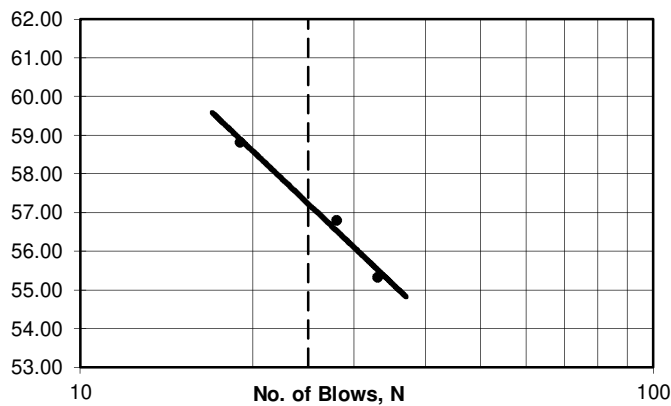
Atterberg Limits (ASTM D4318)

Client: AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7 Attention.: Ryan Cunningham Project: 2021-22 University Cr. Pavement Renewal University Crescent from Chancellor Matheson to Pembina Highway	Project No.: 112-2101 Test No. 7 Lab No.: HM 021 Date Received: 1-Mar-21 Date Tested / By: 15-Mar-21 / GM
---	---

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	15.82	13.59	14.49		
Dry Soil + Dish:	11.88	10.21	10.69		
Moisture:	3.94	3.38	3.8		
Dish:	4.76	4.26	4.23		
Dry Soil:	7.12	5.95	6.46		
% Moisture:	55.34	56.81	58.82		
No. of Blows:	33	28	19		
Liquid Limit:					

Liquid Limit



Material Identification:

T.H./B.H. No. **TH 13**

Depth:

Liquid Limit, %: **57**
 Plastic Limit, %: **20**
 Plasticity Index: **37**
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	10.65	10.42	10.51		
Dry Soil + Dish:	9.6	9.4	9.45		
Moisture:	1.05	1.02	1.06		
Dish:	4.28	4.27	4.2		
Dry Soil:	5.32	5.13	5.25		
% Moisture:	19.74	19.88	20.19		
Average:					20

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

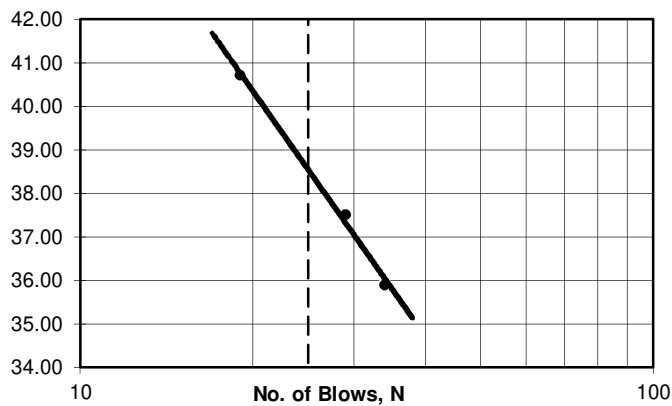
Atterberg Limits (ASTM D4318)

Client: AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7 Attention.: Ryan Cunningham Project: 2021-22 University Cr. Pavement Renewal University Crescent from Chancellor Matheson to Pembina Highway	Project No.: 112-2101 Test No. 8 Lab No.: HM 021 Date Received: 2-Mar-21 Date Tested / By: 15-Mar-21 /GM
---	--

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	14.70	13.7	14.45		
Dry Soil + Dish:	11.95	11.13	11.49		
Moisture:	2.75	2.57	2.96		
Dish:	4.29	4.28	4.22		
Dry Soil:	7.66	6.85	7.27		
% Moisture:	35.90	37.52	40.72		
No. of Blows:	34	29	19		
Liquid Limit:					38

Liquid Limit



Material Identification:

T.H./B.H. No. **TH 15**

Depth:

Liquid Limit, %: **38**
 Plastic Limit, %: **13**
 Plasticity Index: **26**
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	11.46	11.37	11.34		
Dry Soil + Dish:	10.69	10.53	10.55		
Moisture:	0.77	0.84	0.79		
Dish:	4.26	4.23	4.42		
Dry Soil:	6.43	6.3	6.13		
% Moisture:	11.98	13.33	12.89		
Average:					13

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

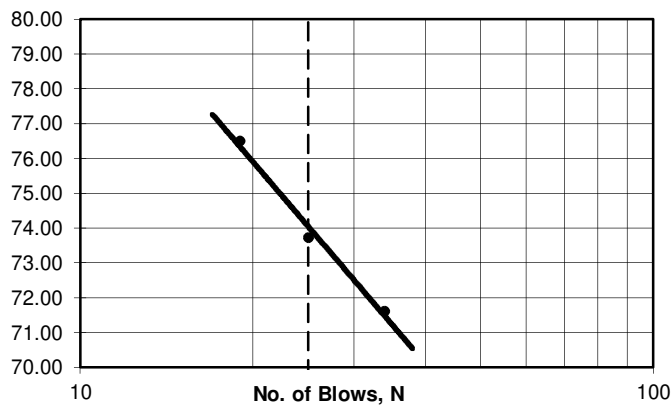
Atterberg Limits (ASTM D4318)

Client: AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7 Attention.: Ryan Cunningham Project: 2021-22 University Cr. Pavement Renewal University Crescent from Chancellor Matheson to Pembina Highway	Project No.: 112-2101 Test No. 9 Lab No.: HM 021 Date Received: Feb. 2021 Date Tested / By: 2021-03-15/GM
---	---

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	13.62	13.57	13.68		
Dry Soil + Dish:	9.91	9.95	9.74		
Moisture:	3.71	3.62	3.94		
Dish:	4.73	5.04	4.59		
Dry Soil:	5.18	4.91	5.15		
% Moisture:	71.62	73.73	76.50		
No. of Blows:	34	25	19		
Liquid Limit:					74

Liquid Limit



Material Identification:

T.H./B.H. No. **TH 16**

Depth:

Liquid Limit, %: **74**
 Plastic Limit, %: **29**
 Plasticity Index: **45**
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	13.11	12.74	12.47		
Dry Soil + Dish:	11.22	10.85	10.62		
Moisture:	1.89	1.89	1.85		
Dish:	4.81	4.28	4.24		
Dry Soil:	6.41	6.57	6.38		
% Moisture:	29.49	28.77	29.00		
Average:					29

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

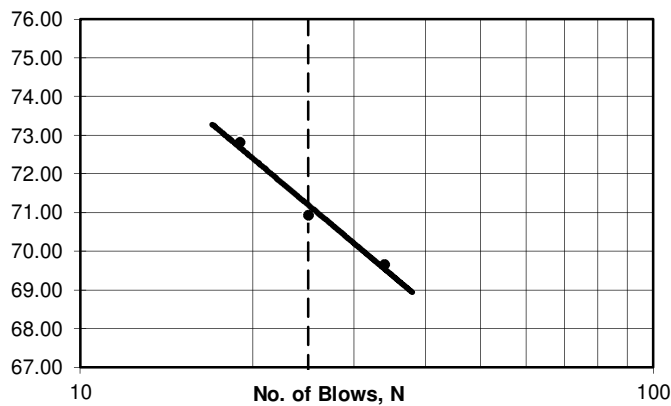
Atterberg Limits (ASTM D4318)

Client: AECOM 99 Commerce Drive Winnipeg MB R3P 0Y7 Attention.: Ryan Cunningham Project: 2021-22 University Cr. Pavement Renewal University Crescent from Chancellor Matheson to Pembina Highway	Project No.: 112-2101 Test No. 10 Lab No.: HM 021 Date Received: 2-Mar-21 Date Tested / By: 15-Mar-21 / GM
---	--

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	13.62	13.57	13.68		
Dry Soil + Dish:	9.97	10.03	9.85		
Moisture:	3.65	3.54	3.83		
Dish:	4.73	5.04	4.59		
Dry Soil:	5.24	4.99	5.26		
% Moisture:	69.66	70.94	72.81		
No. of Blows:	34	25	19		
Liquid Limit:					71

Liquid Limit



Material Identification:

T.H./B.H. No. **TH 19**

Depth:

Liquid Limit, %: **71**
 Plastic Limit, %: **28**
 Plasticity Index: **43**
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	13.11	12.74	12.47		
Dry Soil + Dish:	11.28	10.88	10.69		
Moisture:	1.83	1.86	1.78		
Dish:	4.81	4.28	4.24		
Dry Soil:	6.47	6.6	6.45		
% Moisture:	28.28	28.18	27.60		
Average:					28

Test Method : ASTM: D4318, D2216

P. Bevel

Reviewed by: Paul Bevel

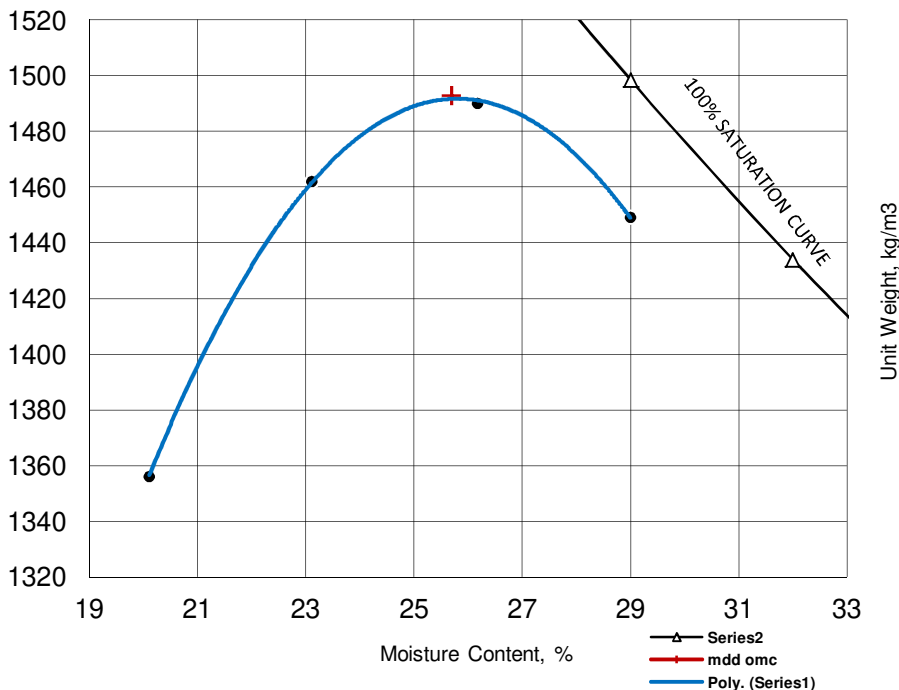
MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd. 99 Commerce Drive Winnipeg, MB. R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	1
PROJECT:	2021-2022 University Crescent Pavement Renewals		

Date Sampled	1-Mar-21	Date Received:	1-Mar-21	PROCEDURE	A
Sampled By:	ET/PB	Date Tested	11-Mar-21	PREPARATION	Dry
MATERIAL INFORMATION				COMPACTION METHOD	Manual
				BLOWS PER LAYER	25
				NO. OF LAYERS	3
				MOLD SIZE	100
				MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg				
Material Type:	Clay		Material Supplier	-	
Material Use	-		Material Source	TH 1	
Maximum Size:	-				

	Test No.	1	2	3	4	5
Wet Density		1629	1800	1880	1870	0
Moisture Content		20.1	23.1	26.2	29.0	0.0
Dry Density		1356	1462	1490	1449	0

Moisture - Density Relationship



Maximum Dry Density (MDD):
1493 kg/m³

Optimum Moisture Content
25.7 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
0 %

Corrected Moisture:
25.7 %

Corrected Maximum Dry Density:
1493 kg/m³

Remarks:

Tested by: ia

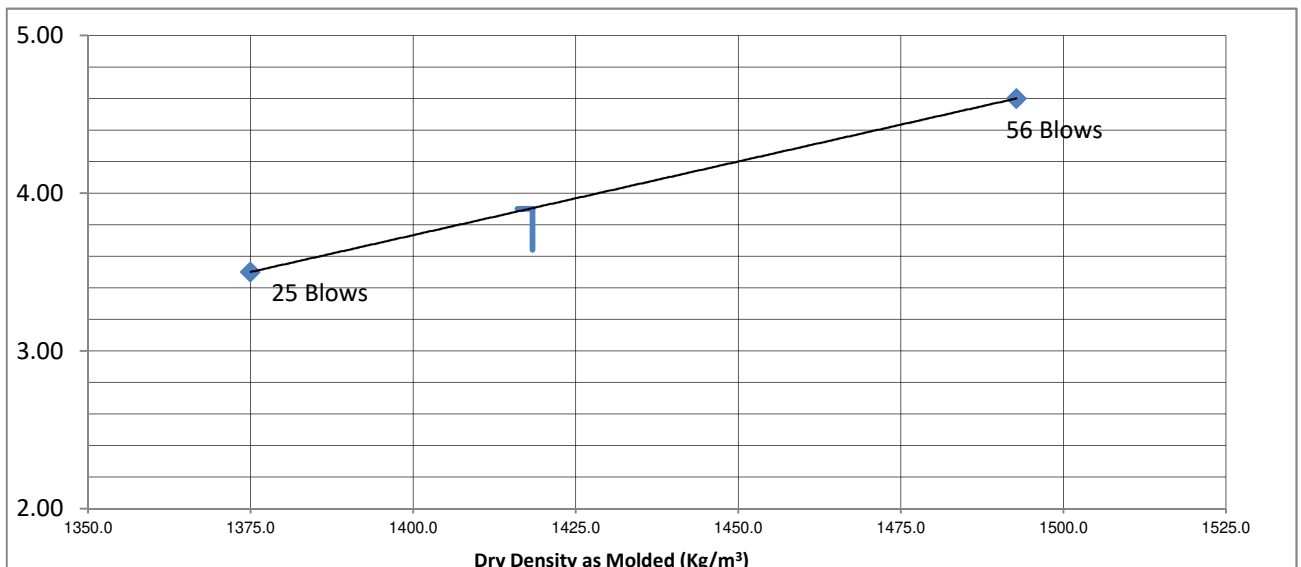
Reviewed By: Hermie Manalo

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	1
PROJECT:	2021-2022 University Crescent Pavement Renewals	DATE RECEIVED :	1-Mar-21
		DATE TESTED :	16-Mar-21
		TESTED BY:	ia

SAMPLE DATA		SPECIMEN DATA		
Sample ID:	CLAY	DESCRIPTION	Before Soaking	After Testing
Source:	TH1	Moisture Content (MC), %	25.5	-
Sampled by:	ET/PB	MC of top 25mm layer, %	-	40
Optimum Moisture Content:	25.7%	Dry Density, kg/m ³	1496	
Maximum Dry Density kg/m ³ :	1493	Compaction, %		
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506	
Proctor Tested by:	ia	Swell, %	2.683	

DISPLACEMENT		STRESS			LOAD PENETRATION CURVE
mm	in	MPa			
		10 Blows	25 Blows	56 Blows	
0	0	0.000	0.000	0.000	
0.64	0.025	0.075	0.083	0.083	
1.27	0.050	0.137	0.166	0.166	
1.91	0.075	0.193	0.248	0.248	
2.54	0.100	0.241	0.317	0.317	
3.18	0.125	0.288	0.372	0.372	
3.81	0.150	0.310	0.414	0.414	
4.45	0.175	0.340	0.443	0.443	
5.08	0.200	0.352	0.476	0.476	
6.35	0.250	0.379	0.512	0.512	
7.62	0.300	0.393	0.552	0.552	
8.89	0.350	0.407	0.579	0.579	
10.16	0.400	0.414	0.607	0.607	



CBR @ 95% MDD = 3.9

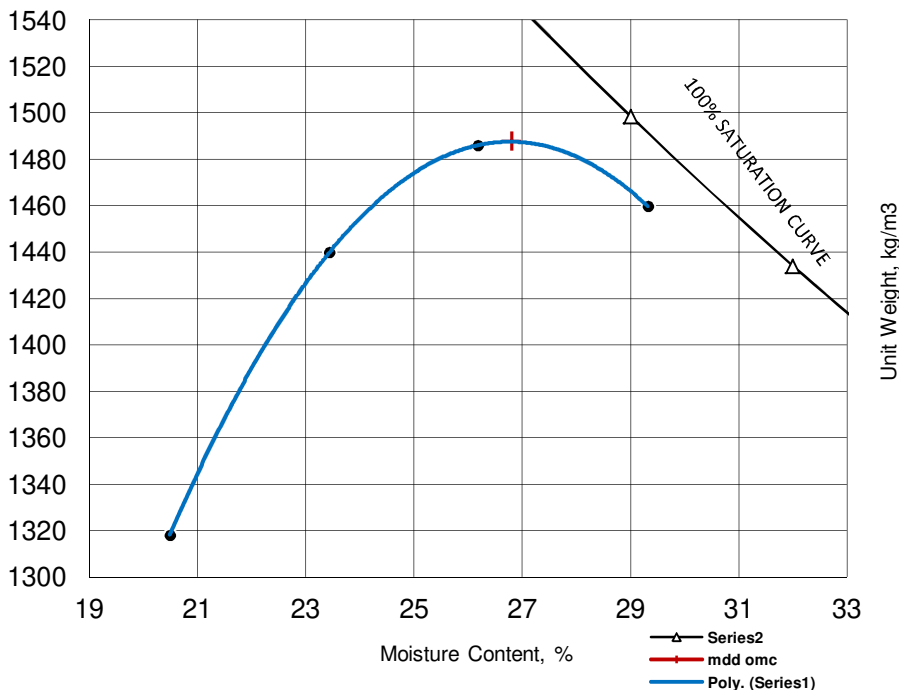
MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd. 99 Commerce Drive Winnipeg, MB. R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	2
PROJECT:	2021-2022 University Crescent Pavement Renewals		

Date Sampled	1-Mar-21	Date Received:	1-Mar-21	PROCEDURE	A
Sampled By:	ET/PB	Date Tested	16-Mar-21	PREPARATION	Dry
MATERIAL INFORMATION				COMPACTION METHOD	Manual
				BLOWS PER LAYER	25
				NO. OF LAYERS	3
				MOLD SIZE	100
				MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg				

	Test No.	1	2	3	4	5
Wet Density		1588	1778	1875	1888	0
Moisture Content		20.5	23.4	26.2	29.3	0.0
Dry Density		1318	1440	1486	1460	0

Moisture - Density Relationship



Maximum Dry Density (MDD):
1488 kg/m³

Optimum Moisture Content
26.8 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
0 %

Corrected Moisture:
26.8 %

Corrected Maximum Dry Density:
1488 kg/m³

Remarks:

Tested by: ia

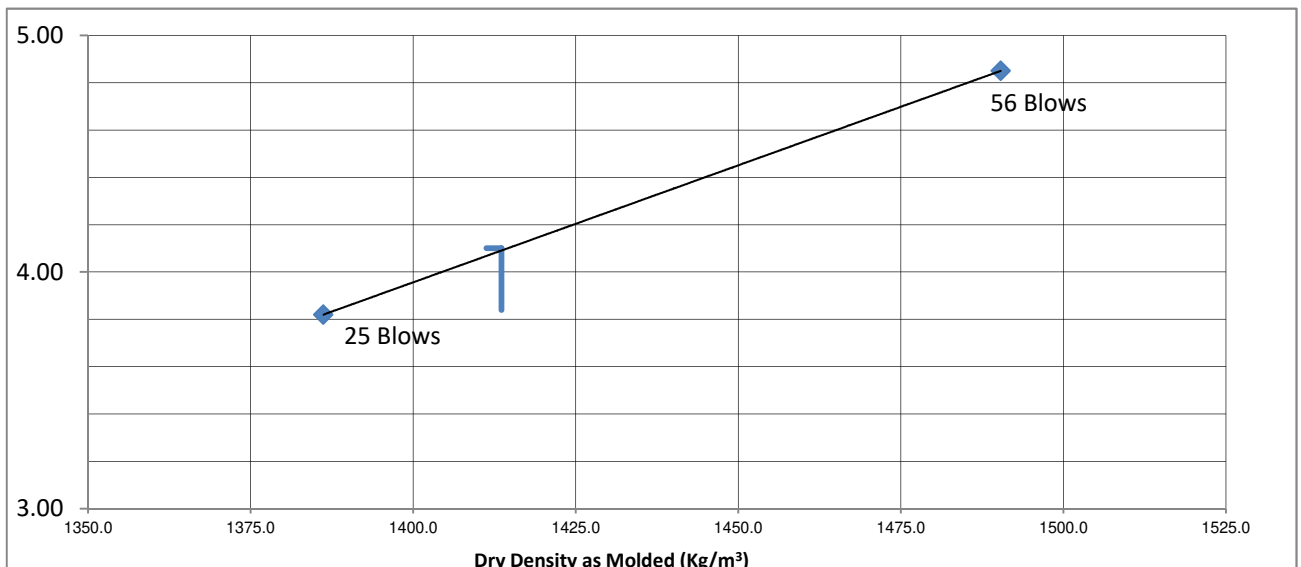
Reviewed By: Hermie Manalo

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	2
PROJECT:	2021-2022 University Crescent Pavement Renewals	DATE RECEIVED :	1-Mar-21
		DATE TESTED :	20-Mar-21
		TESTED BY:	ia

SAMPLE DATA		SPECIMEN DATA		
Sample ID:	CLAY	DESCRIPTION	Before Soaking	After Testing
Source:	TH 3	Moisture Content (MC), %	27.0	-
Sampled by:	ET/PB	MC of top 25mm layer, %	-	33.4
Optimum Moisture Content:	26.8%	Dry Density, kg/m ³	1490	
Maximum Dry Density kg/m ³ :	1488	Compaction, %		
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506	
Proctor Tested by:	ia	Swell, %	2.378	

DISPLACEMENT		STRESS			LOAD PENETRATION CURVE
mm	in	10 Blows	25 Blows	56 Blows	
0	0	0.000	0.000	0.000	
0.64	0.025	0.074	0.096	0.187	
1.27	0.050	0.126	0.187	0.256	
1.91	0.075	0.190	0.256	0.334	
2.54	0.100	0.262	0.334	0.393	
3.18	0.125	0.290	0.393	0.437	
3.81	0.150	0.327	0.437	0.469	
4.45	0.175	0.352	0.469	0.497	
5.08	0.200	0.387	0.497	0.545	
6.35	0.250	0.418	0.545	0.609	
7.62	0.300	0.439	0.580	0.634	
8.89	0.350	0.455	0.609		
10.16	0.400	0.475	0.634		



CBR @ 95% MDD = 4.1

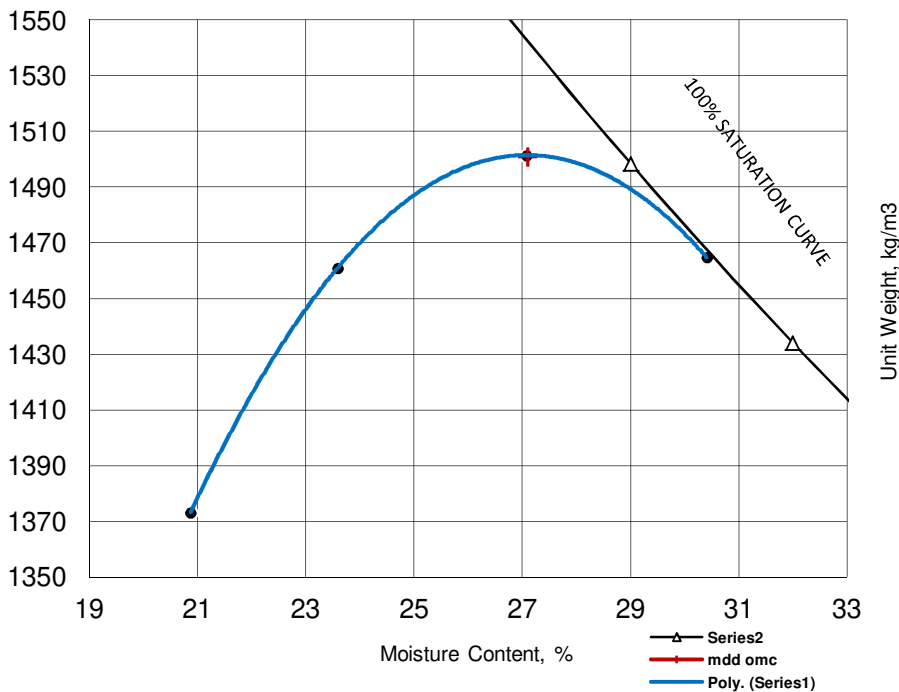
MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd. 99 Commerce Drive Winnipeg, MB. R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	3
PROJECT:	2021-2022 University Crescent Pavement Renewals		

Date Sampled	1-Mar-21	Date Received:	1-Mar-21	PROCEDURE	A
Sampled By:	ET/PB	Date Tested	16-Mar-21	PREPARATION	Dry
MATERIAL INFORMATION				COMPACTION METHOD	Manual
				BLOWS PER LAYER	25
				NO. OF LAYERS	3
				MOLD SIZE	100
				MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg				

	Test No.	1	2	3	4	5
Wet Density		1660	1805	1908	1910	
Moisture Content		20.9	23.6	27.1	30.4	
Dry Density		1373	1461	1501	1465	

Moisture - Density Relationship



Maximum Dry Density (MDD):
1501 kg/m³

Optimum Moisture Content
27.1 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
0 %

Corrected Moisture:
27.1 %

Corrected Maximum Dry Density:
1501 kg/m³

Remarks:

Tested by: ia

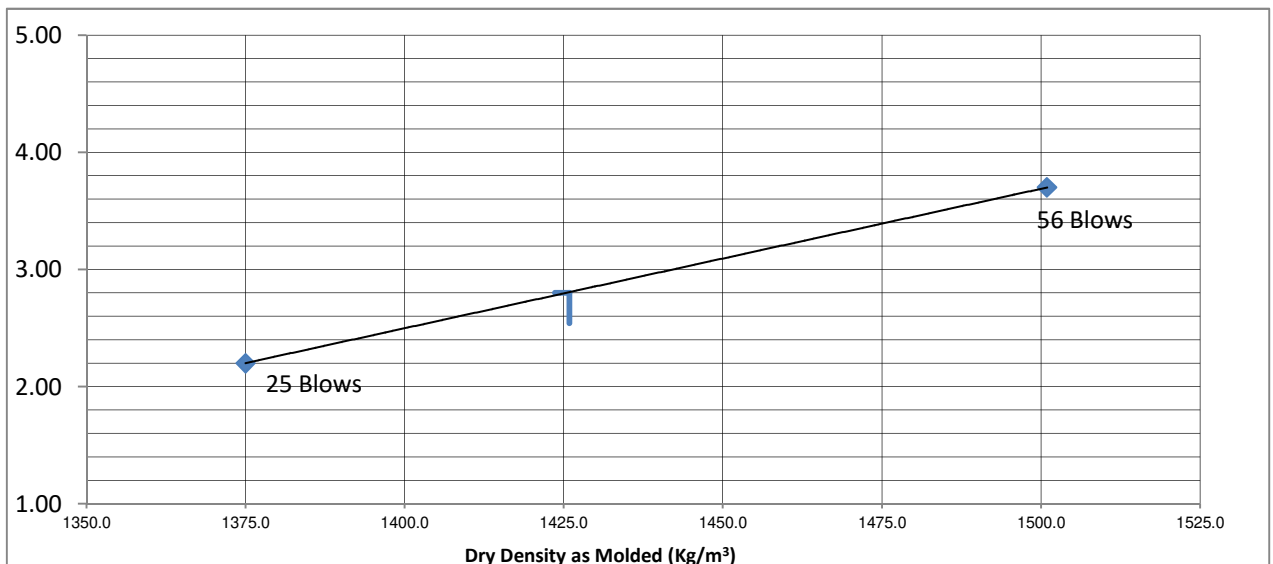
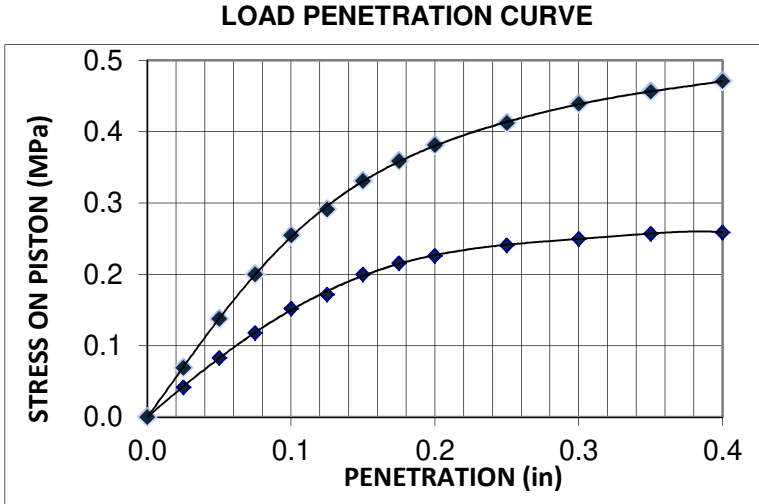
Reviewed By: Hermie Manalo

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	3
PROJECT:	2021-2022 University Crescent Pavement Renewals	DATE RECEIVED :	1-Mar-21
		DATE TESTED :	20-Mar-21
		TESTED BY:	ia

SAMPLE DATA		SPECIMEN DATA	
Sample ID:	CLAY	DESCRIPTION	Before Soaking After Testing
Source:	TH 5	Moisture Content (MC), %	27.0 -
Sampled by:	ET/PB	MC of top 25mm layer, %	- 38.8
Optimum Moisture Content:	27.1%	Dry Density, kg/m ³	1505
Maximum Dry Density kg/m ³ :	1501	Compaction, %	
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506
Proctor Tested by:	ia	Swell, %	2.487

DISPLACEMENT		STRESS		
mm	in	MPa		
		10 Blows	25 Blows	56 Blows
0	0	0.000	0.000	0.000
0.64	0.025	0.042	0.069	0.138
1.27	0.050	0.083	0.138	0.200
1.91	0.075	0.118	0.200	0.291
2.54	0.100	0.152	0.255	0.331
3.18	0.125	0.172	0.291	0.359
3.81	0.150	0.200	0.331	0.381
4.45	0.175	0.216	0.359	0.412
5.08	0.200	0.226	0.381	0.439
6.35	0.250	0.241	0.412	0.456
7.62	0.300	0.250	0.439	0.471
8.89	0.350	0.257	0.456	
10.16	0.400	0.259	0.471	



CBR @ 95% MDD = 2.8

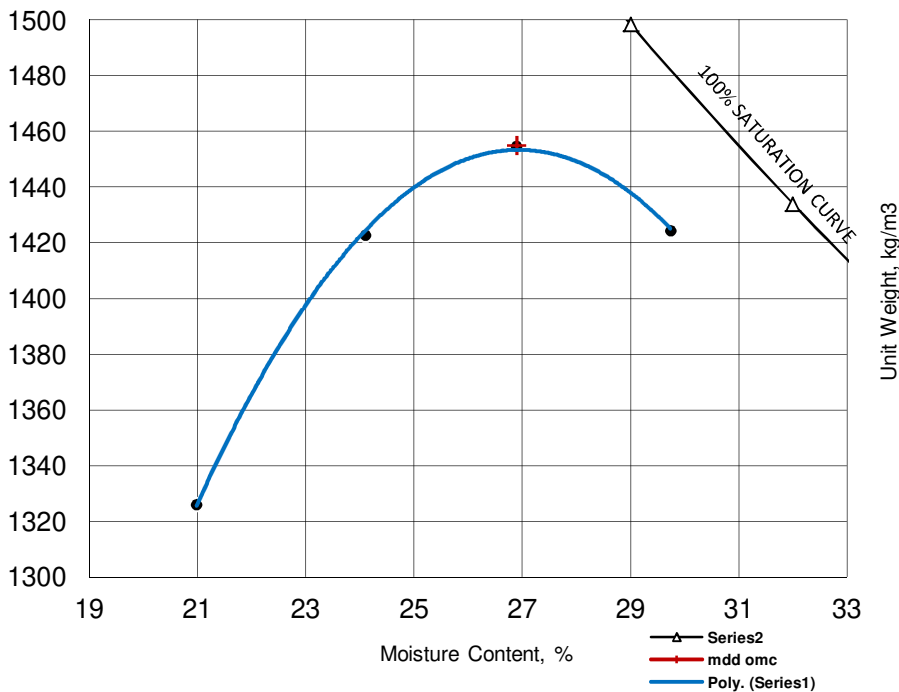
MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd. 99 Commerce Drive Winnipeg, MB. R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	4
PROJECT:	2021-2022 University Crescent Pavement Renewals		

Date Sampled	1-Mar-21	Date Received:	1-Mar-21	PROCEDURE	A
Sampled By:	ET/PB	Date Tested	11-Mar-21	PREPARATION	Dry
MATERIAL INFORMATION				COMPACTION METHOD	Manual
				BLOWS PER LAYER	25
				NO. OF LAYERS	3
				MOLD SIZE	100
				MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg				
Material Type:	Clay	Material Supplier	.	MOLD VOLUME	935
Material Use		Material Source	TH 7	WEIGHT OF HAMMER	2.5 kg
Maximum Size:	.				

	Test No.	1	2	3	4	5
Wet Density		1604	1766	1846	1848	
Moisture Content		21.0	24.1	26.9	29.7	
Dry Density		1326	1423	1455	1425	

Moisture - Density Relationship



Maximum Dry Density (MDD):
1455 kg/m³

Optimum Moisture Content
26.9 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
0 %

Corrected Moisture:
26.9 %

Corrected Maximum Dry Density:
1455 kg/m³

Remarks:

Tested by: ia

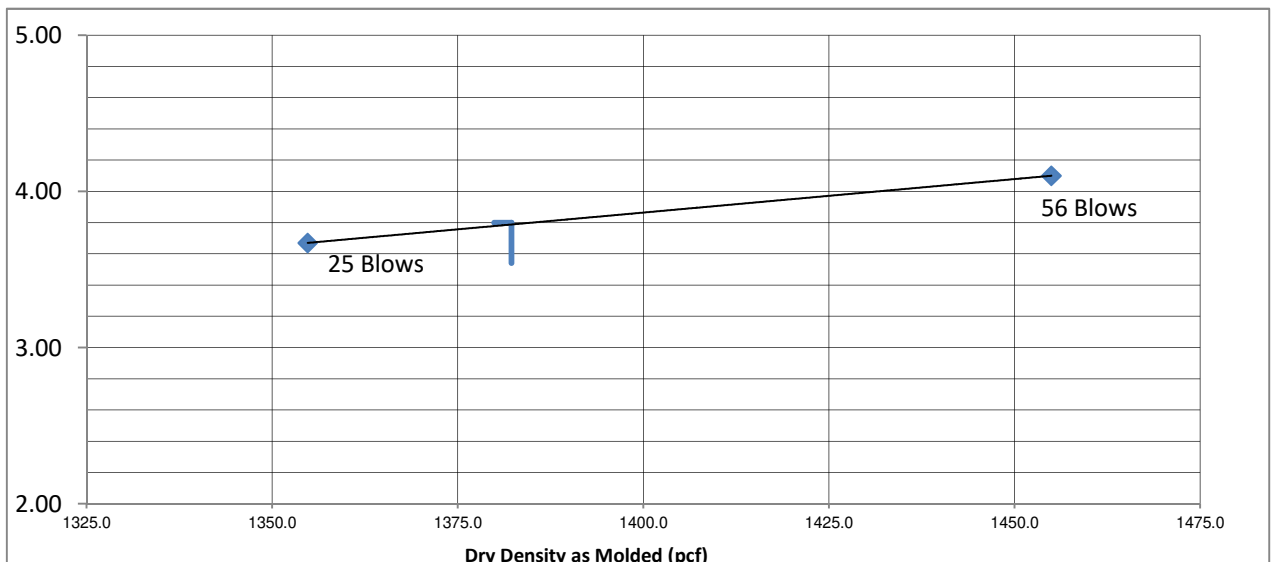
Reviewed By: Hermie Manalo

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	4
PROJECT:	2021-2022 University Crescent Pavement Renewals	DATE RECEIVED :	1-Mar-21
		DATE TESTED :	16-Mar-21
		TESTED BY:	

SAMPLE DATA		SPECIMEN DATA		
Sample ID:	CLAY	DESCRIPTION	Before Soaking	After Testing
Source:	TH 7	Moisture Content (MC), %	27	-
Sampled by:	ET/PB	MC of top 25mm layer, %	-	40.1
Optimum Moisture Content:	26.9%	Dry Density, kg/m ³	1458	
Maximum Dry Density kg/m ³ :	1455	Compaction, %		
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506	
Proctor Tested by:	ia	Swell, %	2.727	

DISPLACEMENT		STRESS			LOAD PENETRATION CURVE
mm	in	10 Blows	25 Blows	56 Blows	
0	0	0.000	0.000	0.000	
0.64	0.025	0.061	0.081	0.081	
1.27	0.050	0.131	0.152	0.152	
1.91	0.075	0.200	0.223	0.223	
2.54	0.100	0.253	0.283	0.283	
3.18	0.125	0.295	0.330	0.330	
3.81	0.150	0.332	0.366	0.366	
4.45	0.175	0.345	0.400	0.400	
5.08	0.200	0.380	0.424	0.424	
6.35	0.250	0.400	0.460	0.460	
7.62	0.300	0.412	0.497	0.497	
8.89	0.350	0.421	0.524	0.524	
10.16	0.400	0.422	0.545	0.545	



CBR @95% MDD - 3.8

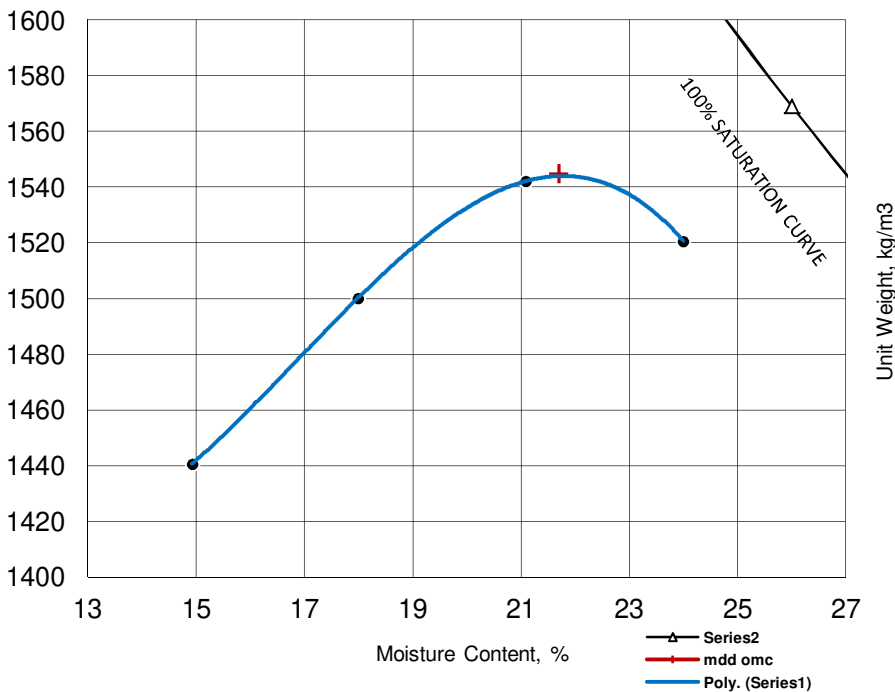
MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd. 99 Commerce Drive Winnipeg, MB. R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	5
PROJECT:	2021-2022 University Crescent Pavement Renewals		

Date Sampled	1-Mar-21	Date Received:	1-Mar-21	PROCEDURE	A
Sampled By:	PB	Date Tested	11-Mar-21	PREPARATION	Dry
MATERIAL INFORMATION				COMPACTION METHOD	Manual
				BLOWS PER LAYER	25
				NO. OF LAYERS	3
				MOLD SIZE	100
				MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg				

	Test No.	1	2	3	4	5
Wet Density		1656	1770	1867	1886	
Moisture Content		14.9	18.0	21.1	24.0	
Dry Density		1441	1500	1542	1521	

Moisture - Density Relationship



Maximum Dry Density (MDD):
1545 kg/m³
Optimum Moisture Content
21.7 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
0 %
Corrected Moisture:
21.7 %
Corrected Maximum Dry Density:
1545 kg/m³

Remarks:

Tested by: ia

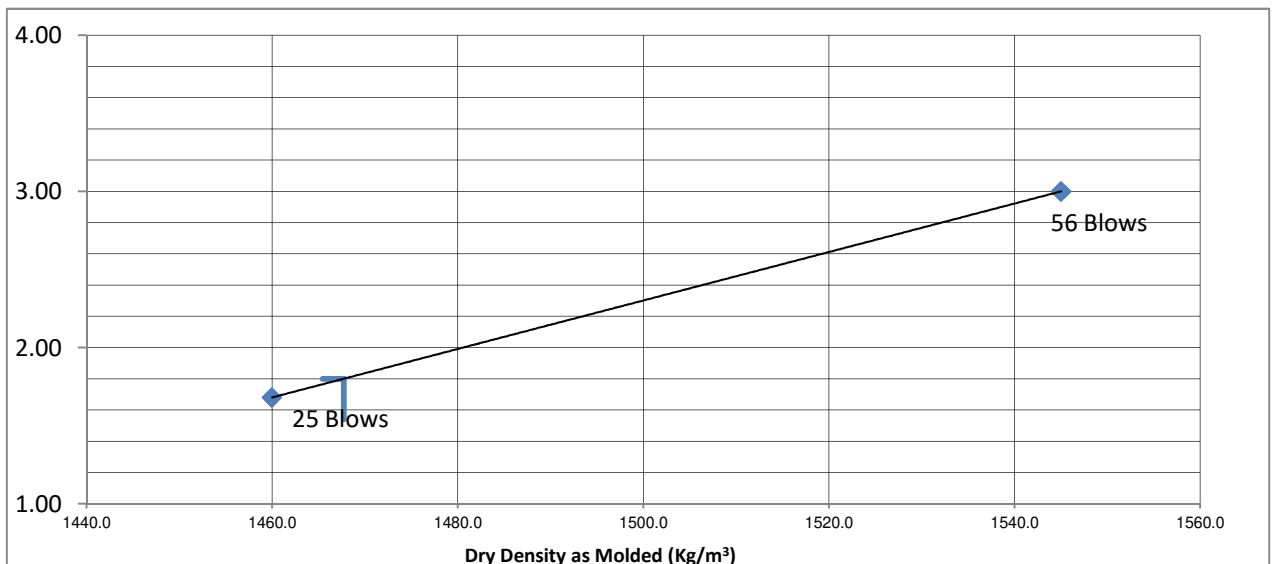
Reviewed By: Hermie Manalo

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	5
PROJECT:	2021-2022 University Crescent	DATE RECEIVED :	1-Mar-21
LOCATION	Pavement Renewals	DATE TESTED :	16-Mar-21
		TESTED BY:	IA/ET

SAMPLE DATA		SPECIMEN DATA		
Sample ID:	CLAY	DESCRIPTION	Before Soaking	After Testing
Source:	TH 9	Moisture Content (MC), %	21.9	-
Sampled by:	PB	MC of top 25mm layer, %	-	44
Optimum Moisture Content:	21.7%	Dry Density, kg/m ³	1545	
Maximum Dry Density kg/m ³ :	1545	Compaction, %		
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506	
Proctor Tested by:	IA	Swell, %	2.574	

DISPLACEMENT		STRESS			LOAD PENETRATION CURVE
mm	in	MPa			
		10 Blows	25 Blows	56 Blows	
0	0	0.000	0.000	0.000	
0.64	0.025	0.028	0.055	0.055	
1.27	0.050	0.056	0.104	0.104	
1.91	0.075	0.088	0.154	0.154	
2.54	0.100	0.116	0.207	0.207	
3.18	0.125	0.139	0.247	0.247	
3.81	0.150	0.152	0.268	0.268	
4.45	0.175	0.165	0.292	0.292	
5.08	0.200	0.174	0.310	0.310	
6.35	0.250	0.186	0.332	0.332	
7.62	0.300	0.194	0.350	0.350	
8.89	0.350	0.196	0.361	0.361	
10.16	0.400	0.198	0.372	0.372	



CBR @ 95% MDD = 1.8

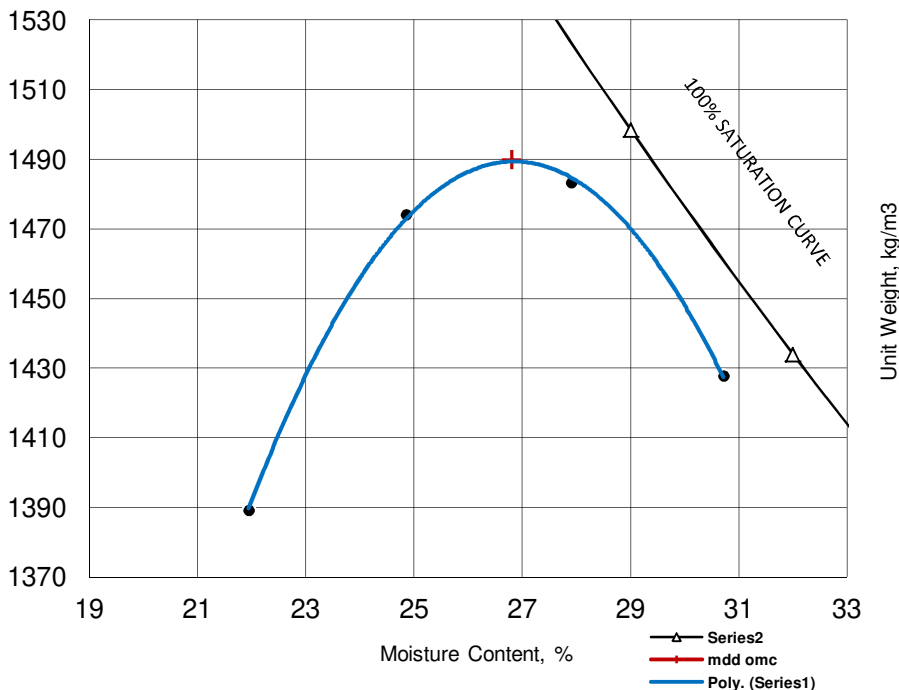
MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd. 99 Commerce Drive Winnipeg, MB. R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	6
PROJECT:	2021-2022 University Crescent Pavement Renewals		

Date Sampled	2-Mar-21	Date Received:	2-Mar-21	PROCEDURE	A
Sampled By:	ET/PB	Date Tested	16-Mar-21	PREPARATION	Dry
MATERIAL INFORMATION				COMPACTION METHOD	Manual
				BLOWS PER LAYER	25
				NO. OF LAYERS	3
				MOLD SIZE	100
				MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg				
Material Type:	Clay	Material Supplier	TH11	MATERIAL INFORMATION	
Material Use		Material Source			
Maximum Size:					

	Test No.	1	2	3	4	5
Wet Density		1694	1841	1897	1866	0
Moisture Content		21.9	24.9	27.9	30.7	0.0
Dry Density		1389	1474	1483	1428	0

Moisture - Density Relationship



Maximum Dry Density (MDD):
1490 kg/m³

Optimum Moisture Content
26.8 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
0 %

Corrected Moisture:
26.8 %

Corrected Maximum Dry Density:
1490 kg/m³

Remarks:

Tested by: ia

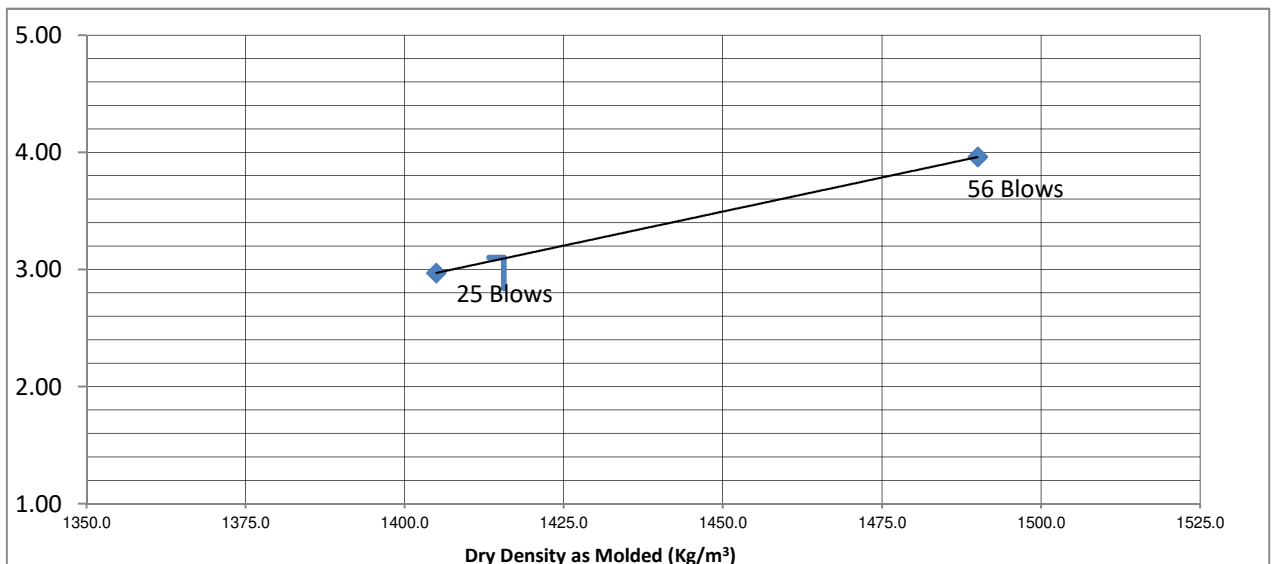
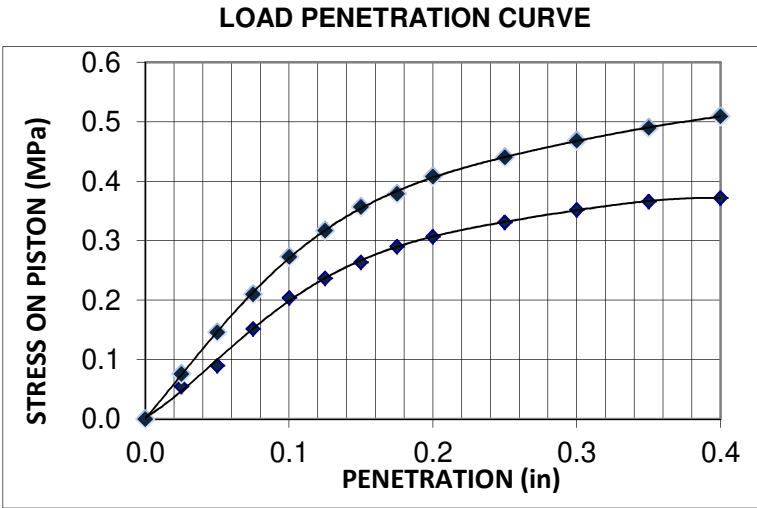
Reviewed By: Hermie Manalo

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	6
PROJECT:	2021-2022 University Crescent	DATE RECEIVED :	2-Mar-21
LOCATION	Pavement Renewals	DATE TESTED :	20-Mar-21
		TESTED BY:	ia

SAMPLE DATA		SPECIMEN DATA	
Sample ID:	CLAY	DESCRIPTION	Before Soaking After Testing
Source:	TH 11	Moisture Content (MC), %	27.0 -
Sampled by:	ET/PB	MC of top 25mm layer, %	- 35.6
Optimum Moisture Content:	26.8%	Dry Density, kg/m ³	1490
Maximum Dry Density kg/m ³ :	1490	Compaction, %	
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506
Proctor Tested by:	ia	Swell, %	2.400

DISPLACEMENT		STRESS		
mm	in	MPa		
		10 Blows	25 Blows	56 Blows
0	0	0.000	0.000	0.000
0.64	0.025	0.055	0.076	0.146
1.27	0.050	0.090	0.146	0.210
1.91	0.075	0.152	0.210	0.273
2.54	0.100	0.204	0.273	0.317
3.18	0.125	0.237	0.317	0.357
3.81	0.150	0.264	0.357	0.379
4.45	0.175	0.290	0.379	0.408
5.08	0.200	0.307	0.408	0.440
6.35	0.250	0.331	0.440	0.468
7.62	0.300	0.352	0.468	0.490
8.89	0.350	0.366	0.490	0.509
10.16	0.400	0.372	0.509	



CBR @ 95% MDD = 3.1

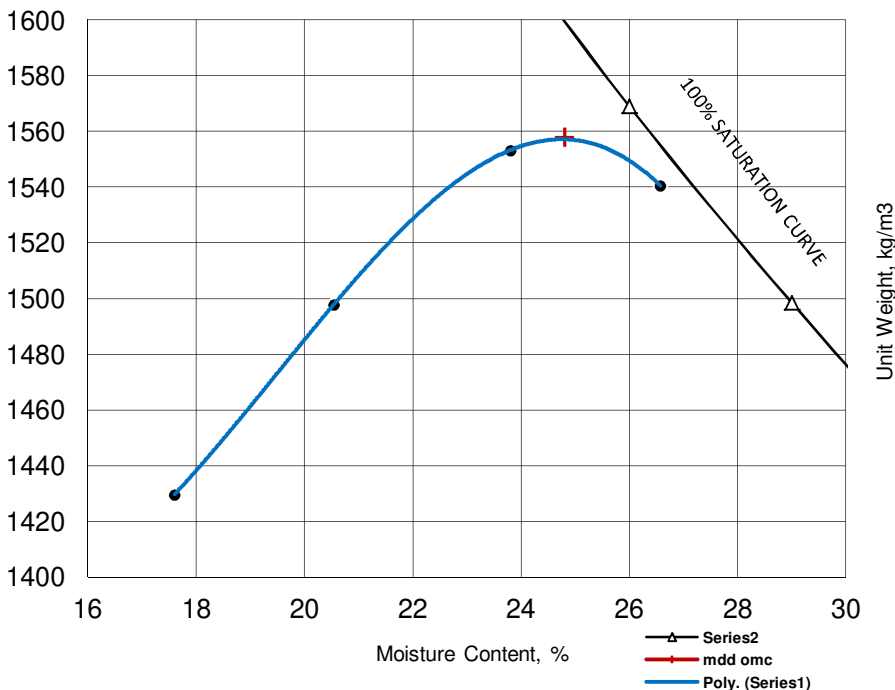
MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd. 99 Commerce Drive Winnipeg, MB. R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	7
PROJECT:	2021-2022 University Crescent Pavement Renewals		

Date Sampled	2-Mar-21	Date Received:	2-Mar-21	PROCEDURE	A
Sampled By:	ET/PB	Date Tested	16-Mar-21	PREPARATION	Dry
MATERIAL INFORMATION				COMPACTION METHOD	Manual
				BLOWS PER LAYER	25
				NO. OF LAYERS	3
				MOLD SIZE	100
				MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg				
Material Type:	Clay	Material Supplier	.	MOLD VOLUME	935
Material Use		Material Source	TH 13	WEIGHT OF HAMMER	2.5 kg
Maximum Size:	.				

	Test No.	1	2	3	4	5
Wet Density		1681	1805	1923	1950	0
Moisture Content		17.6	20.5	23.8	26.6	0.0
Dry Density		1430	1498	1553	1540	0

Moisture - Density Relationship



Maximum Dry Density (MDD):
1558 kg/m³
Optimum Moisture Content
24.8 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
0 %
Corrected Moisture:
24.8 %
Corrected Maximum Dry Density:
1558 kg/m³

Remarks:

Tested by: ia

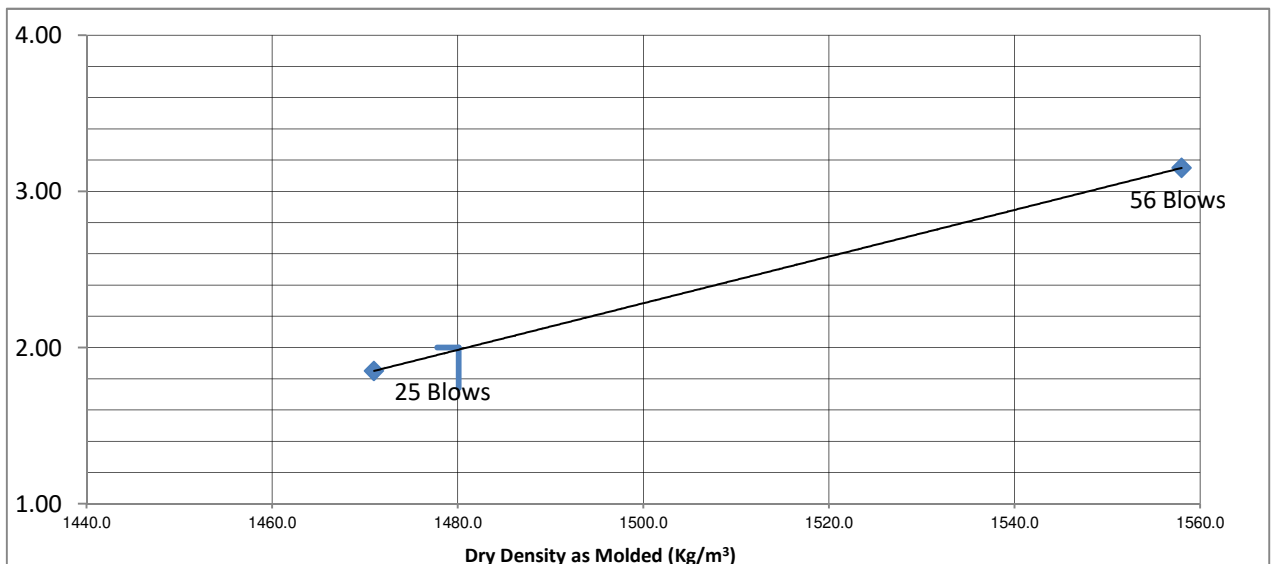
Reviewed By: Hermie Manalo

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	7
PROJECT:	2021-2022 University Crescent	DATE RECEIVED :	2-Mar-21
LOCATION	Pavement Renewals	DATE TESTED :	20-Mar-21
		TESTED BY:	IA

SAMPLE DATA		SPECIMEN DATA		
Sample ID:	CLAY	DESCRIPTION	Before Soaking	After Testing
Source:	TH 13	Moisture Content (MC), %	24.6	-
Sampled by:	ET/PB	MC of top 25mm layer, %	-	35.3
Optimum Moisture Content:	24.8%	Dry Density, kg/m ³	1558	
Maximum Dry Density kg/m ³ :	1558	Compaction, %		
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506	
Proctor Tested by:	IA	Swell, %	2.334	

DISPLACEMENT		STRESS			LOAD PENETRATION CURVE
mm	in	MPa			
		10 Blows	25 Blows	56 Blows	
0	0	0.000	0.000	0.000	
0.64	0.025	0.031	0.062	0.110	
1.27	0.050	0.062	0.110	0.166	
1.91	0.075	0.097	0.166	0.217	
2.54	0.100	0.128	0.217	0.255	
3.18	0.125	0.143	0.255	0.282	
3.81	0.150	0.159	0.282	0.306	
4.45	0.175	0.172	0.306	0.325	
5.08	0.200	0.189	0.325	0.350	
6.35	0.250	0.200	0.350	0.372	
7.62	0.300	0.214	0.372	0.390	
8.89	0.350	0.222	0.390	0.401	
10.16	0.400	0.230	0.401		



CBR @ 95% MDD = 2.0

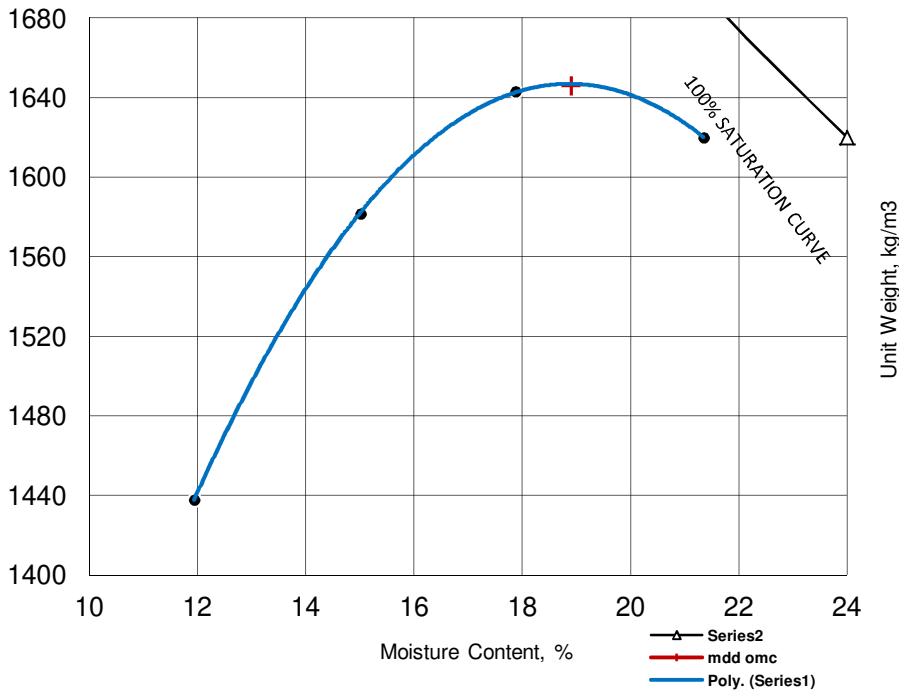
MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd. 99 Commerce Drive Winnipeg, MB. R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	8
PROJECT:	2021-2022 University Crescent Pavement Renewals		

Date Sampled	Date Received:	PROCEDURE	A
Sampled By: PB	Date Tested 11-Mar-21	PREPARATION	Dry
MATERIAL INFORMATION		COMPACTION METHOD	Manual
Material Type: Clay		BLOWS PER LAYER	25
Material Use	Material Supplier .	NO. OF LAYERS	3
Maximum Size: .	Material Source TH15	MOLD SIZE	100
		MOLD VOLUME	935
		WEIGHT OF HAMMER	2.5 kg

	Test No.	1	2	3	4	5
Wet Density		1610	1819	1937	1966	
Moisture Content		11.9	15.0	17.9	21.4	
Dry Density		1438	1582	1643	1620	

Moisture - Density Relationship



Maximum Dry Density (MDD):
1646 kg/m³

Optimum Moisture Content
18.9 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
0 %

Corrected Moisture:
18.9 %

Corrected Maximum Dry Density:
1646 kg/m³

Remarks:

Tested by: ia

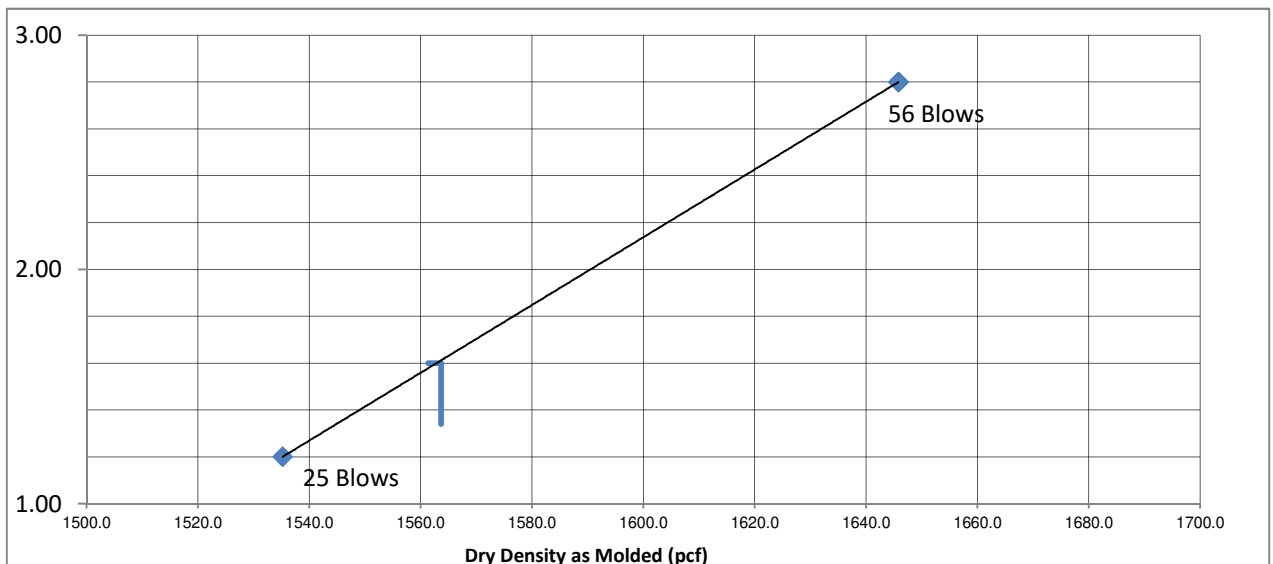
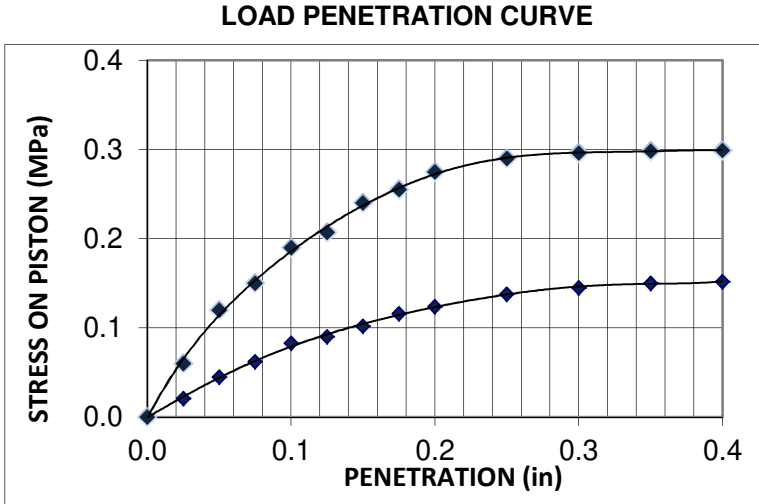
Reviewed By: Hermie Manalo

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	8
PROJECT:	2021-2022 University Crescent	DATE RECEIVED :	2-Mar-21
LOCATION	Pavement Renewals	DATE TESTED :	16-Mar-21
		TESTED BY:	IA

SAMPLE DATA		SPECIMEN DATA		
Sample ID:	CLAY	DESCRIPTION	Before Soaking	After Testing
Source:	TH 15	Moisture Content (MC), %	19	-
Sampled by:	PB	MC of top 25mm layer, %	-	23.6
Optimum Moisture Content:	18.9%	Dry Density, kg/m ³	1648	
Maximum Dry Density kg/m ³ :	1646	Compaction, %		
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506	
Proctor Tested by:	IA	Swell, %	2.312	

DISPLACEMENT		STRESS		
mm	in	MPa		
		10 Blows	25 Blows	56 Blows
0	0	0.000	0.000	0.000
0.64	0.025	0.021	0.060	0.120
1.27	0.050	0.045	0.120	0.150
1.91	0.075	0.062	0.150	0.190
2.54	0.100	0.083	0.190	0.207
3.18	0.125	0.090	0.207	0.240
3.81	0.150	0.102	0.240	0.255
4.45	0.175	0.116	0.255	0.275
5.08	0.200	0.124	0.275	0.290
6.35	0.250	0.138	0.290	0.296
7.62	0.300	0.145	0.296	0.298
8.89	0.350	0.150	0.298	0.299
10.16	0.400	0.152	0.299	



CBR @95% MDD = 1.6

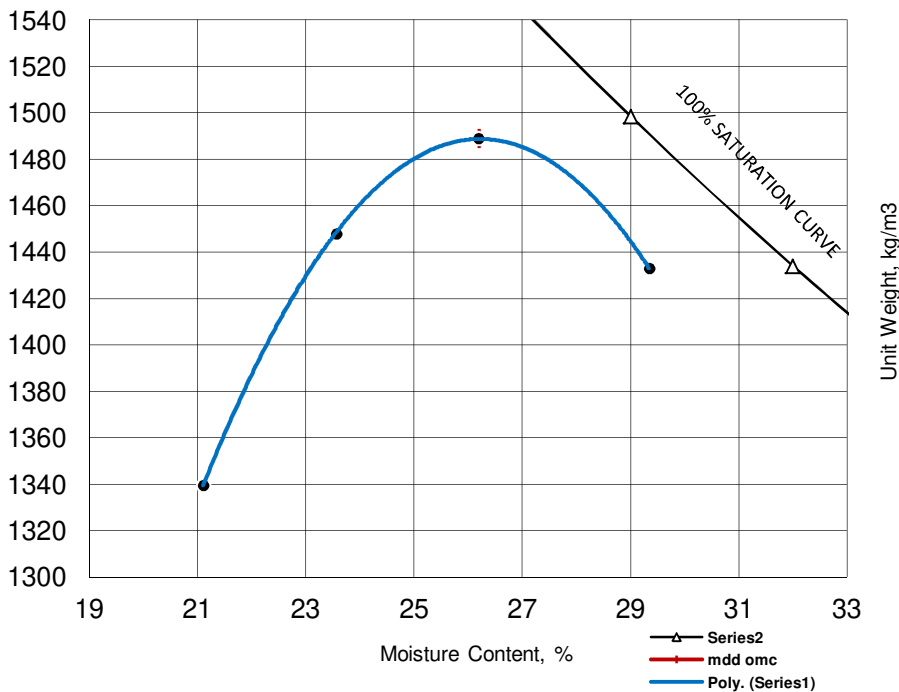
MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd. 99 Commerce Drive Winnipeg, MB. R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	9
PROJECT:	2021-2022 University Crescent Pavement Renewals		

Date Sampled	2-Mar-21	Date Received:	2-Mar-21	PROCEDURE	A
Sampled By:	ET/PB	Date Tested	16-Mar-21	PREPARATION	Dry
MATERIAL INFORMATION				COMPACTION METHOD	Manual
				BLOWS PER LAYER	25
				NO. OF LAYERS	3
				MOLD SIZE	100
				MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg				
Material Type:	Clay				
Material Use	-	Material Supplier	TH 16		
Maximum Size:	-	Material Source	-		

	Test No.	1	2	3	4	5
Wet Density		1622	1789	1879	1853	0
Moisture Content		21.1	23.6	26.2	29.3	0.0
Dry Density		1340	1448	1489	1433	0

Moisture - Density Relationship



Maximum Dry Density (MDD):
1489 kg/m³

Optimum Moisture Content
26.2 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
0 %

Corrected Moisture:
26.2 %

Corrected Maximum Dry Density:
1489 kg/m³

Remarks:

Tested by: ia

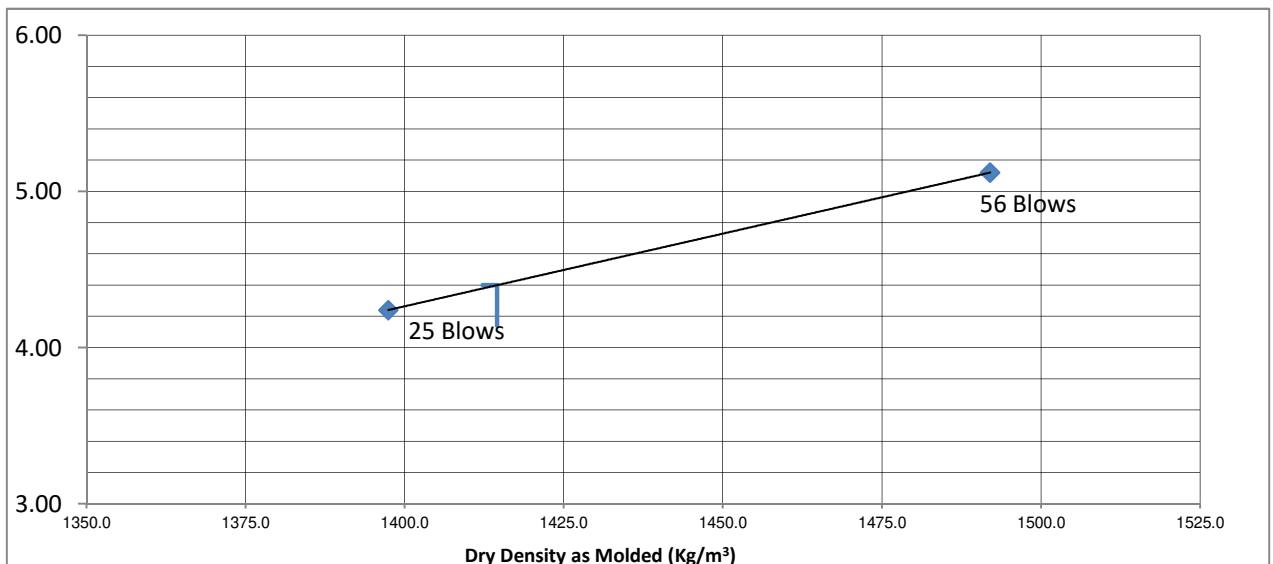
Reviewed By: Hermie Manalo

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	9
PROJECT:	2021-2022 University Crescent	DATE RECEIVED :	2-Mar-21
LOCATION	Pavement Renewals	DATE TESTED :	20-Mar-21
		TESTED BY:	IA

SAMPLE DATA		SPECIMEN DATA		
Sample ID:	CLAY	DESCRIPTION	Before Soaking	After Testing
Source:	TH 16	Moisture Content (MC), %	26.4	-
Sampled by:	ET/PB	MC of top 25mm layer, %	-	31.7
Optimum Moisture Content:	26.2%	Dry Density, kg/m ³	1492	
Maximum Dry Density kg/m ³ :	1489	Compaction, %		
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506	
Proctor Tested by:	ia	Swell, %	2.334	

DISPLACEMENT		STRESS			LOAD PENETRATION CURVE
mm	in	MPa			
		10 Blows	25 Blows	56 Blows	
0	0	0.000	0.000	0.000	
0.64	0.025	0.090	0.109	0.109	
1.27	0.050	0.159	0.193	0.193	
1.91	0.075	0.230	0.276	0.276	
2.54	0.100	0.292	0.353	0.353	
3.18	0.125	0.346	0.416	0.416	
3.81	0.150	0.380	0.457	0.457	
4.45	0.175	0.412	0.497	0.497	
5.08	0.200	0.434	0.528	0.528	
6.35	0.250	0.469	0.572	0.572	
7.62	0.300	0.498	0.617	0.617	
8.89	0.350	0.523	0.650	0.650	
10.16	0.400	0.539	0.683	0.683	



CBR @ 95% MDD = 4.4

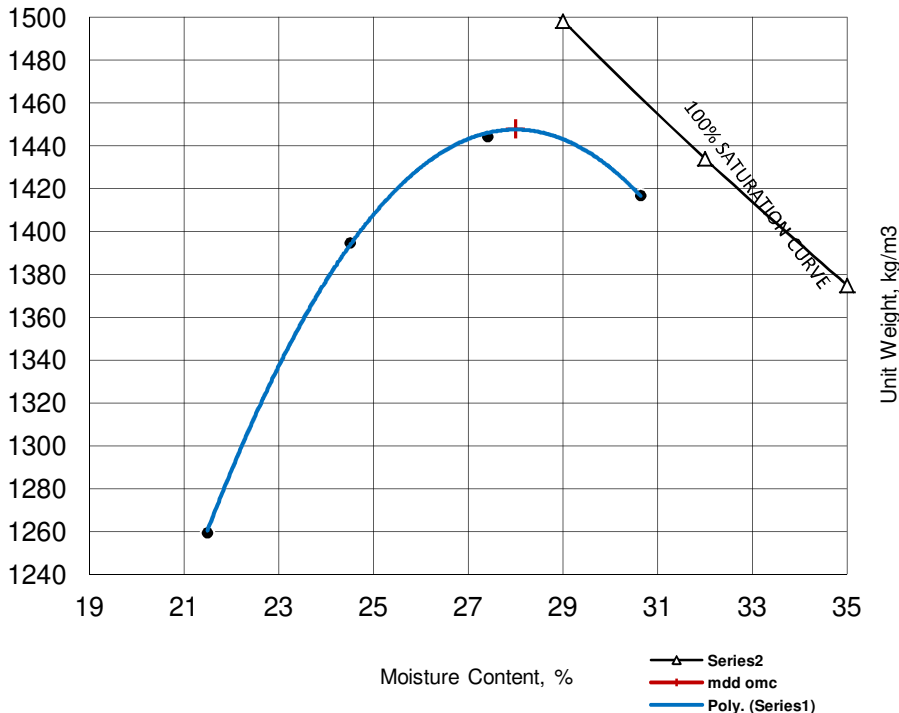
MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd. 99 Commerce Drive Winnipeg, MB. R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	10
PROJECT:	2021-2022 University Crescent Pavement Renewals		

Date Sampled	2-Mar-21	Date Received:	2-Mar-21	PROCEDURE	A
Sampled By:	ET/PB	Date Tested	16-Mar-21	PREPARATION	Dry
MATERIAL INFORMATION				COMPACTION METHOD	Manual
				BLOWS PER LAYER	25
				NO. OF LAYERS	3
				MOLD SIZE	100
				MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg				
Material Type:	Clay	Material Supplier	.	MOLD VOLUME	935
Material Use		Material Source	TH 19	WEIGHT OF HAMMER	2.5 kg
Maximum Size:	.				

	Test No.	1	2	3	4	5
Wet Density		1530	1737	1841	1851	
Moisture Content		21.5	24.5	27.4	30.6	
Dry Density		1260	1395	1445	1417	

Moisture - Density Relationship



Maximum Dry Density (MDD):
1448 kg/m³

Optimum Moisture Content
28.0 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
0 %

Corrected Moisture:
28.0 %

Corrected Maximum Dry Density:
1448 kg/m³

Remarks:

Tested by: ia

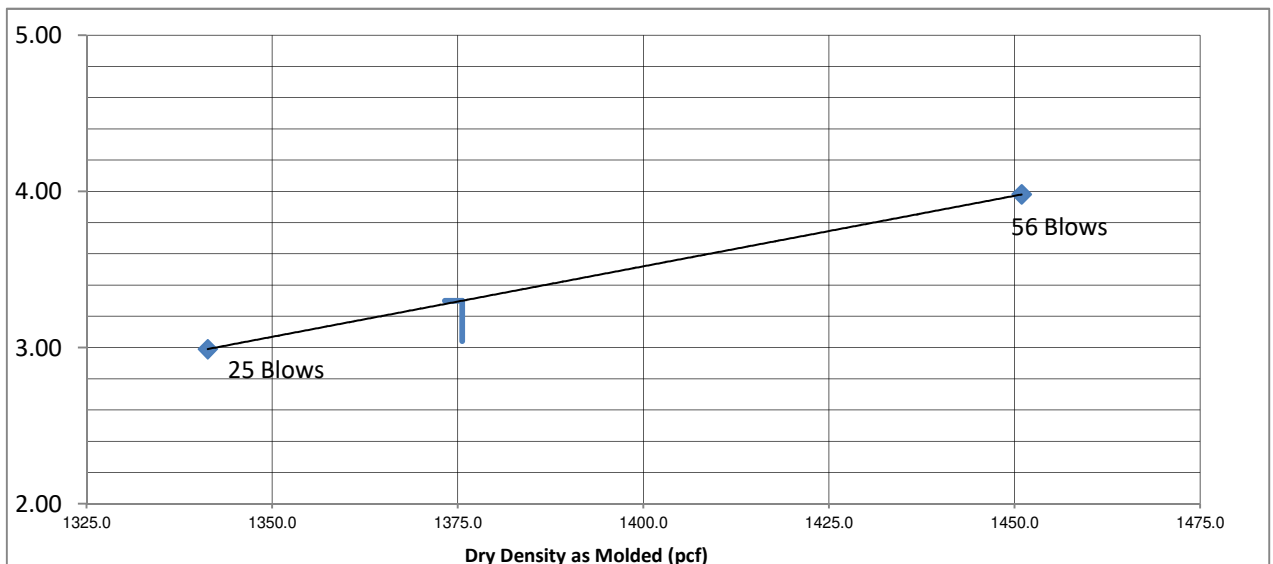
Reviewed By: Hermie Manalo

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

CLIENT:	AECOM 99 Commerce Drive Winnipeg, MB R3P 0Y7	PROJECT NO.:	112-2101
ATTENTION:	Ryan Cunningham	TEST NO.:	10
PROJECT:	2021-2022 University Crescent	DATE RECEIVED :	2-Mar-21
LOCATION	Pavement Renewals	DATE TESTED :	20-Mar-21
		TESTED BY:	IA

SAMPLE DATA		SPECIMEN DATA		
Sample ID:	CLAY	DESCRIPTION	Before Soaking	After Testing
Source:	TH/19	Moisture Content (MC), %	28	-
Sampled by:	PB	MC of top 25mm layer, %	-	38.4
Optimum Moisture Content:	28.0%	Dry Density, kg/m ³	1451	
Maximum Dry Density kg/m ³ :	1448	Compaction, %		
Method of Compaction:	Standard Proctor	Surcharge Weight, grams	4506	
Proctor Tested by:	ia	Swell, %	2.640	

DISPLACEMENT		STRESS			LOAD PENETRATION CURVE
mm	in	MPa			
		10 Blows	25 Blows	56 Blows	
0	0	0.000	0.000	0.000	
0.64	0.025	0.055	0.081	0.110	
1.27	0.050	0.110	0.150	0.209	
1.91	0.075	0.159	0.209	0.271	
2.54	0.100	0.206	0.274	0.308	
3.18	0.125	0.248	0.326	0.332	
3.81	0.150	0.271	0.357	0.356	
4.45	0.175	0.308	0.379	0.366	
5.08	0.200	0.332	0.411	0.371	
6.35	0.250	0.356	0.450	0.373	
7.62	0.300	0.366	0.486		
8.89	0.350	0.371	0.517		
10.16	0.400	0.373	0.539		



CBR @95% MDD - 3.8