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FOUNDATION INVESTIGATION REPORT

QEW - OVERHEAD SIGN SUPPORTS AND HIGH MAST LIGHT POLE QEW WIDENING FROM EAST OF CAWTHRA ROAD TO THE EAST MALL, CITIES OF MISSISSAUGA AND ETOBICOKE MINISTRY OF TRANSPORTATION, ONTARIO GWP 2102-13-00 & 2432-13-00

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REPORT

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Table of Contents

| | |
|---|-----------|
| 1.0 INTRODUCTION..... | 1 |
| 2.0 SITE DESCRIPTION..... | 1 |
| 3.0 INVESTIGATION PROCEDURES | 1 |
| 4.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS | 3 |
| 4.1 Regional Geology | 3 |
| 4.2 Subsurface Conditions..... | 4 |
| 4.2.1 Asphalt / Concrete | 4 |
| 4.2.2 Fill | 4 |
| 4.2.3 Silt to Sandy Silt to Silty Sand to Sand and Gravel | 5 |
| 4.2.4 Clayey Silt | 5 |
| 4.2.5 Clayey Silt Till | 6 |
| 4.2.6 Residual Soil | 6 |
| 4.2.7 Bedrock..... | 6 |
| 4.3 Groundwater Conditions | 8 |
| 4.4 Analytical Testing of Soil Sample | 8 |
| 5.0 CLOSURE | 10 |

DRAWINGS

Drawing 1 Borehole Locations

APPENDICES

Appendix A Record of Boreholes and Record of Drillhole Sheets

Lists of Symbols and Abbreviations

Lithological and Geotechnical Rock Description Terminology

Record of Boreholes OHS-1 to OHS-6, RW2-5, RW3-3, NW6-8, NW9-1, and HML-1

Record of Drillholes OHS-2, OHS-4, OHS-5B, OHS-6, RW3-3 and HML-1

Appendix B Laboratory Test Results, Bedrock Core Photographs

Figure B1 Grain Size Distribution – Silt and Sand to Gravelly Silty Sand to Sand (Fill)

Figure B2 Plasticity Chart – Clayey Silt (Fill)

Figure B3 Grain Size Distribution – Sand to Sand and Gravel

Figure B4 Grain Size Distribution– Silt

Figure B5 Plasticity Chart – Silt

Figure B6 Grain Size Distribution – Clayey Silt to Clayey Silt with Sand

Figure B7 Plasticity Chart – Clayey Silt

Figure B8 Grain Size Distribution – Clayey Silt with Sand (Till)



FOUNDATION REPORT
QEW - OHS AND HML, GWP 2102-13-00 & 2432-13-00

| | |
|---|--|
| Figure B9 | Plasticity Chart – Clayey Silt (Till) |
| Figure B10 | Grain Size Distribution– Clayey Silt (Residual Soil) |
| Figure B11 | Plasticity Chart – Clayey Silt (Residual Soil) |
| Figure B12 | Bedrock Core Photographs – OHS-2 |
| Figure B13 | Bedrock Core Photographs – OHS-4 |
| Figure B14 | Bedrock Core Photographs – OHS-5B |
| Figure B15 | Bedrock Core Photographs – OHS-6 |
| Figure B16 | Bedrock Core Photographs – RW3-3 |
| Figure B17 | Bedrock Core Photographs – HML-1 |
| Bedrock Laboratory Testing Results - Geomechanica | |

Appendix C Analytical Test Results



1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by AECOM on behalf of the Ministry of Transportation, Ontario (MTO) to provide foundation engineering services for the proposed Queen Elizabeth Way (QEW) improvement from east of Cawthra to the East Mall, in the Cities of Mississauga and Etobicoke, Ontario, including rehabilitation of three bridge sites, replacement of three bridges, replacement of two culverts, stormwater management (SWM) ponds, retaining walls, noise barrier walls, high mast light pole foundations, and sign support foundations. This report addresses the results of the foundation investigation carried out for the overhead sign (OHS) supports and high mast light (HML) pole.

The purpose of this investigation is to establish the subsurface soil and bedrock conditions at the proposed OHS support and HML pole locations, by borehole drilling, rock coring and laboratory testing on selected soil and rock core samples.

The Terms of Reference (TOR) and the scope of work for the foundation investigation are outlined in MTO's Request for Proposal, dated January 2016, which forms part of the Consultant's Assignment Number 2015-E-0001 for this project. The work has been carried out in accordance with Golder's Project Specific Supplementary Specialty Plan for foundation engineering services for this project, dated June 6, 2016.

2.0 SITE DESCRIPTION

The west limit of the OHS support and high mast light (HML) pole investigation in the QEW corridor is approximately at the Ogden Avenue Pedestrian Bridge (Station 11+850), and the east limit is approximately at The East Mall interchange (Station 15+000), in the Cities of Mississauga and Etobicoke, respectively. The natural ground surface in this area of the QEW corridor slopes gradually downward from about Elevation 106 m at the west limit to about Elevation 102 m near Etobicoke Creek, then it slopes down into the Etobicoke Creek valley to about Elevation 92 m. East of the Etobicoke Creek valley the natural ground surface rises to about Elevation 112 m near the east limit of the project site. The QEW has generally been constructed on embankment fill, with the embankment height varying from less than 1 m to about 3 m above the adjacent ground surface.

3.0 INVESTIGATION PROCEDURES

The field work for the foundation investigations along the QEW corridor was carried out between September 9 and 22, 2016 during which time a total of ten boreholes were advanced in the general area of the nine proposed OHS structures and one borehole was advanced at the approximate location of the proposed HML pole. The boreholes, designated as Boreholes OHS-1 to OHS-6, RW2-5, RW3-3, NW6-8, NW9-1 and HML-1, were advanced at the locations shown on Drawing 1 and the Record of Borehole/Drillhole sheets are presented in Appendix A.

The field borehole investigation was carried out using truck-mounted CME 55 and CME 75 drill rigs, supplied and operated by Davis Drilling of Milton, Ontario. The boreholes were advanced through the overburden using 108 mm outside diameter (O.D.) solid stem augers and NW casing. Soil samples were obtained at 0.75 m and 1.5 m intervals of depth, using a 50 mm outer diameter (O.D.) split-spoon sampler driven by an automatic hammer in



accordance with Standard Penetration Test (SPT) procedures (ASTM D1586-08)¹. Samples of the bedrock were obtained using an 'NQ' size rock core barrel and coring techniques.

The boreholes were typically advanced to a minimum depth of 6 m below ground surface or to auger and/or sampler refusal (i.e. inferred bedrock) and bedrock was confirmed by coring. The boreholes were advanced to depths ranging from about 6.2 m to 10.9 m below existing ground surface, including coring of bedrock for core lengths between about 3.0 m and 5.7 m in Boreholes OHS-2, OHS-4 to OHS-6, RW3-3 and HML-1. Photographs of the recovered rock samples are provided in Appendix B. Due to restrictions in lane closure times, coring of the bedrock in Borehole OHS-5 was not carried out on the date that Borehole OHS-5 was drilled through the overburden. A second borehole drilled for bedrock coring purposes, Borehole OHS-5B, was advanced adjacent to Borehole OHS-5 through the overburden.

The groundwater conditions and water levels in the open boreholes were observed during the drilling operations. All boreholes were backfilled with bentonite upon completion in accordance with Ontario Regulation 903, "Wells" (as amended).

The field work was observed by members of Golder's engineering and technical staff, who located the boreholes, arranged for the clearance of underground services, observed the drilling, coring, sampling and in situ testing operations, logged the boreholes, and examined and cared for the soil and rock samples. The samples were identified in the field, placed in appropriate containers, labelled and transported to our Mississauga geotechnical laboratory where the samples underwent further visual examination and laboratory testing. All of the laboratory tests were carried out to MTO and/or ASTM Standards, as appropriate. Classification testing (water content, Atterberg limits and grain size distribution) was carried out on selected samples. Point Load Index testing was carried out on selected bedrock core samples and a sample of the bedrock core from Borehole HML-1 was submitted to Geomechanica Inc. for unconfined compression (uniaxial) strength (UCS) testing. The results of the laboratory testing are included in Appendix B.

One soil sample obtained during the field investigation from each of Borehole OHS-4 and OHS-5, using appropriate sampling protocols, were submitted to a specialist analytical laboratory under chain of custody procedures for chemical analysis of conductivity / resistivity, pH and sulphate, and chloride content to assess the potential for the soil to cause deterioration to buried concrete and corrosion to steel. The results of the analytical testing are discussed in Section 4.4 and are provided in Appendix C.

The borehole locations and the ground surface elevations of the as-drilled locations were obtained using a GPS (Trimble XH 3.5G), having an accuracy of 0.1 m in the vertical and 0.1 m in the horizontal. The locations given in the Record of Borehole/Drillhole sheets and shown on Drawing 1 are positioned relative to MTM NAD 83 (Zone 10) northing and easting coordinates and the ground surface elevations are referenced to Geodetic datum. The borehole locations, ground surface elevations and drilled depths are summarized below.

¹ ASTM D1586-08a – Standard Test Method for Standard Penetration Tests and Split Barrel Sampling of the soil.



FOUNDATION REPORT QEW - OHS AND HML, GWP 2102-13-00 & 2432-13-00

| Borehole No. | Approximate Station | Location (MTM NAD 83) | | Ground Surface Elevation (m) | Borehole Depth (m) |
|--------------|---------------------|----------------------------|---------------------------|------------------------------|--------------------|
| | | Northing (Latitude) | Easting (Longitude) | | |
| OHS-1 | 11+835 | 4,827,742.0 (43.589586) | 298,624.3 (-79.576480) | 103.5 | 6.2 |
| OHS-2 | 11+900 | 4,827,799.9 (43.590107) | 298,661.6 (-79.576019) | 104.0 | 10.9* |
| OHS-3 | 12+365 | 4,828,159.5 (43.593347) | 298,952.8 (-79.572416) | 105.5 | 8.2 |
| OHS-4 | 12+750 | 4,828,464.7 (43.596096) | 299,192.8 (-79.569448) | 105.6 | 10.8* |
| OHS-5/5B | 13+245 | 4,828,855.1 (43.599612) | 299,494.6 (-79.565714) | 107.0 | 9.1* |
| OHS-6 | 13+705 | 4,829,219.3 (43.602892) | 299,776.2 (-79.562228) | 105.0 | 9.3* |
| RW2-5 | 13+815 | 4,829,306.2 (43.603674) | 299,845.3 (-79.561374) | 102.1 | 7.7 |
| RW3-3 | 13+830 | 4,829,295.7 (43.603581) | 299,881.0 (-79.560932) | 102.0 | 7.6* |
| NW6-8 | 13+370 | 4,828,943.1 (43.600405) | 299,587.1 (-79.564569) | 107.0 | 6.7 |
| NW9-1 | 14+120 | 4,829,518.2 (43.605585) | 300,060.1 (-79.558715) | 101.0 | 7.7 |
| HML-1 | 14+930 | 4,830,170.8 (43.611462) | 300,564.8 (-79.552469) | 109.7 | 9.3* |

* includes bedrock core of between 3.0 m and 6.1 m lengths

4.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

4.1 Regional Geology

The project area is located within the Iroquois Plain physiographic region, as delineated in The Physiography of Southern Ontario (Chapman and Putman, 1984)².

The glacial Iroquois Plain stretches along the northern shoreline of Lake Ontario, extending from the Niagara Escarpment in the west to the Scarborough Bluffs in the east. The Iroquois Plain soils consist of glaciolacustrine sediments deposited in Lake Iroquois, primarily sands, silts and gravels, with a shallow cover of till remaining over the bedrock.

The bedrock underlying the Greater Toronto Area consists of three shale dominated units: from oldest to youngest, they are the Blue Mountain, Georgian Bay and Queenston Formations. These bedrock formations are essentially

² Chapman, L.J. and Putman, D.F., 1984, The Physiography of Southern Ontario, Ontario Geological Society, Special Volume 2, Third Edition. Accompanied by Map p. 2715, Scale 1:600,000.)



horizontally bedded, although on a regional scale, they dip gently to the south. The Georgian Bay Formation which underlies the study area consists mainly of blue-grey shale, containing siltstone, sandstone and limestone interbeds. Outcrops of this formation are commonly found along water courses on the west side of Toronto and in Mississauga, notably in the Humber River, Mimico Creek, Etobicoke Creek and Credit River valleys.

4.2 Subsurface Conditions

The detailed subsurface soil, bedrock and groundwater conditions as encountered in the boreholes advanced during this investigation and the results of the laboratory tests carried out on selected soil and bedrock core samples are presented on the Record of Borehole and Drillhole sheets provided in Appendix A and on the individual laboratory test reports included in Appendix B and Appendix C. The results of the in-situ field tests (i.e. SPT 'N'-values) as presented on the Record of Borehole Sheets and in Section 4 are uncorrected.

The stratigraphic boundaries shown on the Record of Borehole sheets are inferred from non-continuous sampling, observations of drilling progress and the results of Standard Penetration Tests. These boundaries, therefore, represent transitions between soil types rather than exact planes of geological change. Furthermore, subsurface conditions will vary between and beyond the borehole locations; however, the factual data presented in the record of Borehole and Drillhole sheets governs any interpretation of the site conditions.

In general, the subsurface conditions in the area of the proposed OHS supports and HML pole consist of a layer of asphalt over a deposit of fill associated with the construction of the existing Highway embankment. The fill is underlain by granular deposits of silt to sand in some locations, and silty clay to clayey silt with sand, silty clay till or residual soil. The overburden deposits are underlain by shale bedrock. Additional boreholes advanced within the project limits for the design of noise walls (NW series boreholes) and retaining walls (RW series boreholes), are included in the associated reports (under separate cover), and confirm that in general the stratigraphy is consistent along a majority of the alignment and that subsurface conditions and bedrock surface elevations do not vary significantly over short distances. As such, the boreholes advanced at the locations nearest to the overhead sign supports (i.e. within about 30 m) are considered to be applicable to adequately determine the subsurface conditions of the overhead sign support foundations.

A detailed description of the subsurface conditions encountered in the boreholes advanced in the area of the overhead signs and high mast light pole are provided in the following sections.

4.2.1 Asphalt / Concrete

All of the boreholes were advanced through the QEW roadway surface and encountered a layer of asphalt varying in thickness from about 65 mm to 300 mm. A 380 mm thick layer of concrete was encountered underlying the asphalt in Borehole OHS-5, and a 180 mm thick layer of concrete was encountered underlying the asphalt in Borehole RW2-5.

4.2.2 Fill

Fill material associated with the road base/subbase and highway embankment ranging in thickness between 0.1 m and 3.7 m was encountered in Boreholes OHS-1 to OHS-4, OHS-6, RW2-5, RW3-3, NW6-8, NW9-1 and HML-1 underlying the asphalt and concrete (where present). The fill materials encountered in the boreholes are variable in composition, ranging from sand and gravel road base materials, which are generally present immediately below the asphalt, and from sandy silt to silty sand to gravelly silty sand to sand comprising the roadway embankment. In Borehole NW9-1 a 1.4 m thick layer of cohesive fill consisting of clayey silt was encountered interlayered within the non-cohesive embankment fill. The fill ranges in thickness between about 0.1 m and 3.6 m at the borehole locations.



The measured Standard Penetration Test (SPT) “N”-values in the fill material range from 4 blows to 55 blows per 0.3 m of penetration, and generally greater than 11 blows per 0.3 m of penetration, indicating a loose to very dense, and generally compact, relative density. The measured Standard Penetration Test (SPT) “N”-values in the cohesive fill layer in Borehole NW9-1 are 5 blows and 10 blows per 0.3 m of penetration, suggesting a firm to stiff consistency. The natural moisture content measured on samples of the fill materials ranges between 17 per cent and 25 per cent.

Grain size distribution tests were carried out on three samples of the non-cohesive fill deposits and the results are presented on Figure B1, in Appendix B. An Atterberg limits test was carried out on a sample of the cohesive fill deposit encountered in Borehole NW9-1 and measured a liquid limit of 26 per cent, a plastic limit of 16 per cent and a plasticity index of 10 per cent. This result, which is plotted on a plasticity chart on Figure B2 in Appendix B, indicates that the fill can be classified as clayey silt of low plasticity.

4.2.3 Silt to Sandy Silt to Silty Sand to Sand and Gravel

A 1.0 m to 4.1 m thick deposit of non-cohesive soils, ranging in composition from silt to sandy silt to gravelly sandy silt to silty sand to sand to sand and gravel was encountered underlying the fill in Borehole OHS-2, OHS-3 and NW6-8, underlying the concrete in Borehole OHS-5, underlying the clayey silt in Borehole NW9-1 (as discussed in Section 4.2.4), and interlayered with the clayey silt deposit (as discussed in Section 4.2.4) in Borehole OHS-2. The surface of the granular deposit was encountered between about Elevations 94.9 m and 106.5 m and extends to depths of between about 3.8 m and 7.6 m below ground surface (between Elevations 103.2 m and 93.4 m).

The SPT “N”-values measured within the non-cohesive deposit range from 6 blows to 67 blows per 0.3 m of penetration, indicating that the non-cohesive deposit has a loose to very dense relative density.

Grain size distribution tests were carried out on four samples of the non-cohesive deposit and the results are presented on Figure B3 (sand to sand and gravel portion of the deposit) and Figure B4 (silt portion of the deposit), in Appendix B. An Atterberg limits test was carried out on a samples of the silt deposit encountered in Borehole OHS-3 and measured a liquid limit of 18 per cent, a plastic limit of 14 per cent and a plasticity index of 4 per cent. This result, which is plotted on a plasticity chart on Figure B5 in Appendix B, indicates that the deposit is a silt of slight plasticity.

The water content measured on eight samples of the granular deposit ranges between 6 per cent and 25 per cent.

4.2.4 Clayey Silt

A 0.7 m to 6.3 m thick deposit of clayey silt trace sand to with sand, trace gravel to gravelly, was encountered underlying the fill in Boreholes OHS-1, RW2-5, NW9-1 and HML-1, underlying the non-cohesive native deposit in Borehole NW6-8 and interlayered within the non-cohesive deposit in Borehole OHS-2. The surface of the clayey silt deposit was encountered at between about Elevations 97.3 m and 109.4 m and extends to depths of between about 2.3 m and 7.7 m below ground surface (between Elevations 107.4 m and 94.4 m).

The SPT “N”-values measured within the clayey silt deposit range from 4 blows to 39 blows per 0.3 m of penetration and 50 blows for 0.1 m of penetration, suggesting a firm to hard consistency.

Grain size distribution tests were carried out on six samples of the clayey silt deposit and the results are presented on Figure B6, in Appendix B. Atterberg limits tests were carried out on seven samples of the clayey silt deposit and measured liquid limits between 21 per cent and 33 per cent, plastic limits between 14 per cent and 21 per cent and plasticity indices between 8 per cent and 14 per cent. These results, which are plotted on a plasticity chart on Figure B7 in Appendix B, indicate that the deposit is a clayey silt of low plasticity.



The water content measured on samples of the clayey silt deposit ranges between 10 per cent and 24 per cent.

4.2.5 Clayey Silt Till

A 0.3 m to 3.7 m thick till deposit consisting of clayey silt with sand to some sand, trace gravel to gravelly was encountered underlying the granular deposit in Borehole OHS-3, underlying the fill deposit in Borehole OHS-6 and underlying the clayey silt with sand deposit in Borehole NW6-8. The surface of the clayey silt till deposit was encountered between about Elevation 98.5 m and 104.2 m and the deposit extends to a depth of about 4.5 m below ground surface (Elevation 100.5 m) in Borehole OHS-6 and to depths of 6.7 m and 8.2 m below ground surface in Boreholes NW6-8 and OHS-3 (Elevation 100.3 m and 97.3 m), respectively, wherein the boreholes were terminated without fully penetrating the deposit. The presence of cobbles and boulders within the till deposit in Borehole OHS-6 was inferred based on grinding of the augers as noted on the Record of Borehole sheet in Appendix A.

The SPT "N"-values measured within the clayey silt till deposit range from 21 blows to 59 blows per 0.3 m of penetration, suggesting a very stiff to hard consistency.

A grain size distribution test was carried out on one sample of the clayey silt till deposit and the result is presented on Figure B8, in Appendix B. Atterberg limits tests were carried out on two samples of the clayey silt till deposit and measured liquid limits of 26 per cent and 27 per cent, plastic limits of 17 per cent and plasticity indices of 9 per cent and 10 per cent. These results, which are plotted on a plasticity chart on Figure B9 in Appendix B, indicate that the deposit is a clayey silt of low plasticity.

The water content measured on two samples of the clayey silt till deposit is 8 per cent.

4.2.6 Residual Soil

Underlying the cohesive deposit in Boreholes OHS-1 and HML-1, the fill in Borehole OHS-4, the granular deposits in Borehole OHS-5 and the till deposit in Borehole OHS-6, a 1.5 m to 4.0 m thick deposit of residual soil was encountered. The surface of the residual soil deposit was encountered at between about Elevations 100.5 m and 107.4 m and the deposit extends to depths between about 4.4 m and 6.3 m below ground surface (Elevations 103.5 m and 98.9 m).

The SPT "N"-values measured within the residual soil deposit range from 21 blows to 59 blows per 0.3 m of penetration, suggesting a very stiff to hard consistency.

The deposit consists of clayey silt some sand to with sand, trace to with gravel and contains varying amounts of shale fragments, and is derived from weathering of the underlying shale bedrock. Grain size distribution tests were carried out on two samples of the residual soil deposit and the results are presented on Figure B10, in Appendix B. Atterberg limits tests were carried out on four samples of the residual soil deposit and measured liquid limits between 23 per cent and 30 per cent, plastic limits between 14 per cent and 19 per cent and plasticity indices between 9 per cent and 12 per cent. These results, which are plotted on a plasticity chart on Figure B11 in Appendix B, indicate that the residual soil deposit may be classified as a clayey silt of low plasticity.

The water content measured on samples of the residual soil deposit range between 6 per cent and 15 per cent.

4.2.7 Bedrock

Bedrock was encountered and core samples were recovered in Boreholes OHS-2, OHS-4 to OHS-6, RW3-3 and HML-1. The bedrock surface was encountered in Boreholes OHS-1 and NW9-1 and penetrated for depths of 1.8 m



FOUNDATION REPORT QEW - OHS AND HML, GWP 2102-13-00 & 2432-13-00

and 0.1 m, respectively, by auger drilling and/or split spoon sampling. The depths to bedrock below ground surface and the corresponding bedrock surface elevation are summarized below.

| Borehole | Depth to Bedrock Surface / Refusal (m) | Bedrock Surface / Refusal Elevation (m) | Comments |
|----------------|--|---|---|
| OHS-1 | 4.4 | 99.1 | Bedrock penetrated by augering to a depth of 6.2 m. |
| OHS-2 | 6.1 | 97.9 | Bedrock cored between depths of 7.6 m and 10.9 m. |
| OHS-4 | 4.7 | 100.9 | Bedrock cored between depths of 4.7 m and 10.8 m. |
| OHS-5 / OHS-5B | 6.2 / 6.1 | 100.8 / 100.9 | Bedrock cored between depths of 6.1 m and 9.1 m in Borehole OHS-5B. |
| OHS-6 | 6.1 | 98.9 | Bedrock cored between depths of 6.2 m and 9.3 m. |
| RW3-3 | 2.3 | 99.7 | Bedrock cored between depths of 3.8 m and 7.6 m. |
| NW9-1 | 7.6 | 93.4 | Split-spoon sample recovered |
| HML-1 | 6.2 | 103.5 | Bedrock cored between depths of 6.3 m and 9.3 m. |

Based on a review of the bedrock core samples, the bedrock consists of shale of the Georgian Bay formation. In general, the bedrock core samples are described as moderately weathered (with some completely weathered or slightly weathered zones), thinly laminated, very fine grained, non-porous, weak, grey, with medium strong to strong limestone interbeds at varying intervals, as presented in the Record of Drillhole sheets in Appendix A, and shown on the photographs of the recovered core samples on Figures B12 to B17 in Appendix B. The degree of weathering of the bedrock samples (i.e. fresh to slightly weathered – W1 to W2), and the strength classification of the intact rock mass based on field identification (i.e. strong to very strong – R4 to R5) are described in accordance with the International Society for Rock Mechanics (ISRM³) standard classification system.

The Rock Quality Designation (RQD) measured on the core samples ranges from 0 per cent to 100 per cent, and is generally greater than 53 per cent, indicating a rock mass of very poor to excellent quality, and generally of fair or better quality, as per Table 3.10 of CFEM (2006)⁴. The Total Core Recovery (TCR) and Solid Core Recovery (SCR) of samples recovered are between 0 per cent and 100 per cent.

One unconfined compression strength (UCS) test (ASTM D7012)⁵ was carried out on a core sample of the shale bedrock obtained in Borehole HML-1 which measured a compressive strength of about 17.8 MPa, as summarized in the report from Geomechanica included in Appendix B.

Based on the laboratory UCS test, in accordance with Table 3.5 in CFEM (2006), the shale bedrock is classified as weak (R_2 , $5 \text{ MPa} < \text{UCS} < 25 \text{ MPa}$).

³ International Society for Rock Mechanics Commission on Test Methods, 1985. Int. J. Rock Mech.Min. Sci. & Geomech. Abstr. Vol 22, No. 2, pp. 51-60.

⁴ Canadian Geotechnical Society. 2006. Canadian Foundation Engineering Manual (CFEM), 4th Edition. The Canadian Geotechnical Society, BiTech Publisher Ltd., British Columbia.

⁵ ASTM D7012 – Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens



Point Load tests were carried out on thirteen samples of the bedrock core, and the results are summarized below:

| Borehole No. | Sample Depth (m) | Approximate Sample Elevation (m) | Axial (A) or Diametral (D) Test | Rock Type | I _s (50 mm) (MPa) |
|--------------|------------------|----------------------------------|---------------------------------|-----------|------------------------------|
| OHS-2 | 8.55 | 95.5 | D | Limestone | 4.60 |
| OHS-2 | 8.55 | 95.5 | D | Limestone | 3.32 |
| OHS-2 | 8.55 | 95.5 | D | Limestone | 4.60 |
| OHS-2 | 8.57 | 95.4 | A | Limestone | 10.70 |
| OHS-2 | 8.60 | 95.4 | A | Limestone | 4.97 |
| OHS-2 | 9.66 | 94.3 | A | Shale | 0.95 |
| OHS-4 | 7.90 | 97.7 | A | Limestone | 2.78 |
| OHS-5 | 6.52 | 100.5 | D | Shale | 0.06 |
| OHS-5 | 6.52 | 100.5 | A | Shale | 0.85 |
| OHS-5 | 6.89 | 100.1 | A | Shale | 0.44 |
| OHS-5 | 6.32 | 100.7 | D | Shale | 0.38 |
| OHS-5 | 6.33 | 100.7 | A | Shale | 0.62 |
| OHS-6 | 7.65 | 97.4 | A | Shale | 0.31 |

Based on the point load test results, in accordance with Table 3.5 from CFEM (2006), the shale bedrock within the depth of exploration is classified as weak (R2, PLI < 1 MPa), containing strong to extremely strong (R4 to R6, 2 MPa < PLI < 10 MPa) limestone interlayers.

4.3 Groundwater Conditions

The overburden samples obtained from the boreholes were generally moist to wet. The water level observed in Boreholes OHS-1 to OHS-4, NW9-1 and NW6-8 upon completion of drilling (and prior to rock coring as applicable) varied between depths of about 1.1 m and 6.5 m (between Elevations 102.4 m and 94.5 m), and Boreholes OHS-5, OHS-6, RW3-3 and RW2-5 were observed to be dry upon completion of drilling operations.

It should be noted that the groundwater level in the area is subject to seasonal fluctuations and precipitation events, and should be expected to be higher during wet periods of the year.

4.4 Analytical Testing of Soil Sample

Analytical testing was carried out on a soil sample from each of Boreholes OHS-4 and OHS-5, from depths of about 2.4 m and 4.1 m below ground surface, respectively. The testing was carried out to assess the corrosivity and concrete degradation potential of the soils against the proposed new OHS footings. The analytical test results from the specialist analytical laboratory are presented in Appendix C and are summarized below.



FOUNDATION REPORT
QEW - OHS AND HML, GWP 2102-13-00 & 2432-13-00

| Parameter | OHS-4 | OHS-5 |
|------------------------|-------------------------|------------------------|
| Soil Resistivity | 850 ohm-cm | 1400 ohm-cm |
| Soil Conductivity | 1180 $\mu\text{mho/cm}$ | 720 $\mu\text{mho/cm}$ |
| Sulphate Concentration | 270 $\mu\text{g/g}$ | 560 $\mu\text{g/g}$ |
| Chloride Concentration | 500 $\mu\text{g/g}$ | 40 $\mu\text{g/g}$ |
| Soil pH | 7.9 | 7.9 |



5.0 CLOSURE

This report was prepared by Mr. Matthew Kelly, P.Eng., a geotechnical engineer with Golder. Mr. Jorge Costa, P.Eng., Golder's Designated MTO Foundation Contact for this project and Senior Consultant with Golder, conducted an independent quality control review of the report.

GOLDER ASSOCIATES LTD.



Matthew Kelly, P. Eng.
Geotechnical Engineer

MWK/JMAC/smsm



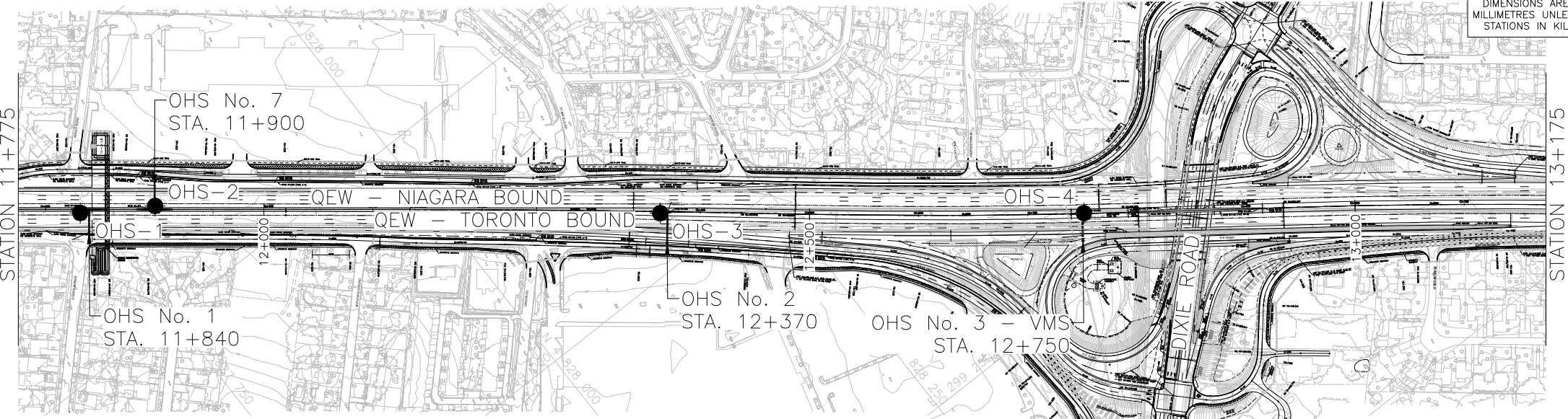
Jorge M.A. Costa, P.Eng.
Designated MTO Foundations Contact, Senior Consultant

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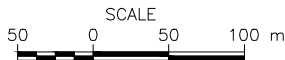
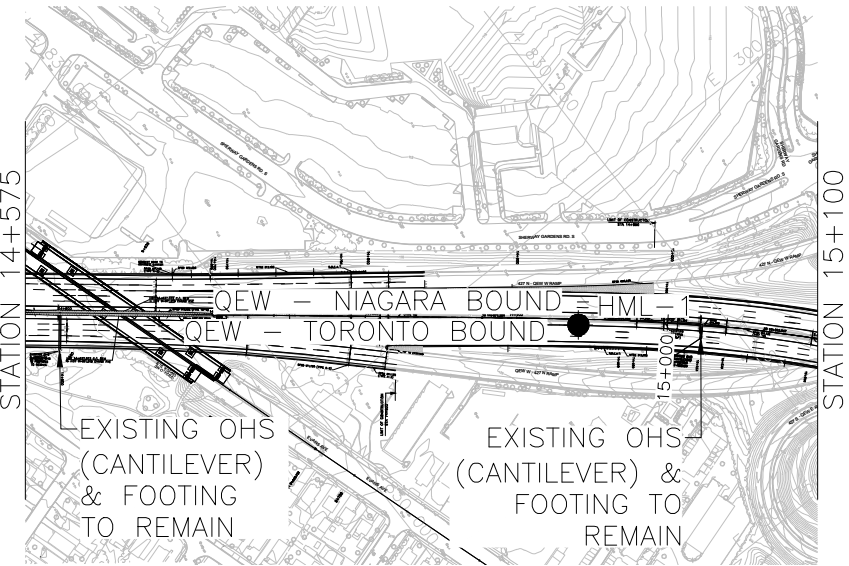
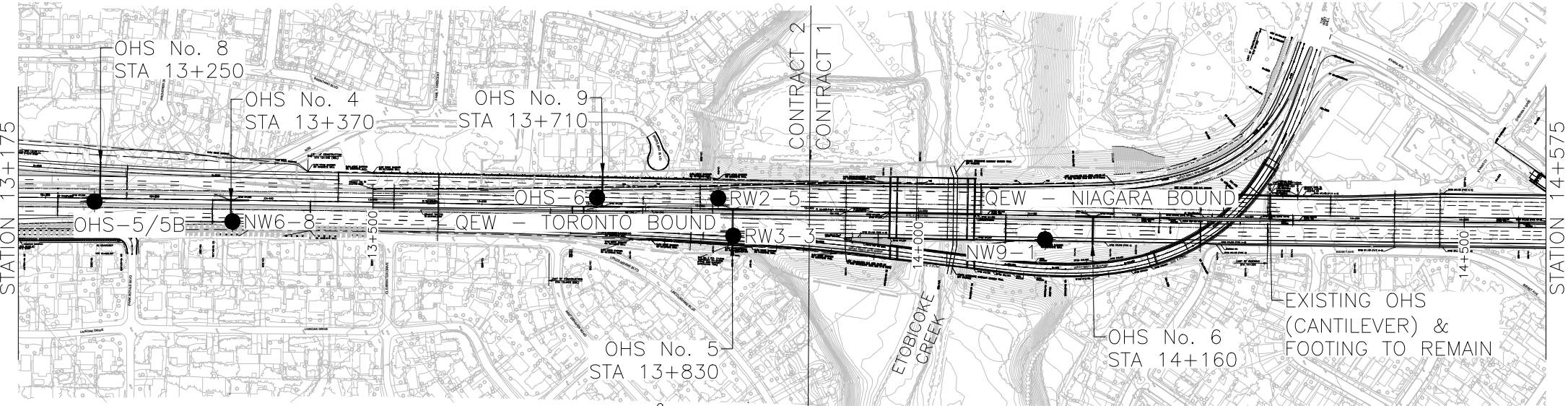


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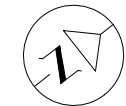
METRIC
DIMENSIONS ARE IN METRES AND/OR
MILLIMETRES UNLESS OTHERWISE SHOWN.
STATIONS IN KILOMETRES + METRES.



PLAN

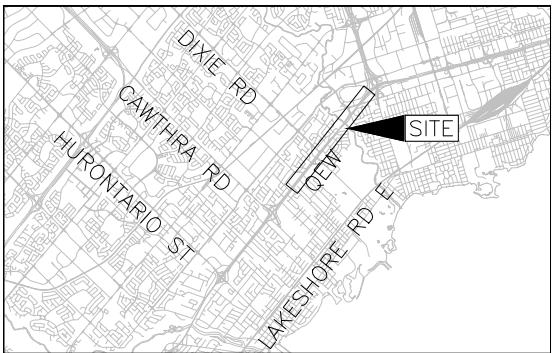


CONT No.
GWP No. 2102-13-00 / 2432-13-00



QEW
OVERHEAD SIGN SUPPORTS AND
HIGH MAST LIGHT POLES
BOREHOLE LOCATIONS

SHEET



KEY PLAN
SCALE
2 0 2 4 km

LEGEND

● Borehole - Current Investigation

| BOREHOLE CO-ORDINATES | | | |
|-----------------------|-----------|-----------|----------|
| No. | ELEVATION | NORTHING | EASTING |
| OHS-1 | 103.5 | 4827742.0 | 298624.3 |
| OHS-2 | 104.0 | 4827799.9 | 298661.6 |
| OHS-3 | 105.5 | 4828159.5 | 298952.8 |
| OHS-4 | 105.6 | 4828464.7 | 299192.8 |
| OHS-5/5B | 107.0 | 4828855.1 | 299494.6 |
| OHS-6 | 105.0 | 4829219.3 | 299776.2 |
| HML-1 | 109.7 | 4830170.8 | 300564.8 |
| NW6-8 | 107.0 | 4828943.1 | 299587.1 |
| NW9-1 | 101.0 | 4829518.2 | 300060.1 |
| RW2-5 | 102.1 | 4829306.2 | 299845.3 |
| RW3-3 | 102.0 | 4829295.7 | 299881.0 |

NOTES

This drawing is for subsurface investigation information only. The proposed highway details/works are shown for illustration purposes only and may not be consistent with the final design configuration as shown elsewhere in the Contracts Documents.

REFERENCE

Base plans provided in digital format by AECOM, drawing file nos. QEW_DixielC_base.dwg and QEW_DixielC_plan.dwg, dated July 20, 2016, received Dec. 06, 2016.
Design plans provided in digital format by AECOM, drawing file nos. QEW_Dixie_Cont1_plan.dwg and QEW_Dixie_Cont2_plan.dwg, received July 21, 2017.
Existing ground contours provided in digital format by AECOM, drawing file no. QEW_DixielC_Contours3D.dwg, received Nov. 08, 2016, contour interval 0.5 m.
Key plan base data - MNRF LIO, obtained 2015.

| NO. | DATE | BY | REVISION |
|-----------------------|---------------------|-----------------|---------------|
| | | | |
| Geocres No. 30M11-270 | | | |
| HWY. QEW | PROJECT NO. 1530382 | | DIST. CENTRAL |
| SUBM'D. MWK | CHKD. MWK | DATE: 8/28/2017 | SITE: . |
| DRAWN: MR | CHKD. SMM | APPD. JMAC | DWG. 1 |





APPENDIX A

Lists of Abbreviations and Symbols

Lithological and Geotechnical Rock Description Terminology

Record of Boreholes and Record of Drillholes



LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

| | |
|-------------|---------------------------------------|
| π | 3.1416 |
| $\ln x$, | natural logarithm of x |
| \log_{10} | x or log x, logarithm of x to base 10 |
| g | acceleration due to gravity |
| t | time |
| FoS | factor of safety |

II. STRESS AND STRAIN

| | |
|--------------------------------|--|
| γ | shear strain |
| Δ | change in, e.g. in stress: $\Delta \sigma$ |
| ε | linear strain |
| ε_v | volumetric strain |
| η | coefficient of viscosity |
| ν | Poisson's ratio |
| σ | total stress |
| σ' | effective stress ($\sigma' = \sigma - u$) |
| σ'_{vo} | initial effective overburden stress |
| $\sigma_1, \sigma_2, \sigma_3$ | principal stress (major, intermediate, minor) |
| σ_{oct} | mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$ |
| τ | shear stress |
| u | porewater pressure |
| E | modulus of deformation |
| G | shear modulus of deformation |
| K | bulk modulus of compressibility |

III. SOIL PROPERTIES

| | |
|--------------------|--|
| (a) | Index Properties |
| $\rho(\gamma)$ | bulk density (bulk unit weight)* |
| $\rho_d(\gamma_d)$ | dry density (dry unit weight) |
| $\rho_w(\gamma_w)$ | density (unit weight) of water |
| $\rho_s(\gamma_s)$ | density (unit weight) of solid particles |
| γ' | unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$) |
| D_R | relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s) |
| e | void ratio |
| n | porosity |
| S | degree of saturation |

(a) Index Properties (continued)

| | |
|-------------|--|
| w | water content |
| w_l or LL | liquid limit |
| w_p or PL | plastic limit |
| I_p or PI | plasticity index = $(w_l - w_p)$ |
| w_s | shrinkage limit |
| I_L | liquidity index = $(w - w_p) / I_p$ |
| I_C | consistency index = $(w_l - w) / I_p$ |
| e_{max} | void ratio in loosest state |
| e_{min} | void ratio in densest state |
| I_D | density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density) |

(b) Hydraulic Properties

| | |
|---|---|
| h | hydraulic head or potential |
| q | rate of flow |
| v | velocity of flow |
| i | hydraulic gradient |
| k | hydraulic conductivity (coefficient of permeability) |
| j | seepage force per unit volume |

(c) Consolidation (one-dimensional)

| | |
|-------------|---|
| C_c | compression index (normally consolidated range) |
| C_r | recompression index (over-consolidated range) |
| C_s | swelling index |
| C_α | secondary compression index |
| m_v | coefficient of volume change |
| C_v | coefficient of consolidation (vertical direction) |
| C_h | coefficient of consolidation (horizontal direction) |
| T_v | time factor (vertical direction) |
| U | degree of consolidation |
| σ'_p | pre-consolidation stress |
| OCR | over-consolidation ratio = σ'_p / σ'_{vo} |

(d) Shear Strength

| | |
|------------------|--|
| τ_p, τ_r | peak and residual shear strength |
| ϕ' | effective angle of internal friction |
| δ | angle of interface friction |
| μ | coefficient of friction = $\tan \delta$ |
| c' | effective cohesion |
| c_u, s_u | undrained shear strength ($\phi = 0$ analysis) |
| p | mean total stress $(\sigma_1 + \sigma_3)/2$ |
| p' | mean effective stress $(\sigma'_1 + \sigma'_3)/2$ |
| q | $(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$ |
| q_u | compressive strength $(\sigma_1 - \sigma_3)$ |
| S_t | sensitivity |

* Density symbol is ρ . Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

Notes: 1
2

$$\tau = c' + \sigma' \tan \phi'$$

$$\text{shear strength} = (\text{compressive strength})/2$$



LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures and in the text of the report are as follows:

I. SAMPLE TYPE

| | |
|----|---------------------|
| AS | Auger sample |
| BS | Block sample |
| CS | Chunk sample |
| DS | Denison type sample |
| FS | Foil sample |
| RC | Rock core |
| SC | Soil core |
| SS | Split-spoon |
| ST | Slotted tube |
| TO | Thin-walled, open |
| TP | Thin-walled, piston |
| WS | Wash sample |

II. PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg. (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) drive open sampler for a distance of 300 mm (12 in.)

Dynamic Cone Penetration Resistance; N_d :

The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure

PM: Sampler advanced by manual pressure

WH: Sampler advanced by static weight of hammer

WR: Sampler advanced by weight of sampler and rod

Piezo-Cone Penetration Test (CPT)

A electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

III. SOIL DESCRIPTION

(a) Non-Cohesive (Cohesionless) Soils

| Density Index | N |
|------------------|--------------------------|
| Relative Density | Blows/300 mm or Blows/ft |
| Very loose | 0 to 4 |
| Loose | 4 to 10 |
| Compact | 10 to 30 |
| Dense | 30 to 50 |
| Very dense | over 50 |

(b) Cohesive Soils Consistency

| | C_u, S_u | |
|------------|------------|----------------|
| | kPa | psf |
| Very soft | 0 to 12 | 0 to 250 |
| Soft | 12 to 25 | 250 to 500 |
| Firm | 25 to 50 | 500 to 1,000 |
| Stiff | 50 to 100 | 1,000 to 2,000 |
| Very stiff | 100 to 200 | 2,000 to 4,000 |
| Hard | over 200 | over 4,000 |

IV. SOIL TESTS

| | |
|----------|---|
| w | water content |
| w_p | plastic limit |
| w_l | liquid limit |
| C | consolidation (oedometer) test |
| CHEM | chemical analysis (refer to text) |
| CID | consolidated isotropically drained triaxial test ¹ |
| CIU | consolidated isotropically undrained triaxial test with porewater pressure measurement ¹ |
| D_R | relative density (specific gravity, G_s) |
| DS | direct shear test |
| M | sieve analysis for particle size |
| MH | combined sieve and hydrometer (H) analysis |
| MPC | Modified Proctor compaction test |
| SPC | Standard Proctor compaction test |
| OC | organic content test |
| SO_4 | concentration of water-soluble sulphates |
| UC | unconfined compression test |
| UU | unconsolidated undrained triaxial test |
| V | field vane (LV-laboratory vane test) |
| γ | unit weight |

Note: 1 Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

V. MINOR SOIL CONSTITUENTS

| Per cent by Weight | Modifier | Example |
|--------------------|--|---|
| 0 to 5 | Trace | Trace sand |
| 5 to 12 | Trace to Some (or Little) | Trace to some sand |
| 12 to 20 | Some | Some sand |
| 20 to 30 | (ey) or (y) | Sandy |
| over 30 | And (non-cohesive (cohesionless)) or With (cohesive) | Sand and Gravel Silty Clay with sand / Clayey Silt with sand |



LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERINGS STATE

Fresh: no visible sign of weathering

Faintly weathered: weathering limited to the surface of major discontinuities.

Slightly weathered: penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material.

Moderately weathered: weathering extends throughout the rock mass but the rock material is not friable.

Highly weathered: weathering extends throughout rock mass and the rock material is partly friable.

Completely weathered: rock is wholly decomposed and in a friable condition but the rock and structure are preserved.

BEDDING THICKNESS

| Description | Bedding Plane Spacing |
|---------------------|-----------------------|
| Very thickly bedded | Greater than 2 m |
| Thickly bedded | 0.6 m to 2 m |
| Medium bedded | 0.2 m to 0.6 m |
| Thinly bedded | 60 mm to 0.2 m |
| Very thinly bedded | 20 mm to 60 mm |
| Laminated | 6 mm to 20 mm |
| Thinly laminated | Less than 6 mm |

JOINT OR FOLIATION SPACING

| Description | Spacing |
|------------------|------------------|
| Very wide | Greater than 3 m |
| Wide | 1 m to 3 m |
| Moderately close | 0.3 m to 1 m |
| Close | 50 mm to 300 mm |
| Very close | Less than 50 mm |

GRAIN SIZE

| Term | Size* |
|---------------------|-------------------------|
| Very Coarse Grained | Greater than 60 mm |
| Coarse Grained | 2 mm to 60 mm |
| Medium Grained | 60 microns to 2 mm |
| Fine Grained | 2 microns to 60 microns |
| Very Fine Grained | Less than 2 microns |

Note: * Grains greater than 60 microns diameter are visible to the naked eye.

CORE CONDITION

Total Core Recovery (TCR)

The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run.

Solid Core Recovery (SCR)

The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.

Rock Quality Designation (RQD)

The percentage of solid drill core, greater than 100 mm length, recovered at full diameter, measured relative to the length of the total core run. RQD varied from 0% for completely broken core to 100% for core in solid sticks.

DISCONTINUITY DATA

Fracture Index

A count of the number of discontinuities (physical separations) in the rock core, including both naturally occurring fractures and mechanically induced breaks caused by drilling.

Dip with Respect to Core Axis

The angle of the discontinuity relative to the axis (length) of the core. In a vertical borehole a discontinuity with a 90° angle is horizontal.

Description and Notes

An abbreviation description of the discontinuities, whether naturally occurring separations such as fractures, bedding planes and foliation planes or mechanically induced features caused by drilling such as ground or shattered core and mechanically separated bedding or foliation surfaces. Additional information concerning the nature of fracture surfaces and infillings are also noted.

Abbreviations

| | |
|---------------------|-------------------|
| JN Joint | PL Planar |
| FLT Fault | CU Curved |
| SH Shear | UN Undulating |
| VN Vein | IR Irregular |
| FR Fracture | K Slickensided |
| SY Stylolite | PO Polished |
| BD Bedding | SM Smooth |
| FO Foliation | SR Slightly Rough |
| CO Contact | RO Rough |
| AXJ Axial Joint | VR Very Rough |
| KV Karstic Void | |
| MB Mechanical Break | |

| PROJECT | | 2102-13-00; 2432-13-00 | | LOCATION | | N 4827742.0; E 298624.3 MTM NAD 83 ZONE 10 (LAT. 43.589586; LONG. -79.576480) | | ORIGINATED BY | | MK | | | | | | | | | | | |
|---------------|---|------------------------|--------|---------------|------------|---|-------------------------|-----------------|--|-----|----|-----|----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|----|----|----|
| DIST | | Central HWY QE | | BOREHOLE TYPE | | 108 mm O.D. Continuous Flight Solid Stem Augers | | COMPILED BY | | PKS | | | | | | | | | | | |
| DATUM | | Geodetic | | DATE | | September 13 and 14, 2016 | | CHECKED BY | | SMM | | | | | | | | | | | |
| SOIL PROFILE | | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | 20 | | | 40 | 60 | 80 | 100 | 20 | | | | | | 40 | 60 | 80 |
| 103.5 | GROUND SURFACE | | | | | | | | | | | | | | | | | | | | |
| 0.0 | ASPHALT (80 mm) | | | | | | | | | | | | | | | | | | | | |
| 0.1 | Silty sand, trace gravel (FILL) Very loose to compact Dark brown/brown Dry to wet | | 1 | SS | 16 | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 4 | | | | | | | | | | | | | | | | |
| 102.1 | CLAYEY SILT, trace to some sand Soft to stiff Grey Moist | | 3 | SS | 10 | | | | | | | | | | | | | | | | |
| 1.4 | | | 4 | SS | 4 | | | | | | | | | | | | | | | | |
| 100.6 | CLAYEY SILT, some sand, trace gravel, trace shale fragments (RESIDUAL SOIL) Very stiff Brown/Grey Moist to wet | | 5 | SS | 20 | | | | | | | | | | | | | | | | |
| 2.9 | | | 6 | SS | 31 | | | | | | | | | | | | | | | | |
| 99.1 | SHALE (BEDROCK) | | 7 | SS | 50/0.08 | | | | | | | | | | | | | | | | |
| 4.4 | | | 8 | SS | 50/0.10 | | | | | | | | | | | | | | | | |
| 97.3 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | | |
| 6.2 | NOTE: 1. Water in open borehole at a depth of 1.1 m below ground surface (Elev.102.4 m) upon completion of drilling. | | | | | | | | | | | | | | | | | | | | |

GTA-MTO 001 S:\CLIENTS\MTQEQW-DIXIE\02_DATA\GINTQEQW-DIXIE.GPJ GAL-GTA.GDT 11/01/17 GPK


| | | | | | | | |
|--------------------------------------|--|---|--|-------------------------|--|---------------|--|
| PROJECT <u>1530382</u> | | RECORD OF BOREHOLE No OHS-2 | | SHEET 1 OF 2 | | METRIC | |
| G.W.P. <u>2102-13-00; 2432-13-00</u> | | LOCATION <u>N 4827799.9; E 298661.6 MTM NAD 83 ZONE 10 (LAT. 43.590107; LONG. -79.576019)</u> | | ORIGINATED BY <u>KG</u> | | | |
| DIST <u>Central</u> HWY <u>QEW</u> | | BOREHOLE TYPE <u>108 mm O.D. Continuous Flight Solid Stem Augers</u> | | COMPILED BY <u>PKS</u> | | | |
| DATUM <u>Geodetic</u> | | DATE <u>September 14, 2016</u> | | CHECKED BY <u>SMM</u> | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL MOISTURE CONTENT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL | | | |
|---------------|-------------|------------|---------|------|------------|----------------------------|-----------------|--|--|---|--|--|---|--|-------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | <div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></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| | | | | | | | | |

Continued Next Page

+ 3, X 3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

GTA-MTO 001 S:\CLIENTS\MTQEW-DIXIE02_DATA\GINTQEW-DIXIE.GPJ GAL-GTA.GDT 11/01/17 GPK

| PROJECT <u>1530382</u> | | RECORD OF BOREHOLE No OHS-2 | | | | SHEET 2 OF 2 | | METRIC | | | | | | | | | | |
|--------------------------------------|---|---|--------|------|----------------------------|-------------------------|--|--------------------|--|--|--|--|--------------------------------------|--|---|--|--|-----------|
| G.W.P. <u>2102-13-00; 2432-13-00</u> | | LOCATION <u>N 4827799.9; E 298661.6 MTM NAD 83 ZONE 10 (LAT. 43.590107; LONG. -79.576019)</u> | | | | ORIGINATED BY <u>KG</u> | | | | | | | | | | | | |
| DIST <u>Central</u> HWY <u>QEW</u> | | BOREHOLE TYPE <u>108 mm O.D. Continuous Flight Solid Stem Augers</u> | | | | COMPILED BY <u>PKS</u> | | | | | | | | | | | | |
| DATUM <u>Geodetic</u> | | DATE <u>September 14, 2016</u> | | | | CHECKED BY <u>SMM</u> | | | | | | | | | | | | |
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL | | |
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | "N" VALUES | SHEAR STRENGTH kPa | | | | | W _p W W _L | | | | | |
| | --- CONTINUED FROM PREVIOUS PAGE --- | | | | | | 20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED | | | | | 20 40 60 80 100 WATER CONTENT (%) | | | | | | |
| 93.1 | SHALE (BEDROCK) |  | 2 | RC | REC 90% | | | | | | | | | | | | | RQD = 85% |
| 10.9 | END OF BOREHOLE NOTE: 1. Water level in open borehole measured at a depth of 3.4 m below ground surface (Elev. 100.6 m) upon completion of drilling and prior to rock coring. | | | | | | | | | | | | | | | | | |

GTA-MTO 001 S:\CLIENTS\MTQEQW-DIXIE02_DATA\INTQEW-DIXIE.GPJ GAL-GTA.GDT 11/01/17 GPK

PROJECT: 1530382

RECORD OF DRILLHOLE: OHS-2

SHEET 1 OF 1

LOCATION: N 4827799.9 ;E 298661.6

DRILLING DATE: September 14, 2016

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: —

DRILL RIG: CME 75 (Truck Mounted)

DRILLING CONTRACTOR: Davis Drilling Ltd.

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough MB - Mechanical Break BR - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | | | | | | | FEATURES | R0/R1 ZONES | NOTES PIEZOMETER OR STANDPIPE INSTALLATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | TOTAL CORE % | SOLID CORE % | | | B Angle | DIP w/r.t. CORE AXIS | TYPE AND SURFACE DESCRIPTION | Jr | Ja | R4 | R3 | R2 | R1 | W1 | W2 | | | | | W3 | W4 | W5 | W6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 8 | NW(Casing) | Continued from Record of Borehole OHS-2 | | 96.38 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1 : 50



LOGGED: KG

CHECKED: KG/AB

GTA-RCK 054 S:\CLIENTS\MTOW\QEW-DIXIE\02 DATA\QINTQEW-DIXIE.GPJ GAL-MISS.GDT 11/01/17 GPK

STA-MTO 001 S:\CLIENTS\MTO\QEW-DIXIE\02 DATA\GIN\QEW-DIXIE.GPJ GAL-GTA.GDT 11/01/17 GPK


+ 3, × 3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

| PROJECT 1530382 | | RECORD OF BOREHOLE No OHS-4 | | SHEET 1 OF 2 | | METRIC | | | | | | | | | | | |
|-------------------------------|---|--|---------|------------------|------------|--|-----------------|-----------------|---|----------------|---|----------------|---|----|---------------------------------------|----|------------|
| G.W.P. 2102-13-00; 2432-13-00 | | LOCATION N 4828464.7; E 299192.8 MTM NAD 83 ZONE 10 (LAT. 43.596096; LONG. -79.569448) | | ORIGINATED BY KG | | | | | | | | | | | | | |
| DIST Central HWY QEW | | BOREHOLE TYPE 108 mm O.D. Continuous Flight Solid Stem Augers | | COMPILED BY ACK | | | | | | | | | | | | | |
| DATUM Geodetic | | DATE September 12, 2016 | | CHECKED BY SMM | | | | | | | | | | | | | |
| SOIL PROFILE | | | SAMPLES | | | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT | | | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | GROUND WATER CONDITIONS | ELEVATION SCALE | 20 40 60 80 100 | 20 40 60 80 100 | W _p | W | W _L | γ | GR | SA | SI | CL |
| 105.6 | GROUND SURFACE | | | | | | | | | | | | | | | | |
| 0.0 | ASPHALT (90 mm) | | | | | | | | | | | | | | | | |
| 0.1 | Sandy silt to silty sand, trace gravel (FILL) Compact Brown/grey Dry to moist | | 1 | SS | 18 | | 105 | | | | | | | | | | |
| | | | 2 | SS | 14 | | | | | | | | | | | | |
| | | | | | | | 104 | | | | | | | | | | |
| | | | 3 | SS | 13 | | | | | | | | | | | | |
| 103.4 | CLAYEY SILT, some sand (RESIDUAL SOIL) Hard Brown Moist | | 4 | SS | 61/0.28 | | 103 | | | | | | | 0 | 13 | 55 | 32 |
| 2.2 | | | 5 | SS | 50/0.10 | | | | | | | | | | | | |
| | | | | | | | 102 | | | | | | | | | | |
| | | | 6 | SS | 50/0.08 | | | | | | | | | | | | |
| 100.9 | SHALE (BEDROCK) | | | | | | 101 | | | | | | | | | | |
| 4.7 | Bedrock cored from depths of 4.7 m to 10.8 m. For bedrock coring details refer to Record of Drillhole OHS-4. | | 1 | RC | REC 10% | | 100 | | | | | | | | | | RQD = 0% |
| | | | | | | | 99 | | | | | | | | | | RQD = 11% |
| | | | 2 | RC | REC 18% | | 98 | | | | | | | | | | RQD = 98% |
| | | | 3 | RC | REC 100% | | 97 | | | | | | | | | | RQD = 100% |
| | | | 4 | RC | REC 100% | | 96 | | | | | | | | | | |

Continued Next Page

+ 3, × 3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

GTA-MTO 001 S:\CLIENTS\MTQEW-DIXIE02_DATA\GINTQEW-DIXIE.GPJ GAL-GTA.GDT 11/01/17 GPK

| PROJECT 1530382 | | RECORD OF BOREHOLE No OHS-4 | | | | SHEET 2 OF 2 | | METRIC | | | | | | | | | |
|---|-----------------|--|---------|------|------------|--|-----------------|--------------------|---|---|----------------|-------------|-------------------|--|---------------------------------------|------------------------|-------------|
| G.W.P. 2102-13-00; 2432-13-00 | | LOCATION N 4828464.7; E 299192.8 MTM NAD 83 ZONE 10 (LAT. 43.596096; LONG. -79.569448) | | | | ORIGINATED BY KG | | | | | | | | | | | |
| DIST Central HWY QEW | | BOREHOLE TYPE 108 mm O.D. Continuous Flight Solid Stem Augers | | | | COMPILED BY ACK | | | | | | | | | | | |
| DATUM Geodetic | | DATE September 12, 2016 | | | | CHECKED BY SMM | | | | | | | | | | | |
| SOIL PROFILE | | | SAMPLES | | | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT | | | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | GROUND WATER CONDITIONS | ELEVATION SCALE | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | γ kN/m ³ | GR SA SI CL |
| | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | W _p | W | W _L | 10 20 30 | | | | | |
| 94.8 | SHALE (BEDROCK) |  | 4 | RC | REC 100% | | 95 | | | | | | | | | | RQD = 100% |
| 10.8 | END OF BOREHOLE | | | | | | | | | | | | | | | | |
| NOTE: 1. Water level in open borehole at a depth of 3.4 m below ground surface (Elev. 102.2 m) upon completion of drilling / prior to rock coring. | | | | | | | | | | | | | | | | | |

GTA-MTO 001 S:\CLIENTS\MTQEQW-DIXIE02_DATA\GINTQEQW-DIXIE.GPJ GAL-GTA.GDT 11/01/17 GPK

SHEET 1 OF 1

DATUM: Geodetic

DRILL RIG: CME 75 (Truck Mounted)

LOGGED: KG
CHECKED: KG/AB

| PROJECT 1530382 | | RECORD OF BOREHOLE No OHS-5 | | | | SHEET 1 OF 1 | | METRIC | | | | | | |
|-------------------------------|---|--|---------|------|------------|-------------------------|-----------------|--|--|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| G.W.P. 2102-13-00; 2432-13-00 | | LOCATION N 4828855.1; E 299494.6 MTM NAD 83 ZONE 10 (LAT. 43.599612; LONG. -79.565714) | | | | ORIGINATED BY PKS | | | | | | | | |
| DIST Central HWY QEW | | BOREHOLE TYPE CME 75, 108 mm O.D. Solid Stem Augers | | | | COMPILED BY AJ | | | | | | | | |
| DATUM Geodetic | | DATE September 22, 2016 | | | | CHECKED BY SMM | | | | | | | | |
| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| 107.0 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.0 | ASPHALT (80 mm) | | | | | | | | | | | | | |
| 0.1 | CONCRETE (380 mm) | | | | | | | | | | | | | |
| 106.5 | Silty SAND, trace clay Compact to dense Brown Moist | | 1 | SS | 11 | | 106 | | | | | | | |
| 0.5 | | | 2 | SS | 44 | | 105 | | | | | | | |
| 104.7 | SAND and GRAVEL, trace to some silt, trace clay Dense to compact | | 3 | SS | 36 | | 104 | | | | | | | 44 41 11 4 |
| 2.3 | | | 4 | SS | 25 | | | | | | | | | |
| | - SILT observed in tip of spoon | | | | | | | | | | | | | |
| 103.2 | Sandy CLAYEY SILT, trace gravel (RESIDUAL SOIL) Very stiff to hard Grey Moist | | 5 | SS | 20 | | 103 | | | | | | | 4 28 45 23 |
| 3.8 | | | 6 | SS | 66 | | 102 | | | | | | | |
| | | | | | | | 101 | | | | | | | |
| 100.9 | SHALE (BEDROCK) | | 7 | SS | 100/0.15 | | | | | | | | | |
| 6.1 | Borehole OHS-5B advanced 2 m East of Borehole OHS-5 to obtain bedrock core samples; Bedrock cored from depths of 6.1 m to 9.1 m. For bedrock coring details refer to Record of Drillhole OHS-5B. | | 1 | RC | REC 100% | | 100 | | | | | | | RQD = 90% |
| | | | 2 | RC | REC 80% | | 99 | | | | | | | RQD = 66% |
| 97.9 | END OF BOREHOLE | | | | | | 98 | | | | | | | |
| 9.1 | NOTE: 1. Open borehole OHS-5 dry upon completion of drilling. | | | | | | | | | | | | | |

GTA-MTO 001 S:\CLIENTS\MTQEQW-DIXIE\02_DATA\GINTQEQW-DIXIE.GPJ GAL-GTA.GDT 11/01/17 GPK

SHEET 1 OF 1

DATUM: Geodetic

DRILLING CONTRACTOR: Davis Drilling Ltd.

[illegible]

FEATURES LEGEND



BROKEN CORE



CLAY SEAM



LIMESTONE



LOST CORE

DEPTH SCALE

1 : 50


**Golder
Associates**

LOGGED: AB

CHECKED: ACK/AB

| PROJECT 1530382 | | | RECORD OF BOREHOLE No OHS-6 | | | SHEET 1 OF 1 | | | METRIC | | | | | |
|-------------------------------|--|------------|--|------|-------------|----------------------------|---|---|--------|--|--|--|---|--|
| G.W.P. 2102-13-00; 2432-13-00 | | | LOCATION N 4829219.3; E 299776.2 MTM NAD 83 ZONE 10 (LAT. 43.602892; LONG. -79.562228) | | | ORIGINATED BY KG | | | | | | | | |
| DIST Central HWY QEWS | | | BOREHOLE TYPE 108 mm O.D. Continuous Flight Solid Stem Augers | | | COMPILED BY ACK | | | | | | | | |
| DATUM Geodetic | | | DATE September 14 and 15, 2016 | | | CHECKED BY SMM | | | | | | | | |
| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| 105.0 | GROUND SURFACE | | | | | | <div style="display: flex; justify-content: space-between;"> 20 40 60 80 100 20 40 60 80 100 </div> | | | | | | | |
| 0.0 | ASPHALT (65 mm) | | | | | | <div style="display: flex; justify-content: space-between;"> 20 40 60 80 100 20 40 60 80 100 </div> | | | | | | | |
| 0.1 | Silty sand, trace gravel (FILL) Compact Brown Moist | | 1 | SS | 17 | | | | | | | | | |
| 104.2 | CLAYEY SILT with SAND, trace gravel to Gravelly (TILL) Very stiff to hard Grey Moist | | 2 | SS | 24 | | 104 | | | | | | | |
| 0.8 | - Presence of cobbles and boulders inferred based on auger grinding below a depth of 1.0 m | | 3 | SS | 21 | | 103 | | | | | | | |
| | | | 4 | SS | 54 | | 102 | | | | | | 23 36 31 10 | |
| | | | 5 | SS | 42 | | 101 | | | | | | | |
| | | | 6 | SS | 59 | | 100 | | | | | | | |
| 100.5 | CLAYEY SILT with SAND, trace to some gravel, trace shale fragments (RESIDUAL SOIL) Hard Grey Moist | | 7 | SS | 50/0.05 | | 99 | | | | | | | |
| 4.5 | | | | | | | 98 | | | | | | RQD = 72% | |
| 98.9 | SHALE (BEDROCK) | | 8 | SS | 50/0.07 | | 97 | | | | | | RQD = 95% | |
| 6.1 | Bedrock cored from depths of 6.2 m to 9.3 m. For bedrock coring details refer to Record of Drillhole OHS-6. | | 1 | RC | REC 75% | | 96 | | | | | | | |
| | | | 2 | RC | REC 100% | | | | | | | | | |
| 95.7 | END OF BOREHOLE | | | | | | | | | | | | | |
| 9.3 | NOTE: 1. Open borehole dry upon completion of drilling / prior to rock coring. | | | | | | | | | | | | | |

GTA-MTO 001 S:\CLIENTS\MTQ\QEWS-DIXIE\02_DATA\GINT\QEWS-DIXIE.GPJ GAL-GTA.GDT 11/01/17 GPK

PROJECT: 1530382

RECORD OF DRILLHOLE: OHS-6

SHEET 1 OF 1

LOCATION: N 4829219.3 ;E 299776.2

DRILLING DATE: September 14 and 15, 2016

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: —

DRILL RIG: CME 75 (Truck Mounted)

DRILLING CONTRACTOR: Davis Drilling Ltd.

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | JN - Joint FLT - Fault SHR- Shear VN - Vein CJ - Conjugate BD- Bedding FO- Foliation CO- Contact OR- Orthogonal CL - Cleavage PL - Planar CU- Curved UN- Undulating ST - Stepped IR - Irregular PO- Polished K - Slickensided SM- Smooth Ro - Rough MB - Mechanical Break BR - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | | | | | | | FEATURES | R0/R1 ZONES | NOTES PIEZOMETER OR STANDPIPE INSTALLATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | TOTAL CORE % | SOLID CORE % | R.Q.D. % | | B Angle | DIP w.r.t CORE AXIS | TYPE AND SURFACE DESCRIPTION | Jr | Ja | R4 | R3 | R2 | R1 | W1 | W2 | W3 | | | | W4 | W5 | W6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | Continued from Record of Borehole OHS-6 | | 98.80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

FEATURES LEGEND



BROKEN CORE



CLAY SEAM



LIMESTONE



LOST CORE

DEPTH SCALE

1 : 50



LOGGED: KG

CHECKED: KG/AB

GTA-RCK 054 S:\CLIENTS\MTOW\QEW-DIXIE\02 DATA\INT\QEW-DIXIE.GPJ GAL-MISS.GDT 11/01/17 GPK

| PROJECT 1530382 | | RECORD OF BOREHOLE No RW2-5 | | SHEET 1 OF 1 | | METRIC | | | | | | | | | | | |
|-------------------------------|--|--|---------|------------------|------------|--|-----------------|--------------------|---|---|----------------|-------------|----|----|---------------------------------------|----|--|
| G.W.P. 2102-13-00; 2432-13-00 | | LOCATION N 4829306.2; E 299845.3 MTM NAD 83 ZONE 10 (LAT. 43.603674; LONG. -79.561374) | | ORIGINATED BY MK | | | | | | | | | | | | | |
| DIST Central HWY QEW | | BOREHOLE TYPE 108 mm O.D. Continuous Flight Solid Stem Augers | | COMPILED BY ACK | | | | | | | | | | | | | |
| DATUM Geodetic | | DATE September 9, 2016 | | CHECKED BY SMM | | | | | | | | | | | | | |
| SOIL PROFILE | | | SAMPLES | | | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT | | | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | GROUND WATER CONDITIONS | ELEVATION SCALE | SHEAR STRENGTH kPa | W _p | W | W _L | γ | GR | SA | SI | CL | |
| 102.1 | GROUND SURFACE | | | | | | | | | | | | | | | | |
| 0.0 | ASPHALT (100 mm) | | | | | | 102 | | | | | | | | | | |
| 101.8 | CONCRETE (180 mm) | | | | | | | | | | | | | | | | |
| 0.3 | Silty sand, some gravel to silty sand and gravel, containing clayey silt pockets (FILL) Compact Brown Moist | | 1 | AS | - | | | | | | | | | | | | |
| | | | 2 | SS | 14 | | 101 | | | | | | | | | | |
| 100.7 | CLAYEY SILT, some gravel (TILL) Stiff to hard Grey Moist | | 3 | SS | 15 | | | | | | | | 18 | 21 | 50 | 11 | |
| 1.4 | | | 4 | SS | 14 | | 100 | | | | | | | | | | |
| 99.1 | CLAYEY SILT, trace to some sand, trace to some gravel Very stiff to hard Grey Moist | | 5 | SS | 45 | | 99 | | | | | | | | | | |
| 3.0 | - Shale fragments at a depth of 3.8 m below ground surface | | 6 | SS | 50/0.10 | | 98 | | | | | | | | | | |
| | | | 7 | SS | 23 | | 97 | | | | | | 8 | 11 | 66 | 15 | |
| | | | 8 | SS | 41 | | 96 | | | | | | | | | | |
| | | | | | | | 95 | | | | | | | | | | |
| 94.5 | - Shale fragments at a depth of 7.6 m below ground surface | | 9 | SS | 50/0.08 | | | | | | | | | | | | |
| 7.7 | SHALE (BEDROCK) END OF BOREHOLE AUGER REFUSAL ON PROBABLE BEDROCK NOTE: 1. Open borehole dry upon completion of drilling. | | | | | | | | | | | | | | | | |

+ 3, × 3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

[illegible]

FEATURES LEGEND



BROKEN CORE



CLAY SEAM



LIMESTONE



LOST CORE

DEPTH SCALE

1 : 50


**Golder
Associates**

LOGGED: PKS

CHECKED: CEC/AB

| PROJECT 1530382 | | RECORD OF BOREHOLE No NW6-8 | | SHEET 1 OF 1 | | METRIC | | | | | | | | | | | |
|--|---|--|---------|-------------------|------------|--|-----------------|--------------------|---|---|----------------|-------------|-------------------|--|---------------------------------------|------------|-------------|
| G.W.P. 2102-13-00; 2432-13-00 | | LOCATION N 4828943.1; E 299587.1 MTM NAD 83 ZONE 10 (LAT. 43.600405; LONG. -79.564569) | | ORIGINATED BY PKS | | | | | | | | | | | | | |
| DIST Central HWY QEW | | BOREHOLE TYPE 108 mm O.D. Continuous Flight Solid Stem Augers | | COMPILED BY ACK | | | | | | | | | | | | | |
| DATUM Geodetic | | DATE September 13, 2016 | | CHECKED BY SMM | | | | | | | | | | | | | |
| SOIL PROFILE | | | SAMPLES | | | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT | | | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | GROUND WATER CONDITIONS | ELEVATION SCALE | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | γ kN/m³ | GR SA SI CL |
| | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | W _p | W | W _L | 10 20 30 | | | | | |
| 107.0 | GROUND SURFACE | | | | | | | | | | | | | | | | |
| 0.0 | ASPHALT (100 mm) | | | | | | | | | | | | | | | | |
| 0.1 | Silty sand, trace to some gravel (FILL) Loose to very dense Brown to grey Dry to moist | | 1 | SS | 9 | | | | | | | | | | | | |
| | | | 2 | SS | 42 | | 106 | | | | | | | | | | |
| | | | 3 | SS | 55 | | 105 | | | | | | | | | | |
| 104.9 | SAND, some gravel, some silt (FILL) Dense Brown to grey Moist | | 4 | SS | 33 | | 104 | | | | | | | | | | 16 64 16 4 |
| 2.1 | | | 5A | SS | 15 | | | | | | | | | | | | |
| 103.7 | Sandy SILT, trace gravel Compact Grey Moist | | 5B | SS | 15 | | | | | | | | | | | | |
| 3.4 | | | | | | | | | | | | | | | | | |
| 103.3 | Gravelly Sandy SILT, containing shale fragments Loose Grey Wet | | 6 | SS | 7 | | 103 | | | | | | | | | | |
| 3.7 | | | | | | | | | | | | | | | | | |
| 102.6 | Gravelly CLAYEY SILT with SAND Firm to hard Grey Wet | | 7 | SS | 6 | | 102 | | | | | | | | | | 25 40 26 9 |
| 4.4 | | | | | | | | | | | | | | | | | |
| 100.6 | CLAYEY SILT, some sand, trace to some gravel (TILL) Hard Grey Moist | | 8 | SS | 34 | | 101 | | | | | | | | | | |
| 6.4 | | | | | | | | | | | | | | | | | |
| 100.3 | END OF BOREHOLE | | | | | | | | | | | | | | | | |
| 6.7 | | | | | | | | | | | | | | | | | |
| NOTE: 1. Water level in open borehole at a depth of 3.5 m below ground surface (Elev. 103.5 m) upon completion of drilling. | | | | | | | | | | | | | | | | | |

GTA-MTO 001 S:\CLIENTS\MTQEW-DIXIE02_DATA\GINTQEW-DIXIE.GPJ GAL-GTA.GDT 11/01/17 GPK

| PROJECT 1530382 | | RECORD OF BOREHOLE No NW9-1 | | | | SHEET 1 OF 1 | | METRIC | | | | | | |
|-------------------------------|--|--|---------|------|------------|----------------------------|-----------------|---|--|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|
| G.W.P. 2102-13-00; 2432-13-00 | | LOCATION N 4829518.2; E 300060.1 MTM NAD 83 ZONE 10 (LAT. 43.605585; LONG. -79.558715) | | | | ORIGINATED BY MK | | | | | | | | |
| DIST Central HWY QEW | | BOREHOLE TYPE 108 mm O.D. Continuous Flight Solid Stem Augers | | | | COMPILED BY PKS | | | | | | | | |
| DATUM Geodetic | | DATE September 15, 2016 | | | | CHECKED BY SMM | | | | | | | | |
| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| 101.0 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.0 | ASPHALT (100 mm) | | | | | | | | | | | | | |
| 0.1 | Silty sand, trace gravel, containing asphalt fragments (FILL) Loose to compact Dark brown/black Moist | | 1 | SS | 19 | | | | | | | | | |
| | - Inferred boulder/cobble at a depth of 0.4 m below ground surface | | 2 | SS | 7 | | | | | | | | | |
| 99.5 | | | | | | | | | | | | | | |
| 1.5 | Clayey silt, some sand, trace gravel, containing rootlets (FILL) Firm to stiff Grey Moist | | 3 | SS | 5 | | | | | | | | | |
| | | | 4 | SS | 10 | | | | | | | | | |
| 98.1 | | | | | | | | | | | | | | |
| 2.9 | Silt and sand, trace to some clay, trace gravel, containing wood pieces and rootlets (FILL) Compact Grey Moist | | 5 | SS | 11 | | | | | | | | | 5 45 40 10 |
| 97.3 | | | | | | | | | | | | | | |
| 3.7 | CLAYEY SILT with SAND, trace to some gravel (TILL) Stiff Grey Moist | | 6 | SS | 9 | | | | | | | | | |
| | | | 7 | SS | 11 | | | | | | | | | 8 35 42 15 |
| 94.9 | | | | | | | | | | | | | | |
| 6.1 | Silty SAND, trace gravel, trace clay Loose Grey Moist to wet | | 8 | SS | 6 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 93.4 | | | | | | | | | | | | | | |
| 7.7 | SHALE (BEDROCK) END OF BOREHOLE | | 9 | SS | 50/0.08 | | | | | | | | | |
| | NOTE: 1. Water level in open borehole at a depth of 6.5 m below ground surface (Elev. 94.5 m) upon completion of drilling. | | | | | | | | | | | | | |

| PROJECT 1530382 | | RECORD OF BOREHOLE No HML-1 | | SHEET 1 OF 1 | | METRIC | | | | | | | | | | | | | | | | | |
|-------------------------------|---|--|---------|-------------------|------------|-------------------------|--|--|-----------------|--|--|--|--|--|---|--|--|-------------|--|--|---------------------------------------|--|--|
| G.W.P. 2102-13-00; 2432-13-00 | | LOCATION N 4830170.8; E 300564.8 MTM NAD 83 ZONE 10 (LAT. 43.611462; LONG. -79.552469) | | ORIGINATED BY PKS | | | | | | | | | | | | | | | | | | | |
| DIST Central HWY QEW | | BOREHOLE TYPE CME 55, 108 mm O.D. Solid Stem Augers | | COMPILED BY ACK | | | | | | | | | | | | | | | | | | | |
| DATUM Geodetic | | DATE September 21, 2016 | | CHECKED BY SMM | | | | | | | | | | | | | | | | | | | |
| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | | | ELEVATION SCALE | | | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT | | | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | | | | | | | | | | | | | | | |
| 109.7 | GROUND SURFACE | | | | | | | | | | | | | | | | | | | | | | |
| 0.0 | ASPHALT | | | | | | | | | | | | | | | | | | | | | | |
| 109.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 0.4 | Sand and gravel (FILL) Brown Moist CLAYEY SILT with SAND, trace to some gravel Very stiff to hard Grey Moist | | 1 | SS | 19 | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 39 | | | | | | | | | | | | | | | | | | |
| 107.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 2.3 | CLAYEY SILT with GRAVEL (RESIDUAL SOIL) Hard Grey Moist | | 3 | SS | 100/0.15 | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 80 | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 100/0.10 | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 74 | | | | | | | | | | | | | | | | | | |
| 103.5 | | | 7 | SS | 100/0.05 | | | | | | | | | | | | | | | | | | |
| 6.2 | SHALE (BEDROCK) Bedrock cored from depths of 6.3 m to 9.3 m. For bedrock coring details refer to record of drillhole HML-1. | | 1 | RC | REC 70% | | | | | | | | | | | | | | | | | | |
| | | | 2 | RC | REC 93% | | | | | | | | | | | | | | | | | | |
| 100.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 9.3 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | | | | |
| | NOTE: 1. Groundwater level not measured prior to rock coring. | | | | | | | | | | | | | | | | | | | | | | |

PROJECT: 1530382

RECORD OF DRILLHOLE: HML-1

SHEET 1 OF 1

LOCATION: N 4830170.8 ;E 300564.8

DRILLING DATE: September 21, 2016

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: —

DRILL RIG: CME 55 (Truck Mounted)

DRILLING CONTRACTOR: Davis Drilling Ltd.

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | JN - Joint FLT - Fault SHR- Shear VN - Vein CJ - Conjugate BD- Bedding FO- Foliation CO- Contact OR- Orthogonal CL - Cleavage PL - Planar CU- Curved UN- Undulating ST - Stepped IR - Irregular PO- Polished K - Slickensided SM- Smooth Ro - Rough MB - Mechanical Break BR - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | | | | | | | FEATURES | R0/R1 ZONES | NOTES PIEZOMETER OR STANDPIPE INSTALLATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | RECOVERY | | R.Q.D. % | FRACT. INDEX PER Meter | DISCONTINUITY DATA | | | | | | ROCK STRENGTH INDEX | | WEATH- ERING INDEX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | TOTAL CORE % | SOLID CORE % | | | B Angle | DIP w.r.t CORE AXIS | TYPE AND SURFACE DESCRIPTION | Jr | Ja | R4 | R3 | R2 | R1 | W1 | W2 | W3 | | | | W4 | W5 | W6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Continued from Record of Borehole HML-1 | | 103.49 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

FEATURES LEGEND



BROKEN CORE



CLAY SEAM



LIMESTONE



LOST CORE

DEPTH SCALE

1 : 50



LOGGED: AB

CHECKED: KG/AB

GTA-RCK 054 S:\CLIENTS\MTOW\QEW-DIXIE\02 DATA\INT\QEW-DIXIE.GPJ GAL-MISS.GDT 11/01/17 GPK



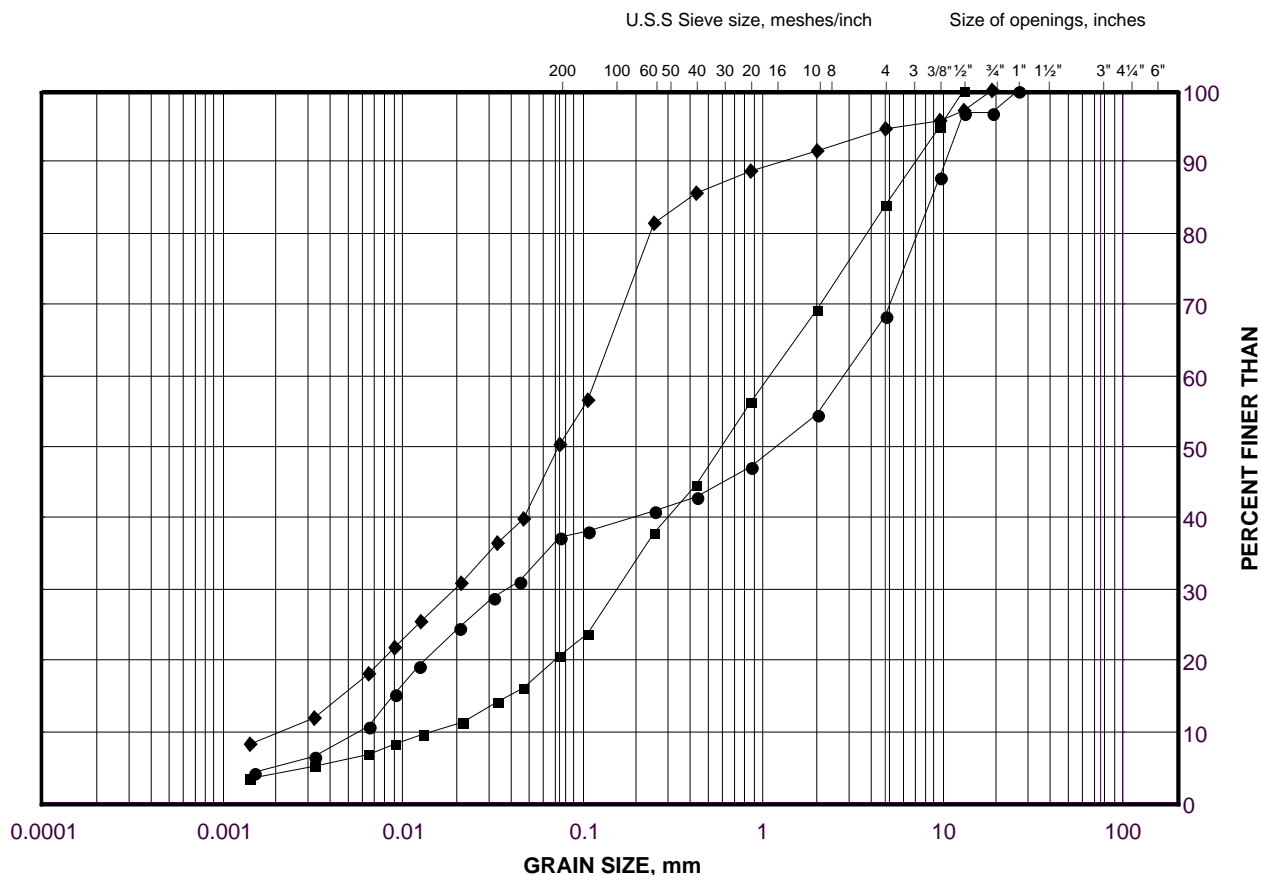
APPENDIX B

Laboratory Test Results, Bedrock Core Photographs

GRAIN SIZE DISTRIBUTION

Silt and Sand to Gravelly Silty Sand to Sand (Fill)

FIGURE B1



| | | | | | | | |
|---------------------|--|-----------|--------|--------|-------------|--------|--------|
| SILT AND CLAY SIZES | | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE |
| FINE GRAINED | | SAND SIZE | | | GRAVEL SIZE | | SIZE |

LEGEND

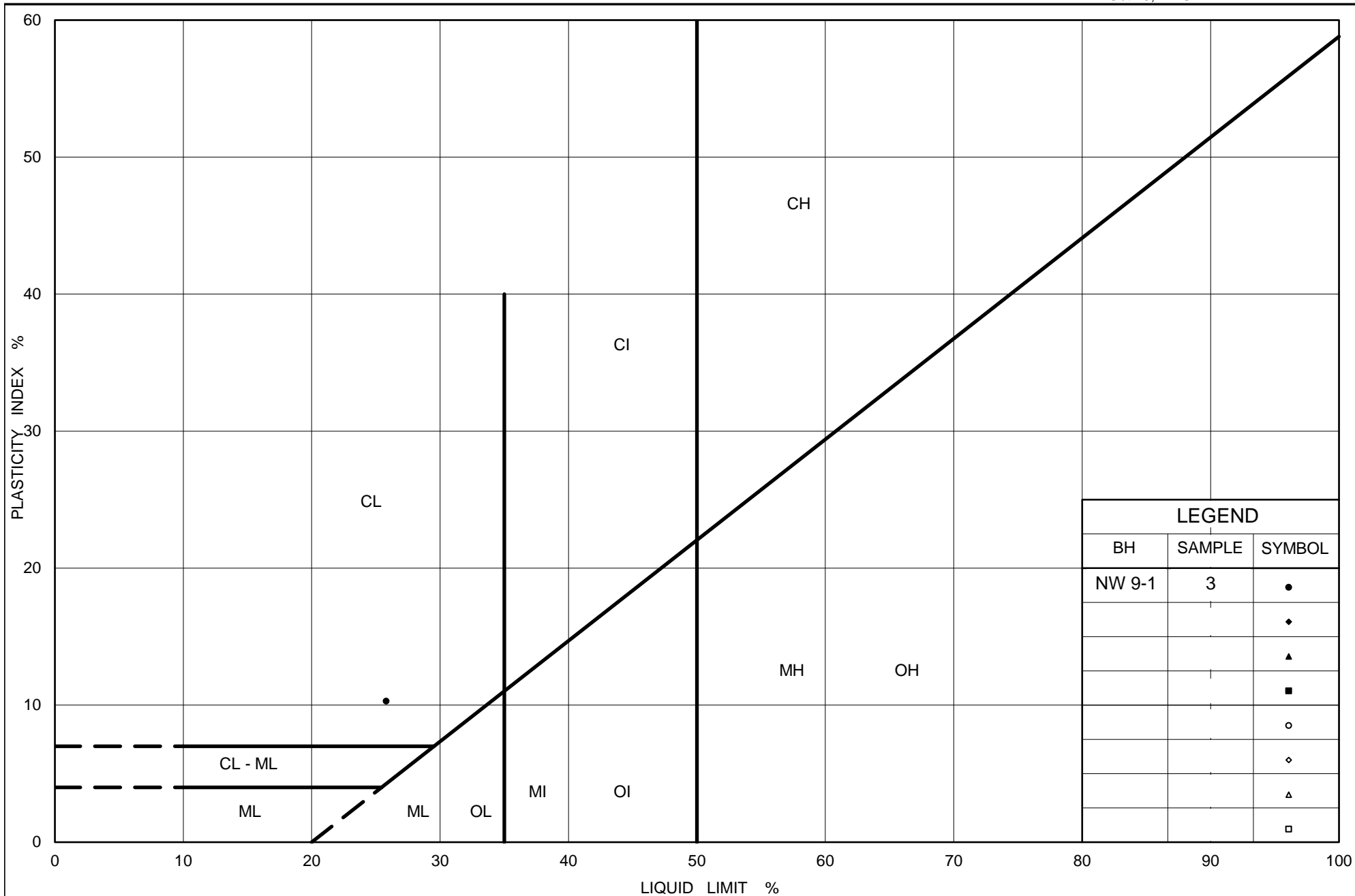
| SYMBOL | BOREHOLE | SAMPLE | ELEVATION(m) |
|--------|----------|--------|--------------|
| ● | RW 3-3 | 2 | 100.1 |
| ■ | NW 6-8 | 4 | 104.3 |
| ◆ | NW 9-1 | 5 | 97.6 |

Project Number: 1530382

Checked By: MWK

Golder Associates

Date: 02-Oct-17



Ministry of Transportation

Ontario

PLASTICITY CHART Clayey Silt (Fill)

Figure No. B2

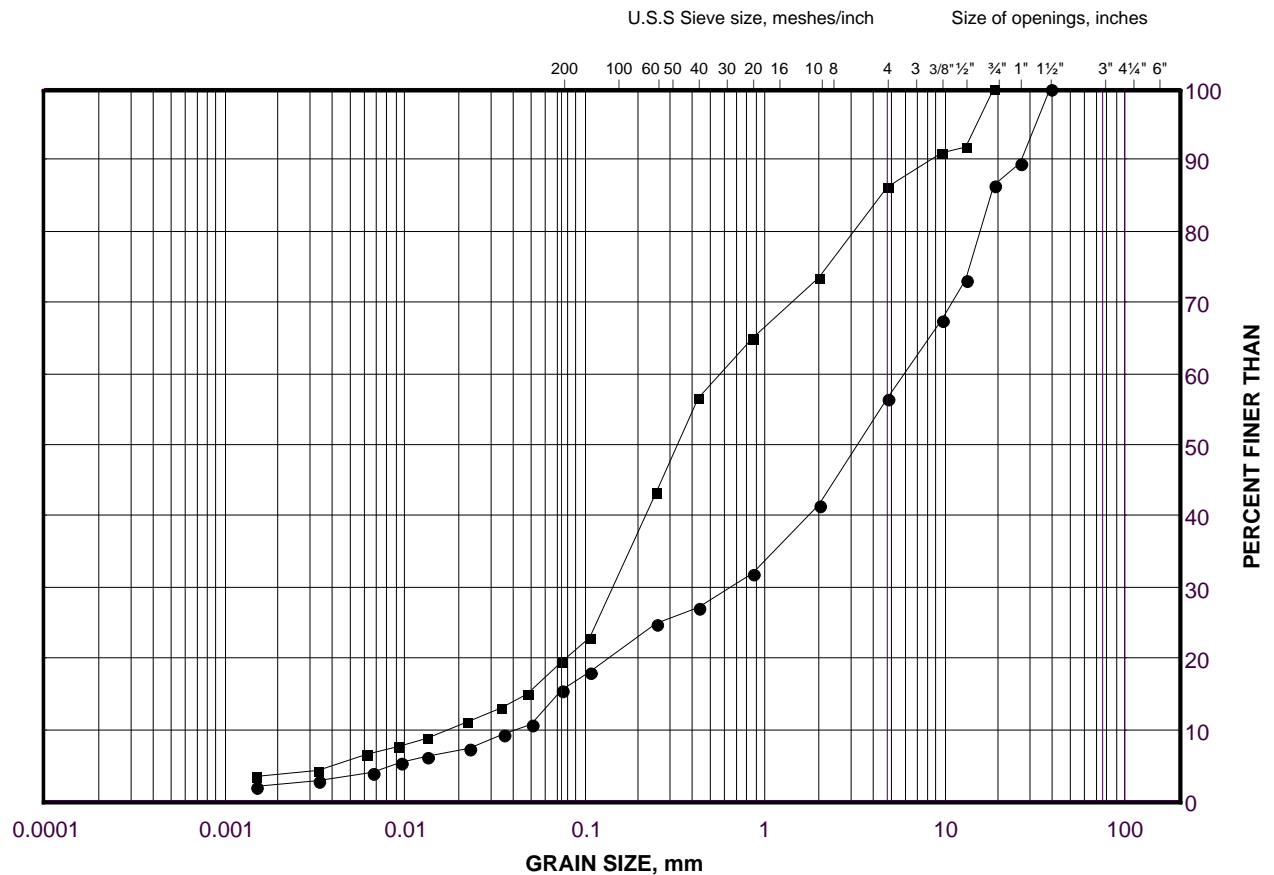
Project No. 1530382

Checked By: MWK

GRAIN SIZE DISTRIBUTION

Silt and Sand and Gravel to Sand to Sand to Gravel

FIGURE B3



| | | | | | | |
|---------------------|-----------|--------|--------|-------------|--------|--------|
| SILT AND CLAY SIZES | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE |
| FINE GRAINED | SAND SIZE | | | GRAVEL SIZE | | SIZE |

LEGEND

| SYMBOL | BOREHOLE | SAMPLE | ELEVATION(m) |
|--------|----------|--------|--------------|
| ● | OHS-5 | 3 | 104.4 |
| ■ | OHS -3 | 5 | 102.1 |

Project Number: 1530382

Checked By: MWK

Golder Associates

Date: 03-Oct-17

Silt

U.S.S Sieve size, meshes/inch

Size of openings, inches

PERCENT FINER THAN

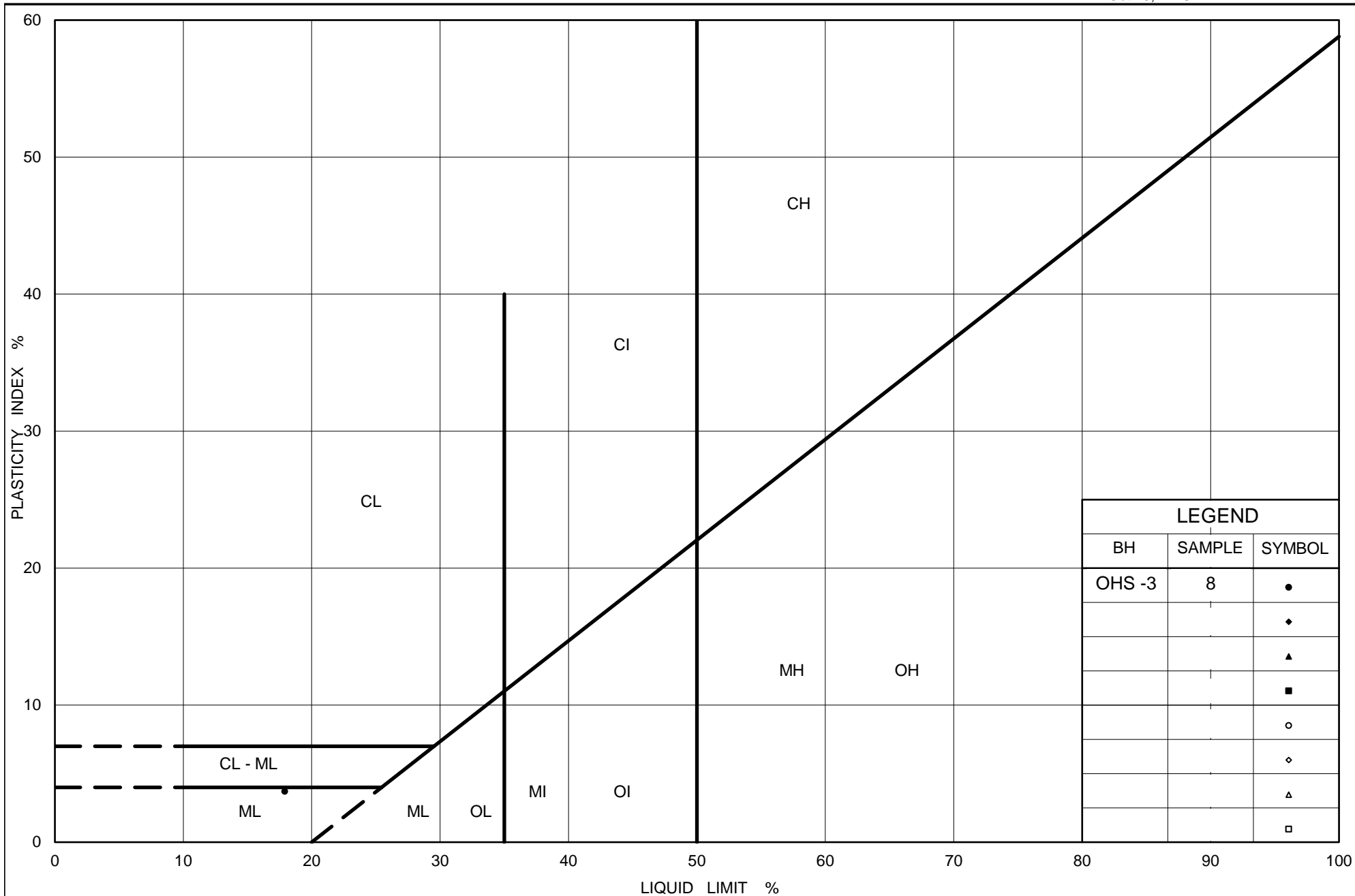
GRAIN SIZE, mm

| Grain Size (mm) | U.S.S Sieve Size (meshes/inch) | Size of Opening (inches) | Percent Finer Than (Circular Markers) | Percent Finer Than (Square Markers) |
|-----------------|--------------------------------|--------------------------|---------------------------------------|-------------------------------------|
| 0.0015 | 100 | 0.0075 | 20 | 18 |
| 0.0025 | 60 | 0.0060 | 28 | 25 |
| 0.00425 | 40 | 0.00425 | 38 | 32 |
| 0.006 | 30 | 0.006 | 42 | 35 |
| 0.0075 | 20 | 0.0075 | 45 | 38 |
| 0.0106 | 16 | 0.0106 | 48 | 40 |
| 0.015 | 10 | 0.015 | 55 | 45 |
| 0.025 | 60 | 0.025 | 65 | 55 |
| 0.0425 | 40 | 0.0425 | 75 | 65 |
| 0.075 | 20 | 0.075 | 85 | 75 |
| 0.106 | 16 | 0.106 | 95 | 85 |
| 0.15 | 10 | 0.15 | 98 | 95 |
| 0.25 | 60 | 0.25 | 99 | 98 |
| 0.425 | 40 | 0.425 | 100 | 100 |
| 0.75 | 20 | 0.75 | 100 | 100 |
| 1.06 | 16 | 1.06 | 100 | 100 |
| 1.5 | 10 | 1.5 | 100 | 100 |
| 2.5 | 60 | 2.5 | 100 | 100 |
| 4.25 | 40 | 4.25 | 100 | 100 |
| 7.5 | 20 | 7.5 | 100 | 100 |
| 10.6 | 16 | 10.6 | 100 | 100 |
| 15 | 10 | 15 | 100 | 100 |
| 25 | 60 | 25 | 100 | 100 |
| 42.5 | 40 | 42.5 | 100 | 100 |
| 75 | 20 | 75 | 100 | 100 |
| 106 | 16 | 106 | 100 | 100 |
| 150 | 10 | 150 | 100 | 100 |
| 250 | 60 | 250 | 100 | 100 |
| 425 | 40 | 425 | 100 | 100 |
| 750 | 20 | 750 | 100 | 100 |
| 1060 | 16 | 1060 | 100 | 100 |
| 1500 | 10 | 1500 | 100 | 100 |
| 2500 | 60 | 2500 | 100 | 100 |
| 4250 | 40 | 4250 | 100 | 100 |
| 7500 | 20 | 7500 | 100 | 100 |
| 10600 | 16 | 10600 | 100 | 100 |
| 15000 | 10 | 15000 | 100 | 100 |
| 25000 | 60 | 25000 | 100 | 100 |
| 42500 | 40 | 42500 | 100 | 100 |
| 75000 | 20 | 75000 | 100 | 100 |
| 106000 | 16 | 106000 | 100 | 100 |
| 150000 | 10 | 150000 | 100 | 100 |
| 250000 | 60 | 250000 | 100 | 100 |
| 425000 | 40 | 425000 | 100 | 100 |
| 750000 | 20 | 750000 | 100 | 100 |
| 1060000 | 16 | 1060000 | 100 | 100 |
| 1500000 | 10 | 1500000 | 100 | 100 |
| 2500000 | 60 | 2500000 | 100 | 100 |
| 4250000 | 40 | 4250000 | 100 | 100 |
| 7500000 | 20 | 7500000 | 100 | 100 |
| 10600000 | 16 | 10600000 | 100 | 100 |
| 15000000 | 10 | 15000000 | 100 | 100 |
| 25000000 | 60 | 25000000 | 100 | 100 |
| 42500000 | 40 | 42500000 | 100 | 100 |
| 75000000 | 20 | 75000000 | 100 | 100 |
| 106000000 | 16 | 106000000 | 100 | 100 |
| 150000000 | 10 | 150000000 | 100 | 100 |
| 250000000 | 60 | 250000000 | 100 | 100 |
| 425000000 | 40 | 425000000 | 100 | 100 |
| 750000000 | 20 | 750000000 | 100 | 100 |
| 1060000000 | 16 | 1060000000 | 100 | 100 |
| 1500000000 | 10 | 1500000000 | 100 | 100 |
| 2500000000 | 60 | 2500000000 | 100 | 100 |
| 4250000000 | 40 | 4250000000 | 100 | 100 |
| 7500000000 | 20 | 7500000000 | 100 | 100 |
| 10600000000 | 16 | 10600000000 | 100 | 100 |
| 15000000000 | 10 | 15000000000 | 100 | 100 |
| 2500000 | | | | |

| | | | | | | |
|---------------------|-----------|--------|--------|-------------|--------|--------|
| | | | | | | |
| SILT AND CLAY SIZES | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE |
| FINE GRAINED | SAND SIZE | | | GRAVEL SIZE | | SIZE |

| SYMBOL | BOREHOLE | SAMPLE | ELEVATION(m) |
|--------|----------|--------|--------------|
| ● | OHS-2 | 4 | 101.4 |
| ■ | OHS-3 | 8 | 99.1 |

Date: 02-Oct-17



Ministry of Transportation

Ontario

PLASTICITY CHART

Silt

Figure No. B5

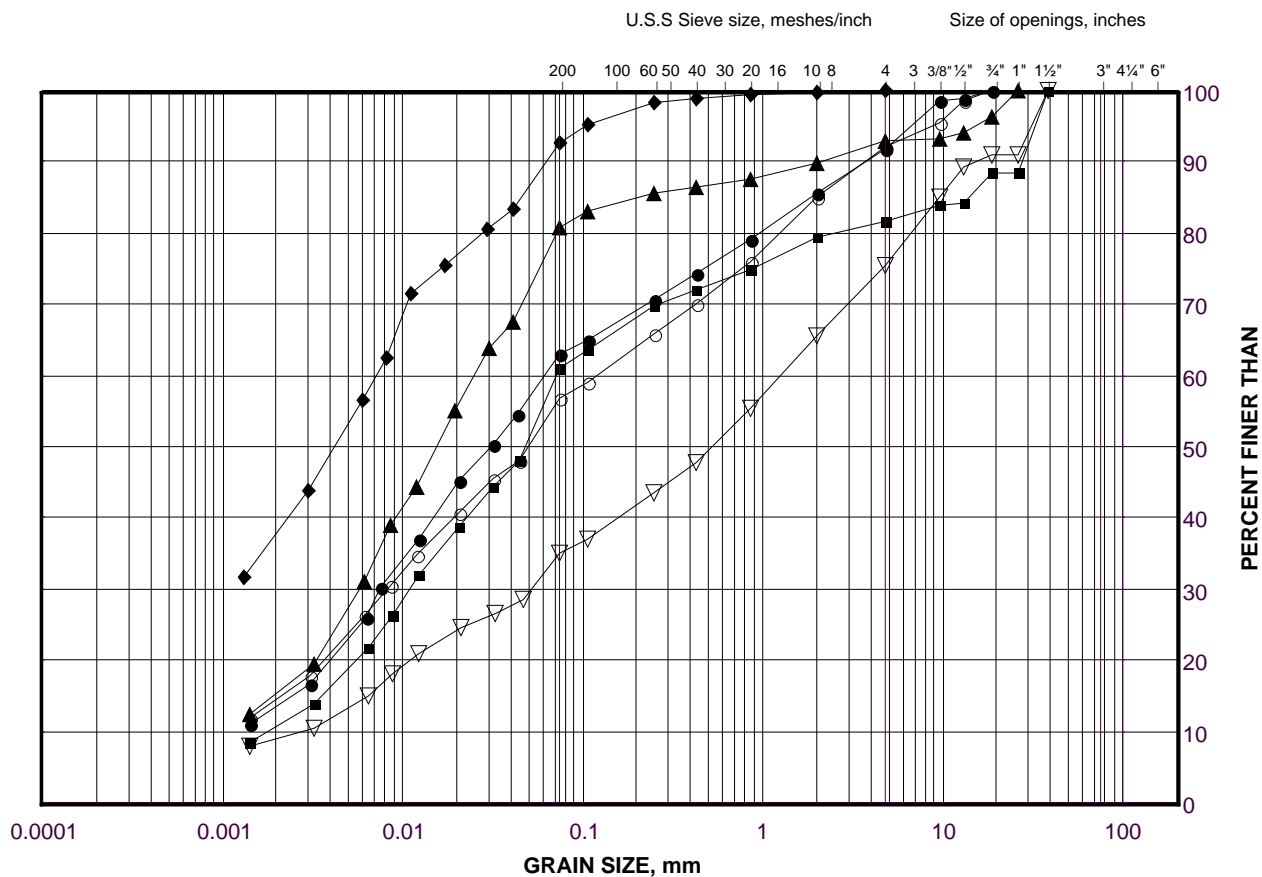
Project No. 1530382

Checked By: MWK

GRAIN SIZE DISTRIBUTION

Clayey Silt to Clayey Silt with Sand

FIGURE B6



| | | | | | | |
|---------------------|-----------|--------|--------|-------------|--------|--------|
| SILT AND CLAY SIZES | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE |
| FINE GRAINED | SAND SIZE | | | GRAVEL SIZE | | SIZE |

LEGEND

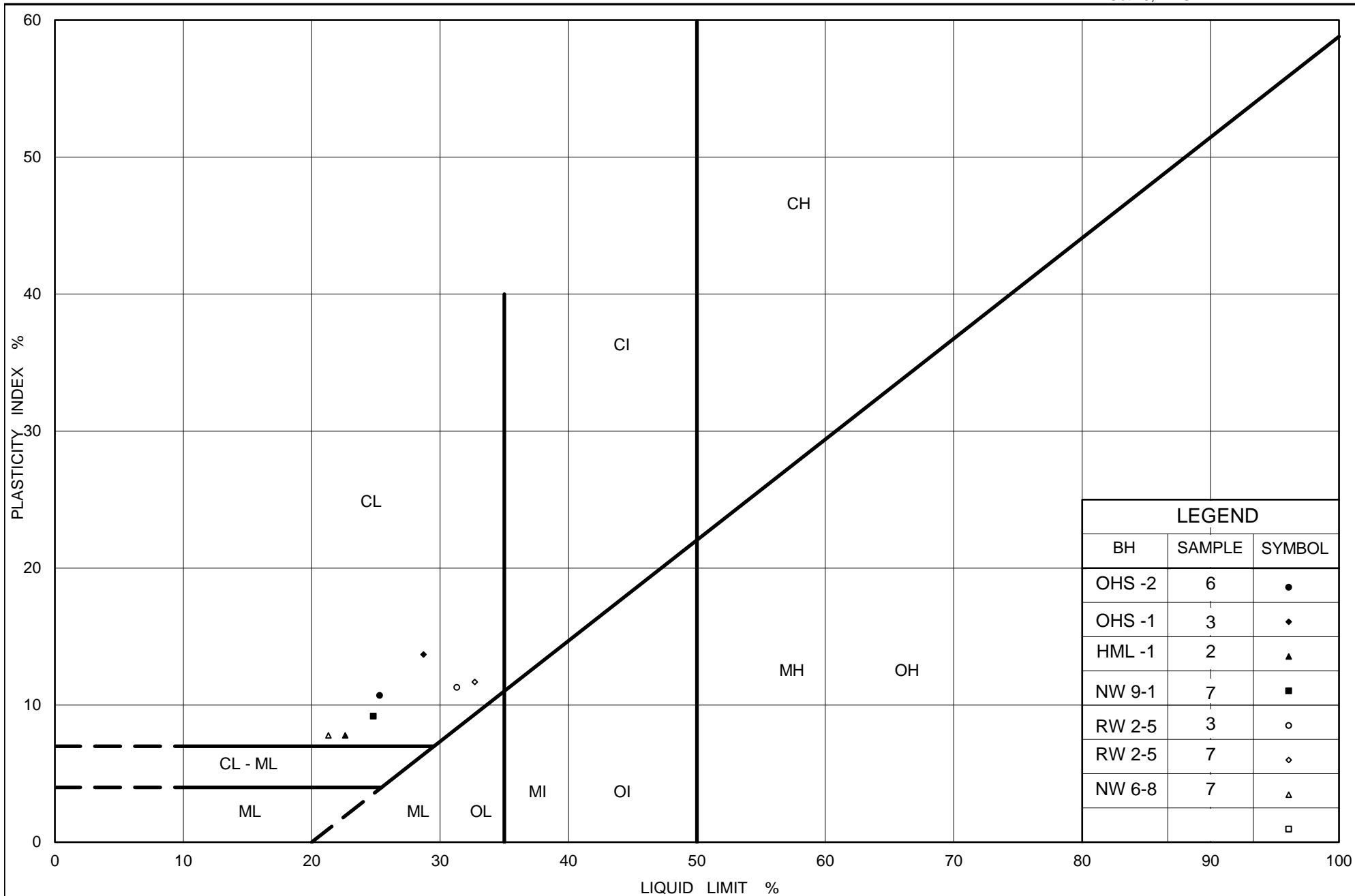
| SYMBOL | BOREHOLE | SAMPLE | ELEVATION(m) |
|--------|----------|--------|--------------|
| ● | HML -1 | 2 | 107.9 |
| ■ | RW 2-5 | 3 | 100.3 |
| ◆ | OHS -1 | 3 | 101.7 |
| ▲ | RW 2-5 | 7 | 97.2 |
| ▽ | NW 6-8 | 7 | 102.1 |
| ○ | NW 9-1 | 7 | 96.1 |

Project Number: 1530382

Checked By: MWK

Golder Associates

Date: 03-Oct-17



Ministry of Transportation

Ontario

PLASTICITY CHART

Clayey Silt

Figure No. B7

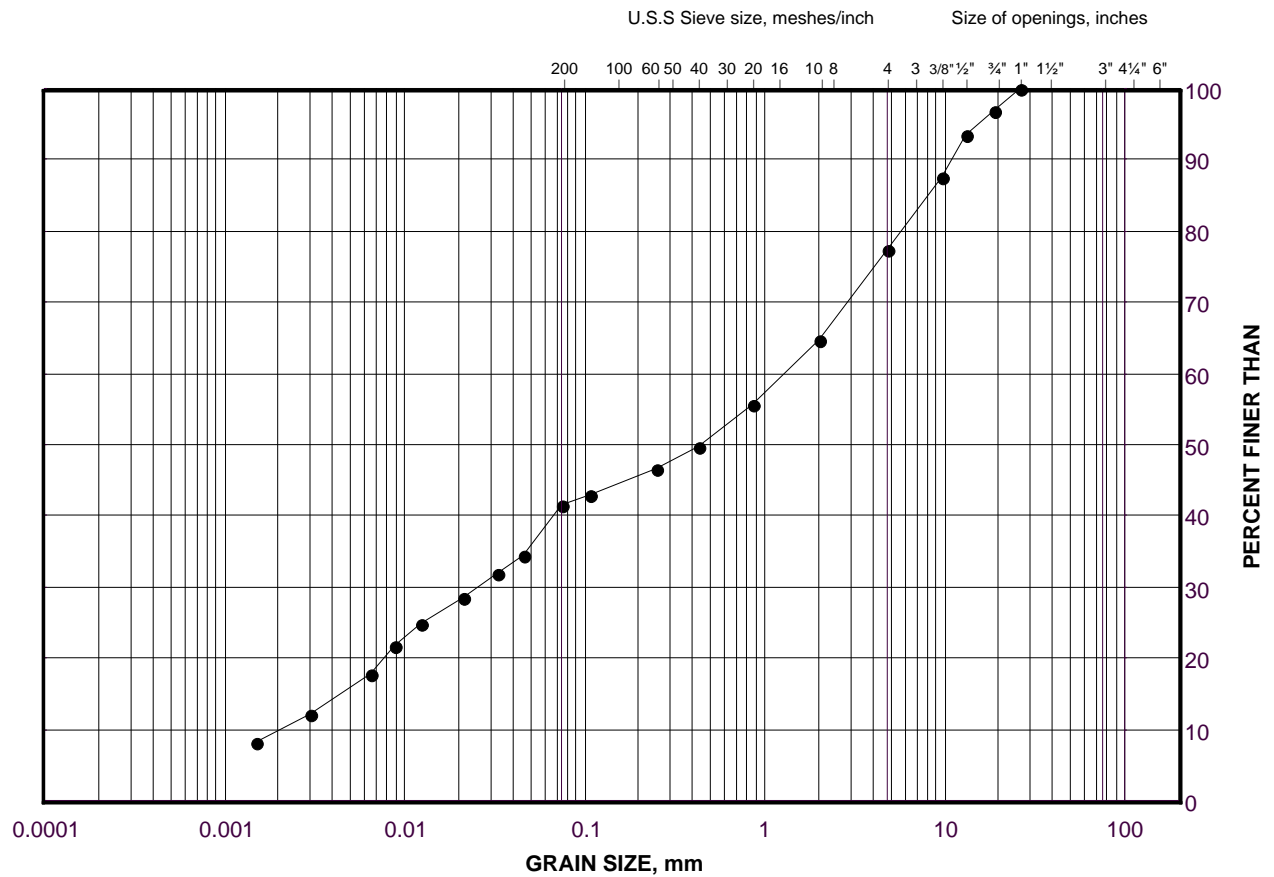
Project No. 1530382

Checked By: MWK

GRAIN SIZE DISTRIBUTION

Clayey Silt with Sand (Till)

FIGURE B8



| SILT AND CLAY SIZES | | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE |
|---------------------|--|-----------|--------|--------|-------------|--------|--------|
| FINE GRAINED | | SAND SIZE | | | GRAVEL SIZE | | SIZE |

LEGEND

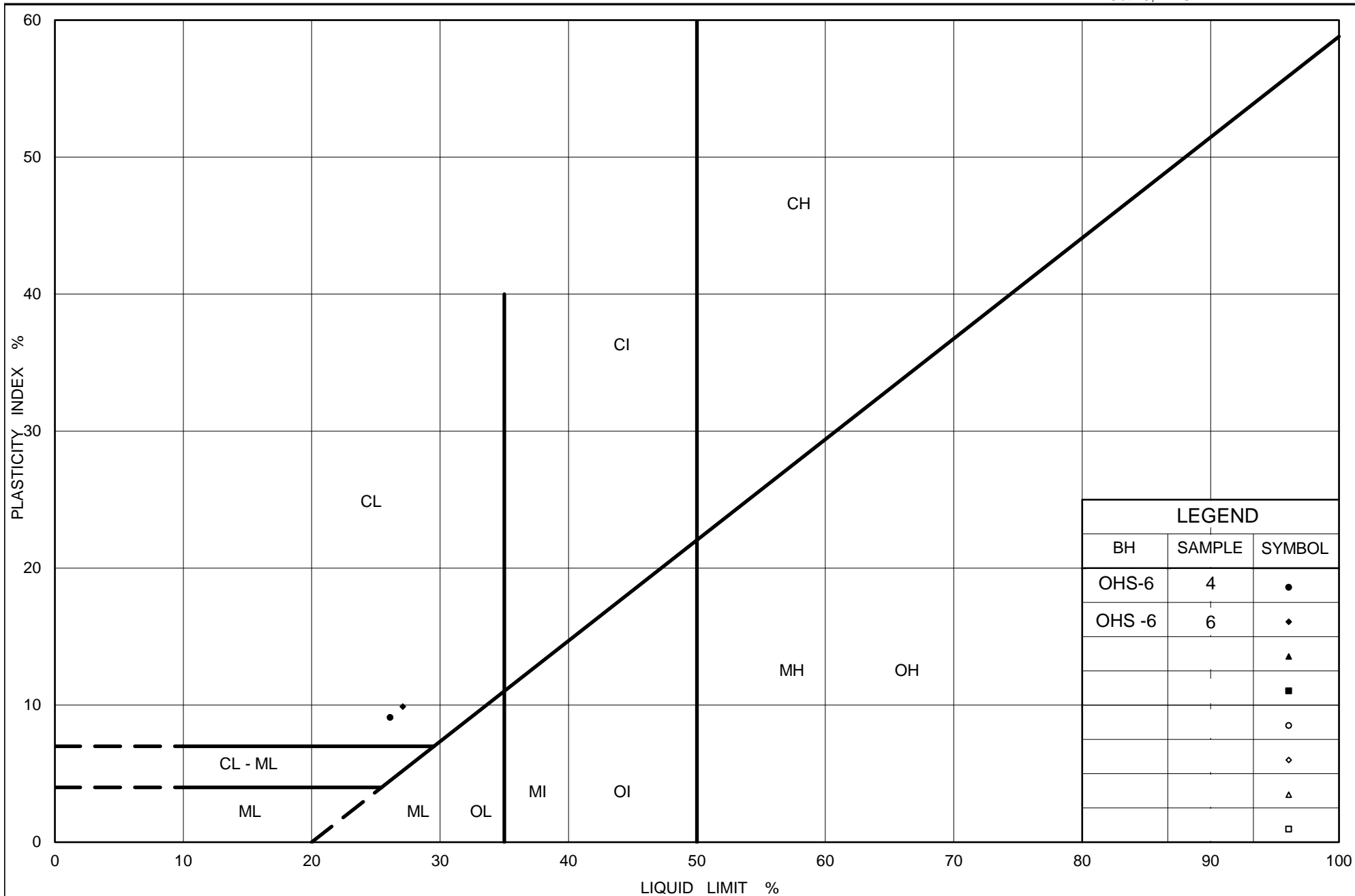
| SYMBOL | BOREHOLE | SAMPLE | ELEVATION(m) |
|--------|----------|--------|--------------|
| • | OHS-6 | 4 | 102.4 |

Project Number: 1530382

Checked By: MWK

Golder Associates

Date: 02-Oct-17



Ministry of Transportation

Ontario

PLASTICITY CHART Clayey Silt (Till)

Figure No. B9

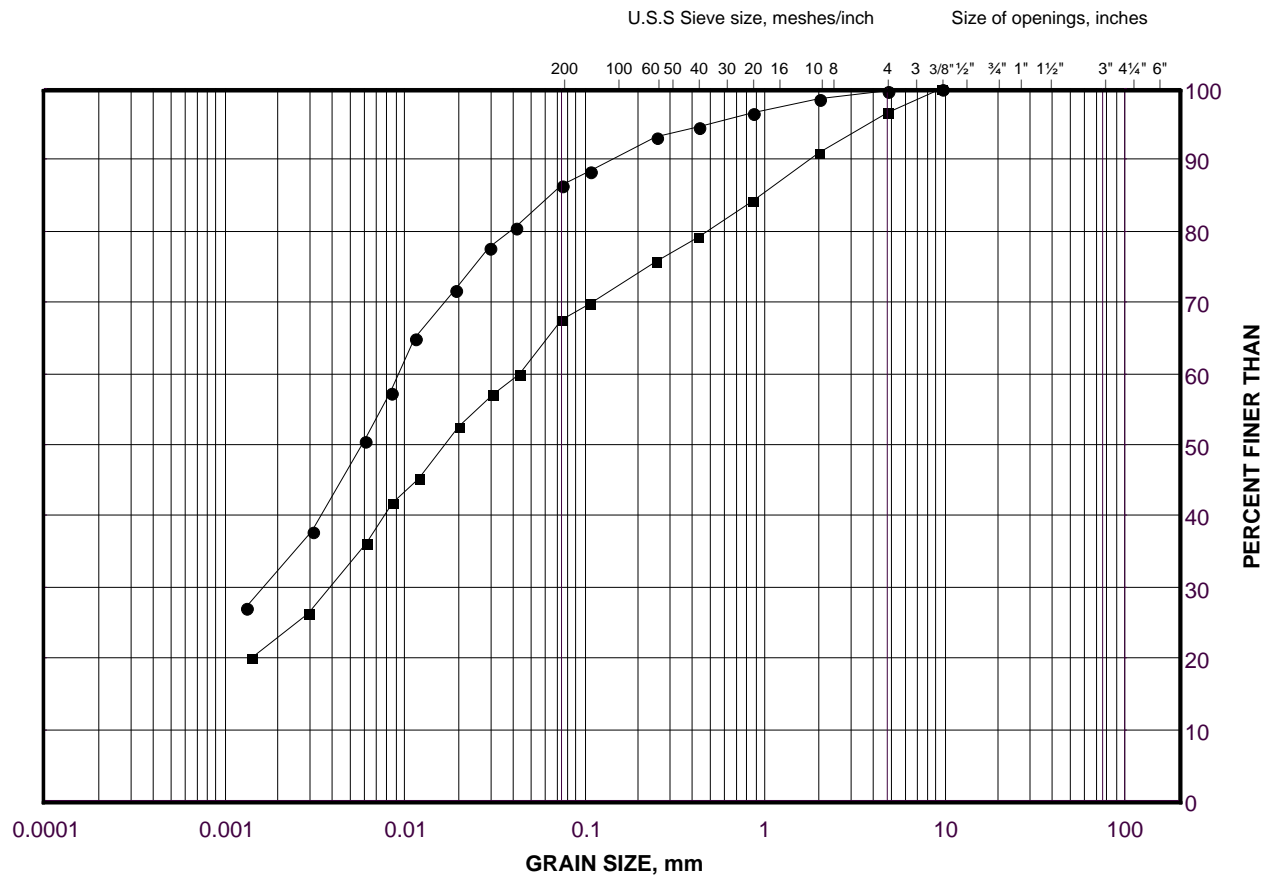
Project No. 1530382

Checked By: MWK

GRAIN SIZE DISTRIBUTION

Clayey Silt (Residual Soil)

FIGURE B10



| | | | | | | | |
|---------------------|--|-----------|--------|--------|-------------|--------|--------|
| SILT AND CLAY SIZES | | FINE | MEDIUM | COARSE | FINE | COARSE | COBBLE |
| FINE GRAINED | | SAND SIZE | | | GRAVEL SIZE | | SIZE |

LEGEND

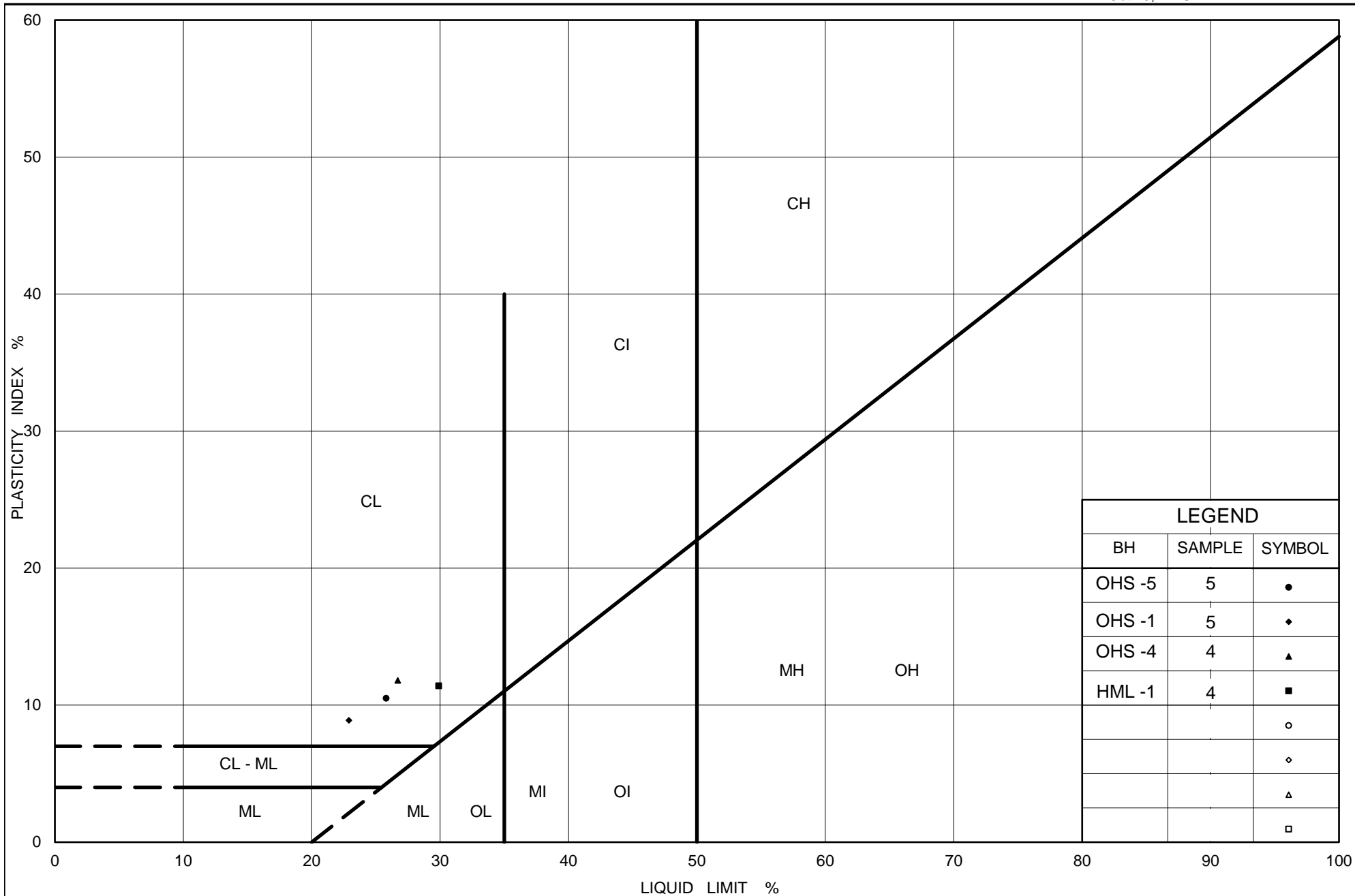
| SYMBOL | BOREHOLE | SAMPLE | ELEVATION(ft) |
|--------|----------|--------|---------------|
| ● | OHS -4 | 4 | 103.0 |
| ■ | OHS-5 | 5 | 102.9 |

Project Number: 1530382

Checked By: MWK

Golder Associates

Date: 02-Oct-17



Ministry of Transportation

Ontario

PLASTICITY CHART Clayey Silt (Residual Soil)

Figure No. B11


Project No. 1530382

Checked By: MWK

7.62 m



10.87 m

| | | | | |
|--|---------------------|------|---------------|-----|
| PROJECT FOUNDATION REPORT – QEW - OHS AND HML, GWP 2102-13-00 & 2432-13-00 | | | | |
| TITLE BEDROCK CORE PHOTOGRAPHS – OHS-2 | | | | |
|  | PROJECT No. 1530382 | | FILE No. ---- | |
| | DESIGN | MWK | SCALE | NTS |
| | CADD | -- | FIGURE B12 | |
| | CHECK | | | |
| | REVIEW | JMAC | | |

4.70 m

6.30 m



9.0 m


9.25 m

10.0 m

10.10 m



10.79 m


| | | | | | | | |
|--|--|---|------|---------------|------------|-----|------|
| PROJECT | | FOUNDATION REPORT – QEW - OHS AND HML, GWP 2102-13-00 & 2432-13-00 | | | | | |
| TITLE | | | | | | | |
| BEDROCK CORE PHOTOGRAPHS – OHS-4 | | | | | | | |
|  | | PROJECT No. 1530382 | | FILE No. ---- | | | |
| | | DESIGN | MWK | | SCALE | NTS | REV. |
| | | CADD | -- | | FIGURE B13 | | |
| | | CHECK | | | | | |
| | | REVIEW | JMAC | | | | |

6.10 m



9.14 m

REVISION DATE: BY: FILE:


| | | | | |
|--|--|---|------|---------------|
| PROJECT | | FOUNDATION REPORT – QEW - OHS AND HML, GWP 2102-13-00 & 2432-13-00 | | |
| TITLE | | BEDROCK CORE PHOTOGRAPHS – OHS-5B | | |
|  | | PROJECT No. 1530382 | | FILE No. ---- |
| | | DESIGN | MWK | SCALE NTS |
| | | CADD | -- | REV. |
| | | CHECK | | FIGURE B14 |
| | | REVIEW | JMAC | |

6.17 m



9.30 m

REVISION DATE: BY: FILE:

| | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|---|--|--|--|--|--|----------------------------------|--|------|--|---------------|--|------------|--|-----|--|------|--|
| PROJECT | | | | | | FOUNDATION REPORT – QEW - OHS AND HML, GWP 2102-13-00 & 2432-13-00 | | | | | | | | | | | | | | | | | |
| TITLE | | | | | | | | | | | | BEDROCK CORE PHOTOGRAPHS – OHS-6 | | | | | | | | | | | |
|  | | | | | | | | | | | | PROJECT No. 1530382 | | | | FILE No. ---- | | | | | | | |
| | | | | | | | | | | | | DESIGN | | MWK | | | | SCALE | | NTS | | REV. | |
| | | | | | | | | | | | | CADD | | -- | | | | FIGURE B15 | | | | | |
| | | | | | | | | | | | | CHECK | | | | | | | | | | | |
| | | | | | | | | | | | | REVIEW | | JMAC | | | | | | | | | |

3.86m




6.10 m



7.62 m

REVISION DATE: BY: FILE:

| | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|---|--|--|--|--|----------------------------------|------|--|---------------|--|------------|--|--|------|
| PROJECT | | | | | FOUNDATION REPORT – QEW - OHS AND HML, GWP 2102-13-00 & 2432-13-00 | | | | | | | | | | | | | |
| TITLE | | | | | | | | | | BEDROCK CORE PHOTOGRAPHS – RW3-3 | | | | | | | | |
|  | | | | | | | | | | PROJECT No. 1530382 | | | FILE No. ---- | | FIGURE B16 | | | |
| | | | | | | | | | | DESIGN | MWK | | SCALE NTS | | | | | REV. |
| | | | | | | | | | | CADD | -- | | | | | | | |
| | | | | | | | | | | CHECK | | | | | | | | |
| | | | | | | | | | | REVIEW | JMAC | | | | | | | |

6.25 m




7.77 m

7.77 m



9.30 m

| | | | | | | | |
|--|--|---|------|---------------|------------|-----|------|
| PROJECT | | FOUNDATION REPORT – QEW - OHS AND HML, GWP 2102-13-00 & 2432-13-00 | | | | | |
| TITLE | | | | | | | |
| BEDROCK CORE PHOTOGRAPHS – HML-1 | | | | | | | |
|  | | PROJECT No. 1530382 | | FILE No. ---- | | | |
| | | DESIGN | MWK | | SCALE | NTS | REV. |
| | | CADD | -- | | FIGURE B17 | | |
| | | CHECK | | | | | |
| | | REVIEW | JMAC | | | | |

December 16, 2016

Ms. Sandra McGaghran
Golder Associates Ltd.
6925 Century Avenue, Suite #100
Mississauga, Ontario
Canada L5N 7K2

Re: UCS Testing of shale samples - Golder Associates Project No. 1530382

Dear Ms. McGaghran:

On December 2, 2016 three (3) NQ-sized core samples were received by Geomechanica Inc. via drop-off. These samples were identified as shale from a drilling investigation near the QEW and Dixie Road in Mississauga, Ontario. Three (3) uniaxial compressive strength (UCS) test specimens were prepared and tested (one from each sample). The tangent elastic modulus was measured during one (1) of these three tests.

Details regarding the steps of specimen preparation and testing along with the test results and photographs of specimens before and after testing are presented in the accompanying laboratory report.

Sincerely,



Giovanni Grasselli Ph.D., P. Eng.

Geomechanica Inc.
Tel: (647) 478-9767
Email: giovanni.grasselli@geomechanica.com

Rock Laboratory Testing Results

A report submitted to:

Ms. Sandra McGaghran
Golder Associates Ltd.
6925 Century Avenue, Suite #100
Mississauga, Ontario
Canada L5N 7K2

Prepared by:

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Geomechanica Inc
#900-390 Bay St
Toronto ON
M5H 3V9 Canada
Tel: +1-647-478-9767
info@geomechanica.com

December 16, 2016

Project number: 1530382

Abstract

This document summarizes the results of Uniaxial Compressive Strength (UCS) testing of 3 NQ-sized rock core samples for Golder Associates Ltd. (Golder Project No. 1530382). The samples were identified as shale from a drilling investigation near the QEW and Dixie Road in Mississauga Ontario. The results, including the tabulated values of the UCS, bulk density, and elastic modulus along with photos of the test specimens before and after testing, are presented herein.

In this document:

| | | |
|---|-------------------------------------|---|
| 1 | Uniaxial Compressive Strength Tests | 1 |
|---|-------------------------------------|---|

1 Uniaxial Compressive Strength Tests

1.1 Introduction

This section summarizes the results of rock laboratory testing of NQ-sized shale samples under unconfined uniaxial compression. The tests were performed in Geomechanica's rock testing laboratory in Vaughan, Ontario using a 150 ton (1.3 MN) Forney hydraulic loading frame equipped with pressure-compensated control valve to maintain a nearly constant axial displacement rate of 0.1 mm/min (Figure 1). The specimen preparation and testing procedure included the following:

1. Unwrapping of the core samples, inspecting them for damage, and re-wrapping them in electrical tape to maintain the moisture content and avoid breakage during handling and preparation.
2. Diamond sawing the core samples to length such that cylindrical specimens with nearly parallel end faces were obtained. When possible, specimens were cut such that they had a length:diameter ratio of at least 2:1. For this project, 1 out of the 3 core samples provided was too short to obtain the desired length to diameter ratio.
3. Surface grinding of specimens to obtain flat and parallel end faces within ± 0.025 mm.
4. Loading the specimens into a stiff hydraulic loading frame and applying a small axial load of 0.5-1.0 kN, removing of the electrical tape, and subsequently loading the specimen to rupture while continuously recording axial force and axial deformation (for select specimens) to determine the peak strength (UCS) and (tangent) Young's modulus (E) (for select specimens).



Figure 1: Forney loading frame used for uniaxial compression testing.

1.2 Results

The results of UCS testing are summarized in Table 1. The stress-strain curve for CV 02/03-1 is shown in Figure 2. The Young's modulus value presented in Table 1 represents the tangent modulus, calculated as the slope of the best fit line through ± 300 data points on either side of the point representing 50% of the UCS.

Table 1: Summary of UCS test results.

| Sample | Rock type | Depth from (m) | Depth to (m) | Bulk density (g/cm ³) | UCS (MPa) | Young's modulus, E_{50} (GPa) | Notes |
|--------------------|-----------|----------------|--------------|-----------------------------------|-----------|---------------------------------|--------------|
| SWM-A-2 | Shale | 5.10 | 5.30 | 2.59 | 17.7 | - | |
| CV 02/03-1 | Shale | 7.47 | 7.70 | 2.60 | 17.6 | 1.2 | ¹ |
| HML-1 | Shale | 7.41 | 7.50 | 2.59 | 17.8 | - | ² |
| Min | | | | 2.59 | 17.6 | 1.2 | |
| Max | | | | 2.60 | 17.8 | 1.2 | |
| Mean | | | | 2.59 | 17.7 | 1.2 | |
| Standard Deviation | | | | 0.01 | 0.1 | - | |

¹ Top 25 mm of specimen is limestone
² Specimen length:diameter < 2:1

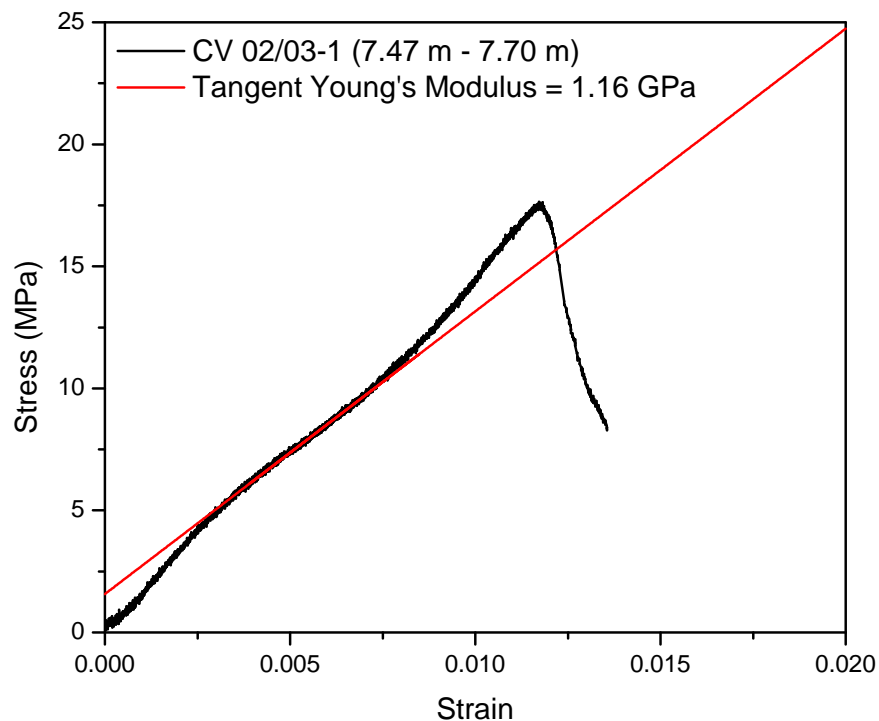


Figure 2: Measured stress-strain curves for samples from different boreholes.

1.3 Specimen photographs

Photographs of the specimens before and after testing are shown in Figure 3.



Figure 3: Photographs of test specimens before testing (top) and after testing (bottom).



APPENDIX C

Analytical Test Results

Your Project #: 1530382
Site Location: QEW-CAWTHRA
Your C.O.C. #: 70344

Attention: Alysha Kobylinski

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/11/19
Report #: R4252452
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B605411

Received: 2016/11/10, 17:14

Sample Matrix: SOLID
Samples Received: 5

| Analyses | Date | | Date Analyzed | Laboratory Method | Reference |
|-------------------------|----------|------------|---------------|-------------------|-----------------|
| | Quantity | Extracted | | | |
| Chloride (20:1 extract) | 5 | N/A | 2016/11/16 | CAM SOP-00463 | EPA 325.2 m |
| Conductivity | 5 | N/A | 2016/11/16 | CAM SOP-00414 | OMOE E3530 v1 m |
| pH CaCl2 EXTRACT | 5 | 2016/11/16 | 2016/11/16 | CAM SOP-00413 | EPA 9045 D m |
| Resistivity of Soil | 5 | 2016/11/10 | 2016/11/17 | CAM SOP-00414 | SM 22 2510 m |
| Sulphate (20:1 Extract) | 5 | N/A | 2016/11/16 | CAM SOP-00464 | EPA 375.4 m |

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your Project #: 1530382
Site Location: QEW-CAWTHRA
Your C.O.C. #: 70344

Attention: Alysha Kobylinski

Golder Associates Ltd
Mississauga - Standing Offer
6925 Century Ave
Suite 100
Mississauga, ON
CANADA L5N 7K2

Report Date: 2016/11/19
Report #: R4252452
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6O5411
Received: 2016/11/10, 17:14

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ema Gitej, Senior Project Manager

Email: EGitej@maxxam.ca

Phone# (905)817-5829

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RESULTS OF ANALYSES OF SOLID

| | | | | | | | |
|----------------------|--------------|--------------------------|--------------------------------------|-----------------|------------------------------|------------|-----------------|
| Maxxam ID | | DKV715 | DKV715 | | DKV716 | | |
| Sampling Date | | 2016/11/03 | 2016/11/03 | | 2016/11/10 | | |
| COC Number | | 70344 | 70344 | | 70344 | | |
| | UNITS | RW3-3-4.33M-4.43M | RW3-3-4.33M-4.43M Lab-Dup | QC Batch | OHS-4-SA4-2.29M-2.59M | RDL | QC Batch |

| | | | | | | | |
|--|---------|------|-----|---------|------|----|---------|
| Calculated Parameters | | | | | | | |
| Resistivity | ohm-cm | 2000 | | 4745989 | 850 | | 4745989 |
| Inorganics | | | | | | | |
| Soluble (20:1) Chloride (Cl) | ug/g | <20 | | 4748291 | 500 | 20 | 4748291 |
| Conductivity | umho/cm | 499 | | 4749169 | 1180 | 2 | 4749169 |
| Available (CaCl ₂) pH | pH | 8.18 | | 4750330 | 7.92 | | 4750333 |
| Soluble (20:1) Sulphate (SO ₄) | ug/g | 250 | 230 | 4748348 | 270 | 20 | 4748348 |
| RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate | | | | | | | |

| | | | | | | | |
|----------------------|--------------|--|-----------------|------------------------------|----------------------------|------------|-----------------|
| Maxxam ID | | DKV716 | | DKV717 | DKV718 | | |
| Sampling Date | | 2016/11/10 | | 2016/11/10 | 2016/11/03 | | |
| COC Number | | 70344 | | 70344 | 70344 | | |
| | UNITS | OHS-4-SA4-2.29M-2.59M Lab-Dup | QC Batch | OHS-5-SA5-3.81M-4.42M | CV01-01-8.74M-8.80M | RDL | QC Batch |

| | | | | | | | |
|--|---------|------|---------|------|------|----|---------|
| Calculated Parameters | | | | | | | |
| Resistivity | ohm-cm | | 4745989 | 1400 | 1000 | | 4745989 |
| Inorganics | | | | | | | |
| Soluble (20:1) Chloride (Cl) | ug/g | | 4748291 | 40 | 260 | 20 | 4748291 |
| Conductivity | umho/cm | | 4749169 | 720 | 965 | 2 | 4749169 |
| Available (CaCl ₂) pH | pH | 7.90 | 4750333 | 7.86 | 8.14 | | 4750330 |
| Soluble (20:1) Sulphate (SO ₄) | ug/g | | 4748348 | 560 | 320 | 20 | 4748348 |
| RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate | | | | | | | |

Maxxam Job #: B605411
Report Date: 2016/11/19

Golder Associates Ltd
Client Project #: 1530382
Site Location: QEW-CAWTHRA
Sampler Initials: AJ

RESULTS OF ANALYSES OF SOLID

| | | | | |
|----------------------------------|--------------|-----------------------------|------------|-----------------|
| Maxxam ID | | DKV719 | | |
| Sampling Date | | 2016/11/03 | | |
| COC Number | | 70344 | | |
| | UNITS | CV02/3-1-5.27M-5.32M | RDL | QC Batch |
| Calculated Parameters | | | | |
| Resistivity | ohm-cm | 1500 | | 4745989 |
| Inorganics | | | | |
| Soluble (20:1) Chloride (Cl) | ug/g | 100 | 20 | 4748291 |
| Conductivity | umho/cm | 682 | 2 | 4749169 |
| Available (CaCl2) pH | pH | 8.01 | | 4750330 |
| Soluble (20:1) Sulphate (SO4) | ug/g | 250 | 20 | 4748348 |
| RDL = Reportable Detection Limit | | | | |
| QC Batch = Quality Control Batch | | | | |

TEST SUMMARY

Maxxam ID: DKV715
Sample ID: RW3-3-4.33M-4.43M
Matrix: SOLID

Collected: 2016/11/03
Shipped:
Received: 2016/11/10

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|-------------------------|-----------------|---------|------------|---------------|---------------------|
| Chloride (20:1 extract) | KONE/EC | 4748291 | N/A | 2016/11/16 | Alina Dobreanu |
| Conductivity | AT | 4749169 | N/A | 2016/11/16 | Tahir Anwar |
| pH CaCl2 EXTRACT | AT | 4750330 | 2016/11/16 | 2016/11/16 | Neil Dassanayake |
| Resistivity of Soil | | 4745989 | 2016/11/17 | 2016/11/17 | Automated Statchk |
| Sulphate (20:1 Extract) | KONE/EC | 4748348 | N/A | 2016/11/16 | Deonarine Ramnarine |

Maxxam ID: DKV715 Dup
Sample ID: RW3-3-4.33M-4.43M
Matrix: SOLID

Collected: 2016/11/03
Shipped:
Received: 2016/11/10

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|-------------------------|-----------------|---------|-----------|---------------|---------------------|
| Sulphate (20:1 Extract) | KONE/EC | 4748348 | N/A | 2016/11/16 | Deonarine Ramnarine |

Maxxam ID: DKV716
Sample ID: OHS-4-SA4-2.29M-2.59M
Matrix: SOLID

Collected: 2016/11/10
Shipped:
Received: 2016/11/10

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|-------------------------|-----------------|---------|------------|---------------|---------------------|
| Chloride (20:1 extract) | KONE/EC | 4748291 | N/A | 2016/11/16 | Alina Dobreanu |
| Conductivity | AT | 4749169 | N/A | 2016/11/16 | Tahir Anwar |
| pH CaCl2 EXTRACT | AT | 4750333 | 2016/11/16 | 2016/11/16 | Neil Dassanayake |
| Resistivity of Soil | | 4745989 | 2016/11/17 | 2016/11/17 | Automated Statchk |
| Sulphate (20:1 Extract) | KONE/EC | 4748348 | N/A | 2016/11/16 | Deonarine Ramnarine |

Maxxam ID: DKV716 Dup
Sample ID: OHS-4-SA4-2.29M-2.59M
Matrix: SOLID

Collected: 2016/11/10
Shipped:
Received: 2016/11/10

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|------------------|-----------------|---------|------------|---------------|------------------|
| pH CaCl2 EXTRACT | AT | 4750333 | 2016/11/16 | 2016/11/16 | Neil Dassanayake |

Maxxam ID: DKV717
Sample ID: OHS-5-SA5-3.81M-4.42M
Matrix: SOLID

Collected: 2016/11/10
Shipped:
Received: 2016/11/10

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|-------------------------|-----------------|---------|------------|---------------|---------------------|
| Chloride (20:1 extract) | KONE/EC | 4748291 | N/A | 2016/11/16 | Alina Dobreanu |
| Conductivity | AT | 4749169 | N/A | 2016/11/16 | Tahir Anwar |
| pH CaCl2 EXTRACT | AT | 4750330 | 2016/11/16 | 2016/11/16 | Neil Dassanayake |
| Resistivity of Soil | | 4745989 | 2016/11/17 | 2016/11/17 | Automated Statchk |
| Sulphate (20:1 Extract) | KONE/EC | 4748348 | N/A | 2016/11/16 | Deonarine Ramnarine |

Maxxam Job #: B605411
Report Date: 2016/11/19

Golder Associates Ltd
Client Project #: 1530382
Site Location: QEW-CAWTHRA
Sampler Initials: AJ

TEST SUMMARY

Maxxam ID: DKV718
Sample ID: CV01-01-8.74M-8.80M
Matrix: SOLID

Collected: 2016/11/03
Shipped:
Received: 2016/11/10

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|-------------------------|-----------------|---------|------------|---------------|---------------------|
| Chloride (20:1 extract) | KONE/EC | 4748291 | N/A | 2016/11/16 | Alina Dobreanu |
| Conductivity | AT | 4749169 | N/A | 2016/11/16 | Tahir Anwar |
| pH CaCl2 EXTRACT | AT | 4750330 | 2016/11/16 | 2016/11/16 | Neil Dassanayake |
| Resistivity of Soil | | 4745989 | 2016/11/17 | 2016/11/17 | Automated Statchk |
| Sulphate (20:1 Extract) | KONE/EC | 4748348 | N/A | 2016/11/16 | Deonarine Ramnarine |

Maxxam ID: DKV719
Sample ID: CV02/3-1-5.27M-5.32M
Matrix: SOLID

Collected: 2016/11/03
Shipped:
Received: 2016/11/10

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|-------------------------|-----------------|---------|------------|---------------|---------------------|
| Chloride (20:1 extract) | KONE/EC | 4748291 | N/A | 2016/11/16 | Alina Dobreanu |
| Conductivity | AT | 4749169 | N/A | 2016/11/16 | Tahir Anwar |
| pH CaCl2 EXTRACT | AT | 4750330 | 2016/11/16 | 2016/11/16 | Neil Dassanayake |
| Resistivity of Soil | | 4745989 | 2016/11/17 | 2016/11/17 | Automated Statchk |
| Sulphate (20:1 Extract) | KONE/EC | 4748348 | N/A | 2016/11/16 | Deonarine Ramnarine |

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|-----------|--------|
| Package 1 | 14.0°C |
|-----------|--------|

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 1530382
Site Location: QEW-CAWTHRA
Sampler Initials: AJ

| QC Batch | Parameter | Date | Matrix Spike | | SPIKED BLANK | | Method Blank | | RPD | |
|----------|-------------------------------|------------|--------------|-----------|--------------|-----------|--------------|---------|-----------|-----------|
| | | | % Recovery | QC Limits | % Recovery | QC Limits | Value | UNITS | Value (%) | QC Limits |
| 4748291 | Soluble (20:1) Chloride (Cl) | 2016/11/16 | NC | 70 - 130 | 108 | 70 - 130 | <20 | ug/g | 0.49 | 35 |
| 4748348 | Soluble (20:1) Sulphate (SO4) | 2016/11/16 | NC | 70 - 130 | 107 | 70 - 130 | <20 | ug/g | 9.4 | 35 |
| 4749169 | Conductivity | 2016/11/16 | | | 99 | 90 - 110 | <2 | umho/cm | 0.93 | 10 |
| 4750330 | Available (CaCl2) pH | 2016/11/16 | | | 99 | 97 - 103 | | | 0.28 | N/A |
| 4750333 | Available (CaCl2) pH | 2016/11/16 | | | 99 | 97 - 103 | | | 0.26 | N/A |

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

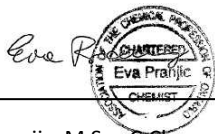
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ewa Pranjić, M.Sc., C.Chem, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

| INVOICE INFORMATION | | | | REPORT INFORMATION (if differs from invoice) | | | | PROJECT INFORMATION | | | | MAXXAM JOB NUMBER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------------|--|-----------------------------|---|------------------------------|-------------------|--|-------------------------------------|--|--|--|--|--|--|--|---|--|--|--|---------------------------------|----------|----------|------|-------------------------------------|----------------------|--|--|---|----------|--------|----------|--------------|-------------------|----|-----------------------------|---------|-------------------------------------|--------------------------|-------------------|--------|-------------------------------------|--------------------------|--|-------|--|-----|------|--|--|--|--|--|--|--|------------------|--|--|--|--|-----------------------|--------------|--------------|-----------------------------|-------------------------------------|------------------------------|-------------------|----------------------|-------------|----|------|---|---|---|-------------------------|--------------|----|------|---|---|---|-------------------------|--------------|----|------|---|---|---|-----------------------|-------------|----|------|---|---|---|------------------------|-------------|----|------|---|---|---|---|--|--|--|--|--|--|---|--|--|--|--|--|--|---|--|--|--|--|--|--|---|--|--|--|--|--|--|----|--|--|--|--|--|--|--|--|--|--|
| Company Name: <u>Golder Associates</u> | | | | Company Name: | | | | Quotation #: | | | | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contact Name: <u>Alysha Kobylinski</u> | | | | Contact Name: | | | | P.O. #: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Address: <u>6925 CENTURY AVE, SUITE 100</u> | | | | Address: | | | | Project #: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <u>Mississauga, ON</u> | | | | | | | | Site Location: <u>QEW - CAWTHRA</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phone: <u>647-618-1364</u> Fax: <u>905-567-6561</u> | | | | Phone: Fax: | | | | Site #: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Email: <u>Alysha.Kobylinski@golder.com</u> | | | | Email: | | | | Sampled By: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>***Note: For MOE Regulated Drinking Water samples, please use the Drinking Water CoC.***</p> <table border="1"> <thead> <tr> <th colspan="4">Regulation 153 (2011)</th> <th colspan="4">Other Regulations</th> </tr> </thead> <tbody> <tr> <td>Table 1</td> <td>Res/Park</td> <td>Med/Fine</td> <td>CCME</td> <td></td> <td>Sanitary Sewer Bylaw</td> <td></td> <td></td> </tr> <tr> <td>Table 2</td> <td>Ind/Comm</td> <td>Coarse</td> <td>Reg. 558</td> <td></td> <td>Storm Sewer Bylaw</td> <td></td> <td></td> </tr> <tr> <td>Table 3</td> <td>Agri/Other</td> <td>For RSC</td> <td>MISA</td> <td></td> <td>Municipality:</td> <td></td> <td></td> </tr> <tr> <td>Table</td> <td></td> <td>Yes</td> <td>PWQO</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td><input checked="" type="checkbox"/> No</td> <td>Other (specify):</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Include Criteria on Certificate of Analysis (Y/N)?</p> <p>SAMPLES MUST BE KEPT COOL (<10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM.</p> <table border="1"> <thead> <tr> <th>Sample Identification</th> <th>Date Sampled</th> <th>Time Sampled</th> <th>Matrix (GW, SW, Soil, etc.)</th> <th>MOE Regulated Drinking Water? (Y/N)</th> <th>Metals Field Filtered? (Y/N)</th> <th>CORROSION PACKAGE</th> </tr> </thead> <tbody> <tr> <td>1 RW 3-3-4.33m-4.43m</td> <td>NOV 3, 2016</td> <td>AM</td> <td>ROCK</td> <td>N</td> <td>N</td> <td>X</td> </tr> <tr> <td>2 OHS-4-SA4-2.29m-2.59m</td> <td>NOV 10, 2016</td> <td>AM</td> <td>SOIL</td> <td>N</td> <td>N</td> <td>X</td> </tr> <tr> <td>3 OHS-6-SA5-3.81m-4.42m</td> <td>NOV 10, 2016</td> <td>AM</td> <td>SOIL</td> <td>N</td> <td>N</td> <td>X</td> </tr> <tr> <td>4 CV01-01-8.14m-8.80m</td> <td>NOV 3, 2016</td> <td>AM</td> <td>ROCK</td> <td>N</td> <td>N</td> <td>X</td> </tr> <tr> <td>5 CV02/3-1-5.27m-5.32m</td> <td>NOV 3, 2016</td> <td>AM</td> <td>ROCK</td> <td>N</td> <td>N</td> <td>X</td> </tr> <tr> <td>6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>9</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>10</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | | | Regulation 153 (2011) | | | | Other Regulations | | | | Table 1 | Res/Park | Med/Fine | CCME | | Sanitary Sewer Bylaw | | | Table 2 | Ind/Comm | Coarse | Reg. 558 | | Storm Sewer Bylaw | | | Table 3 | Agri/Other | For RSC | MISA | | Municipality: | | | Table | | Yes | PWQO | | | | | | | <input checked="" type="checkbox"/> No | Other (specify): | | | | | Sample Identification | Date Sampled | Time Sampled | Matrix (GW, SW, Soil, etc.) | MOE Regulated Drinking Water? (Y/N) | Metals Field Filtered? (Y/N) | CORROSION PACKAGE | 1 RW 3-3-4.33m-4.43m | NOV 3, 2016 | AM | ROCK | N | N | X | 2 OHS-4-SA4-2.29m-2.59m | NOV 10, 2016 | AM | SOIL | N | N | X | 3 OHS-6-SA5-3.81m-4.42m | NOV 10, 2016 | AM | SOIL | N | N | X | 4 CV01-01-8.14m-8.80m | NOV 3, 2016 | AM | ROCK | N | N | X | 5 CV02/3-1-5.27m-5.32m | NOV 3, 2016 | AM | ROCK | N | N | X | 6 | | | | | | | 7 | | | | | | | 8 | | | | | | | 9 | | | | | | | 10 | | | | | | | <p>TURNAROUND TIME (TAT) REQUIRED</p> <p>PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS.</p> <p>Regular (Standard) TAT: <input checked="" type="checkbox"/> (5-7 working days for most tests)</p> <p>Rush TAT: <input type="checkbox"/> (Samples must be received by 3pm to guarantee your TAT)</p> <p>Rush Confirmation #: PN <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days</p> <p>Date Req'd:</p> <p>TATs for certain tests are > 5 days. Please contact your Project Manager for details.</p> <p># of Cont. COMMENTS / TAT COMMENTS</p> <p>10-Nov-16 17:14 Ema Gitej B605411 KP7 ENV-803</p> | | | |
| Regulation 153 (2011) | | | | Other Regulations | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Table 1 | Res/Park | Med/Fine | CCME | | Sanitary Sewer Bylaw | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Table 3 | Agri/Other | For RSC | MISA | | Municipality: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Table | | Yes | PWQO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <input checked="" type="checkbox"/> No | Other (specify): | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sample Identification | Date Sampled | Time Sampled | Matrix (GW, SW, Soil, etc.) | MOE Regulated Drinking Water? (Y/N) | Metals Field Filtered? (Y/N) | CORROSION PACKAGE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 RW 3-3-4.33m-4.43m | NOV 3, 2016 | AM | ROCK | N | N | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 OHS-4-SA4-2.29m-2.59m | NOV 10, 2016 | AM | SOIL | N | N | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 OHS-6-SA5-3.81m-4.42m | NOV 10, 2016 | AM | SOIL | N | N | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 CV01-01-8.14m-8.80m | NOV 3, 2016 | AM | ROCK | N | N | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 CV02/3-1-5.27m-5.32m | NOV 3, 2016 | AM | ROCK | N | N | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>*RELINQUISHED BY (Signature/Print)</p> <p><u>Amelia Jewison</u></p> | | | | <p>Date (YYYY/MM/DD)</p> <p><u>2016/11/10</u></p> | | | | <p>Time</p> <p><u>17:10</u></p> | | | | <p>RECEIVED BY (Signature/Print)</p> <p><u>[Signature]</u></p> | | | | <p>Date (YYYY/MM/DD)</p> <p><u>2016/11/10</u></p> | | | | <p>Time</p> <p><u>17:14</u></p> | | | | <p>#JARS USED AND NOT SUBMITTED</p> | | | | <p>Laboratory Use Only</p> <table border="1"> <tr> <td>Custody Seal</td> <td>Yes</td> <td>No</td> <td>Temperature (°C) on Receipt</td> </tr> <tr> <td>Present</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><u>16.12/14°C</u></td> </tr> <tr> <td>Intact</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td></td> </tr> </table> | | | | Custody Seal | Yes | No | Temperature (°C) on Receipt | Present | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <u>16.12/14°C</u> | Intact | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Custody Seal | Yes | No | Temperature (°C) on Receipt | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Present | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <u>16.12/14°C</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Intact | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

*MANDATORY SECTIONS IN GREY MUST BE FILLED OUT. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

COC-1004 (10/11) - ENV. ENG.

Maxxam Analytics International Corporation o/a Maxxam Analytics

White: Maxxam

Yellow: M

Pink: Client

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| Australasia | + 61 3 8862 3500 |
| Europe | + 356 21 42 30 20 |
| North America | + 1 800 275 3281 |
| South America | + 55 21 3095 9500 |

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