



FOUNDATION INVESTIGATION REPORT
HIGHWAY 11/17, PROPOSED WESTBOUND PASSING LANE AT GOLF COURSE ROAD,
TOWNSHIP OF NIPIGON
MINISTRY OF TRANSPORTATION (MTO), NORTHWESTERN REGION
GWP NUMBER 6057-07-00 / WP 521-00-06
AGREEMENT NUMBER 6008-E-0027
MTO GEOCRES No. 52A-135

Submitted to:

Ministry of Transportation
Northwestern Region
Planning and Design Section
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TABLE OF CONTENTS

| | Page |
|-----------------------------------------------|------|
| 1.0 INTRODUCTION..... | 1 |
| 2.0 SITE AND PROJECT DESCRIPTION | 1 |
| 3.0 QUATERNARY GEOLOGY | 2 |
| 4.0 INVESTIGATION PROCEDURES | 2 |
| 4.1 Field Investigation | 2 |
| 4.2 Laboratory Tests | 5 |
| 5.0 SUB-SURFACE CONDITIONS | 5 |
| 5.1 Organic Materials | 6 |
| 5.2 Rock Fill..... | 6 |
| 5.3 Sandy Silt / Silty Sand | 6 |
| 5.4 Clayey Silt / Silty Clay | 7 |
| 5.5 Sand | 9 |
| 5.6 Sand and Gravel | 10 |
| 5.7 Groundwater..... | 10 |
| 6.0 LIMITED ENVIRONMENTAL INVESTIGATION | 11 |
| 7.0 SOIL CORROSIVITY | 11 |
| 8.0 CLOSURE..... | 12 |

REPORT LIMITATIONS

DRAWING Nos. 1 to 4

APPENDICES

APPENDIX A: Record of Boreholes / DCPT Test Holes

APPENDIX B: Laboratory Test Results

APPENDIX C: Site Photographs

APPENDIX D: Results of Previous Investigations (1972, 2002 & 2008)

1.0 INTRODUCTION

AMEC Earth & Environmental, a division of AMEC Americas Limited (AMEC), Consulting Geotechnical, Construction Quality Control and Environmental Engineers, was retained by the Ministry of Transportation (Northwestern Region) to conduct a foundation investigation for the construction of a proposed new westbound passing lane at its intersection with Golf Course Road, west of Nipigon, Ontario as indicated on Drawing No. 1. The project included widening of the highway to accommodate a westbound passing lane and left and right turn lanes at Golf Course Road.

Twelve (12) borehole and six (6) Dynamic Cone Penetration Testing (DCPT) locations advanced to the required depths for foundation investigation in the vicinity of the proposed embankment widening across two swamps and two culvert locations were specified by MTO in the Terms of Reference as outlined in the Request for Quotation (Agreement Number: 6008-E-0027 dated March 2008). Authorization to proceed with this investigation was signed by the Regional Director of MTO dated 24 December 2008. The work was carried out by AMEC according to the MTO Terms of Reference and AMEC's Proposal No. P28304 dated 17 December 2008.

Additional information (i.e., new construction plan, profile and previous borehole data) was also forwarded to AMEC. Such information was used in preparing this report wherever applicable.

The investigation was carried out by means of a limited number of boreholes, in-situ tests and laboratory tests on selected samples. The factual results of the soil conditions encountered in the boreholes and laboratory tests are presented in this report.

The results of the foundation investigation with design recommendations are presented in a separate report (i.e., Foundation Investigation and Design Report prepared by AMEC - Reference No. TT93000 dated 08 April 2009).

2.0 SITE AND PROJECT DESCRIPTION

The site for the foundation investigation was along the north (left) side of the existing Highway 11/17 at Golf Course Road, approximately 200 m east to 300 m west of the intersection, to the west of Nipigon, Ontario, as shown in the site location plan (Drawing No. 1). Investigation was also completed on the south (right) side of the highway at the locations of two (2) proposed culvert replacements.

A series of site photographs taken during the field investigation works are presented in Appendix C.

At this location, Highway 11/17 is a two-lane asphalt-paved road with gravel shoulders on both sides and on top of an embankment with a height of roughly 2.5 m to 5 m above the surrounding grade. There appeared to be two swamp areas, one in the vicinity of the culvert at approximate Station 18+730, and the other between approximate Station 18+970 and Station 19+050. At the

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time of the field investigation, the ground was covered with snow and frozen soils such that visual identification of the swamp areas was difficult. Another culvert was located at approximate Station 19+100.

Between approximate Station 18+850 and Station 18+950, a rock fill berm was present along the toe of the road embankment. Rock outcrops were visible in the area between approximate Station 18+765 and Station 18+010, west of Station 18+700 and east of Station 19+225.

The existing pavement contained numerous longitudinal and transverse cracks as evidenced in Photographs 9 and 10 in Appendix C.

The proposed widening works are planned to accommodate a westbound passing lane and left and right turn lanes at Golf Course Road, between Station 18+700 to Station 19+200.

3.0 QUATERNARY GEOLOGY

Based on Ministry of Northern Development and Mines Quaternary data (OGS Special Volume 4, Part 2), the project site lies within what is known as the Port Arthur Hills formed by the differential erosion of sills, dikes and sediments tilted slightly to the south to form mesas, cuestas and irregular hills up to 500 m in elevation. The height of the features tends to decrease southward from the Lake Nipigon area to the International Boundary. Sills tend to dominate the topography throughout most of the Port Arthur Hills.

4.0 INVESTIGATION PROCEDURES

4.1 Field Investigation

In accordance with the Terms of Reference for this investigation, twelve (12) borehole locations (BH 1 to BH 12) and six (6) DCP testing locations in the vicinity of the proposed widening were to be investigated for foundation investigation including two (2) boreholes (BH 2 and BH 10) for culvert replacement investigation.

The fieldwork was performed from 12 January 2009 to 18 January 2009, and included staking out the borehole locations, clearing underground utilities, acquiring all necessary permits for road occupancy, preparing access for drilling rig, and drilling the boreholes using a track-mounted drilling rig as supplied and operated by Determination Drilling and Soil Investigations.

The drilled borehole locations were surveyed in the field by AMEC personnel based on a local benchmark (Ministry of Natural Resources benchmark MNR 010806106 with reported geodetic elevation of 269.567 m).

The borehole locations are presented on Drawing No. 2. The coordinates and the geodetic ground surface elevations at the specified borehole locations were surveyed by the on-site AMEC

personnel subsequent to drilling.

The borehole investigation was carried out under the full-time supervision of experienced geotechnical personnel from AMEC (Shami Malla, P.Eng. and Muhammad Saleem, EIT).

The boreholes were sampled to depths ranging from 6.6 m to 11.1 m below the existing ground surface using a combination of solid and hollow stem augers followed by Dynamic Cone Penetration testing beyond the sampled portions to achieve total depths ranging from 8.8 m to 16.7 m below the existing ground surface. Dynamic Cone Penetration test holes (DCPT) locations were advanced to depths ranging from 7.6 m to 11.1 m below the existing ground surface. A summary of the borehole and DCPT locations and achieved depths are presented in the following Table 4.1:

Table 4.1 – Summary of Borehole and DCPT Locations

| LOCATION | STATION | OFFSET (m) | NORTHING ⁽¹⁾ | EASTING ⁽¹⁾ | SAMPLED DEPTH (m) | DCPT ⁽²⁾ DEPTH (m) |
|----------|---------|--------------|-------------------------|------------------------|-------------------|-------------------------------|
| BH 1 | 18+722 | 21.9 m Left | 5428993 | 207270 | 8.1 | 9.9 |
| BH 2 | 18+731 | 18.0 m Right | 5428973 | 207305 | 10.2 | 15.1 |
| BH 3 | 18+740 | 21.2 m Left | 5429005 | 207281 | 6.6 | 16.7 |
| BH 4 | 18+875 | 20.2 m Left | 5429115 | 207361 | 10.7 | - |
| BH 5 | 18+925 | 22.7 m Left | 5429155 | 207393 | 11.1 | 12.0 |
| BH 6 | 18+970 | 19.8 m Left | 5429188 | 207422 | 8.8 | - |
| BH 7 | 19+010 | 17.4 m Left | 5429215 | 207445 | 9.9 | 12.4 |
| BH 8 | 19+050 | 18.3 m Left | 5429251 | 207468 | 9.4 | - |
| BH 9 | 19+102 | 16.8 m Left | 5429297 | 207496 | 9.8 | 12.9 |
| BH 10 | 19+102 | 13.3 m Right | 5429280 | 207521 | 10.0 | 11.1 |
| BH 11 | 19+150 | 14.7 m Left | 5429336 | 207517 | 8.1 | 9.0 |
| BH 12 | 19+200 | 17.2 m Left | 5429383 | 207533 | 9.6 | 10.3 |
| DCPT 1 | 19+176 | 18.8 m Left | 5429361 | 207523 | - | 11.0 |
| DCPT 2 | 19+129 | 15.9 m Left | 5429317 | 207507 | - | 10.1 |
| DCPT 3 | 19+070 | 16.4 m Left | 5429269 | 207481 | - | 11.1 |
| DCPT 4 | 19+033 | 17.7 m Left | 5429236 | 207459 | - | 7.6 |
| DCPT 5 | 18+999 | 20.0 m Left | 5429207 | 207436 | - | 10.2 |
| DCPT 6 | 18+963 | 20.6 m Left | 5429183 | 207417 | - | 10.0 |

Notes: (1) HORIZONTAL DATUM: North American Datum 1983 (NAD83)
3 Degree Modified Transverse Mercator - (MTM) Grid Coordinates, MTM Zone14
(2) DCPT depth beyond sampled portion of boreholes and total depth for DCPT locations

At Boreholes BH 4 and BH 5 where rock fill was present at ground surface, excavation to the bottom of the rock fill (depth of about 4.6 m) was accomplished using an excavator with subsequent augering completed below these depths through a 12 inch (300 mm) corrugated plastic pipe that was installed and backfilled into the rock fill.

Soil samples were normally taken at 0.75 m intervals up to a depth of 6 m and 1.5 m intervals thereafter, during the performance of Standard Penetration Test (SPT) in accordance with ASTM D1586. This consisted of freely dropping a 63.5 kg (140 lbs.) hammer for a vertical distance of 0.76 m (30 inches) to drive a 51 mm (2 inches) diameter O.D. split-barrel (split spoon) sampler into the ground. The number of blows of the hammer required to drive the sampler into the relatively undisturbed ground by a vertical distance of 0.30 m (12 inches) was recorded as SPT 'N' value of the soil which indicated the consistency of cohesive soils or the relative density of non-cohesive soils.

DCPT was carried out at six (6) locations (DCPT 1 to DCPT 6) and below the augered depth at a number of the boreholes locations by advancing a steel cone into the ground with a 63.5 kg (140 lbs.) hammer and a drop height of 0.76 m. The number of blows per 0.3 m required to advance the cone was recorded and presented in the Record of Boreholes / DCPT Test Holes (Appendix A).

Where soft to very soft clayey soils were encountered as indicated by low SPT 'N' values, MTO Field Vane Tests were carried out intermittently in the boreholes drilled by the track-mounted drilling rig.

Soil samples were collected for each soil layer exposed in the boreholes for laboratory inspection and testing. Split-spoon samplers and thin-walled samplers (Shelby tubes) were both used for sampling.

The collected soil samples were screened on site by a gas detector for the total organic vapours (TOV), the results of which are shown in the Record of Boreholes / DCPT Test Holes of Appendix A.

Upon completion of drilling, the boreholes were backfilled with bentonite in accordance with the general requirements of Ministry of the Environment Regulation 903 as indicated in the Record of Boreholes / DCPT Test Holes of Appendix A.

The soil samples were transported to AMEC's Advanced Soil Laboratory in Scarborough (Toronto) for further examination and laboratory soil testing. The program of laboratory testing included grain size analysis, Liquid and Plastic Limit determination, in-situ water content determination, one-dimensional consolidation analysis with creep testing, and soil corrosivity testing.

The results of the in-situ and laboratory tests are presented in the corresponding Record of Boreholes / DCPT Test Holes (Appendix A) and Laboratory Test Results (Appendix B).

4.2 Laboratory Tests

Representative soil samples were subject to laboratory testing in AMEC's Advanced Soil Laboratory in Scarborough (Toronto) for soil classification. The following laboratory tests were conducted:

- In-situ water content determination (82);
- Grain size distribution analyses (12);
- Liquid and Plastic Limits (24);
- Laboratory Vane Tests (3);
- One-Dimensional Primary Consolidation tests (2); and
- One-Dimensional Secondary Consolidation tests (2).

The results of the laboratory tests are included in the Record of Boreholes / DCPT Test Holes in Appendix A, where applicable.

The grain size distribution curves, Liquid/Plastic Limits and results of the primary consolidation and secondary consolidation (creep) tests are presented in Appendix B.

5.0 SUB-SURFACE CONDITIONS

In brief, the soil profile typically consisted of either organic materials (peat or topsoil) or fill soils overlying native soils, though native soils were encountered immediately at ground surface at a number of the borehole locations. The native soils consisted of a combination of sand, silty sand / sandy silt, clayey silt / silty clay and sand and gravel, the majority of which were clayey silt/silty clay.

With the exception of Borehole BH 4 that was dry upon completion of drilling, groundwater was encountered in all boreholes ranging in depth from ground surface to about 4.0 m below the existing ground surface. A variance to this general assessment was at Borehole BH 11 where artesian water pressure corresponding to a groundwater level of about 0.3 m above ground surface was encountered after the borehole was drilled through the sand and gravel underlying the clayey silt/silty clay. High groundwater levels observed in the boreholes were typically encountered when the boreholes were drilled through the clayey silt/silty clay.

The results of DCPT as completed at the additional six (6) DCPT locations are presented in the Record of Boreholes / DCPT Test Holes (Appendix A) and are also plotted in Drawing Nos. 3 and 4. The results of the DCPT indicated the presence of very soft/loose soils to depths of from about 7 m to 10.5 m below the existing ground surface with cone refusal encountered at depths of between 7.5 m and 11.0 m below the existing ground surface.

The stratigraphic units and groundwater conditions at the borehole locations are discussed in the following sections. Detailed information is provided in the Record of Boreholes / DCPT Test Holes (Appendix A) and presented on the longitudinal and transverse soil profiles of Drawing Nos. 3 and 4 respectively. Previous borehole information as provided by the MTO is included in Appendix D.

The following summary is to assist the designers of the project with an understanding of the anticipated soil conditions across the site. However, it should be noted that the soil and groundwater conditions may vary between the borehole locations.

5.1 Organic Materials

Deposits of organic materials consisting primarily of peat were encountered immediately at ground surface at Boreholes BH 2, BH 3, BH 6, BH 9 and BH 10, and below a surface deposit of sandy silt (Section 5.3) at Borehole BH 1 to depths ranging from about 0.6 m to 3.7 m below existing ground surface. Topsoil, approximately 0.9 m in thickness, was encountered at the existing ground surface in Borehole BH 7.

The black peat was fibrous and contained some wood fragments.

The thickness of organic materials may vary between boreholes. For accurate quantity estimates, if required, a regular interval of shallow test holes should be excavated to measure the thickness of the organic materials.

The results of laboratory tests conducted on soil samples are as follows:

Natural moisture content (%): 70 to 569

5.2 Rock Fill

Rock fill was encountered at Boreholes BH 4 and BH 5 from ground surface to about 4.6 m below the existing ground surface. The rock fill ranged in sizes from about 150 mm to 1500 mm and was mixed with sand and gravel.

5.3 Sandy Silt / Silty Sand

Native sandy silt / silty sand deposits were encountered immediately at ground surface at Boreholes BH 1, BH 8, BH 11 and BH 12, below the topsoil at Borehole BH 7, and below the peat at Boreholes BH 1, BH 2, BH 6, BH 9 and BH 10. These deposits were present to depths of between 0.6 m and 4.3 m below the existing ground surface. In addition, a deposit of sandy silt was encountered below the clayey silt / silty clay (Section 5.4) in Borehole BH 4 at a depth of 8.8 m below the existing ground surface and present to the termination depth of 10.7 m.

The sandy silt / silty sand was yellowish-brown/brown to grey in colour and contained a trace of gravel and a trace to some clay with occasional rootlets, wood fragments and organic matters.

Some clayey zones were present within the sandy silt / silty sand at Borehole BH 6 as evidenced by the Plastic Limit / Liquid Limit data presented below.

The SPT 'N' values within the sandy silt / silty sand ranged between 0 and 14 blows per 0.3 m with the majority of values being less than 10 blow per 0.3 m indicating a generally loose to very loose relative density.

The results of laboratory tests conducted on soil samples are as follows:

Natural moisture content (%): 15 to 43

Plastic Limit (clayey sandy silt zone): 15

Liquid Limit (clayey sandy silt zone): 27

| | | |
|-------------------------|-------------|-----------|
| Grain size (2 samples): | Gravel (%): | 2 and 4 |
| | Sand (%): | 31 and 63 |
| | Silt (%): | 31 and 49 |
| | Clay (%): | 4 and 16 |

The grain size distribution curves are presented in Figure No. B1 with plasticity index data plotted in Figure No. B4 of Appendix B.

5.4 Clayey Silt / Silty Clay

The top surface of native clayey silt / silty clay deposits was encountered underlying the sandy silt / silty sand in Boreholes BH 1, BH 2 and BH 6 to BH 12, and below the rock fill in Boreholes BH 4 and BH 5, at depths ranging from 0.6 m to 4.7 m below the existing ground surface.

With the exception of Boreholes BH 1, BH 4, BH 8, BH 10 and BH 12, where the clayey silt / silty clay was underlain by either sandy silt / silty sand, sand (Section 5.5) or sand and gravel (Section 5.6), the clayey silt / silty clay was present to the maximum sampled depth of the boreholes.

The presence of the clayey silt / silty clay was confirmed by sampling to depths ranging from about 5.9 m to 11.1 m below the existing ground surface. Though not confirmed by sampling, results of DCPT testing indicate the possible presence of clayey silt / silty clay to depths of up to 11 m to 14 m below the existing ground surface.

The clayey silt / silty clay was brown to grey in colour and contained a trace of sand and gravel. A boulder was possibly encountered within the clayey silt / silty clay in Borehole BH 1.

The SPT 'N' values of the clayey silt / silty clay ranged from 0 to 8 blows per 0.3 m with the majority of values being less than 4 blows per 0.3 m. Results of a series of MTO Field Vane The

The SPT 'N' values of the clayey silt / silty clay ranged from 0 to 8 blows per 0.3 m with the majority of values being less than 4 blows per 0.3 m. Results of a series of MTO Field Vane Tests completed in the field and laboratory vane tests, as completed on select samples of the clayey silt / silty clay, ranged between 11 kPa and 78 kPa, indicating an overall very soft to stiff consistency. The laboratory vanes tests were carried out on the collected Shelby tube samples using a Pilcon hand vane tester with circumferential graduated scale for direct reading. The vane shear strengths obtained from laboratory vane ranged between 12 kPa and 75 kPa which are consistent with the field tests.

The results of laboratory tests conducted on soil samples are as follows:

Natural moisture content (%): 26 to 52
 Plastic Limit: 14 to 18
 Liquid Limit: 26 to 49

Grain size (8 samples): Gravel (%): 0 to 1
 Sand (%): 0 to 5
 Silt (%): 35 to 74
 Clay (%): 24 to 65

The grain size distribution curves are presented in Figure No. B2 with plasticity index data plotted in Figure Nos. B4 to B7 of Appendix B.

The results of two (2) one-dimensional consolidation tests and two (2) creep tests conducted on select soil samples are presented in the following Table 5.1:

Table 5.1 – Summary of Consolidation Test Results

| Sample ID | Primary Consolidation Test ¹ | | | | | | Creep Test ² |
|------------|-----------------------------------------|-------------------------------|-------|-------|--------------------------------|-------|---------------------------------------------------|
| | c_c | p_c (kN/m ²) | e_0 | e_f | c_v (m ² /day) | c_s | c_α |
| BH 1 - TW7 | 0.18 | 80 | 0.77 | 0.55 | 0.01 – 0.03 | 0.02 | not tested |
| BH 6 - TW5 | 0.29 | 160 | 1.01 | 0.76 | 0.01 – 0.03 | 0.04 | 0.004 (80 kPa loading) 0.011 (160 kPa loading) |

Notes: (1) c_c – compression index, p_c – preconsolidation pressure, e_0 – initial void ratio,
 e_f – final void ratio, c_v – coefficient of consolidation, c_s – swell index/rebound index
 (2) c_α – secondary compression index

The void ratio vs. log pressure plots and coefficient of consolidation vs. log pressure plots for the primary consolidation tests as completed on Samples BH 1 - TW7 and BH 6 - TW5 are presented in Figure Nos. B8 and B9 respectively of Appendix B.

The c_c and c_s values as presented in Table 5.1 were derived from the slopes of the compression and rebound curves of the void ratio vs. log pressure plots with p_c determined using the

Casagrande graphical method.

The secondary consolidation (creep) tests were completed on Sample BH 6 - TW5 at constant loadings of 80 kPa and 160 kPa to determine the potential creep settlement rate to be expected if primary settlement to a degree of consolidation of greater than about 90% is obtained. The void ratio vs. log time plots for the tests under 80 kPa and 160 kPa constant loadings normalized to the void ratio at the end of primary consolidation (e_p) are presented in Figure Nos. B10 and B11 respectively of Appendix B.

The c_α values as presented in Table 5.1 were derived from the slopes of the secondary linear portion of these curves using the final void ratios from the respective primary consolidation tests (e_f) as an estimate of e_p .

5.5 Sand

The top surface of native sand was encountered below the clayey silt / silty clay in Boreholes BH 1 and BH 12 at depths of 5.9 m and 7.0 m respectively and below the peat in Boreholes BH 3 at a depth of 3.7 m. The sand extended to the termination depths of 8.1 m, 6.6 m and 9.6 m in Boreholes BH 1, BH 3 and BH 12 respectively.

The grey to reddish brown sand contained a trace of silt and gravel with a silty clay seam encountered within the sand at Borehole BH 3.

The SPT 'N' values of the sand within Boreholes BH 1 and BH 3 varied from 0 to 28 blows per 0.3 m indicating highly variable very loose to compact conditions. The low SPT 'N' values of the sand measured immediately below the clayey silt / silty clay could possibly be due to the significant flow of sand into the hollow stem augers under high groundwater pressure. The SPT 'N' values of 23 and 26 blows per 0.3 m were measured in the sand within Borehole BH 12 indicating predominately compact conditions.

The results of laboratory tests conducted on soil samples are as follows:

| | | |
|-------------------------------|-------------|-----------|
| Natural moisture content (%): | 11 to 24 | |
| Grain size (2 samples): | Gravel (%): | 2 and 9 |
| | Sand (%): | 88 and 94 |
| | Silt (%): | 3 and 4 |
| | Clay (%): | 0 |

The grain size distribution curves are presented in Figure No. B3 of Appendix B.

5.6 Sand and Gravel

The top surface of native sand and gravel was found underlying the clayey silt / silty clay deposits in Borehole BH 11 at a depth of 7.2 m below the existing ground surface and extending to the termination depth of the borehole of 8.1 m.

Though it could not be confirmed due to the loss of sample, possible sand and gravel was encountered below the clayey silt / silty clay in Borehole BH 8 at a depth of 8.7 m below the existing ground surface and extending to the termination depth of the borehole of 9.4 m.

The grey sand and gravel contained occasional cobbles at Borehole BH 11.

The SPT 'N' values of the sand and gravel of 43 and greater than 50 blows per 0.3 m indicated dense to very dense conditions.

A single water content measured in a sample of the sand and gravel was 12 %.

5.7 Groundwater

The groundwater level in each open borehole was observed during drilling and measured upon completion of drilling and cone penetration testing. The measured groundwater levels are shown in the Record of Boreholes / DCPT Test Holes (Appendix A).

Typically, the high groundwater was encountered when the borehole was drilled through the clayey silt / silty clay into the water-bearing sandy soil.

With the exception of Borehole BH 4 which was dry upon completion of drilling, groundwater was encountered in all the boreholes drilled as indicated in the following Table 5.2:

Table 5.2 – Groundwater Levels

| Borehole No. | Groundwater Depth bgs ⁽¹⁾ (m) | Elevation (m) | Borehole No. | Groundwater Depth bgs ⁽¹⁾ (m) | Elevation (m) |
|--------------|------------------------------------------|---------------|--------------|------------------------------------------|---------------|
| 1 | 1.7 | 266.2 | 7 | 0.6 | 255.8 |
| 2 | 1.4 | 265.5 | 8 | 0.3 | 255.7 |
| 3 | 0.8 | 266.7 | 9 | 0.5 | 255.5 |
| 4 | Dry | - | 10 | 0.0 | 255.8 |
| 5 | 4.0 | 255.9 | 11 | 0.3 ags ⁽²⁾ | 256.8 |
| 6 | 0.3 | 256.4 | 12 | 0.6 | 257.1 |

Notes: (1) bgs – below ground surface

(2) ags – above ground surface (artesian)

It should be noted that the groundwater at the site would fluctuate seasonally and can be expected to be somewhat higher during the spring months and in response to major weather events.

6.0 LIMITED ENVIRONMENTAL INVESTIGATION

In accordance with the Terms of Reference and AMEC proposal, soil samples obtained during the geotechnical field drilling program were field screened for evidence of environmental impact.

The field screening activities included measuring the combustible organic vapours (COV) in the headspace of samples with a portable hydrocarbon surveyor instrument (Thermo Gastechtor 1238ME). The borehole locations were positioned at the site as required by the geotechnical investigation.

Based on the soil conditions encountered in all the boreholes, the soil profile at the site typically comprised either topsoil, peat or fill soils overlying native soils, though native soils were encountered immediately at ground surface at a number of the borehole locations. The native deposits consisted of a combination of sand, silty sand / sandy silt, clayey silt / silty clay and sand and gravel.

No visual or olfactory evidence of environmental impact was observed in the fill and native soil samples recovered from the boreholes. The measured COV concentrations in all soil samples were relatively low, ranging from non-detect to 140 ppm as shown in the Record of Boreholes / DCPT Test Holes. The COV results are semi-quantitative at best and are generally used only for relative sample comparison purposes when selecting samples for laboratory analysis. Based on the field screening results, evidence of environmental impact is not suspected.

7.0 SOIL CORROSIVITY

One soil sample (BH 9 - SS6) was analysed by AMEC's chemical laboratory in Mississauga to determine the soil corrosivity potential with respect to concrete and steel. The results are presented in the following Table 7.1:

Table 7.1 – Results of Corrosivity Testing

| Soil Sample No. | pH | Resistivity (ohms-cm) | Chloride (µg/g) | Sulphate (µg/g) |
|-----------------|-----|--------------------------|--------------------|--------------------|
| BH 9 - SS6 | 7.7 | 4650 | 6 | 26 |

The tests have shown a sulphate value of 26 ppm (µg/g) and, according to Table 10 - "Requirements for Concrete Subject to Sulphate Attack", Clause 15.5.2, of CSA Standard Specification A23. 1-94, any soil which has sulphate concentrations below 1000 ppm is not

considered corrosive with respect to concrete. As such, the general-use Cement Type 10 can be used. The soil resistivity measured is "moderate" while the pH value is close to neutral.

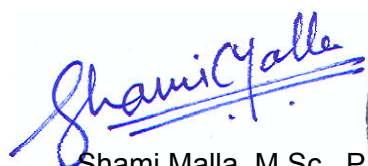
8.0 CLOSURE

The sub-soil information contained in this report should be used solely for the purpose of foundation assessment of this site. This report was prepared by Shami Malla, P.Eng. and Todd Williams, P.Eng. and reviewed by Prapote Boonsinsuk, P.Eng. and George Chow, P.Eng.

The attached Report Limitations is an integral part of this report.

Sincerely,

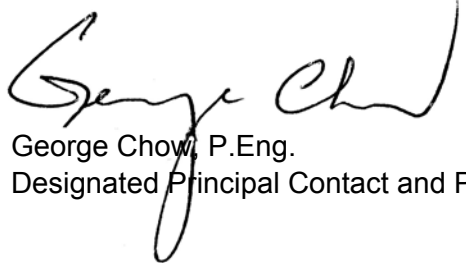
**AMEC Earth & Environmental,
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Shami Malla, M.Sc., P.Eng.
Geotechnical Engineer



Prapote Boonsinsuk, Ph.D., P.Eng.
Project Manager and Technical Reviewer



George Chow, P.Eng.
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AMEC Earth & Environmental, a division of AMEC Americas Limited

REPORT LIMITATIONS

The conclusions and recommendations given in this report are based on information determined at the testhole locations. The information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Geotechnical Engineer be retained during the construction to confirm that the subsurface conditions across the site do not deviate materially from those encountered in the testholes.

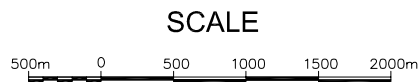
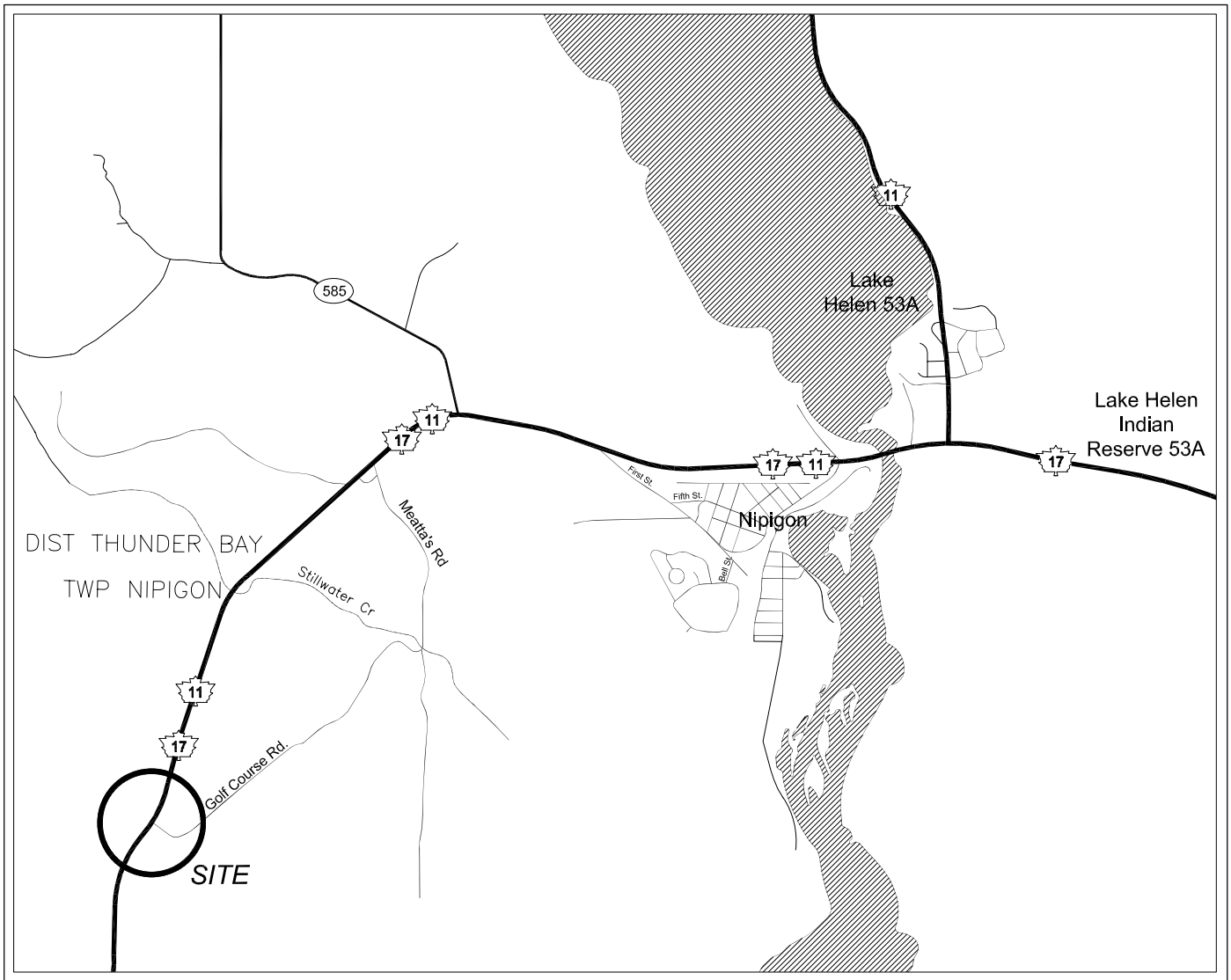
The design recommendations given in this report are applicable only to the project described in the text, and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.



The comments made in this report relating to potential construction problems and possible methods of construction are intended only for the guidance of the designer. The number of testholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

The benchmark and elevations mentioned in this report were obtained strictly for use by this office in the geotechnical design of the project. They should not be used by any other party for any other purpose.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. AMEC Earth & Environmental accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

DRAWINGS



| | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------|
| AMEC Earth & Environmental, a Division of AMEC Americas Limited | |  |  | MINISTRY OF TRANSPORTATION ONTARIO | |
| TITLE SITE MAP | | | DWN BY: KW | DATUM: NAD83 | DATE: March 2009 |
| PROJECT FOUNDATION INVESTIGATION AND DESIGN HIGHWAY 11/17, PROPOSED WESTBOUND PASSING LANE AT GOLF COURSE ROAD, TOWNSHIP OF NIPIGON AGREEMENT NUMBER 6008-E-0027, GWP # 6057-07-00 / W.P. 521-00-26, MTO GEOCREs No.52A-135 | | | CHK'D BY: PB | REV. NO.: A | PROJECT NO.: TT93000 |
| | | | PROJECTION: UTM Zone 16 | SCALE: AS SHOWN | DRAWING No. 1 |

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

AGREEMENT No.
6008-E-0027

G.W.P. No.
6057-07-00

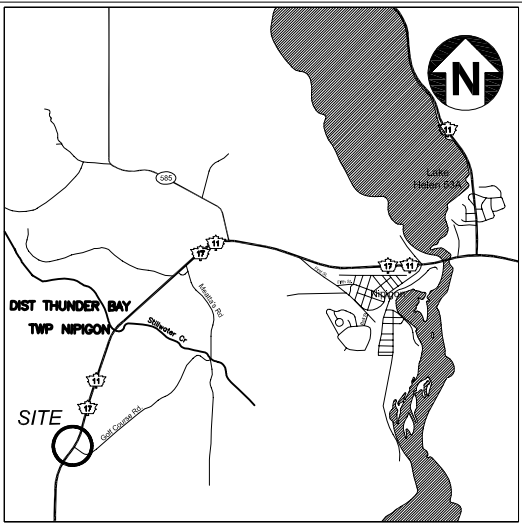
FOUNDATION INVESTIGATION AND DESIGN
HIGHWAY 11/17, PROPOSED WESTBOUND PASSING
LANE AT GOLF COURSE ROAD
TOWNSHIP OF NIPIGON
BOREHOLE LOCATION PLAN



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SHEET



KEY PLAN

1000m 0 1000 2000 3000 4000m
Approximate Scale

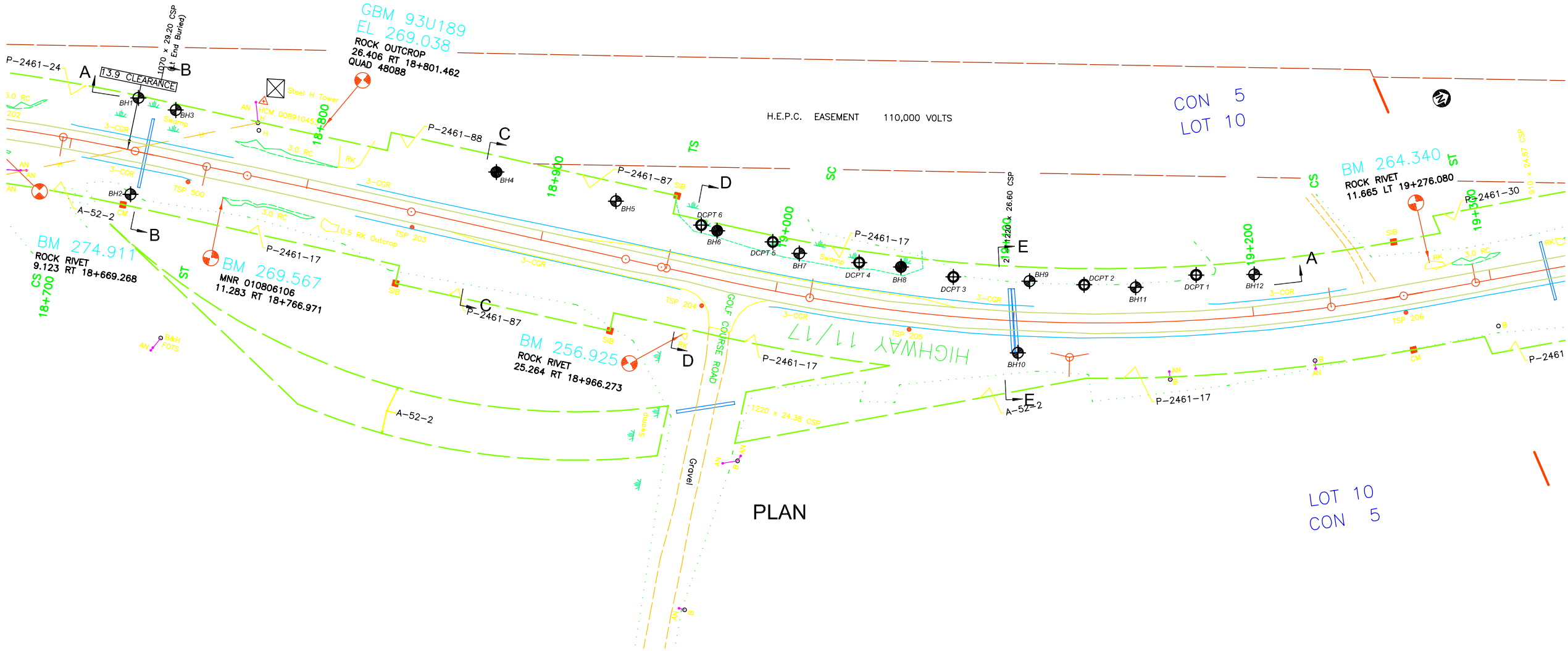
LEGEND

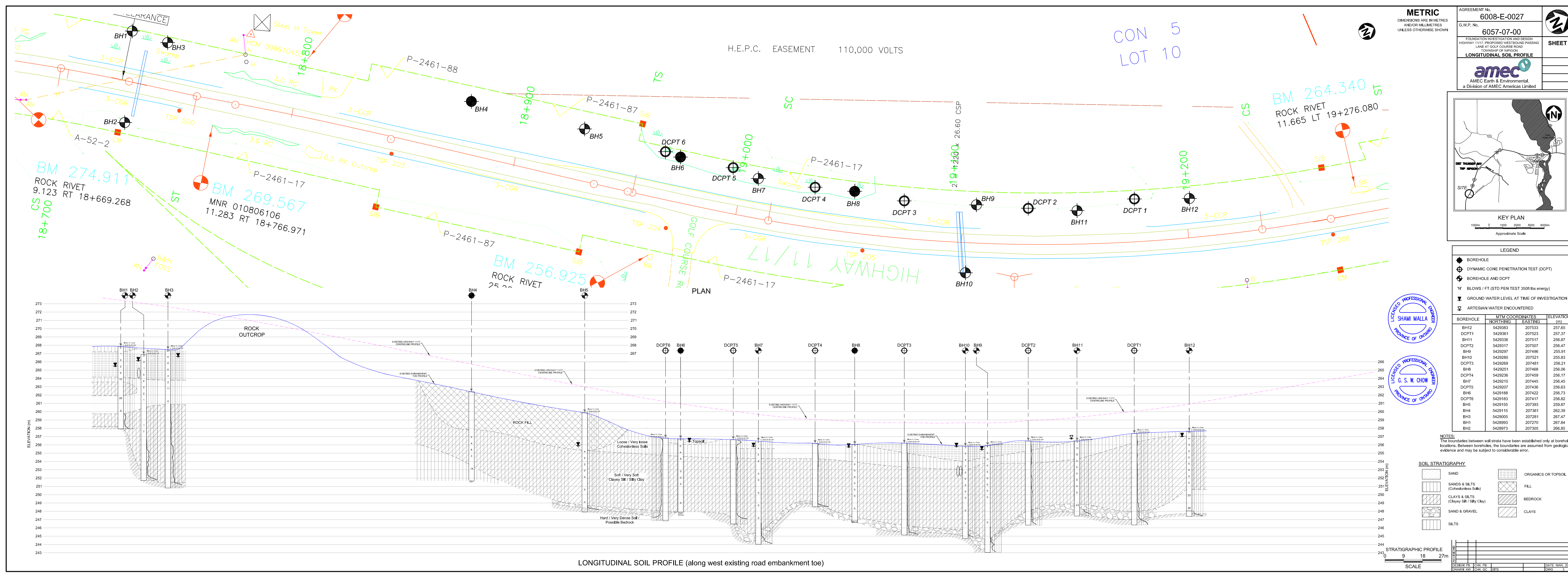
- BOREHOLE
- DYNAMIC CONE PENETRATION TEST (DCPT)
- BOREHOLE & DCPT

| BOREHOLE | MTM COORDINATES | | ELEVATION (m) |
|----------|-----------------|---------|------------------|
| | NORTHING | EASTING | |
| BH12 | 5429383 | 207533 | 257.65 |
| DCPT1 | 5429361 | 207523 | 257.37 |
| BH11 | 5429336 | 207517 | 256.87 |
| DCPT2 | 5429317 | 207507 | 256.47 |
| BH9 | 5429297 | 207496 | 255.91 |
| BH10 | 5429280 | 207521 | 255.83 |
| DCPT3 | 5429269 | 207481 | 256.21 |
| BH8 | 5429251 | 207468 | 256.06 |
| DCPT4 | 5429236 | 207459 | 256.17 |
| BH7 | 5429215 | 207445 | 256.45 |
| DCPT5 | 5429207 | 207436 | 256.63 |
| BH6 | 5429188 | 207422 | 256.73 |
| DCPT6 | 5429183 | 207417 | 256.82 |
| BH5 | 5429155 | 207393 | 259.87 |
| BH4 | 5429115 | 207361 | 262.39 |
| BH3 | 5429005 | 207281 | 267.47 |
| BH1 | 5428993 | 207270 | 267.84 |
| BH2 | 5428973 | 207305 | 266.85 |

0 20 40 60m
SCALE

| | | | |
|-----------|--------|------|----------------|
| DESIGN PB | CHK PB | CODE | DATE MAR. 2009 |
| DRAWN KW | CHK GC | SITE | DWG 2 |





LONGITUDINAL SOIL PROFILE (along west existing road embankment toe)

METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

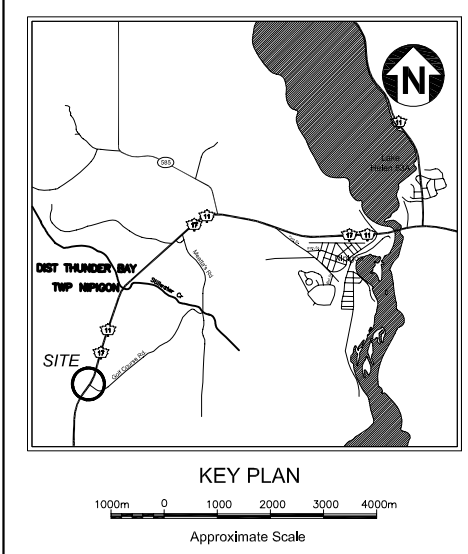
AGREEMENT No.
6008-E-0027

G.W.P. No.
6057-07-00

FOUNDATION INVESTIGATION AND DESIGN
HIGHWAY 117, PROPOSED WESTBOUND PASSING
LANE AT GOLF COURSE ROAD
TOWNSHIP OF NIJIGON
LONGITUDINAL SOIL PROFILE

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SHEET



LEGEND

- BOREHOLE
- DYNAMIC CONE PENETRATION TEST (DCPT)
- BOREHOLE AND DCPT
- 'N' BLOWS / FT (STD PEN TEST 350ft lbs energy)
- GROUND WATER LEVEL AT TIME OF INVESTIGATION
- ARTESIAN WATER ENCOUNTERED

| BOREHOLE | MTM COORDINATES | | ELEVATION (m) |
|----------|-----------------|---------|---------------|
| | NORTHING | EASTING | |
| BH12 | 5429383 | 207533 | 257.65 |
| DCPT1 | 5429361 | 207523 | 257.37 |
| BH11 | 5429336 | 207517 | 256.87 |
| DCPT2 | 5429317 | 207507 | 256.47 |
| BH9 | 5429297 | 207496 | 255.91 |
| BH10 | 5429289 | 207521 | 255.03 |
| DCPT3 | 5429269 | 207481 | 256.21 |
| BH8 | 5429251 | 207468 | 256.06 |
| DCPT4 | 5429236 | 207459 | 256.17 |
| BH7 | 5429215 | 207445 | 256.45 |
| DCPT5 | 5429207 | 207436 | 256.63 |
| BH6 | 5429188 | 207422 | 256.73 |
| DCPT6 | 5429183 | 207417 | 256.82 |
| BH5 | 5429155 | 207393 | 259.87 |
| BH4 | 5429115 | 207361 | 262.39 |
| BH3 | 5429005 | 207281 | 267.47 |
| BH1 | 5428993 | 207270 | 267.84 |
| BH2 | 5428973 | 207305 | 266.85 |

NOTES:
The boundaries between soil strata have been established only at borehole locations. Between boreholes, the boundaries are assumed from geological evidence and may be subject to considerable error.

SOIL STRATIGRAPHY

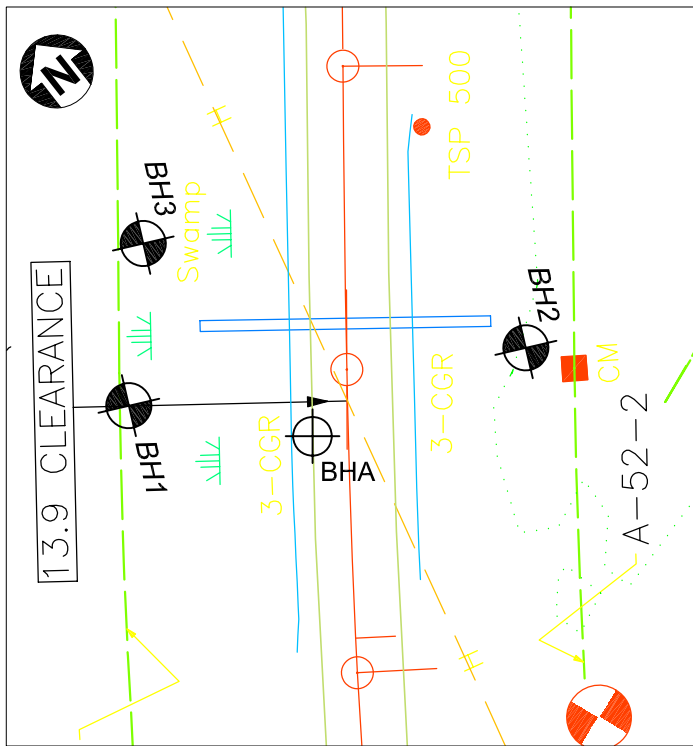
| | |
|-----------------------------------------|---------------------|
| SAND | ORGANICS OR TOPSOIL |
| SANDS & SILTS (Cohesionless Soils) | FILL |
| CLAYS & SILTS (Clayey SIL / Silty Clay) | BEDROCK |
| SAND & GRAVEL | CLAYS |
| SILTS | |

STRATIGRAPHIC PROFILE

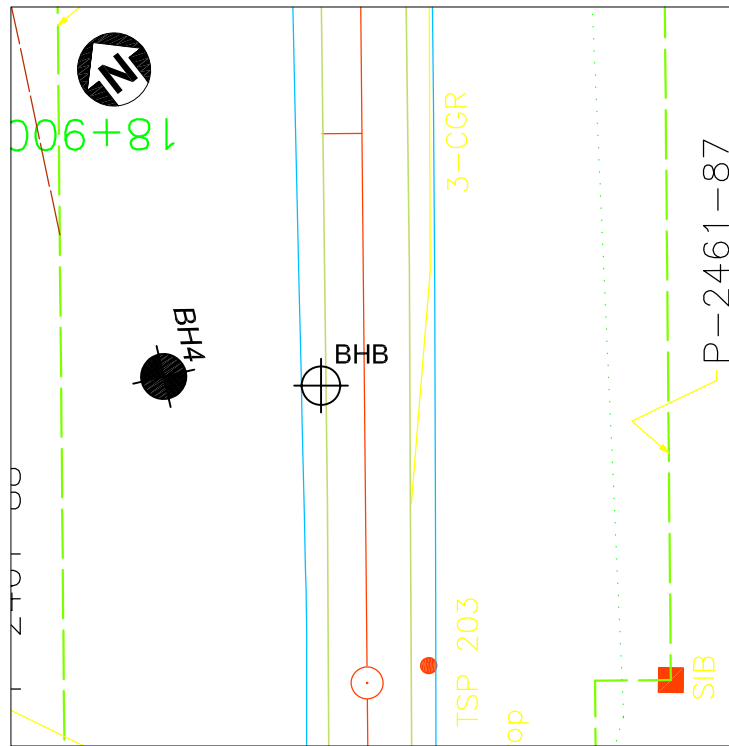
| STATION | DEPTH (m) | SOIL TYPE | REMARKS |
|------------|-----------|-------------------------------------------|---------|
| 18+669.268 | 0.0 | Topsoil | |
| 18+669.268 | 0.5 | Loose / Very loose Cohesionless Soils | |
| 18+669.268 | 1.0 | Soft / Very Soft Clayey SIL / Silty Clay | |
| 18+669.268 | 1.5 | Hard / Very Dense Soil / Possible Bedrock | |

SCALE: 0 9 18 27m

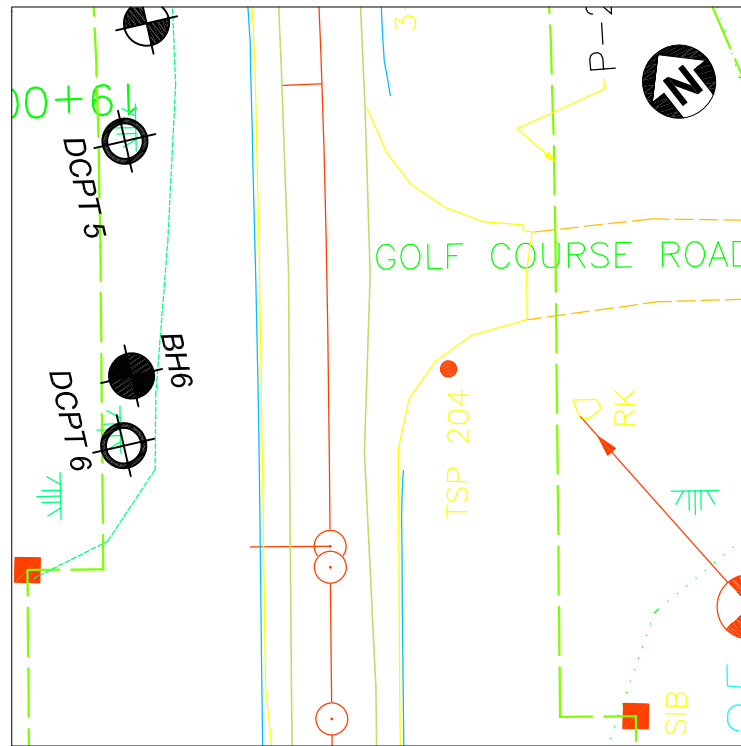
DESIGN: PB, CHK: PB, DATE: MAR, 2009
DRAWN: KW, CHK: GC, SITE, DWS: 3



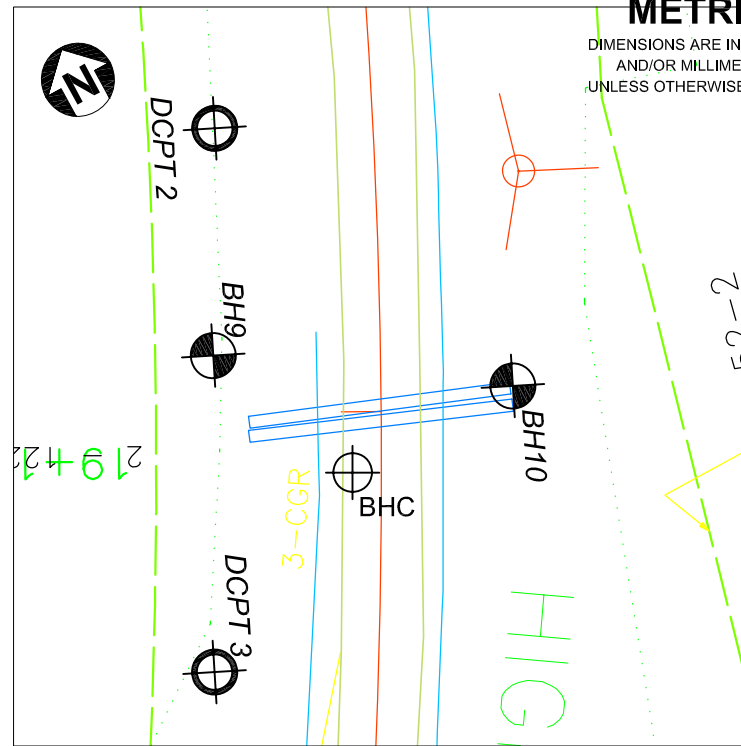
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

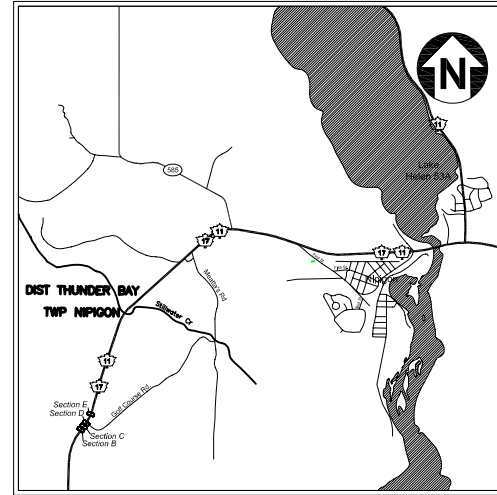
AGREEMENT No.
6008-E-0027

G.W.P. No.
6057-07-00

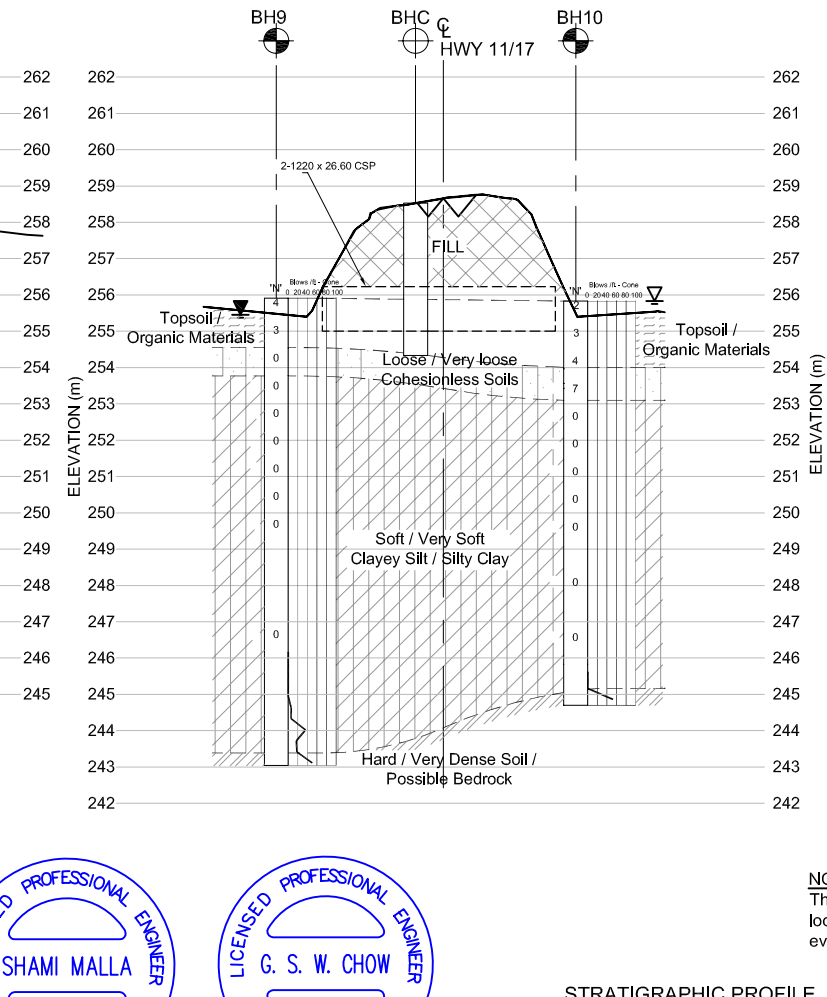
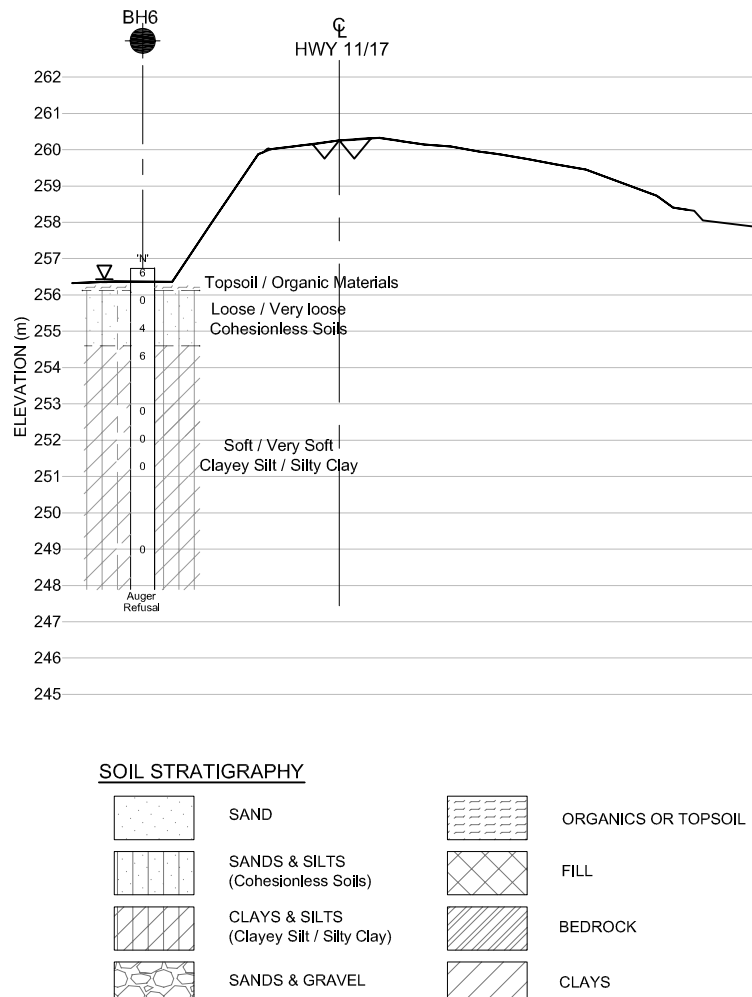
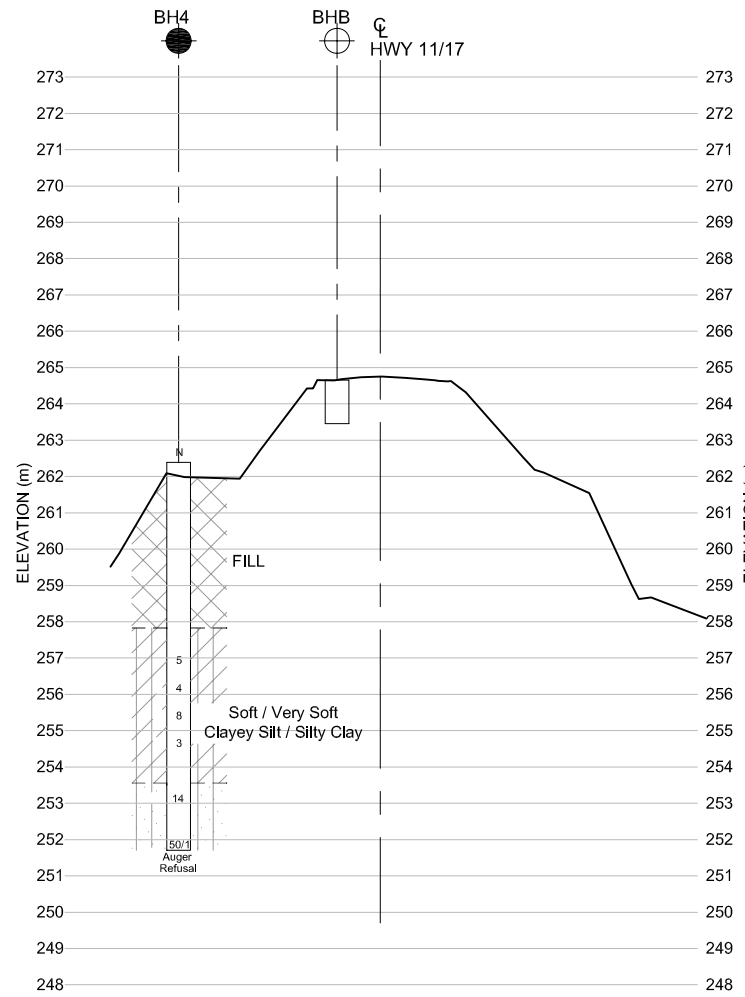
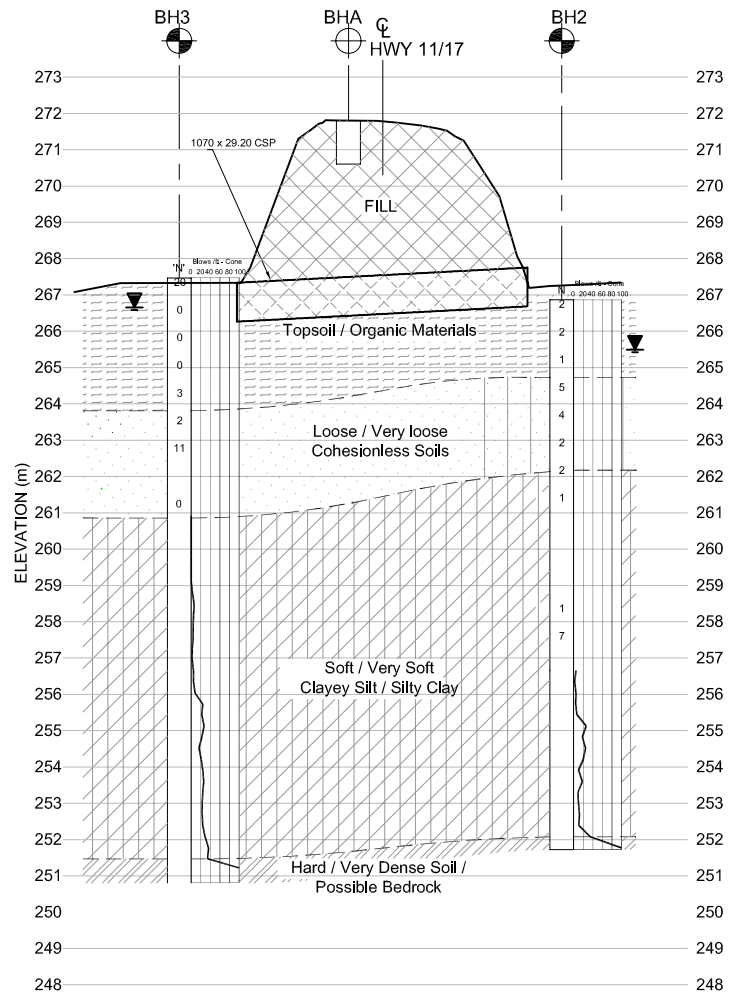
FOUNDATION INVESTIGATION REPORT
HIGHWAY 11/17, PROPOSED WESTBOUND PASSING
LANE AT GOLF COURSE ROAD
TOWNSHIP OF NIPIGON
TRANSVERSE SOIL PROFILES

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SHEET



KEY PLAN



SOIL STRATIGRAPHY

| | | | |
|--|---------------------------------------------|--|---------------------|
| | SAND | | ORGANICS OR TOPSOIL |
| | SANDS & SILTS (Cohesionless Soils) | | FILL |
| | CLAYS & SILTS (Clayey Silt / Silty Clay) | | BEDROCK |
| | SANDS & GRAVEL | | CLAYS |
| | SILTS | | |



STRATIGRAPHIC PROFILE
0 9 18 27m
SCALE

NOTES:
The boundaries between soil strata have been established only at borehole locations. Between boreholes, the boundaries are assumed from geological evidence and may be subject to considerable error.

| BOREHOLE | MTM COORDINATES | | ELEVATION (m) |
|-----------------------------------------|-----------------|---------|---------------|
| | NORTHING | EASTING | |
| BH3 | 5429005 | 207281 | 267.47 |
| BH2 | 5428973 | 207305 | 266.85 |
| BH4 | 5429115 | 207361 | 262.39 |
| BH6 | 5429188 | 207422 | 256.73 |
| BH9 | 5429297 | 207496 | 255.91 |
| BH10 | 5429280 | 207521 | 255.83 |
| PREVIOUSLY DRILLED BOREHOLES (MTO 2002) | STATION | OFFSET | ELEVATION (m) |
| BHA | 18+729 | 4.2 Lt | - |
| BHB | 18+870 | 4.2 Lt | - |
| BHC | 19+096 | 4.6 Lt | - |

| REVISIONS | DESIGN | CHK | DATE |
|-----------|--------|-----|-----------|
| | PB | PB | MAR. 2009 |
| | KW | GC | DWG 4 |

APPENDIX A

**RECORD OF BOREHOLES /
DCPT TEST HOLES**

EXPLANATION OF BOREHOLE LOG

This form describes some of the information provided on the borehole logs, which is based primarily on examination of the recovered samples, and the results of the field and laboratory tests. Additional description of the soil/rock encountered is given in the accompanying geotechnical report.

GENERAL INFORMATION

Project details, borehole number, location coordinates and type of drilling equipment used are given at the top of the borehole log.

SOIL LITHOLOGY

Elevation and Depth

This column gives the elevation and depth of inferred geologic layers. The elevation is referred to the datum shown in the Description column.

Lithology Plot

This column presents a graphic depiction of the soil and rock stratigraphy encountered within the borehole.

Description

This column gives a description of the soil strata, based on visual and tactile examination of the samples augmented with field and laboratory test results. Each stratum is described according to the *Modified Unified Soil Classification System*.

The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined as follows (*Ref. Canadian Foundation Engineering Manual*):

| Compactness of | |
|----------------------------|----------------------------|
| <u>Cohesionless</u> | <u>SPT N-Value*</u> |
| <u>Soils</u> | |
| Very loose | 0 to 4 |
| Loose | 4 to 10 |
| Compact | 10 to 30 |
| Dense | 30 to 50 |
| Very Dense | > 50 |

| Consistency of | | <u>Undrained Shear Strength</u> |
|------------------------------|-------------------|----------------------------------------|
| <u>Cohesive Soils</u> | <u>kPa</u> | <u>psf</u> |
| Very soft | 0 to 12 | 0 to 250 |
| Soft | 12 to 25 | 250 to 500 |
| Firm | 25 to 50 | 500 to 1000 |
| Stiff | 50 to 100 | 1000 to 2000 |
| Very stiff | 100 to 200 | 2000 to 4000 |
| Hard | Over 200 | Over 4000 |

* For penetration of less than 0.3 m, N-values are indicated as the number of blows for the penetration achieved (e.g. 50/25: 50 blows for 25 centimeter penetration).

Soil Sampling

Sample types are abbreviated as follows:

| | | | | | | | |
|----|--------------|----|---------------------------|----|---------------|----|-------------------|
| SS | Split Spoon | TW | Thin Wall Open (Pushed) | RC | Rock Core | GS | Grab Sample |
| AS | Auger Sample | TP | Thin Wall Piston (Pushed) | WS | Washed Sample | AR | Air Return Sample |

Additional information provided in this section includes sample numbering, sample recovery and numerical testing results.

Field and Laboratory Testing

Results of field testing (e.g., SPT, pocket penetrometer, and vane testing) and laboratory testing (e.g., natural moisture content, and limits) executed on the recovered samples are plotted in this section.

Instrumentation Installation

Instrumentation installations (monitoring wells, piezometers, inclinometers, etc.) are plotted in this section. Water levels, if measured during fieldwork, are also plotted. These water levels may or may not be representative of the static groundwater level depending on the nature of soil stratum where the piezometer tips are located, the time elapsed from installation to reading and other applicable factors.


Comments

This column is used to describe non-standard situations or notes of interest.

| MODIFIED * UNIFIED CLASSIFICATION SYSTEM FOR SOILS | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------|--------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| *The soil of each stratum is described using the Unified Soil Classification System (Technical Memorandum 36-357 prepared by Waterways Experiment Station, Vicksburg, Mississippi, Corps of Engineers, U.S Army. Vol. 1 March 1953.) modified slightly so that an inorganic clay of "medium plasticity" is recognized. | | | | | | |
| MAJOR DIVISION | | | GROUP SYMBOL | TYPICAL DESCRIPTION | LABORATORY CLASSIFICATION CRITERIA | |
| COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN 75µm) | GRAVELS MORE THAN HALF THE COARSE FRACTION LARGER THAN 4.75mm | CLEAN GRAVELS (TRACE OR NO FINES) | GW | WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES | $C_u = \frac{D_{60}}{D_{10}} > 4; C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$ | |
| | | | GP | POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES | NOT MEETING ABOVE REQUIREMENTS | |
| | | DIRTY GRAVELS (WITH SOME OR MORE FINES) | GM | SILTY GRAVELS, GRAVEL-SAND- SILT MIXTURES | ATTERBERG LIMITS BELOW "A" LINE OR P.I MORE THAN 4 | |
| | | | GC | CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES | ATTERBERG LIMITS BELOW "A" LINE OR P.I MORE THAN 7 | |
| | SANDS MORE THAN HALF THE COARSE FRACTION SMALLER THAN 4.75mm | CLEAN SANDS (TRACE OR NO FINES) | SW | WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES | $C_u = \frac{D_{60}}{D_{10}} > 6; C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$ | |
| | | | SP | POORLY GRADED GRAVELS, GRAVEL- SAND MIXTURES, LITTLE OR NO FINES | NOT MEETING ABOVE REQUIREMENTS | |
| | | DIRTY SANDS (WITH SOME OR MORE FINES) | SM | SILTY SANDS, SAND-SILT MIXTURES | ATTERBERG LIMITS BELOW "A" LINE OR P.I MORE THAN 4 | |
| | | | SC | CLAYEY SANDS, SAND-CLAY MIXTURES | ATTERBERG LIMITS BELOW "A" LINE OR P.I MORE THAN 7 | |
| FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT SMALLER THAN 75µm) | SILTS BELOW "A" LINE NEGLIGIBLE ORGANIC CONTENT | $W_L < 50\%$ | ML | INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY | CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW) | |
| | | $W_L < 50\%$ | MH | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS | | |
| | CLAYS ABOVE "A" LINE NEGLIGIBLE ORGANIC CONTENT | $W_L < 30\%$ | CL | INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY OR SILTY CLAYS, LEAN CLAYS | | |
| | | $30\% < W_L < 50\%$ | CI | INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS | | |
| | | $W_L < 50\%$ | CH | INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS | | |
| | ORGANIC SILTS & CLAYS BELOW "A" LINE | $W_L < 50\%$ | OL | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY | WHENEVER THE NATURE OF THE FINES CONTENT HAS NOT BEEN DETERMINED, IT IS DESIGNATED BY THE LETTER "F", E.G SF IS A MIXTURE OF SAND WITH SILT OR CLAY | |
| | | $W_L < 50\%$ | OH | ORGANIC CLAYS OF HIGH PLASTICITY | | |
| | HIGH ORGANIC SOILS | | | Pt | PEAT AND OTHER HIGHLY ORGANIC SOILS | STRONG COLOUR OR ODOUR, AND OFTEN FIBROUS TEXTURE |

| SOIL COMPONENTS | | | | | |
|---------------------------------------------------------------------|-------------------------|---------|-------------------------------------------------------------|------------------------------------------------------------------------------|------------|
| FRACTION | U.S STANDARD SIEVE SIZE | | DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS | | |
| GRAVEL | COARSE | PASSING | RETAINED | PERCENT | DESCRIPTOR |
| | | 76 mm | 19 mm | 35-50 | AND |
| | FINE | 19 mm | 4.75 mm | 20-35 | Y/EY |
| SAND | COARSE | 4.75 mm | 2.00 mm | 10-20 | SOME |
| | MEDIUM | 2.00 mm | 425 µm | 1-10 | TRACE |
| | FINE | 425 µm | 75 µm | | |
| FINES (SILT OR CLAY BASED ON PLASTICITY) | | 75 µm | | | |
| OVERSIZED MATERIAL | | | | | |
| ROUNDED OR SUBROUNDED: COBBLES 76 mm TO 200 mm BOULDERS > 200 mm | | | | NOT ROUNDED: ROCK FRAGMENTS > 76 mm ROCKS > 0.76 CUBIC METRE IN VOLUME | |

Plasticity Chart for Soil Passing 425 Micron Sieve

| | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AMEC Earth & Environmental 104 Crockford Boulevard Scarborough, ON M1R 3C3 Ph: (416) 751-6565 Fax: (416) 751-7592 www.amec.com |  | Note 1: Soils are classified and described according to their engineering properties and behaviour. Note 2: The modifying adjectives used to define the actual or estimated percentage range by weight of minor components are consistent with the Canadian Foundation Engineering Manual (4th Edition, Canadian Geotechnical Society, 2006.) |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

RECORD OF BOREHOLE No BH 1

1 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 18+722 Offset: 21.9 Lt ORIGINATED BY SAL
 DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration COMPILED BY SN
 DATUM Geodetic DATE 15 January 2009 - 15 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT LIMIT NATURAL MOISTURE CONTENT LIMIT | | | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|------|------------|----------------------------------------------------------|------------|----------------------|---------------------------------------------|--|--|--|--|-------------------------------------------------------------------|----|-----|------------------------|-----------------------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | |
| | | | | | | | | | 20 40 60 80 100 | | | | | W _P W W _L | | | | |
| | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | | | | | | | |
| 267.8 | | | | | | | | | | | | | | | | | | |
| 0.0 | brown to grey SANDY SILT very loose frozen soil | | 1 | SS | 2 | | | | | | | | | | | 45 | 25 | Ice and snow at ground surface to depth of about 0.2 m |
| 267.2 | | | | | | | | | | | | | | | | | | |
| 0.6 | black ORGANIC MATERIALS fibrous peat some wood fragments | | 2 | SS | 1 | | 1 | 267 | | | | | | | | 146 | 30 | |
| | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 0 | | 2 | 266 | | | | | | | | | | No recovery |
| | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 2 | | | 265 | | | | | | | | 289 | 140 | |
| | | | | | | | 3 | | | | | | | | | | | |
| | | | 5 | SS | 0 | | | 265 | | | | | | | | 569 | 25 | |
| 264.2 | | | | | | | | | | | | | | | | | | |
| 3.7 | grey SANDY SILT loose wet | | 6 | SS | 10 | | 4 | 264 | | | | | | 18 | | | 15 | |
| 263.6 | | | | | | | | | | | | | | | | | | |
| 4.3 | grey CLAYEY SILT / SILTY CLAY trace sand moist | | 7 | TW | | | 5 | 263 | | | | | | 18 | 26 | | 0 2 74 24 | |
| | | | | | | | | | | | | | | | | | | |
| | boulder from 5.5 m to 5.9 m depth | | | | | | | | | | | | | | | | | |
| 261.9 | | | | | | | 6 | 262 | | | | | | | | | | |
| 5.9 | grey SAND trace gravel and silt compact wet | | 8 | SS | 28 | | | | | | | | | 11 | | | 0 | |
| | | | | | | | 7 | 261 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 9 | | 8 | 260 | | | | | | 15 | | | 0 2 94 (4) | |
| 259.8 | | | | | | | | | | | | | | | | | | |
| 8.1 | End of Borehole | | | | | | | | | | | | | | | | | |
| | Sand flowing significantly into hollow stem augers preventing further augering. Changed to Dynamic Cone Penetration Test (DCPT) below 8.1 m depth. | | | | | | 9 | 259 | | | | | | | | | | Water flowing into augers |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 257.9 | | | | | | | | 258 | | | | | | | | | | DCPT = 50 blows/0" at 9.9 m depth |

Continued Next Page

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

RECORD OF BOREHOLE No BH 1

2 OF 2

| | | |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------|
| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 18+722 Offset: 21.9 Lt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration | COMPILED BY SN |
| DATUM Geodetic | DATE 15 January 2009 - 15 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | JOB NO. TT93000 | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | | WATER CONTENT (%) | | | | GR | SA | SI | CL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | ○ UNCONFINED | + | FIELD VANE | ● QUICK TRIAXIAL | × | | | | | LAB VANE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9.9 | End of DCPT Refusal to Dynamic Cone Penetration Test at 9.9 m depth Groundwater in open borehole on completion: 1.7 m Borehole was backfilled with bentonite at the completion of drilling. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | </ |

RECORD OF BOREHOLE No BH 2

1 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 18+731 Offset: 18.0 Rt ORIGINATED BY SAL
 DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Solid Stem Augering and Dynamic Cone Penetration COMPILED BY SN
 DATUM Geodetic DATE 12 January 2009 - 12 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------------|----------------------------------------------------------------------------------|------------|---------|------|-------------------|----------------------------|------------|----------------------|---------------------------------------------|----|----|----|-----|------------------------------------|-------------------------------------|-----------------------------------|-------------------------------|-----------------------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | | |
| | | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | | | |
| | | | | | | | | | ● QUICK TRIAXIAL × LAB VANE | | | | | | | | | |
| | | | | | WATER CONTENT (%) | | | | | | | | | | | | | |
| 266.9 | | | | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | | |
| 0.0 | black ORGANIC MATERIALS fibrous peat some wood fragments | | 1 | SS | 2 | | | | | | | | | | | | 396 | Ice and snow at ground surface to depth of about 1.2 m |
| | | | | | | | | 266 | | | | | | | | | 126 | |
| | | | 2 | SS | 2 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 1 | | | 265 | | | | | | | | | 389 | |
| | | | | | | | | | | | | | | | | | | |
| 264.7 | grey SILTY SAND trace clay and gravel very loose to loose wet | | 4 | SS | 5 | | | 264 | | | | | | | | | | |
| 2.1 | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 4 | | | | | | | | 15 | | | | 60 | |
| | | | | | | | | 263 | | | | | | | | | | |
| | | | 6 | SS | 2 | | | | | | | | 21 | | | | 60 | 2 63 31 4 |
| | | | | | | | | | | | | | | | | | | |
| 262.1 | grey CLAYEY SILT / SILTY CLAY very soft to firm moist | | 7 | SS | 2 | | | 262 | | | | | | | | | 32 | |
| 4.7 | | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 1 | | | | | | | | 16 | | 31 | 34 | 25 | No recovery |
| | | | | | | | | 261 | | | 5 | | | | | | | |
| | | | 9 | TW | | | | | | | | | | | | | | |
| | | | | | | | | 260 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 10 | TW | | | | 259 | | | | | | | | | | No recovery |
| | | | | | | | | | | | | | | | | | | |
| | | | 11 | SS | 1 | | | 258 | | | | | | | | 34 | 10 | |
| | | | | | | | | | | | | | | | | | | |
| | | | 12 | SS | 7 | | | | | | | | | | 26 | | 10 | |
| | | | | | | | | | | | | | | | | | | |
| | | | 13 | TW | | | | 257 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

Continued Next Page

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

| | | |
|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------|
| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 18+731 Offset: 18.0 Rt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Solid Stem Augering and Dynamic Cone Penetration | COMPILED BY SN |
| DATUM Geodetic | DATE 12 January 2009 - 12 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | JOB NO. | TT93000 |

| SOIL PROFILE | | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------|---------|------------|--------------------|----------------------------|------------|----------------------|---------------------------------------------|---|-----------------------------------------------------|-----|----|------------------------|---------------------------------------------------|----|----|-------------------------------------|--|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | SHEAR STRENGTH kPa | | | | W _p | W | W _L | PPM | GR | | SA | SI | CL | | |
| | | | | | | ○ UNCONFINED | | | | + FIELD VANE | | | | | | | | | | |
| 256.6 10.2 | End of Borehole Dynamic Cone Penetration Test (DCPT) was conducted below 10.2 m depth. | | | | | | | | | | | | | | | | | | | |
| 251.7 15.1 | End of DCPT Refusal to Dynamic Cone Penetration Test at 15.1 m depth Groundwater in open borehole on completion: 1.2 m Borehole was backfilled with bentonite at the completion of drilling. | | | | | | | | | | | | | | | | | | DCPT = 100 blows/2" at 15.1 m depth | |

RECORD OF BOREHOLE No BH 3

1 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 18+740 Offset: 21.2 Lt ORIGINATED BY SAL
 DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration COMPILED BY SN
 DATUM Geodetic DATE 16 January 2009 - 16 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|------|------------|----------------------------|------------|----------------------|----------------------------------------------------------|-----|----|----|----|--------------------------------------------------------------|-----|----|------------------------|---------------------------------------------------|-------------|-----------------------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | | | |
| | | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE | | | | | W _P W W _L | | | | | | |
| 267.5 | | | | | | 20 | 40 | 60 | 80 | 100 | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | PPM | GR SA SI CL |
| 0.0 | black ORGANIC MATERIALS fibrous peat some wood fragments | | 1 | SS | 20 | | | | | | | | | | | | | | 50 | Ice and snow at ground surface to depth of about 0.2 m |
| | | | 2 | SS | 0 | | | | | | | | | | | | | | 45 | |
| | | | 3 | SS | 0 | | | | | | | | | | | | | 35 | | |
| | | | 4 | SS | 0 | | | | | | | | | | | | | | No recovery | |
| | | | 5 | SS | 3 | | | | | | | | | | | | | 15 | | |
| 263.8 | grey SAND very loose to compact wet 50 mm thick silty clay seam encountered at 4.0 m depth | | 6 | SS | 2 | | | | | | | | | | | | | | 0 | No recovery |
| 3.7 | | | 7 | SS | 11 | | | | | | | | | | | | | | 0 | |
| | trace wood fragments | | 8 | SS | 0 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 260.9 | End of Borehole Sand flowing significantly into hollow stem augers preventing further augering. Changed to Dynamic Cone Penetration Test (DCPT) below 6.6 m depth. | | | | | | | | | | | | | | | | | | | |
| 6.6 | | | | | | | | | | | | | | | | | | | | |

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

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| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 18+740 Offset: 21.2 Lt | 2 OF 2 | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration | | COMPILED BY SN |
| DATUM Geodetic | DATE 16 January 2009 - 16 January 2009 | | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | | | JOB NO. TT93000 |

[illegible]

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

RECORD OF BOREHOLE No BH 4

1 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 18+875 Offset: 20.2 Lt ORIGINATED BY SAL
 DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration COMPILED BY SN
 DATUM Geodetic DATE 18 January 2009 - 18 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL MOISTURE CONTENT | | | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|----------------------|---------------------------------------------------------------------------------|------------|---------|------|------------|----------------------------|------------|----------------------|---------------------------------------------|--|----------------------------------------------|---|----------------|------------------------|---------------------------------------------------|-------------------|--|--|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | | | | | | | | | | | |
| 262.4 | | | | | | | | | 20 40 60 80 100 | | W _p | W | W _L | | | | | |
| 0.0 | ROCK FILL 150 mm to 1500 mm rock pieces mixed with sand and gravel | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
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Continued Next Page

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

RECORD OF BOREHOLE No BH 4

2 OF 2

| | | |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------|
| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 18+875 Offset: 20.2 Lt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration | COMPILED BY SN |
| DATUM Geodetic | DATE 18 January 2009 - 18 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | | JOB NO. TT93000 |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL | | | |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|------|------------|----------------------------|------------|----------------------|----------------------------------------------------------|--|--|--|--|------------------------------------|-------------------------------------|------------------------------------------|-------------------------------|------------------------------------------------------------------|-------------------|--|--|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | | 20 40 60 80 100 | | | | | | | | | | 10 20 30 | | |
| | | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | | | | | | | |
| 251.7 | SANDY SILT | | 7 | SS | 50/4 | | 252 | | | | | | | | | DCPT = 50 blows/0" at 10.7 m depth | | | | | |
| 10.7 | End of Borehole No noticeable groundwater in open borehole on completion Dynamic Cone Penetration Test (DCPT) was conducted below 10.7 m depth. Refusal to Dynamic Cone Penetration Test at 10.7 m depth Borehole was backfilled with bentonite at the completion of drilling. | | | | | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No BH 5

1 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 18+925 Offset: 22.7 Lt ORIGINATED BY SAL
 DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration COMPILED BY SN
 DATUM Geodetic DATE 17 January 2009 - 17 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|----------------------|-------------------------------------------------------------------------------------|------------|---------|------|------------|----------------------------|------------|----------------------|---------------------------------------------|--------------|------------------|------------|------------------------------------|-------------------------------------|-----------------------------------|-------------------------------|---------------------------------------------------|-------------------|---|----------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● QUICK TRIAXIAL | × LAB VANE | | | | | | W _p | W | W _L |
| 259.9 | | | | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | | | | |
| 0.0 | ROCK FILL 150 mm to 1500 mm rock pieces mixed with sand and gravel | | | | | | | | | | | | | | | | | | | |
| 255.3 | | | | | | | | | | | | | | | | | | | | |
| 4.6 | grey CLAYEY SILT / SILTY CLAY trace sand very soft to firm moist | | 1 | SS | 4 | | 5 | 255 | | | | | | 17 | | 40 | 25 | | | |
| | | | 2 | SS | 2 | | | 254 | | | | | | | | 39 | 15 | | | |
| | | | 3 | SS | 2 | | 6 | 254 | | | | | | | | 35 | 25 | | | |
| | | | 4 | SS | 0 | | 7 | 253 | | | | | | | | | 25 | | | |
| | | | 5 | SS | 0 | | 8 | 252 | | | | | | 17 | 27 | 33 | 15 | | | |
| | | | | | | | | 251 | | | | | | | | | | | | |
| | | | 6 | SS | 0 | | | 250 | | | | | | | | | 0 | | | |


Continued Next Page

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

RECORD OF BOREHOLE No BH 5

2 OF 2





G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 18+925 Offset: 22.7 Lt ORIGINATED BY SAL
DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration COMPILED BY SN
DATUM Geodetic DATE 17 January 2009 - 17 January 2009 CHECKED BY PB
PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------|------|------------|----------------------------|------------|----------------------|---------------------------------------------|--|-----------------------------------------------------|---|----------------|------------------------|---------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | W _p | W | W _L | | |
| | | | | | | | | | 20 40 60 80 100 | | | | | | |
| | | | | | | | | | 20 40 60 80 100 | | | | | | |
| | | | | | | | | | 20 40 60 80 100 | | | | | | |
| 248.7 | CLAYEY SILT / SILTY CLAY |  | 7 | SS | 0 | | | | | | | | | | |
| 11.1 | End of Borehole | | | | | | | | | | | | | | |
| 247.9 | Dynamic Cone Penetration Test (DCPT) was conducted below 11.1 m depth. | | | | | | | | | | | | | | |
| 12.0 | End of DCPT | | | | | | | | | | | | | | |
| | Refusal to Dynamic Cone Penetration Test at 12.0 m depth | | | | | | | | | | | | | | |
| | Groundwater in open borehole on completion: 4.0 m | | | | | | | | | | | | | | |
| | Borehole was backfilled with bentonite at the completion of drilling. | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No BH 6

1 OF 1

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 18+970 Offset: 19.8 Lt ORIGINATED BY SAL
DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Hollow Stem Augering COMPILED BY SN
DATUM Geodetic DATE 17 January 2009 - 17 January 2009 CHECKED BY PB
PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------------|-------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------------|----------------------------|-----------------------------------------------------------------------------------|----------------------|----------------------------------------------------------|----------|-----|-------------|-----------------------------------------------------|-------|----|-----------------------------------------------------------------|---------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | WATER CONTENT (%) | | | | |
| | | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | W _P W W _L | | | | |
| | | | | | | 20 40 60 80 100 | | | | 10 20 30 | PPM | GR SA SI CL | | | | | |
| 256.7 | 0.0 | black ORGANIC MATERIALS fibrous peat some wood fragments |  | 1 | SS | 6 |  | | | | | | | | 70 | Ice and snow at ground surface to depth of about 0.6 m | |
| 256.1 | 0.6 | yellowish brown SANDY SILT trace to some clay with clayey zones, trace gravel very loose wet |  | 2 | SS | 0 | | 256 | | | | | | | 50 | | |
| | | clayey sample at SS 3 | | 3 | SS | 4 | | 255 | | | | | 15 | 23 27 | 0 | 4 31 49 16 | |
| 254.6 | 2.1 | grey CLAYEY SILT / SILTY CLAY very soft moist |  | 4 | SS | 6 | | 254 | | | | | 17 | 28 41 | 15 | | |
| | | | | 5 | TW | | | 253 | | | | | 17 | 44 39 | | 0 0 38 62 | |
| | | | | 6 | SS | 0 | | 252 | | | | | | | 0 | | |
| | | | | 7 | SS | 0 | | 251 | | | | | | | 0 | | |
| | | | | 8 | SS | 0 | | 250 | | | | | | | 0 | | |
| | | | | | | | | 249 | | | | | | | 0 | | |
| 247.9 | 8.8 | End of Borehole due to Auger Refusal | | | | | | 248 | | | | | | | | | |
| | | Groundwater in open borehole on completion: 0.3 m | | | | | | | | | | | | | | | |
| | | Borehole backfilled with bentonite at completion of drilling. | | | | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No BH 7

1 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 19+010 Offset: 17.4 Lt ORIGINATED BY SAL
 DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration COMPILED BY SN
 DATUM Geodetic DATE 17 January 2009 - 17 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|----------------------|-------------------------------------------------------|------------|---------|------|------------|----------------------------|------------|----------------------|---------------------------------------------|--------------|----|------------------------------------|-------------------------------------|-----------------------------------|------------------------|---------------------------------------------------|-------------------|----------|--------------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | | ○ UNCONFINED | + FIELD VANE | × | | | | | | | LAB VANE | |
| 256.5 | | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.0 | TOPSOIL | | 1 | SS | 0 | | | | | | | | | | | | | | Ice and snow at ground surface to depth of about 0.6 m |
| 255.5 | | | | | | | | | | | | | | | | | | | |
| 0.9 | brown SANDY SILT some clay very loose wet | | 2 | SS | 4 | | | | | | | | | | | | | 20 | |
| | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No BH 7

2 OF 2

| | | |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------|
| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 19+010 Offset: 17.4 Lt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration | COMPILED BY SN |
| DATUM Geodetic | DATE 17 January 2009 - 17 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | JOB NO. | TT93000 |

| SOIL PROFILE | | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------|---------|------------|--------------------|----------------------------|------------|----------------------|---------------------------------------------|---|---|------------|------------------------------------|-------------------------------------|-----------------------------------|-------------------------------|---------------------------------------------------|----------|--|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | SHEAR STRENGTH kPa | | | | WATER CONTENT (%) | | | | | | | | | | |
| | | | | | | ○ UNCONFINED | | | | ● QUICK TRIAXIAL | + | × | FIELD VANE | | | | | | LAB VANE | |
| 9.9 | End of Borehole Dynamic Cone Penetration Test (DCPT) was conducted below 9.9 m depth. | | | | | | | | | | | | | | | | | | | |
| 244.0 | | | | | | | | | | | | | | | | | | | | |
| 12.4 | End of DCPT Refusal to Dynamic Cone Penetration Test at 12.4 m depth Groundwater in open borehole on completion: 0.6 m Borehole was backfilled with bentonite at the completion of drilling. | | | | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No BH 8

1 OF 2

| | | |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------|-------------------|
| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 19+050 Offset: 18.3 Lt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Hollow Stem Augering | COMPILED BY SN |
| DATUM Geodetic | DATE 16 January 2009 - 16 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | JOB NO. | TT93000 |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|----------------------|--------------------------------------------------------------------------------------------------------|------------|---------|------|------------|----------------------------|------------|-------------------------|---------------------------------------------|-----------------|----------|------------------------------------|-------------------------------------|-----------------------------------|-------------------------------|-----------------------------------------------------------------|-------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | WATER CONTENT (%) |
| | | | | | | | | | ○ UNCONFINED | + FIELD VANE | × | | | | | | |
| | | | | | | | | | ● QUICK TRIAXIAL | × | LAB VANE | | | | | | |
| 256.1 | | | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | | | |
| 0.0 | grey to brown SANDY SILT trace rootlets and wood fragments in SS2 very loose wet | | 1 | SS | 5 | | | 256 | | | | | | | | Ice and snow at ground surface to depth of about 0.5 m | |
| | | | 2 | SS | 2 | | 1 | 255 | | | | | | 43 | 50 | | |
| | | | 3 | SS | 7 | | 2 | 254 | | | | | | | 30 | | |
| 253.9 | grey CLAYEY SILT / SILTY CLAY very soft to firm moist | | 4 | SS | 0 | | 3 | 253 | | | | | | 40 | 0 | | |
| 2.1 | | | 5 | SS | 0 | | 4 | 252 | | | | | | 17 | 0 | 0 0 35 65 | |
| | | | 6 | SS | 0 | | 5 | 251 | | | | | | 16 | 0 | | |
| | | | 7 | SS | 0 | | 6 | 250 | | | | | | 33 | 10 | | |
| | | | 8 | SS | 0 | | 7 | 249 | | | | | | | | | |
| | | | 9 | SS | 0 | | 8 | 248 | | | | | | | | | |
| | | | 10 | SS | 0 | | 9 | 247 | | | | | | 17 | 25 | | |
| 247.4 | grey POSSIBLE SAND AND GRAVEL very dense | | 11 | SS | 50/13 | | | | | | | | | | | | |
| 8.7 | | | | | | | | | | | | | | | | | |
| 246.6 | End of Borehole Sand flowing significantly into augers preventing further augering. | | | | | | | | | | | | | | | | |
| 9.4 | | | | | | | | | | | | | | | | | |

Continued Next Page

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

| | | | |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------|--------|-------------------|
| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 19+050 Offset: 18.3 Lt | 2 OF 2 | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Hollow Stem Augering | | COMPILED BY SN |
| DATUM Geodetic | DATE 16 January 2009 - 16 January 2009 | | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | | | JOB NO. TT93000 |

[illegible]

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

RECORD OF BOREHOLE No BH 9

1 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 19+102 Offset: 16.8 Lt ORIGINATED BY SAL
 DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration COMPILED BY SN
 DATUM Geodetic DATE 14 January 2009 - 14 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|----------------------|------------------------------------------------------------------------------|------------|---------|------|------------|----------------------------|------------|----------------------|---------------------------------------------|--------------|------------------|------------------------------------|-------------------------------------|-----------------------------------|-------------------------------|---------------------------------------------------|-------------------|--|--|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● QUICK TRIAXIAL | | | | | | × LAB VANE | | |
| 255.9 | | | | | | | | 20 40 60 80 100 | | | | 10 20 30 | | | | | | | |
| 0.0 | black ORGANIC MATERIALS fibrous peat some wood fragments | | 1 | SS | 4 | | | | | | | | | 194 | 25 | | | | |
| | | | 2 | SS | 3 | | | | | | | | | 114 | 40 | | | | |
| 254.5 | grey SILTY SAND very loose wet | | 3 | SS | 0 | | | | | | | | | 39 | 60 | | | | |
| 253.8 | grey CLAYEY SILT / SILTY CLAY trace sand very soft to soft moist | | 4 | SS | 0 | | | | | | | | | 43 | 70 | | | | |
| | | | 5 | SS | 0 | | | | | | | 17 | | 43 50 | 15 | | | | |
| | | | 6 | SS | 0 | | | | | | | | | 52 | 0 | | | | |
| | | | 7 | SS | 0 | | | | | | | 17 | | 41 51 | 0 | | 0 1 39 60 | | |
| | | | 8 | SS | 0 | | | | | | | | | 39 | 0 | | | | |
| | | | 9 | SS | 0 | | | | | | | | | 37 | 0 | | | | |
| | | | 10 | TW | | | | | | | | | | | | | No recovery | | |
| | | | 11 | SS | 0 | | | | | | | | | 33 | 10 | | | | |
| 246.2 | End of Borehole | | | | | | | 246 | | | | | | | | | | | |
| 9.8 | | | | | | | | | | | | | | | | | | | |

Continued Next Page

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

| | | |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------|
| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 19+102 Offset: 16.8 Lt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration | COMPILED BY SN |
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| SOIL PROFILE | | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------|-------------|------------|--------|---------|------------|--------------------|----------------------------|------------|----------------------|---------------------------------------------|----------------|---|----------------|-------------------|--------------------------------------------------------|--|-----|------------------------|---------------------------------------------------|----|----|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | SHEAR STRENGTH kPa | | | | | W _P | W | W _L | WATER CONTENT (%) | | | PPM | | GR | SA | SI | CL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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RECORD OF BOREHOLE No BH 10

1 OF 2

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 DATUM Geodetic DATE 12 January 2009 - 13 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 255.8 | | | | | | | | | 20 | 40 | 60 | 80 | 100 | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Continued Next Page

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

RECORD OF BOREHOLE No BH 10

2 OF 2

| | | |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------|
| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 19+102 Offset: 13.3 Rt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration | COMPILED BY SN |
| DATUM Geodetic | DATE 12 January 2009 - 13 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | JOB NO. TT93000 | |

| SOIL PROFILE | | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
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| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 10.0 | End of Borehole Dynamic Cone Penetration Test (DCPT) was conducted below 10.1 m depth. | | | | | | | | | | | | | | | | | | |
| 244.7 | | | | | | | | | | | | | | | | | | | |
| 11.1 | End of DCPT Refusal to Dynamic Cone Penetration Test at 11.1 m depth Groundwater in open borehole on completion: 0.0 m Borehole was backfilled with bentonite at the completion of drilling. After backfilling, no groundwater seepage to the ground surface was visible. | | | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No BH 11

1 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 19+150 Offset: 14.7 Lt ORIGINATED BY SAL
 DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Hollow Stem Augering COMPILED BY SN
 DATUM Geodetic DATE 14 January 2009 - 14 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
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| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | | |
| | | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● QUICK TRIAXIAL | × LAB VANE | | | | | | |
| 256.5 | | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | yellowish brown SANDY SILT / SILTY SAND trace to some organics in SS1 very loose to compact wet | | 1 | SS | 3 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 13 | | 1 | 256 | | | | | | | 16 | | 60 | |
| | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 8 | | 2 | 255 | | | | | | | | | 25 | |
| 254.3 | | | | | | | | | | | | | | | | | | |
| 2.1 | grey CLAYEY SILT / SILTY CLAY trace sand very soft to firm moist | | 4 | SS | 0 | | 3 | 254 | | | | | | 15 | 25 | 34 | 20 | |
| | | | | | | | 4 | 253 | | | | | | | | | 0 | |
| | | | 5 | SS | 0 | | 5 | 252 | | | | | | | | | 0 | |
| | | | | | | | 6 | 251 | | | | | | | | | 0 | |
| | | | 6 | SS | 0 | | 7 | 250 | | | | | | | | | 0 | |
| | | | | | | | 8 | 249 | | | | | | | | | 0 | |
| | | | 7 | SS | 0 | | 9 | 248 | | | | | | | | | 0 | |
| | | | | | | | | | | | | | | | | | 0 | 0 5 71 25 |
| | | | 8 | SS | 0 | | | | | | | | | | | | | |
| | | | 9 | SS | 0 | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No BH 11

2 OF 2






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| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 19+150 Offset: 14.7 Lt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Hollow Stem Augering | COMPILED BY SN |
| DATUM Geodetic | DATE 14 January 2009 - 14 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | | JOB NO. TT93000 |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT | | | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | |
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| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | W _p | W | W _L | | GR | SA | SI | CL | |
| | | | | | | | | | ○ UNCONFINED | ● QUICK TRIAXIAL | + | × | FIELD VANE | LAB VANE | WATER CONTENT (%) | | | | | | | |
| | surface (artesian) during drilling. Borehole was backfilled with bentonite at the completion of drilling. After backfilling, no groundwater seepage to the ground surface was visible. | | | | | | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No BH 12

1 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 19+200 Offset: 17.2 Lt ORIGINATED BY SAL
 DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration COMPILED BY SN
 DATUM Geodetic DATE 14 January 2009 - 15 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
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| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● QUICK TRIAXIAL | × LAB VANE | | | | | | W _p | W | W _L |
| 257.7 | | | | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | PPM | GR SA SI CL | | |
| 0.0 | brown SILTY SAND some organics frozen |  | 1 | SS | 35 | | | | | | | | | | | | 55 | 35 | | |
| 257.0 | grey CLAYEY SILT / SILTY CLAY very soft to firm moist |  | 2 | SS | 4 | | | | | | | | | | | | | | No recovery | |
| 0.6 | | | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 3 | | | | | | | | | 17 | | 44 | 39 | 40 | | |
| | trace sand |  | 4 | SS | 0 | | | | | | | | | | | | | 25 | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 0 | | | | | | | | | 16 | 27 | 35 | 25 | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 0 | | | | | | | | | | | | | | No recovery | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 0 | | | | | | | | | | | | | 0 | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 0 | | | | | | | | | 17 | 29 | 33 | 0 | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | some sand |  | 9 | SS | 0 | | | | | | | | | | | | | 0 | | |
| | | | | | | | | | | | | | | | | | | | | |
| 250.7 | grey becoming reddish brown SAND trace gravel and silt compact wet |  | | | | | | | | | | | | | | | | | | |
| 7.0 | | | 10 | SS | 23 | | | | | | | | | | | 24 | 0 | | | |
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+ 3, X 3: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No BH 12

2 OF 2

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| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 19+200 Offset: 17.2 Lt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Hollow Stem Augering and Dynamic Cone Penetration | COMPILED BY SN |
| DATUM Geodetic | DATE 14 January 2009 - 15 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | | JOB NO. TT93000 |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------------|-------------|------------|---------|------|------------|----------------------------|------------|----------------------|---------------------------------------------|----|----|----|------------------------------------|-------------------------------------|-----------------------------------|-------------------------------|---------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | |
| | | | | | | | | | 20 | 40 | 60 | 80 | | | | | |
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| G.W.P. <u>6057-07-00</u> | LOCATION <u>HWY 11/17 - Station: 19+176 Offset: 18.8 Lt</u> | ORIGINATED BY <u>SAL</u> |
| DIST <u>Thunder Bay HWY 11/17</u> | BOREHOLE TYPE <u>Dynamic Cone Penetration</u> | COMPILED BY <u>SN</u> |
| DATUM <u>Geodetic</u> | DATE <u>13 January 2009 - 13 January 2009</u> | CHECKED BY <u>PB</u> |
| PROJECT <u>Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon</u> | | JOB NO. <u>TT93000</u> |

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

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

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| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 19+129 Offset: 15.9 Lt | 1 OF 2 | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Dynamic Cone Penetration | | COMPILED BY SN |
| DATUM Geodetic | DATE 13 January 2009 - 13 January 2009 | | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | | | JOB NO. TT93000 |

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

RECORD OF BOREHOLE No DCPT 2

2 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 19+129 Offset: 15.9 Lt ORIGINATED BY SAL
DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Dynamic Cone Penetration COMPILED BY SN
DATUM Geodetic DATE 13 January 2009 - 13 January 2009 CHECKED BY PB
PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------------|-------------------------------------------------------------|------------|---------|------|------------|----------------------------|----------------|--------------------------|---------------------------------------------|---|------------|------------------|----------------------------------------|-----------------------------------------|---------------------------------------|-----------------------------------|---------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | |
| | | | | | | | | | ○ UNCONFINED | + | FIELD VANE | ● QUICK TRIAXIAL | | | | | |
| 246.3 | | | | | | | | | | | | | | | | | GR SA SI CL |
| 10.1 | End of DCPT | | | | | | | | | | | | | | | | blows/3" at 10.1 m depth |
| | Refusal to Dynamic Cone Penetration Test at 10.1 m depth | | | | | | | 246 | | | | | | | | | |

RECORD OF BOREHOLE No DCPT 3

1 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 19+070 Offset: 16.4 Lt ORIGINATED BY SAL
 DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Dynamic Cone Penetration COMPILED BY SN
 DATUM Geodetic DATE 16 January 2009 - 16 January 2009 CHECKED BY PB
 PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | SOIL VAPOUR READING PPM | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|----------------------|--------------------------------------------------------------------------|------------|--------|------|-------------------------|------------|----------------------|----------------------------------------------------------|--------------------|---------------------------------|-------------------------------|--------------------------------|----------------------------|------------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | | "N" VALUES | SHEAR STRENGTH kPa | | | | | |
| 256.2 | Dynamic Cone Penetration Test (DCPT) was conducted below ground surface. | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| 0.0 | | | | | | 256 | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No DCPT 3

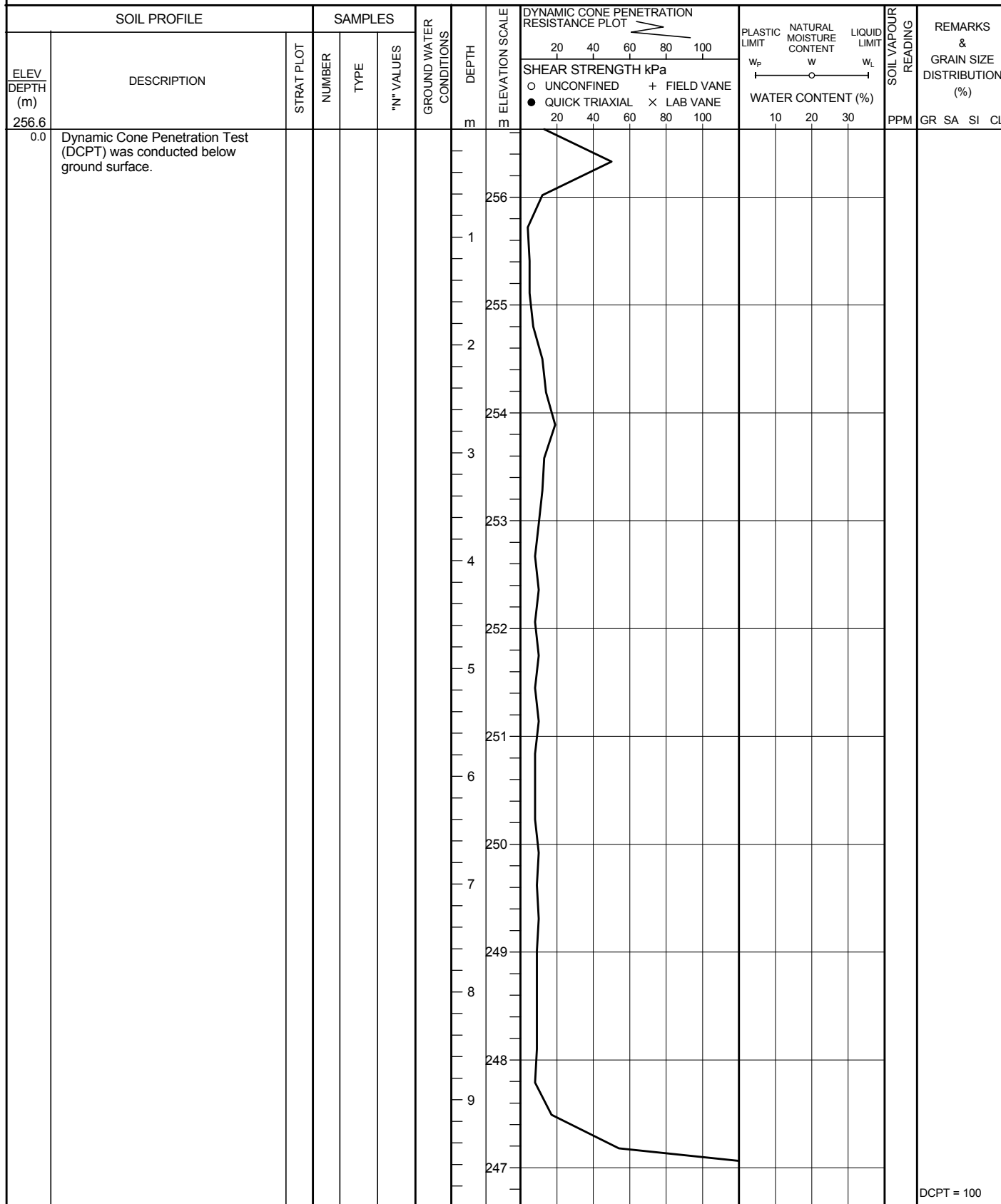
2 OF 2

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|-------------------------------------------------------------------------------------------------|------------------------------------------------------|-------------------|
| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 19+070 Offset: 16.4 Lt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Dynamic Cone Penetration | COMPILED BY SN |
| DATUM Geodetic | DATE 16 January 2009 - 16 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | | JOB NO. TT93000 |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | <div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div><div><div></div><div></div></div><div>20406080100</div></div> <div>SHEAR STRENGTH kPa</div> <div><div>○ UNCONFINED</div><div>● QUICK TRIAXIAL</div><div>+ FIELD VANE</div><div>× LAB VANE</div></div> <div>20406080100</div> | <div>PLASTIC LIMIT</div> <div>NATURAL MOISTURE CONTENT</div> <div>LIQUID LIMIT</div> <div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></d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+³, ×³: Numbers refer to Sensitivity ○^{3%} STRAIN AT FAILURE

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| G.W.P. <u>6057-07-00</u> | LOCATION <u>HWY 11/17 - Station: 18+999 Offset: 20.0 Lt</u> | ORIGINATED BY <u>SAL</u> |
| DIST <u>Thunder Bay</u> , <u>HWY 11/17</u> | BOREHOLE TYPE <u>Dynamic Cone Penetration</u> | COMPILED BY <u>SN</u> |
| DATUM <u>Geodetic</u> | DATE <u>17 January 2009 - 17 January 2009</u> | CHECKED BY <u>PB</u> |
| PROJECT <u>Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon</u> | | JOB NO. <u>TT93000</u> |



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

RECORD OF BOREHOLE No DCPT 5

2 OF 2

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| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 18+999 Offset: 20.0 Lt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Dynamic Cone Penetration | COMPILED BY SN |
| DATUM Geodetic | DATE 17 January 2009 - 17 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | | JOB NO. TT93000 |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------------|-------------------------------------------------------------|------------|---------|------|------------|----------------------------|------------|----------------------|---------------------------------------------|----|----|----|------------------------------------|-------------------------------------|-----------------------------------|------------------------|---------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | SHEAR STRENGTH kPa | | | | | | | | |
| | | | | | | | | | 20 | 40 | 60 | 80 | | | | | |
| | | | | | | | | | | | | | | | | | |
| 246.5 | | | | | | | | | | | | | | | | | |
| 10.2 | End of DCPT | | | | | | | | | | | | | | | | |
| | Refusal to Dynamic Cone Penetration Test at 10.2 m depth | | | | | | | 246 | | | | | | | | | blows/4" at 10.1 m depth |
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| G.W.P. 6057-07-00 | LOCATION HWY 11/17 - Station: 18+963 Offset: 20.6 Lt | ORIGINATED BY SAL |
| DIST Thunder Bay HWY 11/17 | BOREHOLE TYPE Dynamic Cone Penetration | COMPILED BY SN |
| DATUM Geodetic | DATE 17 January 2009 - 17 January 2009 | CHECKED BY PB |
| PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon | | JOB NO. TT93000 |

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

RECORD OF BOREHOLE No DCPT 6

2 OF 2

G.W.P. 6057-07-00 LOCATION HWY 11/17 - Station: 18+963 Offset: 20.6 Lt ORIGINATED BY SAL
DIST Thunder Bay HWY 11/17 BOREHOLE TYPE Dynamic Cone Penetration COMPILED BY SN
DATUM Geodetic DATE 17 January 2009 - 17 January 2009 CHECKED BY PB
PROJECT Highway 11/17, Proposed Westbound Passing Lane at Golf Course Road, Township of Nipigon JOB NO. TT93000

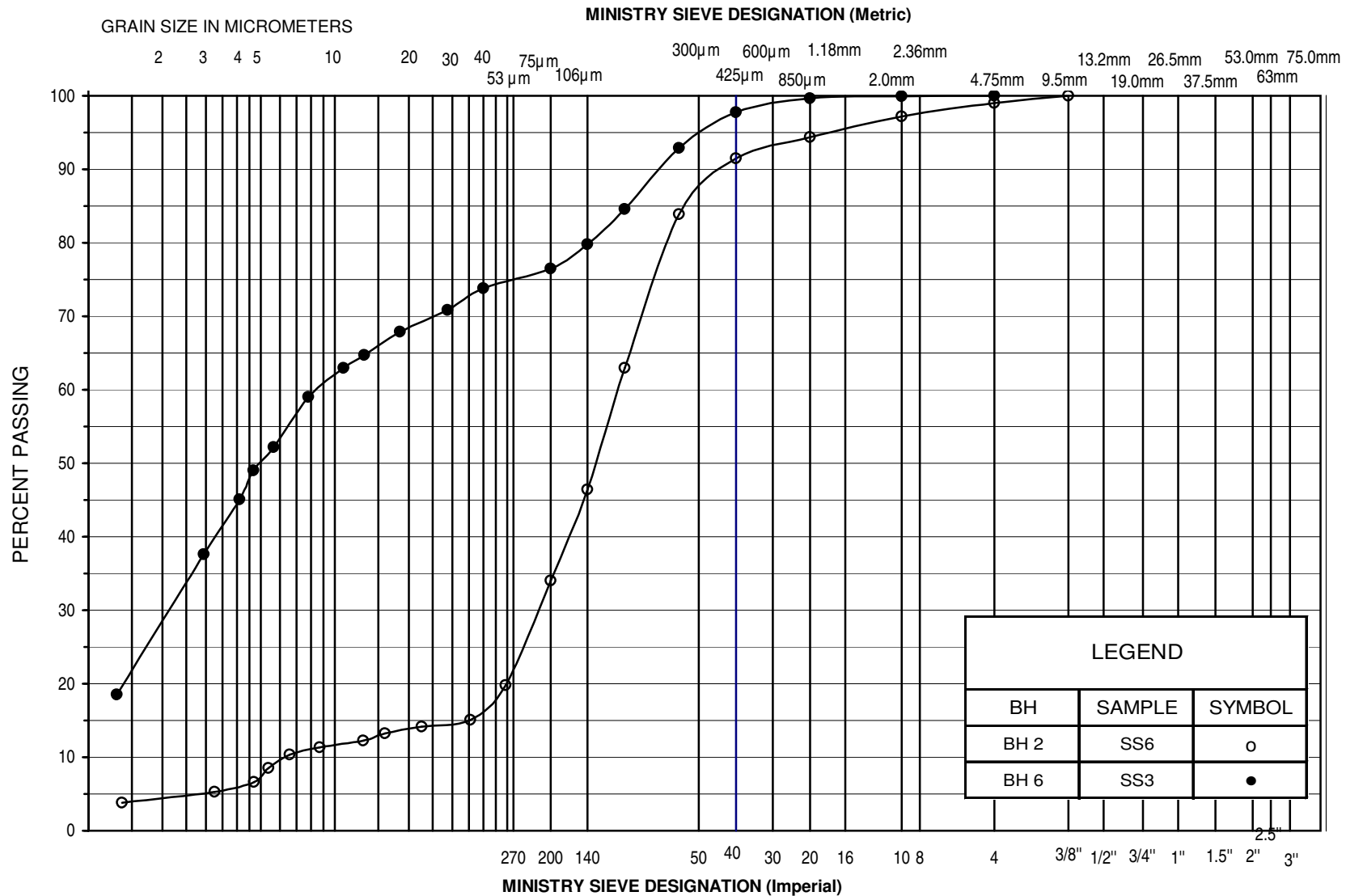
| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | DEPTH m | ELEVATION SCALE m | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | SOIL VAPOUR READING | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------------|------------------------------------------------------------------------------------|------------|--------|------|----------------------------|------------|----------------------|---------------------------------------------|--------------------|--|--|--|--------------------------------------------------------------|-------------------|--|------------------------|---------------------------------------------------|
| ELEV DEPTH (m) | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | | "N" VALUES | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 10.0 | End of DCPT Refusal to Dynamic Cone Penetration Test at 10.0 m depth | | | | | | | | | | | | | | | | |

APPENDIX B

LABORATORY TEST RESULTS

UNIFIED SOIL CLASSIFICATION SYSTEM

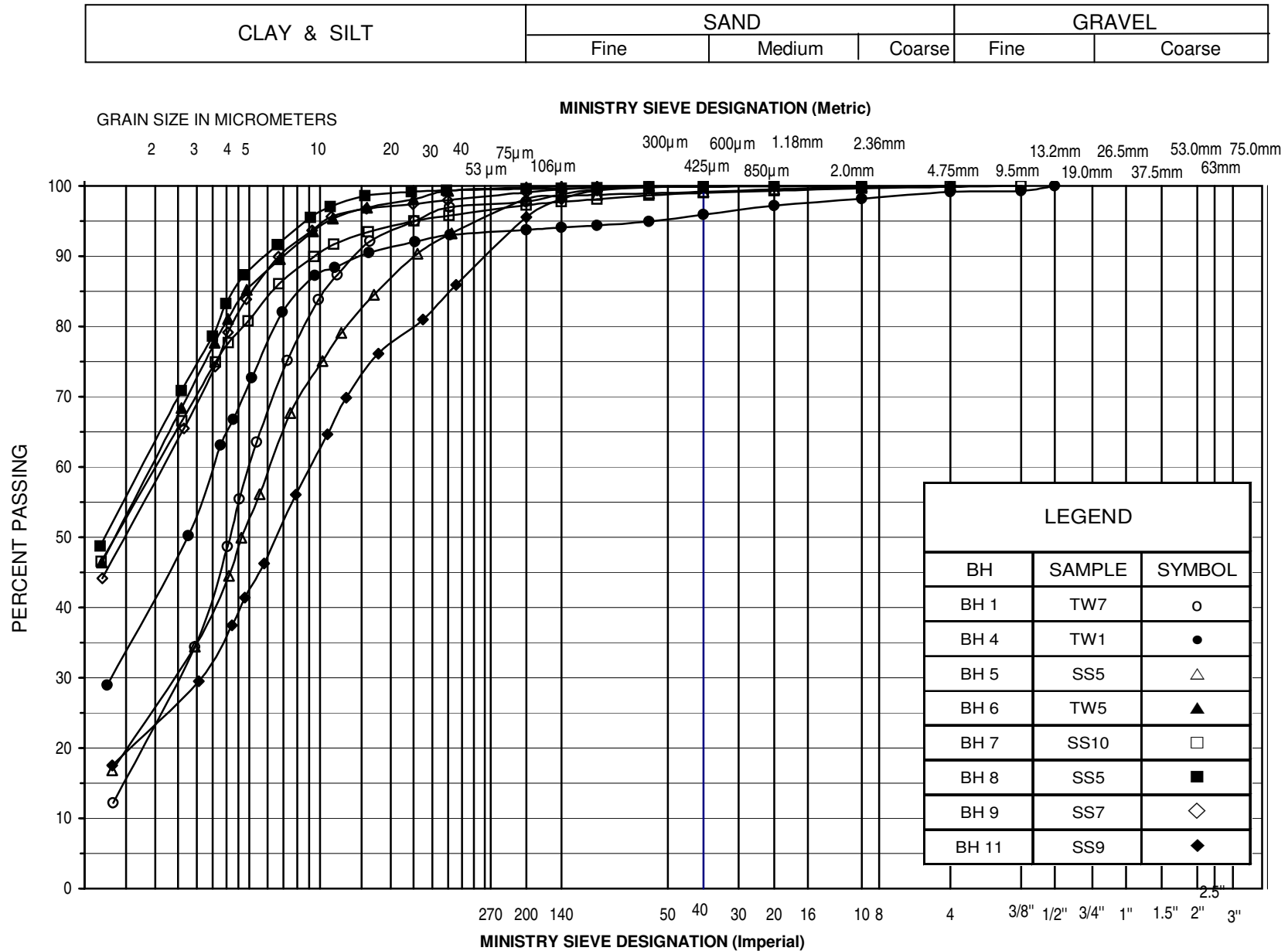
| CLAY & SILT | SAND | | | GRAVEL | |
|-------------|------|--------|--------|--------|--------|
| | Fine | Medium | Coarse | Fine | Coarse |



GRAIN SIZE DISTRIBUTION
SANDY SILT / SILTY SAND
trace to some clay, trace gravel

FIG. NO. B1
CA # 6008-E-0027
Hwy. 11/ 17 Twp. Nipigon

UNIFIED SOIL CLASSIFICATION SYSTEM



UNIFIED SOIL CLASSIFICATION SYSTEM

| CLAY & SILT | SAND | | | GRAVEL | |
|-------------|------|--------|--------|--------|--------|
| | Fine | Medium | Coarse | Fine | Coarse |

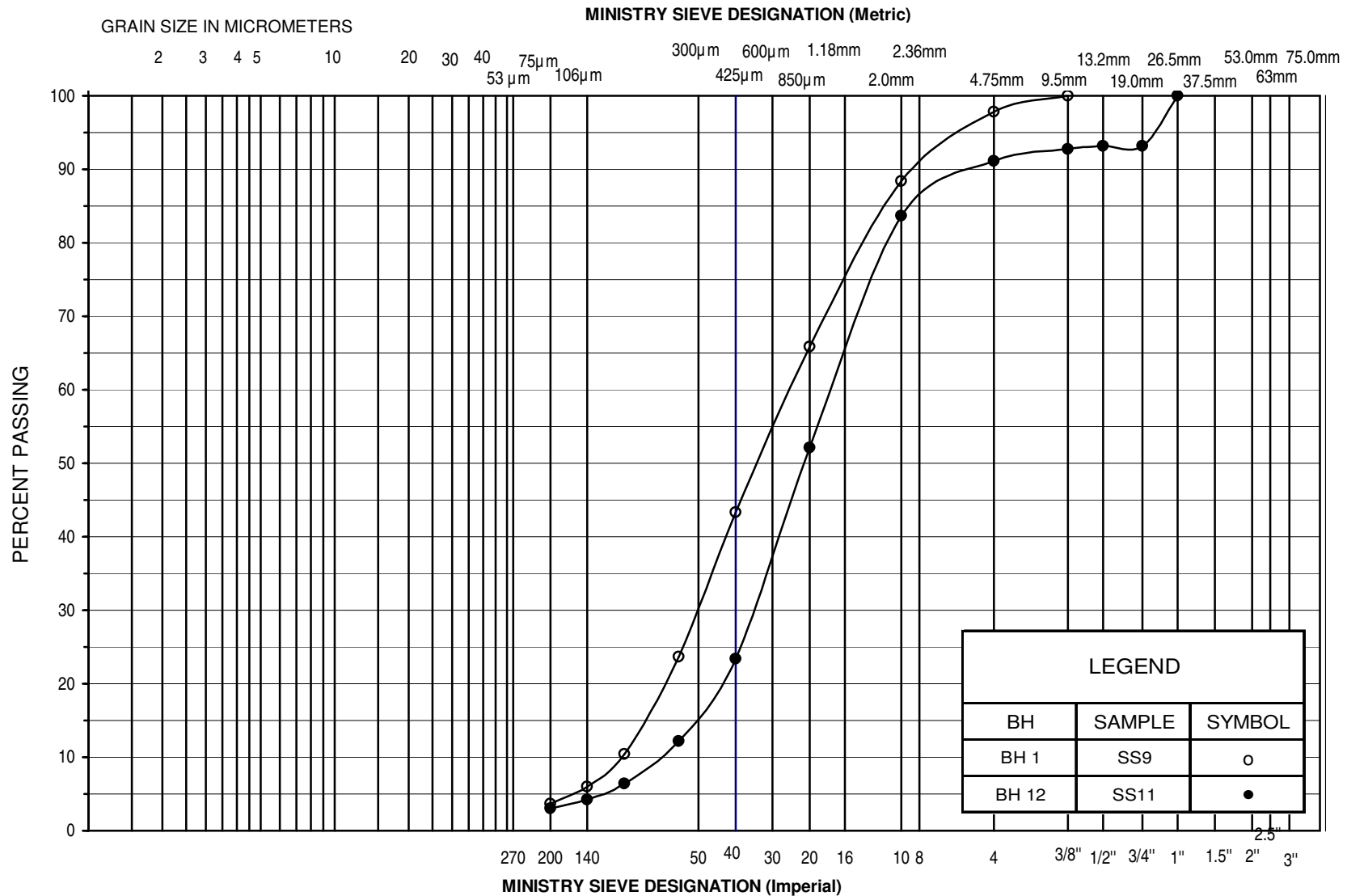
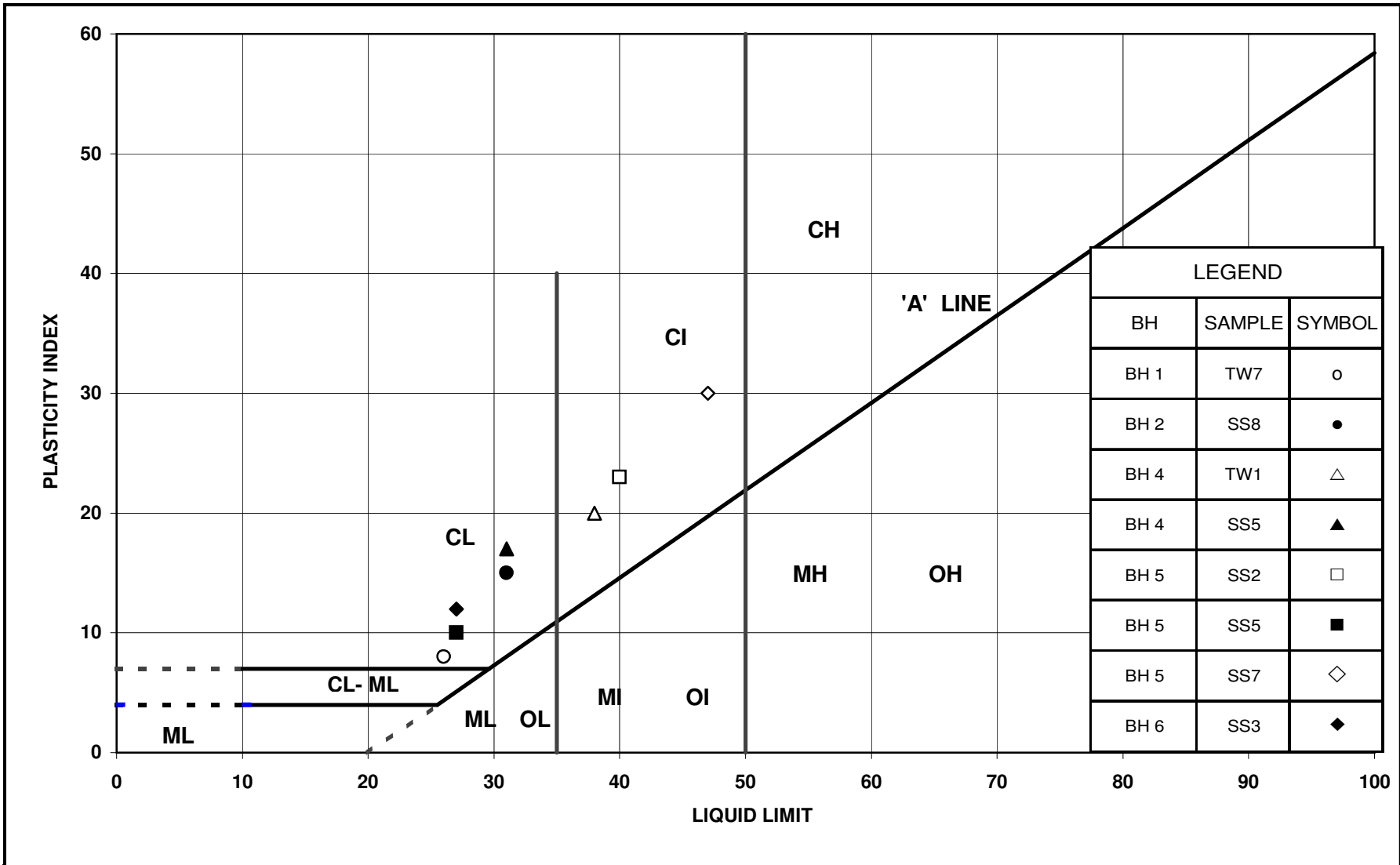
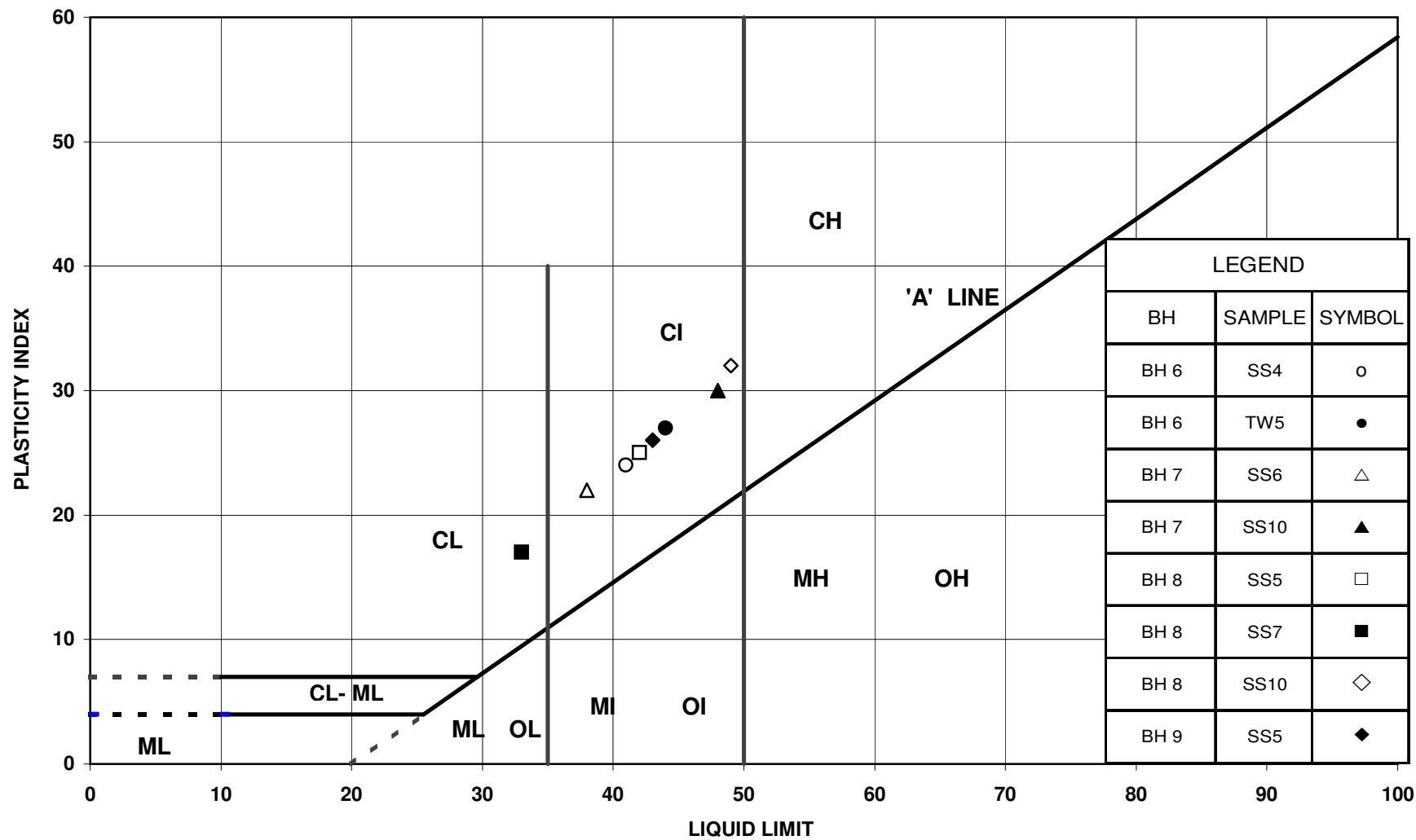


FIG. NO. B3
CA # 6008-E-0027
Hwy. 11/ 17 Twp. Nipigon



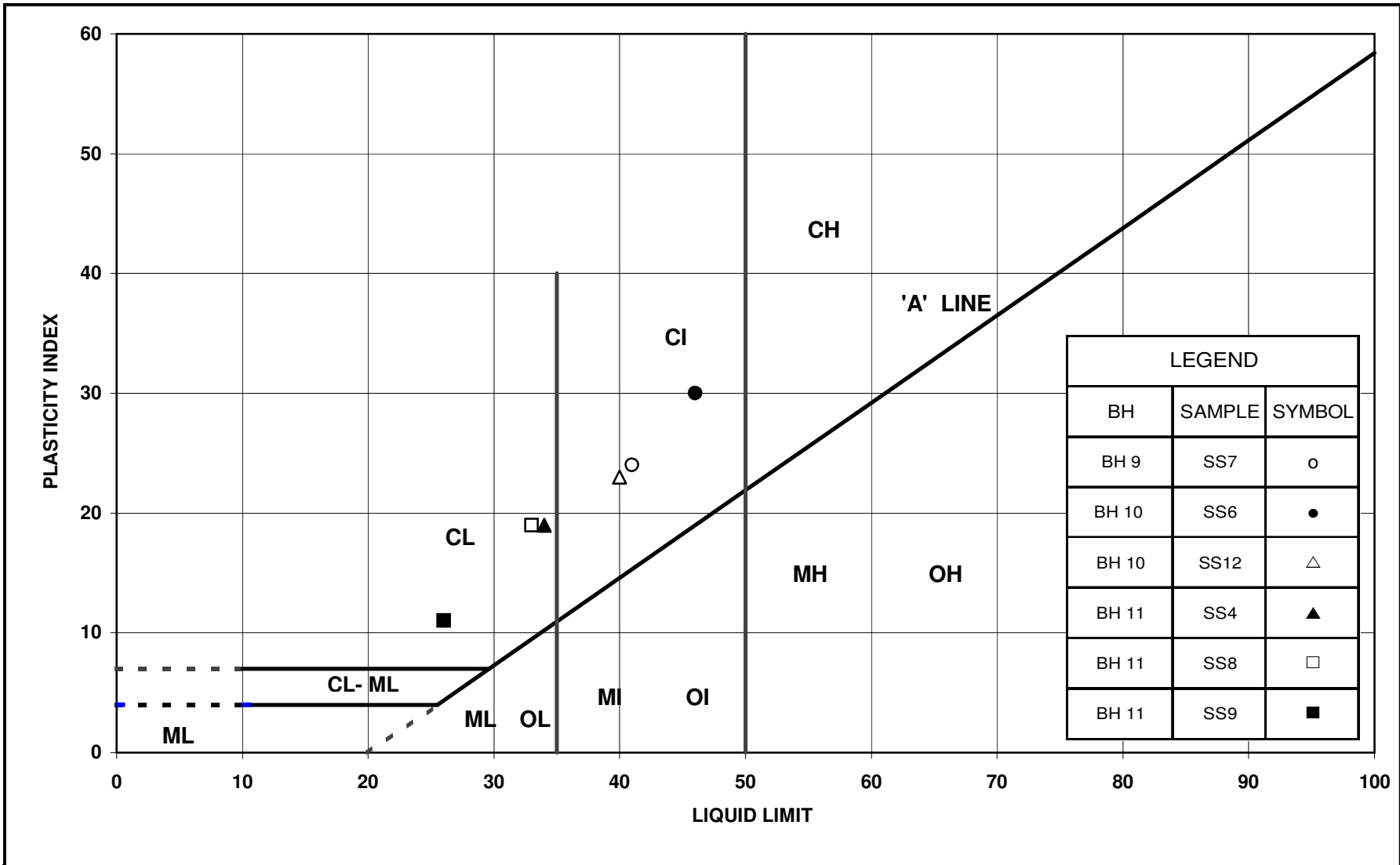


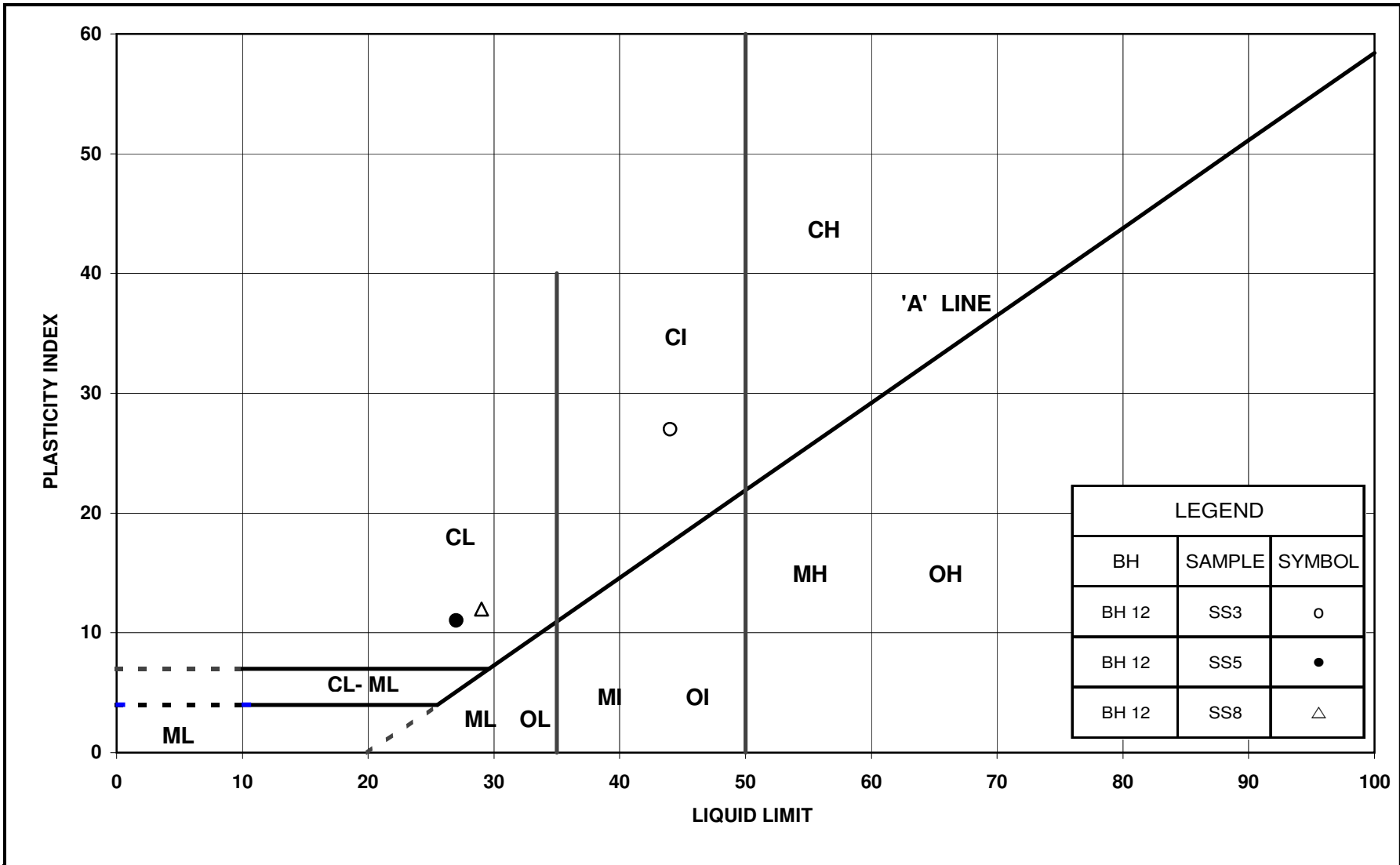
PLASTICITY CHART

FIG No. B5

CA # 6008-E-0027

Hwy. 11/ 17 Twp. Nipigon





ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **Proposed New Westbound Passing Lane Swamp Crossings**
 Client: **Ministry of Transportation**
 Date: **30-Jan-09**

Job No.: **TT93000**

Sample ID: **BH 1 - TW7**

Depth(m): **4.6 - 5.2**

σ'_v versus e and c_v

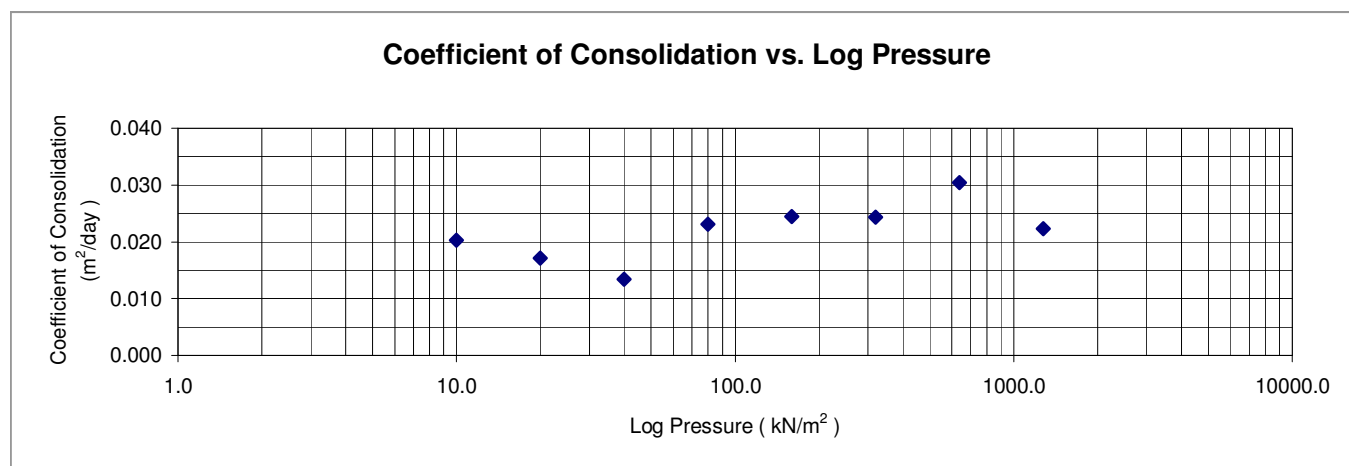
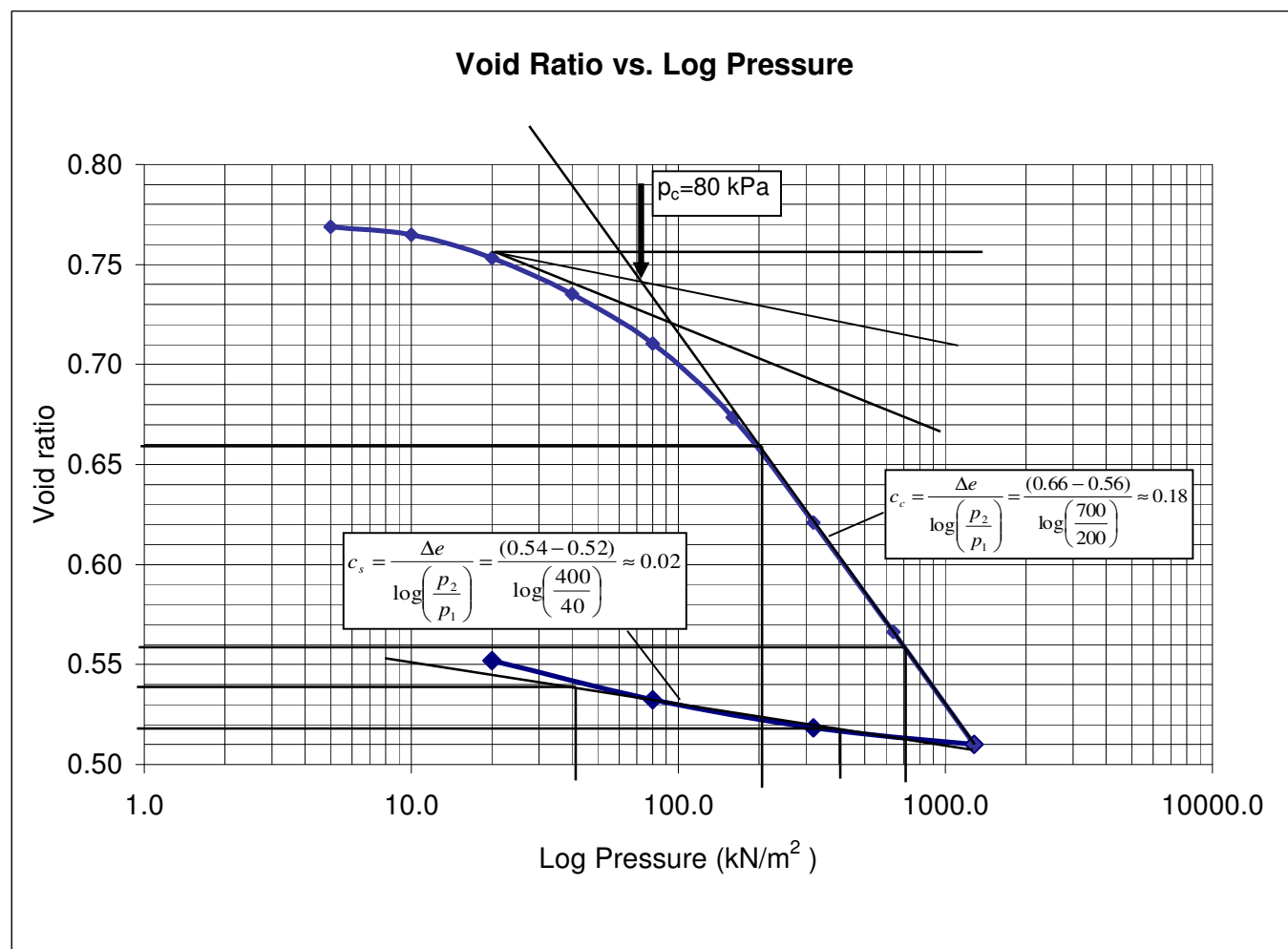


Figure B8

ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **Proposed New Westbound Passing Lane Swamp Crossings**
 Client: **Ministry of Transportation**
 Date: **30-Jan-09**

Job No.: **TT93000**

Sample ID: **BH 6 - TW5**

Depth(m): **3.1 - 3.7**

σ'_v versus e and c_v

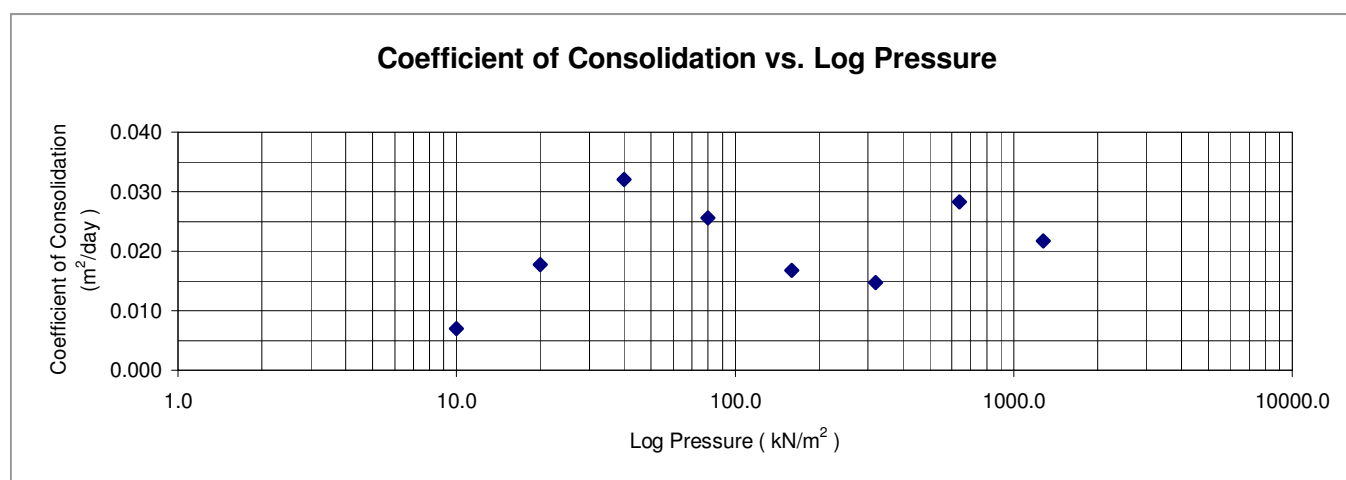
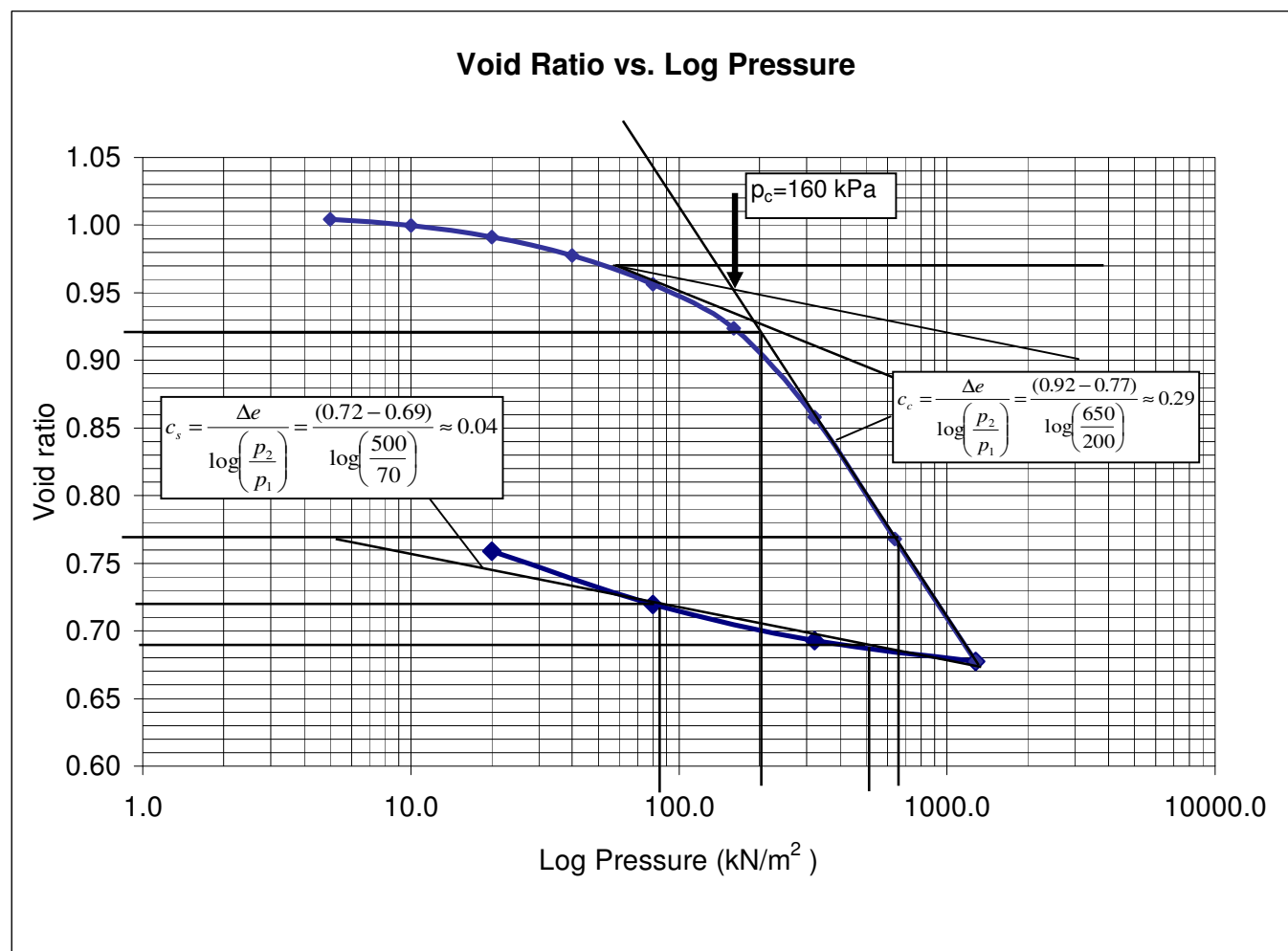
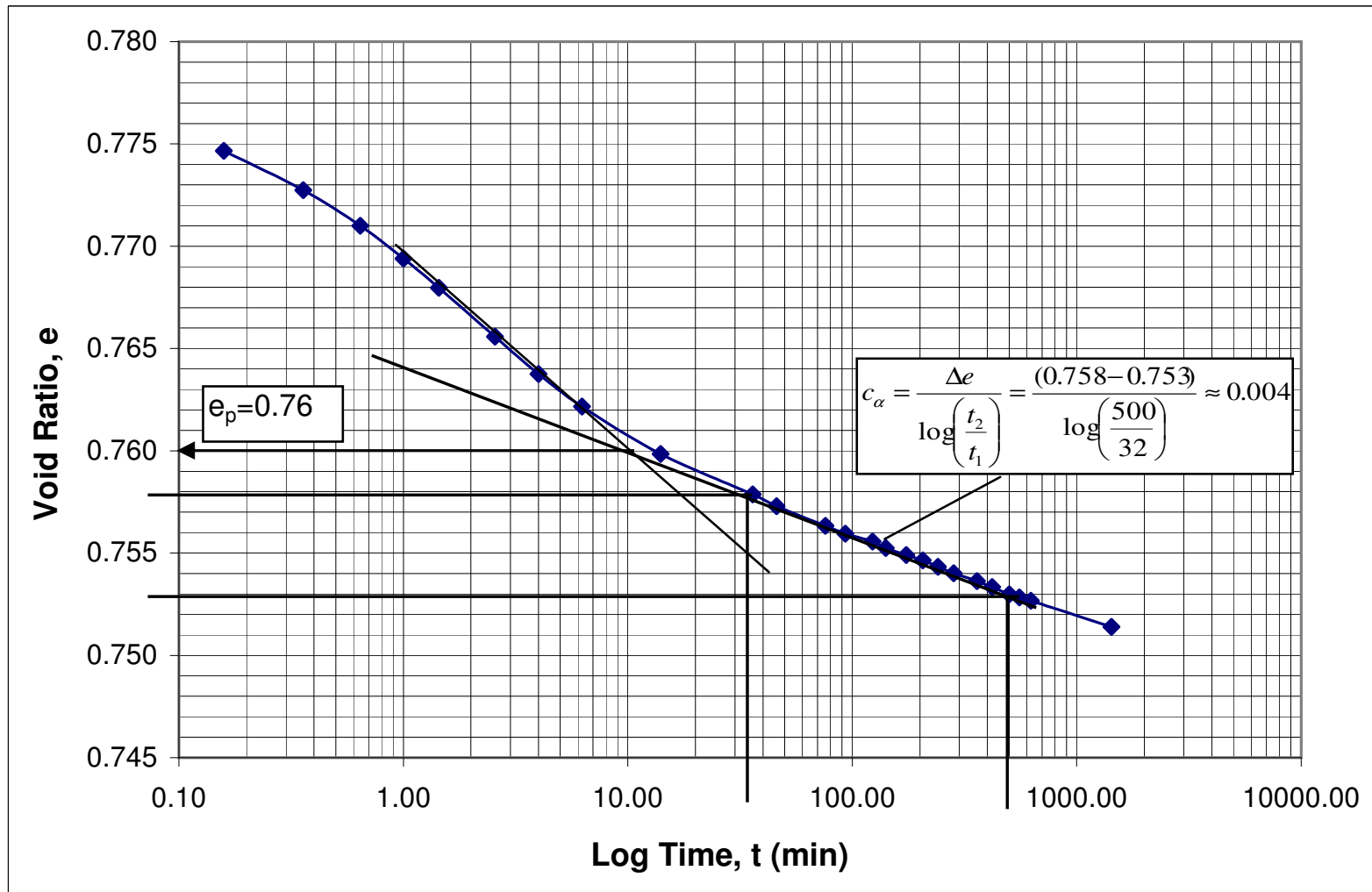
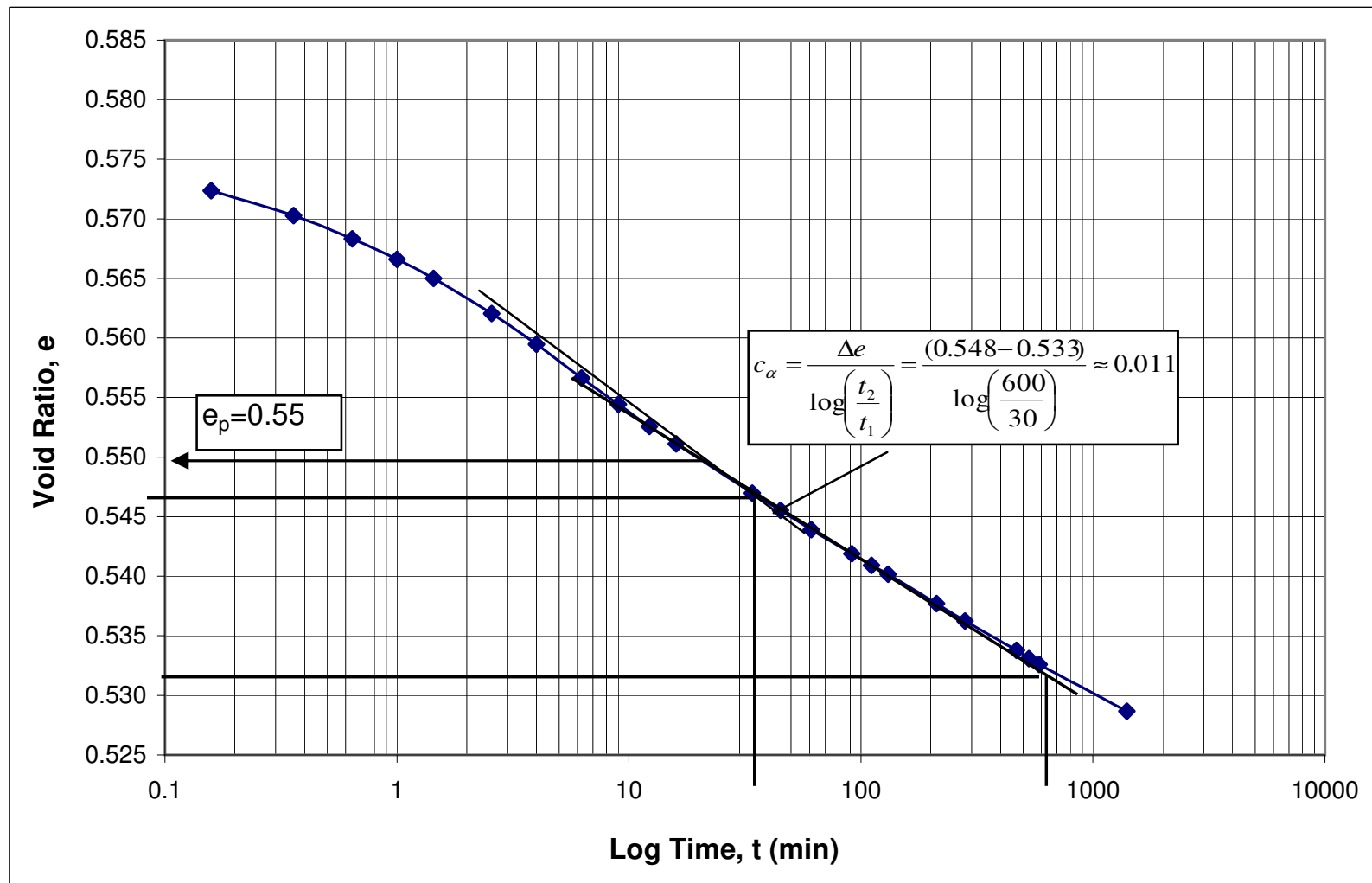


Figure B9





Client: AMEC Earth and Environmental,
a division of AMEC Americas Limited
104 Crockford Boulevard
Scarborough, Ontario M1R 3C3

Report Date: February 12, 2009
Received Date: February 05, 2009

Page: 1 of 2

Project Name: Foundation Engineering for HWY 11/17 TWP Nipigon

Sample Type: Soil

Project Number: TT 93000

Lab Ref.: FN09-238

Contact: Siva Nadarajah

Final

CERTIFICATE OF ANALYSIS

Corrosivity Package

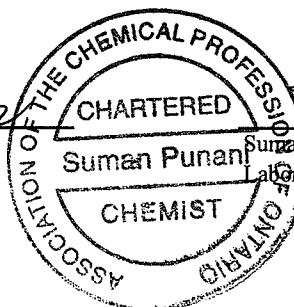
| Lab Number | | | 09-1692 | 09-1692 |
|----------------|----------|-----|---------|-------------|
| Sample ID | | | BH9 SS6 | BH9 SS6 |
| Date Collected | | | NP | NP |
| Parameters | Unit | MDL | | (Replicate) |
| Chloride | (µg/g) | 1 | 6 | 6 |
| pH | - | - | 7.7 | NR |
| Resistivity | (ohmscm) | - | 4650 | NR |
| Sulphate | (µg/g) | 1 | 26 | 26 |

| | | | Lab Blank | Q. C. Standard Actual | Q. C. Standard Expected | Date of Analysis |
|-------------|----------|-----|-----------|-----------------------|-------------------------|------------------|
| | | | (µg/g) | (mg/L) | (mg/L) | |
| Parameters | Unit | MDL | | | | |
| Chloride | (µg/g) | 1 | <1 | 3.9 | 4.2 | 09-Feb-09 |
| pH | - | - | 7.1 | 6.0 | 6.0 | 10-Feb-09 |
| Resistivity | (ohmscm) | - | - | - | - | 10-Feb-09 |
| Sulphate | (µg/g) | 1 | <1 | 22.6 | 24.0 | 09-Feb-09 |

| | | | Method References |
|-------------|----------|-----|-----------------------|
| Parameters | Unit | MDL | |
| Chloride | (µg/g) | 1 | MOE 3013, APHA 4110 C |
| pH | - | - | MOE 9045 |
| Resistivity | (ohmscm) | - | MOE 3137 |
| Sulphate | (µg/g) | 1 | MOE 3013, APHA 4110 C |

AMEC Earth & Environmental,
a division of AMEC Americas Limited
160 Traders Blvd East Unit 4
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www.amec.com

Cynthia Ridge, C. Chem.
Q.A./Q.C. Officer



Suman Punani, C. Chem.
Laboratory Manager

~ GENERAL COMMENTS ~

| | |
|------------|---------------------------|
| MDL | Method Detection Limit |
| RDL | Reporting Detection Limit |
| ANR | Analysis not required |
| NA | Analysis not applicable |
| NP | Not Provided |
| NR | No Lab Replicate |

Result in (brackets) represents Lab Replicate.
Results relate only to the items tested.

APPENDIX C

SITE PHOTOGRAPHS



Photo No. 1 General view of Hwy 11/17 looking west from east end of project area (Sta.19+200).



Photo No. 2 General view of Hwy 11/17 looking east from west end of project area (Sta.18+700)



Photo No. 3 General View of embankment looking east from BH 9 (Sta. 19+100).



Photo No. 4 General View of embankment looking west from BH 8 (Sta. 19+050).



Photo No. 5 General View of north side of the culvert at Sta. 18+730, looking east. (Boreholes BH1 and BH 3). Arrows indicate direction of creek.



Photo No. 6 General View of south side of the culvert at Sta. 18+730, looking south. (Boreholes BH 2). Arrows indicate direction of creek.



Photo No. 7 General View of north side of the culvert at Sta. 19+102, looking north.
(Boreholes BH 9).



Photo No. 8 General View of south side of the culvert at Sta. 19+102, looking south.
(Boreholes BH 10).



Photo No. 9 General view of existing asphalt road surface, looking west from Sta. 19+200.



Photo No. 10 Typical view of existing asphalt road surface.

APPENDIX D

**RESULTS OF PREVIOUS INVESTIGATIONS
(1972, 2002 & 2008)
(Provided by Ministry of Transportation)**

WP 6057-07-00 - Hwy 11/17, WBPL in vicinity of Golf Course Rd near Nipigon

Township Red Rock

Station 18+718 16.0 Rt D-2.4

0 - 100 Tps
100 - 900 Br F Sa with Si Tr Gr Occ Cob & Bld
900 NFP Bld *

Station 18+720 18.0 Lt D-4.5

0 - 1.6 Blk Org
1.6 NFP RF *

Station 18+727 18.0 Lt D-4.5

0 - 2.0 Wat
2.0 - 3.9 Blk Org (soft)
3.9 - 6.8 Br Sa(y) Si (firm with soft layers)
6.8 - 7.7 Gry Si(y) Cl (wet) (firm)
7.7 - 9.0 Gry Si(y) Cl Occ Cob (wet) (firm)
9.0 NFP Bld Poss BR *

Station 18+732 17.0 Rt D-3.6

0 - 300 Wat
300 - 700 Br F Sa with Sa Gr & Tps mixed (loose)
700 - 2.1 Blk Org (wet) (soft)
2.1 - 3.1 Gry Si(y) Cl (wet) (soft)
3.1 - 3.6 Gry Sa(y) Si (wet) (comp)

Station 18+746 17.0 Rt D-2.5

0 - 100 Tps
100 - 700 RF
700 - 900 Br F Sa with Si Tr Gr Occ Cob & Bld
900 NFP Bld *

Station 18+747 18.0 Lt D-4.6

0 - 100 Wat
100 - 3.0 Blk Org
3.0 - 3.9 Gry Si(y) Cl (moist) (stiff)
3.9 - 4.5 Gry Sa(y) Si (wet) (comp)
4.5 - 4.6 Gry Si(y) Sa with Gr (comp)
4.6 NFP Bld Poss BR *

Station 18+765 15.0 Lt D-1.7

0 BR on Surf (bottom of vertical face)

Station 18+825 12.0 Rt

0 - 60 Tps
60 - 3.4 Br F - M Sa some Gr Tr Si Occ Bld (wet @ 2.0)

Station 18+825 12.0 Rt @ 1.0 m

% Passing 4.75 mm 73.6%
% Passing 75 µm 9.7%
FMC 6.2%
LSFH
GS SW-SM

Not Acceptable for Granular 'B'

Station 18+825 12.0 Rt @ 2.0 m

% Passing 4.75 mm 85.0%
% Passing 75 µm 15.2%
FMC 15.7%
LSFH
GS SM

Not Acceptable for Granular 'B'

Station 18+825 12.0 Rt @ 3.0 m

% Passing 4.75 mm 78.9%
% Passing 75 µm 13.2%
FMC 15.8%
LSFH
GS SM

Not Acceptable for Granular 'B'

Station 18+825 37.0 Lt D-6.0

0 - 300 Tps (wat @ surf) (soft)
300 - 1.5 Br Si(y) Cl (moist) (stiff)

Station 18+850 12.5 Lt D-3.0

0 - 600 Tps
600 - 300 Br F - M Sa some Gr Tr Si Occ Bld
300 NFP RF *

Station 18+875 12.0 Lt

0 - 60 Tps
60 - 1.7 Br F - M Sa some Gr Tr Si Occ Bld
1.7 NFP Prob RF *

Station 18+875 17.0 Lt D-3.0

0 - 60 Tps
60 - 500 Br F - M Sa some Gr Tr Si Occ Cob
500 NFP RF *

WP 6057-07-00 - Hwy 11/17, WBPL in vicinity of Golf Course Rd near Nipigon

Township Red Rock

Station 18+875 19.0 Lt D-3.5

0 - 60 Tps
60 - 1.5 Br F - M Sa some Gr Tr Si Occ
Bld
1.5 NFP RF *

Station 18+875 19.0 Lt @ 1.0 m

% Passing 4.75 mm 59.7%
% Passing 75 µm 5.6%
FMC 5.2%
LSFH
GS SP-SM
Acceptable for Granular 'B'

Station 18+875 33.0 Lt D-5.1

0 - 1.1 Blk Org (wat @ surf) (soft)
1.1 - 2.0 Br Si(y) Cl (moist) (stiff)

Station 18+900 14.0 Lt D-2.8

0 - 160 Tps
160 - 1.0 Br F - M Sa some Gr Tr Si Occ
Bld
1.0 NFP RF *

Station 18+900 33.0 Lt @ 1.0 m

% Passing 4.75 mm 84.4%
% Passing 75 µm 5.9%
FMC 5.8%
LSFH
GS SW-SM
Acceptable for Granular 'B'

Station 18+925 11.0 Lt

0 - 60 Tps
60 - 750 Br F - M Sa some Gr Tr Si Occ
Bld
750 NFP RF *

Station 18+935 20 Lt

East End of RF Berm

Station 18+950 11.0 Lt D-2.8

0 - 60 Tps
60 - 500 Br F - M Sa some Gr Tr Si Occ
Bld
500 NFP RF *

Station 18+950 21.0 Lt D-4.5

0 - 1.5 Blk Org (wat @ surf) (soft)

Station 18+975 20.0 Lt D-3.7

0 - 1.1 Blk Org (standing wat on surf)
1.1 - 4.1 Gry Si(y) Cl (soft & wet) (wet @
firm @ 1.9) (moist @ stiff @ 3.1)

Station 19+000 16.0 Lt D-2.9

0 - 900 Blk Org (standing wat on surf)
900 - 2.5 Gry Si(y) Cl (soft) (wet) (firm @
1.5) (stiff @ 2.3)
2.5 - 2.8 Gry Sa(y) Si (wet) (comp)

Station 19+025 16.0 Lt D-2.8

0 - 1.0 Blk Org (standing wat on surf)
1.0 - 2.1 Gry Si(y) Cl (wet) (soft) (moist @
stiff @ 1.3)

Station 19+050 19.0 Lt D-2.7

0 - 300 Wat
300 - 600 Blk Org (wet) (soft)
600 - 2.0 Gry Si(y) Cl (moist) (stiff)

Station 19+075 18.0 Lt D-2.7

0 - 700 Wat
700 - 1.3 Blk Org (soft) (wet)
1.3 - 2.3 Gry Si(y) Cl (wet) (soft) (firm @
1.4)

Station 19+100 18.0 Lt D-2.6

0 - 50 Wat
50 - 200 Tps & Si(y) Sa
200 - 1.3 Br F Sa with Si & comp layers of
Si (wet) (loose)
1.3 - 3.2 Gry Si(y) Cl (moist) (firm) (soft @
2.0) (stiff @ 2.2)

Station 19+125 19.0 Lt D-2.3

0 - 150 Tps (wat @ surf)
150 - 1.3 Br F Sa with Si Occ Gr (wet)
(comp)
1.3 - 1.7 Gry Si(y) Sa Tr Cl (wet) (firm)
1.7 - 2.0 Br Si(y) Cl (moist) (stiff)

Station 19+150 19.0 Lt D-2.1

0 - 50 Wat
50 - 150 Tps & Sa with Si
150 - 1.2 Br F Sa with Si Occ Gr (wet)
(comp)
1.2 - 1.6 Br Si(y) Sa Occ Gr
1.6 NFP Cob *

WP 6057-07-00 - Hwy 11/17, WBPL in vicinity of Golf Course Rd near Nipigon

Township Red Rock

Station 19+175 15.0 Lt D-2.1

0 - 150 Tps & Sa
150 - 400 Br F Sa with Si Occ Gr (wet)
(comp)
400 - 550 Br Si(y) Cl Tr Sa mixed (moist)
(stiff)
550 - 1.5 Br F Sa with Si Occ Gr (wet)
(comp)

Station 19+175 18 Lt D-2.1

0 - 50 Wat
50 - 250 Org Tps (soft) (wet)
250 - 2.0 Br F Sa with Si Occ Gr (wet)
(comp)

Station 19+200 16.0 Lt D-2.7

0 - 150 Tps & Sa
150 - 900 Br F Sa with Si Tr Gr Cob & Bld
(wet)
900 - 1.1 Blk Org (wet) (soft)
1.1 - 2.0 Br Si(y) Cl (moist) (stiff)

Station 19+225 18.0 Lt D-2.6

0 - 100 Tps
100 - 800 Br F Sa with Si Tr Gr Cob & Bld
(wet) (wat @ 200)
800 - 1.5 Br Si(y) Cl (moist) (stiff)

* 3 Attempts made within 1 m, no further
penetration possible.

HIGHWAY 11 & 17
TWP. NIPIGONStation 18+700 12.0 Rt (D-1.6)

0 - 100 Tps
 100 - 400 Br F-Co Sa (Moist)
 400 NFP Sh Rk

Station 18+702 17.0 Lt (D-2.7)

0 - 75 Tps
 75 - 700 Br F-Co Sa Occ Gr with Blds &
 Sh Rk
 700 NFP Sh Rk

Station 18+729 4.2 Lt (Culv)

0 - 30 CM
 30 - 300 Cr Gr
 300 - 900 Br F-Co Sa Tr Si Occ Gr (Moist)
 900 - 1.2 Rk Fill
 1.2 NFP Rk Fill

Station 18+732 23.0 Lt (D-4.5) (Culv)

0 - 7.7 Blk Orgs (F-Co Fib) (Stiff from
 2.0-2.5) (Soft from 2.5-6.0)
 (Firm from 6.0-7.7)
 7.7 - 8.0 Gry Si(y) Cl (Stiff)

Station 18+732 5.7 Rt (Culv)

0 - 50 Asph
 50 - 350 Cr Gr
 350 - 800 Br F-Co Sa Tr Si Occ Gr (Moist)
 800 - 1.2 Rk Fill
 1.2 NFP Rk Fill

Station 18+732 15.0 Rt (D-4.1) (Culv)

0 - 500 Wat
 500 - 1.9 Blk Orgs (F-Co Fib) (Wet)

Station 18+750 15.0 Lt (D-3.5)

0 - 1.5 Blk Orgs (Co Fib) (Wet & Soft)

Station 18+750 13.0 Rt (D-1.6)

0 - 300 Ob to Sh Rk

Station 18+760 17.0 Lt (D-3.3)

0 - 1.5 Br Orgs (Co Fib) (Wet & Soft)
 1.5 NFP Prob Frag BR

Station 18+770 15.0 Lt (D+600)

0 - 100 Ob to BR

Station 18+774 10.0 Rt (D-1.0)

Frag BR on Surf

Station 18+780 13.0 Lt (D+1.7)

BR on Surf

Station 18+788 11.0 Lt (D-1.1)

0 - 200 Ob to Sh Rk

Station 18+790 15.0 Lt (D+1.3)

0 - 200 Ob to BR

Station 18+800 15.0 Lt (D-1.1)

0 - 100 Ob to BR

Station 18+810 10.0 Rt (D-800)

BR on Surf

Station 18+820 15.0 Lt (D-1.7)

0 - 100 Tps
 100 - 400 Br F-Co Sa Occ Gr
 400 NFP BR

Station 18+825 15.0 Lt (D-2.3)

0 - 200 Ob Tr Rk Fill (Old Rd Bed)

Station 18+825 14.0 Rt (D-1.4)

0 - 10 Tps
 10 - 500 Br F-Co Sa Occ Bld (Moist)
 500 NFP Bld

Station 18+855 12.0 Lt (D+- 0.0)

0 - 25 Tps
 25 - 1.3 Br F-Co Sa Occ F Gr (Moist)
 1.3 NFP Poss BR

Station 18+860 16.0 Lt (D-2.8)

0 - 300 Ob to Sh Rk Fill

Station 18+860 16.0 Rt (D-2.7)

0 - 100 Tps
 100 - 600 Br F-Co Sa with Blds & Sh Rk
 600 NFP Blds

Boreholes 2002

W.P. 6057-07-00

Station 18+865 13.0 Lt (D-300)

0 - 900 Br F-Co Sa Tr Si & F Gr (Moist)
900 NFP Poss BR

Station 18+870 4.2 Lt

0 - 50 Asph
50 - 310 Cr Gr
310 - 850 Br F-Co Sa Tr Si & Gr (Moist)
850 - 1.2 Rk Fill
1.2 NFP Rk Fill

Station 18+875 12.0 Lt (D-300)

0 - 25 Tps
25 - 1.4 Br F-Co Sa Tr F Gr (Moist)
1.4 NFP Poss BR

Station 18+890 16.0 Lt (D-2.6)

0 - 100 Tps
100 - 500 Br F-Co Sa
500 NFP Sh Rk

Station 18+900 12.0 Lt (D-1.2)

0 - 75 Tps (Moist)
75 - 300 Br F-Co Sa Tr F Gr (Wet)
300 - 600 Br VF-F Sa Tr Si (Wet) (Fr Wat @ 600)
600 - 1.2 Br VF-F Sa with Si (Wet)

Station 18+915 4.6 Rt

0 - 120 Asph
120 - 350 Cr Gr
350 - 900 Br F-Co Sa Tr Gr & Si (Moist)
900 - 1.2 Rk Fill
1.2 NFP Rk Fill

Station 18+920 17.0 Rt (D-2.5)

0 - 75 Tps
75 - 700 Br F-Co Sa with Blds & Sh Rk
700 NFP Blds

Station 18+930 16.0 Lt (D-2.5)

0 - 100 Tps
100 - 600 Br F-Co Sa with Blds & Sh Rk
600 NFP Sh Rk

Station 18+958 18.0 Rt (D-2.4)

0 - 300 Ob to Sh Rk Fill

Station 18+960 7.0 Lt

0 - 60 Asph
60 - 410 Cr Gr
410 - 900 Br F-Co Sa Tr Gr & Si (Moist)
900 - 1.5 Rk Fill & Sa Mixed (Moist)
1.5 NFP Rk Fill

Station 18+960 18.0 Lt (D-4.1)

0 - 400 Wat
400 - 900 Br Orgs (Co Fib) (Wet & Soft)
900 - 1.3 Lt Br Si(y) Cl Tr Sa (Wet & Firm)

Station 18+990 17.0 Lt (D-3.3)

0 - 200 Wat
200 - 1.4 Br Orgs (Co Fib) (Wet & Soft)
1.4 - 1.6 Lt Br Si(y) Cl Tr Sa (Wet & Firm)

Station 19+000 18.0 Rt (D-4.4)

0 - 700 Br Orgs (Co Fib) (Soft & Wet) (Wat on Surf)
700 - 1.2 Br-Gry Si(y) Cl Tr Sa (Wet & Stiff)

Station 19+020 17.0 Lt (D-3.1)

0 - 200 Wat
200 - 1.3 Br Orgs (F-Co Fib) (Wet & Soft)
1.3 - 1.6 Lt Br Si(y) Cl Tr Sa (Wet & Firm)

Station 19+030 18.0 Rt (D-4.0)

0 - 500 Br Orgs (Co Fib) (Soft & Wet) (Wat on Surf)
500 - 1.2 Br-Gry Si(y) Cl Tr Sa (Wet & Stiff)

Station 19+050 17.0 Lt (D-3.0)

0 - 1.2 Br Orgs (F-Co Fib) (Wet & Firm) (Fr Wat on Surf)
1.2 - 1.5 Lt Br Si(y) Cl Tr Sa (Wet & Firm)

Station 19+060 18.0 Rt (D-3.4)

0 - 200 Br F Sa Tr Cl & Si (Wat on Surf)
200 - 800 Br F-Co Sa (Wet)
800 - 1.2 Br Si(y) Cl with Sa (Wet & Stiff)

Boreholes 2002

W.P. 6057-07-00

Station 19+080 5.4 Lt

| | | | |
|-----|---|-----|-------------------------------------------------------------|
| 0 | - | 40 | CM |
| 40 | - | 410 | Cr Gr |
| 410 | - | 1.2 | Br F-M Sa Tr Si Occ Gr & Cobs (Moist) |
| 1.2 | - | 1.5 | Rk Fill & Sa Mixed (Moist) (Si(y) Sa Seam @ 2.0) |
| 1.5 | - | 3.2 | Br F-Co Sa Tr Si Occ Gr, Cobs & Blds (Moist) (Wet from 2.8) |
| 3.2 | - | 3.7 | Gry F-Co Sa Tr Si (Wet) |

Station 19+080 17.0 Lt (D-3.1)

| | | | |
|-----|---|-----|----------------------------------|
| 0 | - | 300 | Wat |
| 300 | - | 1.1 | Blk Orgs (F Fib) (Wet & Firm) |
| 1.1 | - | 1.5 | Gry Si(y) Cl Tr Sa (Wet & Stiff) |

Station 19+096 4.6 Lt (Culv's)

| | | | |
|-----|---|-----|-------------------------------------------------------------|
| 0 | - | 30 | CM |
| 30 | - | 250 | Cr Gr |
| 250 | - | 3.5 | Br F-M Sa Tr Gr & Si Occ Cobs & Blds (Moist) (Wet from 2.8) |
| 3.5 | - | 4.2 | Gry F-Co Sa Tr Si (Wet) |

Station 19+099 21.0 Lt (D-3.3) (Culv)

| | | | |
|-----|---|-----|--------------------------------------|
| 0 | - | 300 | Wat |
| 300 | - | 800 | Br F Sa with Orgs Tr Cl & Si (Wet) |
| 800 | - | 1.3 | Br-Gry Si(y) Cl Occ Sa (Wet & Stiff) |

Station 19+099 15.0 Rt (D-3.5) (Culv)

| | | | |
|-----|---|-----|----------------------------------------|
| 0 | - | 500 | Wat |
| 500 | - | 700 | Br F-Co Sa Occ F Gr Tr Cl & Si (Wet) |
| 700 | - | 900 | Lt Br-Gry Si(y) Cl Tr Sa (Wet & Stiff) |

Station 19+101 21.0 Lt (D-3.3) (Culv)

| | | | |
|-----|---|-----|--------------------------------------|
| 0 | - | 500 | Wat |
| 500 | - | 800 | Br F Sa with Orgs Tr Cl & Si (Wet) |
| 800 | - | 1.4 | Br-Gry Si(y) Cl Occ Sa (Wet & Stiff) |

Station 19+101 15.0 Rt (D-3.6) (Culv)

| | | | |
|-----|---|-----|----------------------------------------|
| 0 | - | 400 | Wat |
| 400 | - | 600 | Br F-Co Sa Occ F Gr Tr Cl & Si (Wet) |
| 600 | - | 900 | Lt Br-Gry Si(y) Cl Tr Sa (Wet & Stiff) |

Station 19+104 4.1 Rt (Culv)

| | | | |
|-----|---|-----|--------------------------------|
| 0 | - | 40 | Asph |
| 40 | - | 300 | Cr Gr |
| 300 | - | 900 | Br F-M Sa Tr Si Occ Gr (Moist) |
| 900 | - | 1.2 | Rk Fill |
| | - | 1.2 | NFP Rk Fill |

Station 19+110 16.0 Lt (D-2.8)

| | | | |
|-----|---|-----|-------------------------------------------------|
| 0 | - | 1.4 | Blk Orgs (F Fib) (Wet & Firm) (Fr Wat from 400) |
| 1.4 | - | 1.9 | Gry Si(y) Cl Tr Sa (Wet & Stiff) |

Station 19+130 21.0 Rt (D-3.6)

| | | | |
|-----|---|-----|--------------------------------------------------|
| 0 | - | 1.0 | Blk Orgs (F Fib) (Wat on Surf) (Wet & Soft-Firm) |
| 1.0 | - | 1.5 | Br-Gry Si(y) Cl Tr Sa (Wet & Stiff) |

Station 19+140 16.0 Lt (D-2.7)

| | | | |
|-----|---|-----|----------------------------------|
| 0 | - | 100 | Wat |
| 100 | - | 700 | Blk Orgs (F Fib) (Wet & Firm) |
| 700 | - | 1.2 | Lt-Br-Gry Si(y) Cl (Wet & Stiff) |

Station 19+143 4.6 Rt

| | | | |
|-----|---|-----|---------------------------------|
| 0 | - | 30 | Asph |
| 30 | - | 230 | Cr Gr |
| 230 | - | 2.0 | Br F-Co Sa Tr Si Occ Gr (Moist) |

Station 19+160 18.0 Rt (D-4.4)

| | | | |
|-----|---|-----|----------------------------------------|
| 0 | - | 300 | Wat |
| 300 | - | 1.0 | Blk Orgs (F Fib) with Sa (Wet & Stiff) |
| 1.0 | - | 1.5 | Gry Si(y) Cl Tr Sa (Wet & Stiff) |

Station 19+170 16.0 Lt (D-2.6)

| | | | |
|-----|---|-----|----------------------------------|
| 0 | - | 150 | Wat |
| 150 | - | 900 | Blk Orgs (F-Co Fib) (Wet & Firm) |
| 900 | - | 1.5 | Gry Si(y) Cl (Wet & Stiff) |

Boreholes 2002

W.P. 6057-07-00

Station 19+180 5.1 Lt

| | | | |
|-----|---|-----|---------------------------------------|
| 0 | - | 30 | CM |
| 30 | - | 300 | Cr Gr |
| 300 | - | 1.6 | Br F-M Sa Tr Si Occ Gr & Cobs (Moist) |
| 1.6 | - | 1.7 | Rk Fill Poss Blds |
| | | 1.7 | NFP Rk Fill Poss Blds |

Station 19+190 17.0 Rt (D-4.9)

| | | | |
|-----|---|-----|------------------------------------------------------|
| 0 | - | 800 | Blk Orgs (F Fib) Tr Sa (Wet & Soft) (Fr Wat on Surf) |
| 800 | - | 1.2 | Lt Br Cl with Si Tr Sa (Wet & Stiff) |

Station 19+200 16.0 Lt (D-3.9)

| | | | |
|-----|---|-----|-------------------------------------------------|
| 0 | - | 600 | Blk Orgs (Co Fib) (Wet & Soft) (Fr Wat on Surf) |
| 600 | - | 1.2 | Lt Br Si(y) Cl Occ Sa (Wet & Stiff) |

Station 19+220 18.0 Rt (D-5.1)

| | | | |
|-----|---|-----|-----------------------------|
| 0 | - | 200 | Tps (Moist) |
| 200 | - | 1.2 | Lt Br Si(y) Cl (Wet & Firm) |

Station 19+230 16.0 Lt (D-3.1)

| | | | |
|-----|---|-----|------------------------------------|
| 0 | - | 75 | Tps |
| 75 | - | 400 | Br F-Co Si(y) Sa (Wet) |
| 400 | - | 1.0 | Lt Br Si(y) Cl Tr Sa (Wet & Stiff) |
| | | 1.0 | NFP Poss BR |

Station 19+240 4.3 Rt

| | | | |
|-----|---|-----|---------------------------------|
| 0 | - | 50 | Asph |
| 50 | - | 250 | Cr Gr |
| 250 | - | 1.0 | Br F-Co Sa Tr Si Occ Gr (Moist) |
| 1.0 | - | 1.2 | Rk Fill |
| | | 1.2 | NFP Rk Fill |

Station 19+250 11.0 Lt (D-1.4)

| | | | |
|-----|---|-----|-------------------------------------|
| 0 | - | 100 | Tps |
| 100 | - | 500 | Rd F-Co Si(y) Sa Tr Gr & Cl (Moist) |
| | | 700 | NFP Sh Rk |

Station 19+260 12.0 Lt (D-1.0)

| | | | |
|-----|---|-----|------------------------------|
| 0 | - | 50 | Tps |
| 50 | - | 400 | Br F Sa |
| 400 | - | 700 | Lt Br Si(y) Sa with Cl (Wet) |
| | | 700 | NFP Prob Frag BR |

Station 19+270 15.0 Lt (D+500)

Frag BR on Surf

Station 19+280 15.0 Lt (D+1.6)

Frag BR on Surf

Station 19+280 14.0 Rt (D-2.2)

| | | | |
|-----|---|-----|-------------------------------------|
| 0 | - | 150 | Tps |
| 150 | - | 500 | Lt Br Cl with Sa, Si & Cobs (Moist) |
| 500 | - | 800 | Br F-Co Sa with Cobs & Blds (Moist) |
| | | 800 | NFP Blds |

Station 19+290 12.0 Lt (D+2.3)

| | | | |
|---|---|----|----------|
| 0 | - | 25 | Ob to BR |
|---|---|----|----------|

Station 19+300 4.2 Lt

| | | | |
|-----|---|-----|---------------------------------------------|
| 0 | - | 70 | Asph |
| 70 | - | 200 | Cr Gr |
| 200 | - | 1.4 | Br F-Co Sa with VF Gr Tr Si Occ Cob (Moist) |
| 1.4 | - | 1.5 | Sh Rk |
| | | 1.5 | NFP Sh Rk Poss Frag BR |

Station 19+300 8.0 Lt (D-300)

| | | | |
|---|---|-----|-------------|
| 0 | - | 200 | Ob to Sh Rk |
|---|---|-----|-------------|

Station 19+300 15.0 Lt (D+1.8)

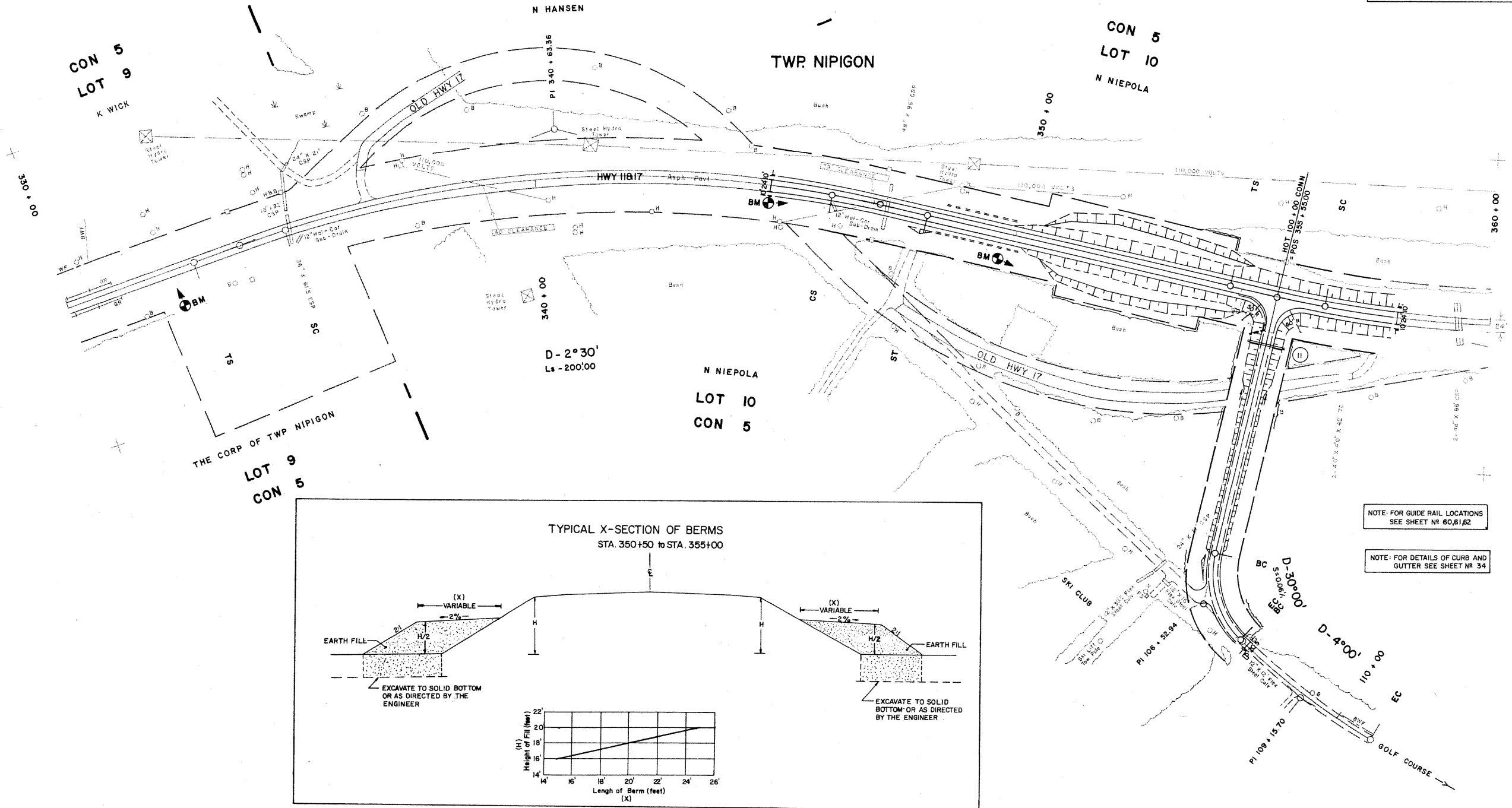
| | | | |
|---|---|----|----------|
| 0 | - | 25 | Ob to BR |
|---|---|----|----------|

Station 19+300 14.0 Rt (D-2.3)

| | | | |
|----|---|-----|--------------------------------------|
| 0 | - | 25 | Tps |
| 25 | - | 600 | Br VF-Co Si(y) Sa Tr Cl Occ Gr (Wet) |
| | | 600 | NFP Poss Frag BR |

Station 19+305 15.0 Lt (D+500)

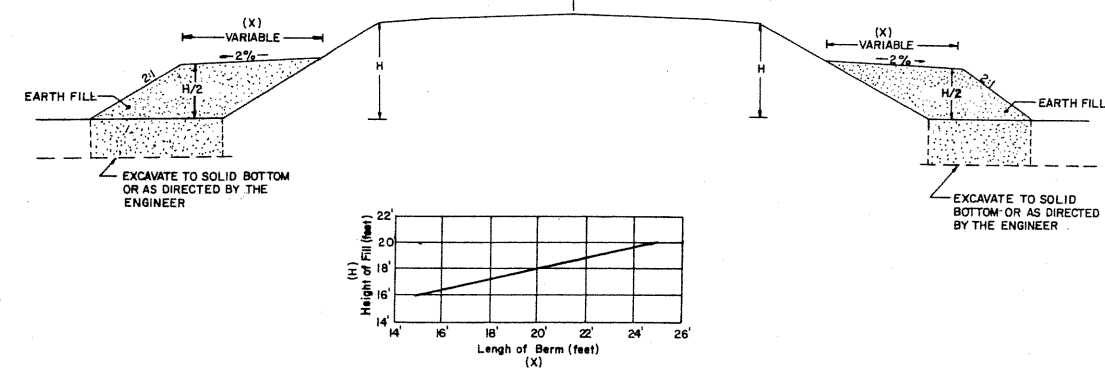
| | | | |
|----|---|-----|---------------|
| 0 | - | 25 | Tps |
| 25 | - | 700 | Br F Si(y) Sa |
| | | 700 | NFP BR |



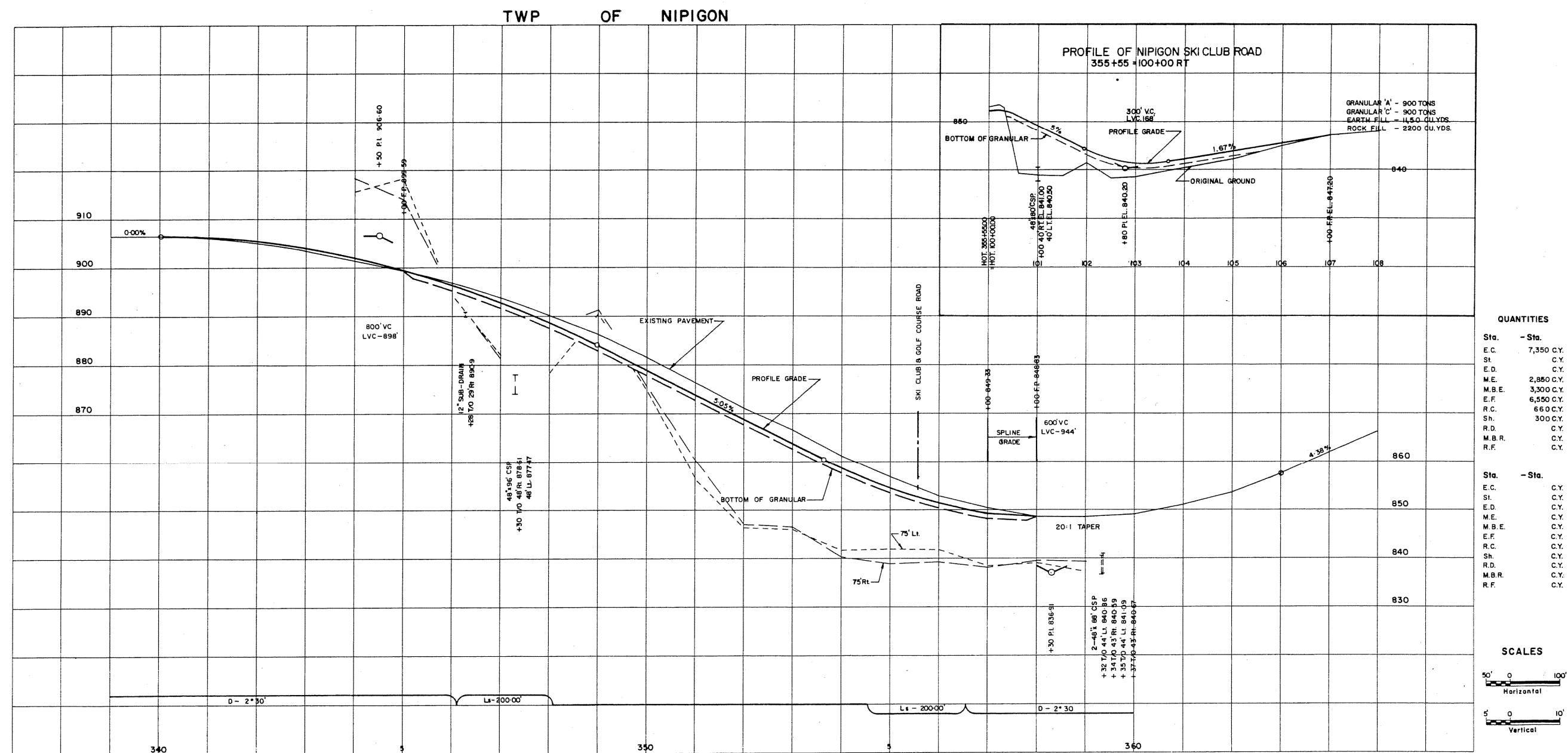
NOTE: FOR GUIDE RAIL LOCATIONS
SEE SHEET N° 60,61,62

NOTE: FOR DETAILS OF CURB AND
GUTTER SEE SHEET N° 34

TYPICAL X-SECTION OF BERMS
STA. 350+50 to STA. 355+00



| | |
|------------------------------------------------|-------------|
| NEW CONSTRUCTION STA. 330+00 TO STA. 360+00 | SHEET 24 |
|------------------------------------------------|-------------|



Station 345+00 13' Lt. E.
0" - 5" Gran "A" (AGM)
5" - 36" Br F-M Sa (Occ F Grav)
(Moist)
36" N F P Sh Rk Pass B/R

Station 347+50 15' Rt. E.
0" - 1" Mulch
1" - 12" Gran "A" (AGM)
12" - 38" Br F Sa (Occ F Grav)
(Moist)
38" N F P Sh Rk Fill

Station 345+00 13' Lt. E.
0" - 4" Pav't
4" - 10" Gran "A" (AGM)
10" - 24" Br F-M Sa (Occ F Grav)
(Moist)
24" N F P Sh Rk Pass B/R

Station 347+50 13' Lt. E.
0" - 4" Pav't
4" - 8" Gran "A" (AGM)
8" - 10" Br F-M Sa (Occ F Grav)
(Moist)
10" - 13" Br F Grav (Moist)
13" - 18" Br F-M Sa (Occ F Grav)
(Moist)
18" - 26" Br F Gravy Sa (Moist)
26" - 36" Br F-M Sa (Occ F Grav)
(Moist)
36" N F P Sh Rk Fill

Station 345+50 13' Rt. E.
0" - 8" Gran "A" (AGM)
8" - 36" Br F-M Sa (SI SI)
(Occ F Grav)(Moist)
36" N F P B/R

Station 348+00 13' Lt. E.
0" - 4" Pav't
4" - 12" Gran "A" (AGM)
12" - 15" Br F-M Sa (Occ F Grav)
(Moist)
15" - 24" Br F Grav (Moist)
24" - 36" Br F-M Sa (Occ F Grav)
(Moist)
36" N F P Sh Rk Fill

Station 345+50 13' Lt. E.
0" - 4" Pav't
4" - 8" Gran "A" (AGM)
8" - 22" Br F-M Sa (Occ F Grav)
(Moist)
22" N F P Sh Rk Pass B/R

Station 348+50 15' Rt. E.
0" - 2" Mulch
2" - 9" Gran "A" (AGM)
9" - 24" Br F Sa (Moist)
24" - 36" Br F-M Sa & Sh Rk Mix
(Occ F Grav)(Moist)
36" N F P Sh Rk Pass B/R

Station 346+00 12' Rt. E.
0" - 4" Pav't
4" - 14" Gran "A" (AGM)
14" - 38" Br F-M Sa (SI SI)
(Occ F Grav)(Moist)
38" N F P Sh Rk

Station 348+50 13' Lt. E.
0" - 3" Pav't
3" - 16" Gran "A" (AGM)
16" - 30" Br F-M Sa (Occ F Grav)
(Moist)
30" N F P Sh Rk Pass B/R

Station 346+50 15' Rt. E.
0" - 2" Mulch
2" - 12" Gran "A"
12" - 40" Br F Sa (SI SI)
(Occ F Grav)(Moist)
40" N F P Sh Rk Fill

Station 349+00 15' Rt. E.
0" - 10" Gran "A" (AGM)
10" - 28" Br F-M Sa (Occ F Grav)
(Moist)
28" - 36" Sh Rk Fill
36" N F P Sh Rk Pass B/R

Station 346+50 13' Lt. E.
0" - 4" Pav't
4" - 8" Gran "A" (AGM)
8" - 30" Br F-M Sa (Occ F Grav)
(Moist)
30" N F P Sh Rk Fill

Station 349+00 13' Lt. E.
0" - 4" Pav't
4" - 14" Gran "A" (AGM)
14" - 26" Br F-M Sa (Occ F Grav)
(Moist)
26" N F P Sh Rk Pass B/R

Station 347+00 15' Rt. E.
0" - 2" Mulch
2" - 7" Gran "A" (AGM)
7" - 12" Br F Gravy Sa (Moist)
(SI SI)
12" - 38" Br F Sa (Moist)
38" N F P Sh Rk Fill

Station 349+50 13' Rt. E.
0" - 3" Pav't
3" - 14" Gran "A" (AGM)
14" - 28" Br F-M Sa (Occ F Grav)
(Moist)
28" - 36" Sh Rk Fill
36" N F P Sh Rk Fill

Station 347+00 13' Lt. E.
0" - 4" Pav't
4" - 10" Gran "A" (AGM)
10" - 32" Br F-M Sa (Occ F Grav)
(Moist)
32" N F P Sh Rk Fill

Station 349+50 13' Lt. E.
0" - 4" Pav't
4" - 12" Gran "A" (AGM)
12" - 22" Br F-M Sa (Occ F Grav)
(Moist)
22" N F P Sh Rk Pass B/R

Station 350+00 13' Rt. E.
0" - 3" Pav't
3" - 14" Gran "A" (AGM)
14" - 30" Br F-M Sa (Occ F Grav)
(Moist)
30" N F P Sh Rk Fill

Station 350+00 13' Lt. E.
0" - 3" Pav't
3" - 14" Gran "A" (AGM)
14" - 28" Br F-M Sa (Occ F Grav)
(Moist)
28" N F P Sh Rk Fill

Station 350+50 13' Rt. E.
0" - 4" Pav't
4" - 12" Gran "A" (AGM)
12" - 32" Br F-M Sa (Occ F Grav)
(Moist)
32" N F P Sh Rk Fill

Station 350+50 13' Lt. E.
0" - 4" Pav't
4" - 16" Gran "A" (AGM)
16" - 30" Br F-M Sa (Occ F Grav)
(Moist)
30" N F P Sh Rk Fill

Station 351+00 13' Rt. E.
0" - 4" Pav't
4" - 18" Gran "A" (AGM)
18" - 44" Br F-M Sa (Occ F Grav)
(Moist)
44" N F P Sh Rk Fill

Station 351+00 13' Lt. E.
0" - 3" Pav't
3" - 18" Gran "A" (AGM)
18" - 40" Br F-M Sa (Occ F Grav)
(Moist)
40" N F P Sh Rk Fill

Station 351+00 55' Lt. E.
0" - 8" Org
8" - 48" SI Cl Sa Mix
48" N F P Pass B/R

Station 351+00 54' Lt. E.
0" - 8" Org
8" - 48" SI Cl (Wet @ 44")

Station 351+50 13' Rt. E.
0" - 3" Pav't
3" - 14" Gran "A" (AGM)
14" - 36" Br F-M Sa (Occ F Grav)
(Moist)
36" - 40" Sh Rk Fill
40" N F P Sh Rk Fill

Station 351+50 13' Lt. E.
0" - 7" Pav't
7" - 16" Gran "A" (AGM)
16" - 32" Br F-M Sa (Occ F Grav)
(Moist)
32" N F P Sh Rk Fill

Station 352+00 13' Rt. E.
0" - 6" Pav't
6" - 14" Gran "A" (AGM)
14" - 36" Br F-M Sa (Occ F Grav)
(Moist)
36" - 42" Sh Rk Fill
42" N F P Sh Rk Fill

Station 352+00 13' Lt. E.
0" - 6" Pav't
6" - 10" Gran "A" (AGM)
10" - 30" Br F-M Sa (Occ F Grav)
(Moist)
30" N F P Sh Rk Fill

Station 352+00 60' Rt. E.
0" - 6" Org
6" - 60" Firm SI Cl

Station 352+00 63' Lt. E.
0" - 12" Org
12" - 48" Firm SI Cl

Station 352+00 70' Lt. E.
0" - 24" Org
24" - 60" Firm SI Cl

Station 352+00 70' Rt. E.
0" - 24" Org
24" - 84" Firm SI Cl

Station 352+50 13' Rt. E.
0" - 8" Pav't
8" - 10" Gran "A" (AGM)
10" - 12" Pav't
12" - 18" Gran "A" (AGM)
18" - 32" Br F-M Sa (Occ F Grav)
(Moist)
32" N F P Sh Rk Fill

Station 352+50 13' Lt. E.
0" - 10" Gran "A" (AGM)
10" - 22" Br F-M Sa (Occ F Grav)
(Moist)
22" N F P Sh Rk Fill

Station 353+00 56' Lt. E.
0" - 24" Org
24" - 84" Firm SI Cl

Station 353+00 62' Rt. E.
0" - 18" Org
18" - 60" Firm SI Cl

Station 353+15 13' Lt. E.
0" - 8" Pav't
8" - 14" Gran "A" (AGM)
14" - 28" Br F-M Sa (Occ F Grav)
(Moist)
28" N F P Sh Rk Fill

Station 353+17 14' Rt. E.
0" - 12" Gran "A" (AGM)
12" - 36" Br F-M Sa (Occ F Grav)
(Moist)
36" N F P Sh Rk Fill

Station 353+50 13' Lt. E.
0" - 8" Pav't
8" - 10" Gran "A" (AGM)
14" - 24" Br F-M Sa (Occ F Grav)
(Moist)
24" N F P Sh Rk Fill

Station 353+60 13' Rt. E.
0" - 3" Pav't
3" - 12" Gran "A" (AGM)
12" - 36" Br F-M Sa (Occ F Grav)
(Occ F Grav)
32" N F P Sh Rk Fill

Station 353+75 60' Rt. E.
0" - 40" Org
40" - 90" Firm SI Cl
90" - 144" Soft SI Cl
144" - 180" Soft SI Cl (Varved)
180" - 300" Soft Gr Cl & SI
300" - 324" Co Sa & Rk Fragments

Station 353+75 60' Lt. E.
0" - 48" Org
48" - 140" Firm SI Cl (Varved)
140" - 160" Soft SI Cl
160" - 240" Soft SI Cl (Varved)
240" Fractured B/R

Station 354+00 50' Lt. E.
0" - 24" Org
24" - 84" Firm SI Cl

Station 354+00 70' Rt. E.
0" - 30" Org
30" - 96" Firm SI Cl

Station 354+00 13' Rt. E.
0" - 4" Pav't
4" - 15" Gran "A" (AGM)
15" - 40" Br F-M Sa (Occ F Grav)
(Moist)
40" N F P Sh Rk Fill

Station 354+00 13' Lt. E.
0" - 3" Pav't
3" - 14" Gran "A" (AGM)
14" - 28" Br F-M Sa (Occ F Grav)
(Moist)
28" N F P Sh Rk Fill

Station 354+50 13' Rt. E.
0" - 14" Gran "A" (AGM)
14" - 42" Br F-M Sa (Occ F Grav)
(Moist)
42" N F P Sh Rk Fill

Station 354+50 13' Lt. E.
0" - 3" Pav't
3" - 13" Gran "A" (AGM)
13" - 26" Br F-M Sa (Occ F Grav)
(Moist)
26" N F P Sh Rk Fill

Station 355+00 13' Rt. E.
0" - 4" Pav't
4" - 12" Gran "A" (AGM)
12" - 36" Br F-M Sa (Occ F Grav)
(Moist)
38" N F P Sh Rk Fill

Station 355+00 13' Lt. E.
0" - 3" Pav't
3" - 14" Gran "A" (AGM)
14" - 26" Br F-M Sa (Occ F Grav)
(Moist)
26" N F P Sh Rk Fill

Station 355+30 13' Lt. E.
0" - 4" Pav't
4" - 14" Gran "A" (AGM)
14" - 38" Br F-M Sa (Occ F Grav)
(Moist)
38" N F P Sh Rk Fill

Station 356+00 13' Rt. E.
0" - 4" Pav't
4" - 10" Gran "A" (AGM)
10" - 42" Br F-M Sa (Occ F Grav)
(Moist)
42" N F P Sh Rk Fill

Station 356+00 13' Lt. E.
0" - 3" Pav't
3" - 14" Gran "A" (AGM)
14" - 36" Br F-M Sa (Occ F Grav)
(Moist)
36" N F P Sh Rk Fill

Station 356+50 13' Rt. E.
0" - 4" Pav't
4" - 12" Gran "A" (AGM)
12" - 44" Br F-M Sa (Occ F Grav)
(Moist)
44" N F P Sh Rk Fill

Station 356+50 14' Lt. E.
0" - 14" Gran "A" (AGM)
14" - 28" Br F-M Sa (Occ F Grav)
(Moist)
28" N F P Sh Rk Fill

Station 357+00 13' Rt. E.
0" - 3" Pav't
3" - 12" Gran "A" (AGM)
12" - 46" Br F-M Sa (Occ F Grav)
(Moist)
46" N F P Sh Rk Fill

Station 357+00 13' Lt. E.
0" - 3" Pav't
3" - 12" Gran "A" (AGM)
12" - 38" Br F-M Sa (Occ F Grav)
(Moist)
38" N F P Sh Rk Fill

Station 357+00 52' Lt. E.
0" - 24" Org
24" - 60" Firm SI Cl

Station 357+00 64' Rt. E.
0" - 30" Org
30" - 60" Firm SI Cl
60" - 84" FI Sa

Station 357+45 13' Rt. E.
0" - 14" Gran "A" (AGM)
14" - 44" Br F-M Sa (Occ F Grav)
(Moist)
44" N F P Sh Rk Fill

Station 357+50 13' Lt. E.
0" - 3" Pav't
3" - 12" Gran "A" (AGM)
12" - 42" Br F-M Sa (Occ F Grav)
(Moist)
42" N F P Sh Rk Fill

Station 358+00 13' Rt. E.
0" - 2" Pav't
2" - 14" Gran "A" (AGM)
14" - 96" Br F-M Sa (Occ F Grav)
(Moist)

Station 358+00 13' Lt. E.
0" - 4" Pav't
4" - 16" Gran "A" (AGM)
16" - 90" Br F-M Sa (Occ F Grav)
(Moist)

| SOILS SURVEY DATA | | |
|-------------------|----------------|--------------|
| DATE OF SURVEY | TYPE OF SURVEY | LOCATION |
| JUNE 1973 | POWER AUGER | SUICIDE HILL |
| JULY 1973 | HAND AUGER | " " |
| AUGUST 1972 | FOUNDATION | " " |

CONT. No. 74-46
W. P. No. 907-71-OI

STA. TO STA.

SHEET
24'A

SCALE