



**Submitted To MMM GROUP
180 Commerce Valley Drive East
Thornhill, Ontario L3T 7N4**

**Northbound Passing Lane – TWP of Taylor
Culvert Extension – Station 22+565
Embankment – Stations 22+450 to 22+590
GWP 5217-08-00
WP 5219-08-01**

**Highway 11 – Passing Lane No. 3
From 2.7 km North of the West Junction
of Highway 101, Southerly 2.4 km
New Liskeard Area**

FINAL FOUNDATION INVESTIGATION REPORT

Date: February 21, 2012
Ref. N^o: 10/07/10131-F3

Geocres No. 42A-89

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1.0 INTRODUCTION

LVM | MERLEX has been retained by MMM Group Ltd., on behalf of the Ministry of Transportation of Ontario (MTO), to carry out a foundation investigation for a proposed northbound passing lane. This passing lane work project (WP 5219-08-01 - Passing Lane No. 3) is located on Highway 11 and passes through part of the Township of Taylor. The location is described as: from 2.7 km north of the west junction of Highway 101 at Station 23+500 Taylor Township, southerly 2.4 km. The foundation investigation for this project involves the investigation for the widening of the existing highway embankment between Stations 22+450 and 22+590, Taylor Township, as well as an extension to a 3050 mm SPCSP culvert located within the proposed widening at Station 22+565. The highway embankment is generally 2 m higher than the surrounding grade, except at the culvert location (Station 22+565) where the height of fill locally increases to 7.5 m. The culvert at Station 22+565 is identified as Site No. 39E-223/C.

The foundation investigation location was specified by the MTO in the RFP/TPM documentation Agreement No. 5009-E-0044. The terms of reference for the scope of work are outlined in LVM | MERLEX's proposal P-10-006, dated January 27, 2010. The purpose of the investigation was to determine the subsurface conditions along select areas of the proposed passing lane. LVM | MERLEX investigated the foundation areas by the drilling of boreholes, carrying out in-situ tests, and performing laboratory testing on select samples.

2.0 SITE DESCRIPTION

The site of the foundation investigation is within the proposed northbound passing lane (Passing Lane No. 3), between Stations 22+450 and 22+590 in the Township of Taylor. The topography at the site is generally of moderate relief. The existing highway embankment currently supports two undivided lanes of highway.

The existing highway between Stations 22+450 to 22+590 is constructed on a fill embankment, with a centerline elevation ranging between 263.9 and 266.0 m. A fill widening will be required to construct the northbound passing lane within the above noted limits. An extension to the outlet of the existing 3050 mm SPCSP culvert at Station 22+565, Taylor Township, is required to accommodate the widening. The flow through the culvert is from west to east (right to left) with a 25 year design flow of $10.5 \text{ m}^3/\text{s}$.

Within the area of investigation there is an entrance on the left, within some 50 m of the culvert location. Infrastructure at this location consists of overhead power and communication wires on the left and right sides of the highway.

2.1 Site Physiography and Surficial Geology

This project is located in the Geomorphic Sub-province known as the Cochrane Clay Plain. The topography on this section of Highway 11 is generally slightly rolling. There are a few exposed bedrock ridges. At many locations, significant layers of earth overlay the bedrock. Organic terrain was also observed. Within the project area overburden consists primarily of clay, containing varying amounts of silt and sand.

Bedrock in the area, as indicated on OGS Map 2506, is of the Early Precambrian Era. At the location of the proposed Passing Lane No. 3, the bedrock comprises of Metasediments including: conglomerate, sandstone, mudstone, marble, chert, iron formation and related migmatites.

3.0 INVESTIGATION PROCEDURES

The field work for this investigation was carried out between September 27 and October 14, 2010, during which six (6) sampled boreholes were advanced for the embankment widening, and two (2) sampled boreholes were advanced for the culvert extension. Each borehole was advanced to the north (left) of the existing embankment along the toe of the embankment.

The field investigation was carried out using a Bombardier mounted CME 45B drilling rig equipped with hollow stem augers, standard augers, and routine geotechnical sampling equipment. Soil samples were obtained at the borehole locations at regular intervals of depth using the standard 50 mm O.D. split spoon sampler (37 mm inside diameter) advanced in accordance with the Standard Penetration Test (SPT) procedures (ASTM D-1586). The SPT method involves advancing a 50 mm O.D. split spoon sampler with the force of a 63.5 kg hammer freely dropping 760 mm mounted in a trip (automatic) hammer. The number of blows per 300 mm penetration was recorded as the “N” value. Between the borehole locations, Dynamic Cone Penetration Tests (DCPT) were carried out to give a continuous plot of the soil resistance with depth. When cohesive deposits were encountered, the in-situ strength was measured using an “N” size field vane, vane collar, and calibrated torque meter. Relatively undisturbed samples of the clay deposits were retrieved using a 75 mm diameter Shelby Tube. All samples taken during this investigation were stored in labeled airtight containers for transport to our North Bay laboratory for visual examination and select laboratory testing.

Groundwater conditions in the open boreholes were observed during the advancement of and immediately following completion of the individual boreholes. All open boreholes were backfilled upon completion with compacted auger cuttings in the general order they were removed and, where necessary, bentonite pellet backfill was added to the boreholes to bring them up to grade.

The field work for this investigation was under the full time direction of a senior member of our engineering staff, who was responsible for locating the boreholes, clearing the borehole locations of underground services, in-situ sampling and testing operations, logging of the boreholes, labeling, and preparation of samples for transport to our North Bay laboratory, plus overall drill supervision. All samples received a visual confirmatory inspection in our laboratory. Laboratory testing of select samples included testing for natural moisture content determination, Atterberg Limits, particle size analysis, specific gravity, and consolidation testing. The results of the laboratory testing are presented on the individual Record of Borehole Sheets (Appendix B), with a summary of results presented on the laboratory sheets in Appendix C (Figure Nos. L-1 to L-19).

The location of the individual boreholes were determined in the field using highway chainage (established by others) and offset relative to highway centerline. The MTO co-ordinates, northing and easting, were then established for the boring locations. Elevations contained in this report are referenced to a geodetic datum.

4.0 SUBSURFACE CONDITIONS

Details of the subsurface conditions revealed by the investigation program are presented on the enclosed Record of Borehole Logs (Appendix B) and on Figure Nos. F3-1 and F3-2 (Appendix C). Please note that stratigraphic delineation presented on the borehole logs and soil strata plot are the results of non-continuous sampling, response to drilling progress, the results of SPT and Dynamic Cone Penetration Test (DCPT) plus field observations. Typically such boundaries represent transitions from one zone to another and are not an exact demarcation of specific geological unit. Additional consideration should be given to the fact that subsurface conditions may vary markedly between adjacent boreholes and beyond any specific boring location, and are shown on the drawings for illustration purposes only.

4.1 Russel Creek Culvert, Station 22+565, TWP of Taylor

Two (2) boreholes, Borehole Nos. A-1 and A-2 (Enclosure Nos. 2 and 3, Appendix B), were advanced to the west of the existing culvert at Station 22+565. The ground surface elevations at Borehole Nos. A-1 and A-2 were recorded at 258.0 and 259.2 m, respectively. A plan and profile showing the borehole locations and stratigraphic sequences is shown on Figure No. F3-1, Appendix C.

A thin layer of surficial organics some 50 mm in thickness was encountered at both boreholes.

4.1.1 Fill (Silt)

Underlying the surficial organics at Borehole No. A-1, a deposit of fill consisting of brown silt trace sand trace gravel trace wood was penetrated. The natural moisture content measured on a sample of this deposit was in the order of 23%. This deposit was encountered to a depth of 0.8 m below grade (elevation 257.2 m).

4.1.2 Fill (Clay)

Underlying the silt fill at Borehole No. A-1, and underlying the surficial organics at Borehole No. A-2, a heterogeneous fill deposit consisting of brown clay some sand to sandy with silt trace gravel was penetrated. The natural moisture content obtained from samples of this deposit was in the order of 15 to 59%. Hydrometer analyses were carried out on three (3) samples of this deposit, the results of which indicated 4 to 10% gravel size particles, 18 to 34% sand size particles, 23 to 27% silt size particles, and 36 to 58% clay size particles (Figure No. L-1, Appendix C). Atterberg Limits testing was carried out on three (3) samples of this deposit, the results of which indicated a Liquid Limit in the order of 38 to 59% and a Plastic Limit in the order of 17 to 22%. Based on the results of the Atterberg Limits testing, the fine grained portion of this deposit was classified under USCS as clay of high plasticity (CH) (Figure No. L-12, Appendix

C). Based on SPT 'N' values of 5 to 22 blows per 300 mm penetration, the consistency of this deposit was estimated as firm to very stiff. This deposit was encountered to depths of 2.1 and 3.0 m below grade at Borehole Nos. A-1 and A-2, respectively (elevations 255.9 and 254.6 m, respectively).

4.1.3 Clay

Underlying the heterogeneous fill deposit at Borehole Nos. A-1 and A-2, a deposit of grey clay trace sand was penetrated. The natural moisture content measured on samples of this deposit was in the order of 46 to 63%. Hydrometer analyses were carried out on four (4) samples of this deposit, the results of which indicated 0% gravel size particles, 0 to 1% sand size particles, 18 to 25% size silt particles, and 74 to 82% clay size particles (Figure No. L-12, Appendix C). Atterberg Limits testing was carried out on five (5) samples of this deposit, the results of which indicated a Liquid Limit in the order of 51 to 60% and a Plastic Limit in the order of 20 to 23%. Based on the results of the Atterberg Limits testing, the deposit was classified under USCS as clay of high plasticity (CH) (Figure No. L-13, Appendix C). Based on the in-situ field vane testing, which returned values of 28 to 44 kPa, the consistency of this deposit was described as firm (Figure No. L-17, Appendix C). The plasticity generally decreased with depth in this deposit as the silt content was observed to gradually increase, resulting in a gradual change to a silty clay. While the transition was gradual, it is considered the change to silty clay was encountered at depths of some 7.3 and 8.8 m at Borehole Nos. A-1 and A-2 respectively (elevations 250.7 and 250.4 m, respectively).

A single one-dimensional oedometer (consolidation) test was carried out on a sample of this deposit obtained from Borehole No. A-2 (see Figure Nos. L-18a to L-18c, Appendix C). The preconsolidation pressure was estimated to be in the order of 100 kPa and the over-consolidation ratio, which is the ratio of the preconsolidation pressure to the existing overburden

pressure, was in the order of 1.5. Based on the results of the oedometer (consolidation) tests, vane shear strength data, and the relationship of the moisture content to liquid limit, this deposit is considered to be slightly over-consolidated.

4.1.4 Silty Clay

Underlying the clay deposit at Borehole Nos. A-1 and A-2, a deposit of grey silty clay trace sand was penetrated. The natural moisture content obtained from samples of this deposit was in the order of 37 to 53%. Hydrometer analyses were carried out on three (3) samples of this deposit, the results of which indicated 0% gravel size particles, 0 to 1% sand size particles, 28 to 66% size silt particles, and 34 to 72% clay size particles (Figure No. L-2, Appendix C). Atterberg Limits testing was carried out on the three (3) samples of this deposit, the results of which indicated a Liquid Limit in the order of 36 to 48% and a Plastic Limit in the order of 19 to 20%. Based on the results of the Atterberg Limits testing, the deposit was classified under USCS as silty clay of medium plasticity (CI) (Figure No. L-15, Appendix C). Based on the in-situ field vane testing, which returned values of 46 to 66 kPa, the consistency of this deposit was described as firm to stiff (Figure No. L-17, Appendix C). The plasticity of this deposit generally decreases with depth in this deposit as the silt content continued to increase, becoming clayey silt at depth as observed at Borehole No. A-1. This deposit was encountered to a depth of 11.9 m at Borehole No. A-1 (elevation 246.1 m). Sampling was terminated in this deposit at a depth of 14.2 m below existing grade at Borehole No. A-2 (elevation 245.0 m).

4.1.5 Clayey Silt

At Borehole No. A-1, a gradual change to grey clayey silt occurred at depth. The natural moisture content from samples of this deposit was in the order of 29 to 46%. A hydrometer analysis was carried out on a single sample of this deposit, the results of which indicated 0% gravel size particles, 0% sand size particles, 86% silt size particles, and 14% clay size particles

(Figure No. L-3, Appendix C). Atterberg Limits testing was carried out on one (1) sample of this deposit, the results of which indicated a Liquid Limit in the order of 21% and a Plastic Limit in the order of 16%. Based on the results of the Atterberg Limits testing, the deposit was classified under USCS as clayey silt (ML-CL) (Figure No. L-16, Appendix C). Based on STP values, the consistency of this deposit was estimated as stiff. Sampling was terminated in this deposit at a depth of 14.2 m at Borehole No. A-1 (elevation 243.8 m).

Refusal was encountered on the DCPTs at depths of 17.9 and 15.8 m below existing grade at Borehole Nos. A-1 and A-2 respectively (elevations 240.1 and 243.4 m, respectively).

4.2 Passing Lane No. 3, Station 22+450 to 22+590, TWP of Taylor

A plan and profile showing the borehole locations and stratigraphic sequences is shown on Figure No. F3-1, Appendix C. During the course of the exploration program, six (6) sampled boreholes (Borehole Nos. 1 to 6, Enclosure Nos. 4 to 9, Appendix B), along with five DCPT (DCPT Nos. 1 to 5, Enclosure Nos. 10 to 14, Appendix B) were advanced to the east of the existing embankment. At the time of the subsurface investigation, the ground surface elevations at Boreholes Nos. 1 to 6 were recorded at 261.4, 261.7, 262.0, 263.6, 263.0, and 263.6 m, respectively. A plan and profile showing the borehole locations and stratigraphic sequences is shown on Figure No. F3-3, Appendix C.

A thin layer of surficial organics some 50 mm in thickness was generally encountered at each borehole.

4.2.1 Silty Clay

Underlying the surficial organics at Borehole No. 1, a deposit of brown silty clay trace to some sand was penetrated. The natural moisture content measured on samples of this deposit was in

the order of 20 to 30%. Hydrometer analyses were carried out on three (3) samples of this deposit, the results of which indicated 0% gravel size particles, 1 to 15% sand size particles, 32 to 41% silt size particles, and 53 to 64% clay size particles (Figure No. L-4, Appendix C). Atterberg Limits testing was carried out on the three (3) samples of this deposit, the results of which indicated a Liquid Limit in the order of 47 to 55% and a Plastic Limit in the order of 19 to 21%. Based on the results of the Atterberg Limits testing, the deposit was classified under USCS as silty clay of medium plasticity to clay of high plasticity (CI to CH) (Figure No. L-12, Appendix C). Based on STP 'N' values of 4 to 13 blows per 300 mm penetration, the consistency of this deposit was estimated as firm to stiff. This deposit was encountered to a depth of some 3.7 m below ground surface (elevation 257.7 m).

4.2.2 Sand

Underlying the silty clay at Borehole No. 1, a deposit of grey sand trace gravel trace silt was penetrated. The natural moisture content measured in a sample of this deposit was in the order of 15%. A gradation analysis was carried out on one sample of this deposit which was retained in the spilt spoon sampler (37 mm inside diameter), the results of which indicated 3% gravel size particles, 93% sand size particles, and 4% silt and clay size particles (Figure No. L-5, Appendix C). Based on SPT values of 2 blows per 300 mm penetration, the compactness of this deposit was described as very loose. This deposit was encountered to a depth of 4.6 m below ground surface (elevation 257.7 m).

4.2.3 Sandy Clay

Underlying the sand at Borehole No. 1, a deposit of sandy clay some silt was penetrated. The natural moisture content measured on samples of this deposit was in the order of 35 to 49%. A hydrometer analysis was carried out on one (1) sample of this deposit, the results of which indicated 0% gravel size particles, 40% sand size particles, 14% silt size particles, and 46% clay

size particles (Figure No. L-6, Appendix C). Atterberg Limits testing was carried out on one sample of this deposit, the results of which indicated a Liquid Limit in the order of 41% and a Plastic Limit in the order of 15%. Based on the results of the Atterberg Limits testing, the deposit was classified under USCS as silty clay of medium plasticity (CI) (Figure No. L-12, Appendix C). Based on STP 'N' values of 0 (static weight of hammer) to 8 blows per 300 mm penetration, the consistency of this deposit was estimated as very soft to firm. This deposit was encountered to a depth of 6.6 m below ground surface (elevation 254.8 m).

4.2.4 Clay

Underlying the sandy clay at Borehole No. 1, and underlying the surficial organics at Boreholes Nos. 2 to 6 inclusive, a deposit of brown to grey clay trace sand was penetrated. The upper 3 to 4 m of this deposit was observed to be desiccated, based upon color, a generally lower moisture content, and in consideration of the consistency (estimated as very stiff based on SPT 'N' values) relative to the remainder of the deposit at greater depths. The transition from desiccated to undesiccated clay occurs at elevations ranging from 261 to 259 m. The silt content generally increased with depth in this deposit. The natural moisture content measured on samples of this deposit was in the order of 24 to 74%. Hydrometer analyses were carried out on seventeen (17) samples of this deposit, the results of which indicated 0% gravel size particles, 0 to 2% sand size particles, 12 to 63% silt size particles, and 35 to 88% clay size particles (Figure Nos. L-7 to L-10, Appendix C). Atterberg Limits testing was carried out on the 17 samples of this deposit, the results of which indicated a Liquid Limit in the order of 52 to 82% and a Plastic Limit in the order of 19 to 24%. Based on the results of the Atterberg Limits testing, the deposit was classified under USCS as clay of high plasticity (CH) (Figure Nos. L-13 and L-14, Appendix C). Based on in-situ shear strengths of 22 to 58 kPa, which generally increased with depth, below elevation 260 m, the consistency of the undesiccated part of this deposit was described as soft to stiff, generally firm (Figure No. L-17, Appendix C). The

plasticity generally decreased with depth in this deposit as the silt content was observed to gradually increase, resulting in a gradual change to a silty clay. While the transition was gradual, the change to silty clay was generally encountered at depths of some 13.4, 11.9, 7.3, 10.4, 14.9, and 16.5 m below ground surface at Borehole Nos. 1 to 6 respectively (elevations 248.0, 249.8, 254.7, 253.2, 248.1, and 247.1 m, respectively).

A single one-dimensional oedometer (consolidation) test was carried out on a sample of this deposit obtained from Borehole No. 3, Sample No. 9 (see Figure Nos. L-19a to L-19c, Appendix C). The preconsolidation pressure was estimated to be in the order of 70 kPa and the over-consolidation ratio, which is the ratio of the preconsolidation pressure to the existing overburden pressure, was in the order of 1.0. Based on the results of the oedometer (consolidation) tests, vane shear strength data, and the relationship of the moisture content to liquid limit, this deposit is considered to be normally consolidated.

4.2.5 Silty Clay

A gradual transition from clay to a deposit of grey silty clay trace sand was observed at Borehole Nos. 1 to 6. The natural moisture content obtained from samples of this lower region of the fine grained deposit was in the order of 28 to 61%. Hydrometer analyses were carried out on ten (10) samples of this deposit, the results of which indicated 0% gravel size particles, 0 to 3% sand size particles, 27 to 73% silt size particles, and 27 to 72% clay size particles (Figure Nos. L-7 to L-10, Appendix C). Atterberg Limits testing was carried out on the ten (10) samples of this deposit, the results of which indicated a Liquid Limit in the order of 33 to 56% and a Plastic Limit in the order of 17 to 21%. Based on the results of the Atterberg Limits testing, the deposit was classified under USCS as silty clay of medium to low plasticity (CI to CL) (Figure No. L-15, Appendix C). The plasticity generally decreased with depth in this deposit as the silt content continued to increase, becoming clayey silt at depth as observed at Borehole No. 2.

Based on in-situ shear strengths of 26 to 74 kPa, the consistency of this deposit was described as firm to stiff (Figure No. L-17, Appendix C). This deposit was encountered to a depth of 14.9 m below grade at Borehole No. 2 (elevation 246.8 m). Sampling was terminated in this deposit at Borehole Nos. 1, 3, 4, 5, and 6 at depths of some 18.8, 18.8, 19.1, 19.1, and 19.1 m below ground surface respectively (elevations 242.6, 243.2, 244.5, 243.9, and 244.5 m, respectively).

4.2.6 Clayey Silt

Underlying the silty clay at Borehole No. 2, a deposit of grey silty clay trace sand was penetrated. The natural moisture content measured on samples of this deposit was in the order of 37 to 42%. A hydrometer analysis was carried out on one (1) sample of this deposit, the results of which indicated 0% gravel size particles, 0% sand size particles, 70% silt size particles, and 30% clay size particles (Figure Nos. L-7, Appendix C). Atterberg Limits testing was carried out on the one (1) sample of this deposit, the results of which indicated a Liquid Limit in the order of 24% and a Plastic Limit in the order of 17%. Based on the results of the Atterberg Limits testing, the deposit was classified under USCS as clayey silt of low plasticity (CL) (Figure No. L-16, Appendix C). The consistency of this deposit was estimated as very stiff (Figure No. L-17, Appendix C). This deposit was encountered to a depth of 17.7 m below grade at Borehole No. 2 (elevation 244.0 m).

4.2.7 Sand

Underlying the clayey silt at Borehole No. 2, a deposit of grey sand with silt trace clay was penetrated. The natural moisture content measured on a sample of this deposit was in the order of 22%. A gradation analysis was carried out on one sample of this deposit which was retained in the spilt spoon sampler, the results of which indicated 0% gravel size particles, 64% sand size particles, 28% silt size particles, and 8% clay size particles (Figure No. L-11, Appendix C). Based on SPT values of 7 blows per 300 mm penetration, the compactness of this deposit was

described as loose. Sampling was terminated in this deposit at a depth of 18.8 m below ground surface (elevation 242.9 m).

Refusal was encountered on the DCPTs at depths of 22.5, 18.1, 18.8, 22.5, 22.2, and 21.8 m below existing grade at Borehole No. 1 and DCPT Nos. 1 to 5, respectively (elevations 238.9, 243.3, 241.1, 239.3, 239.5, and 241.2 m, respectively).

4.3 Groundwater Conditions

Measurement of the groundwater table and cave-in levels were undertaken, where possible, in the open boreholes during the advance of the individual borings and upon completion. Artesian pressure was identified in Borehole No. A-1 when the hole was advanced below 12.8 m depth and silt/fine sand content increased. Groundwater levels were not recorded in Borehole Nos. A-1 and A-2, due to the artesian pressure and the need to immediately seal the boreholes. This artesian pressure was measured in Borehole No. 1, with a piezometer installed to an 18 m depth. The water level rose, over a two day period, to some 325 mm above existing grade at the borehole (elevation 261.7 m). This piezometer was decommissioned and sealed with bentonite before leaving the site. Based on the brown/grey interface in the soils, the groundwater table, at the borehole locations, is estimated to be between elevations 259.3 to 260.3 m in the area of the widening. The water level in the stream was measured at elevation 256.8 m at the time of this investigation. The groundwater levels will fluctuate seasonally.

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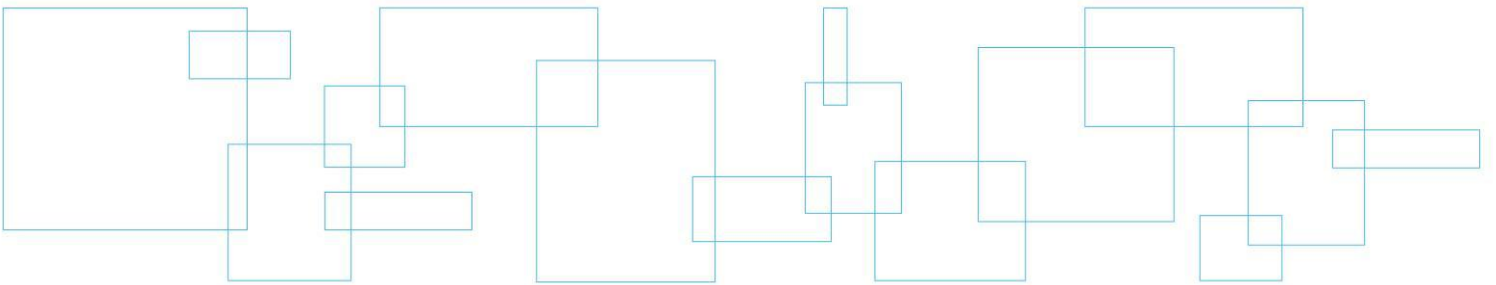
J. R. Berghamer, P. Eng.
Regional Manager

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Appendix A

Key Plan

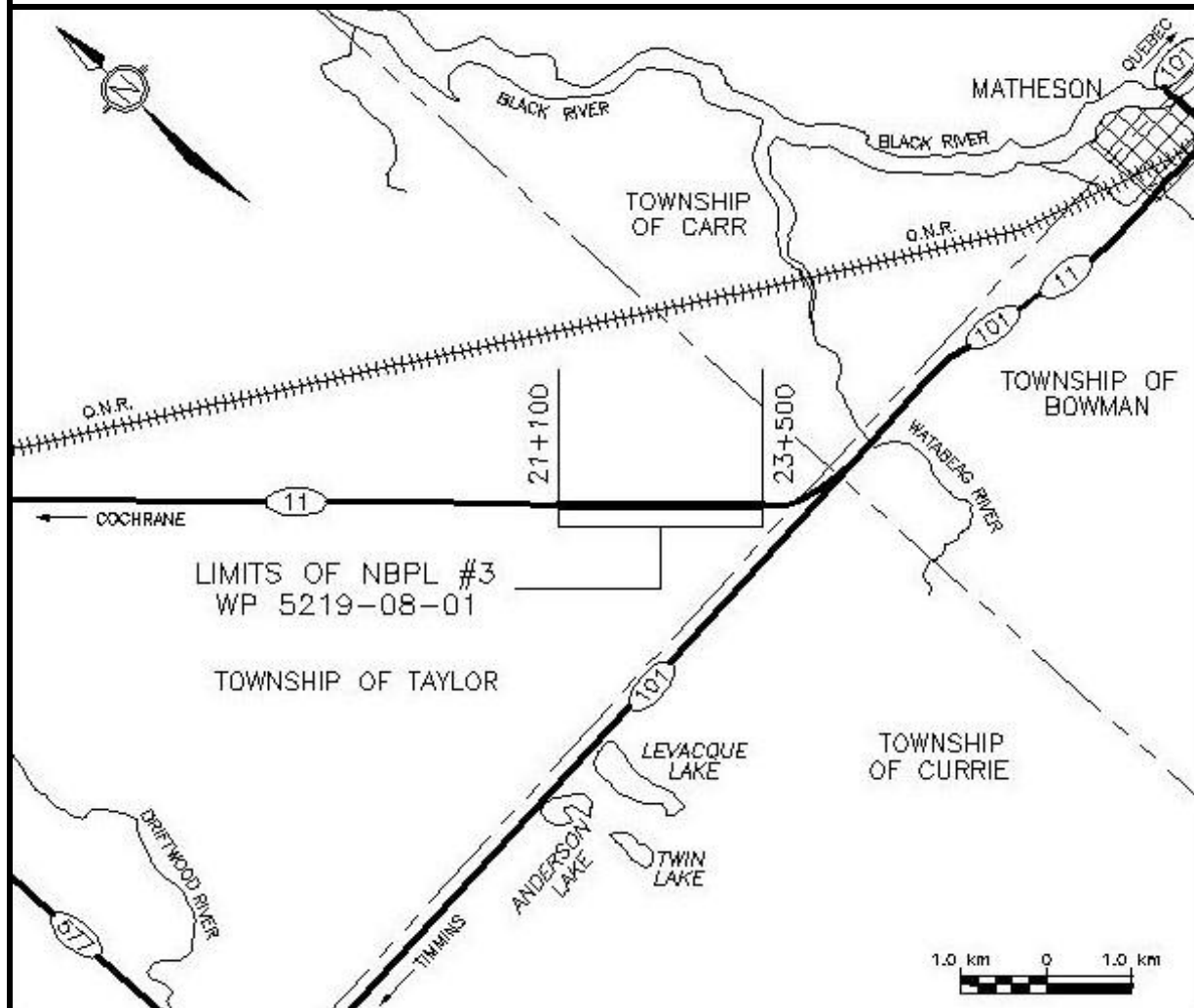
Figure No. 1: Key Plan



KEY PLAN

Figure No. 1

NOT TO SCALE



**FINAL
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GWP 5217-08-00**

WP 5219-08-01

Highway 11, Northbound Passing Lane
2.7 km North of Highway 101,
Southerly 2.4 km

Ref. No.: 10/07/10131-F3

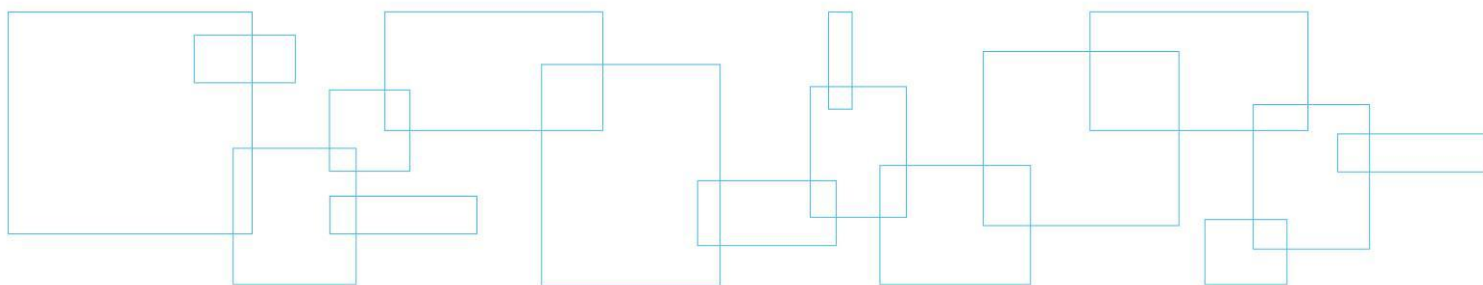
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Appendix B

Abbreviations Record of Borehole Sheets

Enclosure No. 1: List of Abbreviations and Symbols
Enclosure Nos. 2 to 14: Record of Borehole Sheets



LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

The abbreviations and terms, used to describe retrieved samples and commonly employed on the borehole logs, on the figures and in the report are as follows:

1. ABBREVIATIONS

AS	Auger Sample
CS	Chunk Sample
DS	Denison type sample
FS	Foil Sample
NP	Non Plastic
PH	Sampler advanced by hydraulic pressure
PM	Sampler advanced by manual pressure
RC	Rock core with size & percentage of recovery
SS	Split Spoon
ST	Slotted Tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash Sample

2. PENETRATION RESISTANCE/"N"

Dynamic Cone Penetration Test (DCPT):

A continuous profile showing the number of blows for each 300 mm of penetration of a 50 mm diameter 60° cone attached to AW rod driven by a 63 kg hammer falling 760 mm.

Plotted as —●—●—●—●—●—

Standard Penetration Test (SPT) or "N" Values

The number of blows of a 63 kg hammer falling 760 mm required to advance a 50 mm O.D. drive open sampler 300 mm.

3. SOIL DESCRIPTION

a) *Cohesionless Soils:*

"N" (blows/0.3 m)	Relative Density
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
over 50	very dense

3. SOIL DESCRIPTION (Cont'd)

b) *Cohesive Soils:*

Undrained Shear Strength (kPa)	Consistency
Less than 12	very soft
12 to 25	soft
25 to 50	firm
50 to 100	stiff
100 to 200	very stiff
over 200	hard

c) *Method of Determination of Undrained Shear Strength of Cohesive Soils:*

- + 3.2 - Field Vane test in borehole.
The number denotes the sensitivity to remoulding.
- D - Laboratory Vane Test
- " - Compression test in laboratory

For a saturated cohesive soil the undrained shear strength is taken as one-half of the undrained compressive strength.

4. TERMINOLOGY

Terminology used for describing soil strata is based on the proportion of individual particle sizes present in the samples (please note that, with the exception of those samples subject to a grain-size analysis, all samples were classified visually and the accuracy of visual examination is not sufficient to determine exact grain sizing):

Trace, or occasional	Less than 10%
Some	10 to 20%
With	20 to 30%
Adjective (i.e. silty or sandy)	30 to 40%
And (i.e. sand and gravel)	40 to 60%

5. LABORATORY TESTS

P	Standard Proctor Test
A	Atterberg Limit Test
GS	Grain Size Analysis
H	Hydrometer Analysis
C	Consolidation

LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

SAMPLE DESCRIPTION NOTES:

1. **FILL:** The term fill is used to designate all man-made deposits of natural soil and/or waste materials. The reader is cautioned that fill materials can be very heterogeneous in nature and variable in depth, density and degree of compaction. Fill materials can be expected to contain organics, waste materials, construction materials, shot rock, rip-rap, and/or larger obstructions such as boulders, concrete foundations, slabs, abandoned tanks, etc.; none of which may have been encountered in the borehole. The description of the material penetrated in the borehole therefore may not be applicable as a general description of the fill material on the site as boreholes cannot accurately define the nature of fill material. During the boring and sampling process, retrieved samples may have certain characteristics that identify them as 'fill'. Fill materials (or possible fill materials) will be designated on the Borehole Logs. If fill material is identified on the site, it is highly recommended that testpits be put down to delineate the nature of the fill material. However, even through the use of testpits defining the true nature and composition of the fill material cannot be guaranteed. Fill deposits often contain pockets or seams of organics, organically contaminated soils or other deleterious material that can cause settlement or result in the production of methane gas. It should be noted that the origins and history of fill material is frequently very vague or non-existent. Often fill material may be contaminated beyond environmental guidelines and the material will have to be disposed of at a designated site (i.e. registered landfill). Unless requested or stated otherwise in this report, fill material on this site has not been tested for contaminants however, environmental testing of the fill material can be carried out at your request. Detection of underground storage tanks cannot be determined with conventional geotechnical procedures.
2. **TILL:** The term till indicates a material that is an unstratified, glacial deposit, heterogeneous in nature and, as such, may consist of mixtures and pockets of clay, silt, sand, gravel, cobbles and/or boulders. These heterogeneous deposits originate from a geological process associated with glaciation. It must be noted that due to the highly heterogeneous nature of till deposits, the description of the deposit on the borehole log may only be applicable to a very limited area and therefore, caution must be exercised when dealing with a till deposit. When excavating in till, contractors may encounter cobbles/boulders or possibly bedrock even if they are not indicated on the borehole logs. It must be appreciated that conventional geotechnical sampling equipment does not identify the nature or size of any obstruction.
3. **BEDROCK:** Auger refusal may be due to the presence of bedrock, but possibly could also be due to the presence of very dense underlying deposits, boulders or other large obstructions. Auger refusal is defined as the point at which an auger can no longer be practically advanced. It must be appreciated that conventional geotechnical sampling equipment does not differentiate between nature and size of obstructions that prevent further penetration of the boring below grade. Bedrock indicated on the borehole logs will be labeled 'possibly' or 'probable' etc. based on the response of the boring and sampling equipment, surrounding topography, etc. Bedrock can be proven at individual borehole locations, at your request, by diamond core drilling operations or, possibly, by testpits. It must also be appreciated that bedrock surfaces can be, and most times are, very erratic in nature (i.e. sheer drops, isolated rock knobs, etc.) and caution must be used when interpreting subsurface conditions between boreholes. A bedrock profile can be more accurately estimated, at the clients' request, through a series of closely positioned unsampled auger probes combined with core drilling.
4. **GROUNDWATER:** Although the groundwater table may have been encountered during this investigation and the elevation noted in the report and/or on the record of boreholes, it must be appreciated that the elevation of the groundwater table will fluctuate based upon seasonal conditions, localized changes, erratic changes in the underlying soil profile between boreholes, underlying soil layers with highly variable permeabilities, etc. These conditions may affect the design and type and nature of dewatering procedures. Cave-in levels recorded in borings give a general indication of the groundwater level in cohesionless soils however, it must be noted that cave-in levels may also be due to the relative density of the deposit, drilling operations etc.

METRIC**RECORD OF BOREHOLE NO. A-1****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379070.8 E 336793.0 - Taylor Township - Russel Creek Culvert ORIGINATED BY JL

PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RG

CLIENT MMM Group Ltd. DATE (Started) September 27, 2010 TIME

DATE (Completed) September 27, 2010 (Completed) 3:00:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT W _p NATURAL MOISTURE CONTENT W LIQUID LIMIT W _L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES						
258.0	Ground Surface										
0.0	50 mm surficial organics		1	AS	N/A						
	FILL - brown silt trace sand trace gravel trace wood										
257.2											
0.8	FILL - brown clay with sand with silt trace gravel trace organics (firm/stiff)		2	SS	16		257				10 30 23 37
			3	SS	5						
255.9							256				
2.1	CLAY - grey clay (high plasticity) (firm/stiff)		4	SS	2						0 0 22 78
			5	SS	WH		255				
			6	SS	WH		254				0 0 18 82
	Silt content increases with depth Plasticity decreases with depth		7	SS	PM		253				
			8	SS	PM		252				0 0 20 80
							251				
250.7	SILTY CLAY - grey silty clay trace sand (medium plasticity) (firm/stiff)		9	SS	PM		250				
7.3							249				
			10	SS	PM						
	Continued Next Page										
COMMENTS								WATER LEVEL RECORDS			
Artesian groundwater pressure evident when borehole penetrated 12.8 m depth. Immediately plugged after 14 m sample by reverse augering to force cohesive cuttings down hole following which 6 bags of bentonite pellets used to seal hole.								Date (dd/mm/yy)/Time		Water Depth (m)	Cave In (m)
								1)		-	-
								2)		-	-
								3)		-	-
The stratification lines represent approximate boundaries. The transition may be gradual.											

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MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF BOREHOLE NO. A-1****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379070.8 E 336793.0 - Taylor Township - Russel Creek Culvert ORIGINATED BY JL

PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RG

CLIENT MMM Group Ltd. DATE (Started) September 27, 2010 TIME

DATE (Completed) September 27, 2010 (Completed) 3:00:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							WATER CONTENT (%)
								○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE × LAB VANE						
Continued from Previous Page															
246.1	CLAYEY SILT - grey clayey silt (stiff)		11	SS	WH		247								
11.9															
				12	SS	10		246							
							245								
243.8			13	SS	10		244								
14.2	End of Sampling Continuation of DCPT						243								
							242								
							241								
240.1															
17.9	DCPT Refusal End of Borehole														

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF BOREHOLE NO. A-2****LVM | MERLEX**REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379076.7 E 336798.4 - Taylor Township - Russel Creek Culvert ORIGINATED BY JLPROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RGCLIENT MMM Group Ltd. DATE (Started) September 28, 2010 TIME September 28, 2010 (Completed) 11:05:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES								
259.2	Ground Surface												
0.0	50 mm surficial organics												
	FILL - brown clay some sand to sandy with silt trace gravel trace organics (firm/stiff)		1	AS	N/A								
			2	SS	14								4 18 27 51
			3	SS	21								
			4	SS	22								4 34 26 36
			5	SS	14								
			6	SS	7								
254.6													
4.6	CLAY - grey clay trace sand (high plasticity) (firm)		7	SS	3								
			8	SS	WH								0 1 25 74
			9	TO	PM								
250.4													
8.8	SILTY CLAY - grey silty clay trace sand (medium plasticity) (firm/stiff)		10	SS	PM								0 0 28 72
Continued Next Page													
COMMENTS Borehole immediately backfilled upon completion. The water level in the adjacent creek measured at 256.8 m. The stratification lines represent approximate boundaries. The transition may be gradual.								+ 3, × 3 : Numbers on right refer to Sensitivity Numbers on left refer to values greater than 120 kPa ○ 3% STRAIN AT FAILURE					
								WATER LEVEL RECORDS					
								Date (dd/mm/yy)/Time		Water Depth (m)		Cave In (m)	
								1)		-		-	
								2)		-		-	
								3)		-		-	

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

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METRIC

RECORD OF BOREHOLE NO. A-2

LVM | MERLEX

REFERENCE	10/07/10131-F3	DATUM	Geodetic	LOCATION	N 5379076.7 E 336798.4 - Taylor Township - Russel Creek Culvert	ORIGINATED BY	JL
PROJECT	GWP 5217-08-00, Hwy 11, Passing Lane 3			BOREHOLE TYPE	Track Mounted CME 45B - Hollow Stem Augers	COMPILED BY	RG
CLIENT	MMM Group Ltd.	DATE (Started)	September 28, 2010	TIME		CHECKED BY	MAM
		DATE (Completed)	September 28, 2010	(Completed)	11:05:00 AM		

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MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS,GPJ MEL-GEO.GDT 2/22/12

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METRIC

RECORD OF BOREHOLE NO. 1

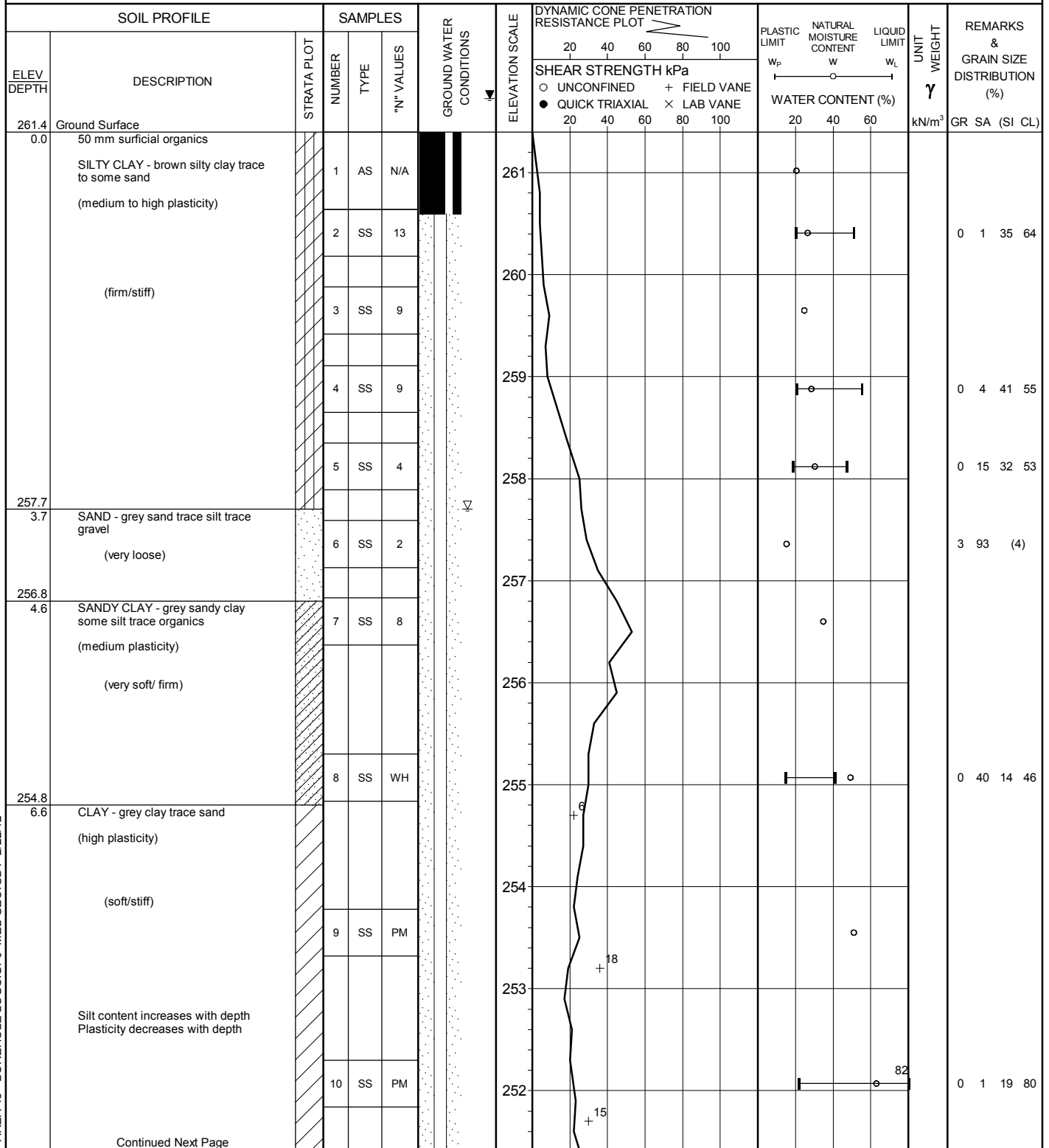
LVM | MERLEX

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379086.8 E 336778.7 - Taylor Township ORIGINATED BY JL

PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM

CLIENT MMM Group Ltd. DATE (Started) September 30, 2010 TIME

DATE (Completed) September 30, 2010 (Completed) 5:30:00 PM CHECKED BY MAM



COMMENTS
Piezometer installed to 18.3 m depth (elevation 243.1 m). Water level rose to 325 mm above ground surface, 14 days after installation. Piezometer decommissioned and plugged with bentonite.

The stratification lines represent approximate boundaries. The transition may be gradual.

+ 3, × 3 : Numbers on right refer to Sensitivity
Numbers on left refer to values greater than 120 kPa

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)
1) 9/30/10 5:30:00 PM	3.7	▽ - 1.5
2) 10/1/10 7:30:00 AM	10.4	▽ -
3) 10/14/10 7:30:00 AM	-0.325	▽ -

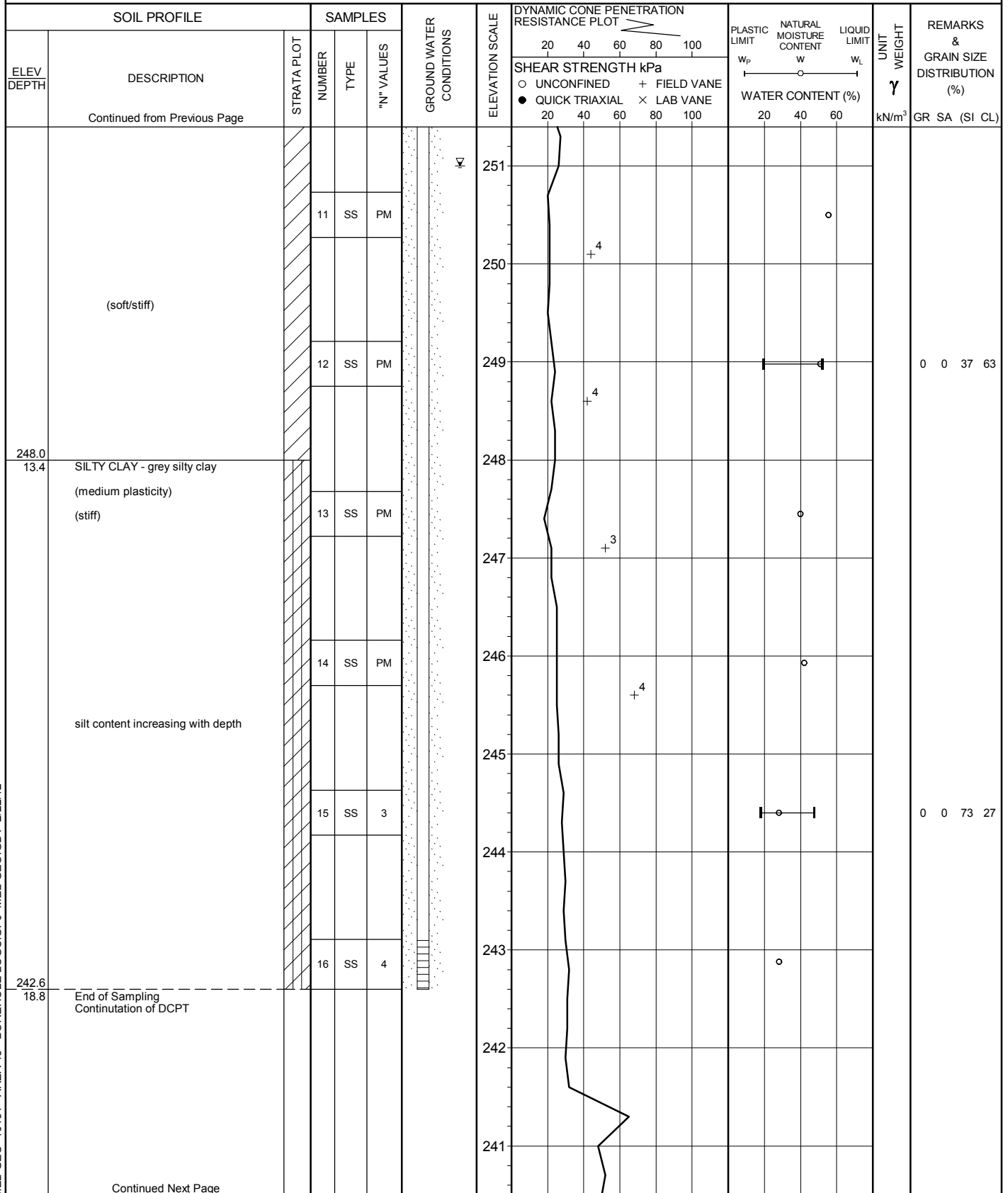
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MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF BOREHOLE NO. 1****LVM | MERLEX**

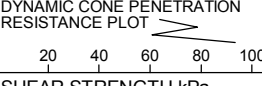
REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379086.8 E 336778.7 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM
 CLIENT MMM Group Ltd. DATE (Started) September 30, 2010 TIME
 DATE (Completed) September 30, 2010 (Completed) 5:30:00 PM CHECKED BY MAM



MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF BOREHOLE NO. 1****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379086.8 E 336778.7 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM
 CLIENT MMM Group Ltd. DATE (Started) September 30, 2010 TIME
 DATE (Completed) September 30, 2010 (Completed) 5:30:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT w_p NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES						
	Continued from Previous Page										
238.9							239				
22.5	DCPT Refusal End of Borehole										

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

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METRIC

RECORD OF BOREHOLE NO. 2

LVM | MERLEX

REFERENCE	<u>10/07/10131-F3</u>	DATUM	<u>Geodetic</u>	LOCATION	<u>N 5379033.4 E 336823.7 - Taylor Township</u>	ORIGINATED BY	<u>JL</u>
PROJECT	<u>GWP 5217-08-00, Hwy 11, Passing Lane 3</u>			BOREHOLE TYPE	<u>Track Mounted CME 45B - Hollow Stem Augers</u>	COMPILED BY	<u>MCM</u>
CLIENT	<u>MMM Group Ltd.</u>	DATE (Started)	<u>October 6, 2010</u>	TIME	<u>(Completed) 5:25:00 PM</u>	CHECKED BY	<u>MAM</u>
		DATE (Completed)	<u>October 6, 2010</u>				

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MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

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METRIC**RECORD OF BOREHOLE NO. 2****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379033.4 E 336823.7 - Taylor Township ORIGINATED BY JL

PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM

CLIENT MMM Group Ltd. DATE (Started) October 6, 2010 TIME

DATE (Completed) October 6, 2010 (Completed) 5:25:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								WATER CONTENT (%)				
								○ UNCONFINED	+	FIELD VANE										
								● QUICK TRIAXIAL	×	LAB VANE										
	Continued from Previous Page						20	40	60	80	100									
249.8			11	SS	PM															
11.9	SILTY CLAY - grey silty clay (medium plasticity) (firm/stiff)																			
			12	SS	PM											0 0 40 60				
			13	SS	PM															
246.8																				
14.9	CLAYEY SILT - grey clayey silty (low plasticity)																			
			14	SS	WH											0 0 70 30				
			15	SS	5															
244.0																				
17.7	SAND - grey sand with silt trace clay (loose)																			
			16	SS	7											0 64 28 8				
242.9																				
18.8	End of Sampling End of Borehole																			

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

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METRIC

RECORD OF BOREHOLE NO. 3

LVM | MERLEX

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379108.2 E 336759.9 - Taylor Township ORIGINATED BY JL

PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM

CLIENT MMM Group Ltd. DATE (Started) October 7, 2010 TIME

DATE (Completed) October 7, 2010 (Completed) 4:45:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
							20 40 60 80 100	20 40 60 80 100	20 40 60					
262.0	Ground Surface													
0.0	50 mm surficial organics													
	CLAY - brown clay some silt trace sand		1	AS	N/A									
	(high plasticity)		2	SS	18									0 2 63 35
	grey at 2.0 m		3	SS	11									
			4	SS	4									
	(firm)		5	SS	1									
			6	SS	PM									
			7	SS	PM									
			8	SS	PM									
			9	SS	PM									
			10	SS	PM									
254.7	SILTY CLAY - grey silty clay trace sand													
7.3	(medium to high plasticity)													
	(firm/stiff)													
	Silt content increases with depth Plasticity decreases with depth													
	Continued Next Page													
COMMENTS							+ 3, × 3 : Numbers on right refer to Sensitivity Numbers on left refer to values greater than 120 kPa ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy)/Time 1) 10/7/10 4:45:00 PM 2) 3)					
									Water Depth (m)		Cave In (m)			
									Dry		2.7			
									-		-			
									-		-			

The stratification lines represent approximate boundaries. The transition may be gradual.

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MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF BOREHOLE NO. 3****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379108.2 E 336759.9 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM
 CLIENT MMM Group Ltd. DATE (Started) October 7, 2010 TIME
 DATE (Completed) October 7, 2010 (Completed) 4:45:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	
	Continued from Previous Page							SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				
			11	SS	PM		251	4				0 0 32 68
			12	SS	PM		250	3				
			13	SS	PM		248	4				
			14	SS	PM		246	4				
			15	SS	PM		245					0 0 50 50
243.2 18.8	End of Sampling End of Borehole		16	SS	2		244					


MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC

RECORD OF BOREHOLE NO. 4

LVM | MERLEX

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379118.7 E 336741.0 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM
 CLIENT MMM Group Ltd. DATE (Started) October 12, 2010 TIME
 DATE (Completed) October 12, 2010 (Completed) 4:55:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT  SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L WATER CONTENT (%)	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)		
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES								
263.6	Ground Surface												
0.0	50 mm surficial organics												
	CLAY - brown clay trace sand (high plasticity)		1	AS	N/A								
			2	SS	12						0 2 34 64		
			3	SS	7								
			4	SS	4								
			5	SS	WH						0 0 23 77		
	grey at 4.3 m		6	SS	PM								
	(firm/stiff)		7	SS	PM								
			8	SS	PM								
			9	SS	PM						0 0 16 64		
			10	SS	PM								
	Continued Next Page												
COMMENTS The stratification lines represent approximate boundaries. The transition may be gradual.								WATER LEVEL RECORDS					
								+ 3, × 3 : Numbers on right refer to Sensitivity Numbers on left refer to values greater than 120 kPa ○ 3% STRAIN AT FAILURE					
								Date (dd/mm/yy)/Time 1) 2) 3)				Water Depth (m) Cave In (m)	

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MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF BOREHOLE NO. 4****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379118.7 E 336741.0 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM
 CLIENT MMM Group Ltd. DATE (Started) October 12, 2010 TIME
 DATE (Completed) October 12, 2010 (Completed) 4:55:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)			
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L
	Continued from Previous Page							20 40 60 80 100							
253.2															
10.4	SILTY CLAY - grey silty clay (medium plasticity) (firm/stiff) Silt content increases with depth Plasticity decreases with depth		11	SS	PM		253								
							252								
			12	SS	WH		251								
							250								
			13	SS	WH		249								
							248								
			14	SS	WH		247								
							246								
			15	SS	1		245								
			16	SS	2										
244.5															
19.1	End of Sampling End of Borehole														

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

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METRIC

RECORD OF BOREHOLE NO. 5

LVM | MERLEX

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379139.6 E 336727.8 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM
 CLIENT MMM Group Ltd. DATE (Started) October 13, 2010 TIME
 DATE (Completed) October 13, 2010 (Completed) 1:00:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT WATER CONTENT (%)	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES						
263.0	Ground Surface										
0.0	50 mm surficial organics										
	CLAY - brown clay trace sand (high plasticity)		1	AS	N/A						
			2	SS	9		262				0 0 28 72
			3	SS	4		261				
	grey at 2.7 m		4	SS	WH						
	Silt content increases with depth Plasticity decreases with depth		5	SS	WH		260				
	(firm)		6	SS	PM		259				0 1 35 64
			7	SS	PM		258				
			8	SS	PM		257				
			9	SS	PM		256				
			10	SS	PM		255				
							254				
Continued Next Page											
COMMENTS The stratification lines represent approximate boundaries. The transition may be gradual.								WATER LEVEL RECORDS			
								+ 3, x 3 : Numbers on right refer to Sensitivity Numbers on left refer to values greater than 120 kPa ○ 3% STRAIN AT FAILURE			
								Date (dd/mm/yy)/Time 1) 2) 3)			
								Water Depth (m) Cave In (m)			

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MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF BOREHOLE NO. 5****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379139.6 E 336727.8 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM
 CLIENT MMM Group Ltd. DATE (Started) October 13, 2010 TIME
 DATE (Completed) October 13, 2010 (Completed) 1:00:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	20 40 60 80 100		
	Continued from Previous Page											
			11	SS	PM		252					
								4				
			12	SS	PM		251					
								5				
							250					
			13	SS	WH		249					
								3				
248.1							248					
14.9	SILTY CLAY - grey silty clay (medium plasticity)		14	SS	WH			3				
	Silt content increases with depth Plasticity decreases with depth						247					
	(firm/stiff)											
			15	SS	WH		246					
								3				
							245					
			16	SS	2							
							244					
243.9								4				
19.1	End of Sampling End of Borehole											

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

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, Phone: Fax: Email:


METRIC**RECORD OF BOREHOLE NO. 6****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379161.9 E 336708.2 - Taylor Township ORIGINATED BY JL

PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY MCM

CLIENT MMM Group Ltd. DATE (Started) October 13, 2010 TIME

DATE (Completed) October 14, 2010 (Completed) 9:45:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT  SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES						
263.6	Ground Surface										
0.0	50 mm surficial organics										
	CLAY - brown clay		1	AS	N/A						
	(firm/stiff)		2	SS	7						
			3	SS	2						
			4	SS	WH						
	grey at 3.4 m		5	SS	PM						
	Silt content increases with depth Plasticity decreases with depth		6	SS	PM						
			7	SS	PM						
			8	SS	PM						
			9	SS	PM						
			10	SS	PM						
	Continued Next Page										
COMMENTS The stratification lines represent approximate boundaries. The transition may be gradual.								+ 3, × 3 : Numbers on right refer to Sensitivity Numbers on left refer to values greater than 120 kPa ○ 3% STRAIN AT FAILURE			
								WATER LEVEL RECORDS			
								Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)	
								1) -	-	-	
2) -	-	-									
3) -	-	-									

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MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC

RECORD OF BOREHOLE NO. 6

LVM | MERLEX

REFERENCE	<u>10/07/10131-F3</u>	DATUM	<u>Geodetic</u>	LOCATION	<u>N 5379161.9 E 336708.2 - Taylor Township</u>	ORIGINATED BY	<u>JL</u>
PROJECT	<u>GWP 5217-08-00, Hwy 11, Passing Lane 3</u>			BOREHOLE TYPE	<u>Track Mounted CME 45B - Hollow Stem Augers</u>	COMPILED BY	<u>MCM</u>
CLIENT	<u>MMM Group Ltd.</u>	DATE (Started)	<u>October 13, 2010</u>	TIME		CHECKED BY	<u>MAM</u>
		DATE (Completed)	<u>October 14, 2010</u>	(Completed)	<u>9:45:00 AM</u>		

[illegible]

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC

RECORD OF DCPT NO. 1

LVM | MERLEX

REFERENCE	<u>10/07/10131-F3</u>	DATUM	<u>Geodetic</u>	LOCATION	<u>N 5379083.5 E 336791.5 - Taylor Township</u>	ORIGINATED BY	<u>JL</u>
PROJECT	<u>GWP 5217-08-00, Hwy 11, Passing Lane 3</u>			BOREHOLE TYPE	<u>Track Mounted CME 45B - Hollow Stem Augers</u>	COMPILED BY	<u>RG</u>
CLIENT	<u>MMM Group Ltd.</u>	DATE (Started)	<u>October 1, 2010</u>	TIME		CHECKED BY	<u>MAM</u>
		DATE (Completed)	<u>October 1, 2010</u>	(Completed)			

[illegible]

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

LVM | MERLEX ENGINEERING LTD.

Phone: Fax: Email:

METRIC**RECORD OF DCPT NO. 1****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379083.5 E 336791.5 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT MMM Group Ltd. DATE (Started) October 1, 2010 TIME
 DATE (Completed) October 1, 2010 (Completed) CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE WATER CONTENT (%) 20 40 60 80 100	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES						
	Continued from Previous Page										
243.3 18.1	DCPT Refusal End of Borehole										

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC

RECORD OF DCPT NO. 2

LVM | MERLEX

REFERENCE	<u>10/07/10131-F3</u>	DATUM	<u>Geodetic</u>	LOCATION	<u>N 5379051.9 E 336814.8 - Taylor Township</u>	ORIGINATED BY	<u>JL</u>
PROJECT	<u>GWP 5217-08-00, Hwy 11, Passing Lane 3</u>			BOREHOLE TYPE	<u>Track Mounted CME 45B - Hollow Stem Augers</u>	COMPILED BY	<u>RG</u>
CLIENT	<u>MMM Group Ltd.</u>	DATE (Started)	<u>October 6, 2010</u>	TIME		CHECKED BY	<u>MAM</u>
		DATE (Completed)	<u>October 6, 2010</u>	(Completed)			

[illegible]

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF DCPT NO. 2****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379051.9 E 336814.8 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT MMM Group Ltd. DATE (Started) October 6, 2010 TIME
 DATE (Completed) October 6, 2010 (Completed) CHECKED BY MAM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L WATER CONTENT (%)	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE						
	Continued from Previous Page									
241.1 18.8	DCPT Refusal End of Borehole									

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF DCPT NO. 3****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379116.5 E 336753.5 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT MMM Group Ltd. DATE (Started) October 6, 2010 TIME (Completed) 1:00:00 PM CHECKED BY MAM
 DATE (Completed) October 6, 2010

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT w_p NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%)	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)												
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE							"N" VALUES											
261.8 0.0	Ground Surface																					
Continued Next Page																						
COMMENTS							+ 3, x 3 : Numbers on right refer to Sensitivity Numbers on left refer to values greater than 120 kPa ○ 3% STRAIN AT FAILURE															
							WATER LEVEL RECORDS <table border="1"> <thead> <tr> <th>Date (dd/mm/yy)/Time</th> <th>Water Depth (m)</th> <th>Cave In (m)</th> </tr> </thead> <tbody> <tr> <td>1)</td> <td>-</td> <td>-</td> </tr> <tr> <td>2)</td> <td>-</td> <td>-</td> </tr> <tr> <td>3)</td> <td>-</td> <td>-</td> </tr> </tbody> </table>				Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)	1)	-	-	2)	-	-	3)	-	-
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)																				
1)	-	-																				
2)	-	-																				
3)	-	-																				

The stratification lines represent approximate boundaries. The transition may be gradual.

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC

RECORD OF DCPT NO. 3

LVM | MERLEX

REFERENCE	10/07/10131-F3	DATUM	Geodetic	LOCATION	N 5379116.5 E 336753.5 - Taylor Township	ORIGINATED BY	JL
PROJECT	GWP 5217-08-00, Hwy 11, Passing Lane 3	BOREHOLE TYPE	Track Mounded CME 45B - Hollow Stem Augers	COMPILED BY	RG		
CLIENT	MMM Group Ltd.	DATE (Started)	October 6, 2010	TIME (Completed)	1:00:00 PM	CHECKED BY	MAM
		DATE (Completed)	October 6, 2010				

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL LIMIT MOISTURE CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)	
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES		ELEVATION SCALE	SHEAR STRENGTH kPa			WATER CONTENT (%)				
	Continued from Previous Page							20 40 60 80 100	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE		W _p W W _L				
							251								
							250								
							249								
							248								
							247								
							246								
							245								
							244								
							243								
							242								
							241								

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

LVM | MERLEX ENGINEERING LTD.

Phone: Fax: Email:

METRIC**RECORD OF DCPT NO. 3****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379116.5 E 336753.5 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT MMM Group Ltd. DATE (Started) October 6, 2010 TIME
 DATE (Completed) October 6, 2010 (Completed) 1:00:00 PM CHECKED BY MAM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE			"N" VALUES	20					
	Continued from Previous Page												
239.3													
22.5	DCPT Refusal End of Borehole												

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC

RECORD OF DCPT NO. 4

LVM | MERLEX

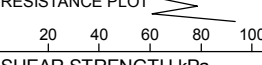
REFERENCE	<u>10/07/10131-F3</u>	DATUM	<u>Geodetic</u>	LOCATION	<u>N 5379133.7 E 336736.8 - Taylor Township</u>	ORIGINATED BY	<u>JL</u>
PROJECT	<u>GWP 5217-08-00, Hwy 11, Passing Lane 3</u>			BOREHOLE TYPE	<u>Track Mounted CME 45B - Hollow Stem Augers</u>	COMPILED BY	<u>RG</u>
CLIENT	<u>MMM Group Ltd.</u>	DATE (Started)	<u>October 8, 2010</u>	TIME		CHECKED BY	<u>MAM</u>
		DATE (Completed)	<u>October 8, 2010</u>	(Completed)			

[illegible]

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF DCPT NO. 4****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379133.7 E 336736.8 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT MMM Group Ltd. DATE (Started) October 8, 2010 TIME
 DATE (Completed) October 8, 2010 (Completed) CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT  SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L WATER CONTENT (%)	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES						
	Continued from Previous Page										
							251				
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							246				
							245				
							244				
							243				
							242				
							241				
	Continued Next Page										

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF DCPT NO. 4****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379133.7 E 336736.8 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT MMM Group Ltd. DATE (Started) October 8, 2010 TIME
 DATE (Completed) October 8, 2010 (Completed) CHECKED BY MAM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE WATER CONTENT (%) 20 40 60 80 100	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE						
	Continued from Previous Page									
239.5 22.2	DCPT Refusal End of Borehole									

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC

RECORD OF DCPT NO. 5

LVM | MERLEX

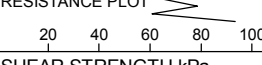
REFERENCE	<u>10/07/10131-F3</u>	DATUM	<u>Geodetic</u>	LOCATION	<u>N 5379152.8 E 336719.2 - Taylor Township</u>	ORIGINATED BY	<u>JL</u>
PROJECT	<u>GWP 5217-08-00, Hwy 11, Passing Lane 3</u>			BOREHOLE TYPE	<u>Track Mounted CME 45B - Hollow Stem Augers</u>	COMPILED BY	<u>RG</u>
CLIENT	<u>MMM Group Ltd.</u>	DATE (Started)	<u>October 8, 2010</u>	TIME		CHECKED BY	<u>MAM</u>
		DATE (Completed)	<u>October 8, 2010</u>	(Completed)			

[illegible]

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF DCPT NO. 5****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379152.8 E 336719.2 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT MMM Group Ltd. DATE (Started) October 8, 2010 TIME
 DATE (Completed) October 8, 2010 (Completed) CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT  SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p — W — W _L WATER CONTENT (%)	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES						
	Continued from Previous Page										
							252				
							251				
							250				
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							248				
							247				
							246				
							245				
							244				
							243				
	Continued Next Page										

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

METRIC**RECORD OF DCPT NO. 5****LVM | MERLEX**

REFERENCE 10/07/10131-F3 DATUM Geodetic LOCATION N 5379152.8 E 336719.2 - Taylor Township ORIGINATED BY JL
 PROJECT GWP 5217-08-00, Hwy 11, Passing Lane 3 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT MMM Group Ltd. DATE (Started) October 8, 2010 TIME
 DATE (Completed) October 8, 2010 (Completed) CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA (SI CL)
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES			20	40					
	Continued from Previous Page						242							
241.2 21.8	DCPT Refusal End of Borehole													

MEL-GEO 10131 - AREA 13 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 2/22/12

Appendix C

Borehole Location Plan Labwork

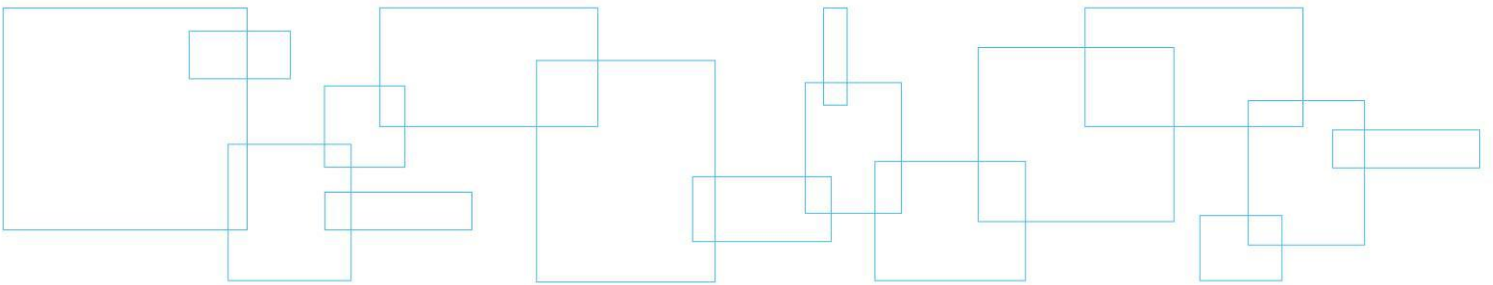
Figure No. F3-1 and F3-2: Borehole Location and Soil Strata

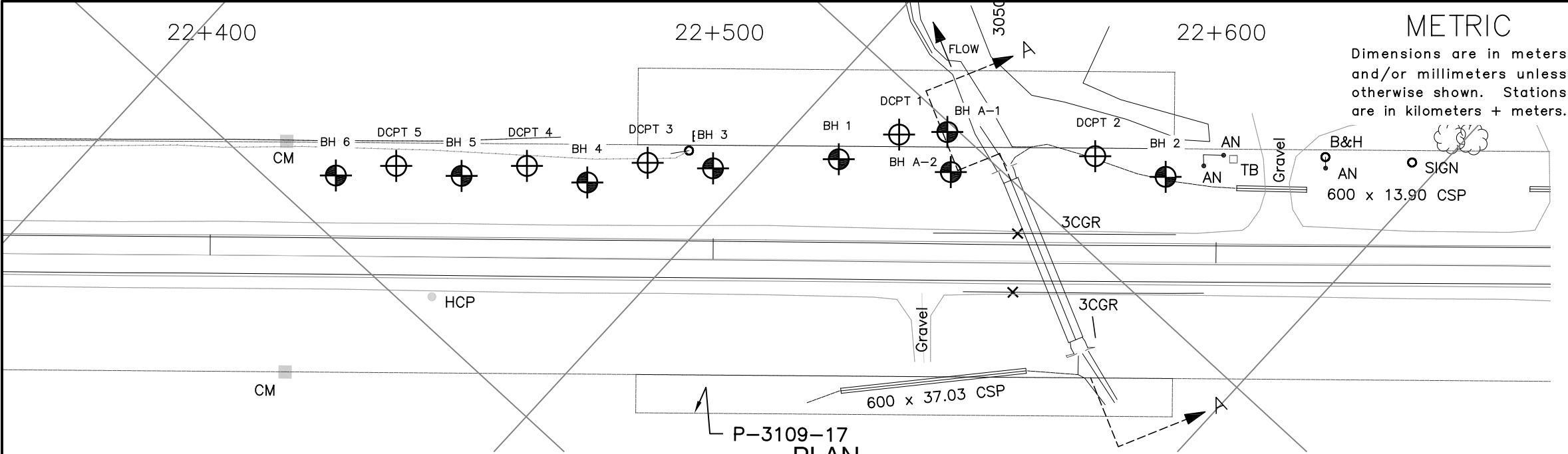
Figure Nos. L-1 to L-11: Summary Grain Size Analysis Graph

Figure Nos. L-12 and L-16: Plasticity Chart

Figure No. L-17: Shear Strength Chart

Figure Nos. L-18 and L-19: Consolidation Test Results





CONT No
WP No 5219-08-01
Geocres No 42A-89

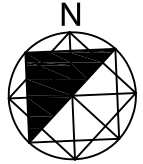
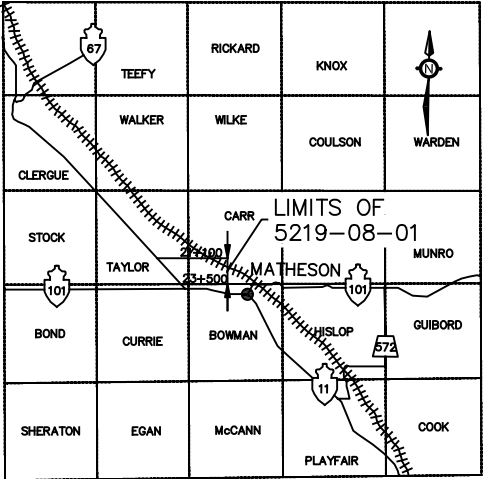


Figure
F3-1

HWY NO. 11 – Township of Taylor




Passing Lane No. 3 – Site No. 39E-223/C
Russel Creek Culvert Extension – Station 22+565
BOREHOLE LOCATIONS & SOIL STRATA

LVM | MERLEX



KEY PLAN – NOT TO SCALE

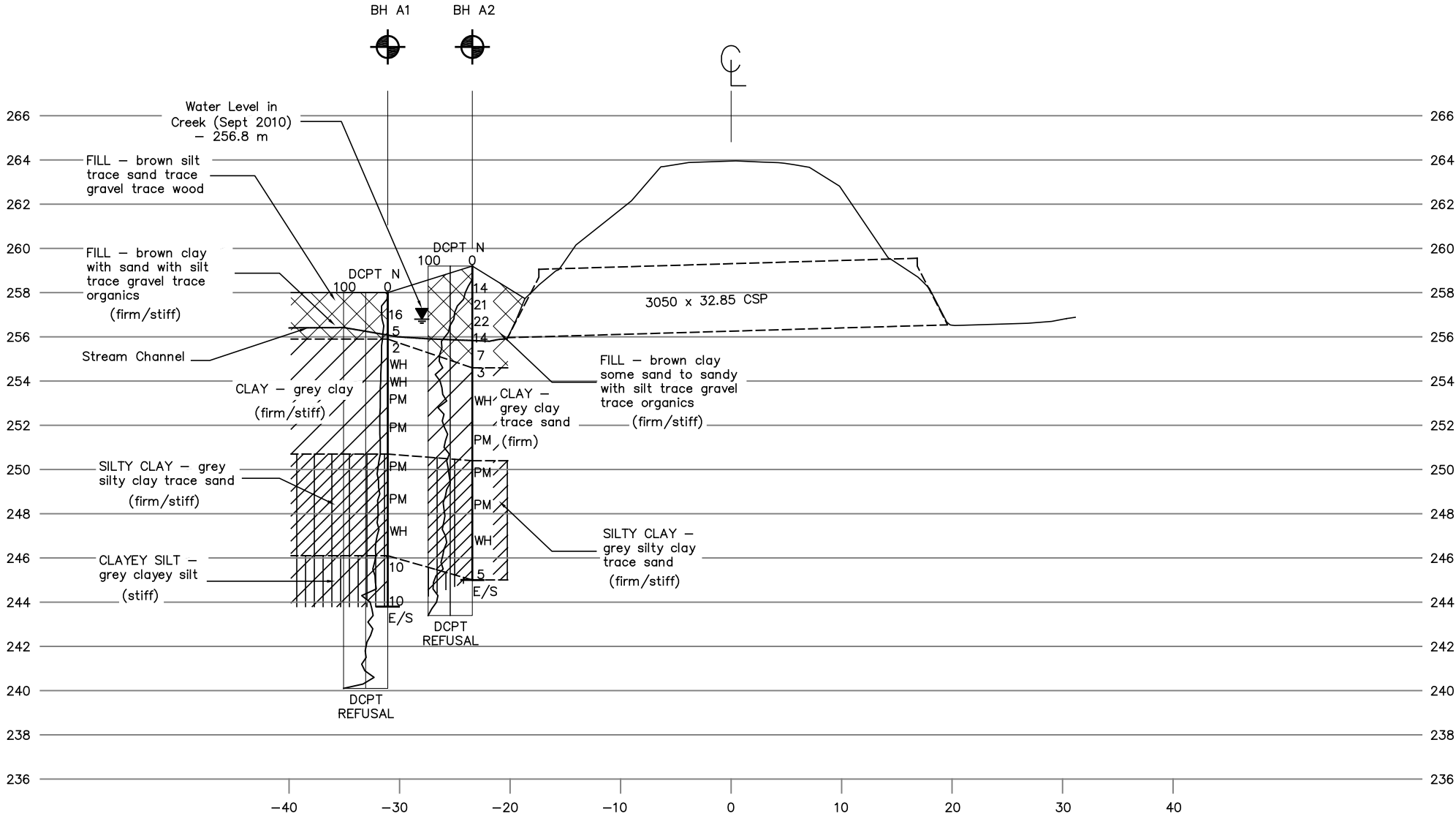
LEGEND

-  Borehole  Dynamic Cone Penetration Test
- "N" Blows/0.3 m (Std Pen Test, 475 J/blow)
- DCPT Blows/0.3 m (60° Cone, 475 J/blow)
-  Water Level at Time of Investigation
- A/R Auger Refusal at Elevation
- E/S End of Sampling

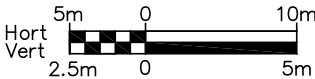
Borehole No.	Elev.	O/S	Co-ordinates	
			Northerly	Easterly
Borehole No. A-1	258.0	27m Lt	5379076.7	336798.4
Borehole No. A-2	259.2	18m Lt	5379070.8	336793.0

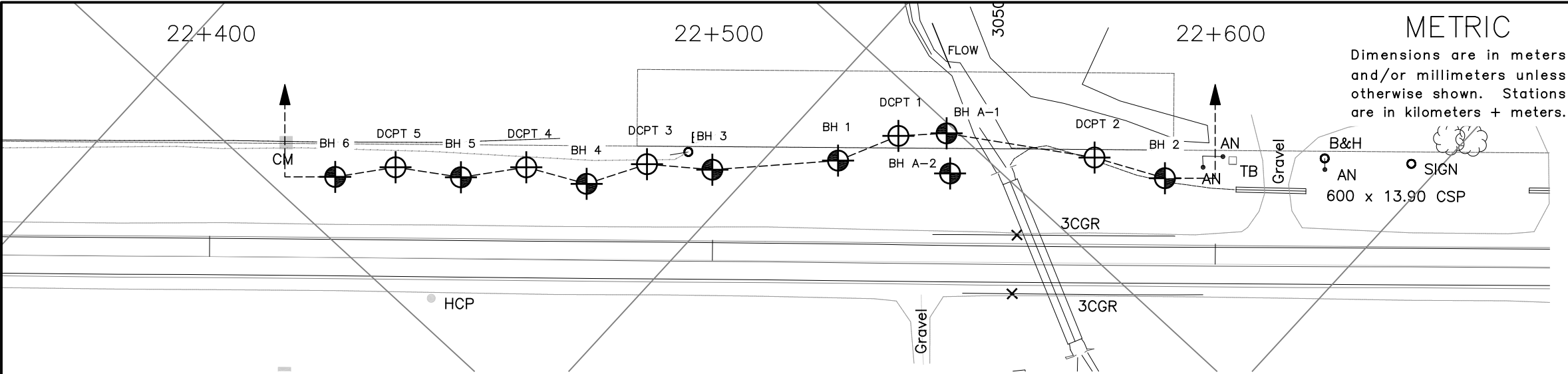
NOTE 1:
The boundaries between soil strata have been established at the borehole locations only. The boundaries illustrated and stratigraphy between boreholes on this drawing are assumed based on borehole data and may vary. They are intended for design only.

REVISIONS	DATE	BY	DESCRIPTION
	Feb 2012	MCM	FINAL
HWY No. 11 – Station 22+565 – Taylor Twp			REF: 10131-F3
SUBM'D			Passing Lane 3
DRAWN RG			CHK MAM
DATE December 2010			FIG F3-1



CULVERT SECTION A - A



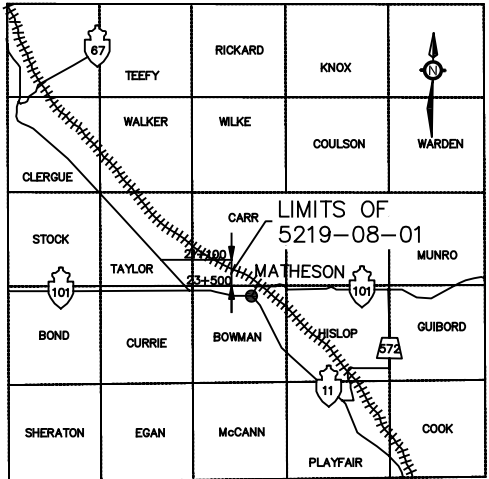


CONT No
WP No 5219-08-01
Geocres No 42A-89

HWY NO. 11 – Township of Taylor
Passing Lane No. 3
Embankment Widening – 22+450 to 22+590
BOREHOLE LOCATIONS & SOIL STRATA

Figure
F3-2

LVM | MERLEX



KEY PLAN – NOT TO SCALE

LEGEND

- Borehole Dynamic Cone Penetration Test
- "N" Blows/0.3 m (Std Pen Test, 475 J/blow)
- DCPT Blows/0.3 m (60° Cone, 475 J/blow)
- Water Level at Time of Investigation
- Auger Refusal at Elevation
- End of Sampling

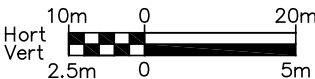
Borehole No.	Elev.	O/S	Co-ordinates	
			Northerly	Easterly
Borehole No. 1	261.4	20m Lt	5379086.8	336778.7
Borehole No. 2	261.7	17m Lt	5379033.4	336823.7
Borehole No. 3	262.0	18m Lt	5379108.2	336759.9
Borehole No. 4	263.6	15m Lt	5379118.7	336741.0
Borehole No. 5	263.0	16m Lt	5379139.6	336727.8
Borehole No. 6	263.6	16m Lt	5379161.9	336708.2
Borehole No. A-1	258.0	27m Lt	5379076.7	336798.4
Borehole No. A-2	259.2	18m Lt	5379070.8	336793.0
DCPT No. 1	259.4	25m Lt	5379083.5	336791.6
DCPT No. 2	259.9	21m Lt	5379051.8	336814.8
DCPT No. 3	261.8	19m Lt	5379116.5	336753.5
DCPT No. 4	261.7	18m Lt	5379133.7	336736.8
DCPT No. 5	263.0	18m Lt	5379152.8	336719.2

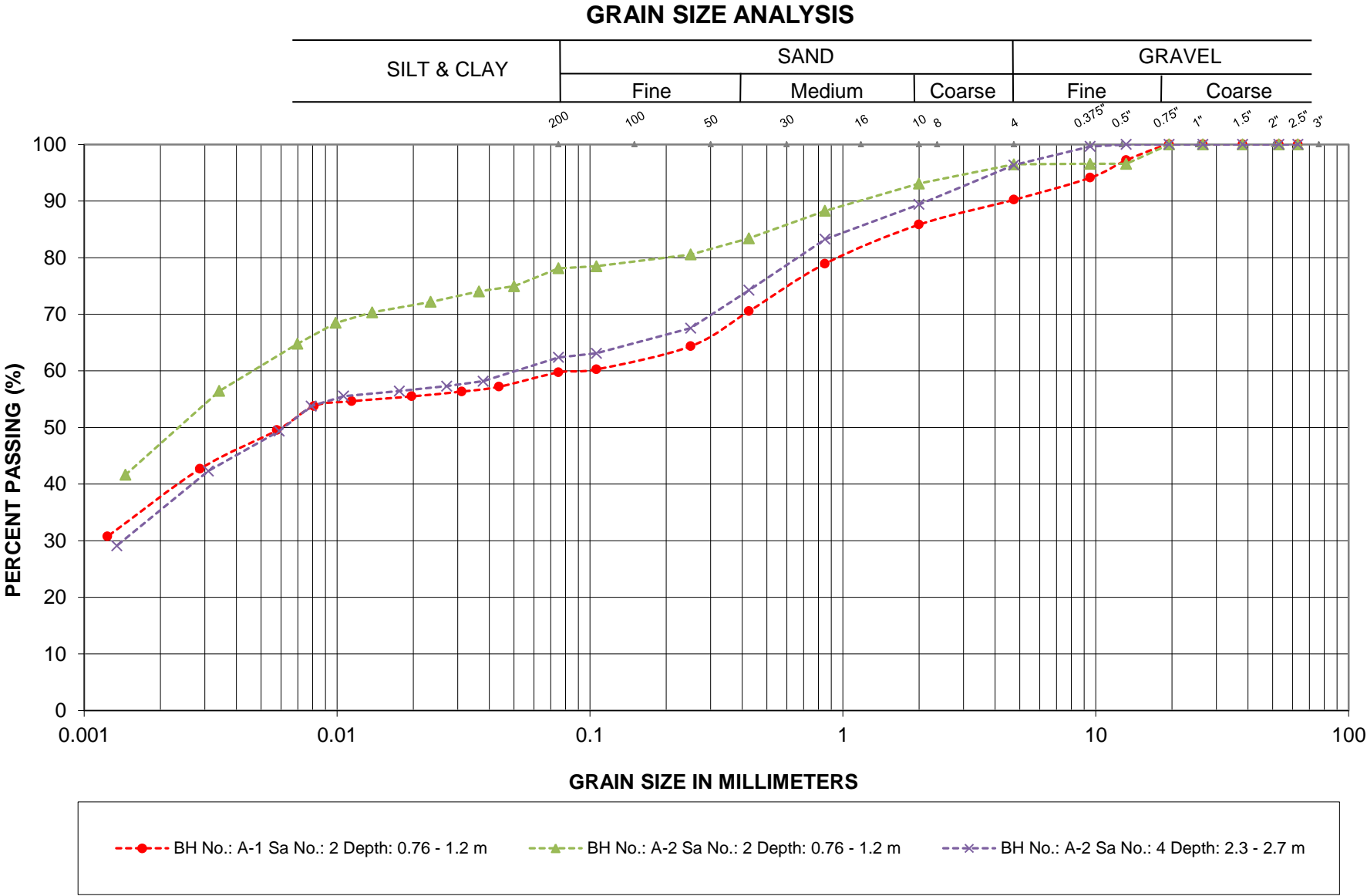
NOTE 1:
The boundaries between soil strata have been established at the borehole locations only. The boundaries illustrated and stratigraphy between boreholes on this drawing are assumed based on borehole data and may vary. They are intended for design only.

REVISIONS	DATE	BY	DESCRIPTION
	Feb 2012	MCM	FINAL
HWY No. 11 – Sta. 22+450–22+590 – Taylor Twp			REF: 10131-F3
SUBM'D			Passing Lane 3
DRAWN RG			CHK MAM
DATE December 2010			FIG F3-2



PROFILE

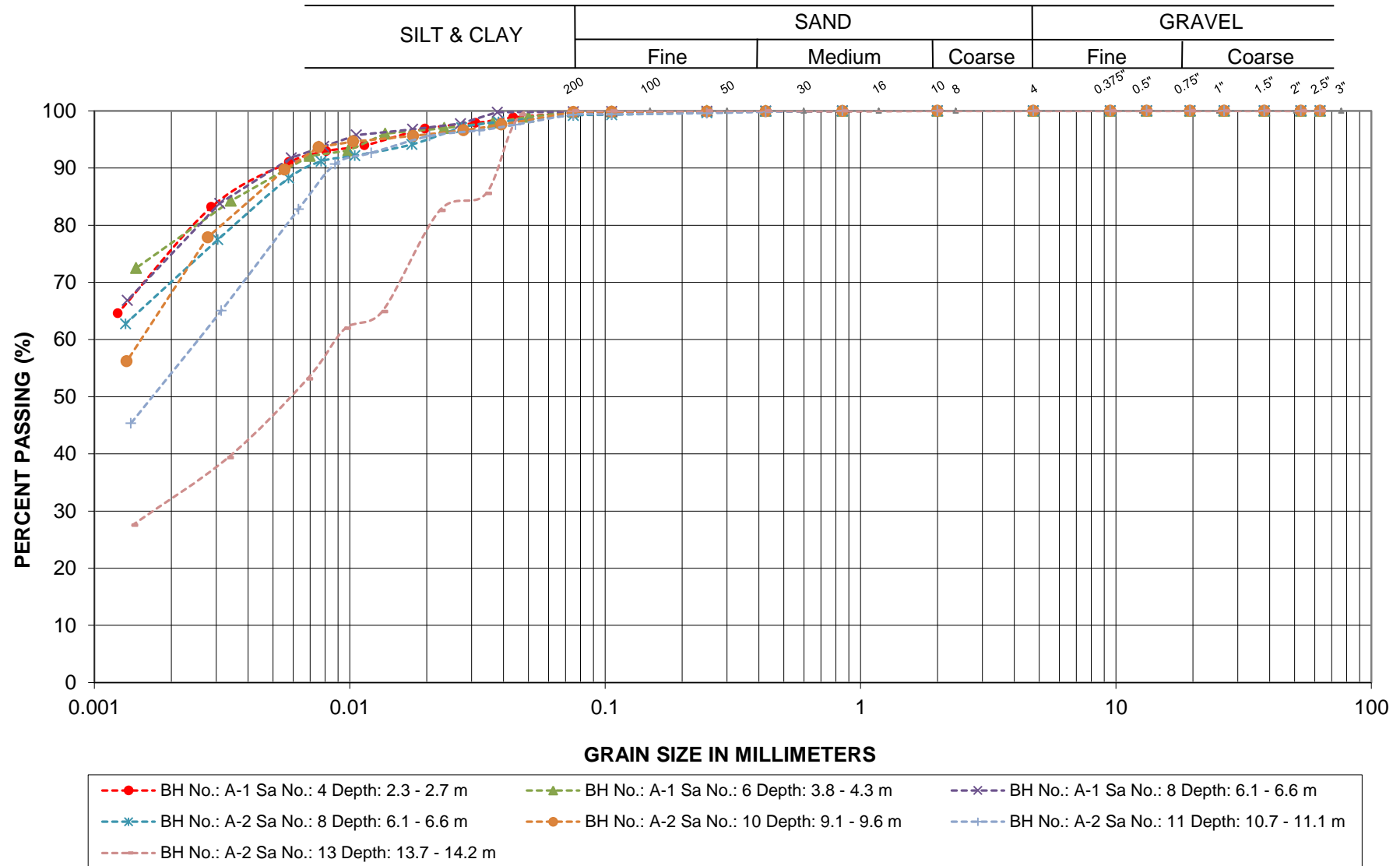




PROJECT: W.P. 5219-08-01
LOCATION: Hwy 11 Passing Lane 3

FILL
LVM | MERLEX

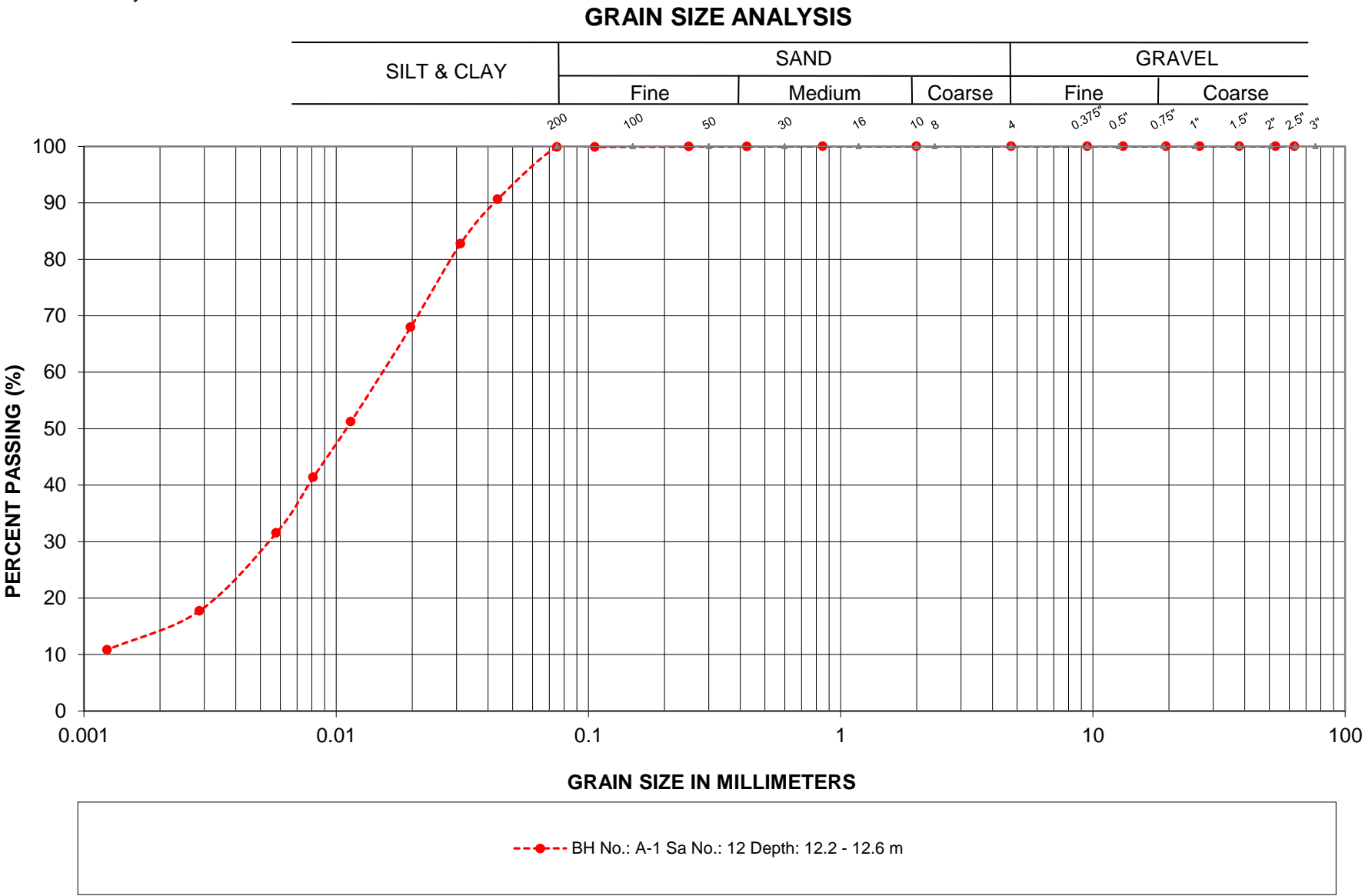
FIGURE L-1

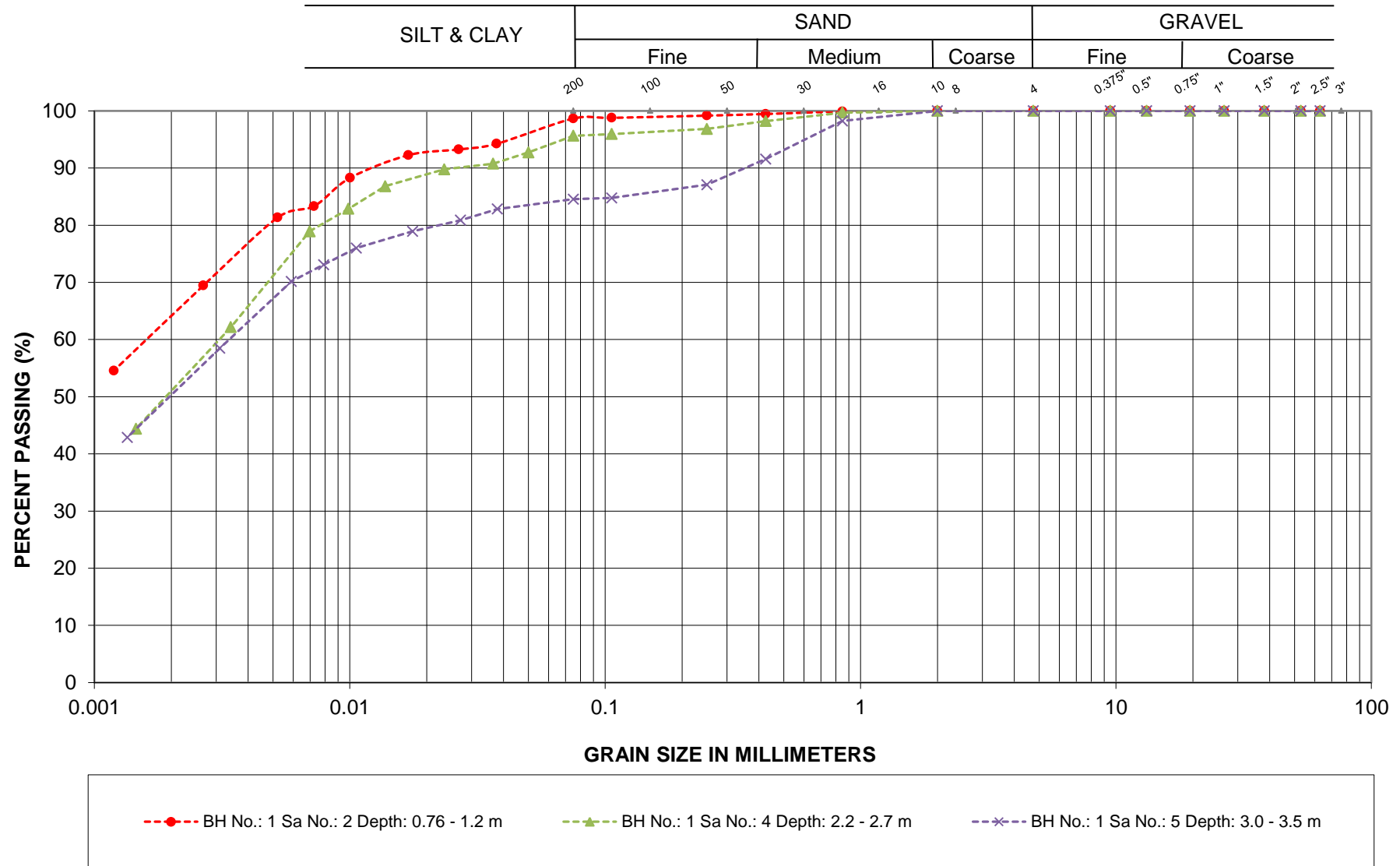
GRAIN SIZE ANALYSIS

PROJECT: W.P. 5219-08-01
 LOCATION: Hwy 11 Passing Lane 3

CLAY/SILTY CLAY
 LVM | MERLEX

FIGURE L-2

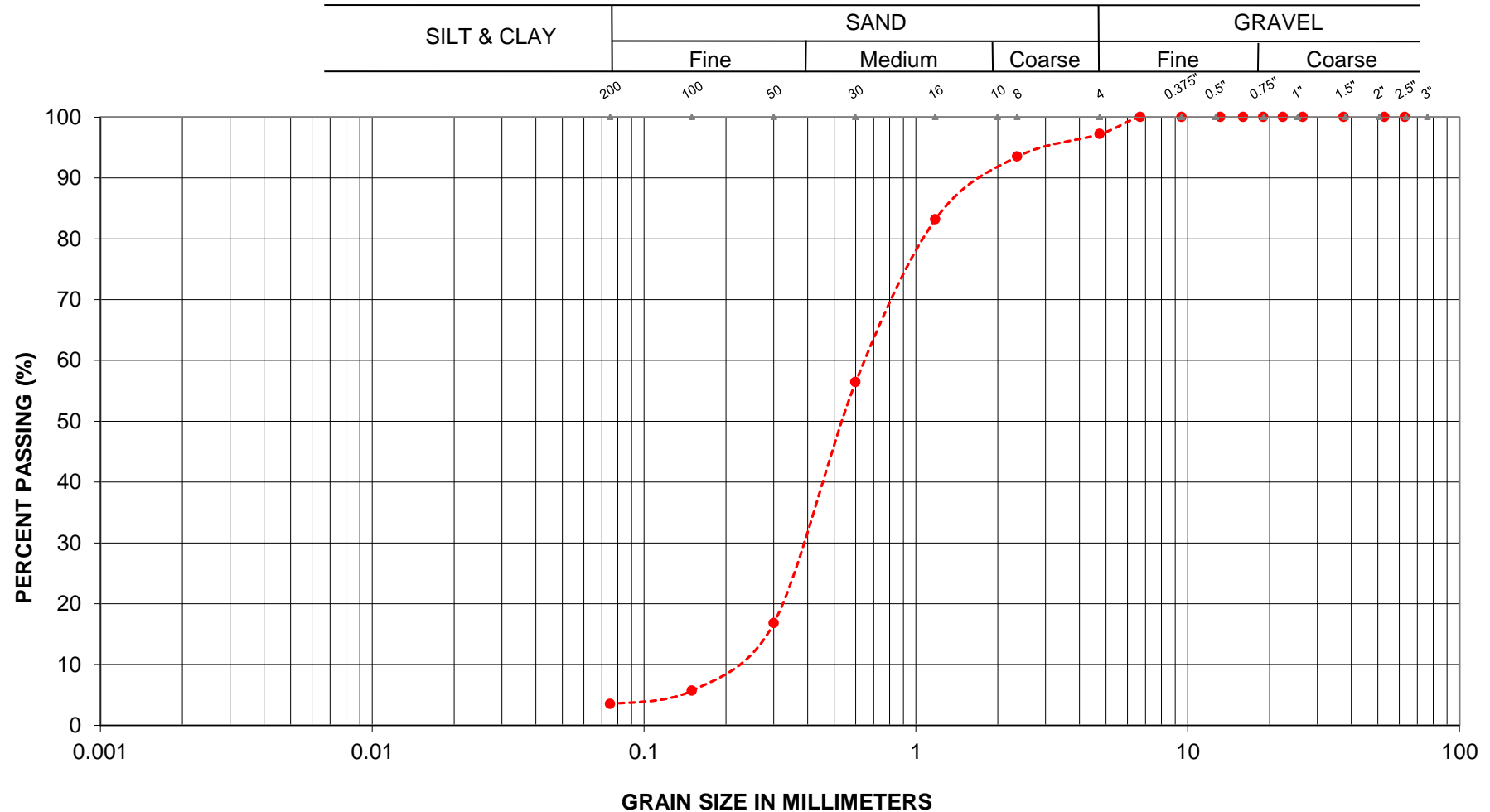


GRAIN SIZE ANALYSIS

PROJECT: W.P. 5219-08-01
 LOCATION: Hwy 11 Passing Lane 3

SILTY CLAY
 LVM | MERLEX

FIGURE L-4

GRAIN SIZE ANALYSIS

---●--- BH No.: 1 Sa No.: 6 Depth: 3.8 - 4.3 m

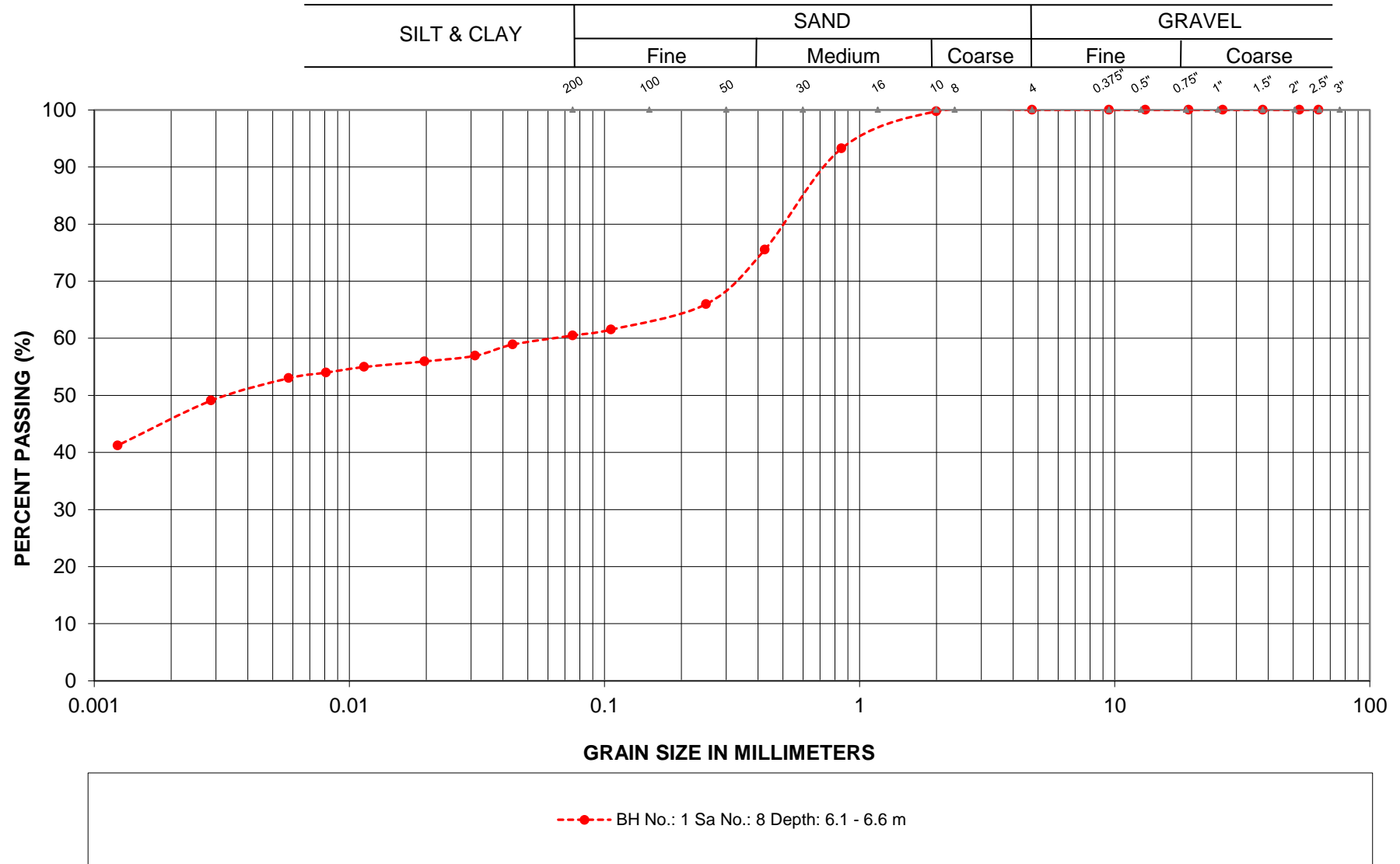
PROJECT: W.P. 5219-08-01
 LOCATION: Hwy 11 Passing Lane 3

SAND

LVM | MERLEX

FIGURE L-5

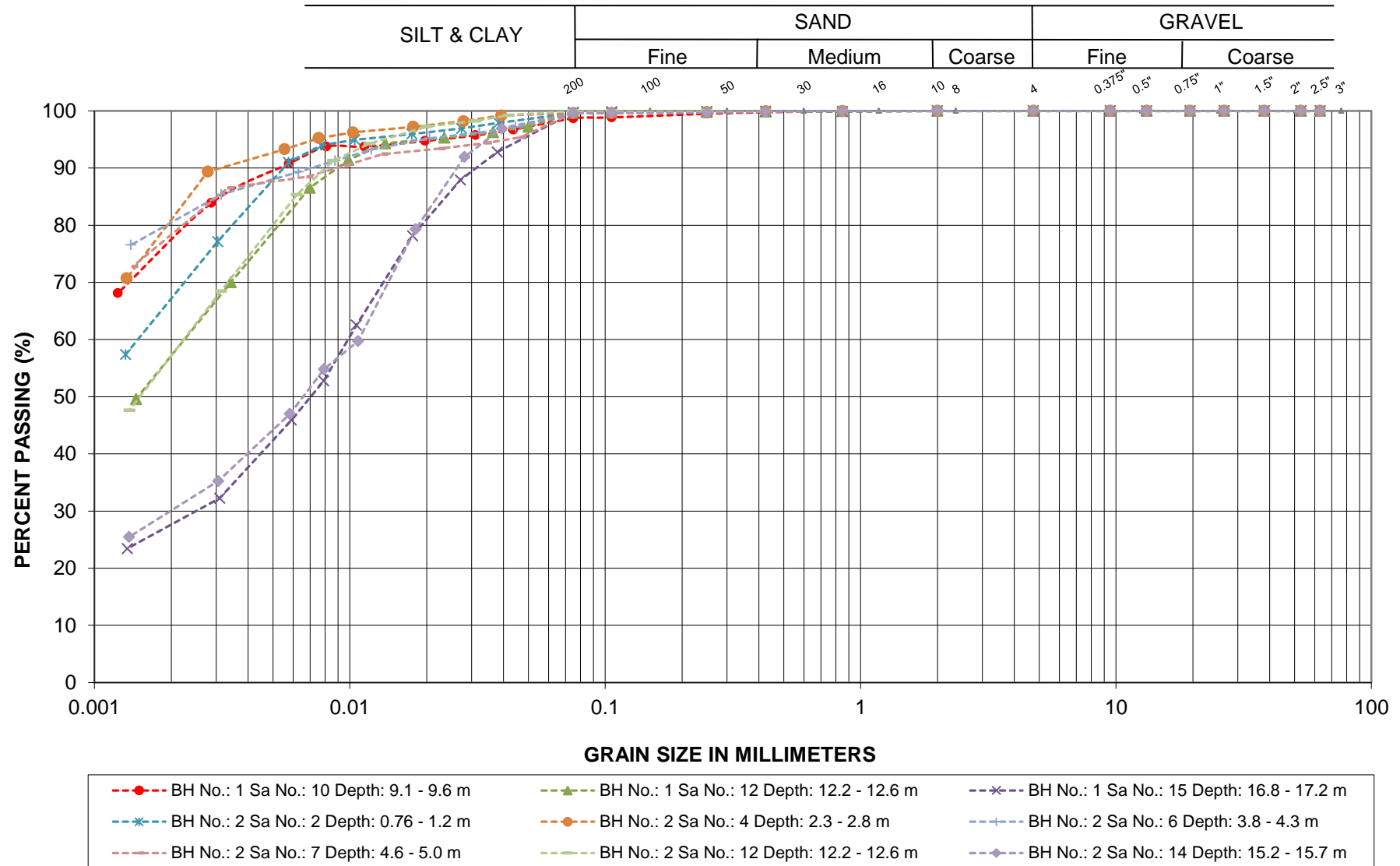
GRAIN SIZE ANALYSIS



PROJECT: W.P. 5219-08-01
LOCATION: Hwy 11 Passing Lane 3

SANDY CLAY
LVM | MERLEX

FIGURE L-6

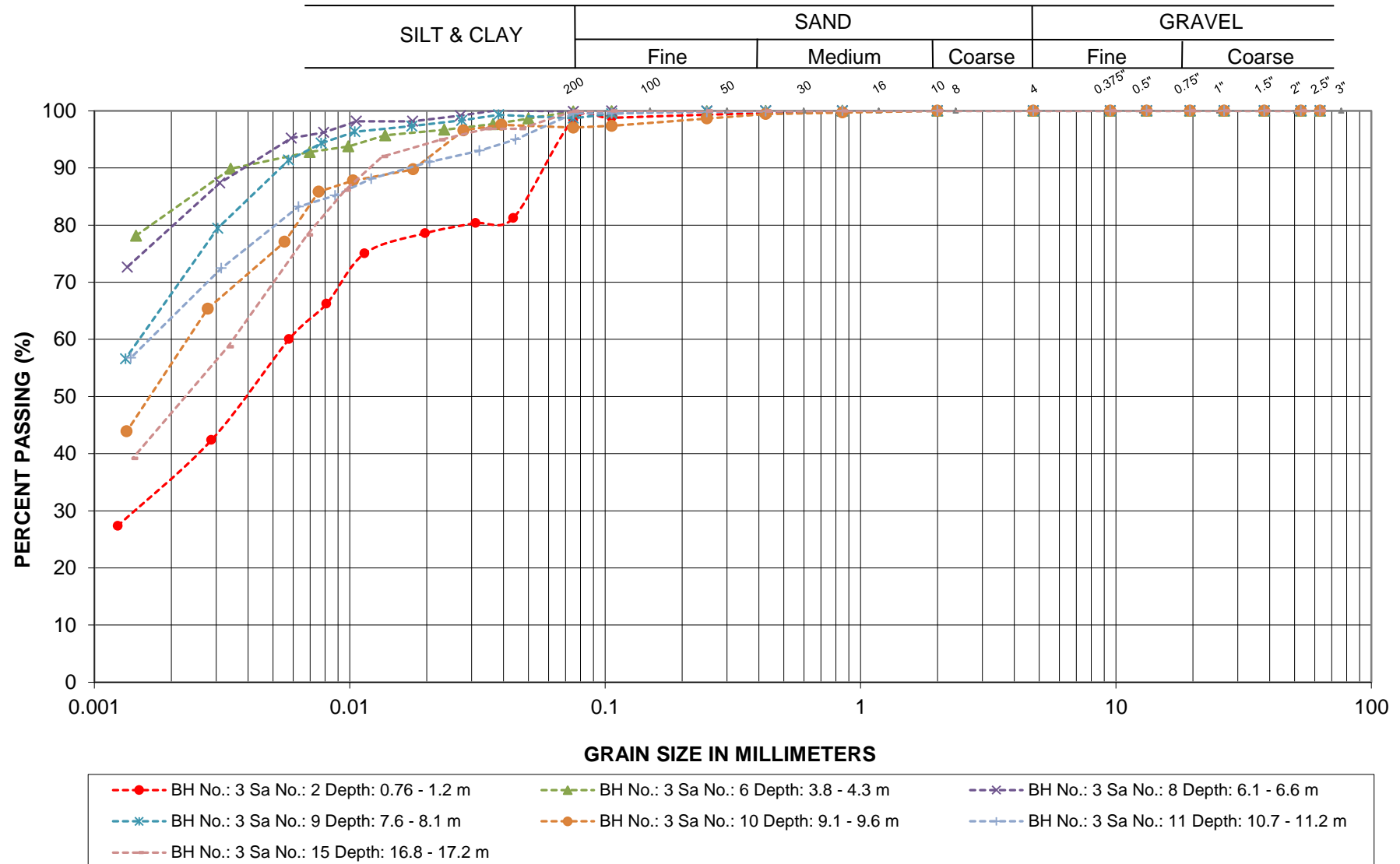
GRAIN SIZE ANALYSIS

PROJECT: W.P. 5219-08-01
 LOCATION: Hwy 11 Passing Lane 3

CLAY/SILTY CLAY
 LVM | MERLEX

FIGURE L-7

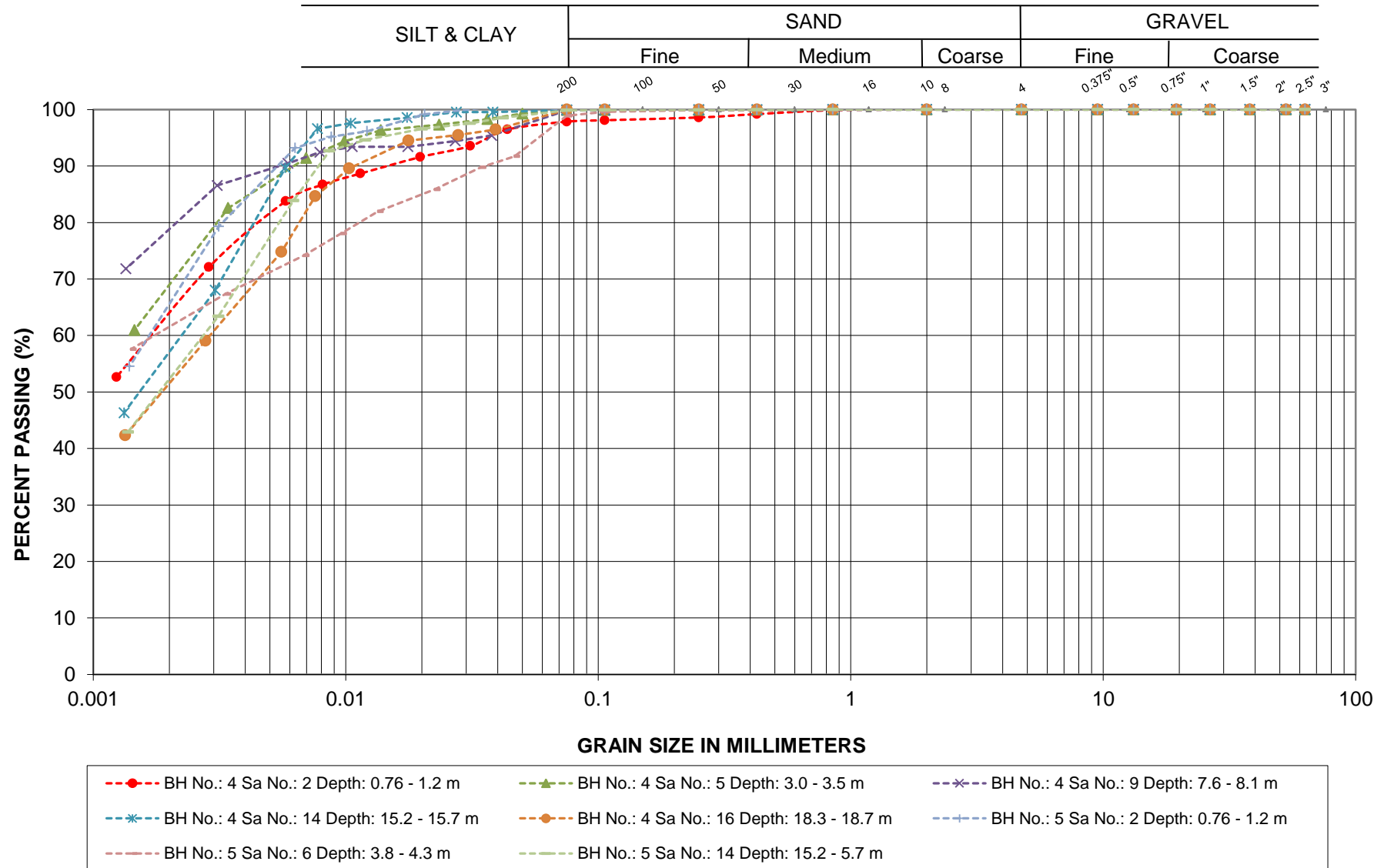
GRAIN SIZE ANALYSIS



PROJECT: W.P. 5219-08-01
LOCATION: Hwy 11 Passing Lane 3

CLAY/SILTY CLAY
LVM | MERLEX

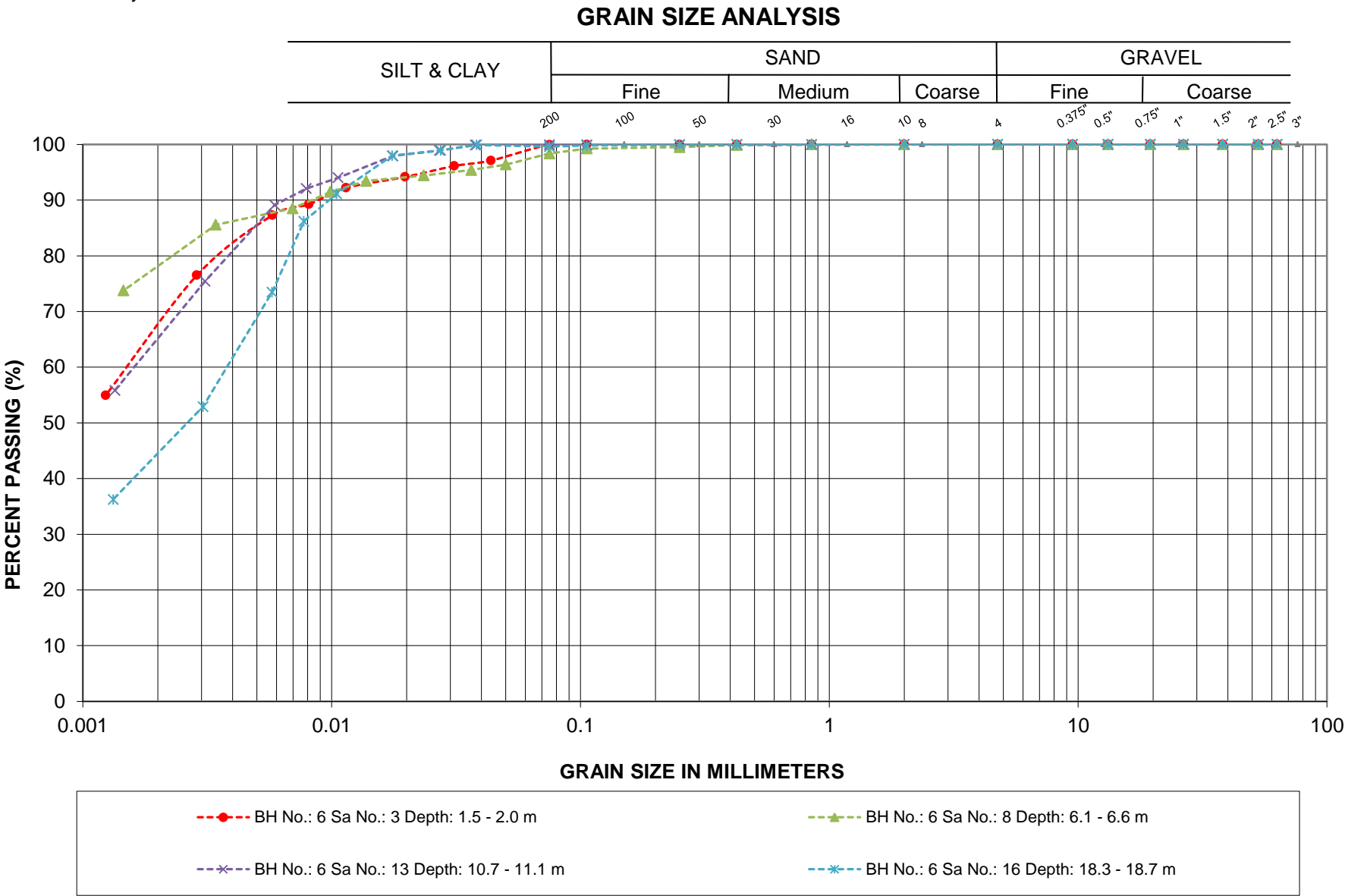
FIGURE L-8

GRAIN SIZE ANALYSIS

PROJECT: W.P. 5219-08-01
 LOCATION: Hwy 11 Passing Lane 3

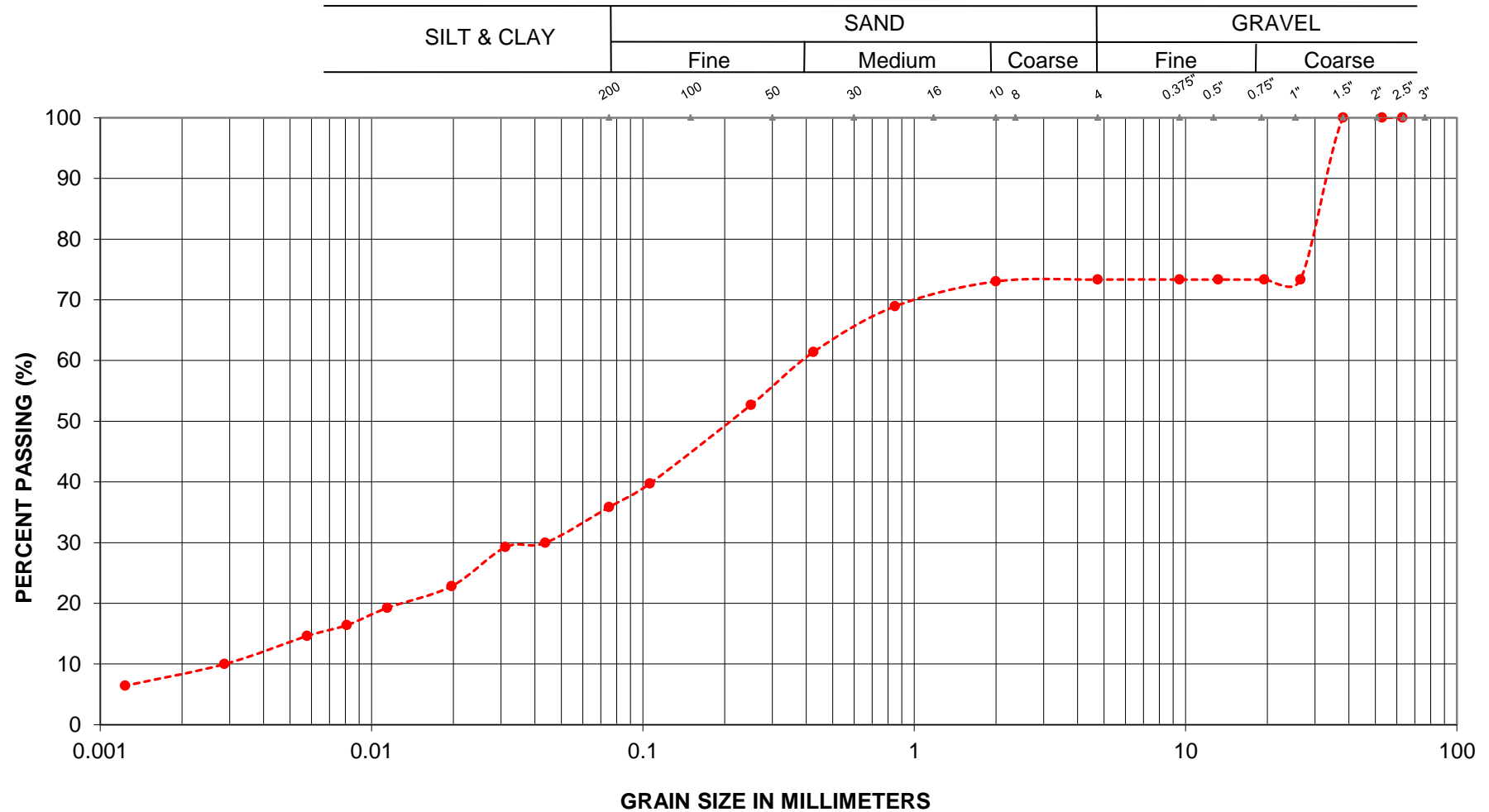
CLAY/SILTY CLAY
 LVM | MERLEX

FIGURE L-9



CLAY/SILTY CLAY
LVM | MERLEX

GRAIN SIZE ANALYSIS

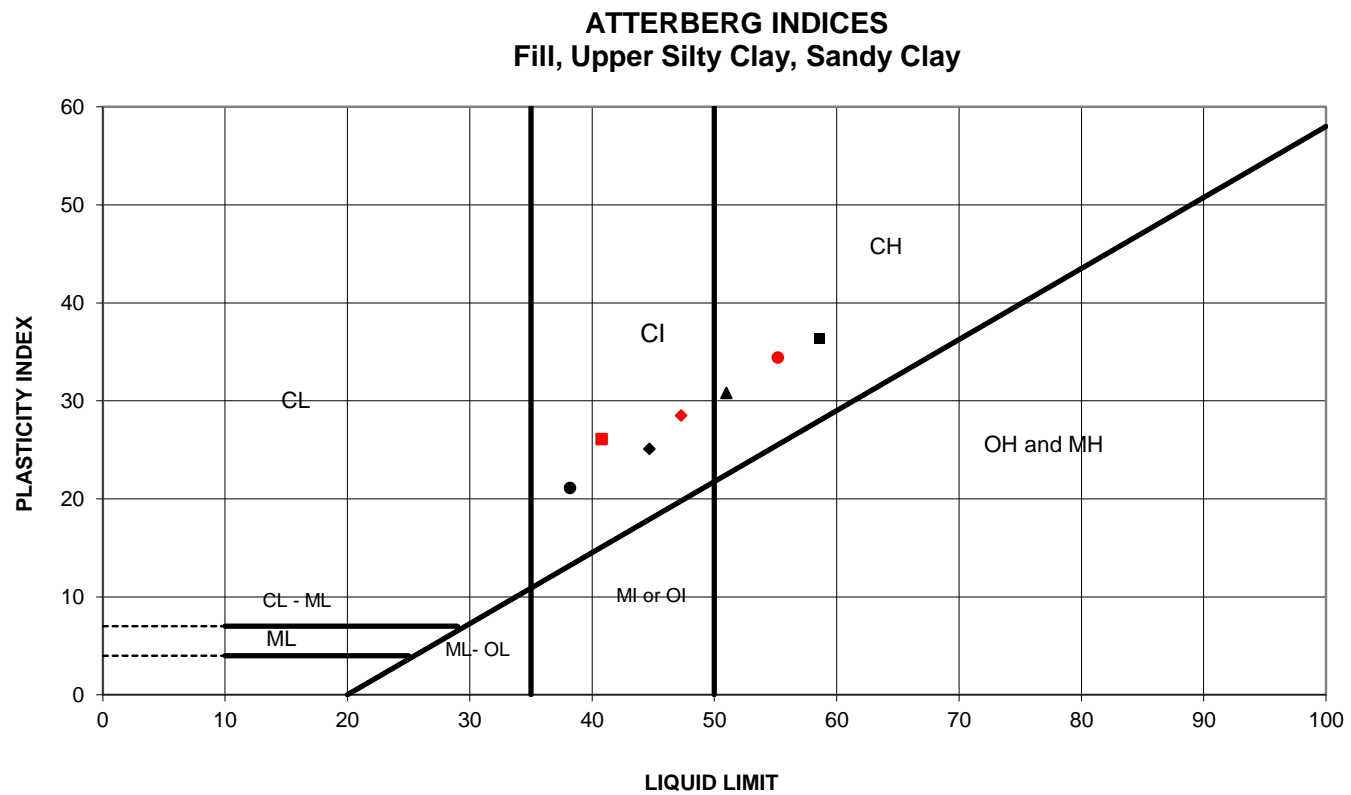


---●--- BH No.: 2 Sa No.: 16 Depth: 18.3 - 18.7 m

SAND

ATTERBERG LIMITS TEST RESULTS

FIGURE L-12



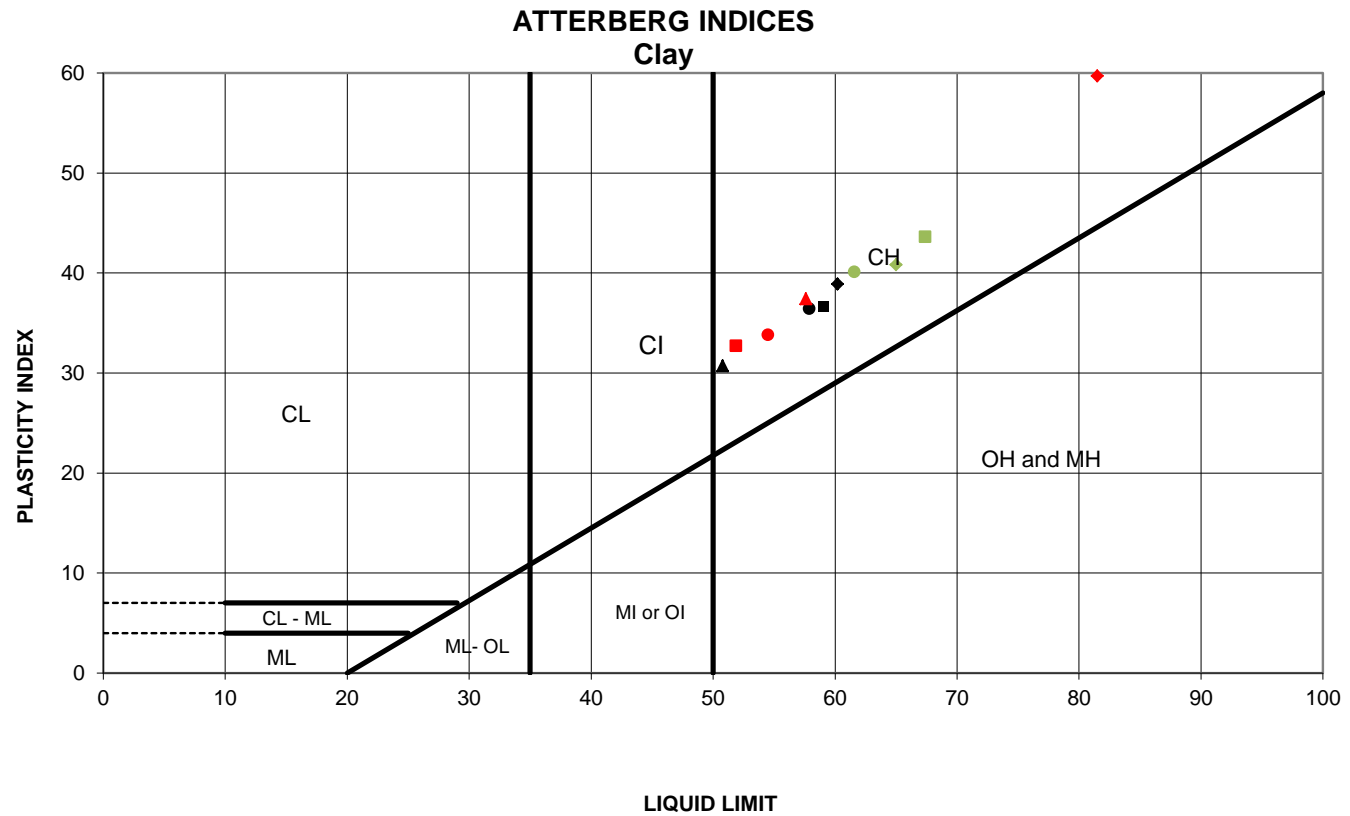
SYMBOL	BH	Sa. No.	Depth(m)	Elev.(m)	Liquid Limit	Plastic Limit	Plasticity Index	NMC %
●	A-1	2	0.8	258.4	38.2	17.1	21.1	15.0
◆	A-2	2	0.8	257.2	44.7	19.6	25.1	24.1
■	A-2	4	2.3	255.7	58.6	22.2	36.4	19.6
▲	1	2	0.8	260.6	51.0	20.2	30.8	26.4
●	1	4	2.3	259.1	55.2	20.8	34.4	28.4
■	1	5	3.0	258.4	47.3	18.8	28.5	30.3
▲	1	8	6.1	255.3	40.8	14.7	26.1	49.2

Date: Feb-12
Project: Northbound Passing Lane 3
W.P: 5219-08-01

Prep'd: AT
Chkd: RG
Ref. No.: 10/07/10131-F3

ATTERBERG LIMITS TEST RESULTS

FIGURE L-13



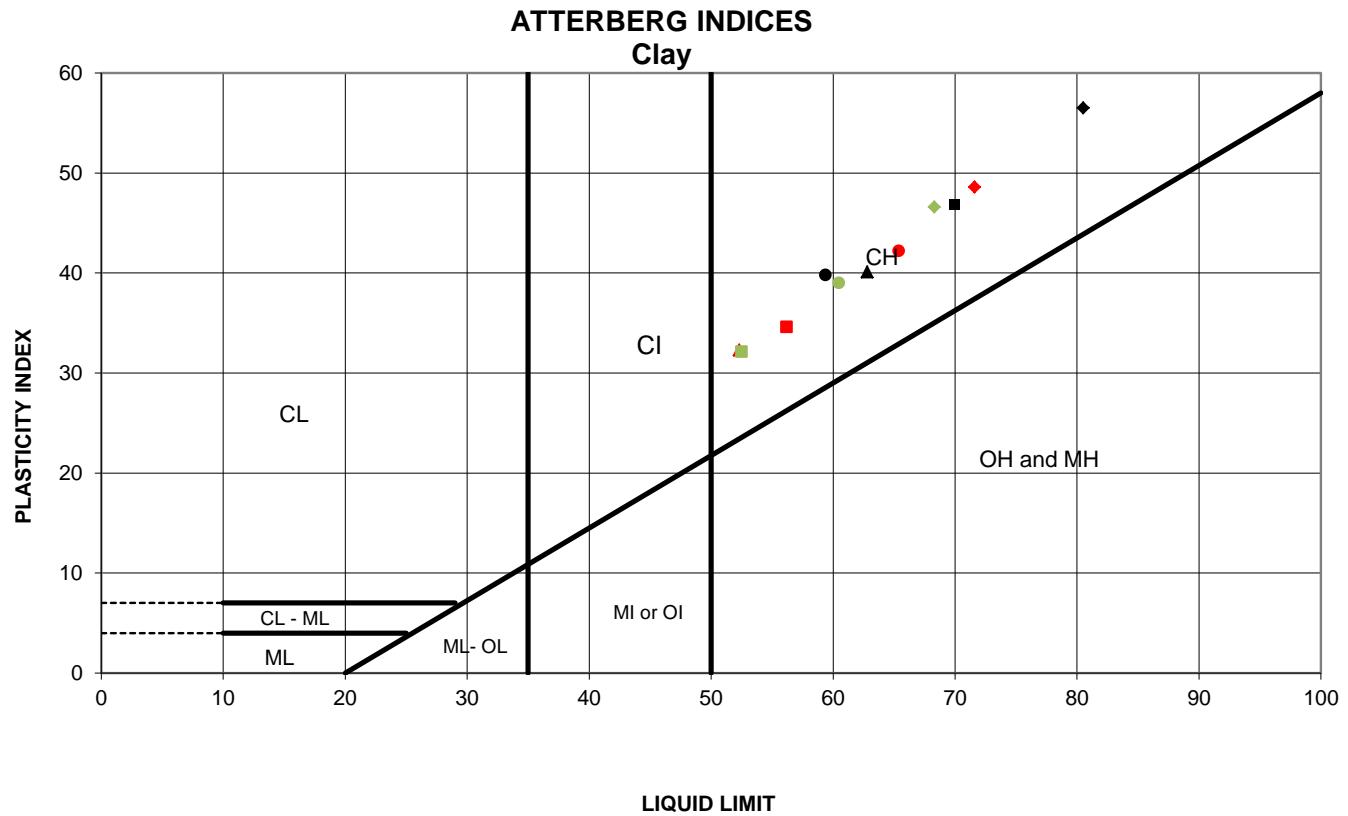
SYMBOL	BH	Sa. No.	Depth(m)	Elev.(m)	Liquid Limit	Plastic Limit	Plasticity Index	NMC %
●	A-1	4	2.3	256.9	57.9	21.5	36.4	51.7
◆	A-1	6	3.8	255.4	60.2	21.3	38.9	51.7
■	A-1	8	6.1	253.1	59.1	22.5	36.6	61.1
▲	A-2	8	6.1	251.9	50.8	20.1	30.7	59.1
●	A-2	9	7.6	250.4	54.5	20.7	33.8	63.0
◆	1	10	9.1	252.3	81.5	21.8	59.7	63.0
■	1	12	12.2	249.2	51.9	19.2	32.7	50.9
▲	2	2	0.8	260.9	57.6	20.2	37.4	41.6
●	2	4	2.3	259.4	61.6	21.5	40.1	56.5
◆	2	6	3.8	257.9	65.0	24.2	40.8	66.4
■	2	7	4.6	257.1	67.4	23.8	43.6	66.2

Date: Feb-12
 Project: Northbound Passing Lane 3
 W.P: 5219-08-01

Prep'd: AT
 Chkd: RG
 Ref. No.: 10/07/10131-F3

ATTERBERG LIMITS TEST RESULTS

FIGURE L-14



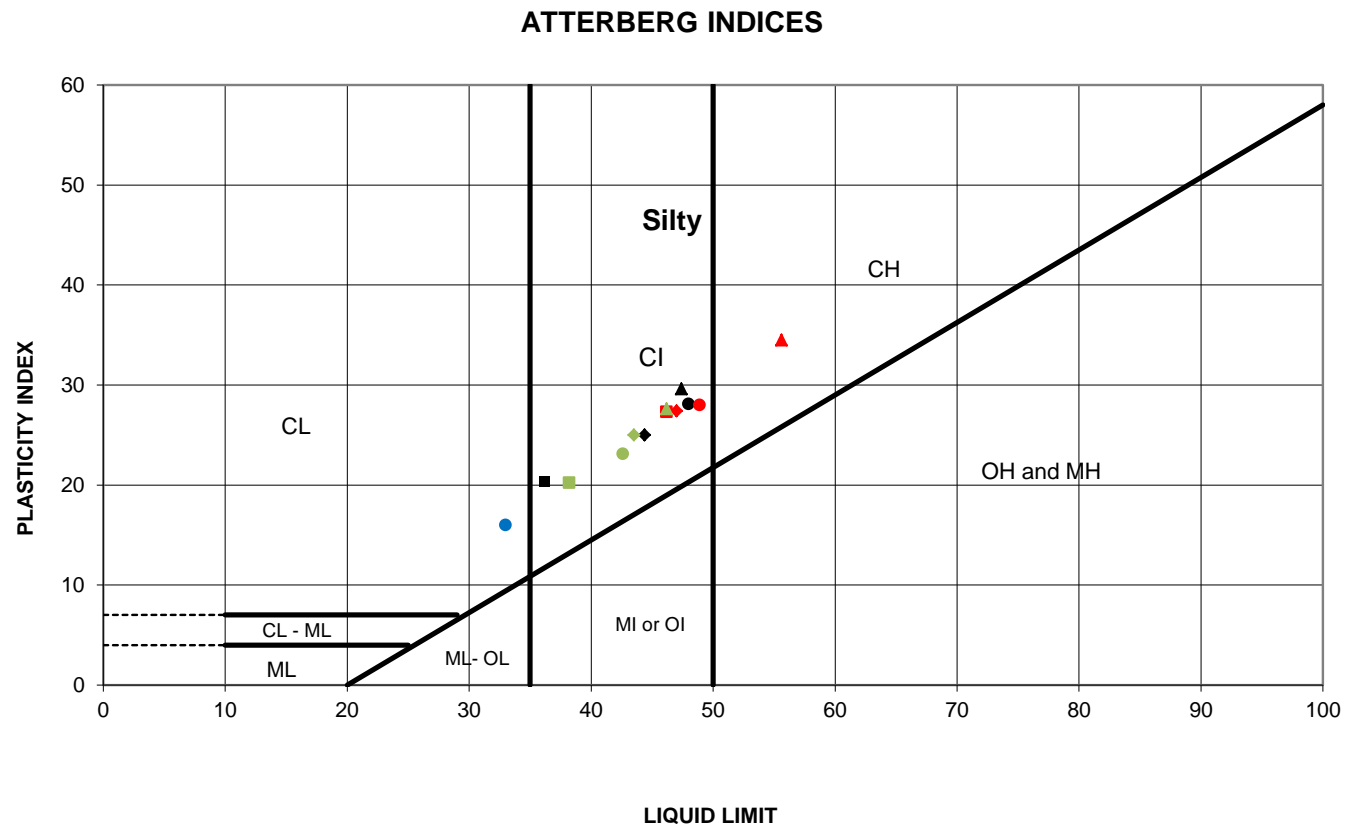
SYMBOL	BH	Sa. No.	Depth(m)	Elev.(m)	Liquid Limit	Plastic Limit	Plasticity Index	NMC %
●	3	2	0.8	261.2	59.4	19.6	39.8	23.7
◆	3	6	3.8	258.2	80.5	24.0	56.5	64.5
■	3	8	6.1	255.9	70.0	23.2	46.8	61.4
▲	4	2	0.8	262.8	62.8	22.7	40.1	32.4
●	4	5	3.0	260.6	65.4	23.2	42.2	52.6
◆	4	9	7.6	256.0	71.6	23.0	48.6	64.7
■	5	2	0.8	262.2	56.2	21.6	34.6	34.7
▲	5	6	3.8	259.2	52.3	20.0	32.3	62.0
●	6	3	1.5	262.1	60.5	21.5	39.0	38.3
◆	6	8	6.1	257.5	68.3	21.7	46.6	65.7
■	6	13	13.7	249.9	52.5	20.4	32.1	57.9

Date: Feb-12
 Project: Northbound Passing Lane 3
 W.P: 5219-08-01

Prep'd: AT
 Chkd: RG
 Ref. No.: 10/07/10131-F3

ATTERBERG LIMITS TEST RESULTS

FIGURE L-15



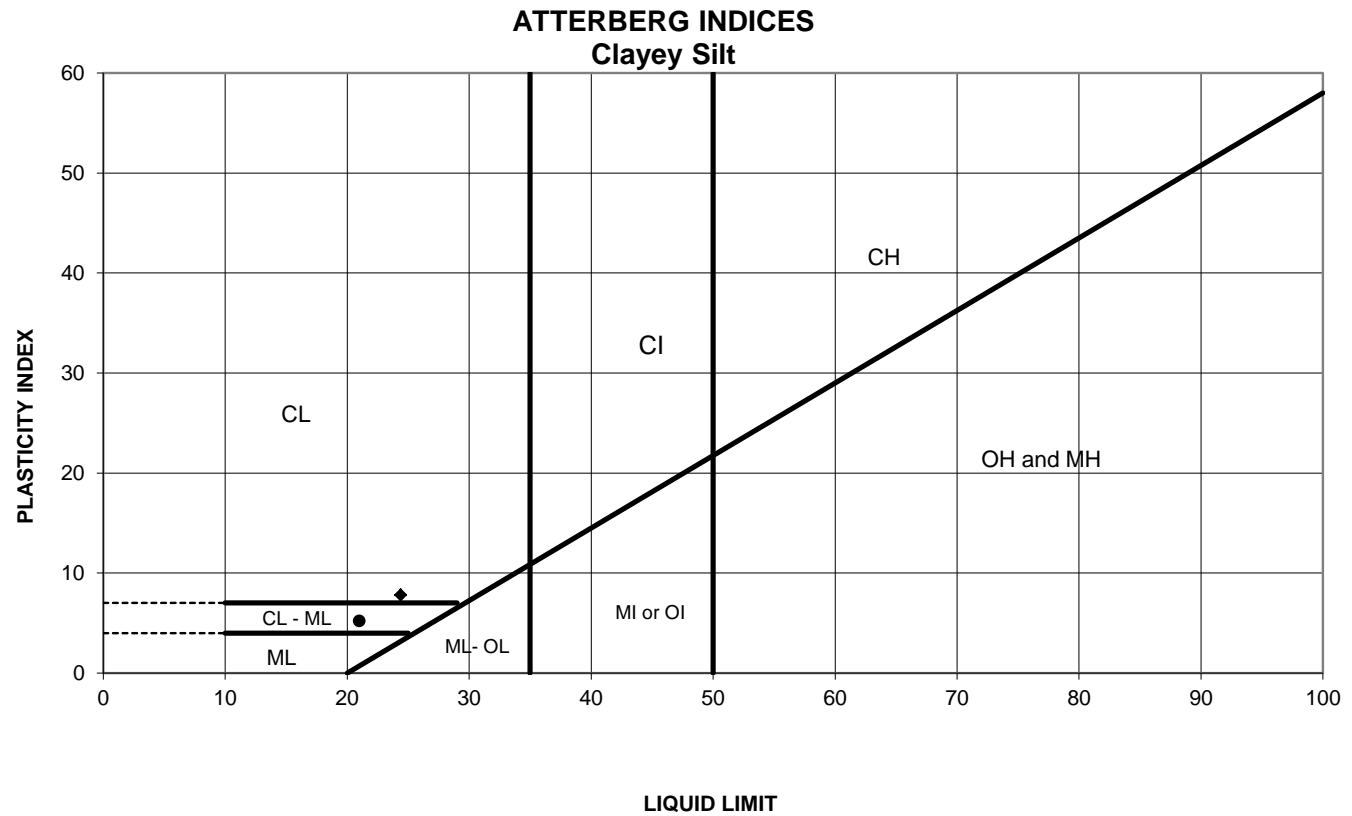
SYMBOL	BH	Sa. No.	Depth(m)	Elev.(m)	Liquid Limit	Plastic Limit	Plasticity Index	NMC %
●	A-2	10	9.1	248.9	48.0	19.9	28.1	50.0
◆	A-2	11	10.7	247.3	44.4	19.4	25.0	47.7
■	A-2	13	13.7	244.3	36.2	15.9	20.3	36.7
▲	1	15	16.8	244.6	47.4	17.8	29.6	28.0
●	2	12	12.2	249.5	48.9	20.9	28.0	40.6
◆	3	9	7.6	254.4	47.0	19.6	27.4	51.3
■	3	10	9.1	252.9	46.2	18.9	27.3	47.6
▲	3	11	10.7	251.3	55.6	21.1	34.5	59.1
●	3	15	16.8	245.2	42.6	19.5	23.1	61.5
◆	4	14	15.2	248.4	43.5	18.5	25.0	37.9
■	4	16	18.3	245.3	38.2	18.0	20.2	38.7
▲	5	14	15.2	247.8	46.2	18.6	27.6	44.1
●	6	16	18.3	245.3	33.0	17.0	16.0	31.1

Date: Feb-12
 Project: Northbound Passing Lane 3
 W.P.: 5219-08-01

Prep'd: AT
 Chkd: RG
 Ref. No.: 10/07/10131-F3

ATTERBERG LIMITS TEST RESULTS

FIGURE L-16

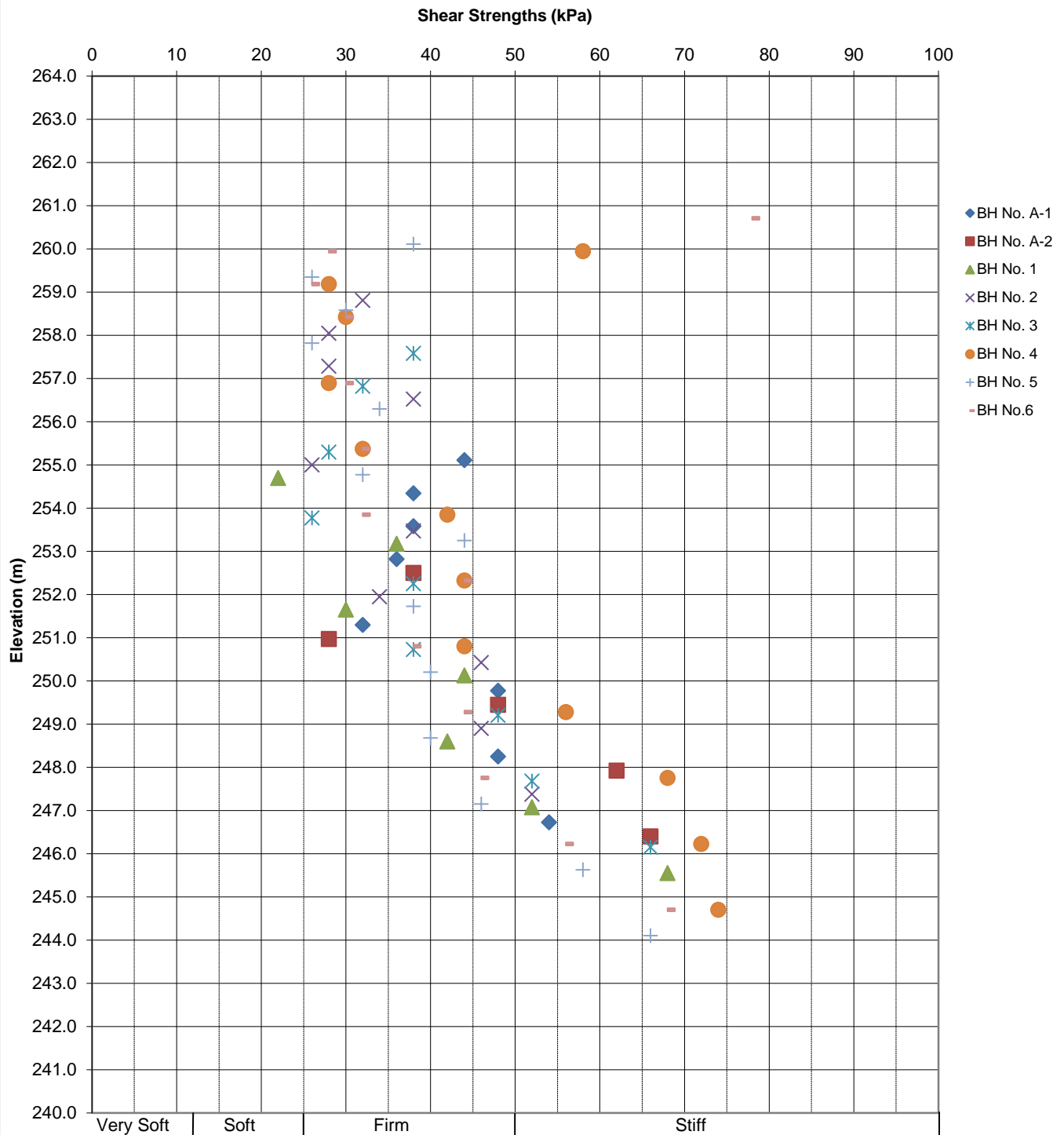


SYMBOL	BH	Sa. No.	Depth(m)	Elev.(m)	Liquid Limit	Plastic Limit	Plasticity Index	NMC %
●	A-1	12	12.2	247.0	21.0	15.8	5.2	46.6
◆	2	14	15.2	246.5	24.4	16.6	7.8	36.5

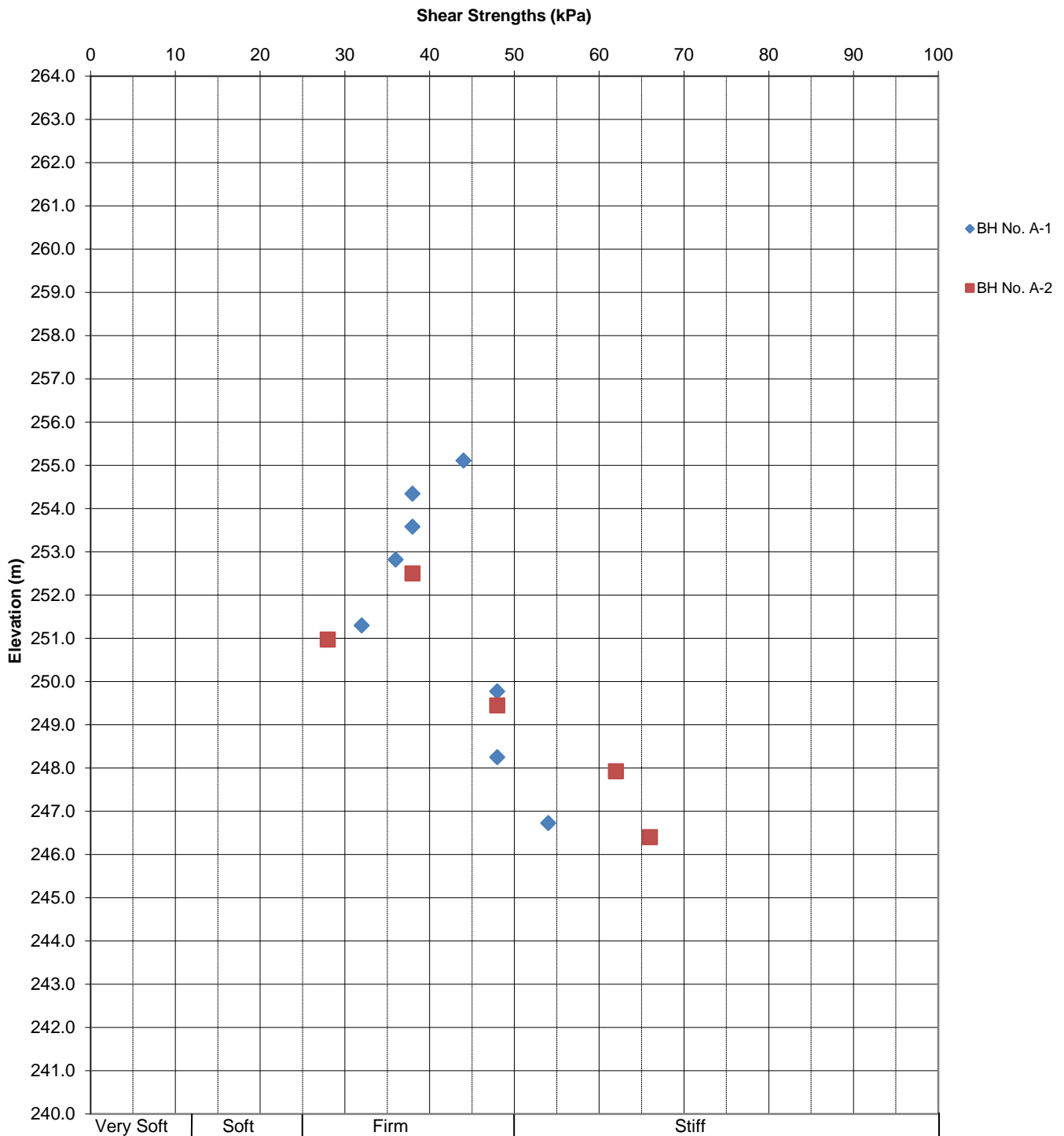
Date: Feb-12
 Project: Northbound Passing Lane 3
 W.P: 5219-08-01

Prep'd: AT
 Chkd: RG
 Ref. No.: 10/07/10131-F3

In-Situ Shear Strengths vs. Depth



In-Situ Shear Strengths vs. Depth



Date: February 2012

Project: 10/07/10131-F3

WP: 5219-08-01

LVM | MERLEX

Checked: MAM

CONSOLIDATION TEST SUMMARY**FIGURE L-18a****SAMPLE IDENTIFICATION**

Project Number	10-1183-0107	Sample Number	9
Borehole Number	A-2	Sample Depth, m	7.6

TEST CONDITIONS

Test Type	Standard	Load Duration, hr	24
Oedometer Number	4		
Date Started	12/3/2010		
Date Completed	12/20/2010		

SAMPLE DIMENSIONS AND PROPERTIES - INITIAL

Sample Height, cm	2.54	Unit Weight, kN/m ³	16.55
Sample Diameter, cm	6.30	Dry Unit Weight, kN/m ³	10.36
Area, cm ²	31.19	Specific Gravity, measured	2.73
Volume, cm ³	79.17	Solids Height, cm	0.982
Water Content, %	59.70	Volume of Solids, cm ³	30.64
Wet Mass, g	133.59	Volume of Voids, cm ³	48.52
Dry Mass, g	83.65	Degree of Saturation, %	102.9

TEST COMPUTATIONS

Pressure kPa	Corr. Height cm	Void Ratio	Average Height cm	t ₉₀ sec	c _v cm ² /s	m _v m ² /kN	k cm/s
0.00	2.538	1.584	2.538				
5.00	2.537	1.583	2.538	5	2.73E-01	7.88E-05	2.11E-06
9.99	2.535	1.581	2.536	73	1.87E-02	1.66E-04	3.03E-07
20.00	2.524	1.569	2.529	595	2.28E-03	4.33E-04	9.67E-08
40.03	2.497	1.542	2.510	759	1.76E-03	5.31E-04	9.16E-08
79.79	2.444	1.488	2.470	1852	6.99E-04	5.26E-04	3.60E-08
160.00	2.320	1.361	2.382	2269	5.30E-04	6.10E-04	3.17E-08
320.00	2.083	1.120	2.201	4133	2.49E-04	5.83E-04	1.42E-08
640.00	1.916	0.950	1.999	2306	3.67E-04	2.06E-04	7.41E-09
1280.00	1.784	0.816	1.850	1185	6.12E-04	8.12E-05	4.87E-09
2557.23	1.670	0.700	1.727	735	8.60E-04	3.52E-05	2.96E-09
1280.00	1.682	0.712	1.676				
320.00	1.727	0.758	1.704				
79.79	1.787	0.819	1.757				
20.00	1.845	0.878	1.816				
5.00	1.896	0.930	1.871				

Note:
k calculated using c_v based on t₉₀ values.

SAMPLE DIMENSIONS AND PROPERTIES - FINAL

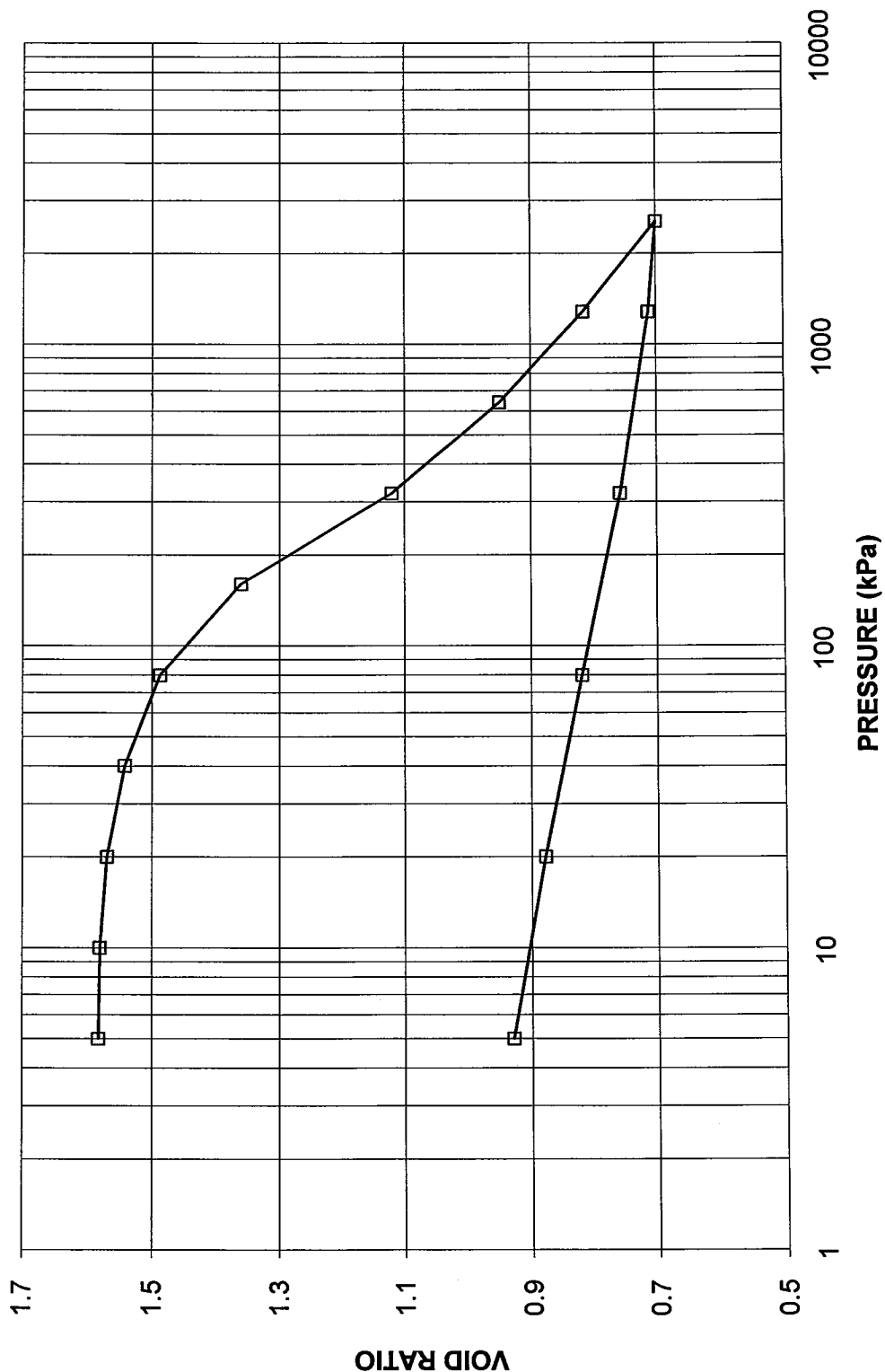
Sample Height, cm	1.90	Unit Weight, kN/m ³	18.93
Sample Diameter, cm	6.30	Dry Unit Weight, kN/m ³	13.87
Area, cm ²	31.19	Specific Gravity, measured	2.73
Volume, cm ³	59.14	Solids Height, cm	0.982
Water Content, %	36.50	Volume of Solids, cm ³	30.64
Wet Mass, g	114.18	Volume of Voids, cm ³	28.50
Dry Mass, g	83.65		

**CONSOLIDATION TEST
VOID RATIO VS LOG PRESSURE**

FIGURE L-18b

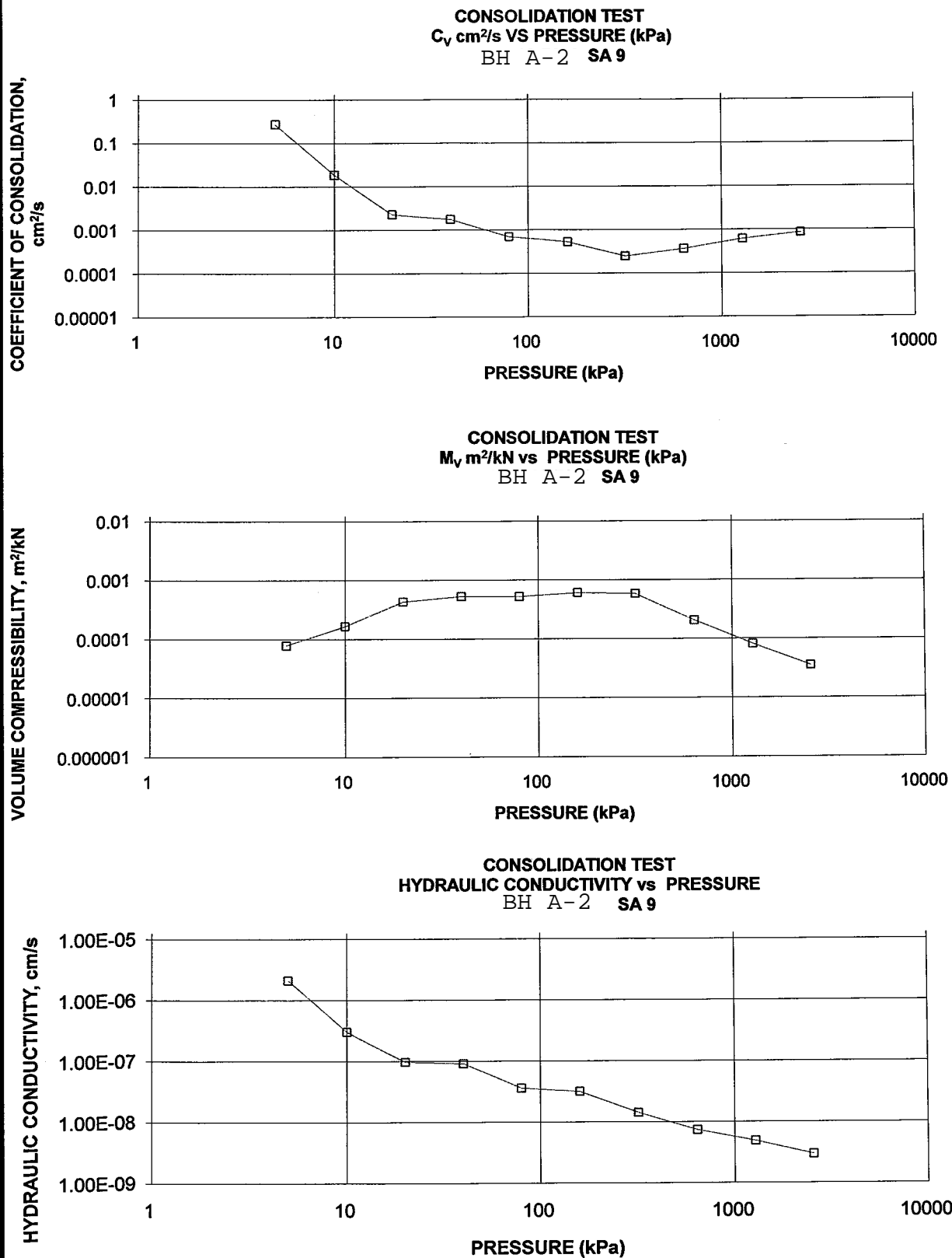
**CONSOLIDATION TEST
VOID RATIO vs PRESSURE
SA 9**

BH A-2



CONSOLIDATION TEST SUMMARY

FIGURE L-18c



CONSOLIDATION TEST SUMMARY**FIGURE L-19a****SAMPLE IDENTIFICATION**

Project Number	10-1183-0107	Sample Number	9
Borehole Number	BH 3	Sample Depth, m	7.6

TEST CONDITIONS

Test Type	Standard	Load Duration, hr	24
Oedometer Number	12		
Date Started	12/3/2010		
Date Completed	12/21/2010		

SAMPLE DIMENSIONS AND PROPERTIES - INITIAL

Sample Height, cm	2.55	Unit Weight, kN/m ³	16.85
Sample Diameter, cm	6.34	Dry Unit Weight, kN/m ³	11.02
Area, cm ²	31.58	Specific Gravity, measured	2.76
Volume, cm ³	80.46	Solids Height, cm	1.038
Water Content, %	52.83	Volume of Solids, cm ³	32.77
Wet Mass, g	138.22	Volume of Voids, cm ³	47.70
Dry Mass, g	90.44	Degree of Saturation, %	100.2

TEST COMPUTATIONS

Pressure	Corr. Height	Void Ratio	Average Height	t ₉₀ sec	c _v cm ² /s	m _v m ² /kN	k cm/s
kPa	cm		cm				
0.00	2.548	1.456	2.548				
5.03	2.540	1.448	2.544	1215	1.13E-03	6.32E-04	6.99E-08
10.00	2.530	1.438	2.535	1949	6.99E-04	8.13E-04	5.57E-08
20.00	2.507	1.416	2.518	2614	5.14E-04	9.07E-04	4.57E-08
40.00	2.459	1.370	2.483	2323	5.62E-04	9.36E-04	5.16E-08
80.00	2.389	1.303	2.424	1882	6.62E-04	6.82E-04	4.42E-08
160.00	2.249	1.167	2.319	3286	3.47E-04	6.91E-04	2.35E-08
320.00	2.074	0.999	2.161	3025	3.27E-04	4.29E-04	1.37E-08
640.00	1.942	0.872	2.008	1815	4.71E-04	1.61E-04	7.44E-09
1280.00	1.826	0.759	1.884	984	7.65E-04	7.16E-05	5.36E-09
2556.39	1.720	0.658	1.773	735	9.07E-04	3.25E-05	2.88E-09
1280.00	1.726	0.663	1.723				
320.00	1.777	0.712	1.751				
80.00	1.829	0.762	1.803				
20.00	1.880	0.812	1.854				
5.03	1.924	0.854	1.902				

Note:

k calculated using c_v based on t₉₀ values.**SAMPLE DIMENSIONS AND PROPERTIES - FINAL**

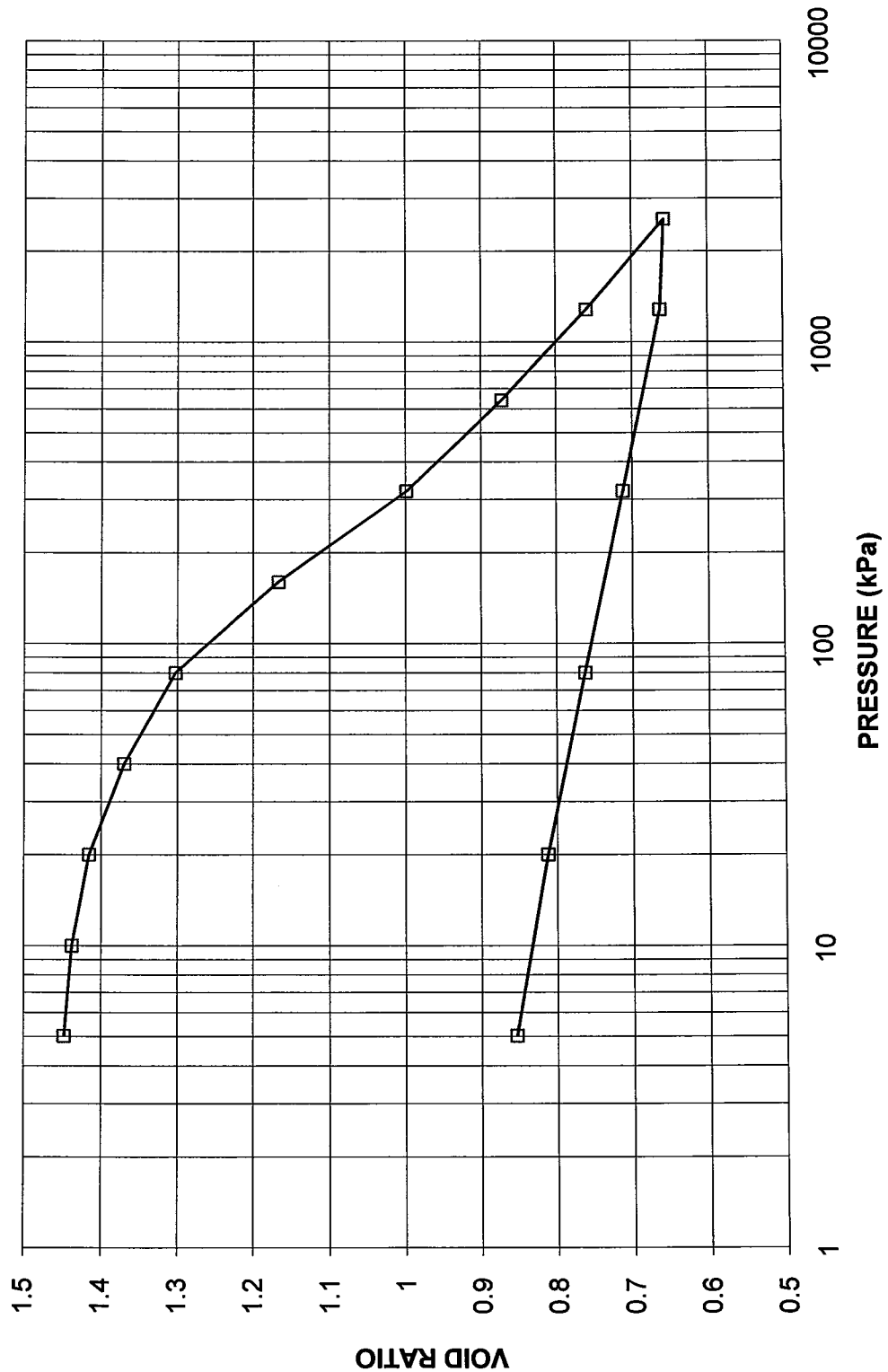
Sample Height, cm	1.92	Unit Weight, kN/m ³	19.43
Sample Diameter, cm	6.34	Dry Unit Weight, kN/m ³	14.60
Area, cm ²	31.58	Specific Gravity, measured	2.76
Volume, cm ³	60.75	Solids Height, cm	1.038
Water Content, %	33.06	Volume of Solids, cm ³	32.77
Wet Mass, g	120.34	Volume of Voids, cm ³	27.98
Dry Mass, g	90.44		



**CONSOLIDATION TEST
VOID RATIO VS LOG PRESSURE**

FIGURE L-19b

**CONSOLIDATION TEST
VOID RATIO vs PRESSURE
BH 3 SA 9**



Project No. 10-1183-0107

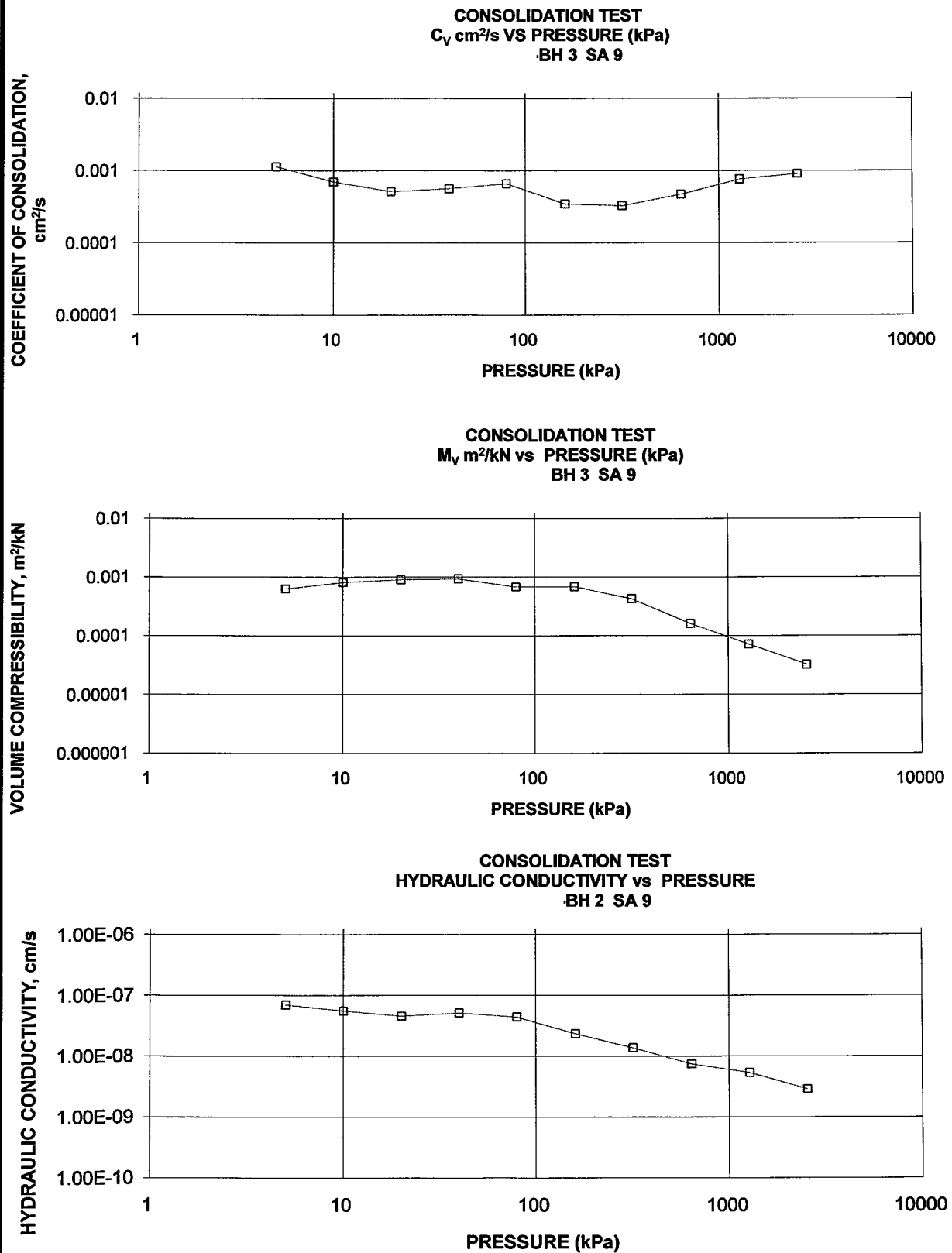
Prepared By: LFG

Golder Associates

Checked By: *[Signature]*

CONSOLIDATION TEST SUMMARY

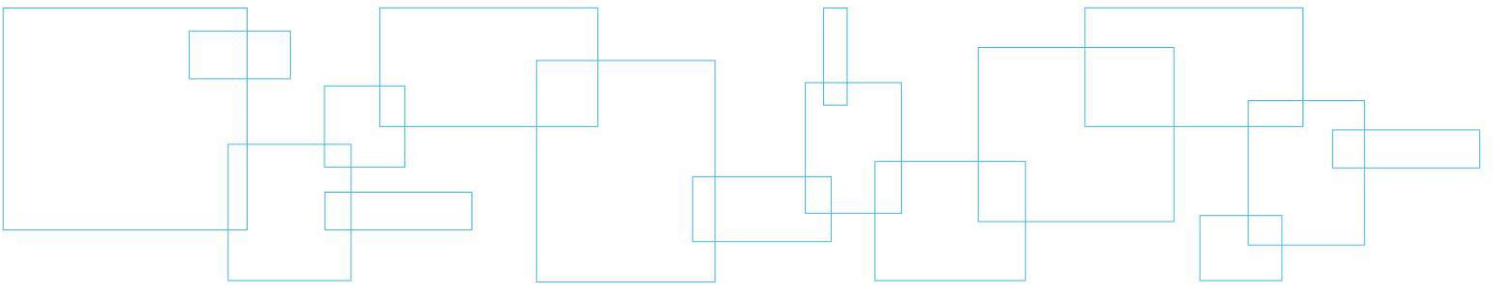
FIGURE L-19c



Appendix D

Photo Essay

- Enclosure Nos. 15: Photo Essay
- Enclosure No. 16: List of Abbreviation for Geotechnical Borehole Logs
- Enclosure No. 17: Geotechnical Borehole Logs



Culvert Outlet - Looking South-West

Photo: 1



Drilling Boreholes for Culvert Extension – Looking East

Photo: 2



Reference No.: 10/07/10131-F3

Project: Hwy 11 – Township of Taylor, Culvert Station 22+565

Originated By: JL

Date: September, 2010

LIST OF ABBREVIATIONS

Accep	Acceptable	Hi	Highly	RSS	Remoulded Shear Strength
Agg	Aggregate	HP	High Plasticity	RF	Rock Fill
Amor	Amorphous	HM	Hot Mix	Sa	Sand
Asph	Asphalt	Ip	Plasticity Index	Sat	Saturated
AP	Auger Probe	L	Loose	SH	Shale
BR	Bedrock	Lt	Light or Left	Sh Rk	Shot Rock
Blk	Black	Liq	Liquid	Si (y)	Silt (y)
Bl	Blue	Lo	Loam	Sl (y)	Slight (ly)
BH	Borehole	Matl	Material	(L,M,H)SFH	Susceptibility to Frost
Bld (y)	Boulder (y)	Max	Maximum		Heave (L – Low, M – Med, H – High)
Blds	Boulders	Med	Medium	SP	Slight Plasticity
Br	Brown	Mod	Moderate	SSM	Select Subgrade Material
CF	Channel Face	Mott	Mottled	St	Sensitivity
Cl	Clay	Mrl	Marl	Stn (y)	Stoney
Co	Coarse	Mul	Mulch	Stks	Streaks
Cob	Cobbles	Num	Numerous	Surf	Surface
Comp	Compact	MDD	Maximum Dry Density	Temp	Temperature
Conc	Concrete	MWD	Maximum Wet Density	TH	Test Hole
Contam	Contaminated	MP	Medium Plasticity	TP	Test Pit
Cr	Crushed	NFP	No Further Progress	Tps	Topsoil
Dk	Dark	NFP (Blds)	No Further Progress (Boulders)	Tr	Trace
Decomp	Decomposed	NMC	Natural Moisture Content	USS	Undisturbed Shear Strength
D	Dense	OCC	Occasional	Unreinf	Unreinforced
D_R	Relative Density	Ora	Orange	Varv	Varved
E	Earth	Org	Organic	VF	Very Fine
Fib	Fibrous	Org M	Organic Matter	WT	Water Table
F	Fine	Ob	Overburden	Weath	Weathered
Fr Wat	Free Water	Pavt	Pavement	W	With
FB	Frost Boil	Pedo	Pedological	w	Field Moisture Content
FH	Frost Heave	Pen Mac	Penetration Macadam	Wd (y)	Wood (y)
Gran	Granular	Psty	Polystyrene	Wopt	Optimum Moisture Content
Gr	Gravel (ly)	Poss	Possible	Wp	Plastic Limit
Grn	Green	PST	Prime & Surface Treated	W_L	Liquid Limit
Gry	Grey	Quant	Quantity	Yel	Yellow
H	Heavy	Reinf	Reinforced		

Example of an Abbreviated Borehole

10+000	On C/L	Station	Offset from Centerline (C/L) (Rt – Right; Lt – Left)
0 - 300	Rooty Peat Fr Wat @ 200	Depth below Grade*	Abbreviated Soil Description Groundwater Data (where encountered) Abbreviated Lab Data (where applicable) - Sample No., Type of Test(s) and Test Results - Relation to Ontario Provincial Standards and Specifications (OPSS) included (i.e. pass or fail; reason) where applicable
300 - 800	Br F Sa Tr Gr Tr Si 20ELS107 NOT Accep Granular 'B' Type I 21% PASSING 75 µm Accep SSM		
800 - 4.0	Gry Si F Sa Tr Gr 20ELS108 w @ 3.6 = 20.0 % % Passing 2.00 mm = 91 425 µm = 80 75 µm = 34		
4.0	NFP Bld or BR		
	LSFH		

* Depths are measured in millimeters from 0 up to 1 meter and in meters for depths equal to greater than 1 meter

22+450 6.7 Lt C/L

0 - 300 Cr Gr
300 - 650 F-Med Sa W Gr Occ Cob
650 - 2.7 Si W Cl Tr F Sa

22+450 4.1 Lt C/L

0 - 80 Asph
80 - 280 Cr Gr
280 - 700 F-Med Sa W Gr Occ Cob
700 - 2.7 Si W Cl Tr F Sa

22+500 5.7 Lt C/L

0 - 350 Cr Gr
350 - 1.7 F-Med Sa W Gr Occ Cob
1.7 - 2.7 Si W Cl Tr F Sa

22+500 4.2 Lt C/L

0 - 70 Asph
70 - 290 Cr Gr
290 - 1.6 F-Med Sa W Gr Occ Cob
1.6 - 2.7 Si W Cl Tr F Sa

22+500 1.6 Lt C/L

0 - 260 Asph
260 - 450 Cr Gr
450 - 1.8 F-Med Sa W Gr
Accep Granular B Type I
1.8 - 2.7 Si W Cl Tr F Sa

22+550 5.7 Lt C/L

0 - 250 Cr Gr
250 - 2.0 F-Med Sa W Gr Occ Cob
2.0 - 2.7 Si W Cl Tr F Sa

22+550 4.2 Lt C/L

0 - 70 Asph
70 - 300 Cr Gr
300 - 1.7 F-Med Sa W Gr Occ Cob
1.7 - 2.7 Si W Cl Tr F Sa