



**Submitted To AECOM Canada Ltd.
189 Wyld Street Suite 103, North Bay, Ontario P1B 1Z2
On Behalf of the Ontario Ministry of Transportation**

**Highway 124 Rehabilitation
Culvert Replacement
Station 11+225 - Twp. of Croft
GWP 5467-09-00**

**Highway 124
From 1.0 km West of West Junction Hwy 520, Easterly 20.7 km to 2.4 km East of
Hwy 510**

FINAL FOUNDATION INVESTIGATION REPORT

Date: May 30, 2013
Ref. N^o: 12/08/12141-F1

Geocres No. 31E-322A

LVM | MERLEX

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Culvert Replacement
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Final Foundation Investigation Report

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Test results mentioned herein are only valid for the sample(s) stated in this report.

LVM inc.'s subcontractors who may have accomplished work either on site or in laboratory are duly qualified as stated in our Quality Manual's procurement procedure. Should you require any further information, please contact your Project Manager."

Client:

AECOM Canada Ltd.

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North Bay, Ontario

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Attention: **Mr. Al Rose**

REVISION AND PUBLICATION REGISTER		
Revision N°	Date	Modification And/Or Publication Details
00	2013-02-20	DRAFT Report Issued
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REPORT DISTRIBUTION	
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1 hard copy	File

1 INTRODUCTION

LVM | MERLEX has been retained by AECOM Canada Ltd., on behalf of the Ministry of Transportation of Ontario (MTO), to carry out a foundation investigation for the proposed replacement of an existing culvert and a detour to be used during the culvert replacement under GWP 5467-09-00. This culvert replacement is located on Highway 124, some 1.1 km East of the West Junction with Hwy 520, in the Township of Croft.

The foundation investigation location was specified by the MTO in the RFP/TPM documentation Agreement No. 5011-E-0021. The terms of reference for the scope of work are outlined in LVM | MERLEX's Proposal P-11-151, dated March, 2012. The purpose of this investigation was to determine the subsurface conditions in the area of the culvert and proposed detour in order to provide design recommendations. LVM | MERLEX investigated the foundation area by the drilling of boreholes, carrying out in-situ tests, and performing laboratory testing on select samples.

2 SITE DESCRIPTION

This Corrugated Steel Pipe (CSP) culvert is located at Station 11+225, Township of Croft. The topography at the site is a low wet land area with organic terrain to the north (left) of the embankment. The existing highway embankment currently supports two undivided lanes of highway, running in a west-east direction. The existing highway, at the culvert location, is constructed on an embankment consisting of an earth and rock fill mix, some 5.4 m in height, with centerline elevation of 269.9 m at the culvert location. The culvert at this location is a 760 mm diameter CSP culvert, some 40.41 m in length. Flow was not observed in the culvert at the time of this investigation, due to the culvert being buried (see Photo Essay, Appendix 4). Based on culvert inverts, the flow at this culvert location is from south to north, toward the wetland area.

Infrastructure at the culvert location consists of overhead wires on the south (right) side of the highway.

2.1 SITE PHYSIOGRAPHY AND SURFICIAL GEOLOGY

This project is located in the Geomorphic Sub-province known as the Muskoka Ridges and Pockets. The topography on this section of Highway 124 is generally slightly rolling. There are 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 silts and silty clays containing varying amounts of sand and gravel. Bedrock outcroppings are present to the east and west of the culvert location.

3 INVESTIGATION PROCEDURES

The fieldwork for this investigation was carried out during the period of August 28th to September 20th, 2012 during which time ten (10) sampled boreholes and DCPTs, were

advanced. For the purposes of foundation design for the culvert replacement, two boreholes were advanced at the culvert outlet, three boreholes were advanced through the embankment slightly up and down chainage from the culvert, and five boreholes were advanced to the south along the toe of the embankment, two of which were advanced at the culvert inlet.

The field investigation was carried out using both a Bombardier and a truck mounted CME drill 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 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. At the boreholes, a Dynamic Cone Penetration Test (DCPT) was 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. 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. When shallow refusal was encountered at the culvert boreholes, NQ size diamond coring equipment was used to determine the nature of shallow refusal. Testpits were advanced using a rubber tired backhoe at select borehole locations, at the toe of embankment slope, to determine the nature of refusal.

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. At the borehole(s) through the embankment, the upper portion of the hole, where necessary, was backfilled with an asphalt cold patch to seal the existing asphalt surface.

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 routine testing for natural moisture content determination and particle size analysis, Atterberg Limits testing, as well as specific gravity testing. The results of the laboratory testing are presented on the individual Record of Borehole Sheets (Appendix 2), with a summary of results presented on the laboratory sheets in Appendix C (Figures Nos. L-1 to L-6).

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 SUBSURFACE CONDITIONS

Details of the subsurface conditions revealed by the investigation program are presented on the enclosed Record of Borehole Logs (Appendix 2) and on Drawing No. 2 (Appendix 3). 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 a 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 CULVERT STATION 11+225, TWP OF CROFT

A plan and profile illustrating the borehole locations and stratigraphic sequences is shown on Drawing No. 2, Appendix 3. During the course of the exploration program, ten (10) sampled boreholes were put down at this site, with Borehole Nos. 3, 9, and 10 advanced through the embankment, and Borehole Nos. 1, 2, 4, and 8 advanced at the culvert ends. Boreholes No. 5 to 7 inclusive were advanced to the south (right) of the existing embankment along the toe to slope. At the time of the subsurface investigation, the ground surface elevations at Boreholes Nos. 1 to 10 were recorded at 265.2, 266.1, 269.9, 265.3, 268.1, 267.1, 269.4, 266.0, 269.9, and 269.9 m, respectively.

4.1.1 Pavement Structure

At surface at Borehole Nos. 3, 9, and 10, a pavement structure consisting of 75 mm of asphalt and 225 to 250 mm crushed gravel was penetrated.

4.1.2 Fill

Underlying the pavement structure base at Borehole Nos. 3, 9, and 10, a deposit of fill consisting of brown sand some silt trace to some gravel was penetrated. The natural moisture content measured on samples of this deposit was in the order of 2 to 4%. Gradation analyses were carried out on two (2) samples of this deposit, the results of which indicated 2 to 18% gravel size particles, 72 to 84% sand size particles, and 10 to 14% silt and clay size particles (Figure No. L-1, Appendix 3). Auger refusal was encountered in this deposit at depths of some 0.8, 0.8, and 0.9 m below grade at Borehole Nos. 3, 9, and 10, respectively (elevations 269.1, 269.1, and 269.0 m, respectively). NQ casing with diamond coring equipment was used to advance past the auger refusal depth.

4.1.3 Earth and Rock Fill Mix

Borehole Nos. 3, 9, and 10 were advanced using NQ sized diamond coring equipment to determine the nature of shallow auger refusal encountered at BH Nos. 3, 9, and 10. Underlying the granular fill (subbase), a deposit of earth (sands and gravels) and rock fill mix was penetrated. This fill deposit was encountered to depths of 4.7, 3.8, and 5.2 m below grade, respectively (elevations 265.2, 266.1, and 264.7 m, respectively).

Refusal of DCPT driven from surface was encountered in this deposit at depths of 3.4 and 3.6 m below grade at Borehole Nos. 3 and 10 (elevations 266.5 and 266.3 m).

4.1.4 Surficial Organics

At surface, at BH Nos. 1 and 5, a layer of surficial organics, some 50 to 100 mm thick, was penetrated.

4.1.5 Silt

Underlying the surficial organics at Borehole Nos. 1 and 5, underlying the embankment fill at Borehole Nos. 3, 9, and 10, and at surface at Borehole Nos. 2, 4, 6, 7, and 8 a deposit of brown to grey silt, trace to with sand, some to with clay, trace gravel was penetrated. Organics were encountered in this deposit at Borehole Nos. 2, 4, and 8. The natural moisture content measured on samples of this deposit was in the order of 20 to 46%. Hydrometer analyses were carried out on seven (7) samples of this deposit, the results of which indicated 0 to 4% gravel size particles, 2 to 37% sand size particles, 55 to 76% silt size particles, and 7 to 25% clay size particles (Figure No. L-2, Appendix 3). Atterberg Limits testing was attempted on seven samples of this deposit, the results of which indicated this deposit is a non-plastic sandy silt to a clayey silt (SM to CL). The plasticity increased with depth at Borehole No. 1, to the point where the lower part of this deposit was classified as silty clay (CI). This deposit was encountered to depths of 1.2, 2.9, 6.1, 0.8, 0.8, 3.0, 5.3, and 6.0 m, at Borehole Nos. 1, 2, 3, 5, 6, 8, 9 and 10 respectively (elevations 264.0, 263.2, 263.8, 267.3, 266.3, 263.0, 264.6, and 263.9 m, respectively). Auger refusal was encountered in the deposit (on bedrock) at depths of 0.8 and 0.2 m, at Borehole Nos. 4 and 7 m, respectively (elevations 264.5 and 269.2 m, respectively).

DCPT refusal was encountered in this deposit (on bedrock) at depths of 0.8, 0.2, and 5.3 m at Borehole Nos. 4, 7, and 9, respectively (elevations 264.5, 269.2, and 264.6 m, respectively).

4.1.6 Silty Clay

Underlying the silt at Boreholes Nos. 2, 3, and 8, transition to a deposit of grey silty clay was encountered. The natural moisture content measured on samples of this deposit was in the order of 30 to 46%. A hydrometer analysis was carried out on one (1) sample of this deposit, the results of which indicated 0% gravel size particles, 1% sand size particles, 54% silt size particles, and 45% clay size particles (Figure No. L-3, Appendix 3). Atterberg Limits testing was carried out on one (1) sample of this deposit, the results of which indicated a Plastic Limit in the order of 22% and a Liquid Limit in the order of 41% (Figure No. L-5, Appendix 4). Based on

results of Atterberg Limits testing, this deposit was described as a silty clay of medium plasticity (CI). Based on SPT 'N' values of 0 (static weight of hammer) to 11 blows per 300 mm, and based on tactile examinations, the consistency of this deposit was estimated as firm to stiff. This deposit was encountered to a depth of 3.8 m below grade at Borehole Nos. 2 and 8 (elevations 262.3 and 262.2 m, respectively). Auger refusal was encountered in this deposit at a depth of 7.3 m below grade at Borehole No. 3 (elevation 262.6 m).

4.1.7 Sand

Underlying the silt deposit at Borehole Nos. 1, 5, and 6, and underlying the silty clay deposit at Borehole Nos. 2 and 8, a deposit of grey sand some silt to silty, some to with gravel was penetrated. The natural moisture content measured on samples of this deposit was in the order of 6 to 26%. Gradation analyses were carried out on three (3) samples of this deposit, the results of which indicated 1 to 25% gravel size particles, 49 to 61% sand size particles, and 14 to 43% silt and clay size particles (Figure No. L-4, Appendix 3). Auger refusal was encountered in this deposit at depths of 2.0, 4.3, 2.0, 1.6, and 4.3, m at Borehole Nos. 1, 2, 5, 6, and 8, respectively (elevations 263.2, 261.8, 266.1, 265.5, and 261.7 m, respectively). DCPT Refusal was encountered in this deposit at depths of 1.7, 4.3, 0.8, 1.6, and 4.3 m below grade at Borehole Nos. 1, 2, 5, 6, and 8, respectively (elevations 263.5, 261.8, 267.3, 265.5, and 261.7 m, respectively).

4.1.8 Bedrock

Underlying the silty clay at Borehole No. 3, and underlying the silt at Borehole Nos. 9 and 10, bedrock was proven by diamond core drilling. The bedrock was described as a pink to grey gneiss. Based on a RQD of 46 to 98% the bedrock was described as good quality. Sampling in the bedrock was terminated at depths of 10.3, 8.3, and 9.0 m below grade at Borehole Nos. 3, 9, and 10 (elevations 259.6, 261.6, and 260.9 m).

The bedrock surface was exposed by advancing testpits at the locations of Borehole Nos. 1, 6, and 7, at depths of 1.5, 0.9, and 0.2 m, respectively (elevations 263.7, 266.2, and 269.2 m, respectively).

4.2 GROUNDWATER DATA

The water level at the culvert inlet and outlet was measured between elevations of 264.8 and 265.1 m (outlet (submerged) and inlet, respectively), at the time of this investigation.

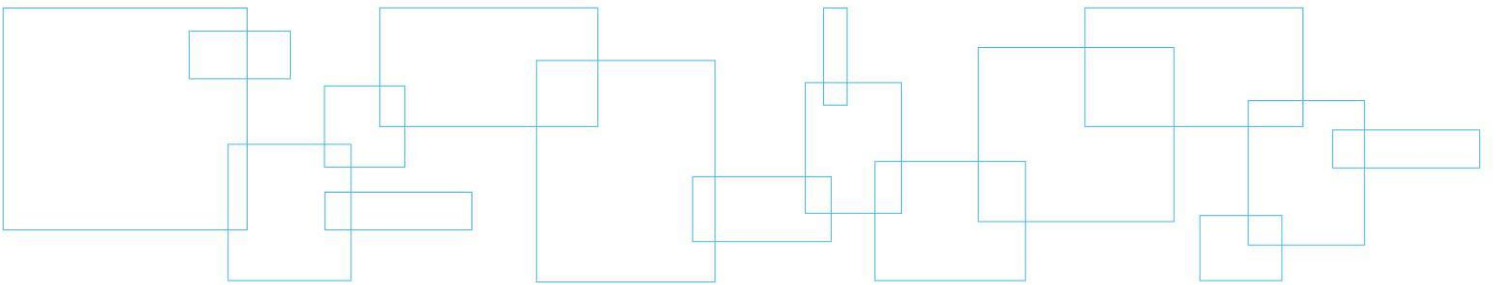
Measurements of the groundwater level and cave-in levels were undertaken, where possible, in the open boreholes during the advance of the individual borings and upon completion. These levels are recorded on the individual Record of Borehole Log Sheets (Appendix B). The water levels in Borehole Nos. 1, 2, 5, and 8 were measured at elevations 264.2, 262.7, 266.3, and 262.2 m upon completion, respectively. Borehole Nos. 3, 4, 6, 7, 9, and 10 were dry upon completion.

The groundwater and surface water levels will fluctuate seasonally/yearly.

Appendix 1 Key Plan

Drawing No. 1

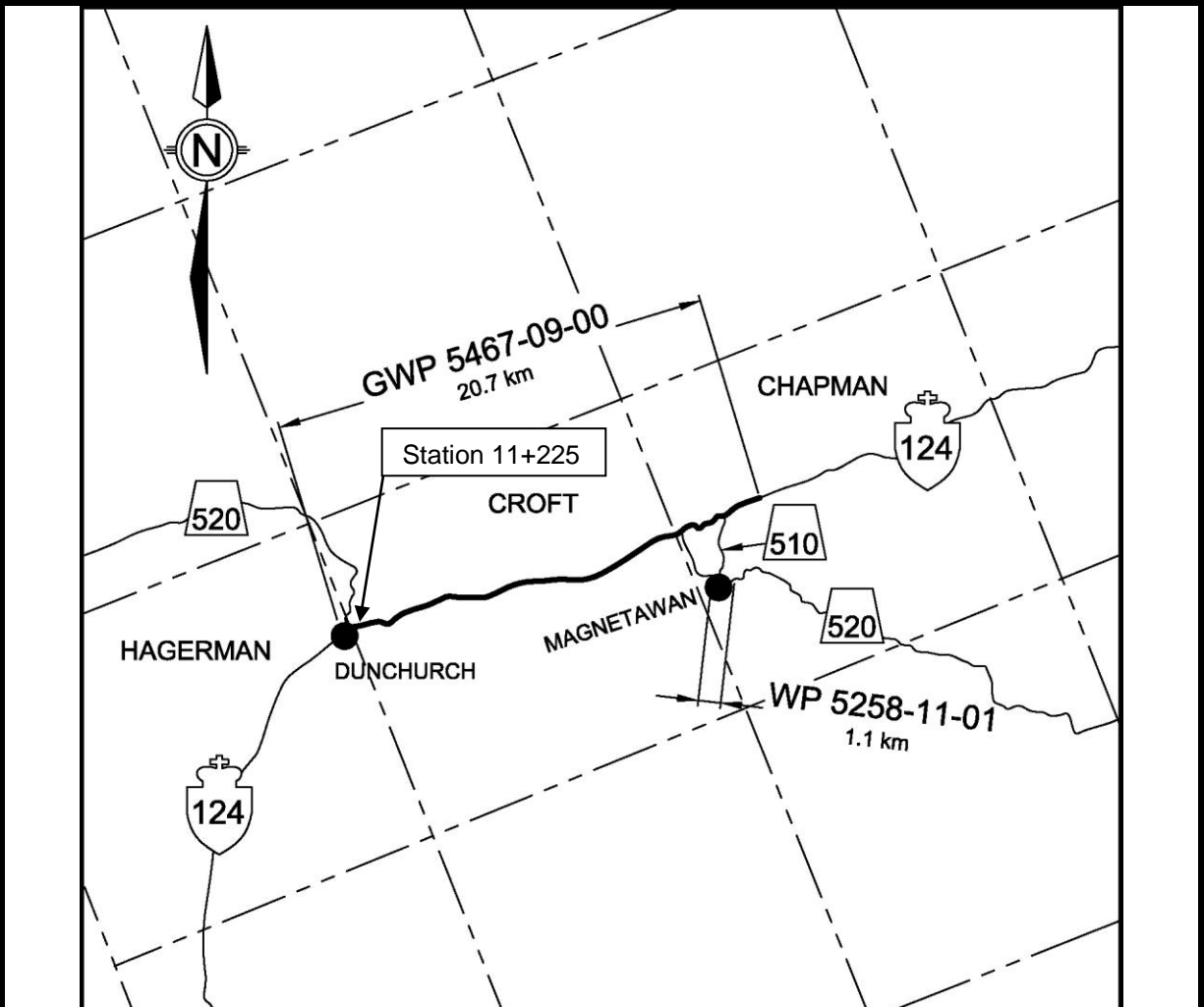
Key Plan



KEY PLAN

Drawing No. 1

NOT TO SCALE



FINAL
FOUNDATION INVESTIGATION REPORT
GWP 5467-09-00
Highway 124

From 1.0 km West of West Junction Hwy 520,
Easterly 20.7 km to 2.4 km East of Hwy 510

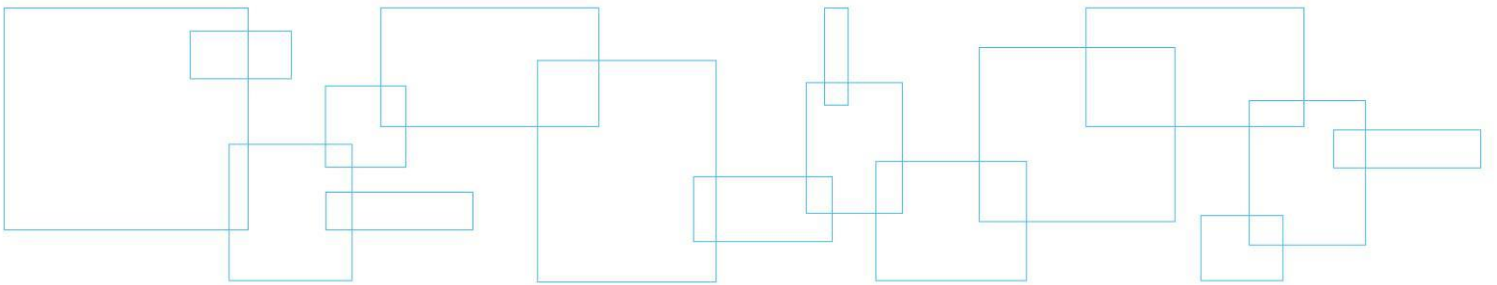
Reference No: 12/08/12141-F1

May 2013

LVM | MERLEX

Appendix 2 Subsurface Data

Enclosure No. 1	List of Abbreviations and Symbols
Enclosure Nos. 2 to 11	Record of Borehole Sheet



LIST OF ABBREVIATIONS & 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
NFP	No Further Progress
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

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

3. SOIL DESCRIPTION (Cont'd)

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%

Terminology for cobbles and/or boulders frequency is an estimate based on drill response and field observations:

Occasional	Obstructions encountered in borehole, however advance is not severely impeded
Numerous	Obstructions appear essentially continuous over drilled length

5. LABORATORY TESTS

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

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. 01



REFERENCE 12/08/12141-F1 DATUM Geodetic LOCATION N 5057100.9 E 278954.2 - Township of Croft ORIGINATED BY JL
 PROJECT GWP 5467-09-00, Highway 124 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY AT
 CLIENT AECOM Inc. DATE (Started) 28 August 2012 TIME
 DATE (Completed) 28 August 2012 (Completed) 1:45:00 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								
265.2	Ground Surface											
0.0	100 mm organics											
	SILT - brown and grey silt trace sand some clay trace gravel		1	AS								
	plasticity increasing with depth (compact)		2	SS	17							4 2 76 18
264.0												
1.2	SAND - grey sand some silt some gravel (compact)											
263.5												
1.7	DCPT Refusal		3	SS	60/275 mm							
263.2												
2.0	Auger Refusal End of Borehole											

COMMENTS		WATER LEVEL RECORDS	
Testpit advanced at borehole location. Bedrock encountered at 1.5 m.		Date (dd/mm/yy)/Time	Water Depth (m)
The stratification lines represent approximate boundaries. The transition may be gradual.		1) 28/8/12 1:38:00 PM	0.9
		2) 31/8/12 8:00:00 AM	1
		3)	-

MEL-GEO 12141 - AREA 1 - BOREHOL LOGS.GPJ MEL-GEO.GDT 4/6/13



METRIC

RECORD OF BOREHOLE NO. 02



REFERENCE 12/08/12141-F1 DATUM Geodetic LOCATION N 5057134.7 E 278945.6 - Township of Croft ORIGINATED BY JL
 PROJECT GWP 5467-09-00, Highway 124 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY AT
 CLIENT AECOM Inc. DATE (Started) 11 September 2012 TIME 11 September 2012
 DATE (Completed) 11 September 2012 (Completed) 2:05:00 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								
266.1	Ground Surface												
0.0	SILT - brown silt trace to with sand some clay trace gravel trace organics		1	AS									
	brown		2	SS	2								1 23 66 10
	grey												
	(very loose/ loose)		3	SS	10								
			4	SS	9								0 9 77 14
263.2	SILTY CLAY - grey silty clay												
2.9	medium plasticity		5	SS	WH								0 1 54 45
	(firm)												
262.3	SAND - grey sand some silt some gravel		6	SS	25/25 mm								
3.8	Auger Refusal												
262.1													
4.0													
261.8	DCPT Refusal												
4.3	End of Borehole												
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 Water Depth (m) Cave In (m) 1) 11/9/12 2:00:00 PM 3.4 3.9 2) - - 3) - -					

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

MEL-GEO 12141 - AREA 1 - BOREHOL LOGS.GPJ MEL-GEO.GDT 4/6/13



METRIC

RECORD OF BOREHOLE NO. 03



REFERENCE 12/08/12141-F1 DATUM Geodetic LOCATION N 5057120.5 E 278944.8 - Township of Croft ORIGINATED BY JL
 PROJECT GWP 5467-09-00, Highway 124 BOREHOLE TYPE Truck Mounted CME 45B - Hollow Stem Augers and NQ casing COMPILED BY AT
 CLIENT AECOM Inc. DATE (Started) 19 September 2012 TIME (Completed) 5:00:00 PM CHECKED BY MAM
 DATE (Completed) 19 September 2012

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 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						
269.9	Ground Surface										
0.0	75 mm Asphalt 250 mm Crushed Gravel FILL - brown sand some silt trace gravel		1	AS							2 84 (14)
269.1	Auger Refusal EARTH AND ROCK FILL MIX advanced NQ size casing through earth and rock fill mix										
0.8											
266.5	DCPT Refusal EARTH AND ROCK FILL MIX										
3.4											
265.2	SILT - grey sandy silt to silty sand trace clay trace gravel (very loose/loose)		2	SS	4						1 37 55 7
4.7			3	SS	WH						
263.8	SILTY CLAY - grey silty clay trace to some sand (firm)		4	SS	11						
6.1											
262.6	BEDROCK - pink to grey gneiss		5	RC	Rec=100% RQD=89%						
7.3			6	RC	Rec=95% RQD=87%						
259.6	End of Borehole										
10.3											

COMMENTS
Advanced hole with NW Casing and NQ size coring equipment below 0.8 m depth

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) 19/9/12 4:45:00 PM	DRY	2.5
2)	-	-
3)	-	-

MEL-GEO 12141 - AREA 1 - BOREHOLE LOGS.GPJ MEL-GEO.GDT 4/6/13



METRIC

RECORD OF BOREHOLE NO. 04



REFERENCE 12/08/12141-F1 DATUM Geodetic LOCATION N 5057101.5 E 278960.2 - Township of Croft ORIGINATED BY JL
 PROJECT GWP 5467-09-00, Highway 124 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY AT
 CLIENT AECOM Inc. DATE (Started) 29 August 2012 TIME
 DATE (Completed) 29 August 2012 (Completed) 8:45:00 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						
265.3	Ground Surface									
0.0	SILT - brown silt some sand trace clay trace organics occasional cobbles/boulders		1	AS		265				
264.5	(loose)									
0.8	Auger Refusal DCPT Refusal End of Borehole									

COMMENTS		WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)
+ 3, × 3 : Numbers on right refer to Sensitivity Numbers on left refer to values greater than 120 kPa ○ 3% STRAIN AT FAILURE		1)	-	-
		2)	-	-
		3)	-	-

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

MEL-GEO 12141 - AREA 1 - BOREHOL LOGS.GPJ MEL-GEO.GDT 4/6/13

METRIC

RECORD OF BOREHOLE NO. 05



REFERENCE 12/08/12141-F1 DATUM Geodetic LOCATION N 5057103.8 E 279000.2 - Township of Croft ORIGINATED BY JL
 PROJECT GWP 5467-09-00, Highway 124 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY AT
 CLIENT AECOM Inc. DATE (Started) 11 September 2012 TIME 11 September 2012 (Completed) 9:30:00 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								
268.1	Ground Surface												
0.0	50 mm organics		1	AS			268						
267.3	SILT - brown silt some sand some clay (loose)		2	SS	12		267						1 56 (43)
0.8	SAND - brown sand some silt to silty trace to with gravel (compact/very dense)		3	SS	85								25 61 (14)
266.1													
2.0	Auger Refusal End of Borehole												

COMMENTS		WATER LEVEL RECORDS	
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	Date (dd/mm/yy)/Time	Water Depth (m)
		1) 11/9/12 9:25:00 AM	1.8
		2)	-
		3)	-

MEL-GEO 12141 - AREA 1 - BOREHOL LOGS.GPJ MEL-GEO.GDT 4/6/13



METRIC

RECORD OF BOREHOLE NO. 06



REFERENCE 12/08/12141-F1 DATUM Geodetic LOCATION N 5057104.4 E 278931.1 - Township of Croft ORIGINATED BY JL
 PROJECT GWP 5467-09-00, Highway 124 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY AT
 CLIENT AECOM Inc. DATE (Started) 28 August 2012 TIME
 DATE (Completed) 28 August 2012 (Completed) 3:30:00 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						
267.1	Ground Surface									
0.0	SILT - brown silt with sand trace clay trace gravel (loose/compact)		1	AS						3 28 59 10
266.3										
0.8	SAND - brown silty sand some gravel (dense/very dense)		2	SS	59					13 49 (38)
265.5										
1.6	Auger Refusal DCPT Refusal End of Borehole		3	SS	50/50					

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	
Testpit advanced at borehole location. Bedrock encountered at 0.9 m.				Date (dd/mm/yy)/Time	Water Depth (m)
				1) 28/8/12 3:30:00 PM	DRY
				2)	
				3)	
					Cave In (m)
					1.4

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

MEL-GEO 12141 - AREA 1 - BOREHOL LOGS.GPJ MEL-GEO.GDT 4/6/13



METRIC

RECORD OF BOREHOLE NO. 07



REFERENCE 12/08/12141-F1 DATUM Geodetic LOCATION N 5057105.3 E 278896.1 - Township of Croft ORIGINATED BY JL
 PROJECT GWP 5467-09-00, Highway 124 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY AT
 CLIENT AECOM Inc. DATE (Started) 28 August 2012 TIME
 DATE (Completed) 28 August 2012 (Completed) 4:00:00 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	40	60	80					
269.4	Ground Surface															
269.2	SILT - brown silt some sand trace clay trace organics		1	AS												
0.2	Auger Refusal DCPT Refusal End of Borehole															

COMMENTS		WATER LEVEL RECORDS		
Testpit advanced at borehole location. Bedrock encountered at 0.2 m.		+ 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	Water Depth (m)	Cave In (m)		
1)	-	▽		
2)	-	▽		
3)	-	▽		

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

MEL-GEO 12141 - AREA 1 - BOREHOL LOGS.GPJ MEL-GEO.GDT 4/6/13



METRIC**RECORD OF BOREHOLE NO. 08**

REFERENCE 12/08/12141-F1 DATUM Geodetic LOCATION N 5057134.8 E 278950.5 - Township of Croft ORIGINATED BY JL
 PROJECT GWP 5467-09-00, Highway 124 BOREHOLE TYPE Track Mounted CME 45B - Hollow Stem Augers COMPILED BY AT
 CLIENT AECOM Inc. DATE (Started) 11 September 2012 TIME
 DATE (Completed) 11 September 2012 (Completed) 3:20:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)												
ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" VALUES																		
266.0	Ground Surface																						
0.0	SILT - brown silt trace to with sand trace to some clay		1	AS																			
	organic layer		2	SS	WH																		
	(very loose/compact)																						
	brown																						
	grey		3	SS	17						0 31 (69)												
			4	SS	9						0 6 69 25												
263.0																							
3.0	SILTY CLAY - grey silty clay (firm)		5	SS	WH																		
262.2																							
3.8	SAND - grey sand some silt (dense)		6	SS	28/75 mm																		
261.8																							
264.7	Auger Refusal																						
4.3	DCPT Refusal End of Borehole																						
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 <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) 11/9/12 3:10:00 PM</td> <td>3.8</td> <td>3.9</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) 11/9/12 3:10:00 PM	3.8	3.9	2)	-	-	3)	-	-
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)																					
1) 11/9/12 3:10:00 PM	3.8	3.9																					
2)	-	-																					
3)	-	-																					

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

MEL-GEO 12141 - AREA 1 - BOREHOL LOGS.GPJ MEL-GEO.GDT 4/6/13



METRIC**RECORD OF BOREHOLE NO. 09**

REFERENCE 12/08/12141-F1 DATUM Geodetic LOCATION N 5057115.5 E 278930.9 - Township of Croft ORIGINATED BY JL
 PROJECT GWP 5467-09-00, Highway 124 BOREHOLE TYPE Truck Mounted CME 45B - Hollow Stem Augers and NQ casing COMPILED BY AT
 CLIENT AECOM Inc. DATE (Started) 20 September 2012 TIME (Completed) 8:25:00 AM CHECKED BY MAM
 DATE (Completed) 20 September 2012

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								
269.9	Ground Surface												
0.0	75 mm Asphalt 225 mm Crushed Gravel FILL - brown sand some silt trace gravel		1	AS									
269.1	Auger Refusal												
0.8	EARTH AND ROCK FILL MIX - earth (sand and gravel) and rock fill mix (compact)		2	SS	14								
			3	SS	27								
			4	SS	50/150 mm								
266.1	SILT - brown to grey silt with sand (compact)		5	SS	13								
			6	SS	35/100 mm								
264.6	DCPT Refusal												
5.3	BEDROCK - pink to grey gneiss		7	RC	Rec = 95% RQD = 85%								
			8	RC	Rec = 98% RQD = 98%								
261.6	End of Borehole												
8.3													

COMMENTS		WATER LEVEL RECORDS	
Advanced hole with NW Casing and NQ size coring equipment		Date (dd/mm/yy)/Time	Water Depth (m)
The stratification lines represent approximate boundaries. The transition may be gradual.		1) 20/9/12 8:25:00 AM	0.7
		2)	-
		3)	-

MEL-GEO 12141 - AREA 1 - BOREHOL LOGS.GPJ MEL-GEO.GDT 4/6/13



METRIC

RECORD OF BOREHOLE NO. 10



REFERENCE 12/08/12141-F1 DATUM Geodetic LOCATION N 5057116.0 E 278955.9 - Township of Croft ORIGINATED BY JL
 PROJECT GWP 5467-09-00, Highway 124 BOREHOLE TYPE Truck Mounted CME 45B - Hollow Stem Augers and NQ casing COMPILED BY AT
 CLIENT AECOM Inc. DATE (Started) 20 September 2012 TIME (Completed) 8:45:00 AM CHECKED BY MAM
 DATE (Completed) 20 September 2012

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								
269.9	Ground Surface												
0.0	75 mm Asphalt 250 mm Crushed Gravel FILL - brown sand some silt some gravel		1	AS									18 72 (10)
269.0	Auger Refusal												
0.9	EARTH AND ROCK FILL MIX - earth (sands and gravels) and rock fill mix (compact/dense)		2	SS	15								
			3	SS	21								
			4	SS	44								
266.3	DCPT Refusal												
3.6	EARTH AND ROCK FILL MIX												
264.7	SILT - brown and grey silt (compact)		5	SS	22								
263.9	BEDROCK - grey gneiss		6	RC	Rec = 95% RQD = 77%								
6.0			7	RC	Rec = 85% RQD = 46%								
260.9	End of Borehole												
9.0													

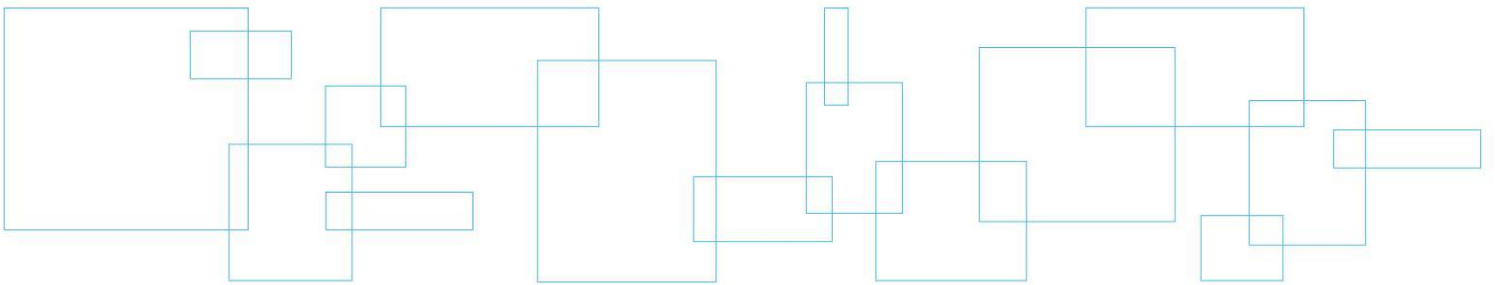
COMMENTS		WATER LEVEL RECORDS	
Advanced hole with NW Casing and NQ size coring equipment below 0.9 m depth below 0.8 m depth		Date (dd/mm/yy)/Time	Water Depth (m) Cave In (m)
The stratification lines represent approximate boundaries. The transition may be gradual.		1) 20/9/12 8:45:00 AM	DRY 0.7
		2)	-
		3)	-

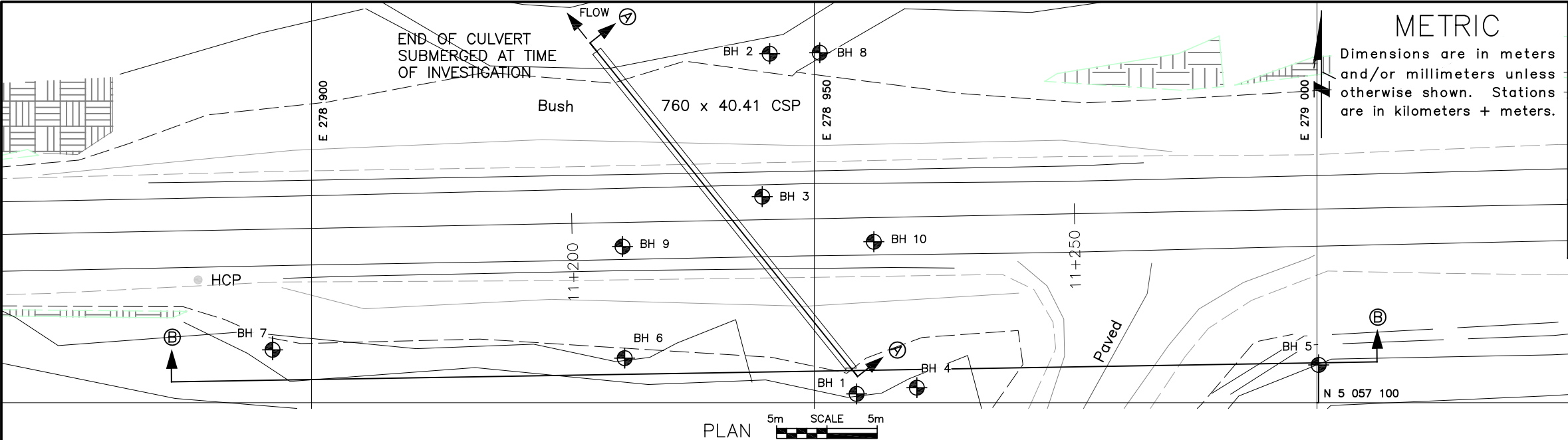
MEL-GEO 12141 - AREA 1 - BOREHOL LOGS.GPJ MEL-GEO.GDT 4/6/13



Appendix 3 Borehole Plan and Lab Data

Drawing No. 2: Borehole Location and Soil Strata
Figure Nos. L-1 to L-4: Grain Size Distribution Curves
Figure No. L-5: Atterberg Limits Sheet
Figure No. L-6: Lab Test Summary Sheet

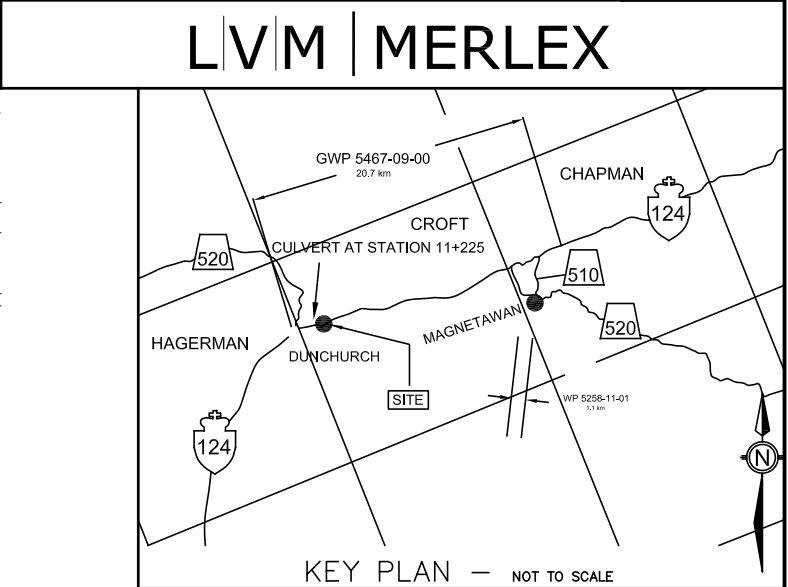






Cont No
GWP No 5467-09-00


HWY NO. 124
Township of Croft
Culvert at Station 11+225
BOREHOLE LOCATIONS & SOIL STRATA

Drawing
2




LEGEND

 Borehole
  Dynamic Cone Penetration Test (DCPT)

 Borehole and DCPT

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

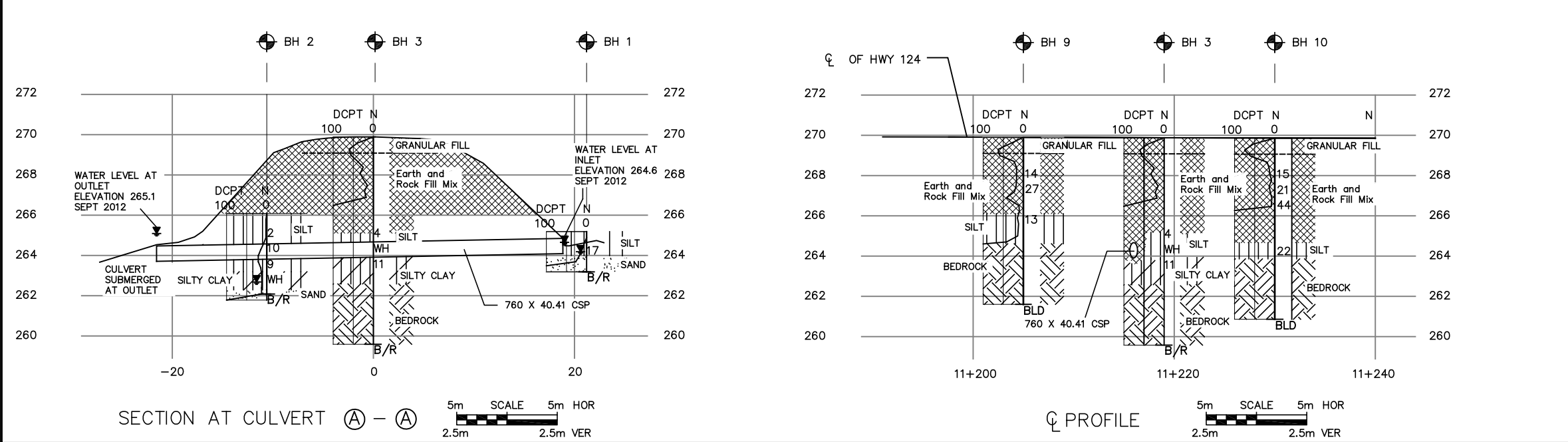
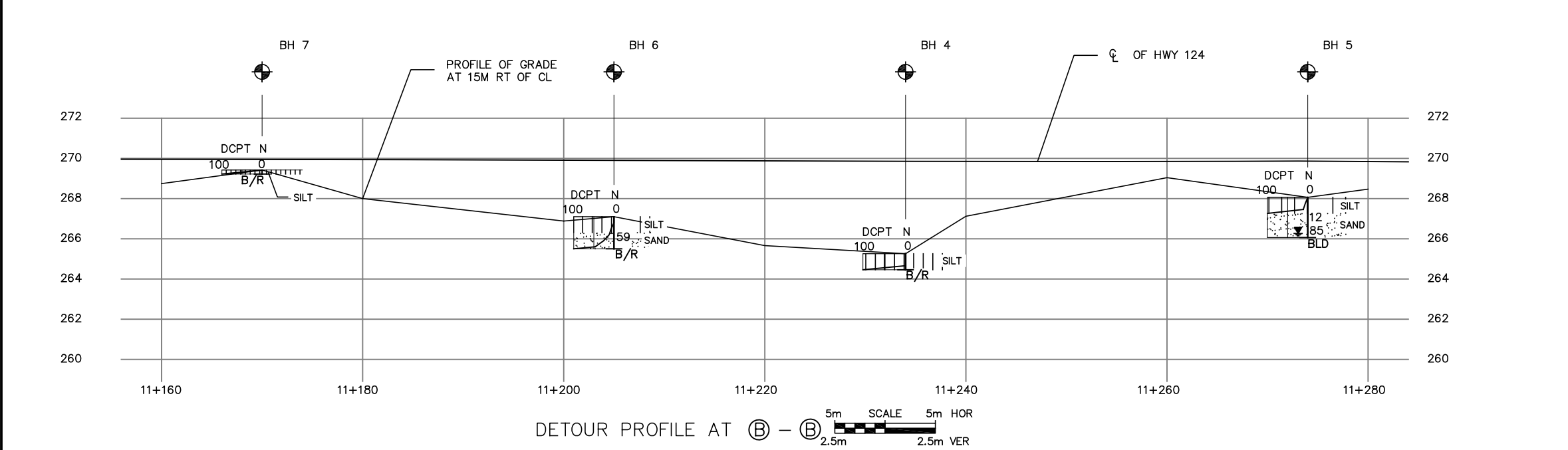
A/R Auger Refusal at Elevation

E/S End of Sampling

Borehole No.	Elev.	O/S	Co-ordinates	
			Northerly	Easterly
Borehole No. 1	265.2	17.5m Rt	5057100.9	278954.2
Borehole No. 2	266.1	16.5m Lt	5057134.7	278945.6
Borehole No. 3	269.9	2.3m Lt	5057120.5	278944.8
Borehole No. 4	265.3	19.0m Rt	5057101.5	278960.2
Borehole No. 5	268.1	15.5m Rt	5057103.8	279000.2
Borehole No. 6	267.1	13.5m Rt	5057104.4	278931.1
Borehole No. 7	269.4	12.0m Rt	5057105.3	278896.1
Borehole No. 8	266.0	16.5m Lt	5057134.8	278950.5
Borehole No. 9	269.9	2.4m Rt	5057115.5	278930.9
Borehole No. 10	269.9	2.4m Rt	5057116.0	278955.9

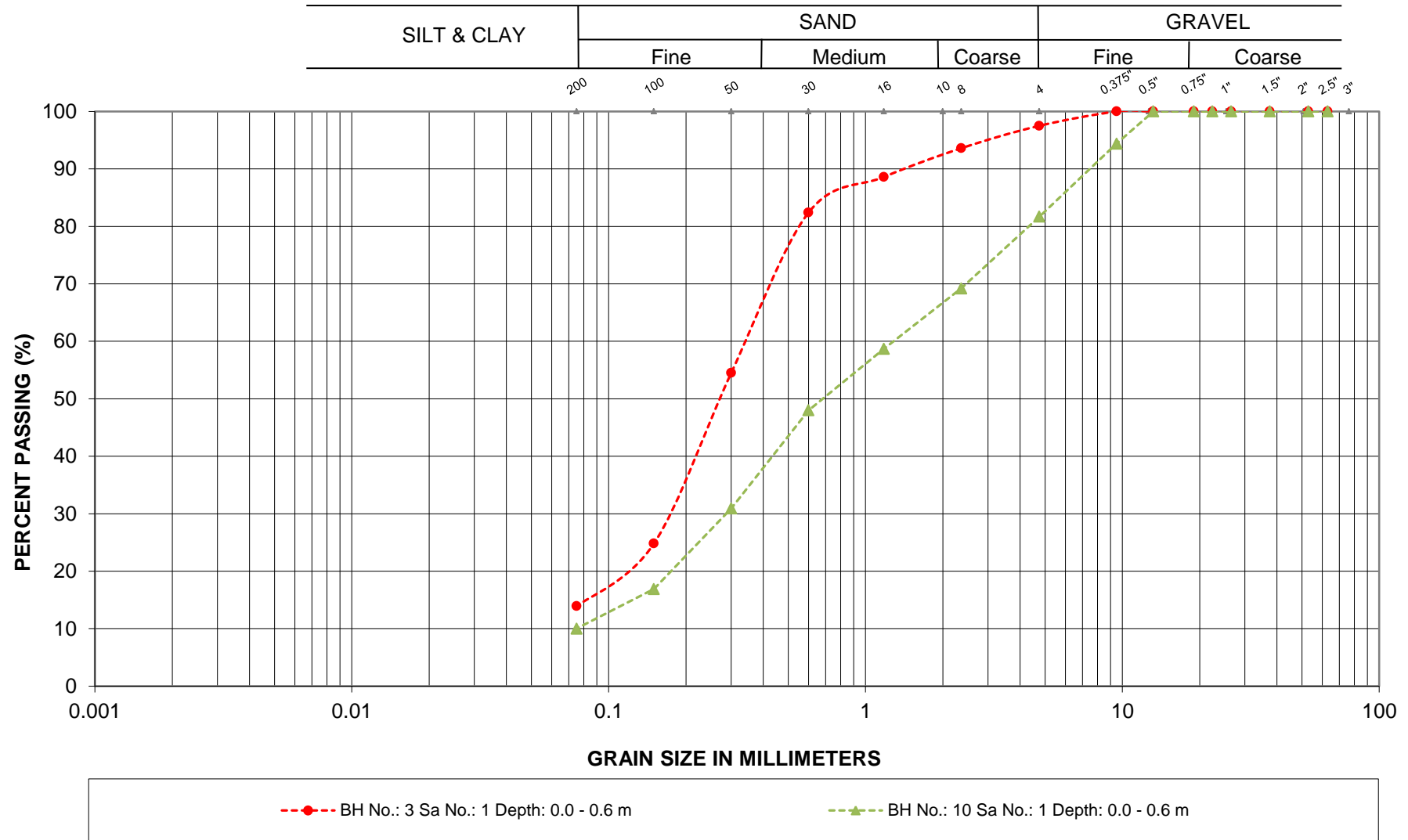
NOTE 1: This drawing is for subsurface information only. Surface details and features are for conceptual illustration. The proposed structure location is shown for illustration purposes only and may not be consistent with the final design configuration as shown elsewhere in the Contract Documents.

NOTE 2: 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
	Jan 2013	IK	DRAFT
	May 2013	MCM	FINAL
HWY No. 124 - Croft Twp - Culvert at Station 11+225			
SUBM'D			REF 12141 - F1
DRAWN IK			SITE
CHK MAM			DATE January 2013
			DWG 2

GRAIN SIZE ANALYSIS



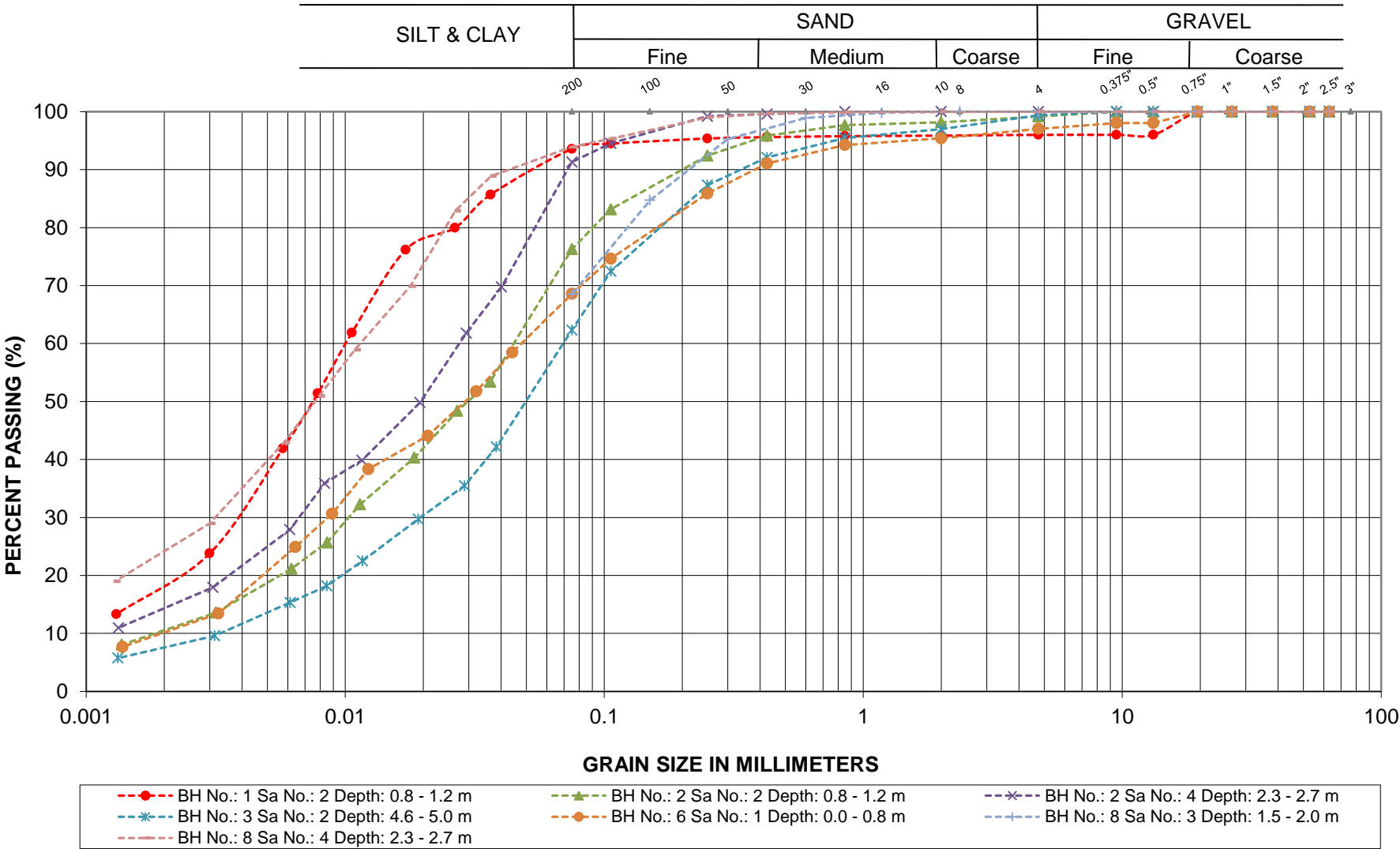
G.W.P.: 5467-09-00
LOCATION: Hwy 124

GRANULAR FILL

LVM | MERLEX

FIGURE L-1

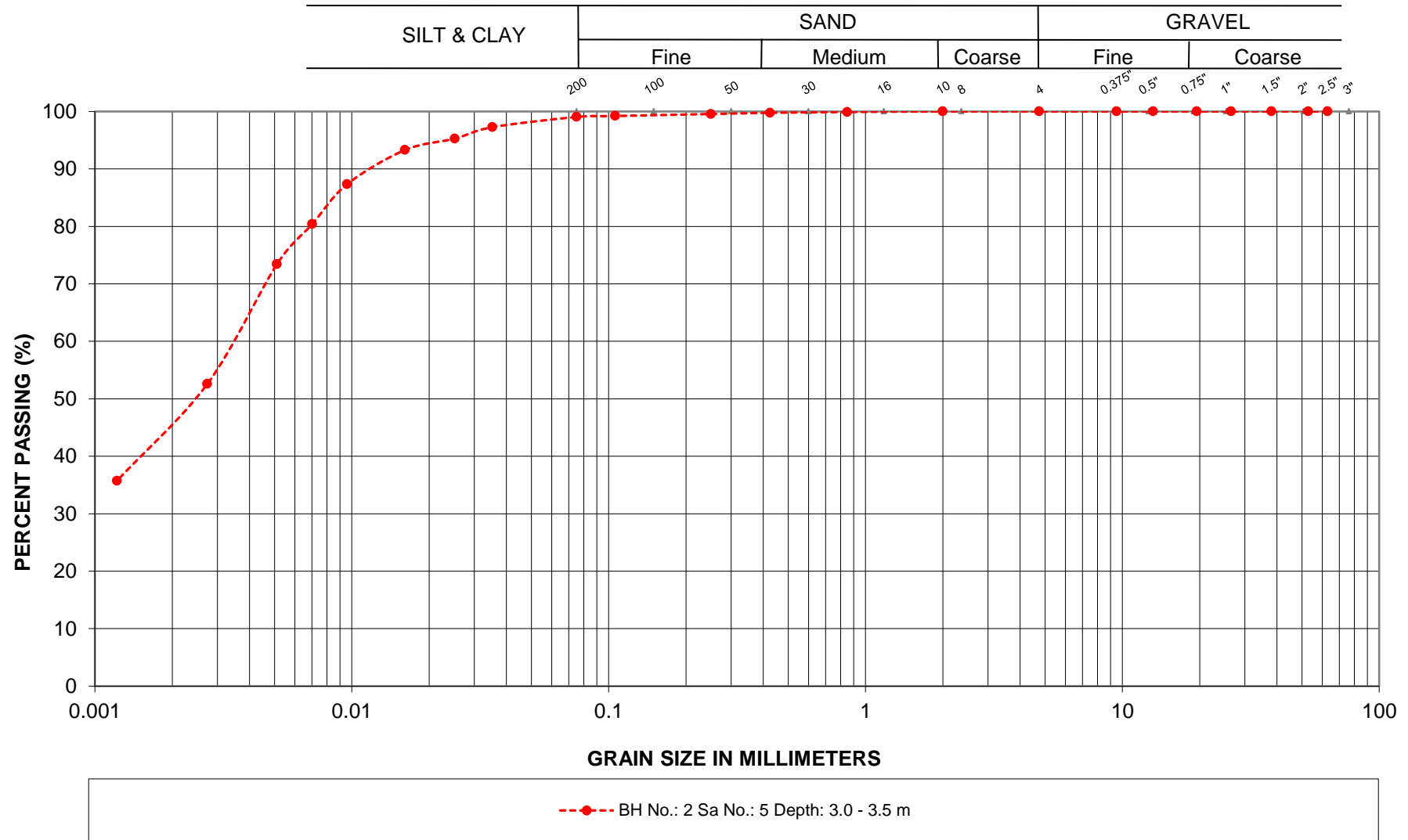
GRAIN SIZE ANALYSIS



G.W.P.: 5467-09-00
LOCATION: Hwy 124

SILT

GRAIN SIZE ANALYSIS



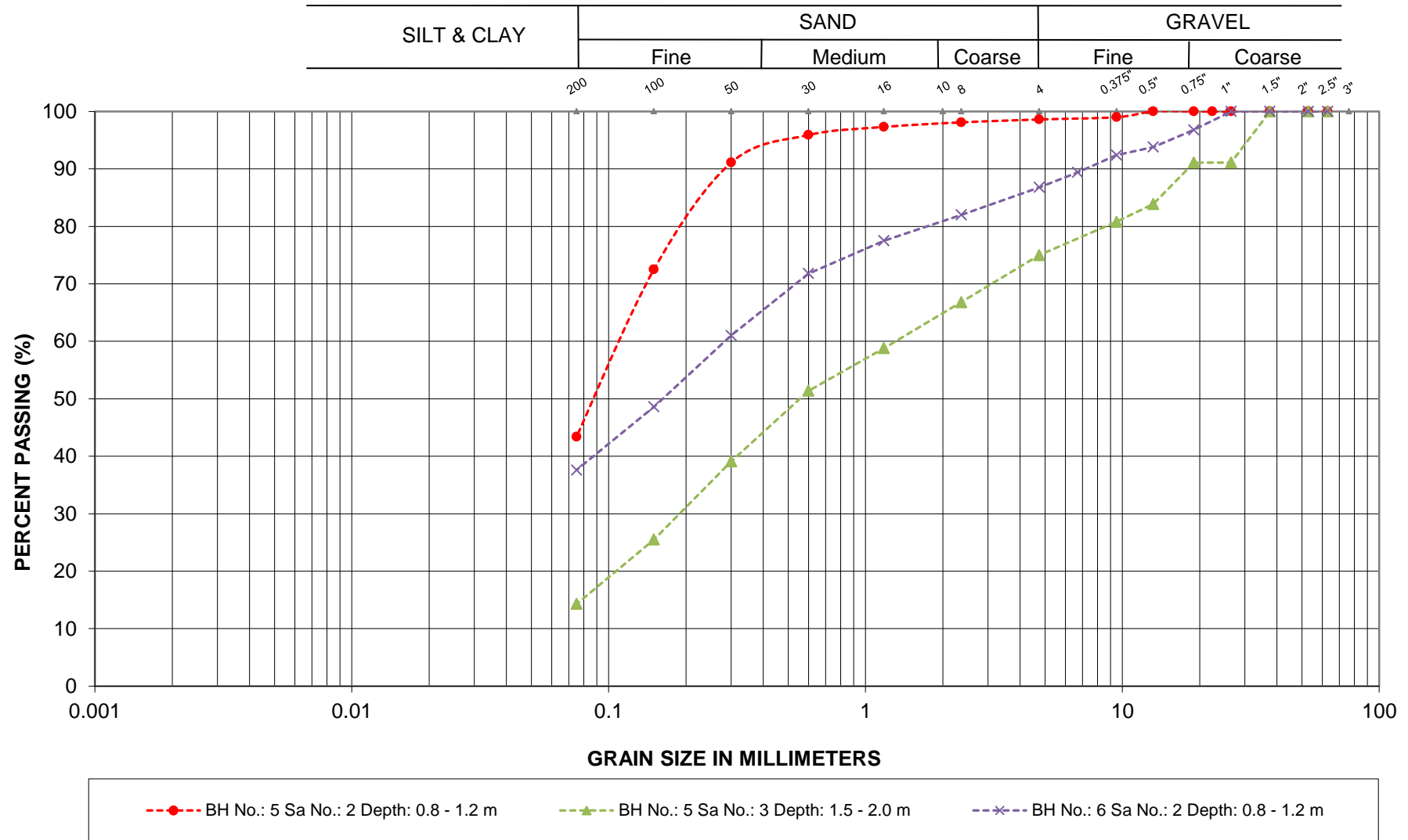
G.W.P.: 5467-09-00
LOCATION: Hwy 124

SILTY CLAY

LVM | MERLEX

FIGURE L-3

GRAIN SIZE ANALYSIS

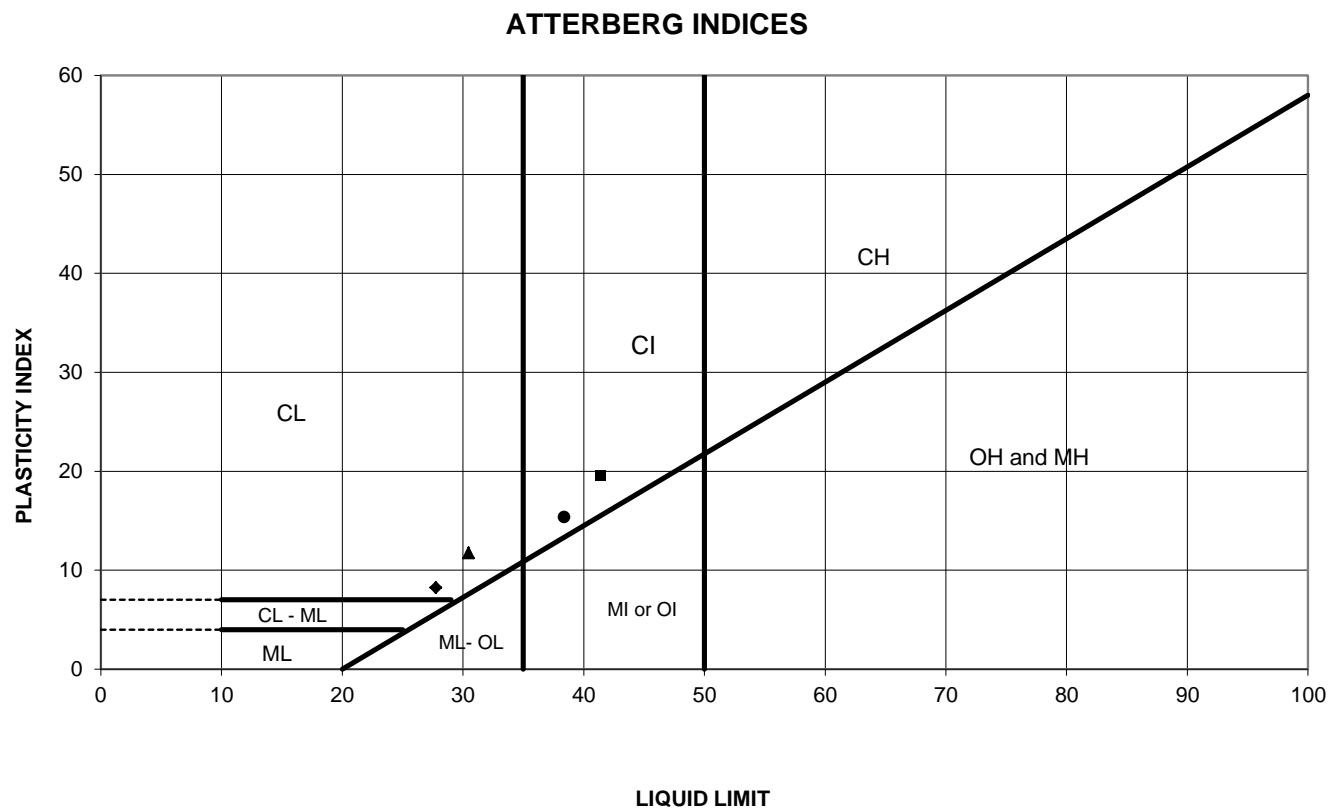


G.W.P.: 5467-09-00
LOCATION: Hwy 124

SAND

ATTERBERG LIMITS TEST RESULTS

FIGURE L-5



SYMBOL	BH	Sa. No.	Depth(m)	Elev.(m)	Liquid Limit	Plastic Limit	Plasticity Index	NMC %
●	1	2	0.8	264.4	38.4	23.0	15.3	24.2
◆	2	4	2.3	263.8	27.8	19.5	8.2	26.3
■	2	5	3.0	263.1	41.5	21.9	19.6	43.6
▲	8	4	2.3	263.7	30.5	18.7	11.8	27.6

Date: May-13
Project: Hwy 124
G.W.P.: 5467-09-00

Prep'd: AT
Chkd: MAM
Ref. No.: 12/08/12141-F1

LVM | MERLEX

Laboratory Tests - Summary Sheet

Borehole No.	Sample No.	Depth	Grain Size Analysis				NMC	Atterberg Limits			SPT 'N'	USCS	Unit Weight (kN/m ³)	Remarks
			Gravel Size (%)	Sand Size (%)	Silt Size (%)	Clay Size (%)		LL (%)	PL (%)	IP (%)				
1	1	0.0					26.8				N/A			
	2	0.8	4	2	76	18	24.2	38.4	23.0	15.3	17			
	3	1.5					18.6				60/275 mm			
2	1	0.0					21.2				N/A			
	2	0.8	1	23	66	10	38.4				2			
	3	1.5					22.1				10			
	4	2.3	0	9	77	14	26.3	27.8	19.5	8.2	9			
	5	3.1	0	1	54	45	43.6	41.5	21.9	19.6	WH			
	6	3.8					24.4				25/25 mm			
3	1	0.0	2	84	14		4.0				N/A			
	2	4.6	1	37	55	7	23.5				4			
	3	5.3					30.9				WH			
	4	6.1									11			
4	1	0.0					32.5				N/A			
5	1	0.0					20.2				N/A			
	2	0.8	1	56	43		16.9				12			
	3	1.5	25	61	14		11.5				85			
6	1	0.0	3	28	59	10	27.6				N/A			
	2	0.8	13	49	38		10.4				59			
	3	1.5					6.0				50/50 mm			
7	1	0.0					34.3				N/A			
8	1	0.0					24.7				N/A			
	2	0.76					46.0				WH			
	3	1.52	0	31	69		19.9				17			
	4	2.3	0	6	69	25	27.6	30.5	18.7	11.8	9			
	5	3.1					46.4				WH			
	6	3.8					25.9				28/75 mm			

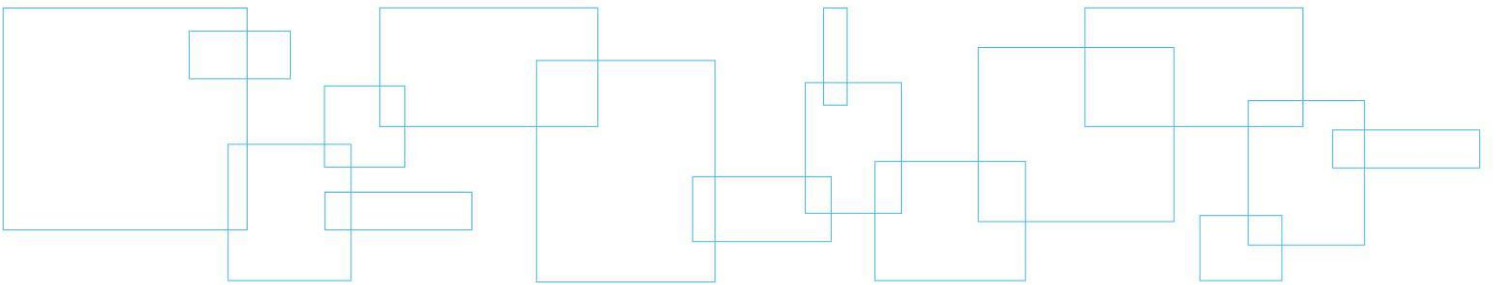
Laboratory Tests - Summary Sheet

[illegible]

Appendix 4 Photo Essay

Enclosure No. 12:

Photo Essay



South Embankment Slope – Looking West

Photo: 1

Location of culvert inlet



Culvert Inlet

Photo: 2



Project: Hwy 124 – Station 11+225, Twp of Croft

Photos Provided By: LVM

Date: September 2012

Testpit at Borehole No. 1 (Culvert Inlet)

Photo: 3



South Embankment Slope and Side Road – Looking East

Photo: 4



Project: Hwy 124 – Station 11+225, Twp of Croft

Photos Provided By: LVM

Date: September 2012

View of North Embankment Slope From Embankment - Looking North

Photo: 5



Location of Borehole No. 2 – Looking North

Photo: 6



Project: Hwy 124 – Station 11+225, Twp of Croft

Photos Provided By: LVM

Date: September 2012