



MERLEX ENGINEERING LTD.

CONSULTING GEOTECHNICAL ENGINEERS

**FINAL
FOUNDATION INVESTIGATION REPORT
NORTHBOUND PASSING LANE – TWP. of Grenfell
GWP 162-98-00
MEL SITE D**

**Highway 11, From 0.3 km South of the Highway 11/66 Intersection
Northerly 11.7 km to 3.5 km South of Highway 570**

MEL Ref. No.: 09/10/09181D

January 14, 2011

Submitted to:

AECOM Canada Ltd.
189 Wyld Street
North Bay, Ontario
P1B 1Z2

Geocres No. 42A-82



TABLE OF CONTENTS

	PAGE
1.0 INTRODUCTION.....	1
2.0 SITE DESCRIPTION.....	1
2.1 Site Physiography and Surficial Geology	2
3.0 INVESTIGATION PROCEDURES	3
4.0 SUBSURFACE CONDITIONS.....	4
4.1 Passing Lane, Station 13+450 to 13+775, TWP of Grenfell – MEL Site D-1 .	5
4.1.1 Sand and Gravel.....	5
4.1.2 Sand	6
4.2 Passing Lane, Station 14+000 to 14+025, TWP of Grenfell – MEL Site D-2 .	6
4.2.1 Bedrock	7
4.3 Passing Lane, Station 14+125 to 14+250, TWP of Grenfell – MEL Site D-3 .	7
4.3.1 Silt.....	7
4.3.2 Sand	8
4.3.3 Silt and Organics	8
4.3.4 Surficial Organics.....	8
4.3.5 Sand	8
4.4 Groundwater Conditions.....	9

APPENDICES

APPENDIX A

Figure No. 1

Key Plan

APPENDIX B

Enclosure No. 1

List of Abbreviations and Symbols

Enclosure Nos. 2 to 17

Record of Borehole Sheets

APPENDIX C

Figure No. D-1

Borehole Locations and Soil Strata

Figure Nos. L-1 to L-3

Summary Grain Size Analysis Graph



1.0 INTRODUCTION

Merlex Engineering Ltd. (MEL) has been retained by AECOM Canada Ltd., on behalf of the Ministry of Transportation of Ontario (MTO), to carry out a foundation investigation for three areas within the proposed northbound passing lane. The general work project (GWP 162-98-00) is located on Highway 11 and passes through parts of the Townships of Eby and Grenfell, and the location is described as: from 0.3 km South of the Highway 11/66 intersection Northerly 11.7 km to 3.5 km South of Highway 570. The three areas are located at: Stations 13+450 to 13+775 (MEL Site D-1), Stations 14+000 to 14+025 (MEL Site D-2), and Stations 14+125 to 14+250 (MEL Site D-3), Township of Grenfell. The project involves the widening of the current highway embankment, which will include earth cut widening between Stations 13+450 and 13+775, rock cut widening between Stations 14+000 and 14+025, and fill widening between Stations 14+125 and 14+250.

The foundation investigation location was specified by the MTO in the RFP/TPM documentation Agreement No. 5008-E-0067. The terms of reference for the scope of work are outlined in MEL's proposal P-09-037, dated May 2009. The purpose of the investigation was to determine the subsurface conditions along select areas of the proposed passing lane. MEL 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 proposed northbound passing lane foundation investigation sites are located between Stations 13+450 and 13+775 (MEL Site D-1), Stations 14+000 and 14+025 (MEL Site D-2), and Stations 14+125 and 14+250 (MEL Site D-3), all in the Township of Grenfell. The topography at



the site is generally of moderate relief. The existing highway embankment at the three sites currently supports two undivided lanes of highway, running in a north south direction.

The existing highway, between Stations 13+450 to 13+725 is constructed in an earth cut, with a centerline elevation between 332.6 and 338.1 m, and the north bound passing lane will require cutting into the existing backslope. The existing highway between Stations 14+000 to 14+025 is in a rock cut, with a centerline elevation between 323.4 and 325.0 m, and the north bound passing lane will require cutting into the existing bedrock backslope. Between Stations 14+125 to 14+250, the existing highway is constructed on a fill embankment, with a centerline elevation between 318.2 and 320.6 m, and a fill will be required to construct the north bound passing lane within the above noted limits.

Within the area of investigation there are no entrances (side road, commercial, field, etc) and infrastructure is limited to overhead power and communication wires which are on the opposite side of the highway.

2.1 Site Physiography and Surficial Geology

This project is located in the Geomorphic Sub-province known as the Eastern Sandy Uplands. The topography on this section of Highway 11 is generally rolling. There are exposed bedrock ridges. At many locations, layers of earth overlay the bedrock. Organic terrain was also observed however no organic terrain was observed in the areas of this specific investigation. Within the project area overburden consists primarily of sand and gravel containing varying amounts of silt and occasional stratum of silt.



Bedrock in the area, as indicated on OGS Map 2440, is of the Early Precambrian Era. At the location of the three passing lane foundation sections, the bedrock comprises of Metavolcanics including basaltic and andesitic flows, tuffs and breccias.

3.0 INVESTIGATION PROCEDURES

The field work for this investigation was carried out between February 27 and March 1, 2010, during which eight (8) sampled boreholes were advanced at Site D-1, three (3) sampled boreholes at Site D-2, and five (5) sampled boreholes advanced at Site D-3. Each borehole was advanced to the east of the existing embankment along the alignment of the proposed passing lane.

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 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) at the borehole locations. 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.



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 routine testing for natural moisture content determination and particle size analysis. 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 (Figures Nos. L-1 to L-3).

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 No. D-1 (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 Passing Lane, Station 13+450 to 13+775, TWP of Grenfell – MEL SITE D-1

A plan and profile showing the borehole locations and stratigraphic sequences is shown on Figure No. D-1, Appendix C. During the course of the exploration program, eight (8) sampled boreholes were put down at this site, with Borehole Nos. D-1-01 to D-1-08, advanced to the east of the existing embankment. At the time of the subsurface investigation, the ground surface elevations at Boreholes Nos. D-1-01 to D-1-08 were recorded at 337.6, 338.2, 338.2, 337.2, 337.2, 336.4, 335.2, and 334.2 m, respectively.

4.1.1 Sand and Gravel

At surface at Borehole Nos. D-1-01 and D-1-02 a deposit of brown sand and gravel to gravelly sand, trace silt containing occasional cobbles and boulders was penetrated. The natural moisture content obtained from samples of this deposit was in the order of 2 to 5%. Gradation analyses were carried out on two (2) samples of this deposit, the results of which indicated 39 to 46% gravel size particles, 52 to 59% sand size particles, and 2% silt and clay size particles (Figure No. L-1, Appendix C). Based on SPT values of 18 to 27, the compactness of this deposit was described as compact. This deposit was encountered to depth of some 1.4 m below ground surface (elevations 336.2 and 336.8 m, at Borehole Nos. D-1-01 and D-1-02, respectively).



4.1.2 Sand

At the surface of Borehole Nos. D-1-03 to D-1-08 inclusive, and underlying the sand and gravel at Borehole Nos. D-1-01 and D-1-02, a deposit of brown sand containing varying amounts of gravel (generally trace to with gravel), trace silt containing occasional cobbles and boulders was penetrated. Gravel content generally decreases with depth in this deposit, except at Borehole No. D-1-06, where a gravel and sand seam was encountered at elevation 334.1 m. Natural moisture contents from samples of this deposit were in the order of 2 to 9%. Gradation analyses were carried out on 13 samples of this deposit which were retained in the split spoon sampler (37 mm inside diameter), the results of which indicated 1 to 27% gravel size particles, 80 to 98% sand size particles, and 1 to 4% silt and clay size particles (Figure Nos. L-2 and L-3, Appendix C). A gradation analysis was carried out on one (1) sample of the gravel and sand seam encountered in this deposit, the results of which indicated 55% gravel size particles, 43% sand size particles, and 2% silt and clay size particles. Based on SPT values of 6 to 40 blows per 300 mm penetration, the compactness of this deposit was described as loose to dense, generally compact. Sampling was terminated at a depth of 5 m below ground surface at Borehole Nos. D-1-01 to D-1-03 (elevations 332.6, 333.2, and 333.2 m, respectively). Auger refusal was encountered in this deposit at Borehole Nos. D-1-04 to D-1-08 inclusive at depths of 4.5, 3.8, 3.7, 2.4, and 3.1 m below ground surface, respectively (elevations 337.2, 333.4, 332.7, 332.8, and 331.1 m respectively).

4.2 Passing Lane, Station 14+000 to 14+025, TWP of Grenfell – MEL SITE D-2

A plan and profile showing the borehole locations and stratigraphic sequences is shown on Figure No. D-1, Appendix C. During the course of the exploration program, three (3) sampled boreholes were put down at this site, with Borehole Nos. D-2-01 to D-2-03 advanced to the east of the existing embankment. At the time of the subsurface investigation, the ground surface



elevations at Boreholes Nos. D-2-01 to D-2-03 were recorded at 330.0, 329.2, and 325.7 m, respectively.

4.2.1 Bedrock

At the three borehole locations at this site, bedrock was exposed at the existing ground surface at an offset of 16 m right of centerline. At this site the bedrock is sound with vertical and sub horizontal jointing with a generally wide spacing.

4.3 Passing Lane, Station 14+125 to 14+250, TWP of Grenfell – MEL SITE D-3

A plan and profile showing the borehole locations and stratigraphic sequences is shown on Figure No. D-1, Appendix C. During the course of the exploration program, five (5) sampled boreholes were put down at this site, with Borehole Nos. D-3-01 to D-3-05 inclusive advanced to the east of the existing embankment. At the time of the subsurface investigation, the ground surface elevations at Boreholes Nos. D-3-01 to D-3-05 were recorded at 317.6, 316.3, 316.5, 316.5 and 317.2 m, respectively.

4.3.1 Silt

At the surface of Borehole No. D-3-01, a deposit of brown silt containing trace sand to silt and sand, trace clay was penetrated. The sand content generally increases with depth in this deposit. Natural moisture contents from samples of this deposit were in the order of 23 to 29%. Gradation and hydrometer analyses were carried out on three (3) samples of this deposit which were retained in the spilt spoon sampler (37 mm inside diameter), the results of which indicated 0% gravel size particles, 4 to 44 sand size particles, 56 to 90% silt size particles, and 4 to 6% clay size particles (Figure No. L-4, Appendix C). Based on SPT values of 0 (static weight of



hammer) to 11, the compactness of this deposit is described as very loose to compact. This deposit was encountered to depth of 4.3 m below ground surface (elevation 313.3 m).

4.3.2 Sand

Underlying the silt at Borehole No. D-3-01, a deposit of grey sand containing trace to with silt was penetrated. Natural moisture contents from samples of this deposit were in the order of 14 to 23%. Based on SPT values of 2 to 12 blows per 300 mm penetration the compactness of this deposit is described as very loose to compact. Auger and DCPT refusal was encountered in this deposit at depth of 9.7 m below ground surface (elevation 307.9 m).

4.3.3 Silt and Organics

At the surface of Borehole No. D-3-02, a thin deposit of silt with organics and rootlets was penetrated. The natural moisture content from a sample of this deposit was in the order of 42%. Auger refusal was encountered at a depth of 0.3 m below ground surface (elevation 316.0 m).

4.3.4 Surficial Organics

At the surface of Borehole Nos. D-3-04 and D-3-05, a thin layer of surface grass and organics some 50 mm thick was penetrated.

4.3.5 Sand

Underlying the surficial organics at Borehole Nos. D-3-04 and D-3-05, and at the surface of Borehole No. D-3-03 a deposit of brown fine sand containing some silt was penetrated. Natural moisture contents from samples of this deposit were in the order of 15 to 28%. Based on SPT values of 22 to 24, the compactness of this deposit is described as compact. Auger refusal was encountered in this deposit at a depth of 0.7, 0.8, and 2.2 m below ground surface at Borehole



Nos. D-3-03 to D-3-05, respectively (elevations 315.8, 315.7, and 315.0 m, respectively). DCPT refusal was generally encountered at a similar elevation to auger refusal, except at Borehole No. D-3-05 where DCPT refusal was encountered at a depth of 3.2 m (elevation 314.0 m).

4.4 Groundwater Conditions

Groundwater and cave-in levels in the open boreholes were measured, where possible, during the advance of the individual borings and upon completion. These levels are recorded on the individual Record of Borehole Log Sheets (Appendix B). Borehole Nos. D-1-01 to D-1-08 were recorded as dry at the time of sampling. The water level was measured at a depth of 1.6 m at Boreholes No. D-3-01 (elevation 316.0 m). These groundwater levels will fluctuate seasonally.

MERLEX ENGINEERING LTD.

M. A. Merleau, P. Eng.
Principal

J. R. Berghamer, P. Eng.
Project Engineer

Z:\PROJECT FILES\2009\09181 - PAVE & FDN, Hwy 11 Kenogami 162-98-00 (AECOM)\FOUNDATION\REPORTS\FINAL\Site D - Northbound Passing Lane\09181D - FINAL FIR, Hwy 11 GWP 162-98-00 - SITE D, NBPL.doc

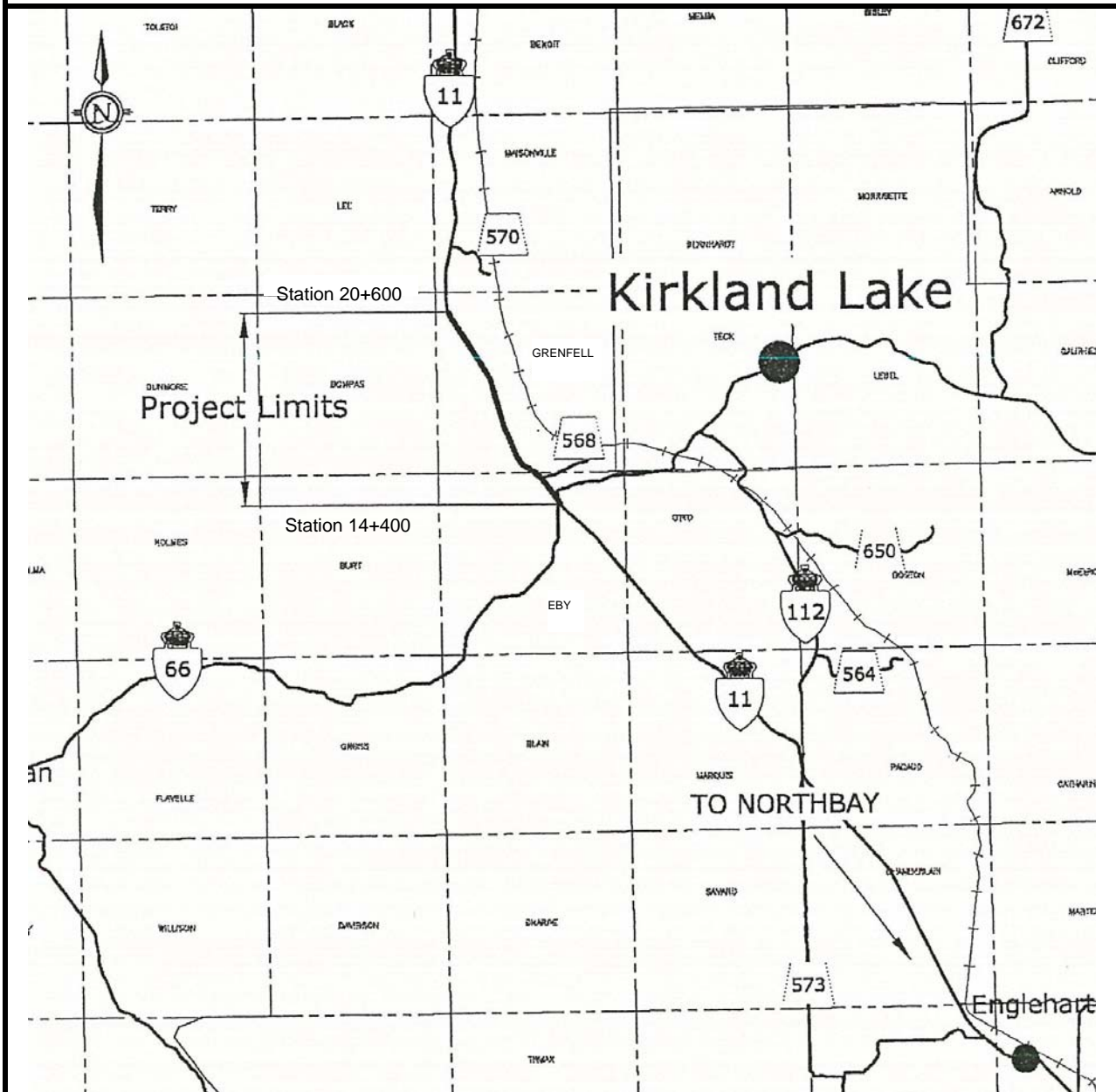
APPENDIX A

Figure No. 1: Key Plan

KEY PLAN

Figure No. 1

NOT TO SCALE



**FINAL
FOUNDATION INVESTIGATION REPORT
GWP 162-98-00**

Highway 11, From 0.3 km South
of Highway 66, Northerly 11.7 km to
3.5 km South of Highway 570

MEL Ref. No.: 09/10/09181D

January 2011



MERLEX ENGINEERING LTD.

CONSULTING GEOTECHNICAL ENGINEERS

APPENDIX B

Enclosure No. 1: List of Abbreviations and Symbols

Enclosure Nos. 2 to 17: Record of Borehole Sheets



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
HB	Hammer Bouncing
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
WH	Sampler Advanced by static weight (weight of hammer and/or rods)
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 90° point cone 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



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. D-1-01**

REFERENCE 09181 DATUM Geodetic LOCATION N 5332309.65 E 362544.36 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/2/27 - 10/2/27 TIME 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								
337.6	Ground Surface												
0.0	SAND and GRAVEL - brown sand and gravel trace silt (compact)		1	AS	N/A								
336.2			2	SS	18								46 52 (2)
1.4	SAND - brown sand trace to with gravel trace silt		3	SS	22								25 74 (1)
	Gravel content decreasing with depth												
	(compact)		4	SS	19								
	brown												
	grey		5	SS	24								
			6	SS	21								3 96 (1)
332.6	End of Sampling		7	SS	20								
5.0													
331.9	DCPT Refusal End of Borehole												
5.7													

COMMENTS		WATER LEVEL RECORDS	
Date (dd/mm/yy)	Time	Water Depth (m)	Cave In (m)
1) 10/2/27	9:30:00 AM	DRY	3.5
2)		-	-
3)		-	-

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

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

MERLEX ENGINEERING LTD.

2-120 Progress Court, P1B-8G4 Phone: 1-705-476-2550 Fax: 1-705-476-8882 Email: merlex@merlex.ca



ENCLOSURE NO.:3 (Pg. 1 of 1)

METRIC**RECORD OF BOREHOLE NO. D-1-02**

REFERENCE 09181 DATUM Geodetic LOCATION N 5332357.55 E 362530.68 - Grenfell Township ORIGINATED BY JL
PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/2/28 - 10/2/28 TIME 12:20:00 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						100	WATER CONTENT (%)	20
338.2	Ground Surface		1	AS	N/A														
0.0	SAND and GRAVEL - brown gravelly fine sand trace silt Occasional cobble and boulders		2	SS	27														
336.8																			
1.4	SAND - brown fine to medium sand trace to with gravel trace silt Occasional cobbles Gravel content decreasing with depth (compact)		3	SS	12														
			4	SS	9														
			5	SS	11														
			6	SS	18														
			7	SS	24														
333.2																			
5.0	End of Sampling 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) 10/2/28 12:20:00 PM				DRY				4			
2)				-				-				-							
3)				-				-				-							
The stratification lines represent approximate boundaries. The transition may be gradual.																			

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

MERLEX ENGINEERING LTD.

2-120 Progress Court, P1B-8G4 Phone: 1-705-476-2550 Fax: 1-705-476-8882 Email: merlex@merlex.ca

**METRIC****RECORD OF BOREHOLE NO. D-1-03**

REFERENCE 09181 DATUM Geodetic LOCATION N 5332405.93 E 362518.02 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/2/28 - 10/2/28 TIME 1:40:00 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								
338.2	Ground Surface		1	AS	N/A								
0.0	SAND - brown fine to medium sand some gravel trace silt		2	SS	17								17 82 (1)
	Occasional cobbles												
	Gravel content decreasing with depth		3	SS	16								
	(compact)		4	SS	8								0 98 (2)
			5	SS	10								
			6	SS	10								2 97 (1)
333.2	End of Sampling		7	SS	23								
5.0													
331.2	DCPT Refusal End of Borehole												
7.0													

WATER LEVEL RECORDS	
Date (dd/mm/yy)/Time	Water Depth (m) / Cave In (m)
1) 10/2/28 1:40:00 PM	DRY / 3.5
2)	- / -
3)	- / -

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

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

MERLEX ENGINEERING LTD.

2-120 Progress Court, P1B-8G4 Phone: 1-705-476-2550 Fax: 1-705-476-8882 Email: merlex@merlex.ca

**METRIC****RECORD OF BOREHOLE NO. D-1-04**

REFERENCE 09181 DATUM Geodetic LOCATION N 5332453.77 E 362503.43 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/2/28 - 10/2/28 TIME 2:50:00 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								
337.2	Ground Surface		1	AS	N/A								
0.0	SAND - brown fine to medium sand trace gravel trace silt		2	SS	8								2 97 (1)
	(loose/compact)		3	SS	8								
			4	SS	10								
			5	SS	29								
			6	SS	29								7 89 (4)
332.7	Auger Refusal												
332.6	DCPT Refusal												
4.6	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						
The stratification lines represent approximate boundaries. The transition may be gradual.							WATER LEVEL RECORDS						
							Date (dd/mm/yy)/Time			Water Depth (m)		Cave In (m)	
							1) 10/2/28 2:50:00 PM			DRY		4	
							2)			-		-	
3)			-		-								

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

**METRIC****RECORD OF BOREHOLE NO. D-1-05**

REFERENCE 09181 DATUM Geodetic LOCATION N 5332502.15 E 362490.77 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/2/28 - 10/2/28 TIME 3:55:00 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								
337.2	Ground Surface		1	AS	N/A								
0.0	SAND - brown fine to medium sand some gravel trace silt		2	SS	10								19 80 (1)
	(compact/dense)		3	SS	11								
			4	SS	11								17 82 (1)
333.9	DCPT Refusal		5	SS	36								
333.4	Auger Refusal End of Borehole												
3.8													

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) 10/2/28 3:55:00 PM	DRY	3.3
		2)	-	-
		3)	-	-

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

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

**METRIC****RECORD OF BOREHOLE NO. D-1-06**

REFERENCE 09181 DATUM Geodetic LOCATION N 5332549.98 E 362476.18 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/3/1 - 10/3/1 TIME 9:45:00 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								
336.4	Ground Surface		1	AS	N/A								
0.0	SAND - brown fine to medium sand trace gravel trace silt		2	SS	17								
	(loose/dense)		3	SS	6								2 97 (1)
	gravel and sand seam		4	SS	40								55 43 (2)
			5	SS	19								
332.7	DCPT Refusal Auger 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		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)
		1) 10/3/1 9:45:00 AM	DRY	3.3
		2)	-	-
3)	-	-		

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

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

**METRIC****RECORD OF BOREHOLE NO. D-1-07**

REFERENCE 09181 DATUM Geodetic LOCATION N 5332598.09 E 362462.56 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/3/1 - 10/3/1 TIME 11:00:00 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								
335.2	Ground Surface		1	AS	N/A								
0.0	SAND - brown fine to medium sand trace gravel trace silt (compact)		2	SS	18								6 92 (2)
332.8			3	SS	25								
2.4	DCPT Refusal Auger 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		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)
		1) 10/3/1 11:00:00 AM	DRY	1.9
		2)	-	-
		3)	-	-

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

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

METRIC

RECORD OF BOREHOLE NO. D-1-08

REFERENCE 09181 DATUM Geodetic LOCATION N 5332622.42 E 362456.70 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/3/1 - 10/3/1 TIME 12:25:00 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								
334.2	Ground Surface												
0.0	SAND - brown fine to medium sand trace gravel trace silt		1	AS	N/A								
	(compact)		2	SS	12								1 95 (4)
			3	SS	17								
331.5			4	SS	26								
2.7	DCPT Refusal												
331.1	Auger Refusal End of Borehole												
3.1													

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) 10/3/1 12:25:00 PM	DRY	2.8
		2)	-	-
3)	-	-		

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

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

RECORD OF BOREHOLE NO. D-2-01

[illegible]

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)
1)	-	-
2)	-	-
3)	-	-

2-120 Progress Court, P1B-8G4 Phone: 1-705-476-2550 Fax: 1-705-476-8882 Email: merlex@merlex.ca



METRIC

RECORD OF BOREHOLE NO. D-2-02

REFERENCE 09181 DATUM Geodetic LOCATION N 5332857.87 E 362388.98 - Grenfell Township ORIGINATED BY JL
PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/3/1 - 10/3/1 TIME _____ 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 (%)			
								20	40	60	80	100									
								○ UNCONFINED	+	FIELD VANE											
								● QUICK TRIAXIAL	×	LAB VANE											
								20	40	60	80	100		20	40	60					
329.2 0.0	Exposed Bedrock Surface																GR SA SI CL				
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)			-		▽		-	
													2)			-		▽		-	
The stratification lines represent approximate boundaries. The transition may be gradual.													3)								
													-								

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14



METRIC

RECORD OF BOREHOLE NO. D-2-03

REFERENCE 09181 DATUM Geodetic LOCATION N 5332877.11 E 362383.53 - Grenfell Township ORIGINATED BY JL
PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/3/1 - 10/3/1 TIME _____ 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 (%)						
								20	40	60	80	100					GR	SA	SI	CL				
325.7 0.0	Exposed Bedrock Surface																							
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)			-			▽			-		
													2)			-			▽			-		
3)			-			▽			-															
The stratification lines represent approximate boundaries. The transition may be gradual.																								

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

METRIC**RECORD OF BOREHOLE NO. D-3-01**

REFERENCE 09181 DATUM Geodetic LOCATION N 5332959.17 E 362361.33 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/2/27 - 10/2/27 TIME 1:50:00 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								
317.6	Ground Surface												
0.0	±50 mm organics SILT - brown silt trace to with sand to silt and sand trace clay		1	AS	N/A								
	(very loose/compact)		2	SS	11								0 4 90 6
	brown		3	SS	10								0 22 74 4
	grey		4	SS	WH								
	Sand content increases with depth		5	SS	7								0 44 (56)
			6	SS	WH								
313.3													
4.3	SAND - grey fine to medium sand trace to with silt		7	SS	2								
	(loose/compact)		8	SS	4								
			9	SS	3								
			10	SS	12								
307.9													
9.7	DCPT Refusal Auger 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					
The stratification lines represent approximate boundaries. The transition may be gradual.								WATER LEVEL RECORDS					
								Date (dd/mm/yy)/Time		Water Depth (m)		Cave In (m)	
								1) 10/2/27 1:50:00 PM		1.6		2.6	
								2)		-		-	
3)		-		-									

MERLEX ENGINEERING LTD.

2-120 Progress Court, P1B-8G4 Phone: 1-705-476-2550 Fax: 1-705-476-8882 Email: merlex@merlex.ca

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

METRIC**RECORD OF BOREHOLE NO. D-3-02**

REFERENCE 09181 DATUM Geodetic LOCATION N 5333007.28 E 362347.71 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/2/27 - 10/2/27 TIME 2:30:00 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								
316.3	Ground Surface												
0.0	SILT - grey silt with organics with rootlets		1	AS	N/A		316						
316.0	Auger Refusal												
0.5	DCPT Refusal End of Borehole												


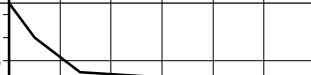
COMMENTS	+ 3, × 3 : Numbers on right refer to Sensitivity Numbers on left refer to values greater than 120 kPa ○ 3% STRAIN AT FAILURE	WATER LEVEL RECORDS			
		Date (dd/mm/yy)Time	Water Depth (m)	Cave In (m)	
		1)	-	▽	-
		2)	-	▽	-
3)	-	▽	-		

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

MEL-GEO 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

METRIC**RECORD OF BOREHOLE NO. D-3-03**

REFERENCE 09181 DATUM Geodetic LOCATION N 5333031.06 E 362339.93 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/2/27 - 10/2/27 TIME _____ 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								
316.5 0.0	Ground Surface ±50 mm organics SAND - brown fine sand some silt		1	AS	N/A		316						
315.8 0.7	DCPT Refusal Auger 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			
		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 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

RECORD OF BOREHOLE NO. D-3-04

[illegible]

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In (m)
1)	-	-
2)	-	-
3)	-	-

2-120 Progress Court, P1B-8G4 Phone: 1-705-476-2550 Fax: 1-705-476-8882 Email: merlex@merlex.ca

**METRIC****RECORD OF BOREHOLE NO. D-3-05**

REFERENCE 09181 DATUM Geodetic LOCATION N 5333079.17 E 362326.31 - Grenfell Township ORIGINATED BY JL
 PROJECT GWP 162-98-00, Highway 11 North - Site D BOREHOLE TYPE CME 45B - Hollow Stem Augers COMPILED BY RG
 CLIENT AECOM Canada Inc. DATE (Started/Completed) 10/2/27 - 10/2/27 TIME 4:20:00 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								
317.2	Ground Surface												
0.0	±50 mm grass and organics		1	AS	N/A								
	SAND - brown fine sand some silt (compact)		2	SS	24								
			3	SS	22								
315.0	Auger Refusal												
2.2													
314.0	DCPT Refusal												
3.2	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 09181 - SITE D - BOREHOLE LOGS.GPJ MEL-GEO.GDT 11/1/14

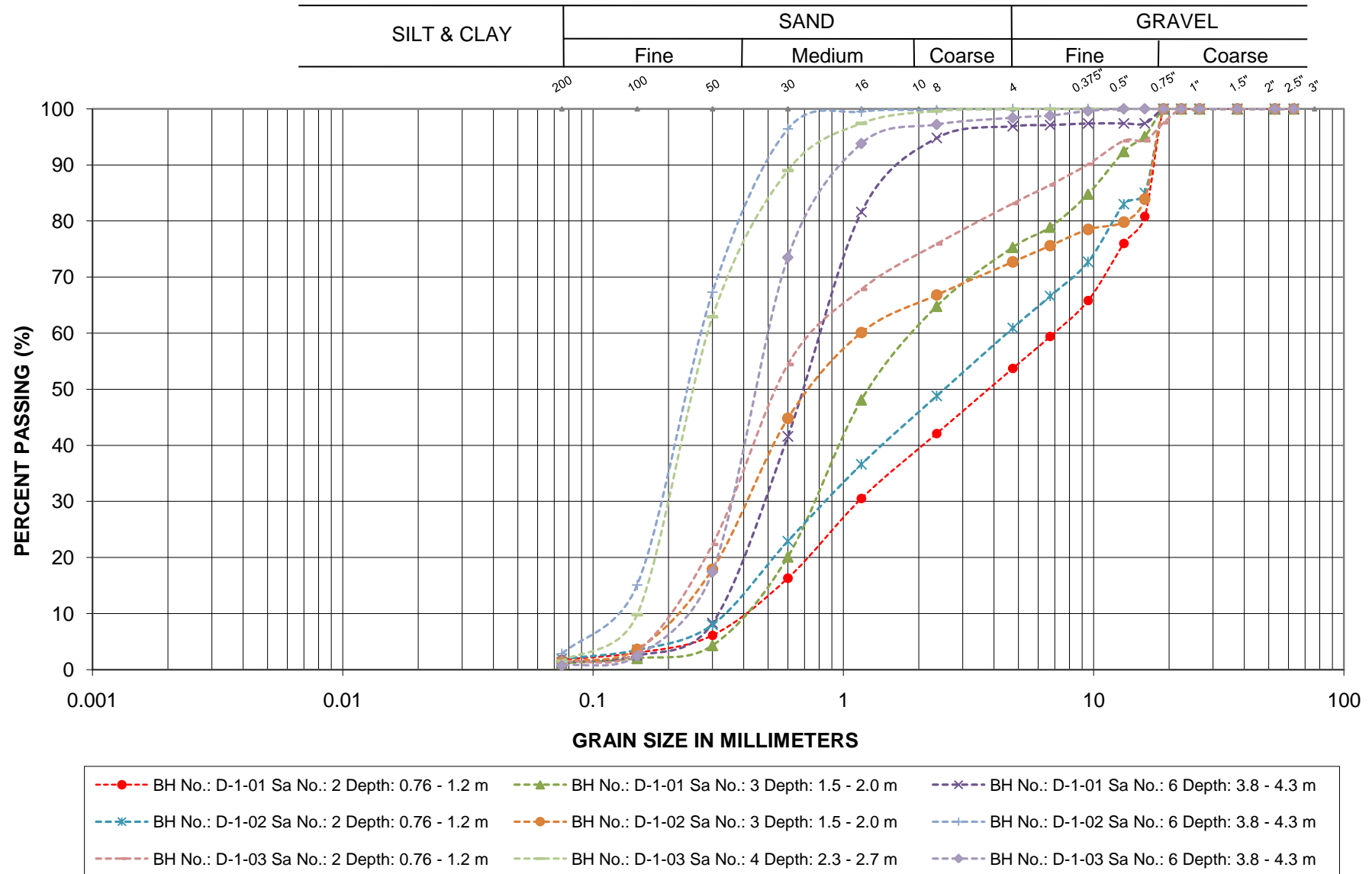
APPENDIX C

Figure No. D-1: Borehole Locations & Soil Strata

Figure Nos. L-1 to L-3: Summary Grain Size Analysis Graph



GRAIN SIZE ANALYSIS



PROJECT: G.W.P. 162-98-00
LOCATION: Hwy 11 MEL Site D

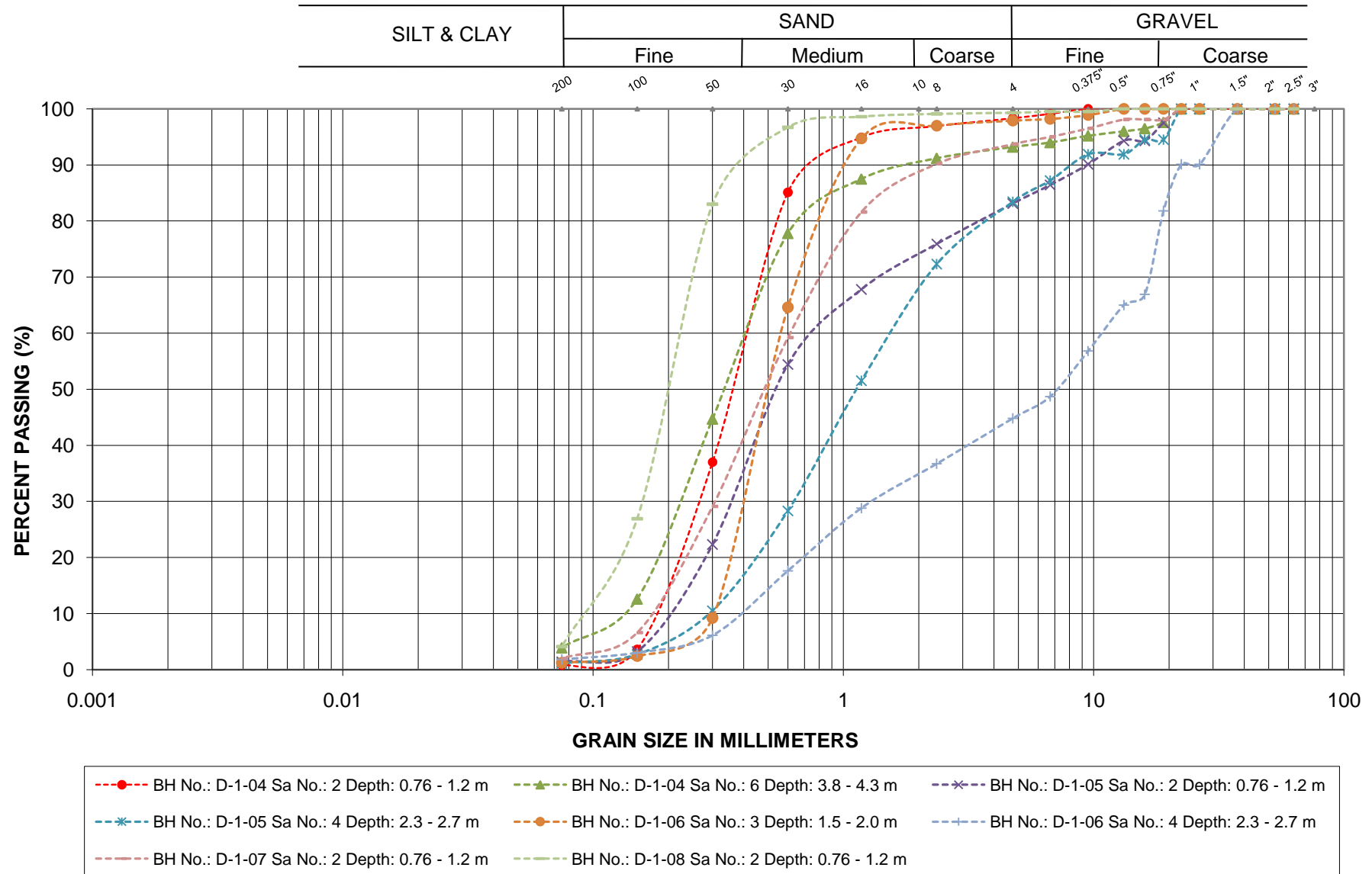
SANDS - Sand, Trace to Some Gravel, Trace Silt

MERLEX ENGINEERING LTD.

FIGURE L-1



GRAIN SIZE ANALYSIS



PROJECT: G.W.P. 162-98-00
LOCATION: Hwy 11 MEL Site D

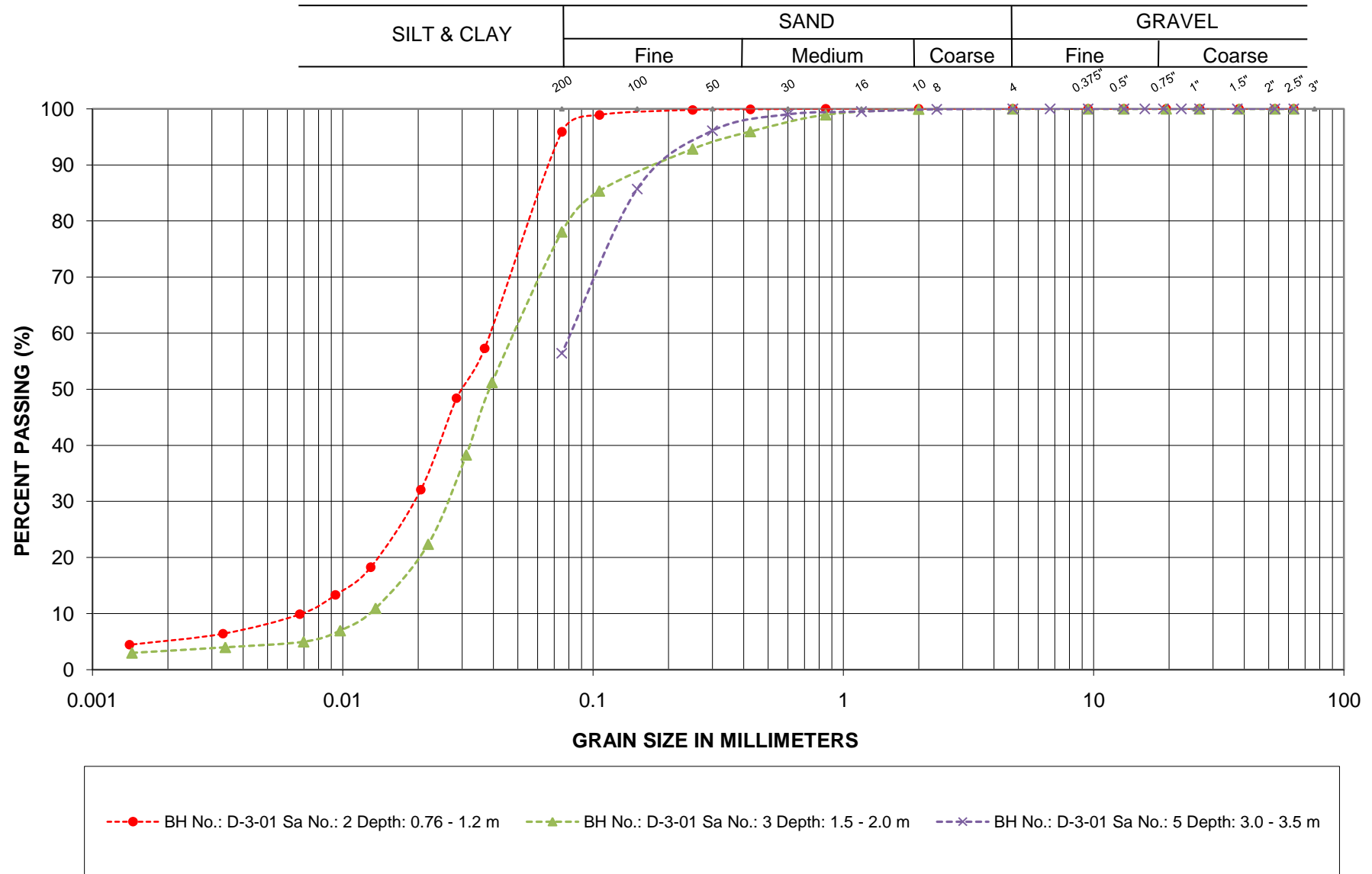
SANDS - Sand, Trace to Some Gravel, Trace Silt

MERLEX ENGINEERING LTD.

FIGURE L-2



GRAIN SIZE ANALYSIS



PROJECT: G.W.P. 162-98-00
LOCATION: Hwy 11 MEL Site D

SILT - Silt, Trace to With Sand, Trace Clay to Silt and Sand

MERLEX ENGINEERING LTD.

FIGURE L-3