

**FOUNDATION INVESTIGATION AND DESIGN REPORT  
HIGH FILL - EMBANKMENT WIDENING STA. 25+735 TO 26+045  
HIGHWAY 11/17 FOUR LANING NIPIGON  
FROM FIRST STREET TO EAST OF THE HWY 11 JUNCTION  
W.P. 124-90-00**

**Geocres Number: 52H-19**

**Report to**

**Hatch Mott MacDonald**

**Thurber Engineering Ltd.**

2010 Winston Park Drive, Suite 103

Oakville, Ontario

L6H 5R7

Phone: (905) 829 8666

Fax: (905) 829 1166

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**PART 1: FACTUAL INFORMATION**

**1 INTRODUCTION**

This report presents the factual findings obtained from a foundation investigation conducted for the proposed embankment widening along the north side of the existing westbound lane (WBL) of Highway 11/17, in the Township of Nipigon, Ontario. The widening work forms part of the Highway 11/17 four-laning through Nipigon. Grading design was completed by McCormick Rankin.

The purpose of the investigation was to explore the subsurface conditions at the site and, based on the data obtained, to provide borehole logs, a borehole location plan, a stratigraphic profile, laboratory test results, and a generalized description of the subsurface conditions.

Thurber carried out the investigation as a sub-consultant to Hatch Mott MacDonald (HMM) under the Ministry of Transportation Ontario (MTO) Agreement Number 6010-E-0006.

**2 SITE DESCRIPTION**

The site is located along Highway 11/17 between about 390 m and 700 m west of the west abutment of the existing Nipigon River Bridge, with the town of Nipigon to the south. The area surrounding the site is heavily treed. The site appears to be on a ridge with the ground sloping downhill in the north-eastward direction towards the river valley. Nipigon River generally flows southward from Lake Nipigon to Lake Superior.

The site lies within the physiographic region known as the Quetico Subprovince of the Superior Province of the Canadian Shield, which is underlain by Archaen rocks. The metasedimentary bedrock is deep and the overburden consists of sand and gravel and deep deposits of silts and clayey silts.

### 3 SITE INVESTIGATION AND FIELD TESTING

The site investigation for this project was carried out between July 13 and 14, 2012 and consisted of drilling and sampling three boreholes. The boreholes were identified as Boreholes 25+760 30L, 25+850 30L and 25+940 30L, and were advanced to depths of 12.5 m to 12.8 m (elevations 211.0 to 203.4).

The boreholes were drilled at approximately 30m offset north of the centreline of the existing Highway 11/17, at the toe of the existing WBL embankment. The approximate borehole locations are shown on the attached Borehole Locations and Soil Strata drawing included in Appendix F.

The borehole locations were established by Thurber with reference to centreline station markings established on-site by McCormick Rankin. Ground elevations at the borehole locations were provided by McCormick Rankin based on topographic survey information. Prior to commencement of drilling, utility clearances were obtained for all borehole locations.

The drilling was carried out using a CME-45 track-mounted drill rig and hollow-stem auger drilling technique was used to advance the boreholes. Soil samples were obtained at selected intervals using a split spoon sampler in conjunction with Standard Penetration Testing (SPT).

The drilling and sampling operations were supervised on a full time basis by a member of Thurber's technical staff. The supervisor logged the boreholes and processed the recovered soil samples for transport to Thurber's laboratory for further examination and testing.

Groundwater conditions in the open boreholes were recorded throughout the drilling operations. Standpipe piezometers were installed in selected boreholes to monitor groundwater levels. The completion details of the piezometers and boreholes are summarized in Table 3.1. Following the final water level reading, the piezometers were decommissioned in November 2012 in general accordance with MOE Regulation 903.

**Table 3.1 – Piezometer and Borehole Completion Details**

<b>Borehole</b>	<b>Piezometer Depth/ Elevation (m)</b>	<b>Borehole Completion Details</b>
25+760 30L	12.2/ 211.6	Piezometer with 1.5 m slotted screen installed, sand filter from 12.2 m to 9.3 m, bentonite seal from 9.3 m to 1.9 m, cuttings to ground surface.
25+850 30L	-	Borehole backfilled with bentonite holeplug from 12.8 m to 2.2 m, then cuttings to surface
25+940 30L	12.2/ 203.7	Piezometer with 1.5 m slotted screen installed, sand filter from 12.2 m to 9.6 m, bentonite seal from 9.6 m to 2.0 m, cuttings to ground surface.

#### **4 LABORATORY TESTING**

The recovered soil samples were subjected to Visual Identification (VI) and to natural moisture content determination. Selected samples were also subjected to gradation analysis (sieve and hydrometer) and Atterberg Limits testing where appropriate. The results of this testing are shown on the Record of Borehole sheets in Appendix A and are presented in the figures included in Appendix B.

#### **5 DESCRIPTION OF SUBSURFACE CONDITIONS**

Details of the encountered soil stratigraphy are presented on the Record of Borehole sheets and the Borehole Locations and Soil Strata Drawings in Appendices A and E, respectively. A general description of the stratigraphy based on the conditions encountered in the boreholes is given in the following paragraphs. However, the factual data presented in the borehole logs takes precedence over this general description and for interpretation of the site conditions. It must be recognized that soil conditions may vary between and beyond borehole locations.

The site stratigraphy generally comprises topsoil overlying sand, silt and silty clay. No bedrock or refusal layer was encountered within the depths of investigation between 12.5 and 12.8 m. More detailed descriptions of the individual strata are presented below.

The subsurface conditions of the existing Highway 11/17 embankment at the site were obtained from a pavement investigation by TBT Engineering Ltd. (TBTE) and references should be made to their pavement borehole information provided in Appendix D.

##### **5.1.1 Existing Embankment Soils**

Review of TBTE's available borehole information indicates that the existing embankment soils generally consists of 80 to 130 mm of asphalt underlain by 270 to 390 mm of crusher run gravel overlying at least 2 m of brown sand and gravel.

##### **5.1.2 Topsoil**

Topsoil was encountered in all boreholes. The thickness of the topsoil ranged from 100mm to 200mm. Topsoil thickness may vary between and beyond the boreholes and in other areas of the site.

##### **5.1.3 Sand**

Brown sand with trace gravel to gravelly, trace to some silt and clay, and occasional cobbles and bounders, was encountered beneath the topsoil except in Borehole 25+940 30L. Borehole 25+760 30 L was terminated within this layer. The thickness of the sand layer in the two boreholes ranged from 4.1 m to more than 12.7 m, with the lower boundary at 4.3 m and 12.8 m depth (Elev. 211.0 m and 212.1 m).

SPT ‘N’ values of 16 to 90 blows per 0.3 m penetration were recorded in this layer, indicating a compact to very dense relative density. A localised SPT ‘N’ value of 7 blows per 0.3 m penetration was recorded in Borehole 25+850 30L. Moisture content of the sand varies between 3 and 19%.

Results of grain size distribution analyses conducted on samples of the sand are presented on the Record of Borehole sheets and on Figures B1 and B2 of Appendix B. The results are summarized as follows:

	<u>Gravelly Sand</u>	<u>Sand</u>
Gravel %	23 to 35	1 to 10
Sand %	47 to 70	71 to 85
Silt & Clay%	7 to 18	14 to 19

#### **5.1.4 Silty Clay**

Grey silty clay with silt seams was encountered beneath the topsoil in Borehole 25+940 30L and beneath the sand in Borehole 25+850 30L. The clay layer thickness ranged from 2.1 m to 2.9 m, with its lower boundary at depths of 2.3 m and 7.2 m (Elev. 213.6 m and 209.2 m). Silt seams (varved like) were noted in the clay layer in Borehole 25+850 30L.

SPT ‘N’ values between 4 and 15 blows per 0.3 m penetration were recorded in this layer, indicating a firm to stiff consistency. Moisture content of the clay samples ranged from 25% to 33%.

The results of grain size distribution analyses conducted on a sample of the silty clay are presented on the Record of Borehole sheets and on Figure B3 of Appendix B. Atterberg Limits test results are presented on Figure B6 of Appendix B. The results are summarized as follows:

Gravel %	0
Sand %	0
Silt %	66
Clay %	34
Liquid Limit	31
Plastic Limit	20

The above results show that the silty clay is of low plasticity with a group symbol of CL.

#### **5.1.5 Silt and Sand**

Layers of silt and sand with trace clay and trace to some gravel were encountered beneath the silty clay in Boreholes 25+850 30L and 25+940 30L. The boreholes were terminated within this cohesionless deposit at depths of 12.5 m and 12.8 m (Elev. 203.4 m and 203.6 m).

SPT ‘N’ values in this deposit ranged from 20 blows per 0.3 m penetration to 100 blows for 0.25 m penetration, indicating a compact to very dense relative density. Moisture content measured in the sand samples ranged from 1% to 3%. In the silt samples, moisture content was 12% to 22%.

The results of grain size distribution analyses conducted on samples of the silt and sand are presented on the Record of Borehole sheets and on Figures B4 and B5 of Appendix B. The results are summarized as follows:

	<u>Silt</u>	<u>Sand</u>
Gravel %	0	10 to 23
Sand %	3 to 11	72 to 84
Silt %	85	-
Clay %	4 to 12	-
Silt & Clay %	-	5 to 6

#### 5.1.6 Groundwater Conditions

The boreholes were observed to be dry upon completion of drilling and after installation of standpipe piezometers. Readings observed in the boreholes and the piezometers during and upon completion of drilling are summarized in Table 5.1.

**Table 5.1 – Water Level Observations**

Borehole	Date	Water Level		Comment
		Depth (m)	Elev. (m)	
25+760 30L	July 15, 12	Dry	-	Piezometer
	Nov 21, 12	Dry		
25+850 30L	July 14, 12	Dry	-	Open borehole
25+940 30L	July 14, 12	Dry	-	Piezometer
	Nov 21, 12	Dry		

The above values are short-term observations and will vary depending upon seasonal fluctuations and rainfall patterns. In particular, water levels may be higher after the spring snowmelt or periods of heavy rainfall.

## 6 MISCELLANEOUS

MRC survey personnel established the centreline alignment prior to drilling of the boreholes. The borehole locations were established by measuring offset distances from the centreline. The approximate ground surface elevations at the boreholes were interpreted by McCormick Rankin based on topographic survey data.

George Downing Estate Drilling Ltd. of Hawkesbury, Ontario supplied and operated the drilling and sampling equipment for the field program. Full time supervision of the field activities, including obtaining utility clearances, was carried out by Mr. Stephane Loranger of Thurber.

Supervision of the field program was performed by Mr. Mark Farrant, and interpretation of the field data and preparation of the report was performed by Ms. Mei Cheong and Mr. Jason Lee, P.Eng. The report was reviewed by Dr. P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations Projects.

### Thurber Engineering Ltd.

Mei T. Cheong, M.Phil.  
Geotechnical Specialist

  
APR 3, 2013



Jason Lee, P.Eng., M.Sc.  
Principal/ Geotechnical Engineer



P.K. Chatterji, P.Eng., Ph.D.  
Review Principal

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**PART 2: ENGINEERING DISCUSSION AND RECOMMENDATIONS**

**7 INTRODUCTION**

This report presents interpretation of the geotechnical data in the factual report and presents foundation design recommendations for the proposed embankment widening along a section of the westbound lane (WBL) of Highway 11/17, as part of the highway four-laning works. The proposed widening section is on the north side of the existing WBL and extends from Station 25+735 to 26+045, which is approximately 390 m to 700 m west of Nipigon River in the Township of Nipigon, Ontario.

The existing embankment in this section was constructed on sloping ground, which slopes in a northward direction. The existing WBL embankment is up to 10 m in height along the north side and up to 1 m in height along the south side. The existing embankment is 17 to 18 m wide at the crest, with a side slope ranging from 2H: 1V to 4H: 1V.

The existing embankment will be widened by approximately 12 to 16 m. Fill thickness between 3 to 6 m will be placed on the north-facing slope. The right of way can only accommodate the proposed embankment widening with a side slope no flatter than 2H:1V. The profile grade remains unchanged between Stations 25+735 and 25+870, but gradually increases by 1 m at Station 25+950. Drainage ditches is proposed on the EBL of the existing highway. The ditches will cut into the existing ground with a side slope of 2H: 1V and depth up to 7 m.

The project information used for preparation of this report, including plans and profiles of the proposed alignments was provided by McCormick Rankin in February 2013. The discussion and recommendations presented in this report are based on the information provided by McCormick Rankin and the factual data obtained during the course of the investigation. The subsurface conditions of the existing embankment of Highway 11/17 at the site were obtained from a

pavement investigation by TBT Engineering Ltd. (TBTE) and their factual data is provided in Appendix D.

## **8 ENGINEERING ANALYSIS**

### **8.1 General**

The potential impacts of additional fill placement on the shoulder of the existing embankment for the widening works were investigated. A number of assumptions were made that are consistent with MTO's standard highway design practices:

- Organic deposits, topsoil or other deleterious material will be removed prior to constructing fill embankments.
- The embankment widening will be constructed using either rock fill or Select Subgrade Material (SSM).
- Embankment widening will be constructed with side slopes not steeper than 1.25H:1V for rock fill or 2H:1V for SSM fill.
- Embankment slopes greater than 10 m high in rock fill and greater than 8m high in SSM fill will be provided with a 2 m wide mid-height berm.

A review of TBTE's subsurface information indicates that the existing Highway 11/17 embankment comprises mainly of granular soils within the depth of investigation. This has been assumed in the following analyses.

### **8.2 Stability Analyses**

Stability analyses were carried out at selected critical locations of the widened embankment where the planned fill height exceeds 4.5 m and where ground conditions are least favourable. The commercially available slope stability program SLOPE/W developed by GEO-SLOPE International Ltd. with the option for Morgenstern-Price method was used for the limit equilibrium analyses.

Analyses were carried out for rock fill and SSM fill embankments, under static and seismic loading conditions. For cohesive foundation soils, short term (undrained) and long term (effective stress) conditions were assessed.

Based on consideration of the risk involved and past experience with highway embankment design/monitoring, a factor of safety of 1.3 is considered appropriate to achieve both short and long-term stability for embankments founded on cohesionless soils. For cohesive foundation soils, the recommended factor of safety is 1.3 for short-term conditions and 1.5 for long-term conditions. A factor of safety of 1.0 under seismic conditions is considered to be acceptable on the foundation soils encountered at this site.

Results of the stability analyses carried out are summarized in Table 8.1. The results indicate that the factor of safety for all embankment geometries analysed will be greater than 1.3 for static conditions and greater than 1.0 for seismic condition.

**Table 8.1 – Summary of Factor of Safety from Slope Stability Analysis**

Analysed Section (Sta.)	Final Embankment Height, m	Factor of Safety			
		SSM Fill (2H:1V)		Rock Fill (1.25H:1V)	
		Static	Seismic	Static	Seismic
Sta. 25+840	12	1.5	1.4	1.4	1.4
Sta. 25+940	5.5	1.5	1.5	1.6	1.6

The input parameters and soil model used in the stability analyses for both rock fill and SSM fill embankment, including soil stratigraphy, engineering properties, groundwater conditions, and embankment geometry, are shown in Figures E1 to E12 of Appendix E.

### 8.3 Settlement Analyses

Settlement analysis involved computation of the immediate settlement of the foundation soils under the additional imposed embankment loading, calculation of primary consolidation settlement using Terzaghi's one-dimensional consolidation theory, calculation of secondary consolidation (creep) settlement and estimation of settlement of embankment fill materials due to compression under self-weight.

Embankment fill compression was estimated based on the MTO document "Post-Construction Rock Fill Settlement and Guidelines for Estimating Rock Fill Quantity" (April 12, 2010). Based on past experiences in similar projects, the magnitude of embankment compression in rock fill is assumed to be 0.7% of the additional fill height placed and 0.5% in SSM fill.

Settlement analysis was carried out at stations with representative subsurface conditions and the analysis also takes into account the 1m grade raise at the eastern section of the project. The analyses indicate that most of the primary consolidation would be completed within 2 months following completion of the embankment construction. Results of the estimated foundation soil settlement and embankment fill compression are summarised in Table 8.2.

Settlement analysis indicates that the estimated differential settlement rate across the width of the embankment due to the proposed widening is no greater than 200:1, which is considered acceptable in accordance to the MTO document "Embankment Settlement Criteria For Design" (March 2, 2010).

**Table 8.2 – Summary of Foundation Soils Settlement and Embankment Fill Compression**

Type of settlement	Estimated Settlement (mm)	
	SSM Fill	Rock Fill
Settlement during construction and within 2 months after construction (includes immediate settlement and primary consolidation settlement of foundation soils, and partial post construction settlements)	80	60
Post construction Settlement – 20 years after paving (includes secondary consolidation settlement of foundation soils and fill compression)	25	35
<b>Total settlement</b>	<b>105</b>	<b>95</b>

The estimated magnitudes and rates of settlement are considered approximate and may vary along and across the highway alignment based on embankment height and thickness of compressible foundation soils.

#### 8.4 Recommendations

Based on discussion with McCormick Rankin and due to limited quantity of rock fill which is readily available near the site, it is understood that SSM will be used for the embankment widening. Based on the results of the slope stability analyses, the embankment widening using SSM may be constructed with a side slope of 2H: 1V with mid-height bench provided for fill height greater than 8m.

In order to mitigate the effects of settlement, it is recommended that the embankment be overbuilt vertically by 125mm to accommodate the estimated total settlement. The overbuild material should also consist of SSM fill. The platform width of the embankment must also be overbuilt to take into account the predicted settlement so that the required design embankment geometry is achieved after settlement is complete. Based on NRE 98-200 Directive (October 28, 1998), a minimum platform widening of 500mm will be required for the WBL of the embankment.

Although most of the settlement will be completed during embankment construction, some settlement in the foundation soils and granular fill compression is expected to continue after completion of the fill placement. There should be a waiting period of two months between completion of the fill placement and pavement construction, to accommodate

embankment settlement and compression. Some overbuild material may have to be stripped to the subgrade level before pavement construction.

## **9 EMBANKMENT CONSTRUCTION**

Embankment construction should be carried out in accordance with OPSS 206 and SP 206S03. Topsoil and organics must be removed from the footprints of the new embankments prior to placement of fill.

Earth fill may consist of granular materials and Select Subgrade Material (SSM) in compliance with OPSS1010. The fill should be compacted as per OPSS501.

Mid-height berms comprising 2 m wide benches should be incorporated along the length of embankments with heights exceeding 8 m in earth fill and 10 m in rock fill. Where new embankment fill is placed against existing embankment slopes or on a sloping ground surface, the existing earth or fill slope must be properly compacted and benched in accordance with OPSD 208.010.

Earth slopes must be provided with erosion protection in accordance with OPSS804.

Attention should be given to maintain continuity of drainage between the existing granular base/ sub-base and the new granular base/ sub-base.

## **10 CONSTRUCTION CONCERNS**

During construction, qualified geotechnical staff should be retained to observe activities related to subgrade preparation of embankment construction and advise the Contract Administrator on construction concerns or issues related to embankment stability or settlement.

Potential construction concerns include, but are not necessarily limited to:

- The thickness and presence of topsoil and organic deposits were investigated at the borehole locations only. Thickness of topsoil and organic deposits may vary at other locations between and beyond boreholes.
- Contractor must be alerted to the potential of perched ground water when cutting into the existing Highway 11/17 embankment and for the construction of drainage ditches on the EBL of the highway. Control of groundwater seepage is the responsibility of the Contractor.
- The risk of settlement of the existing WBL due to the widening fill placement is expected to be low. If any settlement of the existing pavement is noted in any area due to construction of the widening, maintenance measures such as placement of asphalt overlay may be required to compensate the settlement.

## 11 CLOSURE

Engineering analysis and preparation of the foundation design report were carried out by Ms. Mei Cheong and Mr. Jason Lee, P.Eng. The report was reviewed by Dr. P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations Projects.

**Thurber Engineering Ltd.**

Mei T. Cheong, M.Phil.  
Geotechnical Specialist



APR 3, 2013



Jason Lee, P.Eng., M.Sc  
Principal/ Geotechnical Engineer



P.K. Chatterji, P.Eng., Ph.D.  
Review Principal

## **Appendix A**

### **Record of Borehole Sheets**

## SYMBOLS, ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES

### 1. TEXTURAL CLASSIFICATION OF SOILS

CLASSIFICATION	PARTICLE SIZE	VISUAL IDENTIFICATION
Boulders	Greater than 200mm	same
Cobbles	75 to 200mm	same
Gravel	4.75 to 75mm	5 to 75mm
Sand	0.075 to 4.75mm	Not visible particles to 5mm
Silt	0.002 to 0.075mm	Non-plastic particles, not visible to the naked eye
Clay	Less than 0.002mm	Plastic particles, not visible to the naked eye

### 2. COARSE GRAIN SOIL DESCRIPTION (50% greater than 0.075mm)

TERMINOLOGY	PROPORTION
Trace or Occasional	Less than 10%
Some	10 to 20%
Adjective (e.g. silty or sandy)	20 to 35%
And (e.g. sand and gravel)	35 to 50%

### 3. TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

DESCRIPTIVE TERM	UNDRAINED SHEAR STRENGTH (kPa)	APPROXIMATE SPT <sup>(1)</sup> 'N' VALUE
Very Soft	12 or less	Less than 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	Greater than 200	Greater than 30

NOTE: Hierarchy of Soil Strength Prediction

- 1) Laboratory Triaxial Testing
- 2) Field Insitu Vane Testing
- 3) Laboratory Vane Testing
- 4) SPT value
- 5) Pocket Penetrometer



### 4. TERMS DESCRIBING DENSITY (COHESIONLESS SOILS ONLY)

DESCRIPTIVE TERM	SPT "N" VALUE
Very Loose	Less than 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Greater than 50

### 5. LEGEND FOR RECORDS OF BOREHOLES

SYMBOLS AND ABBREVIATIONS FOR SAMPLE TYPE	SS Split Spoon Sample	WS Wash Sample	AS Auger (Grab) Sample
	TW Thin Wall Shelby Tube Sample	TP Thin Wall Piston Sample	
	PH Sampler Advanced by Hydraulic Pressure	PM Sampler Advanced by Manual Pressure	
	WH Sampler Advanced by Self Static Weight	RC Rock Core	SC Soil Core

$$\text{Sensitivity} = \frac{\text{Undisturbed Shear Strength}}{\text{Remoulded Shear Strength}}$$

 Water Level  
 Shear Strength Determination by Pocket Penetrometer

- (1) SPT 'N' Value      Standard Penetration Test 'N' Value – refers to the number of blows from a 63.5kg hammer free falling a height of 0.76m to advance a standard 50 mm outside diameter split spoon sampler for 0.3 m depth into undisturbed ground.
- (2) DCPT      Dynamic Cone Penetration Test – Continuous penetration of a 50 mm outside diameter, 60° conical steel point attached to "A" size rods driven by a 63.5 kg hammer free falling a height of 0.76 m. The resistance to cone penetration is the number of hammer blows required for each 0.3 m advance of the conical point into undisturbed ground.

# UNIFIED SOILS CLASSIFICATION

MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.
		GM	Silty gravels, gravel-sand-silt mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS	SW	Well-graded sands or gravelly sands, little or no fines.
		SP	Poorly-graded sands or gravelly sands, little or no fines.
		SM	Silty sands, sand-silt mixtures.
		SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS	SILTS AND CLAYS $W_L < 50\%$	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. ( $W_L < 30\%$ ).
		CI	Inorganic clays of medium plasticity, silty clays. ( $30\% < W_L < 50\%$ ).
		OL	Organic silts and organic silty-clays of low plasticity.
	SILTS AND CLAYS $W_L > 50\%$	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.
CLAY SHALE			
SANDSTONE			
SILTSTONE			
CLAYSTONE			
COAL			

## METRIC

[illegible]

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 25+760 30L

2 OF 2

METRIC

W.P. 124-90-00 LOCATION Red Rock to Nipigon - C1 (WBL) N 5 431 982.6 E 212 650.6 ORIGINATED BY SLL  
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN  
DATUM Interpolated from Geodetic DATE 2012.07.13 - 2012.07.13 CHECKED BY MC

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)				
							20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>			
	Continued From Previous Page																
	SAND, trace silt, trace to some gravel, trace to some silt and clay Very Dense Grey Moist																
	Gravelly		8	SS	64											35 47 18 (SI+CL)	
			9	SS	83												
211.0																	
12.8	END OF BOREHOLE AT 12.8m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.  WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Jul 15,12 Dry Nov 21,12 Dry																

# RECORD OF BOREHOLE No 25+850 30L

1 OF 2

METRIC

W.P. 124-90-00 LOCATION Red Rock to Nipigon - C1 (WBL) N 5 431 985.0 E 212 740.5 ORIGINATED BY SLL  
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN  
 DATUM Interpolated from Geodetic DATE 2012.07.14 - 2012.07.14 CHECKED BY MC

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT  γ  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)						
216.4								20	40	60	80	100						
0.0	<b>TOPSOIL</b> , moss, with roots and rootlets  <b>SAND</b> , trace to some gravel, some silt Loose to very dense Brown Moist																	
0.2																		
			1	SS	20													
			2	SS	7													
			3	SS	16													
			4	SS	68													
212.1																		
4.3	Silty <b>CLAY</b> , with silt seams (varved) Firm to Stiff Grey Moist		5	SS	4													
			6	SS	15													
209.2																		
7.2	<b>SAND</b> , some silt Compact Brown Moist																	
208.5																		
7.9	<b>SILT</b> , some clay Dense Grey Moist		7	SS	37													
207.6																		
8.8	<b>SAND</b> , trace to some gravel, trace silt Very Dense to Dense Grey Moist																	
			8	SS	52													

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity

20  
15  
10  
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 25+850 30L

2 OF 2

METRIC

W.P. 124-90-00 LOCATION Red Rock to Nipigon - C1 (WBL) N 5 431 985.0 E 212 740.5 ORIGINATED BY SLL  
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN  
DATUM Interpolated from Geodetic DATE 2012.07.14 - 2012.07.14 CHECKED BY MC

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT      NATURAL MOISTURE      LIQUID CONTENT      LIMIT			UNIT WEIGHT  γ  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR   SA   SI   CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)				
	Continued From Previous Page							20   40   60   80   100								
			9	SS	42		206									
							205									
203.6			10	SS	50		204									
12.8	END OF BOREHOLE AT 12.8m. BOREHOLE OPEN TO 12.8m AND DRY AFTER COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 2.2m, THEN CUTTINGS TO SURFACE.															

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
(%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 25+940 30L

1 OF 2

METRIC

W.P. 124-90-00 LOCATION Red Rock to Nipigon - C1 (WBL) N 5 431 987.5 E 212 830.5 ORIGINATED BY SLL  
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN  
 DATUM Interpolated from Geodetic DATE 2012.07.14 - 2012.07.14 CHECKED BY MC

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT      NATURAL MOISTURE CONTENT      LIQUID LIMIT			UNIT WEIGHT  <b>γ</b>  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR   SA   SI   CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)							
								20   40   60   80   100		w <sub>P</sub> w                      w <sub>L</sub>									
								20   40   60   80   100		20   40   60									
215.9																			
0.0		<b>TOPSOIL</b> , with roots and rootlets																	
0.2		Silty <b>CLAY</b> , with silt seams Stiff Brown Moist																	
			1	SS	8														
			2	SS	8														
213.6																			
2.3		<b>SILT</b> , trace to some sand, trace to some clay Compact to Very Dense Brown Moist  <																	

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to  
Sensitivity 20  
15 10 5 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 25+940 30L

2 OF 2

METRIC

W.P. 124-90-00 LOCATION Red Rock to Nipigon - C1 (WBL) N 5 431 987.5 E 212 830.5 ORIGINATED BY SLL  
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN  
DATUM Interpolated from Geodetic DATE 2012.07.14 - 2012.07.14 CHECKED BY MC

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)				
							20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>			
	Continued From Previous Page																
			9	SS	100/ 250												
203.4			10	SS	50/ 150												
12.5	END OF BOREHOLE AT 12.5m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.  WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Jul 15, 12 Dry Nov 21, 12 Dry																

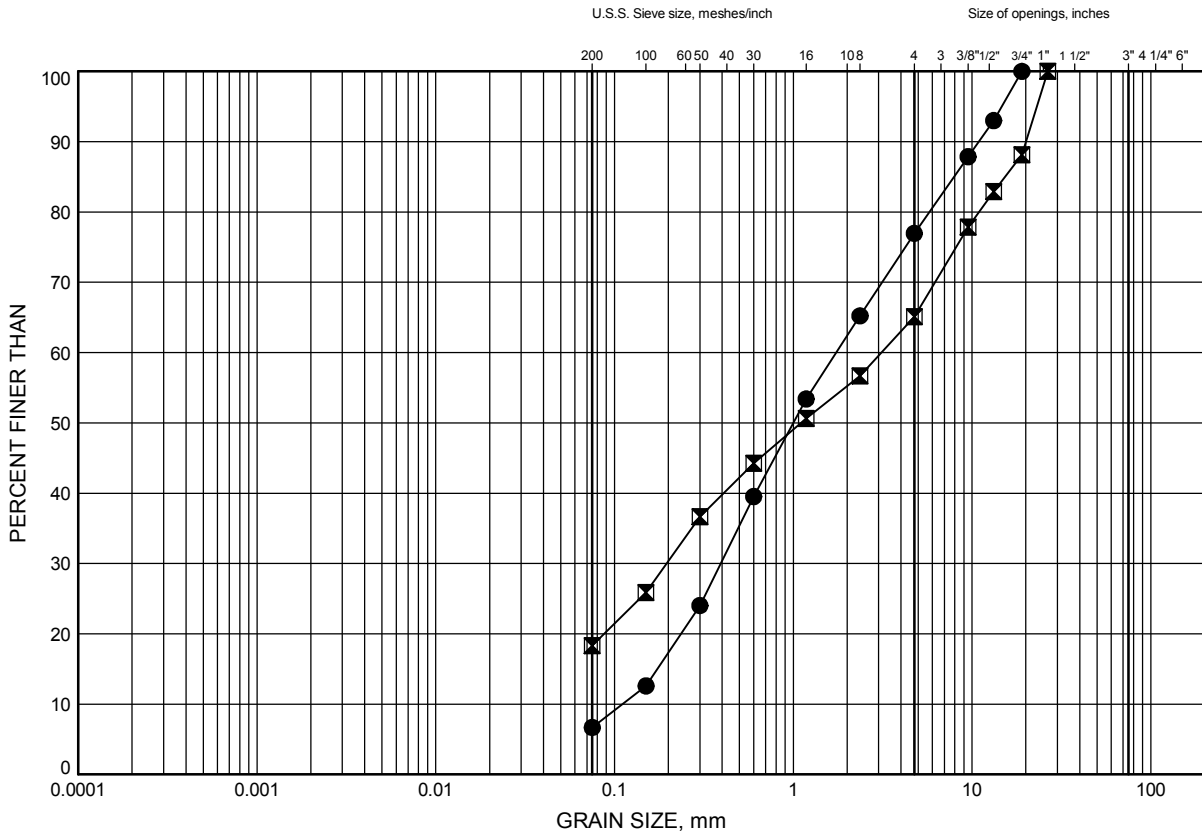
## **Appendix B**

### **Laboratory Test Results**

Hwy 11/17 Nipigon  
**GRAIN SIZE DISTRIBUTION**

FIGURE B1

**GRAVELLY SAND**



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	25+760 30L	2.59	221.25
⊠	25+760 30L	10.97	212.86

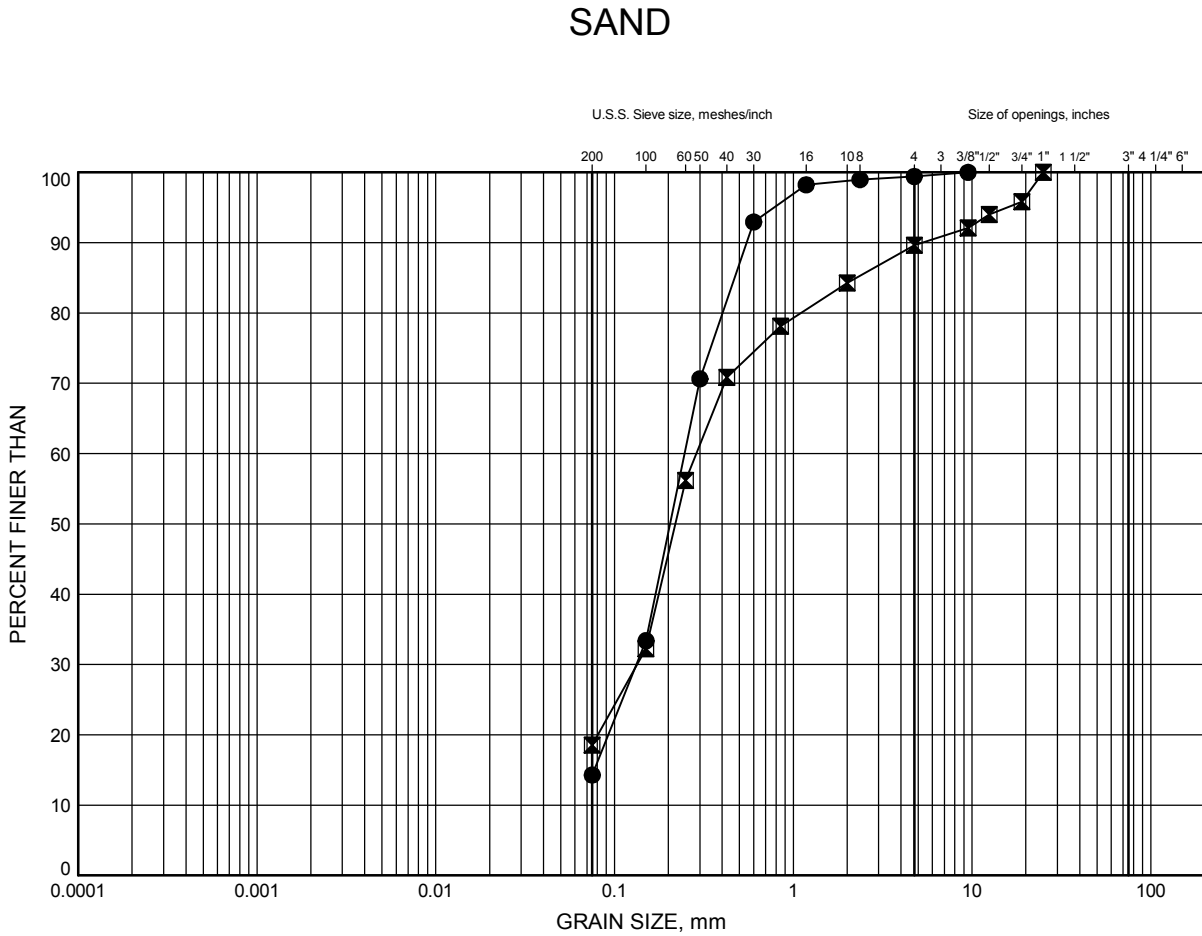
Date January 2013  
124-90-00



Prep'd AN  
 Chkd. MC

Hwy 11/17 Nipigon  
**GRAIN SIZE DISTRIBUTION**

FIGURE B2



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	25+760 30L	7.92	215.91
⊠	25+850 30L	2.59	213.81

Date January 2013  
 124-90-00

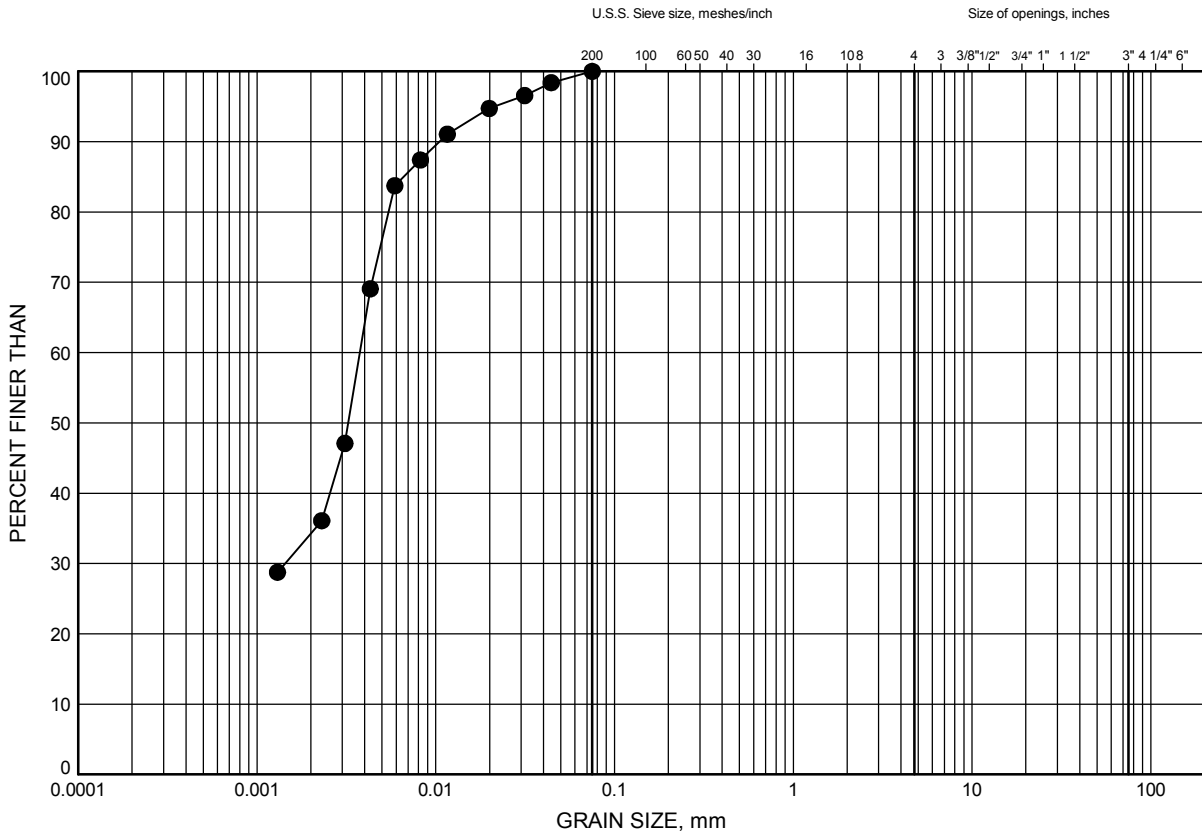


Prep'd AN  
 Chkd. MC

# Hwy 11/17 Nipigon GRAIN SIZE DISTRIBUTION

FIGURE B3

## SILTY CLAY



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

## LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	25+850 30L	4.88	211.53

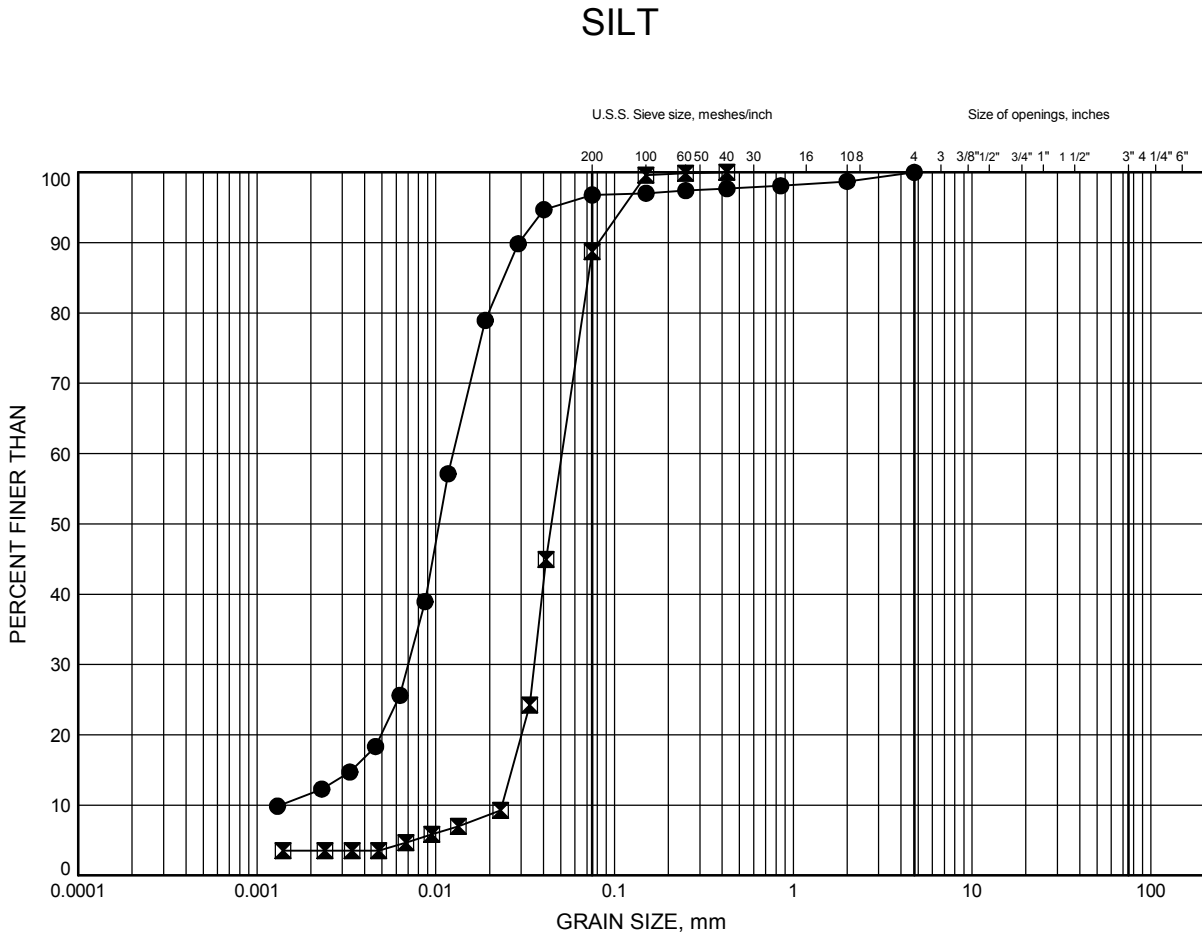
Date January 2013  
124-90-00



Prep'd AN  
Chkd. MC

# Hwy 11/17 Nipigon GRAIN SIZE DISTRIBUTION

FIGURE B4



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

## LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	25+940 30L	2.59	213.33
☒	25+940 30L	6.40	209.52

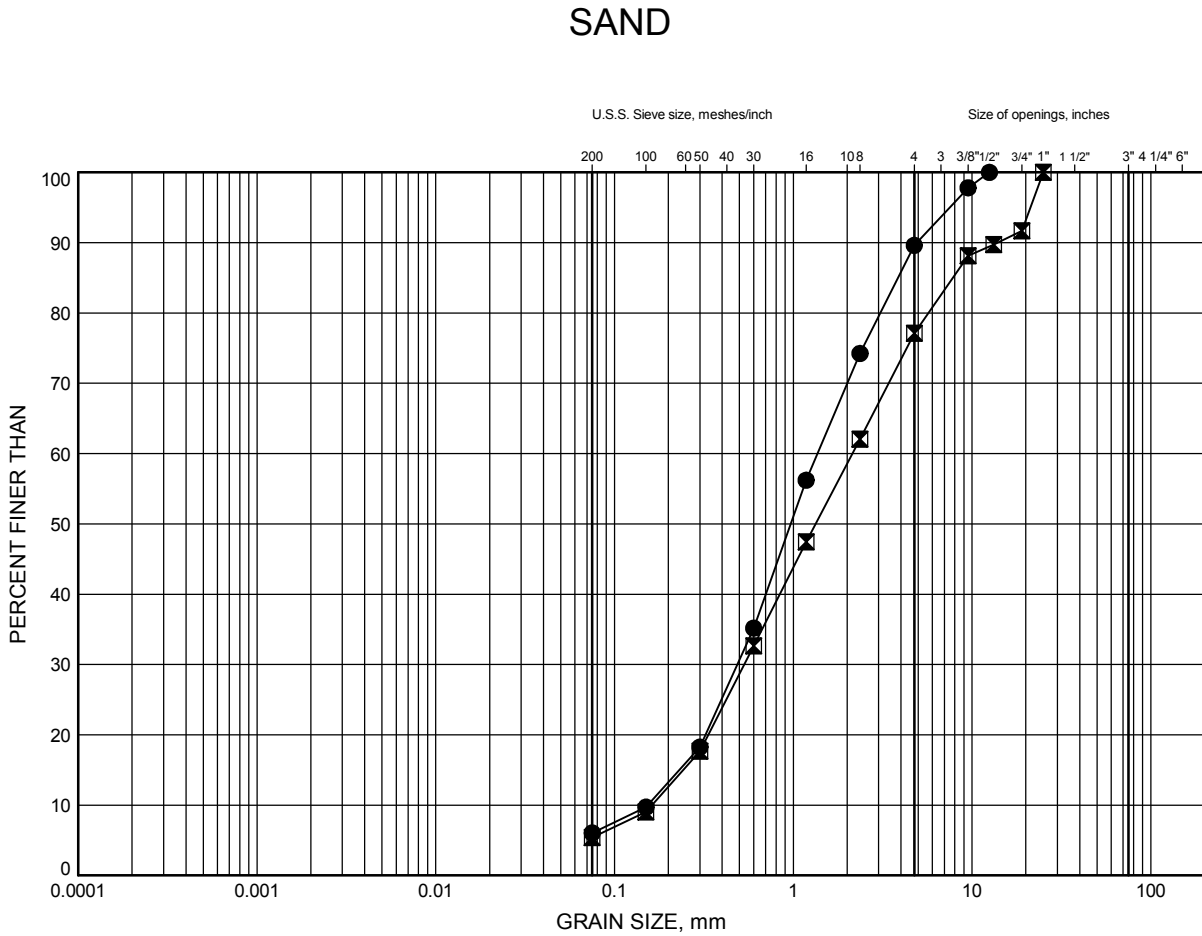
Date January 2013  
124-90-00



Prep'd AN  
Chkd. MC

Hwy 11/17 Nipigon  
**GRAIN SIZE DISTRIBUTION**

FIGURE B5



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

**LEGEND**

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	25+850 30L	9.45	206.95
⊠	25+940 30L	9.45	206.48

Date January 2013  
124-90-00



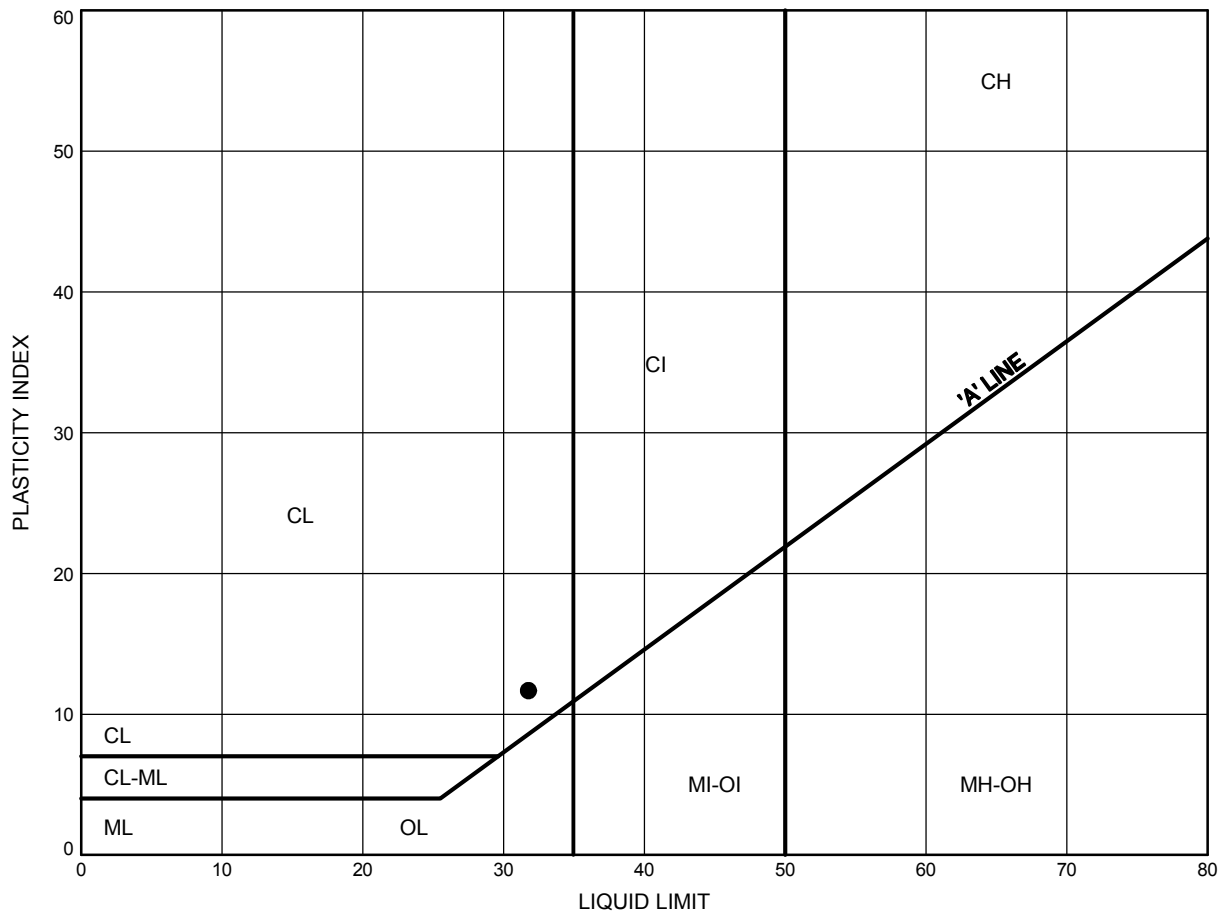
Prep'd AN  
 Chkd. MC

Hwy 11/17 Nipigon

# ATTERBERG LIMITS TEST RESULTS

FIGURE B6

## SILTY CLAY



### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	25+850 30L	4.88	211.53

Date January 2013  
124-90-00



Prep'd AN  
Chkd. MC

## **Appendix C**

### **Site Photos**



**Photograph 1 - Embankment toe of the existing WBL, looking west**



**Photograph 2 - Embankment toe of the existing WBL, looking west**

## **Appendix D**

### **TBTE Pavement Borehole Information**

**HIGHWAY 11/17 WESTBOUND LANES –  
TWP. NIPIGON****Station 24+296 5.3 Lt (D-100) PA**

0 - 70 Asph  
 70 - 450 Cr Gr  
 450 - 1.8 Br F-Med Sa with Gr  
 1.8 - 2.5 Br Si Tr F Sa & Cl  
 2.5 EOH

**Station 24+296 5.3 Lt PA****Sample No. 10-RK-009 (150 – 300)**

% Passing 4.75 mm 66.4 %  
 % Passing 75 um 8.5 %  
 % Crushed 71.8 %

**Station 24+296 5.3 Lt PA****Sample No. 10-RK-010 (700 – 1.1)**

% Passing 4.75 mm 72.5 %  
 % Passing 75 um 11.1 %  
 FMC @ 1.1 2.6 %  
 Group Symbol SP-SM

**Station 24+296 5.3 Lt PA****Sample No. 10-RK-011 (2.0 – 2.2)**

% Passing 4.75 mm 99.9 %  
 % Passing 75 um 97.0 %  
 FMC @ 2.2 23.1 %  
 W<sub>L</sub> 30 %  
 W<sub>p</sub> 19 %  
 I<sub>p</sub> 11  
 Group Symbol CL

**Station 24+351 6.3 Lt (D-230) PA**

0 - 70 Asph  
 70 - 450 Cr Gr  
 450 - 2.5 Br F-Med Sa with Gr  
 2.5 EOH

**Station 24+383 10.8 Lt (D-1.3) HA**

0 - 50 Tps  
 50 - 200 Br F-Co Sa Tr Gr & Org  
 (Moist & L)  
 200 - 900 Br F-Co Sa with Gr  
 (Moist & L-Comp) (L from 800)  
 900 - 1.5 Br F-Co Sa (Moist & L)  
 1.5 EOH

**Station 24+383 13.4 Lt (D-1.1) HA**

0 - 70 Tps  
 70 - 250 Br Si (Comp)  
 250 - 400 Br Si Tr F Sa & Gr  
 (Moist & L-Comp)  
 400 - 500 Br F-Med Sa Tr Gr (Moist & L)  
 500 - 800 Br F-Co Sa with Gr (L)  
 800 NFP Sloughing

**Station 24+383 7.8 Lt (D-380) HA**

0 - 500 Br F-Co Sa with Gr Tr Si (L)  
 500 NFP Cob

**Station 24+383 9.5 Lt (D-1.0) HA**

0 - 50 Tps  
 50 - 300 Br F Sa (Moist & L)  
 300 - 700 Br F-Co Sa (Moist & L)  
 (Tr Gr @ 650)  
 700 NFP Cob

**Station 24+395 5.1 Lt (D-140) PA**

0 - 80 Asph  
 80 - 500 Cr Gr  
 500 - 2.5 Br F-Med Sa with Gr  
 2.5 EOH

**Station 24+433 8.0 Lt (D-380) HA**

0 - 900 Br F-Co Sa with Gr Tr Si  
 (Moist & Comp)  
 900 - 1.2 Br F-Med Sa (Moist & L)  
 (Tr Gr @ 1.0)  
 1.2 NFP Cob

**Station 24+445 6.6 Lt (D-270) PA**

0 - 90 Asph  
 90 - 500 Cr Gr  
 500 - 2.5 Br F-Med Sa with Gr  
 2.5 EOH

**Station 24+482 11.0 Lt (D-1.1) HA**

0 - 50 Tps (Moist)  
 50 - 350 Br F-Co Sa Tr Org (Moist & L)  
 350 - 500 Br F-Co Sa Tr Gr (Moist & L)  
 500 - 900 Br F-Co Sa with Gr (Moist & L)  
 900 NFP Cob

**Station 24+483 14.9 Lt (D-630) HA**

0 - 30 Tps

30 - 800 Br F-Co Sa with Gr (Moist & L)  
800 NFP Cob

Station 24+484 14.9 Lt (D-650) HA

0 - 60 Tps  
60 - 400 Br F-Co Sa with Gr (Moist & L)  
400 NFP Cob

Station 24+491 10.2 Lt (D-870) HA

0 - 150 Tps (Moist)  
150 - 500 Br F-Co Sa Tr Gr (Moist & L)  
500 NFP Cob

Station 24+491 13.0 Lt (D-1.0) HA

0 - 400 Br F-Co Sa Tr Gr  
400 NFP Cob

Station 24+491 14.9 Lt (D-680) HA

0 - 30 Tps  
30 - 900 Br F-Co Sa Tr Gr  
(Moist & L @ 300)  
(with Gr @ 700)  
900 NFP Cob

Station 24+491 5.9 Lt (D-190) PA

0 - 90 Asph  
90 - 500 Cr Gr  
500 - 2.5 Br F-Med Sa with Gr  
2.5 EOH

Station 24+497 10.2 Lt (D-890) HA

0 - 130 Tps  
130 - 1.1 Br F-Co Sa with Gr (Moist & L)  
1.1 NFP Bld

Station 24+497 14.7 Lt (D-700) HA

0 - 20 Tps  
20 - 500 Br F-Co Sa (Moist & L)  
500 - 900 Br F-Co Sa with Gr Tr Si  
(Moist & L)  
900 1.5 Br Si (Moist & Comp)  
1.5 EOH

Station 24+497 15.9 Lt (D-640) HA

0 - 150 Tps  
150 - 400 Br Si(y) F-Med Sa  
(Moist & Comp)  
400 - 1.5 Br F-Med Sa Tr Gr (Moist)

1.5 EOH

Station 24+522 12.8 Lt (D-1.0) HA

0 - 600 Br F-Co Sa with Gr (L)  
600 NFP Cob

Station 24+523 12.7 Lt (D-1.1) HA

0 - 30 Tps  
30 - 400 Br F-Co Sa with Gr Tr Si  
(Moist & L)  
400 - 1.0 Br F-Co Sa with Gr (Moist & L)  
1.0 - 1.5 Br Si(y) Cl (Moist & Firm)  
1.5 EOH

Station 24+523 12.7 Lt HASample No. 10-LA-055 (600 – 750)

% Passing 4.75 mm 74.2 %  
% Passing 75 um 0.9 %  
FMC @ 750 3.8 %  
Group Symbol SP

Station 24+523 12.7 Lt HASample No. 10-LA-056 (1.0 – 1.3)

% Passing 4.75 mm 99.4 %  
% Passing 75 um 94.3 %  
FMC @ 1.3 21.3 %  
W<sub>L</sub> 22 %  
W<sub>p</sub> 18 %  
I<sub>p</sub> 4  
Group Symbol Cl-ML

Station 24+525 12.4 Lt (D-1.2) HA

0 - 600 Br F-Co Sa with Gr Tr Si  
(Moist & L)  
600 - 1.5 Br Si(y) Cl (Firm) (Moist @ 1.0)  
1.5 EOH

Station 24+525 15.0 Lt (D-650) HA

0 - 100 Tps  
100 - 400 Br F-Co Sa with Gr (Moist & L)  
400 NFP Cob

Station 24+525 22.5 Lt (D-300) HA

0 - 50 Tps  
50 - 1.0 Br F-Co Sa with Gr Tr Si  
1.0 - 1.5 Br Si Tr F-Co Sa  
1.5 - 3.0 Br Si(y) Cl (Moist & Firm)  
(Dry from 2.0)

## 3.0 EOH

Station 24+547 8.1 Lt (D-800) HA

0 - 200 Br F-Co Sa with Gr (L)  
200 NFP Cob

Station 24+558 4.9 Lt (D-370) PA

0 - 90 Asph  
90 - 450 Cr Gr  
450 - 2.5 Br F-Med Sa with Gr  
2.5 EOH

Station 24+567 0.7 Lt (D-100) PA

0 - 80 Asph  
80 - 500 Cr Gr  
500 - 2.5 Br F-Med Sa with Gr  
2.5 EOH

Station 24+570 11.9 Lt (D-1.1) HA

0 - 100 Tps  
100 - 700 Br F-Co Sa (Moist & L)  
700 NFP Cob

Station 24+570 7.9 Lt (D-1.1) HA

0 - 70 Tps  
70 - 400 Br F-Co Sa with Gr Tr Si  
(Moist & L)  
400 NFP Cob

Station 24+571 9.2 Lt (D-1.3) HA

0 - 100 Tps  
100 - 500 Br Si(y) F-Co Sa with Gr  
(Moist & L)  
500 - 650 Br F-Co Sa (Moist & L)  
650 - 700 Br Si with F-Co Sa (Moist & Firm)  
700 NFP Cob

Station 24+605 6.9 Lt (D-630) HA

0 - 300 Br F-Co Sa with Gr Tr Si  
(Moist & L)  
300 - 900 Br F-Med Sa (Moist & L)  
900 NFP Bld

Station 24+609 2.3 Lt (D-290) PA

0 - 90 Asph  
90 - 500 Cr Gr  
500 - 2.5 Br F-Med Sa with Gr  
2.5 EOH

Station 24+610 11.0 Lt (D+1.5) HA

0 - 50 Tps  
50 - 1.8 Br F-Co Sa with Gr (L)  
1.8 - 3.0 Gry Si(y) Cl (Wet & Firm)  
(Dry from 2.1)  
3.0 EOH

Station 24+629 7.6 Lt (D-860) HA

0 - 350 Br F-Co Sa (L) (Moist @ 300)  
350 - 450 Br F-Med Sa (Moist & L)  
450 NFP Bld

Station 24+629 9.3 Lt (D-610) HA

0 - 200 Br Org (Co-Fib) Tr F Sa  
200 - 300 Br F-Co Sa (Moist & L)  
300 NFP Bld

Station 24+647 11.1 Lt (D+430) HA

0 - 250 Blk Org (Co-Fib) with F-Co Sa  
(Moist & L)  
250 - 500 Br F-Co Sa with Gr (Moist & L)  
500 NFP Bld

Station 24+647 7.4 Lt (D-230) HA

0 - 250 Blk Org (Co-Fib) Tr F-Co Sa  
(Moist & L)  
250 NFP Cob

Station 24+650 6.0 Lt (D+1.5) HA

0 - 70 Tps  
70 - 1.5 Br F-Co Sa with Gr  
1.5 - 3.0 Br Si(y) Cl  
3.0 EOH

Station 24+671 13.7 Lt (D+670) HA

0 - 70 Tps (Moist)  
70 - 200 Br F-Med Sa with Si (Moist & L)  
200 - 400 Br F-Med Sa (Moist & L)  
(Tr Gr @ 300)  
400 NFP Bld

Station 24+671 4.8 Lt (D-480) HA

0 - 250 Br F-Co Sa with Gr (Moist & L)  
250 NFP Bld

Station 24+671 7.0 Lt (D-140) HA

0 - 50 Tps (Moist)

50 - 300 Br F-Co Sa (Moist & L)  
300 NFP Cob

Station 24+694 8.2 Lt (D+580) HA

0 - 50 Tps  
50 - 600 Br F-Med Sa (L)  
600 - 700 Br Co Sa (Moist & L)  
700 NFP Bld

Station 24+695 18.6 Lt (D?) HA

0 - 140 Tps  
140 - 300 Br F-Co Sa (Comp)  
300 NFP Cob

Station 24+718 2.8 Lt (D-240) HA

0 - 400 Br F-Co Sa Tr Gr (Moist & L)  
400 - 500 Br Si(y) Cl (Moist & Firm)  
500 NFP Bld

Station 24+719 11.9 Lt (D+3.0) HA

0 - 50 Tps  
50 - 300 Br F Sa Tr Gr (Moist & L)  
300 NFP Bld

Station 24+719 8.1 Lt (D+1.6) HA

0 - 250 Br Org (Co-Fib) Tr F-Med Sa & Gr  
(Moist & L)  
250 - 500 Br F-Med Sa Tr Gr (Moist)  
(Tr Si @ 400)  
500 - 600 Br F-Co Sa with Gr (Moist & L)  
600 NFP Bld

Station 24+747 6.5 Lt (D+1.6) HA

0 - 20 Tps  
20 - 400 Br F-Co Sa with Gr (Moist & L)  
400 NFP Cob

Station 24+748 18.8 Lt (D?) HA

0 - 150 Tps  
150 - 500 Br F-Co Sa Tr Gr  
500 NFP Cob

Station 24+749 10.6 Lt (D+3.1) HA

0 - 100 Tps (Moist)  
100 - 250 Br F-Co Sa with Gr (Moist & L)  
250 NFP Cob

Station 24+749 2.0 Lt (D±0.0) HA

0 - 500 Br F-Co Sa Tr Gr (Moist & L)  
500 NFP Cob

Station 24+772 7.3 Lt (D+2.5) HA

0 - 70 Tps  
70 - 300 Br F-Co Sa with Gr (Moist & L)  
300 NFP Cob

Station 24+795 0.8 Lt (D+350) HA

0 - 550 Br F-Co Sa with Gr (Moist & L)  
550 NFP Cob

Station 24+795 19.1 Lt (D?) HA

0 - 250 Blk Org (Co-Fib) (Moist)  
250 - 400 Br F-Co Sa Tr Gr  
400 NFP Cob

Station 24+796 7.7 Lt (D+3.4) HA

0 - 100 Tps (Moist)  
100 - 1.2 Br F-Co Sa with Gr (Moist & L)  
(Dry @ 400, Moist from 1.1)  
1.2 NFP Cob

Station 24+796 7.7 Lt HA

Sample No. 10-LA-057 (500 – 750)

% Passing 4.75 mm 80.8 %  
% Passing 75 um 1.4 %  
FMC @ 750 2.5 %  
Group Symbol SP

Station 24+818 7.5 Lt (D+3.4) HA

0 - 50 Tps  
50 - 700 Br F-Co Sa with Gr (Moist & L)  
700 NFP Cob

Station 24+842 7.6 Lt (D+3.3) HA

0 - 20 Tps  
20 - 1.5 Br F-Co Sa with Gr (Moist & L)  
1.5 NFP Bld

Station 24+843 0.5 Lt (D-230) HA

0 - 500 Br F-Co Sa with Gr (Moist & L)  
500 NFP Bld

Station 24+866 18.9 Lt (D?) HA

0 - 150 Tps (Moist)  
150 - 300 Br F-Co Sa with Gr Tr Si  
(Moist & Comp)

300 NFP Cob

0 - 900 Br F-Co Sa with Gr (Moist & L)  
900 NFP Bld

Station 24+866 8.0 Lt (D+3.9) HA

0 - 50 Tps  
50 - 600 Br F-Co Sa with Gr Tr Si  
(Moist & L)  
600 NFP Bld

Station 24+987 1.3 Lt (D+300) HA

0 - 750 Br F-Co Sa with Gr (Moist & L)  
750 NFP Bld

Station 24+889 2.6 Lt (D+1.4) HA

0 - 140 Tps  
140 - 600 Br F-Co Sa with Gr (Moist & L)  
600 NFP Cob

Station 24+987 1.3 Lt HA

Sample No. 10-LA-059 (600 – 700)

% Passing 4.75 mm 79.2 %  
% Passing 75 um 1.5 %  
FMC @ 700 3.0 %  
Group Symbol SP

Station 24+889 7.4 Lt (D+4.0) HA

0 - 50 Tps  
50 - 500 Br F-Co Sa with Gr (Moist & L)  
500 NFP Bld

Station 24+987 7.1 Lt (D+2.7) HA

0 - 20 Tps  
20 - 750 Br F-Co Sa with Gr (Moist & L)  
750 NFP Bld

Station 24+917 17.4 Lt (D?) HA

0 - 150 Tps (Moist)  
150 - 700 Br F-Co Sa with Gr Tr Si  
(Moist & Comp)  
700 NFP Cob

Station 25+013 17.8 Lt (D+5.1) HA

0 - 250 Blk Org (Co-Fib) (Moist)  
250 - 700 Br F-Co Sa with Gr Tr Si  
(Moist & Comp)  
700 NFP Cob

Station 24+917 6.5 Lt (D+3.4) HA

0 - 120 Tps  
120 - 700 Br F-Co Sa with Gr (Moist & L)  
700 NFP Bld

Station 25+013 8.2 Lt (D+2.6) HA

0 - 20 Tps  
20 - 200 Br F-Co Sa with Gr (Moist & L)  
200 NFP Cob

Station 24+940 2.1 Lt (D±0.0) HA

0 - 600 Br F-Co Sa with Gr (L)  
600 - 1.6 Br F-Med Sa  
(Moist & L from 600 – 1.1)  
1.6 NFP Bld

Station 25+039 2.8 Lt (D+100) HA

0 - 600 Br F-Co Sa with Gr (Moist & L)  
(Wet from 550)  
600 - 700 Br F-Co Sa with Si (Wet & L)  
700 NFP Sloughing

Station 24+940 2.1 Lt HA

Sample No. 10-LA-058 (1.2 – 1.5)

% Passing 4.75 mm 99.1 %  
% Passing 75 um 1.8 %  
FMC @ 1.5 3.0 %  
Group Symbol SP

Station 25+039 2.8 Lt HA

Sample No. 10-LA-060 (400 – 500)

% Passing 4.75 mm 99.9 %  
% Passing 75 um 32.1 %  
FMC @ 500 19.5 %  
Group Symbol SM

Station 24+940 7.2 Lt (D+3.7) HA

0 - 50 Tps  
50 - 700 Br F-Med Sa Tr Gr (Moist & L)  
700 NFP Bld

Station 25+039 7.5 Lt (D+1.5) HA

0 - 20 Tps  
20 - 800 Br F-Co Sa with Gr (Moist & L)  
800 NFP Bld

Station 24+964 7.1 Lt (D+3.2) HA

Station 25+050 2.0 Lt (D+500) HA

0 - 50 Tps  
 50 - 3.0 Br F-Co Sa with Gr Occ Cob  
 3.0 EOH

Station 25+065 6.6 Lt (D+530) HA

0 - 100 Tps (Moist)  
 100 - 150 Br F-Co Sa with Gr (Moist & L)  
 150 NFP Cob

Station 25+066 17.9 Lt (D?) HA

0 - 280 Blk Org (Co-Fib) (Moist)  
 280 - 550 Br F-Co Sa with Gr Tr Si  
 550 NFP Cob

Station 25+077 3.0 Lt (D+300) HA

0 - 70 Tps  
 70 - 3.0 Br F-Co Sa with Gr Occ Cob  
 (Gry from 2.5)  
 3.0 EOH

Station 25+077 3.8 Lt (D-100) HA

0 - 200 Br F-Co Sa with Gr (Moist)  
 200 NFP Cob

Station 25+087 8.2 Lt (D+210) HA

0 - 200 Blk Org (Co-Fib) (Moist)  
 200 NFP Bld

Station 25+095 4.1 Lt (D-530) HA

0 - 300 Br F-Co Sa with Gr (Moist & L)  
 300 NFP Cob

Station 25+095 8.6 Lt (D±0.0) HA

0 - 140 Tps  
 140 NFP Cob

Station 25+097 8.8 Lt (D-100) HA

0 - 150 Tps (Moist)  
 150 - 200 Br F-Co Sa with Gr (Moist & L)  
 200 NFP Cob

Station 25+100 3.1 Lt (D+500) HA

0 - 50 Tps  
 50 - 3.0 Br F-Co Sa with Gr Occ Cob  
 3.0 EOH

Station 25+100 3.1 Lt (D+500) HASample No. 10-LA-085 (500 – 700)

% Passing 4.75 mm %  
 % Passing 75 um %  
 FMC @ 700 %  
 Group Symbol

Station 25+121 18.3 Lt (D?) HA

0 - 200 Blk Org (Co-Fib) (Moist)  
 200 - 600 Br F-Co Sa Tr Gr & Si  
 (Moist & Comp)  
 600 NFP Cob

Station 25+122 5.0 Lt (D-1.1) HA

0 - 160 Blk Org (Co-Fib) (Moist)  
 160 - 400 Br F-Co Sa with Gr  
 400 NFP Cob

Station 25+122 8.2 Lt (D-710) HA

0 - 200 Br Org (Co-Fib) (Moist)  
 200 - 300 Br F-Co Sa with Gr  
 300 NFP Cob

Station 25+146 7.4 Lt (D-880) HA

0 - 100 Tps (Moist)  
 100 NFP Cob

Station 25+150 8.0 Lt (D+300) HA

0 - 50 Tps  
 50 - 2.5 Br F-Co Sa with Gr  
 2.5 - 4.0 Gry F-Co Sa with Si  
 4.0 EOH

Station 25+173 4.8 Lt (D-770) HA

0 - 200 Br F-Co Sa with Gr (Moist & L)  
 200 NFP Cob

Station 25+173 7.9 Lt (D±0.0) HA

0 - 40 Tps (Moist)  
 40 - 300 Br Gr Tr F-Co Sa (Moist & VL)  
 300 NFP Cob

Station 25+173 7.9 Lt (D±0.0) HA

0 - 100 Tps (Moist)  
 100 - 400 Br F-Co Sa with Gr (Moist & L)  
 400 NFP Cob

Station 25+179 18.1 Lt (D+1.8) HA

0 - 160 Blk Tps

160 - 500 Br F Sa (L)  
500 NFP Cob

Station 25+180 5.0 Lt (D-600) HA

0 - 1.5 Br F-Co Sa Tr Gr (Moist & L)  
1.5 EOH

Station 25+191 4.6 Lt (D-420) HA

0 - 200 Br F-Co Sa with Gr (Moist & L)  
200 NFP Cob

Station 25+191 8.6 Lt (D+300) HA

0 - 140 Tps (Moist)  
140 NFP Cob

Station 25+214 7.9 Lt (D+850) HA

0 - 1.0 Br F-Co Sa with Gr (Moist & L)  
1.0 NFP Bld

Station 25+215 11.9 Lt (D+1.2) HA

0 - 20 Tps  
20 - 4.0 Br F-Co Sa with Gr  
(Moist from 2.5)  
4.0 EOH

Station 25+238 4.2 Lt (D+180) HA

0 - 400 Br F-Co Sa with Gr (Moist & L)  
400 - 800 Br F-Co Sa (Moist & L)  
800 - 1.0 Gry F-Med Sa Tr Gr (Moist & L)  
1.0 1.3 Gry F-Co Sa Tr Gr (Moist & L)  
1.3 NFP Bld

Station 25+239 18.1 Lt (D+4.6) HA

0 - 50 Tps  
50 NFP Cob

Station 25+239 18.1 Lt (D+4.6) HA

0 - 60 Tps  
60 NFP Cob

Station 25+239 9.0 Lt (D+1.9) HA

0 - 10 Tps  
10 - 600 Br F-Co Sa (Moist & L)  
600 NFP Cob

Station 25+250 C/L HA

0 - 50 Tps  
50 - 5.0 Br F-Co Sa with Gr (Moist)

5.0 EOH

Station 25+258 6.8 Lt (D+1.2) HA

0 - 850 Br F-Co Sa with Gr (Moist & L)  
850 NFP Cob

Station 25+275 14.5 Lt (D+6.0) HA

0 - 50 Tps  
50 - 6.0 Br F-Co Sa Tr Gr (Moist)  
(Gry from 3.0)  
6.0 EOH

Station 25+279 0.3 Lt (D±0.0) PA

0 - 90 Asph  
90 - 350 Cr Gr  
350 - 2.5 Br F-Med Sa with Gr  
2.5 EOH

Station 25+282 3.8 Lt (D+1.3) HA

0 - 1.9 Br F-Med Sa with Gr (Moist & L)  
1.9 NFP Cob

Station 25+282 6.7 Lt (D+200) HA

0 - 1.0 Br F-Co Sa with Gr (Moist & L)  
1.0 NFP Cob

Station 25+283 18.0 Lt (D+5.7) HA

0 - 50 Tps  
50 - 400 Br F-Med Sa (L)  
400 - 1.3 Br F Sa  
1.3 NFP Cob

Station 25+300 11.0 Lt (D+3.1) HA

0 - 50 Tps  
50 - 4.0 Br F-Med Sa (Moist)  
(Wet from 3.0)  
4.0 EOH

Station 25+300 11.0 Lt (D+3.1) HASample No. 10-LA-084 (500 – 700)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 700 %

Group Symbol

Station 25+307 7.1 Lt (D+1.5) HA

0 - 900 Br F-Co Sa (Moist & L)  
900 NFP Cob

Station 25+325 11.0 Lt (D+2.0) HA

0 - 50 Tps  
 50 - 3.5 Br F-Co Sa with Gr (Moist)  
 3.5 EOH

Station 25+333 17.1 Lt (D+4.1) HA

0 - 1.4 Br F-Med Sa  
 1.4 NFP Cob

Station 25+333 4.5 Lt (D+150) HA

0 - 550 Br F-Co Sa Tr Gr (Moist & L)  
 550 NFP Cob

Station 25+333 7.6 Lt (D+1.1) HA

0 - 1.2 Br F-Co Sa Tr Gr (Moist & L)  
 1.2 NFP Cob

Station 25+350 C/L HA

0 - 50 Tps  
 50 - 3.0 Br F-Co Sa with Gr  
 3.0 EOH

(3 previous attempts hit Bld @ 800)

Station 25+350 C/L HASample No. 10-LA-083 (700 – 900)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 900 %

Group Symbol

Station 25+360 11.6 Lt (D+1.8) HA

0 - 500 Br F-Med Sa with Gr (L)  
 500 NFP Cob

Station 25+360 15.8 Lt (D+2.3) HA

0 - 50 Tps  
 50 - 100 Br F-Med Sa (L)  
 100 NFP Cob

Station 25+361 4.7 Lt (D±0.0) HA

0 - 450 Br F-Med Sa with Gr (L)  
 450 NFP Cob

Station 25+375 C/L HA

0 - 50 Tps  
 50 - 3.0 Br F-Co Sa with Gr  
 3.0 EOH

Station 25+380 4.2 Lt (D-370) HA

0 - 350 Br F-Med Sa with Gr (L)  
 350 NFP Cob

Station 25+400 C/L HA

0 - 90 Tps  
 90 - 3.0 Br F-Co Sa with Gr  
 (Occ Cob from 1.5)  
 3.0 EOH

Station 25+407 10.8 Lt (D+530) HA

0 - 30 Tps  
 30 - 700 Br F-Med Sa with Gr (Moist & L)  
 700 NFP Cob

Station 25+407 4.9 Lt (D-360) HA

0 - 1.1 Br F-Med Sa (L) (Moist from 500)  
 1.1 NFP Cob

Station 25+425 C/L HA

0 - 100 Tps  
 100 - 1.5 Br Si Tr F Sa  
 1.5 - 3.0 Br F-Co Sa with Gr  
 3.0 EOH

Station 25+430 5.9 Lt (D-130) HA

0 - 1.0 Br F-Co Sa with Gr (Moist & L)  
 1.0 NFP Cob

Station 25+442 C/L HA

0 - 150 Blk Org (Co Fib) (Moist)  
 150 - 1.5 Br Si with F Sa Tr Gr  
 1.5 - 2.0 Br F-Co Sa Tr Gr  
 2.0 - 3.0 Gry Si Tr F Sa & Gr  
 3.0 EOH

Station 25+442 C/L HASample No. 10-LA-080 (800 – 1.0)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 1.0 %

Group Symbol

Station 25+442 C/L HASample No. 10-LA-081 (1.5 – 1.7)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 1.7 %  
Group Symbol

1.5 - 3.0 Br F-Co Sa Tr Gr  
3.0 EOH

Station 25+442 C/L HASample No. 10-LA-082 (2.0 – 2.2)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 2.2 %

Group Symbol

Station 25+511 11.7 Lt (D-2.4) HA

0 - 90 Tps

90 - 450 Br Si(y) F-Med Sa with Gr  
(Moist & L)

450 NFP Cob

Station 25+511 6.8 Lt (D-1.7) HA

0 - 90 Tps

90 - 300 Br Si(y) F-Med Sa with Gr  
(Moist & L)

300 NFP Cob

Station 25+450 5.0 Lt (D-900) HA

0 - 300 Br F-Co Sa with Gr

300 - 2.0 Gry Si Tr F-Co Sa (Moist)

2.0 - 3.0 Gry F Sa Tr Gr

3.0 EOH

Station 25+531 7.5 Lt (D-2.1) HA

0 - 70 Tps

70 - 250 Br F-Co Sa Tr Gr (L)

250 NFP Cob

Station 25+450 5.0 Lt (D-900) HASample No. 10-LA-078 (500 – 700)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 700 %

Group Symbol

Station 25+540 17.0 Lt (D-1.8) HA

0 - 120 Tps

120 - 1.5 Br F-Co Sa with Gr

1.5 - 4.0 Gry Si (Moist &amp; Firm) (Dry @ 2.0)

4.0 EOH

Station 25+450 5.0 Lt (D-900) HASample No. 10-LA-079 (2.0 – 2.3)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 2.3 %

Group Symbol

Station 25+550 7.5 Lt (D-1.9) HA

0 - 120 Tps

120 - 500 Br F-Co Sa with Gr

500 - 1.5 Br Si Tr F-Co Sa & Gr  
(Moist & Firm)1.5 - 3.0 Gry Si(y) Cl (Moist & Firm)  
(Cob from 1.5 – 1.7)

3.0 - 4.0 Gry Si (Firm)

4.0 EOH

Station 25+454 10.8 Lt (D-500) HA

0 - 90 Tps

90 - 400 Br F-Co Sa with Gr (Moist &amp; L)

400 NFP Cob

Station 25+456 4.2 Lt (D-690) HA

0 - 500 Br F-Co Sa with Gr (Moist &amp; L)

500 NFP Cob

Station 25+553 8.2 Lt (D-2.1) HA

0 - 90 Tps

90 - 500 Br Si(y) F-Med Sa with Gr  
(Moist & L)

500 NFP Cob

Station 25+480 5.4 Lt (D-1.1) HA

0 - 100 Tps

100 - 450 Br Si(y) F-Med Sa Tr Gr  
(Moist & L)

450 NFP Cob

Station 25+554 11.1 Lt (D-2.4) HA

0 - 100 Tps

100 - 350 Br Si(y) F-Med Sa with Gr  
(Moist & L)

350 NFP Cob

Station 25+500 7.5 Lt (D-1.2) HA

0 - 120 Tps

120 - 1.5 Br F-Co Sa with Si Tr Gr (Moist)

Station 25+579 14.6 Lt (D-2.8) HA

0 - 100 Tps  
 100 - 900 Br Si(y) F-Med Sa with Gr  
 900 NFP Cob

Station 25+580 7.1 Lt (D-2.0) HA

0 - 150 Tps  
 150 - 600 Br F Sa Tr Si (Moist)  
 600 NFP Cob

Station 25+581 12.4 Lt (D-2.7) HA

0 - 50 Tps  
 50 - 100 Br F-Med Sa (L)  
 100 NFP Cob

Station 25+581 12.4 Lt (D-2.7) HA

0 - 50 Tps  
 50 - 150 Br F-Med Sa (L)  
 150 NFP Cob

Station 25+600 7.5 Lt (D-1.5) HA

0 - 100 Tps  
 100 - 1.1 Br F-Co Sa with Gr  
 1.1 - 2.0 Br Si with F-Co Sa (Moist & Firm)  
 (Cob @ 2.0)  
 2.0 - 2.7 Gry Si (Moist & Firm)  
 2.7 - 4.0 Br F-Co Sa with Gr (L)  
 4.0 EOH

Station 25+600 8.3 Lt (D-1.9) HA

0 - 150 Tps  
 150 - 400 Br F-Med Sa  
 400 NFP Cob

Station 25+601 12.0 Lt (D-2.3) HA

0 - 50 Tps  
 50 - 450 Br F-Med Sa  
 450 NFP Cob

Station 25+631 14.9 Lt (D-1.9) HA

0 - 100 Tps  
 100 - 300 Br F-Co Sa with Gr  
 300 NFP Cob

Station 25+631 8.2 Lt (D-1.5) HA

0 - 150 Tps  
 150 - 400 Br F-Med Sa with Gr  
 400 - 900 Br F-Med Sa

900 NFP Cob

Station 25+650 17.2 Lt (D-1.5) HA

0 - 90 Tps  
 90 - 1.7 Br F-Co Sa Tr Gr  
 1.7 - 2.0 Gry F-Co Sa  
 2.0 - 3.5 Br Si(y) Cl (Moist & Firm)  
 3.5 EOH

Station 25+650 7.5 Lt (D-1.3) HA

0 - 100 Tps  
 100 - 2.0 Br F-Co Sa with Gr (Moist)  
 2.0 - 3.5 Gry F-Co Sa Tr Gr Occ Cob  
 3.5 EOH

Station 25+654 7.5 Lt (D-1.0) HA

0 - 70 Tps  
 70 - 170 Br F-Med Sa with Gr  
 170 - 500 Br Si with F Sa (Moist)  
 500 NFP Cob

Station 25+655 13.3 Lt (D-1.3) HA

0 - 80 Tps  
 80 - 400 Br F-Med Sa with Gr  
 400 NFP Cob

Station 25+680 6.6 Lt (D-690) HA

0 - 50 Tps  
 50 - 400 Br F-Med Sa  
 400 NFP Cob

Station 25+681 12.2 Lt (D-480) HA

0 - 50 Tps  
 50 - 300 Br F-Med Sa  
 300 NFP Cob

Station 25+700 6.0 Lt (D-1.0) HA

0 - 50 Tps  
 50 - 3.0 Br F-Co Sa with Gr Occ Cob  
 3.0 EOH

Station 25+702 14.1 Lt (D-210) HA

0 - 60 Tps  
 60 - 500 Br Gr(ly) F-Co Sa  
 500 NFP Cob

Station 25+703 6.4 Lt (D-580) HA

0 - 200 Br F-Med Sa

200 - 700 Br F-Co Sa with Org (Co Fib)  
(Moist)  
700 - 950 Br Gr(ly) F-Co Sa (Moist)  
950 NFP Cob

Station 25+730 8.8 Lt (D±0.0) HA

0 - 20 Tps  
20 - 300 Br F-Med Sa  
300 NFP Cob

Station 25+731 16.5 Lt (D-560) HA

0 - 20 Tps  
20 - 300 Br F-Med Sa  
300 NFP Cob

Station 25+731 6.7 Lt (D-620) HA

0 - 20 Tps  
20 - 500 Br F-Med Sa  
500 - 900 Br F-Med Sa with Gr (Moist)  
900 NFP Cob

Station 25+741 6.2 Lt (D-1.0) HA

0 - 200 Blk Org (Co-Fib) (Moist)  
200 - 600 Br F-Co Sa with Gr  
600 - 1.0 Br F-Med Sa (Moist)  
1.0 - 1.3 Br Si Tr F Sa (Moist)  
1.3 NFP Cob

Station 25+741 6.2 Lt HASample No. 10-LA-064 (1.2 – 1.3)

% Passing 4.75 mm 100.0 %  
% Passing 75 um 81.0 %  
FMC @ 1.3 24.7 %  
Group Symbol ML

Station 25+741 7.5 Lt (D-1.1) HA

0 - 190 Blk Org (Co-Fib) (Moist)  
190 - 600 Br F-Med Sa (Moist & L)  
600 - 700 Br Si (Moist)  
700 NFP Cob

Station 25+763 32.1 Lt (D-??) TP

0 - 100 Br Org (Co Fib) (Root Mat)  
100 - 300 Br Si(y) Co Sa & Gr Tr Cl & Org  
Occ Cob (Moist & L)  
300 - 1.0 Br Si Tr Sa (Moist & L)  
1.0 - 1.4 Gry Si(y) Cl Tr Sa & Org Occ Cob  
(Moist & Stiff)

1.4 - 2.2 Gry Si (Moist & Comp)  
2.2 - 3.0 Br Med Sa Tr Gr & Si (Dry)  
3.0 EOH (Maximum Reach)

Station 25+763 32.1 Lt TPSample No. 10-TD-050 (100 – 200)

% Passing 4.75 mm 45.7 %  
% Passing 75 um 11.0 %  
FMC @ 200 11.0 %  
Group Symbol ??

Station 25+763 32.1 Lt TPSample No. 10-TD-051 (300 – 400)

% Passing 4.75 mm 99.5 %  
% Passing 75 um 73.6 %  
FMC @ 400 29.4 %  
Group Symbol ??

Station 25+794 6.8 Lt (D-2.9) HA

0 - 300 Blk Org (Co-Fib) (Moist)  
300 - 850 Br F-Co Sa Tr Gr (Moist & L)  
850 - 900 Br F-Med Sa  
900 NFP Cob

Station 25+810 48.8 Lt (D-??) TP

0 - 100 Br Org (Co Fib) (Root Mat)  
100 - 400 Br Si(y) F-Med Sa with Gr Occ  
Cob & Bld (Moist & L)  
400 - 1.2 Br Si(y) F Sa (Moist & L-Comp)  
1.2 - 2.8 Br Med-Co Sa Tr Gr & Si Occ Cob  
(Dry)  
2.8 - 2.9 Gry Si(y) Cl (Moist & Soft-Firm)  
2.9 EOH (Maximum Reach)

Station 25+810 48.8 Lt TPSample No. 10-TD-055 (200 – 300)

% Passing 4.75 mm 54.8 %  
% Passing 75 um 4.6 %  
FMC @ 300 9.3 %  
Group Symbol ??

Station 25+810 48.8 Lt TPSample No. 10-TD-056 (2.8 – 2.9)

% Passing 4.75 mm 100.0 %  
% Passing 75 um 99.4 %  
FMC @ 2.9 28.8 %  
W<sub>L</sub> 28 %  
W<sub>p</sub> 21 %

I<sub>p</sub> 7  
Group Symbol CL

Station 25+843 11.3 Lt (D-3.7) HA

0 - 200 Blk Org (Co-Fib) (Moist)  
200 - 600 Br F-Co Sa Tr Gr (Moist & L)  
600 NFP Cob

Station 25+843 7.6 Lt (D-2.4) HA

0 - 350 Blk Org (Co-Fib) (Moist)  
350 - 750 Br F-Med Sa Tr Gr (Moist & L)  
750 NFP Cob

Station 25+846 41.8 Lt (D-??) TP

0 - 100 Br Org (Co Fib) (Root Mat)  
100 - 400 Br Si(y) F Sa Occ Cob (Moist & L)  
400 - 1.6 Gry-Br Si with F Sa  
(Moist & Comp)  
1.6 - 2.8 Gry Si(y) Cl (Moist & Soft-Firm)  
2.8 EOH (Maximum Reach)

Station 25+846 41.8 Lt TPSample No. 10-TD-057 (500 – 600)

% Passing 4.75 mm 99.9 %  
% Passing 75 um 67.0 %  
FMC @ 600 27.4 %  
Group Symbol ??

Station 25+848 23.2 Lt (D-8.9) HA

0 - 60 Tps  
60 - 200 Br F-Med Sa (L)  
200 NFP Cob

Station 25+848 23.2 Lt (D-8.9) HA

0 - 60 Tps  
60 - 450 Br F-Med Sa (L)  
450 NFP Cob

Station 25+887 37.7 Lt (D-??) TP

0 - 200 Br Org (Co Fib) (Root Mat)  
200 - 400 Br Si Tr F Sa & Org (Moist)  
400 - 3.0 Gry Si(y) Cl (Moist & Stiff)  
(Stiff-V Stiff from 2.5)  
(Alternating 12mm dark & 25mm  
light layers)  
3.0 EOH (Maximum Reach)

Station 25+887 37.7 Lt TPSample No. 10-TD-059 (700 – 800)

% Passing 4.75 mm 100.0 %  
% Passing 75 um 99.5 %  
FMC @ 800 32.8 %  
W<sub>L</sub> 36 %  
W<sub>p</sub> 21 %  
I<sub>p</sub> 15  
Group Symbol ??

Station 25+893 7.4 Lt (D-2.2) HA

0 - 140 Tps (Moist)  
140 - 800 Br F-Co Sa with Gr (Moist & L)  
800 NFP Cob

Station 25+943 7.5 Lt (D-2.1) HA

0 - 200 Blk Org (Co-Fib) (Moist)  
200 - 650 Br F-Med Sa  
650 - 1.4 Br F Sa Tr Co Sa  
1.4 NFP Cob

Station 25+943 7.5 Lt HASample No. 10-LA-061 (1.2 – 1.4)

% Passing 4.75 mm 93.6 %  
% Passing 75 um 33.0 %  
FMC @ 1.4 14.4 %  
Group Symbol SM

Station 25+992 7.5 Lt (D-1.0) HA

0 - 100 Br F-Co Sa with Gr (Moist & L)  
100 - 1.6 Br F Sa  
1.6 - 2.0 Gry Si(y) F Sa  
2.0 EOH

Station 26+043 6.6 Lt (D-1.3) HA

0 - 500 Br F-Co Sa with Gr (Moist & L)  
500 NFP Cob

Station 26+044 24.3 Lt (D+930) HA

0 - 100 Tps  
100 - 200 Br Si(y) F Sa (Moist & L)  
200 NFP Cob

Station 26+096 8.0 Lt (D-690) HA

0 - 400 Br F-Co Sa with Gr (Moist & L)  
400 NFP Cob

Station 26+097 4.4 Lt (D-190) PA

0 - 120 Asph

120 - 500 Cr Gr  
 500 - 2.1 Br F-Med Sa with Gr  
 2.1 - 2.5 Br F Sa Tr Si  
 2.5 EOH

Station 26+122 6.3 Lt (D-290) PA

0 - 120 Asph  
 120 - 500 Cr Gr  
 500 - 2.5 Br F-Med Sa with Gr  
 2.5 EOH

Station 26+162 4.5 Lt (D-160) PA

0 - 130 Asph  
 130 - 500 Cr Gr  
 500 - 2.5 Br F-Med Sa with Gr  
 2.5 EOH

Station 26+600 7.5 Lt (D-1.5) HA

0 - 20 Tps  
 20 - 2.0 Br F-Co Sa with Gr Occ Cob  
 (Moist)  
 2.0 - 3.5 Br F-Co Sa (Moist)  
 3.5 EOH

Station 26+648 16.9 Lt (D-790) HA

0 - 50 Tps  
 50 - 350 Br F-Med Sa (L)  
 350 NFP Cob

Station 26+648 7.5 Lt (D-1.6) HA

0 - 650 Br F-Med Sa (L)  
 650 NFP Cob

Station 26+650 7.5 Lt (D-1.5) HA

0 - 1.2 Br F-Co Sa with Si  
 (Moist from 900)  
 1.2 - 3.0 Br F-Co Sa with Gr Occ Cob  
 (Moist)  
 3.0 EOH

Station 26+681 17.0 Lt (D±0.0) HA

0 - 30 Tps  
 30 - 300 Br F-Med Sa (L)  
 300 NFP Cob

Station 26+682 8.6 Lt (D-730) HA

0 - 80 Tps  
 80 - 1.0 Br F-Med Sa Tr Gr (Moist & L)

(Wet &amp; L from 600)

1.0 - 1.7 Br Si(y) F Sa Tr Cl (Wet & L)  
 1.7 - 2.0 Br F Sa (Wet & L)  
 2.0 EOH

Station 26+682 8.6 Lt (D-730) HASample No. 10-RK-016 (1.2 – 1.5)

% Passing 4.75 mm 100.0 %  
 % Passing 75 um 66.1 %  
 FMC @ 1.5 21.7 %  
 Group Symbol ML

Station 26+700 7.5 Lt (D-900) HA

0 - 150 Blk Org (Co Fib)  
 150 - 600 Br Si Tr F Sa (Moist & Firm)  
 600 - 3.0 Br F-Co Sa Tr Gr (Moist & L)  
 3.0 EOH

Station 26+708 15.6 Lt (D-560) HA

0 - 30 Tps  
 30 - 450 Br F-Med Sa with Gr (L)  
 450 NFP Cob

Station 26+731 7.6 Lt (D-820) HA

0 - 70 Tps  
 70 - 1.5 Br F-Med Sa Tr Gr  
 (Moist from 1.2)  
 1.5 EOH

Station 26+733 14.8 Lt (D-100) HA

0 - 350 Br F-Co Sa (L)  
 350 NFP Cob

Station 26+750 7.5 Lt (D-1.5) HA

0 - 70 Tps  
 70 - 3.0 Br F-Co Sa (Moist from 1.5)  
 3.0 EOH

Station 26+756 8.3 Lt (D-160) HA

0 - 1.5 Br F-Med Sa with Gr (L)  
 1.5 EOH

Station 26+779 10.2 Lt (D-670) HA

0 - 600 Br F-Med Sa with Gr  
 600 - 2.7 Br Si with Cl Tr F Sa (Comp)  
 2.7 NFP Cob

Station 26+780 13.9 Lt (D-100) HA

0 - 30 Tps  
 30 - 450 Br F-Med Sa with Gr (L)  
 450 NFP Cob

Station 26+794 7.5 Lt (D-1.4) HA

0 - 50 Tps  
 50 - 3.0 Gry Si(y) Cl (Moist & Firm)  
 3.0 EOH

Station 26+806 10.3 Lt (D-830) HA

0 - 100 Tps  
 100 - 400 Br F-Med Sa with Gr (L)  
 400 NFP Cob

Station 26+830 11.2 Lt (D-880) HA

0 - 100 Tps  
 100 - 400 Br F-Med Sa Tr Gr  
 400 - 1.5 Br Si & F Sa (L)  
 1.5 EOH

Station 26+830 16.9 Lt (D+480) HA

0 - 70 Tps  
 70 - 400 Br F-Med Sa with Gr (L)  
 400 NFP Cob

Station 26+844 4.9 Lt (D-100) PA

0 - 70 Asph  
 70 - 350 Cr Gr  
 350 - 2.0 Br F-Med Sa with Gr  
 2.0 - 2.5 Br Si(y) F Sa  
 2.5 EOH

Station 26+850 11.5 Lt (D-1.1) HA

0 - 80 Tps  
 80 - 1.5 Gry F-Co Sa  
 1.5 - 3.0 Gry F Sa  
 3.0 EOH

Station 26+850 11.5 Lt (D-1.1) HASample No. 10-LA-077 (550 – 700)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 700 %

Group Symbol

Station 26+854 14.4 Lt (D+220) HA

0 - 1.1 Br F-Med Sa with Gr (L)  
 1.0 - 1.6 Br F Sa Tr Si (L)

1.6 EOH

Station 26+867 5.9 Lt (D±0.0) PA

0 - 70 Asph  
 70 - 300 Cr Gr  
 300 - 1.5 Br F-Med Sa with Gr  
 1.5 - 2.5 Br Si(y) F Sa  
 2.5 EOH

Station 26+878 13.1 Lt (D-700) HA

0 - 400 Br F-Med Sa with Gr (L)  
 400 - 1.5 Br F-Med Sa (Moist & L)  
 1.5 EOH

Station 26+879 20.0 Lt (D+480) HA

0 - 300 Br F-Med Sa with Gr (L)  
 300 - 1.5 Br F-Med Sa (Moist & L)  
 1.5 EOH

Station 26+895 8.8 Lt (D-120) PA

0 - 70 Asph  
 70 - 300 Cr Gr  
 300 - 1.5 Br F-Med Sa with Gr  
 1.5 - 2.5 Br Si(y) Sa  
 2.5 EOH

Station 26+900 14.5 Lt (D-650) HA

0 - 300 Br F-Med Sa Tr Gr (L)  
 300 - 1.5 Br F Sa (L)  
 1.5 EOH

Station 26+927 16.0 Lt (D-340) PA

0 - 70 Asph  
 70 - 500 Br F-Med Sa with Gr  
 500 - 2.5 Br Si(y) Sa  
 2.5 EOH

Station 26+929 25.2 Lt (D-570) HA

0 - 550 Br F-Med Sa Tr Gr (L)  
 550 NFP Cob

Station 26+980 103.8 Lt (D-690) HA

0 - 50 Tps  
 50 - 800 Br F Sa Tr Si (L)  
 800 - 1.5 Br Si(y) F Sa (Moist & L)  
 1.5 EOH

Station 26+980 128.7 Lt (D-550) HA

0 - 1.5 Br F-Med Sa  
1.5 EOH

Station 26+982 78.3 Lt (D-710) HA

0 - 50 Tps  
50 - 200 Br F-Med Sa Tr Si (L)  
200 NFP Cob

Station 26+982 78.8 Lt (D-730) HA

0 - 50 Tps  
50 - 400 Br F Sa Tr Si (L)  
400 NFP Cob

Station 26+983 56.6 Lt (D-550) HA

0 - 50 Tps  
50 - 500 Br F-Med Sa (L)  
500 NFP Cob

Station 26+993 34.5 Lt (D-860) HA

0 - 50 Tps  
50 - 200 Br F-Med Sa (L)  
200 NFP Cob

Station 26+993 35.3 Lt (D±0.0) HA

0 - 50 Tps  
50 - 500 Br F-Med Sa (L)  
500 NFP Cob

Station 27+011 21.4 Lt (D-850) HA

0 - 50 Tps  
50 - 100 Br F-Med Sa (L)  
100 NFP Cob

Station 27+011 21.5 Lt (D-870) HA

0 - 50 Tps  
50 - 350 Br F-Med Sa (L)  
350 NFP Cob

Station 27+034 18.4 Lt (D-700) HA

0 - 200 Br F-Co Sa Tr Gr (L)  
200 NFP Cob

Station 27+034 23.9 Lt (D+350) HA

0 - 350 Br F-Med Sa Tr Gr (L)  
350 NFP Cob

Station 27+035 11.4 Lt (D±0.0) PA

0 - 70 Asph

70 - 300 Cr Gr  
300 - 350 Asph  
350 - 1.5 Br F-Med Sa with Gr  
1.5 - 2.6 Br Si(y) Sa  
2.6 EOH

Station 27+058 16.3 Lt (D-1.0) HA

0 - 200 Br F-Med Sa Tr Gr (L)  
200 - 1.5 Br Si(y) F Sa (L) (Moist from 1.1)  
1.5 EOH

Station 27+059 10.1 Lt (D±0.0) PA

0 - 70 Asph  
70 - 210 Cr Gr  
210 - 300 Asph  
300 - 2.0 Br F-Med Sa with Gr  
2.0 - 2.5 Br Si(y) Sa  
2.5 EOH

Station 27+082 15.8 Lt (D-1.1) HA

0 - 100 Tps  
100 - 400 Br F-Med Sa (L)  
400 NFP Cob

Station 27+083 20.1 Lt (D+630) HA

0 - 100 Tps  
100 - 300 Br F-Med Sa (L)  
300 - 400 Br F-Med Sa with Gr (L)  
400 NFP Cob

Station 27+107 15.1 Lt (D-1.3) HA

0 - 100 Tps  
100 - 200 Br F-Med Sa Tr Gr (L)  
200 - 900 Br Si(y) F Sa (Moist from 800)  
900 NFP Cob

Station 27+124 5.3 Lt (D+150) PA

0 - 60 Asph  
60 - 280 Cr Gr  
280 - 2.0 Br F-Med Sa with Gr  
2.0 - 2.5 Br Si(y) Sa  
2.5 EOH

Station 27+133 14.7 Lt (D-1.5) HA

0 - 100 Tps  
100 - 300 Br F-Med Sa (L)  
300 - 1.5 Br F Sa Tr Si (L)  
1.5 EOH

Station 27+133 19.2 Lt (D-250) HA

0 - 50 Tps  
 50 - 400 Br F-Med Sa  
 400 NFP Cob

Station 27+150 13.8 Lt (D-1.6) HA

0 - 100 Tps  
 100 - 3.0 Br F Sa  
 3.0 EOH

Station 27+153 4.9 Lt (D+160) PA

0 - 70 Asph  
 70 - 210 Cr Gr  
 210 - 300 Asph  
 300 - 400 Cr Gr  
 400 - 2.0 Br F-Med Sa with Gr (Moist)  
 2.0 - 2.5 Br Si(y) F-Med Sa (Moist)  
 2.5 EOH

Station 27+158 14.6 Lt (D-1.3) HA

0 - 50 Tps  
 50 - 1.5 Br F Sa Tr Si (L)  
 1.5 EOH

Station 27+180 4.3 Lt (D+100) PA

0 - 80 Asph  
 80 - 200 Cr Gr  
 200 - 300 Asph  
 300 - 2.0 Br F-Med Sa with Gr (Moist)  
 2.0 - 2.5 Br Si(y) F-Med Sa  
 2.5 EOH

Station 27+182 15.0 Lt (D-1.6) HA

0 - 50 Tps  
 50 - 1.5 Br F Sa Tr Si (L)  
 1.5 EOH

Station 27+183 20.2 Lt (D-1.9) HA

0 - 50 Tps  
 50 - 200 Br F Sa Tr Si (L)  
 200 NFP Cob

Station 27+200 11.0 Lt (D-2.3) HA

0 - 100 Tps  
 100 - 3.0 Br-Gry F Sa  
 3.0 EOH

Station 27+206 3.9 Lt (D-100) PA

0 - 60 Asph  
 60 - 200 Cr Gr  
 200 - 250 Asph  
 250 - 2.2 Br F-Med Sa with Gr  
 2.2 - 2.5 Br Si(y) F-Med Sa  
 2.5 EOH

Station 27+207 12.5 Lt (D-2.1) HA

0 - 50 Tps  
 50 - 1.5 Br F Sa Tr Si (L)  
 1.5 EOH

Station 27+230 3.5 Lt (D-150) PA

0 - 40 Asph  
 40 - 210 Cr Gr  
 210 - 250 Asph  
 250 - 2.3 Br F-Med Sa with Gr  
 2.3 - 2.5 Br Si(y) F-Med Sa  
 2.5 EOH

Station 27+231 12.9 Lt (D-2.2) HA

0 - 70 Tps  
 70 - 600 Br F Sa Tr Si (L)  
 600 - 1.5 Br Si with F Sa (Moist & Comp)  
 1.5 EOH

Station 27+233 20.1 Lt (D-1.6) HA

0 - 80 Tps  
 80 - 400 Br F-Med Sa Tr Gr (L)  
 400 NFP Cob

Station 27+250 7.5 Lt (D-1.7) HA

0 - 200 Blk Org (Co Fib)  
 200 - 1.0 Br F Sa  
 1.0 - 1.6 Br Si Tr F Sa (Moist)  
 1.6 - 2.8 Br Si(y) Cl (Wet & Firm)  
 2.8 - 4.0 Gry F Sa (Moist)  
 4.0 EOH

Station 27+250 7.5 Lt (D-1.7) HASample No. 10-LA-073 (700 – 900)

% Passing 4.75 mm %  
 % Passing 75 um %  
 FMC @ 900 %  
 Group Symbol

Station 27+250 7.5 Lt (D-1.7) HA

Sample No. 10-LA-074 (1.1 – 1.4)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 1.4 %

Group Symbol

Station 27+250 7.5 Lt (D-1.7) HASample No. 10-LA-075 (1.9 – 2.1)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 2.1 %

Group Symbol

Station 27+250 7.5 Lt (D-1.7) HASample No. 10-LA-076 (3.1 – 3.3)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 3.3 %

Group Symbol

Station 27+300 7.5 Lt (D-1.5) HA

0 - 100 Tps

100 - 1.0 Br F Sa Tr Si (Moist &amp; L)

1.0 - 1.6 Br Si Tr F Sa (Moist & Firm)  
(Wet from 1.5)

1.6 - 3.0 Br Si(y) Cl (Wet &amp; Firm)

3.0 - 4.0 Gry F Sa (Moist)

4.0 EOH

Station 27+350 7.5 Lt (D-1.5) HA

0 - 100 Tps

100 - 500 Br F Sa Tr Si

500 - 1.0 Br F Sa

1.0 - 1.5 Br Si Tr F Sa (Wet &amp; Soft)

1.5 - 4.5 Br Si(y) Cl (Wet &amp; Firm)

4.5 EOH

Station 27+400 7.5 Lt (D-1.5) HA

0 - 200 Blk Org (Co Fib)

200 - 650 Br F Sa Tr Si (Comp)  
(Wet from 600)

650 - 2.5 Br Si Tr F Sa (Wet &amp; Soft)

2.5 - 4.5 Br Si(y) Cl (Wet &amp; Firm)

4.5 EOH

Station 27+450 7.5 Lt (D-1.4) HA

0 - 100 Tps (Moist)

100 - 1.0 Br F Sa Tr Si (Comp)

1.0 - 4.0 Br Si Tr F Sa Tr Cl (Moist & Firm)  
(Wet from 1.1)

4.0 - 4.5 Gry Si(y) Cl (Wet &amp; Soft)

4.5 EOH

Station 27+450 7.5 Lt (D-1.4) HASample No. 10-LA-070 (600 – 750)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 750 %

Group Symbol

Station 27+450 7.5 Lt (D-1.4) HASample No. 10-LA-071 (1.1 – 1.3)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 1.3 %

Group Symbol

Station 27+450 7.5 Lt (D-1.4) HASample No. 10-LA-072 (4.1 – 4.2)

% Passing 4.75 mm %

% Passing 75 um %

FMC @ 4.2 %

Group Symbol

**HIGHWAY 11/17 EASTBOUND LANES –  
TWP. NIPIGON****Station 24+542 5.0 Rt (D+180) PA**

0	-	60	Asph
60	-	400	Cr Gr
400	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 24+585 6.2 Rt (D+280) PA**

0	-	60	Asph
60	-	400	Cr Gr
400	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 24+710 0.1 Rt (D±0.0) PA**

0	-	100	Asph
100	-	650	Cr Gr
650	-	2.0	Br F-Med Sa with Gr
		2.0	Br Cl with Si (Moist)
		3.5	Br F-Med Sa (Moist)
		4.0	EOH

**Station 24+710 100 Rt PA****Sample No. 10-RK-012 (2.5 – 3.0)**

% Passing 4.75 mm	98.9 %
% Passing 75 um	85.3 %
FMC @ 3.0	25.4 %
W <sub>L</sub>	25 %
W <sub>p</sub>	17 %
I <sub>p</sub>	8
Group Symbol	CL

**Station 24+761 3.7 Rt (D+450) PA**

0	-	90	Asph
90	-	600	Cr Gr
600	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 24+807 3.9 Rt (D+180) PA**

0	-	80	Asph
80	-	450	Cr Gr
450	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 24+861 3.7 Rt (D-260) PA**

0	-	80	Asph
80	-	400	Cr Gr

400	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 24+917 3.1 Rt (D+100) PA**

0	-	80	Asph
80	-	400	Cr Gr
400	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 25+185 2.4 Rt (D+150) PA**

0	-	100	Asph
100	-	400	Cr Gr
400	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 25+208 11.4 Rt (D+140) PA**

0	-	80	Asph
80	-	350	Cr Gr
350	-	2.0	Br F-Med Sa with Gr
		2.0	NFP Bld Poss BR

**Station 25+216 1.0 Rt (D+100) PA**

0	-	90	Asph
90	-	400	Cr Gr
400	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 25+229 11.5 Rt (D+100) PA**

0	-	120	Asph
120	-	400	Cr Gr
400	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 25+246 11.6 Rt (D±0.0) PA**

0	-	90	Asph
90	-	300	Cr Gr
300	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 25+249 0.6 Rt (D±0.0) PA**

0	-	90	Asph
90	-	400	Cr Gr
400	-	2.5	Br F-Med Sa with Gr
		2.5	EOH

**Station 25+531 9.6 Rt (D±0.0) PA**

0	-	70	Asph
70	-	550	Cr Gr

550 - 2.5 Br F-Med Sa with Gr  
2.5 EOH

Station 25+580 11.5 Rt (D±0.0) PA

0 - 50 Asph  
50 - 350 Cr Gr  
350 - 2.0 Br F-Med Sa with Gr  
2.0 EOH

Station 25+628 10.5 Rt (D±0.0) PA

0 - 60 Asph  
60 - 370 Cr Gr  
370 - 2.0 Br F-Med Sa with Gr  
2.0 NFP Cob Poss Bld

Station 25+683 9.1 Rt (D±0.0) PA

0 - 60 Asph  
60 - 400 Cr Gr  
400 - 2.0 Br F-Med Sa with Gr  
2.0 NFP Cob Poss Bld

Station 25+712 11.1 Rt (D-100) PA

0 - 80 Asph  
80 - 300 Cr Gr  
300 NFP Bld Poss Cob

Station 25+718 11.8 Rt (D-120) PA

0 - 80 Asph  
80 - 450 Cr Gr  
450 - 2.5 Br F-Med Sa with Gr  
2.5 EOH

Station 25+725 11.4 Rt (D-100) PA

0 - 80 Asph  
80 - 450 Cr Gr  
450 - 3.0 Br Si with F Sa  
3.0 - 3.5 Br F-Med Sa with Gr  
3.5 EOH

Station 25+727 11.3 Rt (D-100) PA

0 - 80 Asph  
80 - 300 Cr Gr  
300 - 1.1 Br Si with F Sa  
1.1 NFP Bld Poss Cob

Station 25+730 11.4 Rt (D-100) PA

0 - 80 Asph  
80 - 300 Cr Gr

300 - 1.1 Br F-Med Sa with Gr  
1.1 - 1.4 Br Si with F Sa  
1.4 - 2.5 Br F-Med Sa with Gr  
2.5 EOH

Station 25+732 11.7 Rt (D-100) PA

0 - 80 Asph  
80 - 500 Cr Gr  
500 - 650 Br F-Med Sa with Gr  
650 - 1.8 Br Si with F Sa  
1.8 - 2.5 Br F-Med Sa with Gr Occ Cob  
2.5 EOH

Station 25+735 11.3 Rt (D-100) PA

0 - 80 Asph  
80 - 450 Cr Gr  
450 - 1.0 Br F-Med Sa with Gr  
1.0 - 2.3 Br Si with F Sa  
2.3 - 2.8 Br F-Med Sa with Gr  
2.8 EOH

Station 25+735 11.3 Rt PA

Sample No. 10-RK-013 (150 – 250)

% Passing 4.75 mm 66.3 %  
% Passing 75 um 7.3 %  
% Crushed 71.3 %

Station 25+735 11.3 Rt PA

Sample No. 10-RK-014 (600 – 900)

% Passing 4.75 mm 62.2 %  
% Passing 75 um 5.1 %  
FMC @ 900 3.4 %  
Group Symbol SP

Station 25+735 11.3 Rt PA

Sample No. 10-RK-015 (1.2 – 1.8)

% Passing 4.75 mm 70.6 %  
% Passing 75 um 35.2 %  
FMC @ 1.8 9.7 %  
Group Symbol SM

Station 25+737 11.7 Rt (D-100) PA

0 - 80 Asph  
80 - 400 Cr Gr  
400 - 2.5 Br F-Med Sa with Gr  
2.5 EOH

Station 25+878 12.2 Rt (D-170) PA

0 - 160 Asph  
 160 - 500 Cr Gr  
 500 - 2.5 Br F-Med Sa with Gr  
 2.5 EOH

Station 25+927 10.5 Rt (D-100) PA

0 - 160 Asph  
 160 - 470 Cr Gr  
 470 - 2.5 Br F-Med Sa with Gr  
 2.5 EOH

Station 25+964 10.5 Rt (D±0.0) PA

0 - 160 Asph  
 160 - 550 Cr Gr  
 550 - 2.5 Br F-Med Sa with Gr  
 2.5 EOH

Station 26+003 10.5 Rt (D±0.0) PA

0 - 130 Asph  
 130 - 400 Cr Gr  
 400 - 500 Br F-Med Sa with Gr  
 500 - 1.5 Br Si(y) F Sa  
 1.5 - 2.1 Br Si with F Sa Tr Cl  
 2.1 - 2.5 Br Si(y) F Sa  
 2.5 EOH

Station 26+003 10.5 Rt PASample No. 10-RK-008 (1.5 – 1.8)

% Passing 4.75 mm 98.7 %  
 % Passing 75 um 83.9 %  
 FMC @ 1.8 22.8 %  
 W<sub>L</sub> 21 %  
 W<sub>p</sub> 18 %  
 I<sub>p</sub> 3  
 Group Symbol ML

Station 26+098 16.2 Rt (D-810) HA

0 - 70 Br F-Med Sa Tr Gr (L)  
 70 - 900 Br Si(y) F Sa (Moist & L-Comp)  
 900 NFP Cob

Station 26+098 16.2 Rt HASample No. 10-LA-062 (700 – 900)

% Passing 4.75 mm 99.6 %  
 % Passing 75 um 55.9 %  
 FMC @ 900 15.6 %  
 Group Symbol ML

Station 26+099 25.8 Rt (D+960) HA

0 - 150 Blk Org (Co-Fib) (Moist)  
 150 - 400 Br F-Med Sa with Gr (Moist & L)  
 400 NFP Cob

Station 26+125 15.9 Rt (D-1.3) HA

0 - 90 Br F-Med Sa Tr Gr (L)  
 90 - 600 Br F-Med Sa Tr Si (Moist & L)  
 600 NFP Cob

Station 26+125 3.8 Rt (D+140) PA

0 - 70 Asph  
 70 - 400 Cr Gr  
 400 - 2.5 Br F-Med Sa with Gr  
 2.5 EOH

Station 26+151 15.8 Rt (D-2.2) HA

0 - 90 Br F-Med Sa Tr Gr (L)  
 90 - 400 Blk Org (Co-Fib) Tr F Sa (Moist)  
 400 - 500 Br F-Med Sa Tr Si (Moist & L)  
 500 NFP Cob

Station 26+152 26.1 Rt (D-2.0) HA

0 - 20 Tps  
 20 - 300 Br F-Med Sa with Gr (Moist & L)  
 300 NFP Cob

Station 26+175 17.5 Rt (D-2.6) HA

0 - 100 Tps  
 100 - 250 Br F-Med Sa with Gr (Moist & L)  
 250 NFP Cob (RF)

Station 26+757 14.7 Rt (D-300) PA

0 - 40 Asph  
 40 - 200 Cr Gr  
 200 - 2.1 Br F-Med Sa with Gr  
 2.1 - 2.5 Br F Sa  
 2.5 EOH

Station 26+807 14.9 Rt (D-350) PA

0 - 60 Asph  
 60 - 210 Cr Gr  
 210 - 1.5 Br F-Med Sa with Gr (Moist)  
 1.5 - 2.0 Br Si(y) Cl (Wet)  
 2.0 NFP Sloughing

Station 26+807 14.9 Rt PASample No. 10-RK-005 (1.6 – 2.0)

% Passing 4.75 mm 99.6 %  
 % Passing 75 um 89.9 %  
 FMC @ 2.0 24.5 %  
 W<sub>L</sub> 27 %  
 W<sub>p</sub> 22 %  
 I<sub>p</sub> 5  
 Group Symbol ML

Station 26+858 14.1 Rt (D-570) PA

0 - 50 Asph  
 50 - 180 Cr Gr  
 180 - 2.5 Br F-Med Sa with Gr (Moist)  
 2.5 EOH

Station 26+911 14.6 Rt (D-790) PA

0 - 50 Asph  
 50 - 210 Cr Gr  
 210 - 1.5 Br F-Med Sa with Gr (Moist)  
 1.5 - 2.5 Br Si(y) F-Med Sa (Moist)  
 2.5 EOH

Station 26+911 14.6 Rt PASample No. 10-RK-006 (50 – 210)

% Passing 4.75 mm 47.5 %  
 % Passing 75 um 3.3 %  
 % Crushed 75.4 %  
 % Asphalt Coated 11.3 %

Station 26+911 14.6 Rt PASample No. 10-RK-007 (400 – 800)

% Passing 4.75 mm 71.7 %  
 % Passing 75 um 2.6 %  
 FMC @ 800 3.4 %  
 Group Symbol SP

Station 26+959 12.7 Rt (D-320) PA

0 - 70 Asph  
 70 - 300 Cr Gr  
 300 - 1.5 Br F-Med Sa with Gr (Moist)  
 1.5 - 2.5 Br Si(y) F-Med Sa (Moist)  
 2.5 EOH

Station 27+009 11.7 Rt (D-620) PA

0 - 70 Asph  
 70 - 310 Cr Gr  
 310 - 1.8 Br F-Med Sa with Gr (Moist)  
 1.8 NFP Bld

Station 27+059 11.9 Rt (D-670) PA

0 - 80 Asph  
 80 - 380 Cr Gr  
 380 - 1.9 Br F-Med Sa with Gr  
 1.9 - 2.5 Br Si(y) F-Med Sa (Moist)  
 2.5 EOH

Station 27+111 9.8 Rt (D-510) PA

0 - 60 Asph  
 60 - 400 Cr Gr  
 400 - 1.2 Br F-Med Sa with Gr  
 1.2 - 2.6 Br F Sa with Si  
 2.6 EOH

Station 27+159 9.3 Rt (D-520) PA

0 - 40 Asph  
 40 - 400 Cr Gr  
 400 - 1.5 Br F-Med Sa with Gr  
 1.5 - 2.5 Br F Sa with Si  
 2.5 EOH

## **Appendix E**

### **Slope Stability Analyses**

Name: Analysis 2  
 Description: Sta. 25+840 - Short-term  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: E1.1t.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Earthfill\25+840\V3\  
 Minimum Slip Surface Depth: 2 m

Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 50 kPa  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: SSM fill Unit Weight: 22 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 32 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

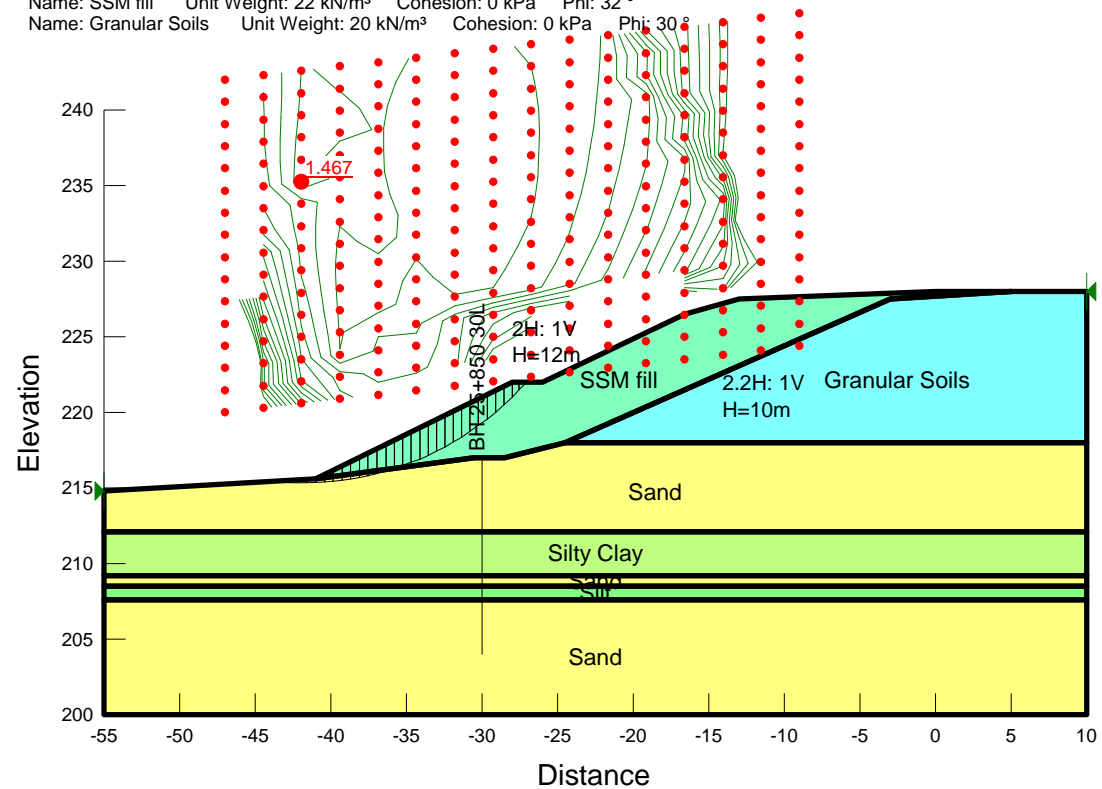


FIGURE E1

Name: Analysis 2  
 Description: Sta. 25+840 - Long-term  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: E1.1e.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Earthfill\25+840\V3\  
 Minimum Slip Surface Depth: 2 m

Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 26 °  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: SSM fill Unit Weight: 22 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 32 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

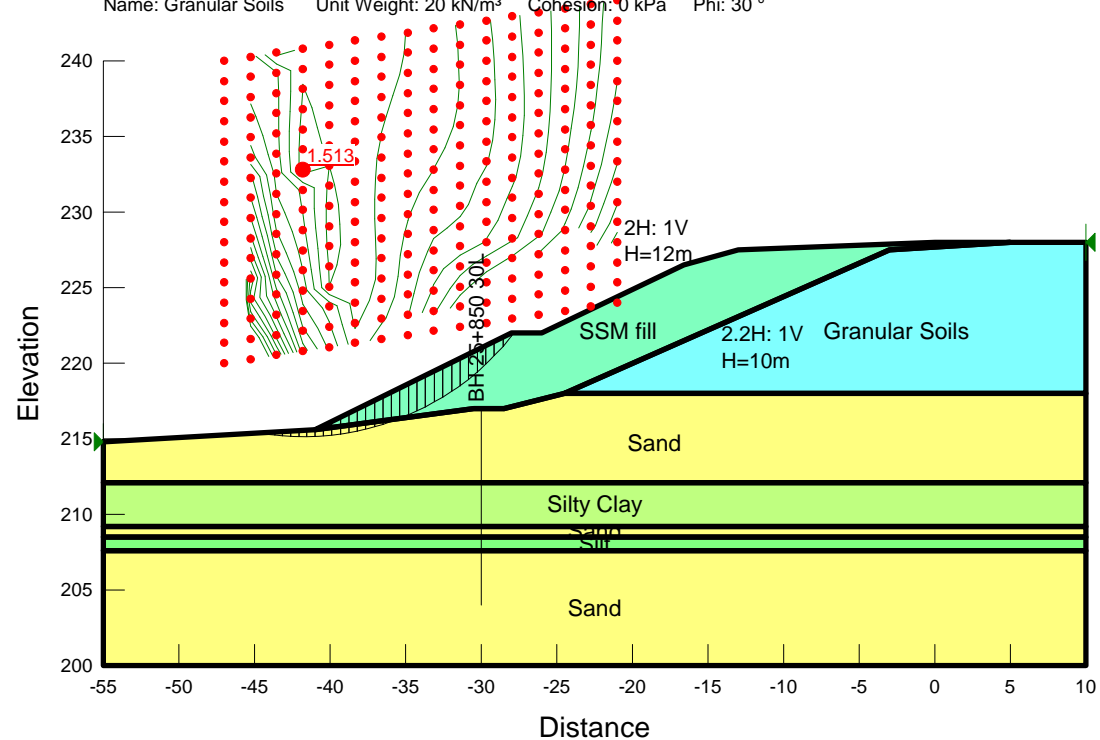


FIGURE E2

Name: Analysis 2  
 Description: Sta. 25+840 - Seismic  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: E1.1e - seismic.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Earthfill\25+840\V3\  
 Horz Seismic Load: 0.011

Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 26 °  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: SSM fill Unit Weight: 22 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 32 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

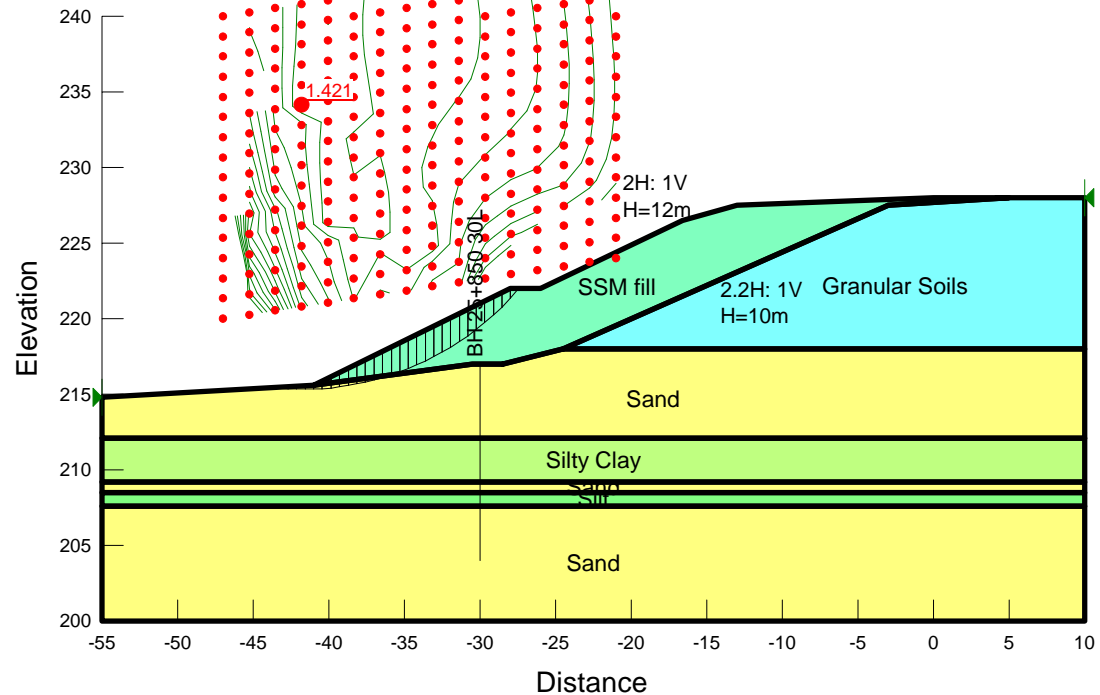


FIGURE E3

Name: Analysis 2  
 Description: Sta. 25+840 -Short-term  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: 1.1t-1-berm.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Rockfill\IV3\  
 Minimum Slip Surface Depth: 2 m

Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 50 kPa  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: Rockfill Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 42 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

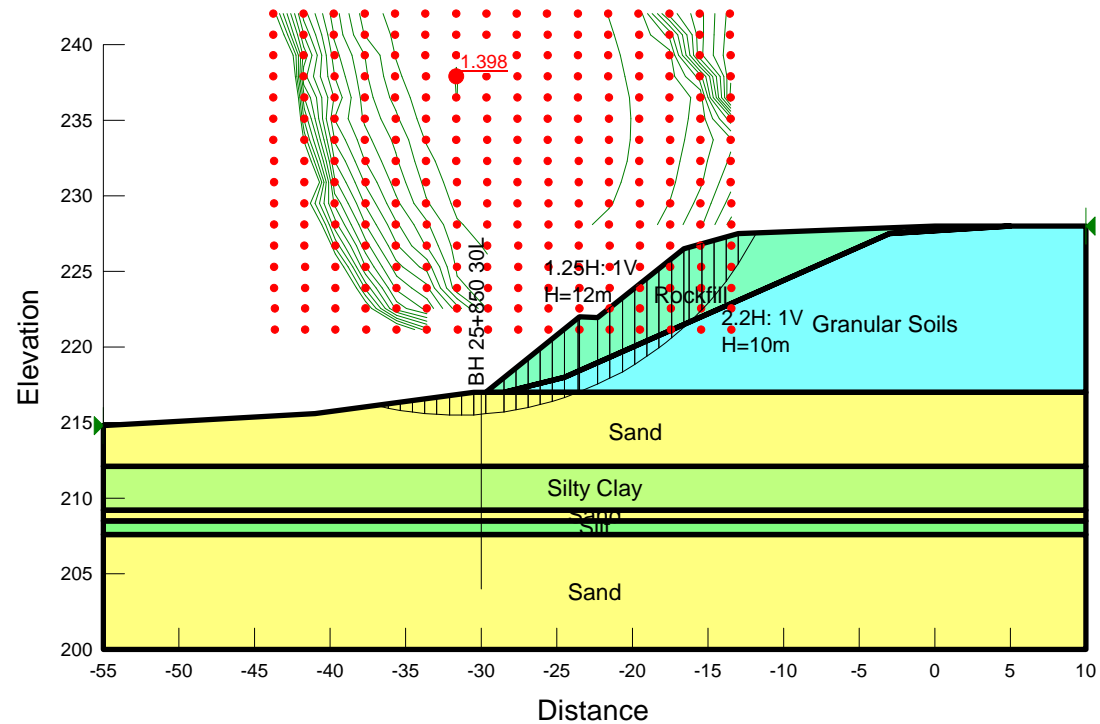


FIGURE E4

Name: Analysis 2  
 Description: Sta. 25+840 -Long-term  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: 1.1e-1-berm.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Rockfill\IV3\  
 Minimum Slip Surface Depth: 2 m

Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 26 °  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: Rockfill Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 42 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

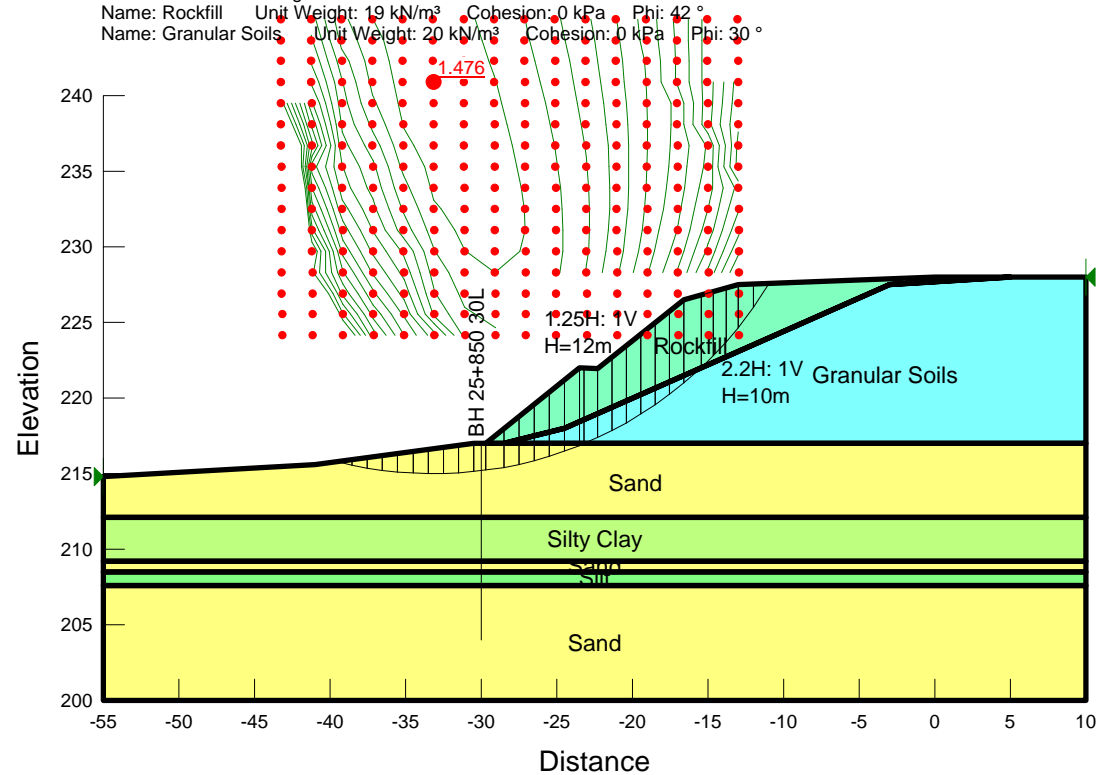


FIGURE E5

Name: Analysis 2  
 Description: Sta. 25+840 -Seismic  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: 1.1e-1-berm - seismic.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Rockfill\IV3\  
 Horz Seismic Load: 0.011

Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 26 °  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: Rockfill Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 42 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

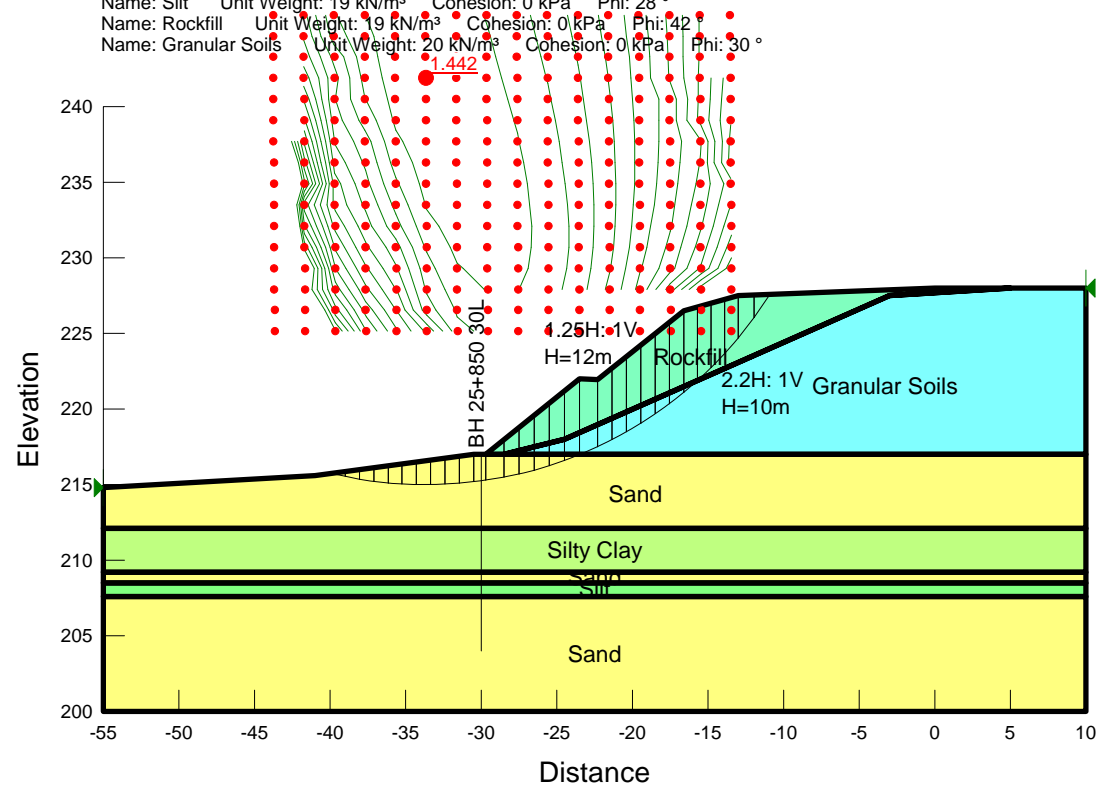


FIGURE E6

Name: Analysis 2  
 Description: Sta. 25+940 - Short-term  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: E2.1t.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Earthfill\25+940\V3\  
 Minimum Slip Surface Depth: 2 m

Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 50 kPa  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: SSM fill Unit Weight: 22 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 32 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

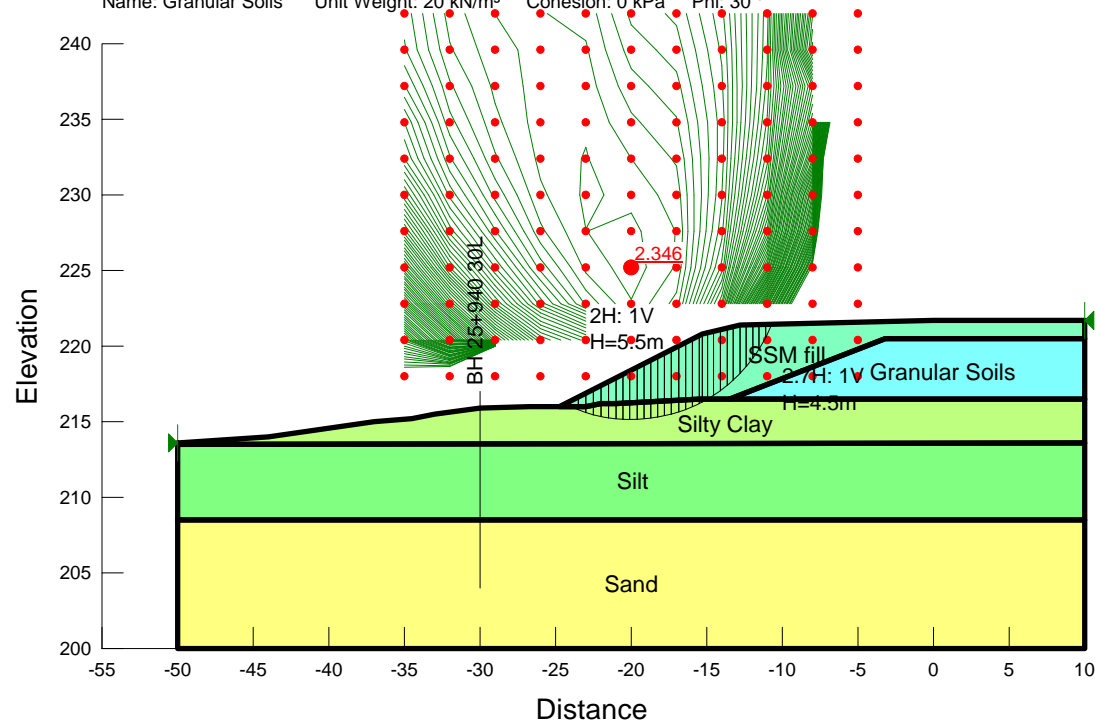


FIGURE E7

Name: Analysis 2  
 Description: Sta. 25+940 - Long-term  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: E2.1e.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Earthfill\25+940\V3\  
 Minimum Slip Surface Depth: 2 m  
 Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 26 °  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: SSM fill Unit Weight: 22 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 32 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

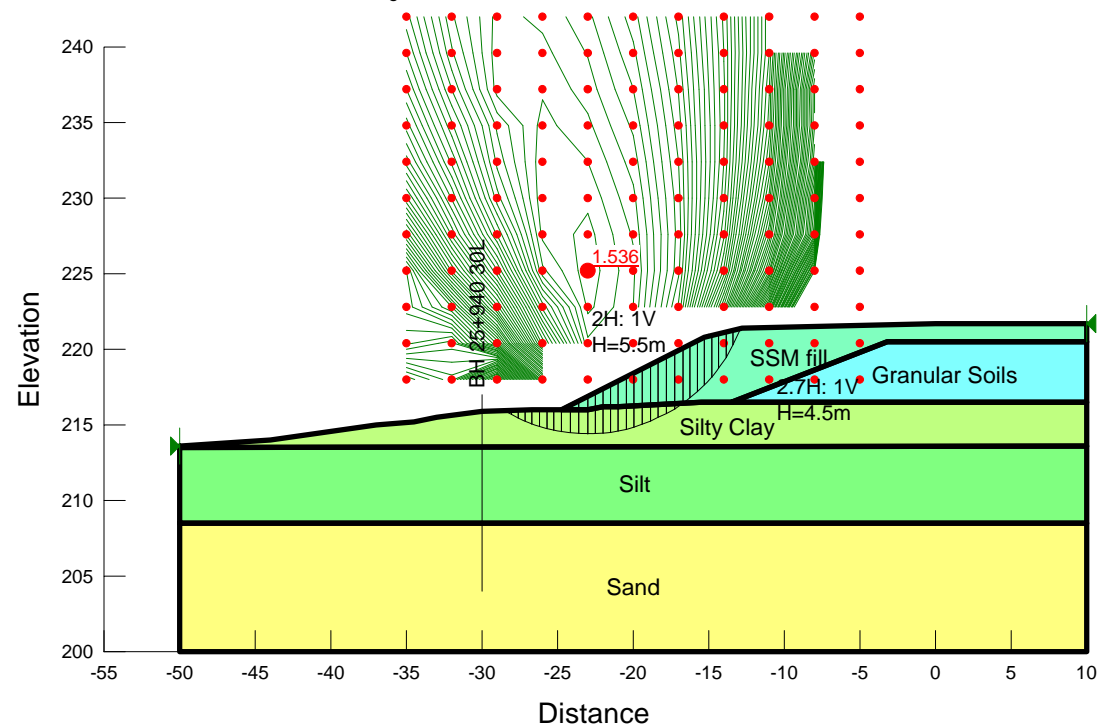


FIGURE E8

Name: Analysis 2  
 Description: Sta. 25+940 - Seismic  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: E2.1e - Seismic.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Earthfill\25+940\V3\  
 Horz Seismic Load: 0.011

Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 26 °  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: SSM fill Unit Weight: 22 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 32 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

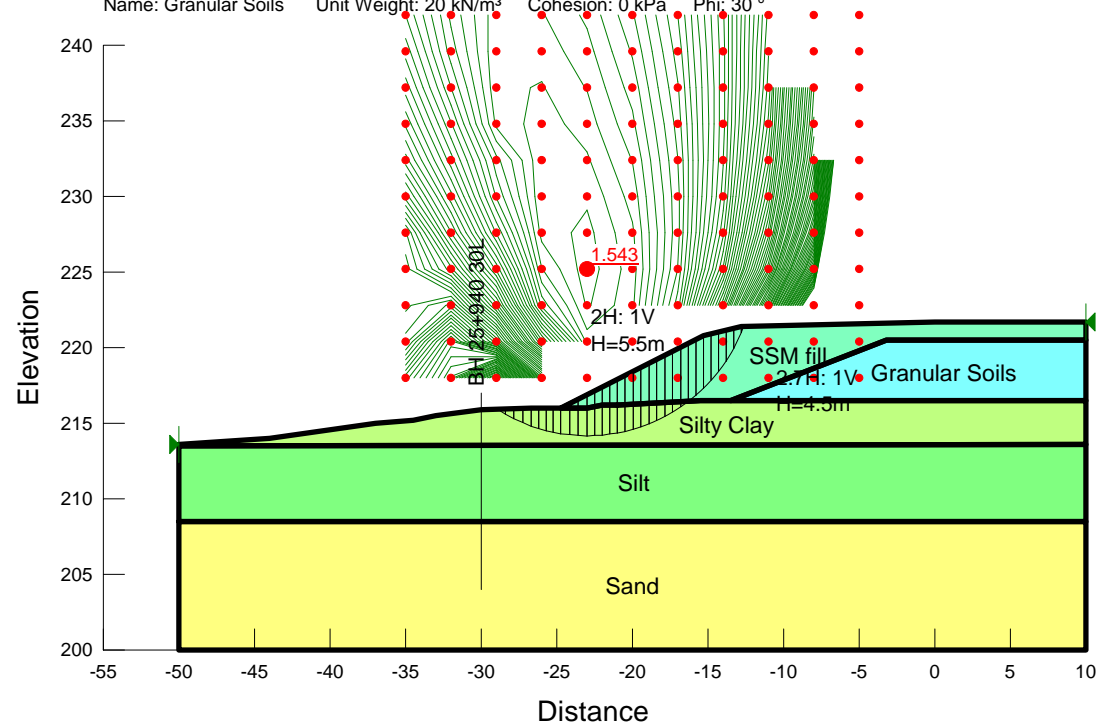


FIGURE E9

Name: Analysis 2  
 Description: Sta. 25+940 - Short-term  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: 2.1t.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Rockfill\IV3\  
 Minimum Slip Surface Depth: 2 m

Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 50 kPa  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: Rockfill Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 42 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

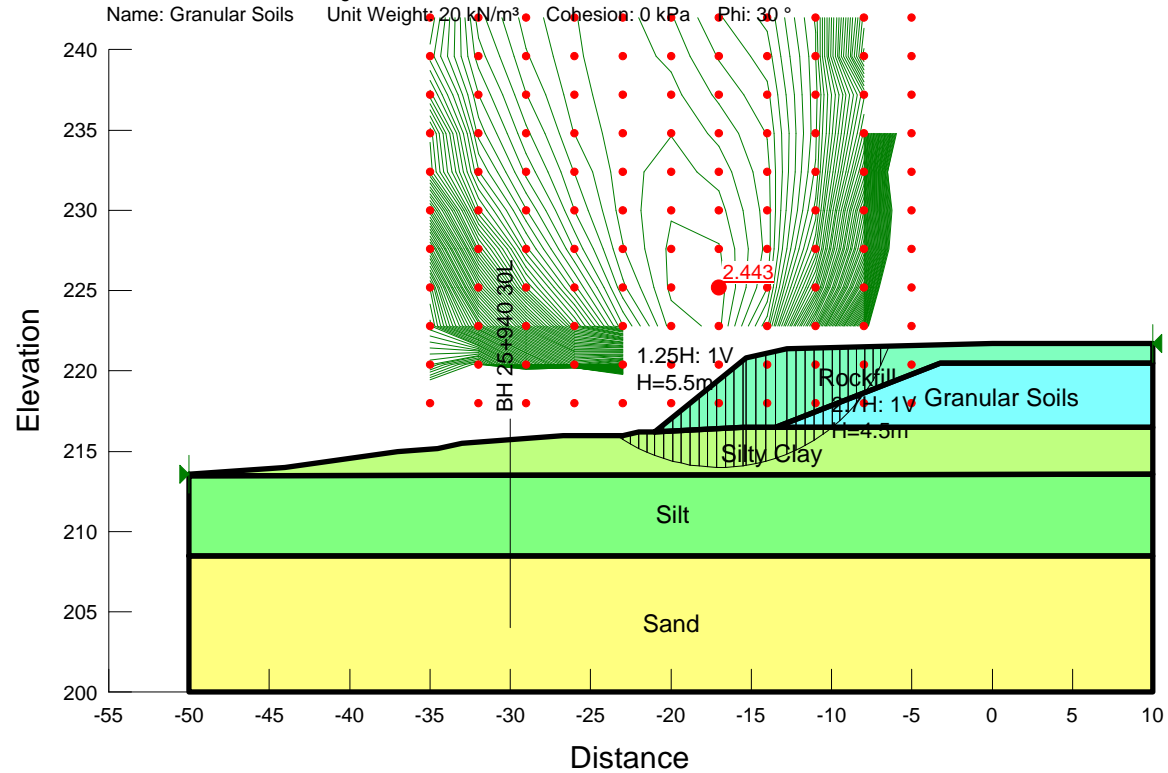


FIGURE E10

Name: Analysis 2  
 Description: Sta. 25+940 - Long-term  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: 2.1e.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Rockfill\IV3\  
 Minimum Slip Surface Depth: 2 m

Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 26 °  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: Rockfill Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 42 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

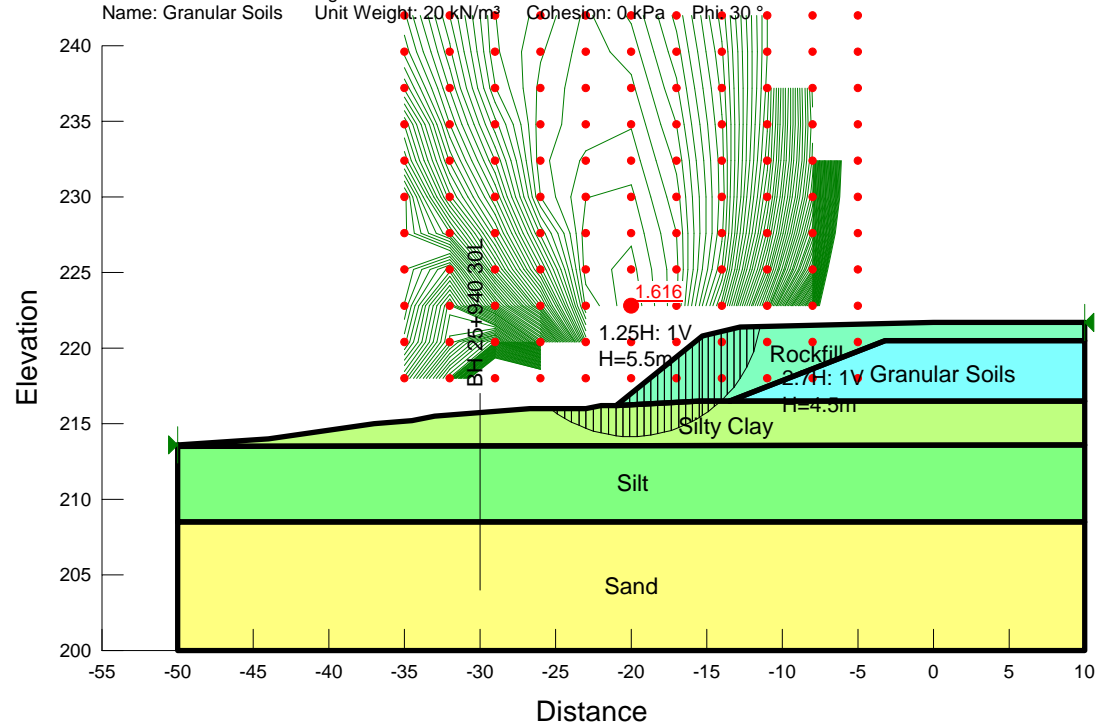


FIGURE E11

Name: Analysis 2  
 Description: Sta. 25+940 - Seismic  
 Method: Morgenstern-Price  
 Created By: Mei Cheong  
 Date: 4/03/13  
 File Name: 2.1e - Seismic.gsz  
 Directory: H:\19\1605\117 Hwy 11-17 Nipigon\Analysis\Analysis C1 25+000 to 26+000\Rockfill\V3\  
 Horz Seismic Load: 0.011  
 Name: Sand Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 33 °  
 Name: Silty Clay Unit Weight: 18 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 26 °  
 Name: Silt Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 28 °  
 Name: Rockfill Unit Weight: 19 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 42 °  
 Name: Granular Soils Unit Weight: 20 kN/m<sup>3</sup> Cohesion: 0 kPa Phi: 30 °

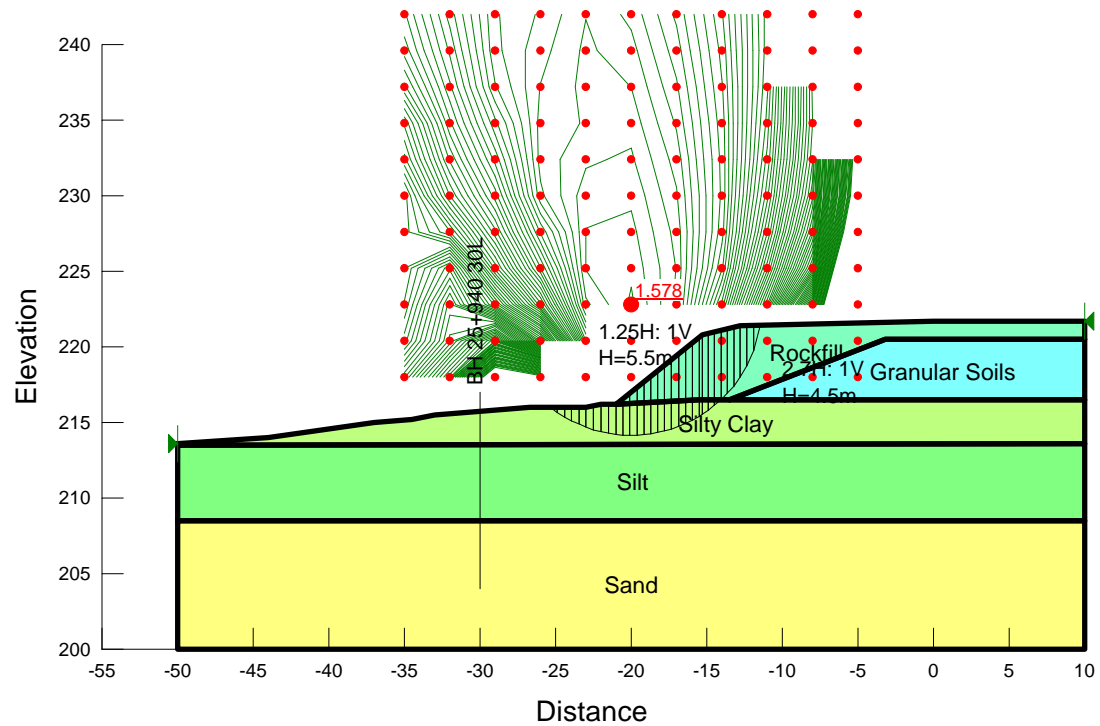
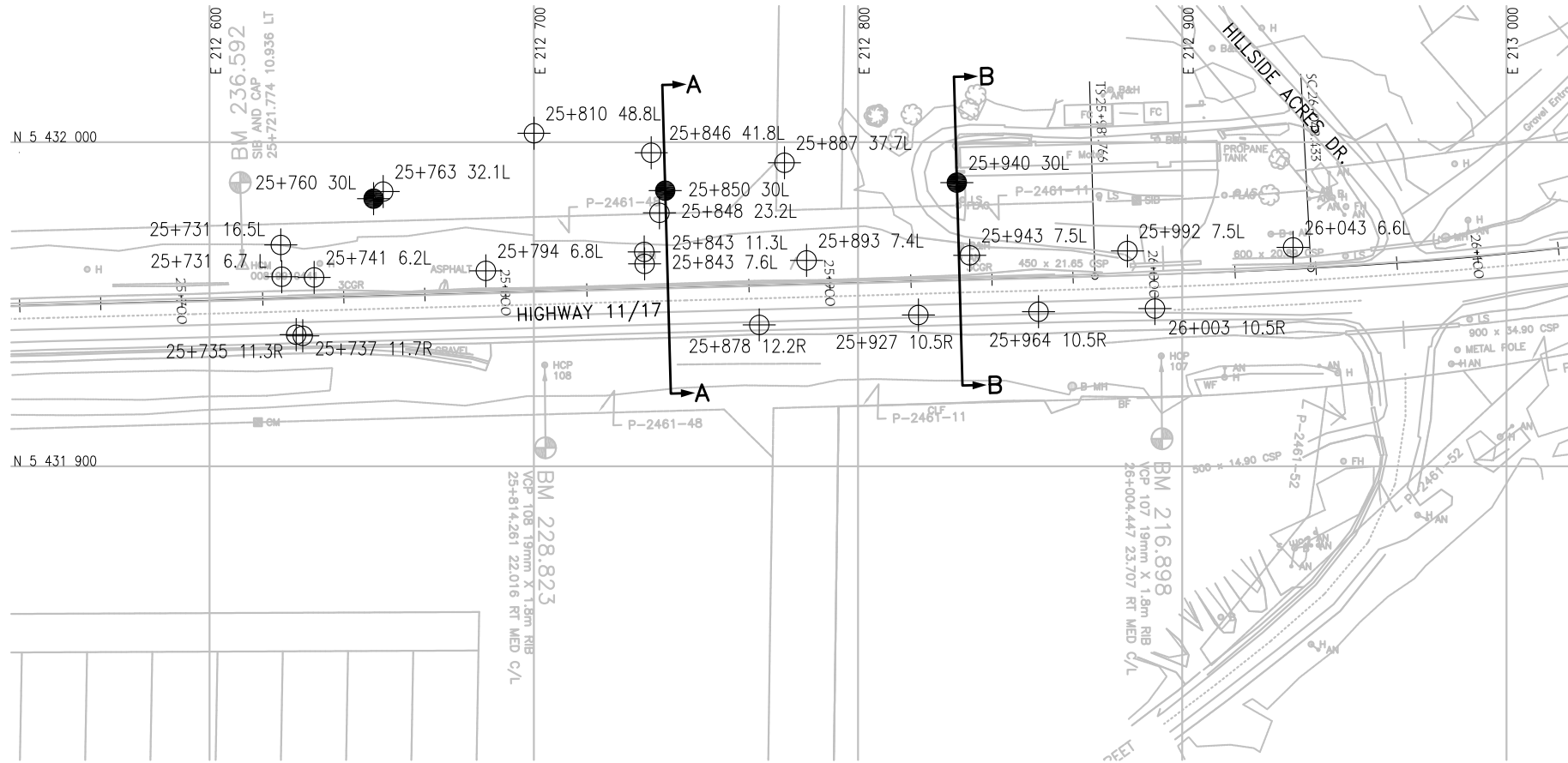


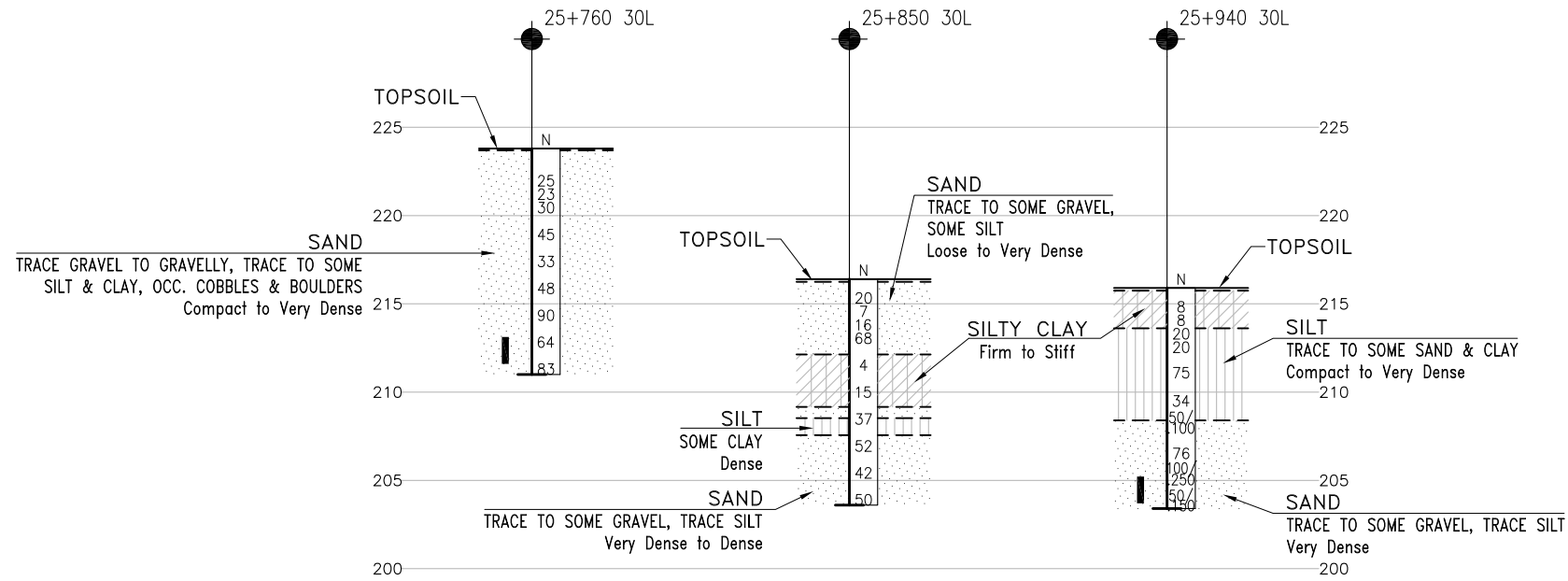
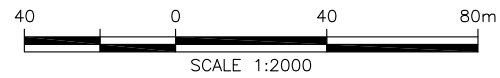
FIGURE E12

## **Appendix F**

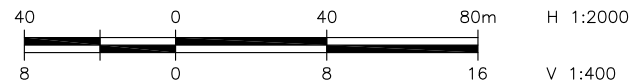
### **Borehole Locations and Soil Strata Drawings**



## PLAN



# PROFILE ALONG C HWY 11/17



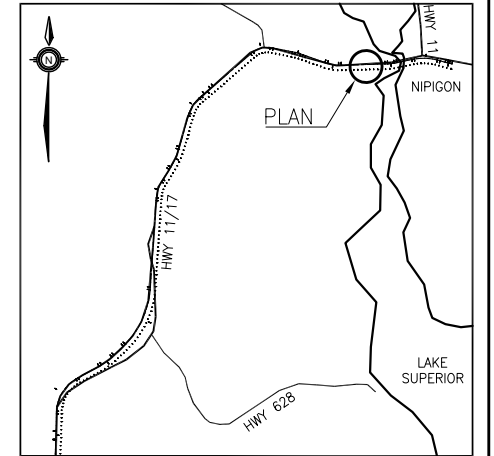
METRIC  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

CONT No  
WP No 124-90-00

HIGHWAY 11/17 FOUR LANING STA. 25+735 TO 26+045 WESTBOUND LANE BOREHOLE LOCATIONS AND SOIL STRATA	
--	--








**THURBER ENGINEERING LTD.**



## KEYPLAN

## LEGEND

	Borehole
	Borehole and Cone
	TBT Pavement Borehole
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level During Drilling
	Water Level In Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

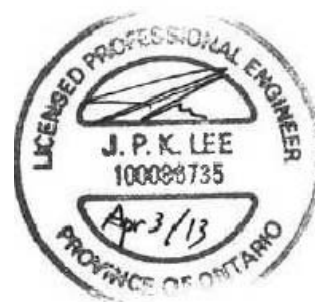
[illegible]

-NOTES-

- 1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- 2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

**GEOCRES No. 52H-19**

[illegible]



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

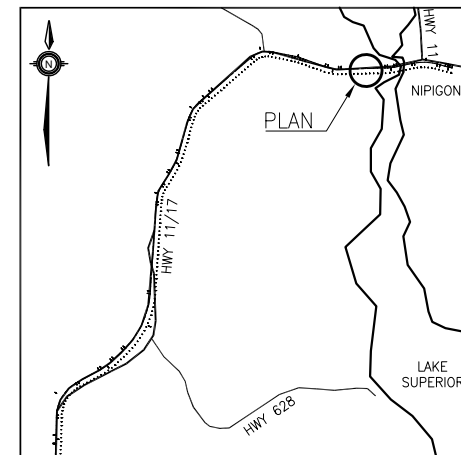
CONT No  
WP No 124-90-00

HIGHWAY 11/17 FOUR LANING  
STA. 25+735 TO 26+045  
WESTBOUND LANE  
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET








**THURBER** ENGINEERING LTD.



## KEYPLAN

## LEGEND

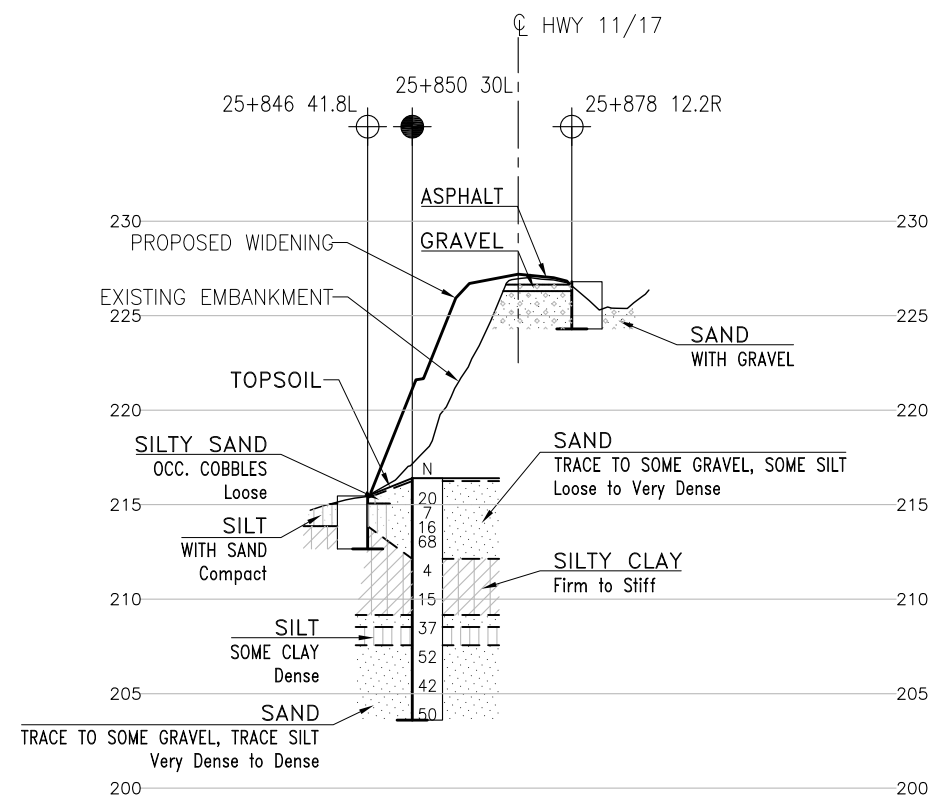
	Borehole
	Borehole and Cone
	TBT Pavement Borehole
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level During Drilling
	Water Level In Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

[illegible]

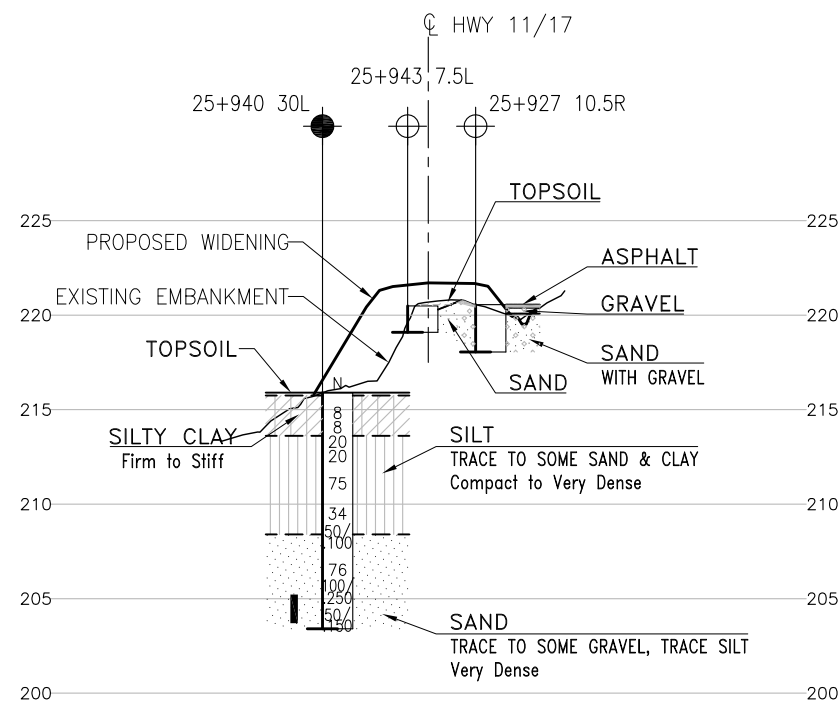
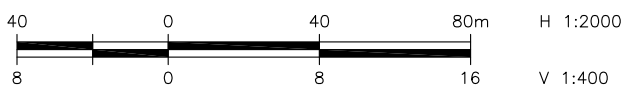
**-NOTES-**

- 1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- 2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

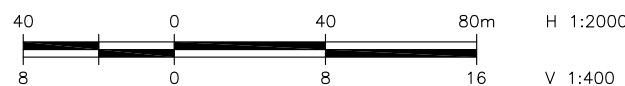
**GEOCRES No. 52H-19**



SECTION A-A AT STATION 25+850



SECTION B-B AT STATION 25+940

[illegible]