

**FOUNDATION INVESTIGATION REPORT
CULVERTS, SUPPLEMENTARY EMBANKMENTS AND CUT SLOPES
HIGHWAY 11/17 RED ROCK TO NIPIGON
FROM 4.8 KM WEST OF HWY 628 TO 1.5KM WEST OF HWY 585
G.W.P. 647-89-00**

**Geocres Number: 52A-184
VOLUME 3 / 3**

Report to

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H:\19\1351\237 Hwy 11-17 Nipigon\Reports & Memos\Culverts, Supplementary Embankments and Cut Slopes (2014)\Final Report\FIR\Culverts, Supplementary Embankments and Cut Slopes - FIR.docx



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Appendices B to AP include:

- Record of Borehole Sheets
- Laboratory Test Results
- Borehole Locations and Soil Strata Drawings

Appendix AA

Highway 11/17 EBL
Sta. 14+900 to 14+930



Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 14+910 19R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 502.0 E 206 779.4 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.01 - 2014.03.01 CHECKED BY MKE

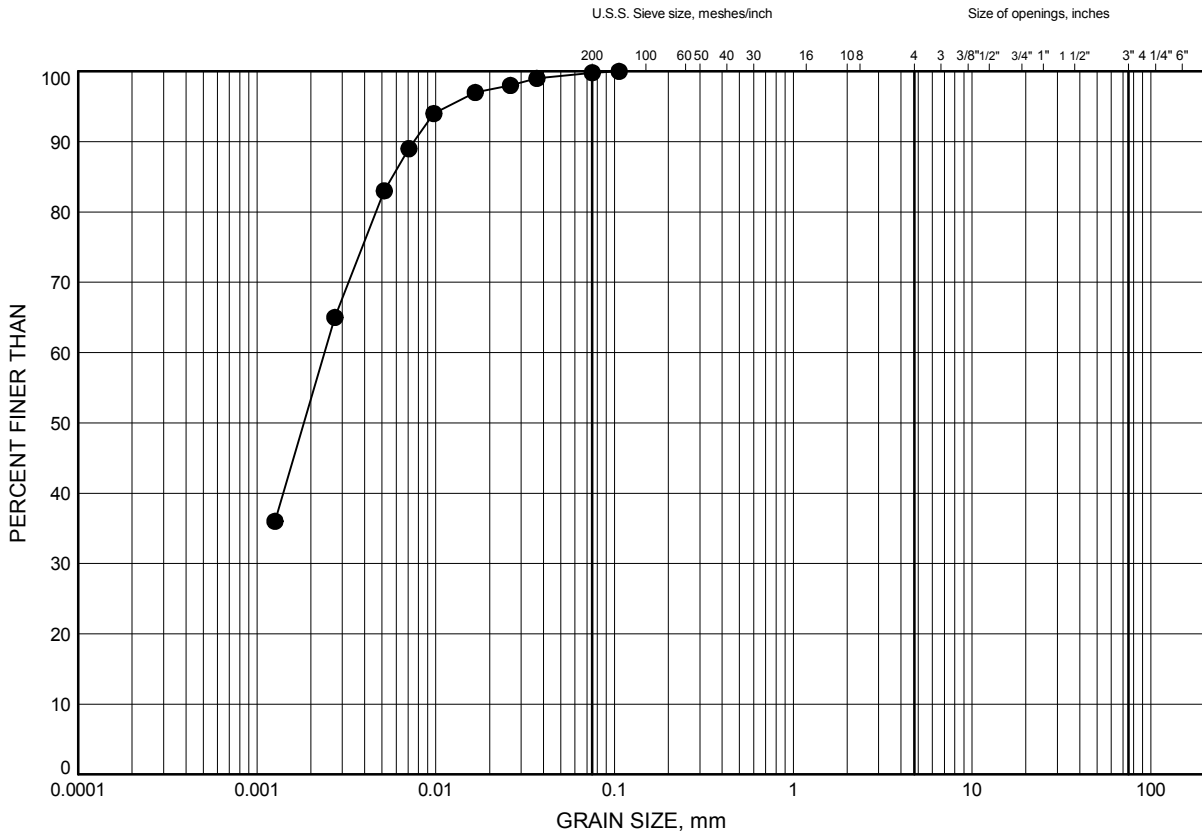
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL LIMIT MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa			WATER CONTENT (%)					
217.4							20	40	60	80	100	W P	W	W L		
0.0	PEAT , trace rootlets Dark Brown Frozen		1	SS	19											
216.6																
0.8	Silty CLAY Firm Brown		2	SS	6											0 0 46 54
			3	SS	4											
214.7																
2.7	END OF BOREHOLE AT 2.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.7m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.															

+³, ×³: Numbers refer to Sensitivity
 20
 15
 10
 (%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AA1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+910 19R	1.07	216.33

Date July 2014
 WP# 647-89-00

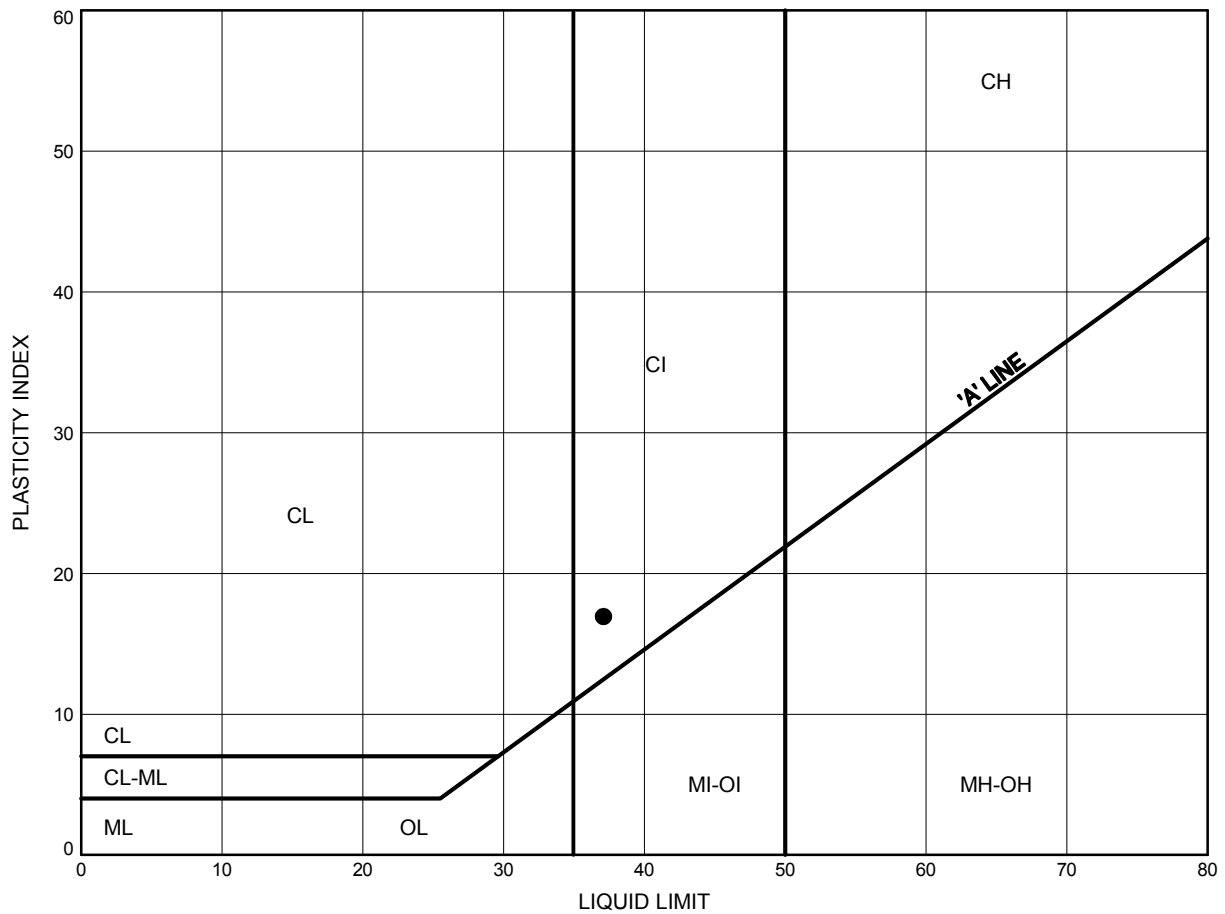


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AA2

Silty CLAY



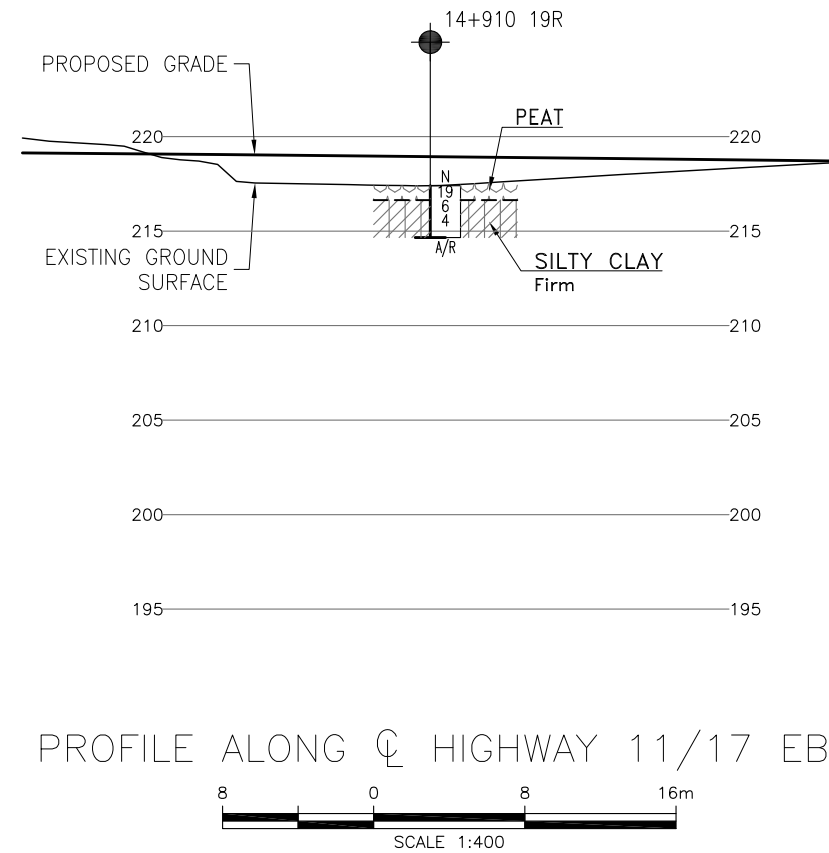
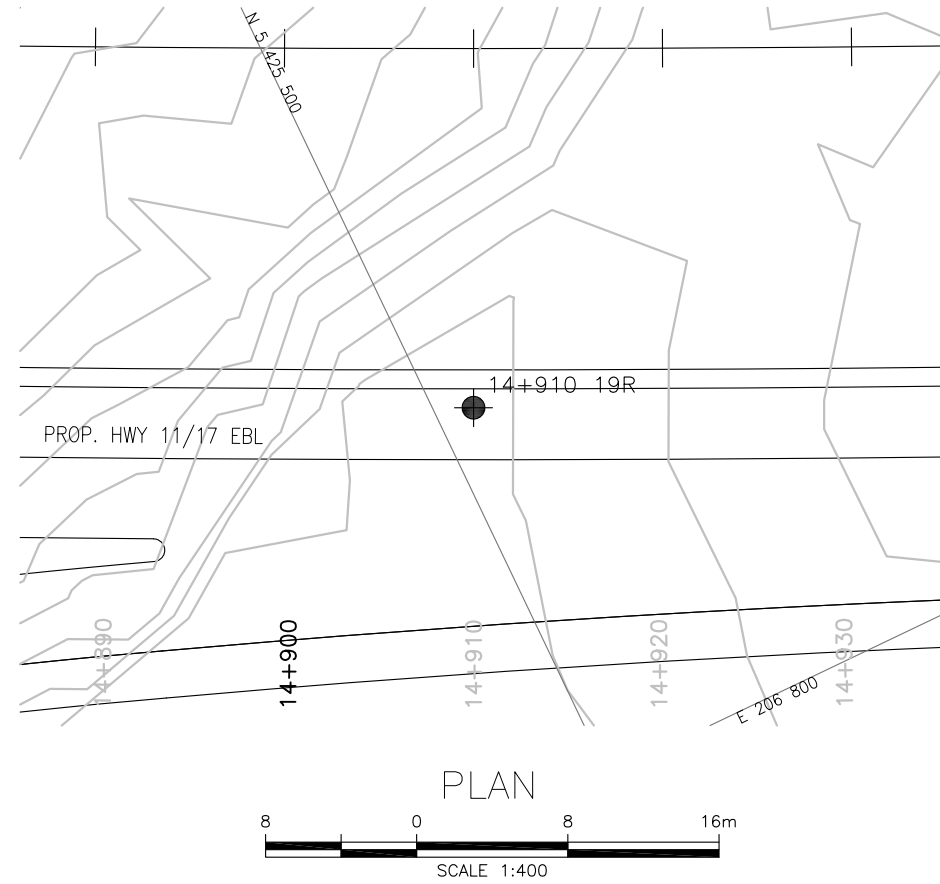
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+910 19R	1.07	216.33

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

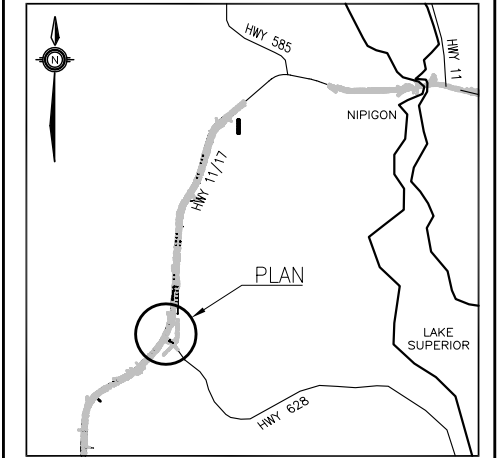


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








CONT No 2014-6026	(
GWP No 647-89-00)

HWY 11/17 FOUR LANING EASTBOUND LANES (STA. 14+900 TO 14+930) BOREHOLE LOCATIONS AND SOIL STRATA	
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KEYPLAN

LEGEND

	Borehole
	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	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. 52A-184

[illegible]

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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Appendix AB

Highway 11/17 EBL and WBL

Sta. 15+190 to 15+220

Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 15+196 42R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 762.4 E 206 908.4 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.28 - 2014.02.28 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
								○ UNCONFINED + FIELD VANE					
								● QUICK TRIAXIAL × LAB VANE					
						WATER CONTENT (%)							
						PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT							
						W P W W L							
212.5							20	40	60	80	100		
0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	5								
211.8													
0.7	Silty CLAY, trace sand Firm to Very Stiff Brown		2	SS	3								
			3	SS	2								
	Grey		4	SS	1								
			5	SS	0								
	varved		6	SS	0								
	occasional silt seams		7	SS	1								
			8	SS	1								

Continued Next Page

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+196 42R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 762.4 E 206 908.4 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.28 - 2014.02.28 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				
								○ UNCONFINED + FIELD VANE				
								● QUICK TRIAXIAL × LAB VANE				
Continued From Previous Page												
197.7 <												

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+203 21R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 775.7 E 206 890.6 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.28 - 2014.02.28 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT		UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		W P W W L			
								20 40 60 80 100	WATER CONTENT (%) 20 40 60				
213.1													
0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	4		213						
212.3													
0.8	Silty CLAY, trace sand Firm to Very Stiff Brown		2	SS	4		212						
			3	SS	3		211						
	Grey		4	SS	2		210						
			5	SS	5		209						
			6	SS	1	207							
	trace gravel		7	SS	3	206							

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+203 21R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 775.7 E 206 890.6 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.28 - 2014.02.28 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				
	Continued From Previous Page						20 40 60 80 100	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W P W W L				
							20 40 60 80 100	WATER CONTENT (%) 20 40 60				
							203					
			9	SS	0		202					
							201					
			10	SS	1		200					
199.4							199					
13.7	SILT, trace sand Loose Grey Wet		11	SS	3		198					
198.8							197					
14.3	Begin DCPT at 14.3m.						196.3					
16.8	END OF BOREHOLE AND DCPT AT 16.8m. BOREHOLE OPEN TO 16.8m AND WATER LEVEL AT 2.5m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.											





+³, ×³: Numbers refer to Sensitivity
 20
15
10
5
0
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+210 01R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 788.5 E 206 873.7 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.26 - 2014.02.26 CHECKED BY MKE

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		W P W W L			WATER CONTENT (%)				
								20 40 60 80 100	○ UNCONFINED + FIELD VANE		20 40 60						
						● QUICK TRIAXIAL × LAB VANE											
213.0																	
0.0	PEAT , trace rootlets Dark Brown Frozen		1	SS	26												
212.4																	
0.6	Silty CLAY , trace sand Firm to Stiff Brown		2	SS	4		212										
			3	SS	4		211										
	Grey		4	SS	2		210										
			5	SS	1		208										
			6	SS	0	207											
			7	SS	2	205											
203.9																	
9.1	SILT , trace clay, trace sand Loose Grey Wet		8	SS	7												

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+210 01R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 788.5 E 206 873.7 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.26 - 2014.02.26 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL LIMIT MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa			WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE							
	Continued From Previous Page							20 40 60 80 100				W P W W L			
								● QUICK TRIAXIAL × LAB VANE							
202.3								20 40 60 80 100				20 40 60			
10.7	Silty CLAY Stiff Grey		9	SS	2		202						○		
							201			+					
			10	SS	4								○		
							200								
	occasional silt seams		11	SS	4		199						○		
198.2															
14.8	END OF BOREHOLE AT 14.8m. BOREHOLE OPEN TO 14.8m AND WATER LEVEL AT 3.0m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.									3.3					

+³, ×³: Numbers refer to Sensitivity
 20
 15
 10
 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+213 21L

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 798.0 E 206 853.7 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.27 - 2014.02.27 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								
								20 40 60 80 100								
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE								
213.6																
0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	10											
213.0							213									
0.6	Silty CLAY, trace sand Firm to Very Stiff Brown		2	SS	4											
			3	SS	2		212									
	Grey		4	SS	2		211									
							210									
			5	SS	1		209									
							208									
			6	SS	1		207									
	varved						206									
			7	SS	1											
							205									
	occasional silt seams															
			8	SS	0		204									

Continued Next Page

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+213 21L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 798.0 E 206 853.7 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.27 - 2014.02.27 CHECKED BY MKE

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 ³	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		W _P W W _L				
								○ UNCONFINED + FIELD VANE						
								● QUICK TRIAXIAL × LAB VANE						
								20 40 60 80 100		20 40 60				
			</											




+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+218 35L

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 807.1 E 206 841.9 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.27 - 2014.02.27 CHECKED BY MKE

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		W _P W W _L				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	WATER CONTENT (%)					
214.2							20 40 60 80 100							
0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	7		214						116	
213.6														
0.6	Silty CLAY Firm to Stiff Brown		2	SS	2		213							
			3	SS	2		212							
	Grey		4	SS	1		211							
	varved		5	SS	1		210							
							209							
			6	SS	1	208								
							207							
	occasional silt seams		7	SS	1	206								
			8	SS	1	205								

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+218 35L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 807.1 E 206 841.9 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.27 - 2014.02.27 CHECKED BY MKE

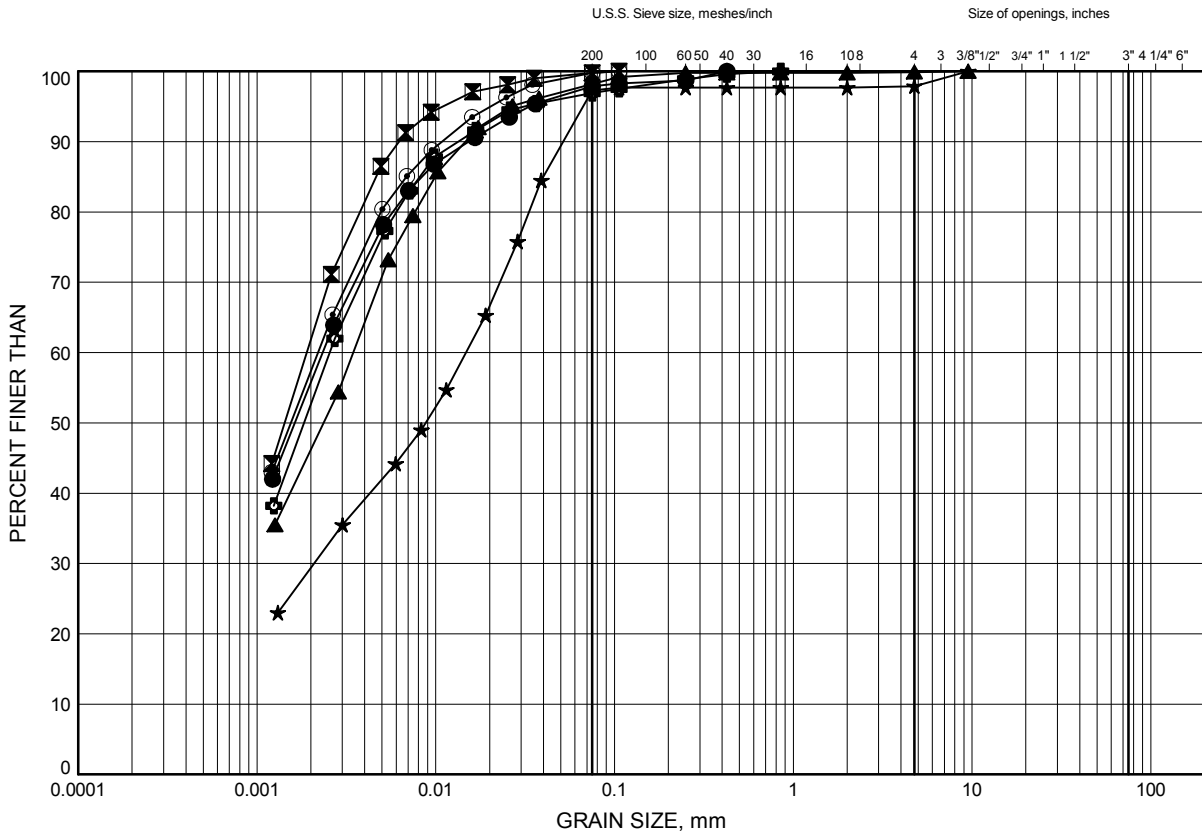
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
								20 40 60 80 100						
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
	Continued From Previous Page													
203.1			9	SS	4		204							
11.1	Sandy SILT, trace gravel Grey Wet						203							
202.3														
11.9	END OF BOREHOLE AT 11.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 11.9m AND WATER LEVEL AT 2.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.													

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon GRAIN SIZE DISTRIBUTION

FIGURE AB1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15+196 42R	1.83	210.67
⊠	15+196 42R	12.50	200.00
▲	15+203 21R	3.35	209.75
★	15+203 21R	7.92	205.18
⊙	15+210 01R	7.92	205.08
⊕	15+213 21L	1.83	211.81

Date July 2014
WP# 647-89-00

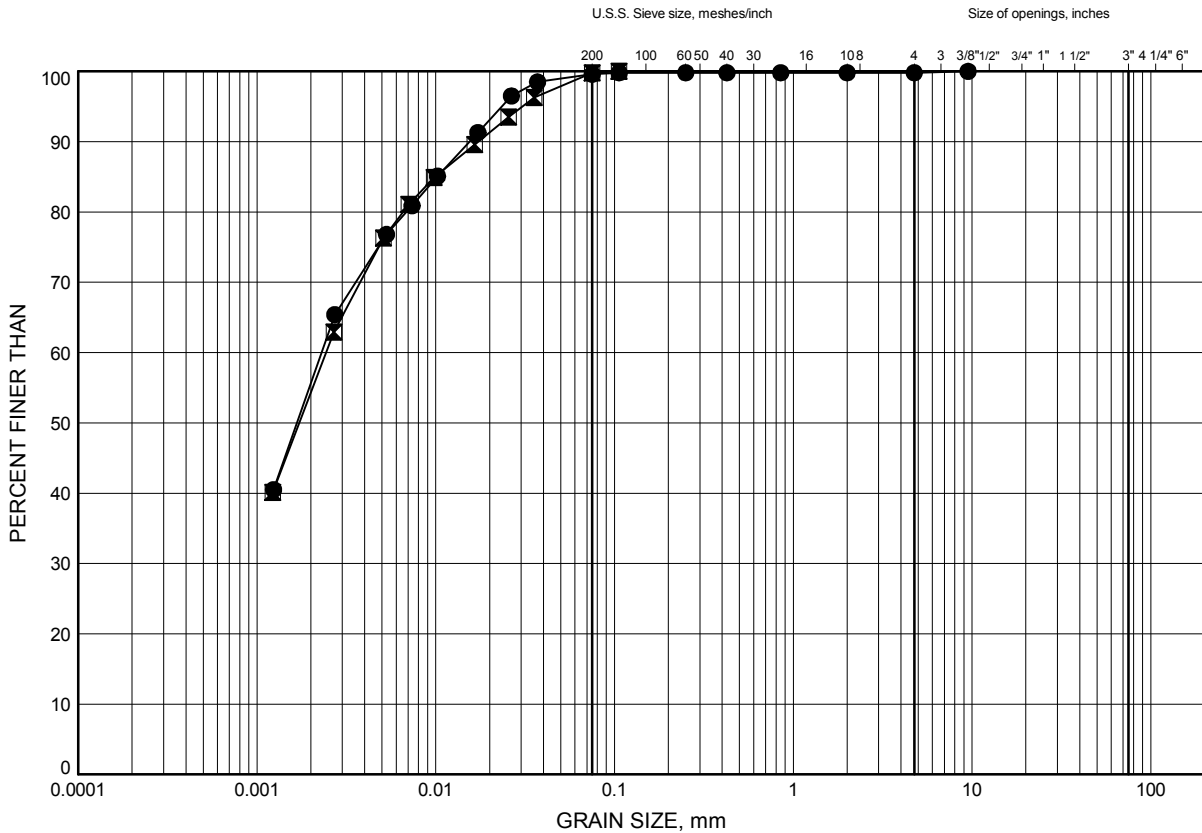


Prep'd AN
Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AB2

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15+213 21L	10.97	202.67
⊠	15+218 35L	7.92	206.29

Date July 2014
 WP# 647-89-00

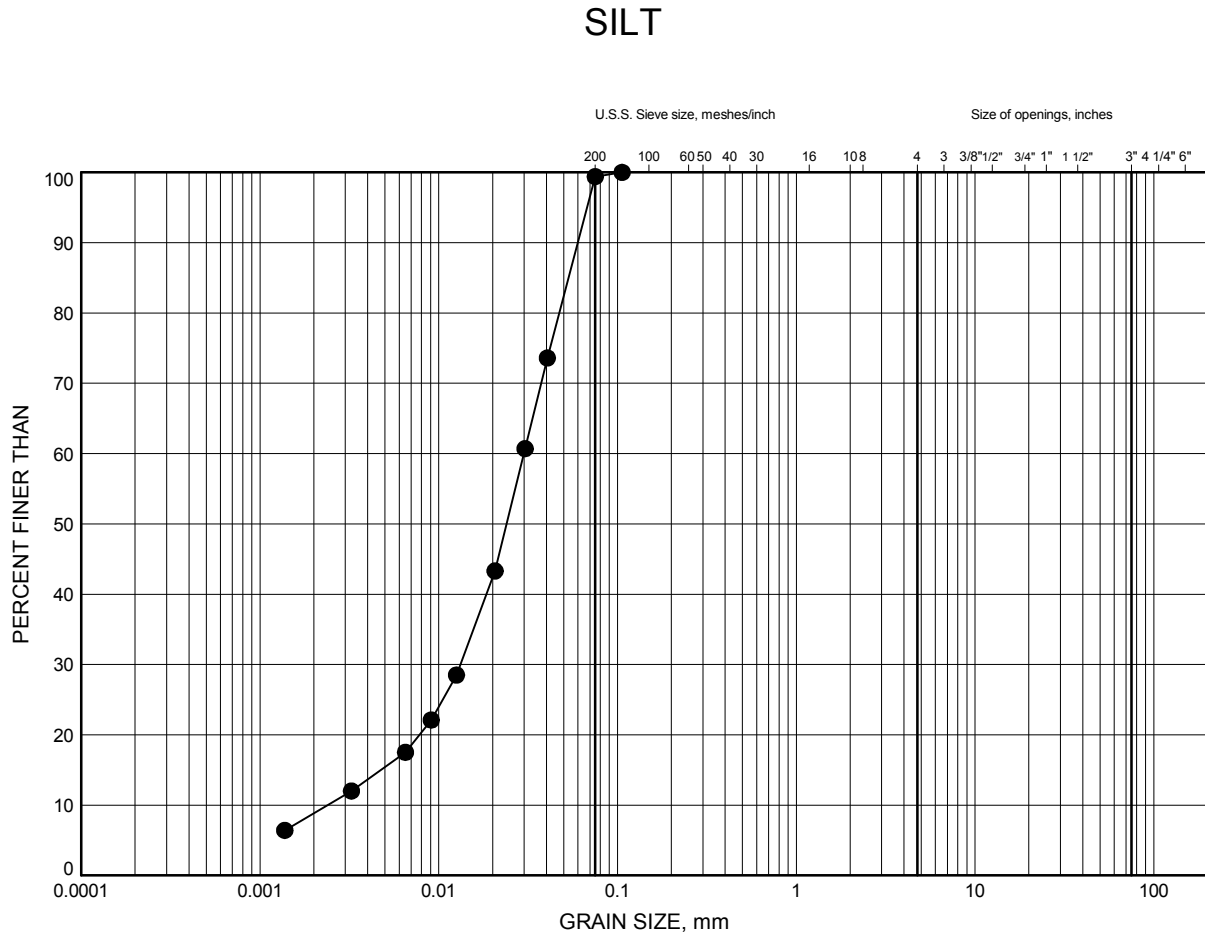


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

GRAIN SIZE DISTRIBUTION

FIGURE AB3



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15+210 01R	9.45	203.55

Date July 2014
 WP# 647-89-00

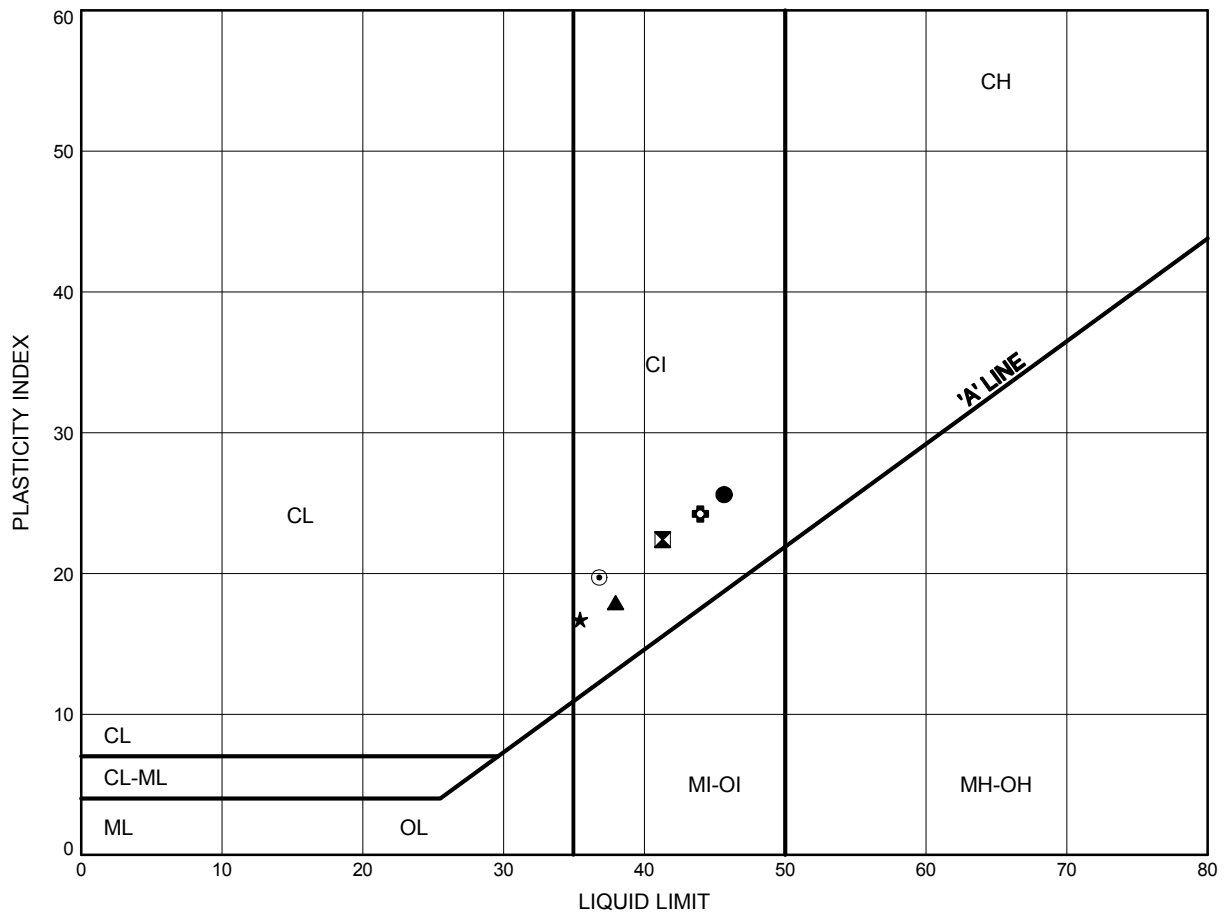


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AB4

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15+196 42R	1.83	210.67
⊠	15+196 42R	6.40	206.10
▲	15+196 42R	12.50	200.00
★	15+203 21R	1.07	212.03
⊙	15+203 21R	3.35	209.75
⊕	15+203 21R	10.97	202.13

Date July 2014
 WP# 647-89-00

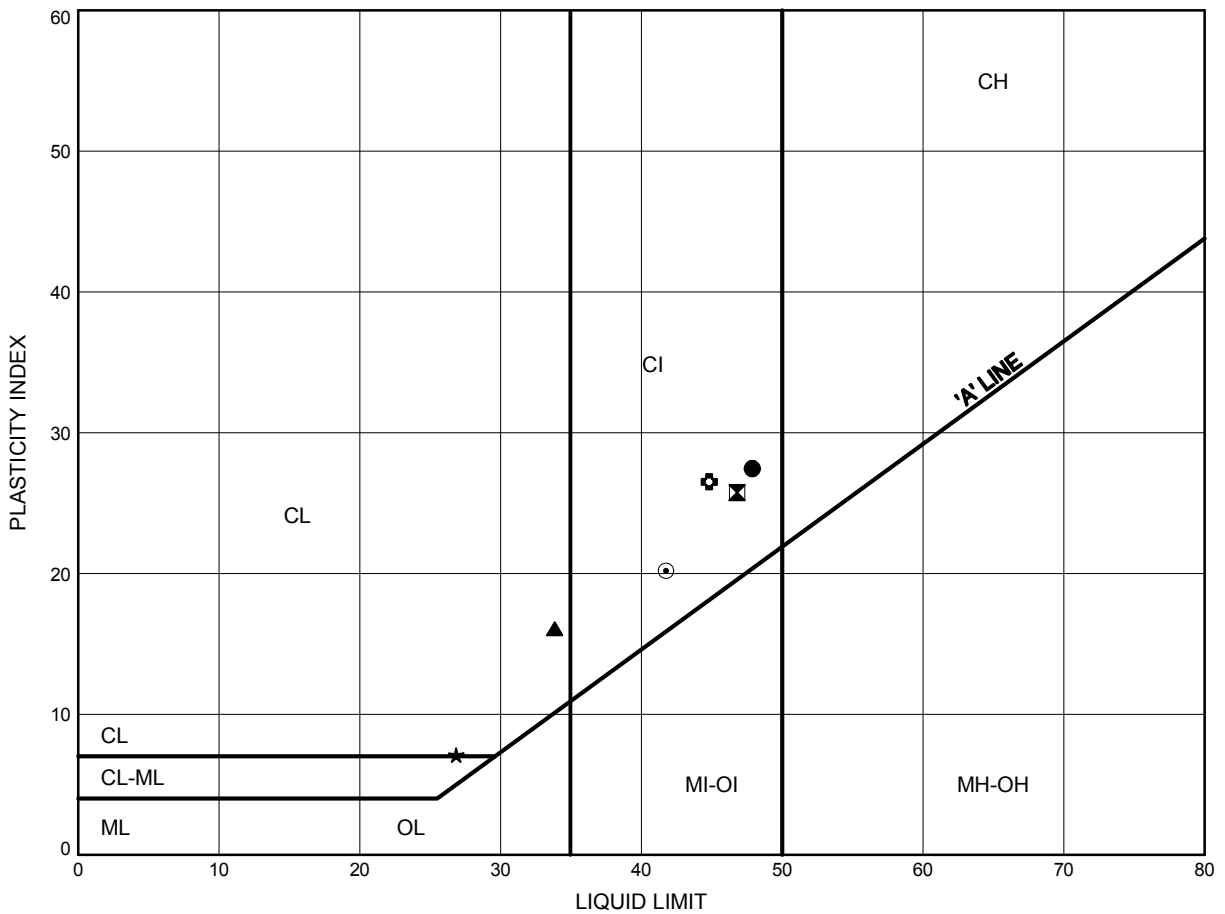


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AB5

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15+210 01R	3.35	209.65
⊠	15+210 01R	7.92	205.08
▲	15+210 01R	12.50	200.50
★	15+213 21L	1.83	211.81
⊙	15+213 21L	6.40	207.24
⊕	15+213 21L	10.97	202.67

Date July 2014
 WP# 647-89-00

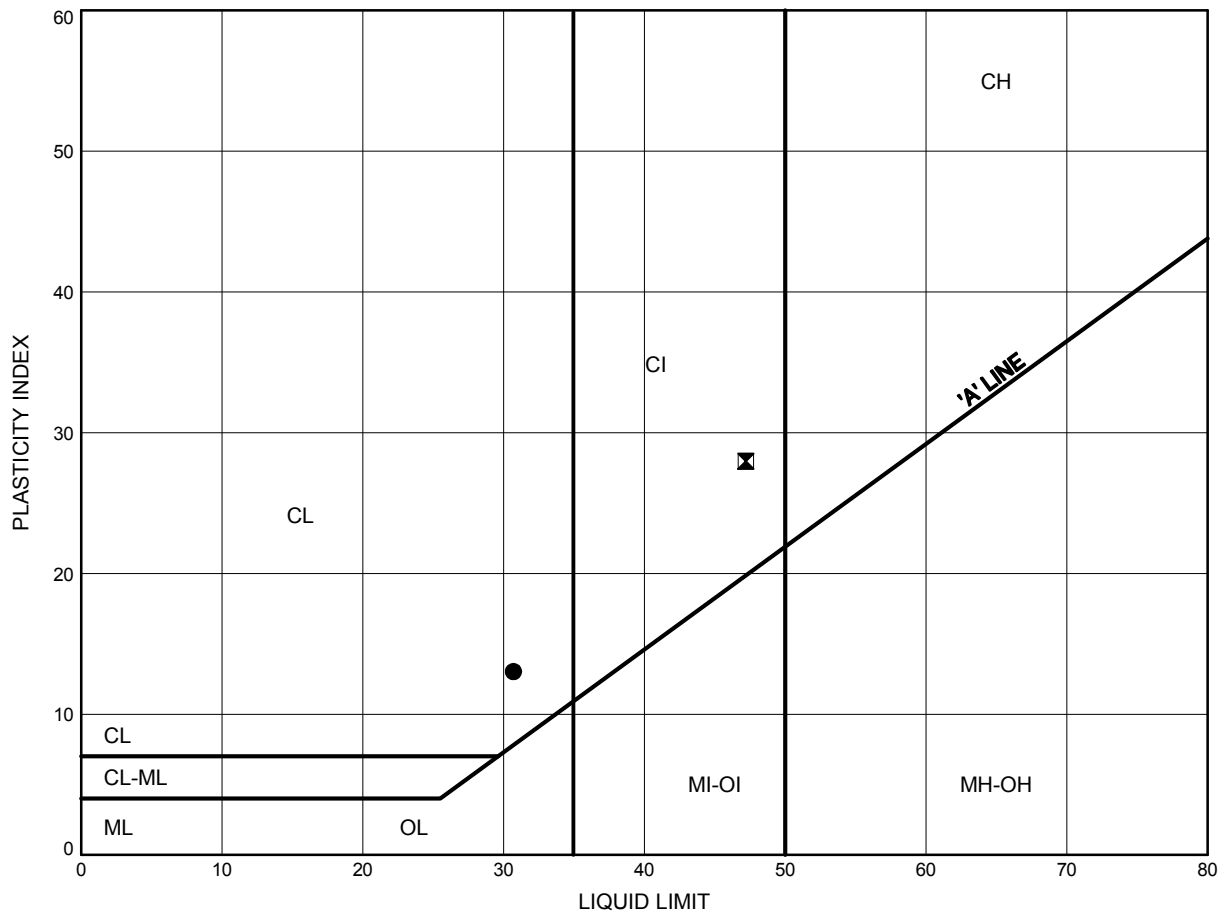


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AB6

Silty CLAY




LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15+218 35L	1.07	213.15
⊠	15+218 35L	7.92	206.29

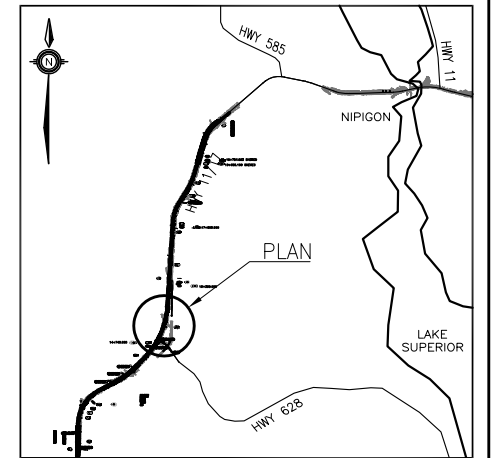
Date July 2014
 WP# 647-89-00








Prep'd AN
 Chkd. MKE



SHEET



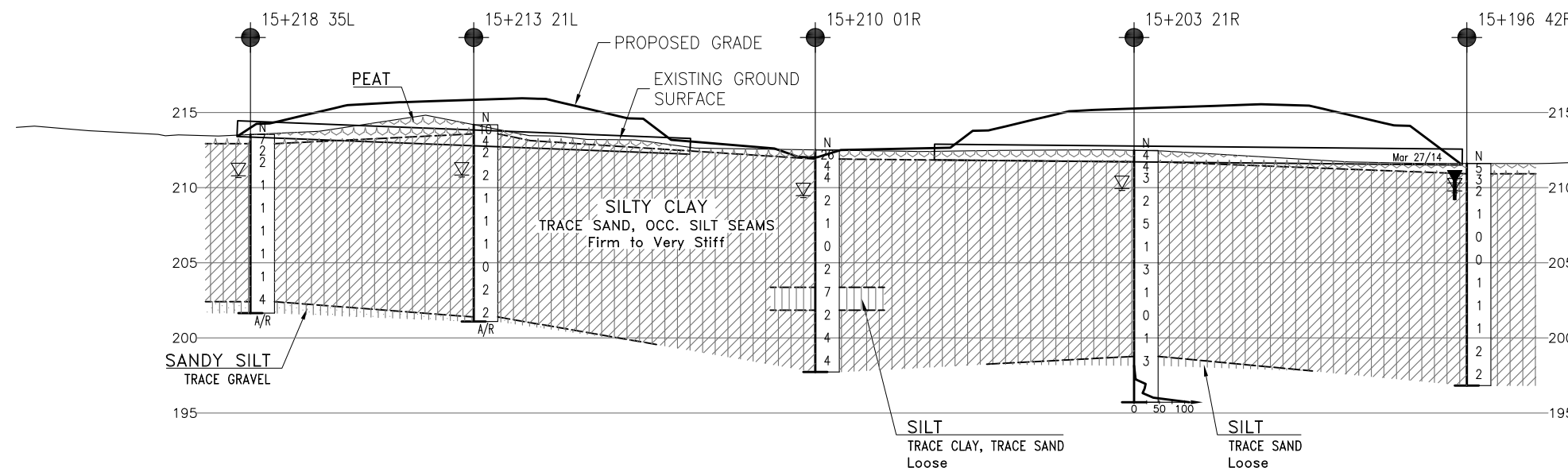
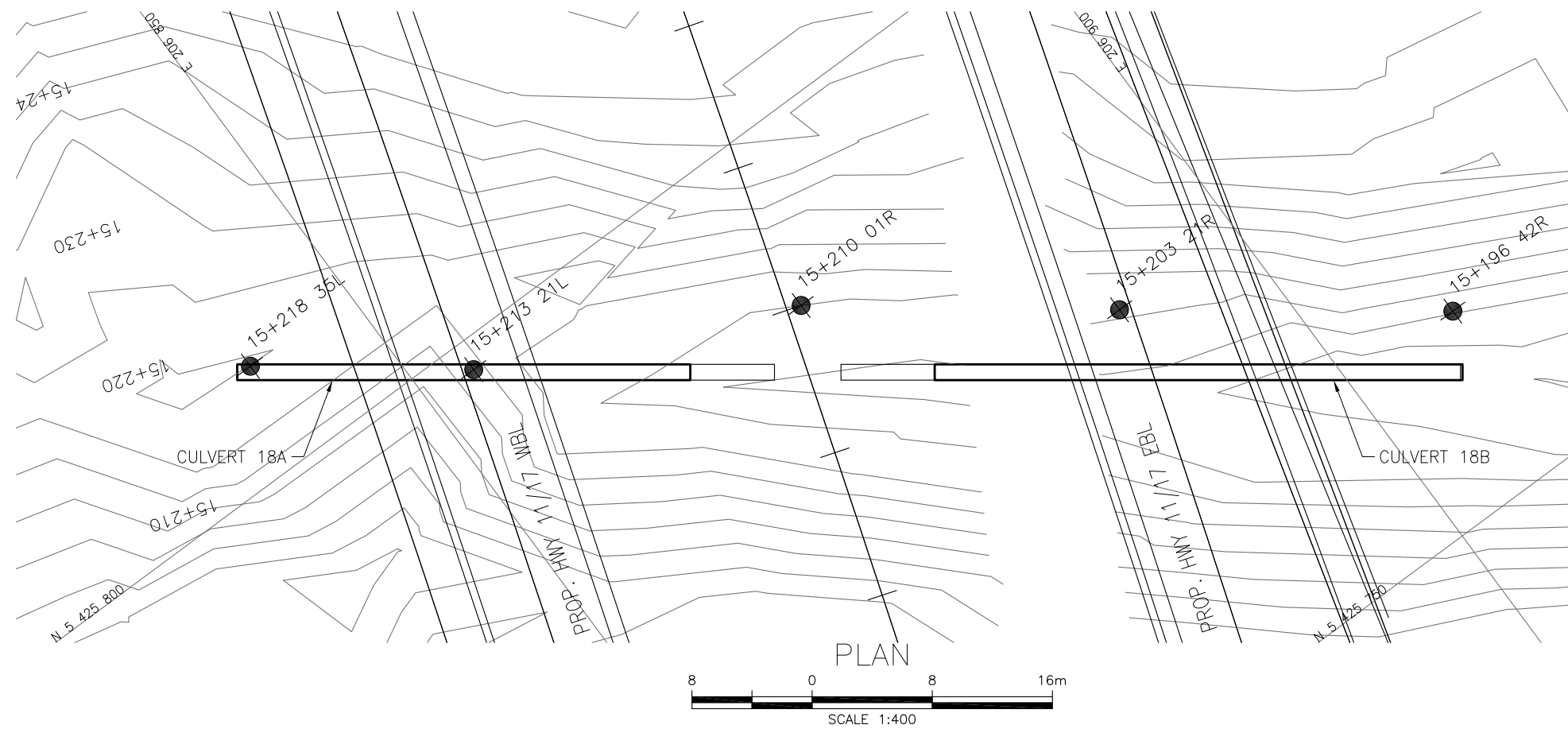
LEGEND

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

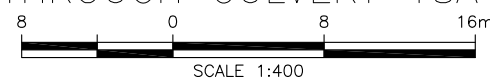
[illegible]

- 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.

REVISIONS										
	DATE	BY	DESCRIPTION							
DESIGN	SBP	CHK	JPL	CODE	LOAD	DATE	OCT.	2014		
DRAWN	MFA	CHK	SBP	SITE	STRUCT	DWG	9			



SECTION THROUGH CULVERT 18A AND 18B



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

Appendix AC

Highway 11/17 EBL and WBL

Sta. 15+725 to 16+250

Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 15+740 24R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 306.4 E 206 996.0 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.17 - 2014.02.17 CHECKED BY JPL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
221.7								20 40 60 80 100							
0.0	ORGANICS , trace rootlets, trace wood Dark Brown Frozen		1	SS	3		221								
	trace silt, trace sand		2	SS	11		220								
220.2															
1.5	Silty CLAY , trace sand Soft Brown	3	SS	3	220										
	Grey	4	SS	0	219										
			5	SS	0		218								
217.4															
4.3	END OF BOREHOLE AT 4.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 4.3m AND WATER LEVEL AT 3.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.														




+³, ×³: Numbers refer to Sensitivity
20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+850 23R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 416.4 E 207 002.4 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.17 - 2014.02.17 CHECKED BY JPL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL LIMIT MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa			WATER CONTENT (%)					
226.3							20 40 60 80 100									
0.0	ORGANICS , trace rootlets Brown Frozen		1	SS	5											
225.5																
0.8	Silty CLAY , oxide staining Soft to Firm Brown		2	SS	8											
			3	SS	6											
			4	SS	4											
	trace sand Brown/Grey		5	SS	3											
222.5																
3.8	END OF BOREHOLE AT 3.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 3.7m AND WATER LEVEL AT 3.0m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.															

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+890 45L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 460.8 E 206 937.2 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hand Shovel COMPILED BY AN
 DATUM Geodetic DATE 2013.11.13 - 2013.11.13 CHECKED BY SBP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
234.1								20	40	60	80	100					
0.0								20	40	60	80	100					
0.1	ORGANICS , roots and rootlets Dark Brown Damp END OF BOREHOLE AT 0.1m UPON BEDROCK.						234										

RECORD OF BOREHOLE No 15+940 19L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 508.9 E 206 966.4 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hand Shovel COMPILED BY AN
 DATUM Geodetic DATE 2013.11.13 - 2013.11.13 CHECKED BY SBP

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
233.2																	
0.0																	
0.2	<p>ORGANICS, some sand, roots and rootlets, dark brown, damp</p> <p>END OF BOREHOLE AT 0.1m UPON BEDROCK.</p>																

RECORD OF BOREHOLE No 15+940 49L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 510.9 E 206 936.5 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hand Shovel COMPILED BY AN
 DATUM Geodetic DATE 2013.11.13 - 2013.11.13 CHECKED BY SBP

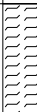


SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
235.6 0.0	BEDROCK EXPOSED AT SURFACE.													

RECORD OF BOREHOLE No 15+950 23R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 516.1 E 207 009.0 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.17 - 2014.02.17 CHECKED BY JPL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W P W W L WATER CONTENT (%)		
229.0								20	40	60	80	100					
0.0	ORGANICS , trace rootlets Brown Frozen		1	SS	5										○		
228.2																	
0.8	Silty CLAY , trace sand, trace rootlets Stiff to Hard Brown Moist oxide staining		2	SS	9		228								○		
			3	SS	14		227										0 1 45 54
226.5			4	SS	50/												
2.5	END OF BOREHOLE AT 2.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.4m. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.				.080												

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 15+990 45L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 560.6 E 206 943.8 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hand Shovel COMPILED BY AN
 DATUM Geodetic DATE 2013.11.13 - 2013.11.13 CHECKED BY SBP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
237.2														
0.0														
0.1	ORGANICS , roots and rootlets, occasional wood fibres Dark Brown Moist END OF BOREHOLE AT 0.1m UPON BEDROCK.													

RECORD OF BOREHOLE No 16+040 19L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 608.7 E 206 973.0 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2013.11.13 - 2013.11.13 CHECKED BY SBP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
233.2								20 40 60 80 100						
0.0	ORGANICS: (50mm) Silty CLAY , some sand, trace organics Soft to Stiff Brown		1	SS	3		233							
			2	SS	9		232							
231.6			3	SS	78/ 0.230									
1.7 231.3	SAND , some silt, trace gravel, occasional bedrock fragments Very Dense Brown Moist													
1.9	END OF BOREHOLE AT 1.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 1.9m AND WATER LEVEL AT 1.4m UPON COMPLETION. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.													

RECORD OF BOREHOLE No 16+040 49L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 610.7 E 206 943.1 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2013.11.12 - 2013.11.12 CHECKED BY SBP




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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
236.4								20	40	60	80	100					
0.0	ORGANICS, occasional roots and rootlets, dark brown		1	SS	4		236										
235.8	SAND, some silt, trace gravel, occasional wood fibres																
0.7	Loose Brown Moist END OF BOREHOLE AT 0.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 0.7m AND WATER LEVEL AT 0.5m UPON COMPLETION. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No 16+050 23R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 615.9 E 207 015.6 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.18 - 2014.02.18 CHECKED BY JPL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
230.3								20 40 60 80 100							
0.0	PEAT, trace rootlets Soft Dark Brown Frozen		1	SS	4		230								
229.6															
0.8	Silty CLAY, oxide staining Soft to Firm Brown		2	SS	6		229								
			3	SS	5										
	Brown to Grey		4	SS	3		228								
			5	SS	2		227								
	Grey		6	SS	2	226									
224.9															
5.5	END OF BOREHOLE AT 5.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 5.5m AND WATER LEVEL AT 3.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.														

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 16+090 35L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 659.7 E 206 960.4 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2013.11.12 - 2013.11.12 CHECKED BY SBP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
233.1								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
								20 40 60 80 100									
0.0	ORGANICS , occasional roots and rootlets, occasional wood fibres Loose Dark Brown Damp Silty CLAY , some sand Stiff to Very Stiff Brown		1	SS	4												
232.5																	
0.6																	
			2	SS	8												
			3	SS	6												
230.3																	
2.8	END OF BOREHOLE AT 2.8m UPON AUGE REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 2.8m AND WATER LEVEL AT 1.9m UPON COMPLETION Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m)																

METRIC

SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT		UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE "N" VALUES			20 40 60 80 100	20 40 60 80 100	W P W W L					
231.4 0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	4	▽	231					135		
	trace silt		2	SS	6		230							102
229.7 1.7	Silty CLAY Stiff to Very Stiff Brown to Grey		3	SS	1		229							
		4	SS	0	228									
		5	SS	0	227									
		6	SS	0	226									
		7	SS	0	225									
		8	SS	0	224									
	Grey	9	SS	0	223									
					222									

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 16+150 20R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 715.9 E 207 019.2 ORIGINATED BY MKE
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.18 - 2014.02.18 CHECKED BY JPL

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
	Continued From Previous Page																
220.7																	
10.7	Clayey SILT , some sand, trace gravel Loose Grey Saturated		10	SS	6											6 15 49 30	
220.0																	
11.4	END OF BOREHOLE AT 11.4m. BOREHOLE OPEN TO 11.3m AND WATER LEVEL AT 4.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No 16+175 34L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 744.4 E 206 967.0 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2013.11.12 - 2013.11.12 CHECKED BY SBP

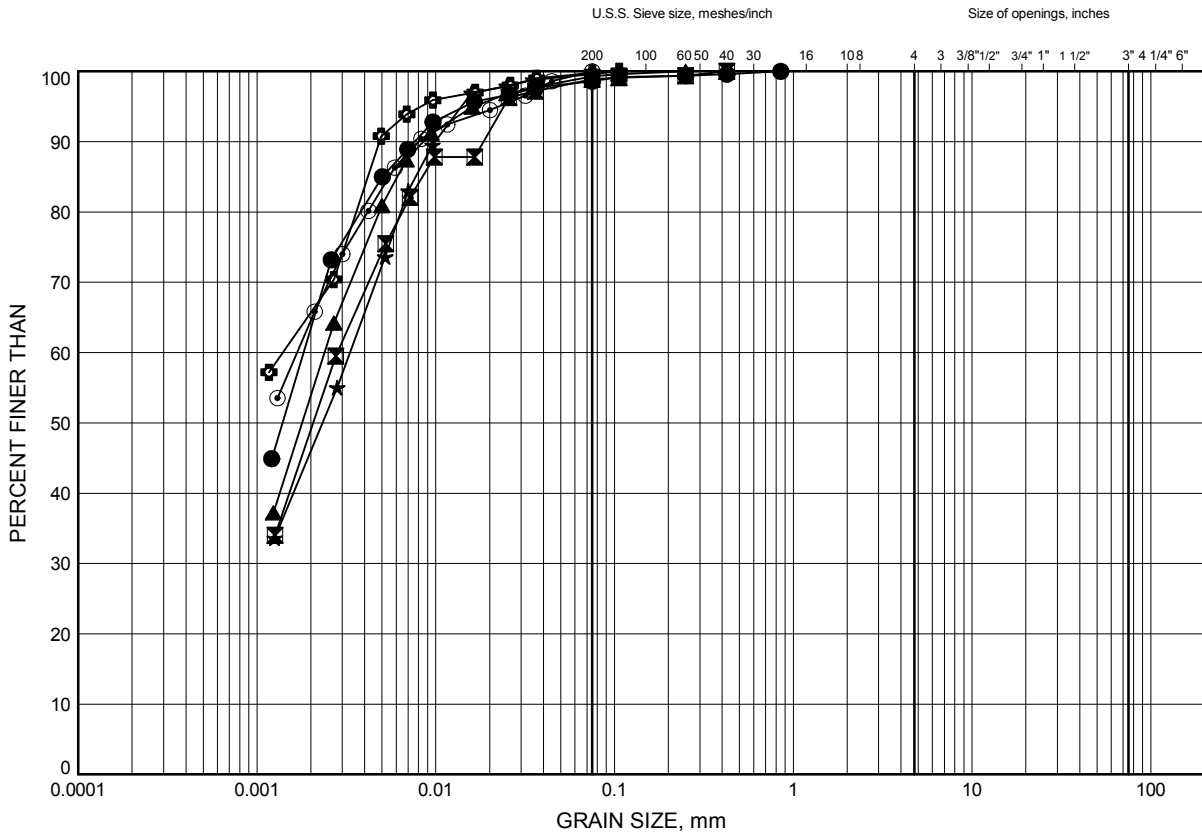
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
233.0								20 40 60 80 100							
0.0								20 40 60 80 100							
0.1	ORGANICS: (100mm) Silty CLAY , trace to some sand, trace roots and rootlets Firm to Very Stiff Dark Brown		1	SS	4										0 7 46 47
	Brown and Grey to Grey		2	SS	5										
	Sand seams and pockets		3	SS	2										
			4	SS	1										0 0 26 74
227.4															
5.6	END OF BOREHOLE AT 5.6m. BOREHOLE OPEN TO 5.6m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.														

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon GRAIN SIZE DISTRIBUTION

FIGURE AC1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15+740 24R	1.83	219.89
⊠	15+850 23R	3.35	222.94
▲	15+950 23R	1.83	227.17
★	16+050 23R	2.59	227.76
⊙	16+090 35L	1.07	232.01
⊕	16+150 20R	7.92	223.46

Date July 2014
WP# 647-89-00

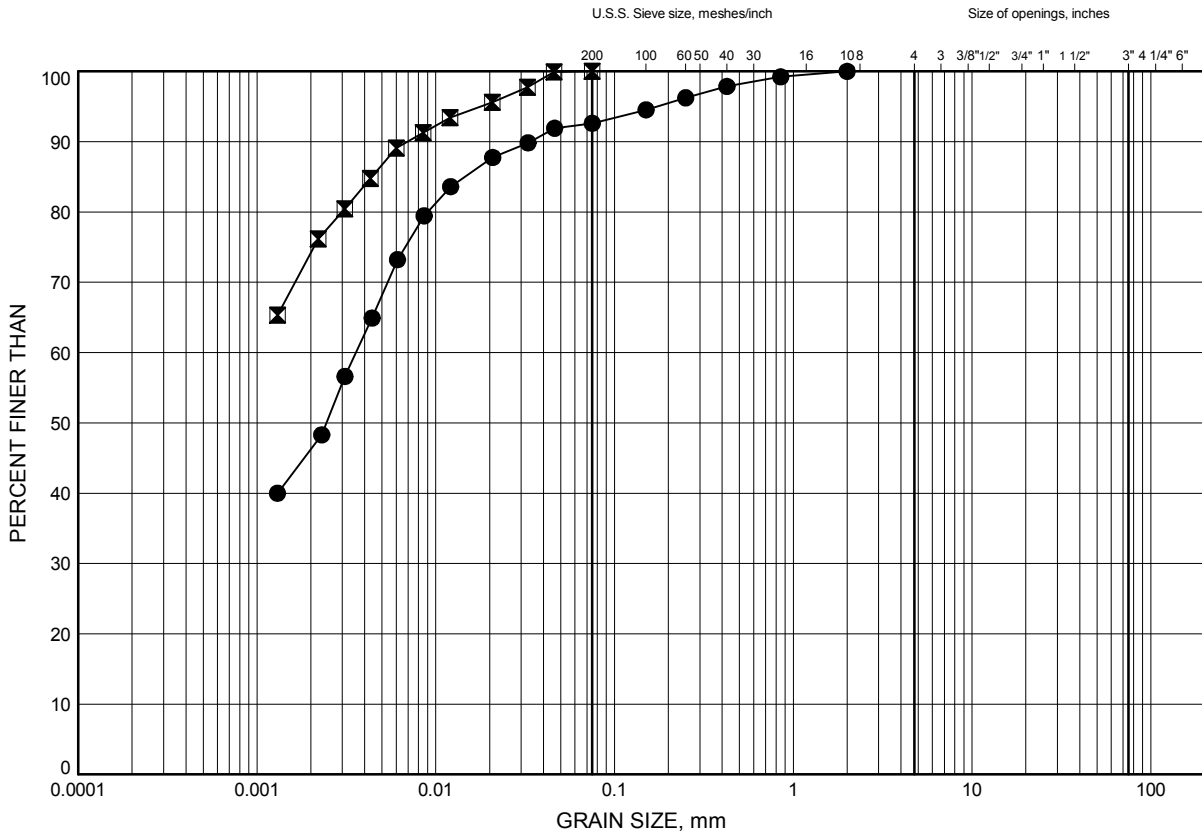


Prep'd AN
Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AC2

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	16+175 34L	0.30	232.72
⊠	16+175 34L	4.88	228.15

Date July 2014
 WP# 647-89-00

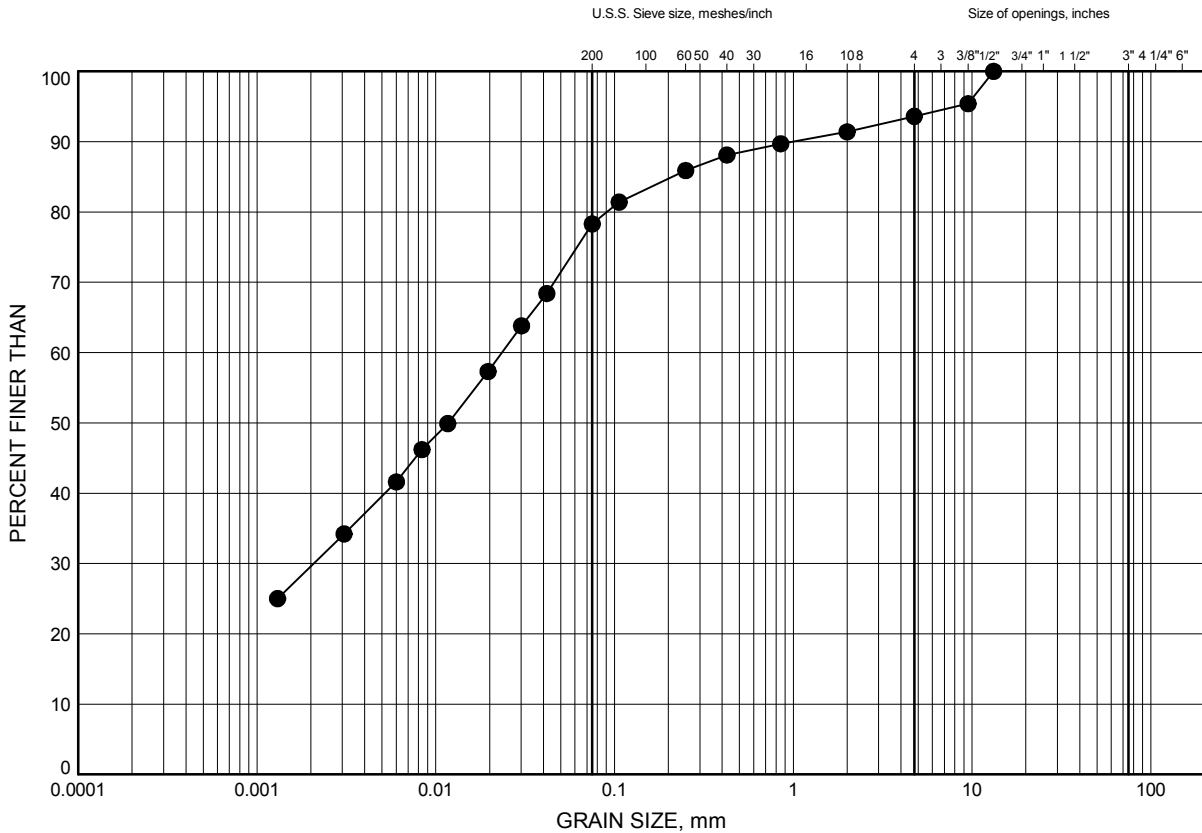


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AC3

Clayey SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	16+150 20R	10.97	220.41

Date July 2014
 WP# 647-89-00

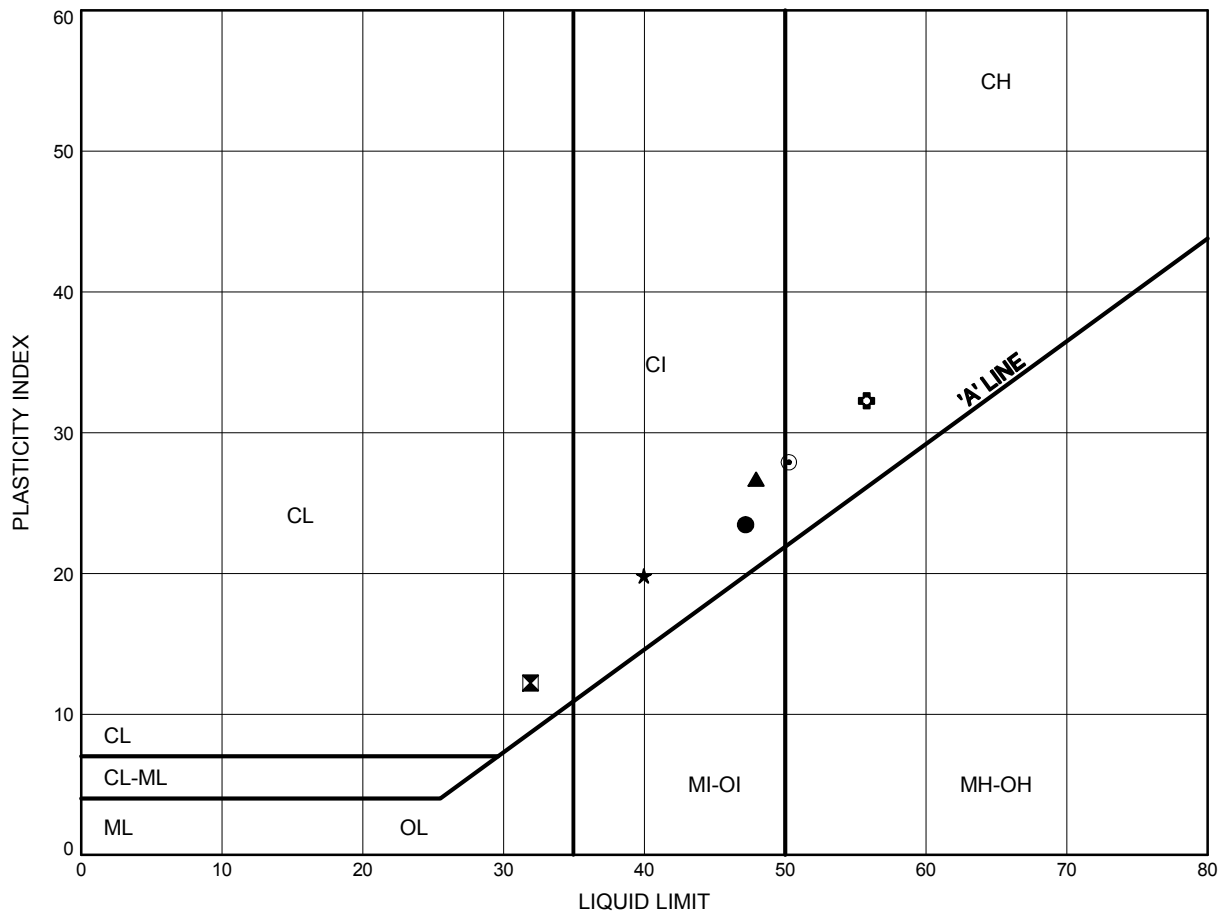


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AC4

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	15+740 24R	1.83	219.89
⊠	15+850 23R	1.07	225.23
▲	15+950 23R	1.83	227.17
★	16+050 23R	2.59	227.76
⊙	16+050 23R	4.88	225.47
⊕	16+090 35L	1.07	232.01

Date July 2014
 WP# 647-89-00



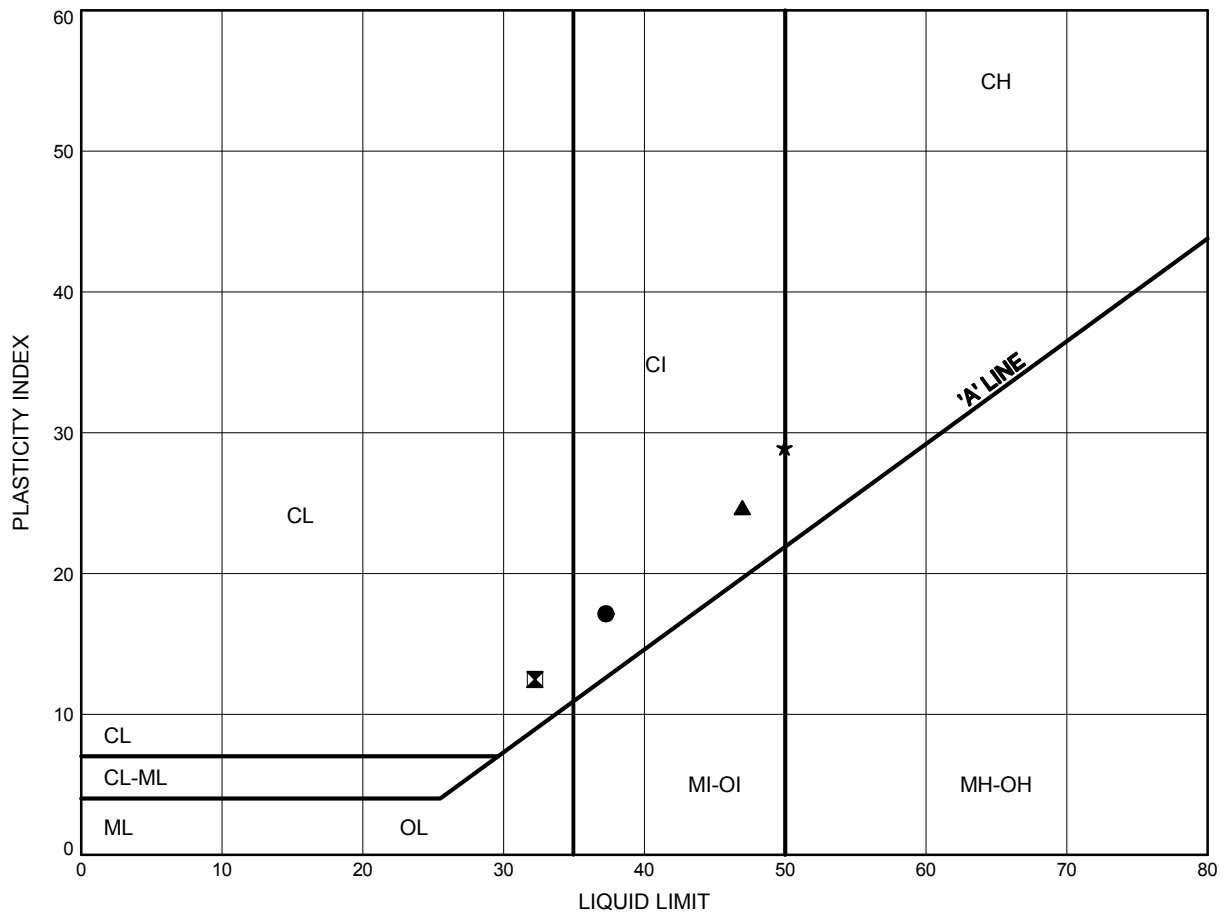
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE AC5

Silty CLAY



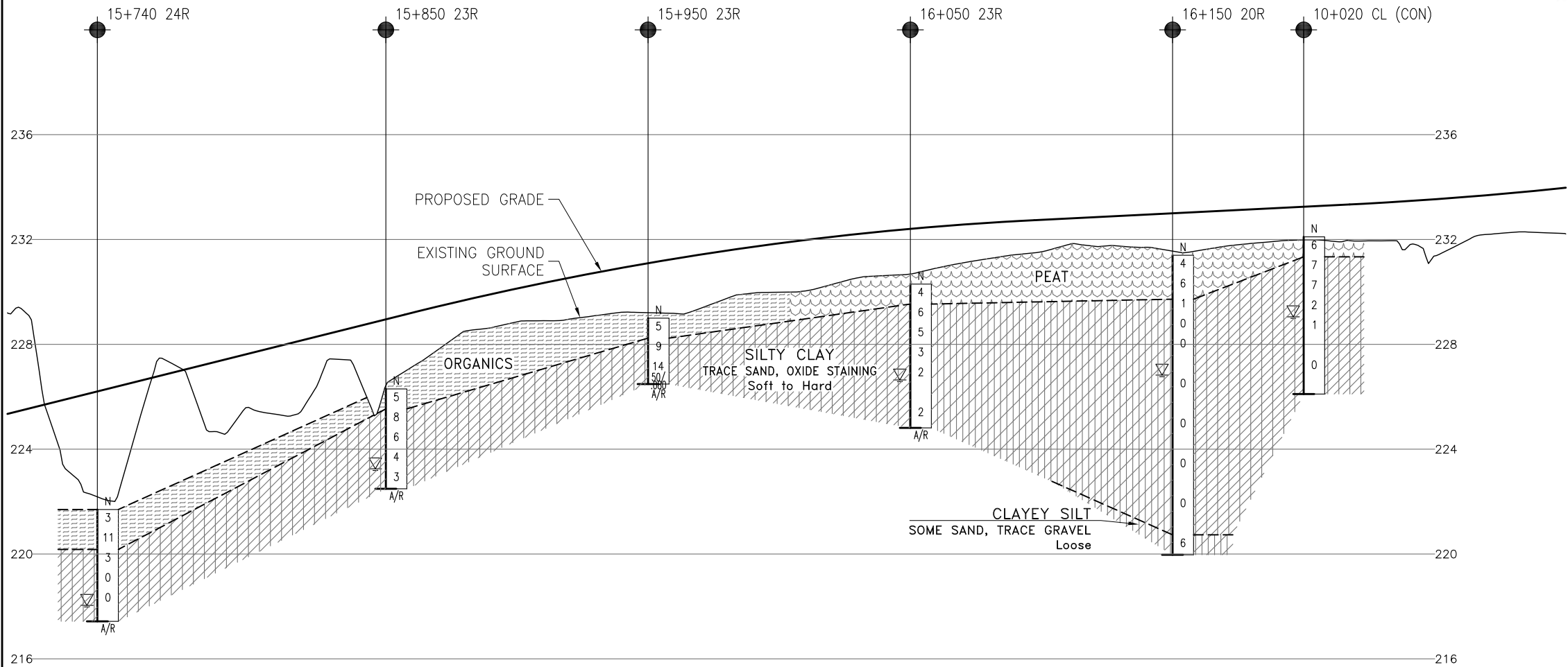
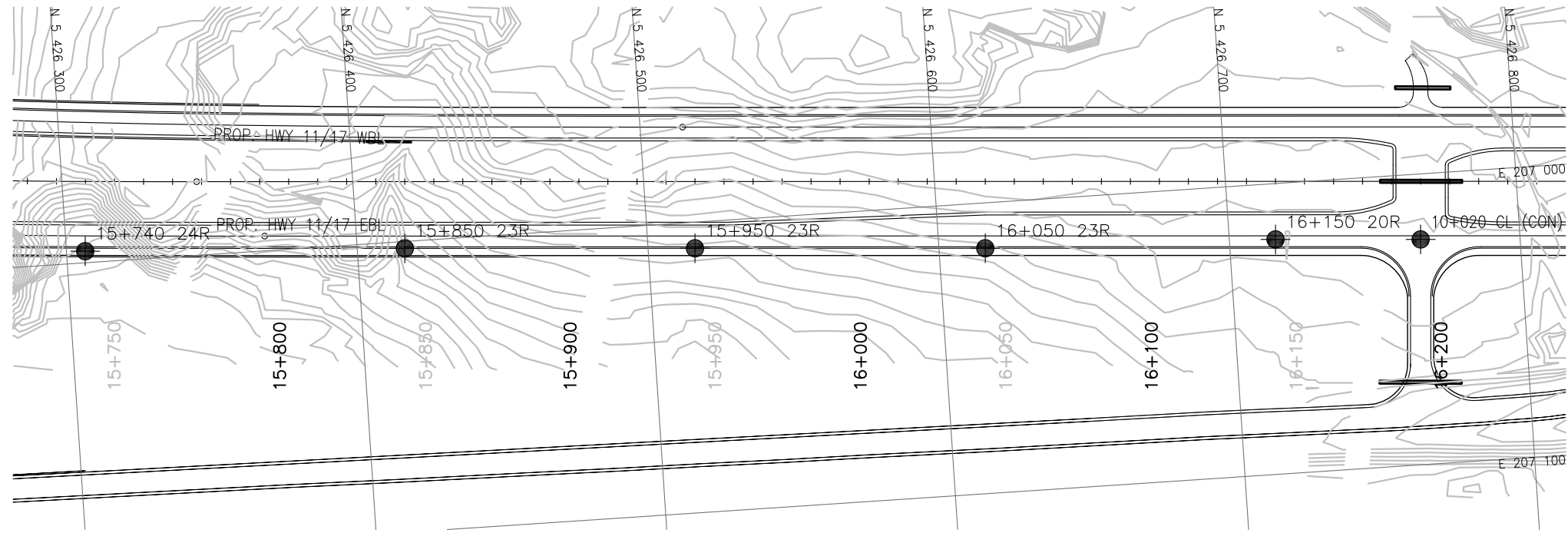
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	16+150 20R	1.83	229.56
⊠	16+150 20R	3.35	228.03
▲	16+150 20R	7.92	223.46
★	16+175 34L	4.88	228.15

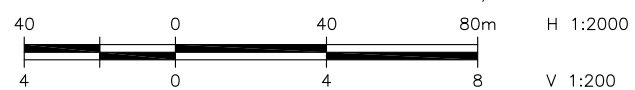
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



PROFILE ALONG CL HIGHWAY 11/17 EBL



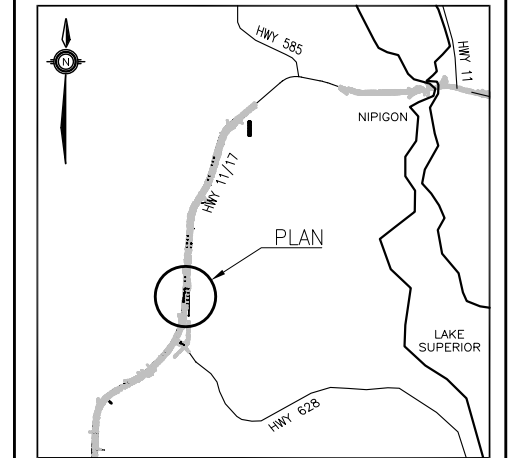
DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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



CONT No 2014-6026
GWP No 647-89-00

HWY 11/17 FOUR LANING
EASTBOUND LANES
(STA. 15+730 TO 16+250)
BOREHOLE LOCATIONS AND SOIL STRATA



KEYPLAN

LEGEND

	Borehole
	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60' Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
15+740 24R	221.7	5 426 306.4	206 996.0
15+850 23R	226.3	5 426 416.4	207 002.4
15+950 23R	229.0	5 426 516.1	207 009.0
16+050 23R	230.3	5 426 615.9	207 015.6
16+150 20R	231.4	5 426 715.9	207 019.2
10+020 CL (CON)	232.1	5 426 765.8	207 022.5

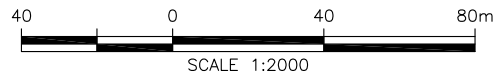
-NOTES-

- 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. 52A-184

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	SBP	CHK JPL	CODE
DRAWN	MFA	CHK SBP	SITE
			LOAD
			STRUCT
			DWG 21
			DATE OCT. 2014

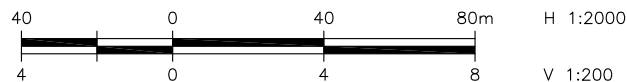
PLAN



This diagram is a geological cross-section showing the subsurface profile of a road or embankment. The vertical axis represents elevation in feet, with major grid lines at 224, 228, 232, 236, and 240. The horizontal axis represents stationing, with labels at 15+890 45L, 15+940 49L, 15+990 45L, 16+040 49L, 16+090 35L, and 16+175 34L. The diagram illustrates the relationship between the existing ground surface, the proposed grade, and various subsurface layers. Key features include:

- Existing Ground Surface:** A solid line representing the current terrain.
- Proposed Grade:** A solid line representing the planned road or embankment profile.
- Soil and Rock Layers:**
 - ORGANICS:** Indicated by dashed lines and labels at various points.
 - PROBABLE BEDROCK:** Shaded areas with cross-hatching.
 - BEDROCK:** A layer labeled between stations 15+940 and 15+990.
 - SAND:** A layer labeled "SAND" with "SOME SILT, TRACE GRAVEL, OCC. WOOD FIBRES Loose" below it.
 - SILTY CLAY:** A layer labeled "SILTY CLAY SOME SAND Stiff to Very Stiff" with a vertical scale of 1 to 5 feet.
- Vertical Scale:** A vertical scale on the right side of the diagram, ranging from 1 to 5 feet, with a total height of 4 feet indicated.
- Stationing:** The horizontal axis is marked with stationing values: 15+890 45L, 15+940 49L, 15+990 45L, 16+040 49L, 16+090 35L, and 16+175 34L.

PROFILE ALONG \mathbb{Q} HIGHWAY 11/17 WBL

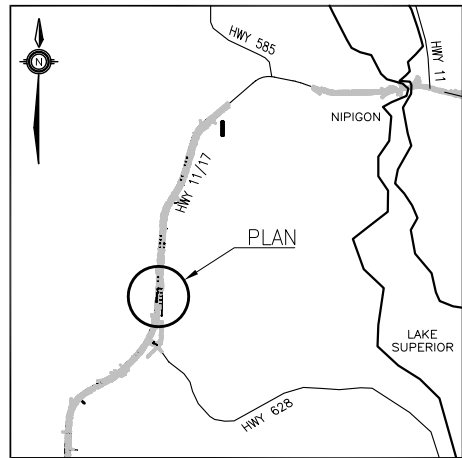


DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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








THURBER ENGINEERING LTD



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING
15+890 45L	234.1	5 426 460.8	206 937.2
15+940 49L	235.6	5 426 510.9	206 936.5
15+990 45L	237.2	5 426 560.6	206 943.8
16+040 49L	236.4	5 426 610.7	206 943.1
16+090 35L	233.1	5 426 659.7	206 960.4
16+175 34L	233.0	5 426 744.4	206 967.0

-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. 52A-184

[illegible]

Appendix AD

Off Highway 11/17 Sta. 16+200



Median Connector

Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 10+020 CL (CON) 1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 765.8 E 207 022.5 ORIGINATED BY MKE
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.18 - 2014.02.18 CHECKED BY JPL

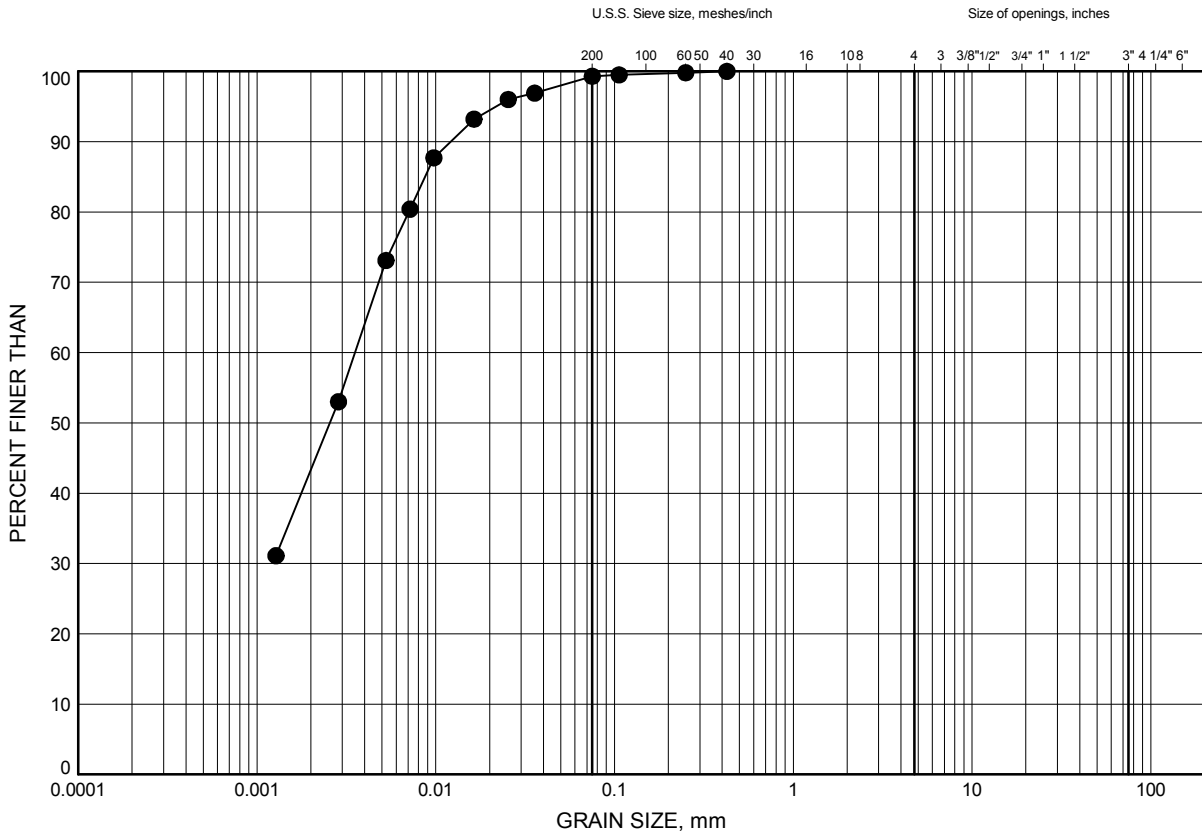
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		W _P	W	W _L			WATER CONTENT (%)
232.1						▽		20 40 60 80 100						GR SA SI CL	
0.0	PEAT , trace rootlets Dark Brown Frozen		1	SS	6										
231.4															
0.8	Silty CLAY , trace sand, oxide staining Soft to Firm Brown to Grey		2	SS	7										
			3	SS	7										
			4	SS	2										
			5	SS	1										
			6	SS	0										
226.1															
6.0	END OF BOREHOLE AT 6.0m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 5.8m AND WATER LEVEL AT 3.0m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.														

+³, ×³: Numbers refer to Sensitivity
 20
15
10
(%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AD1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+020 CL (CON)	1.83	230.29

Date July 2014
 WP# 647-89-00

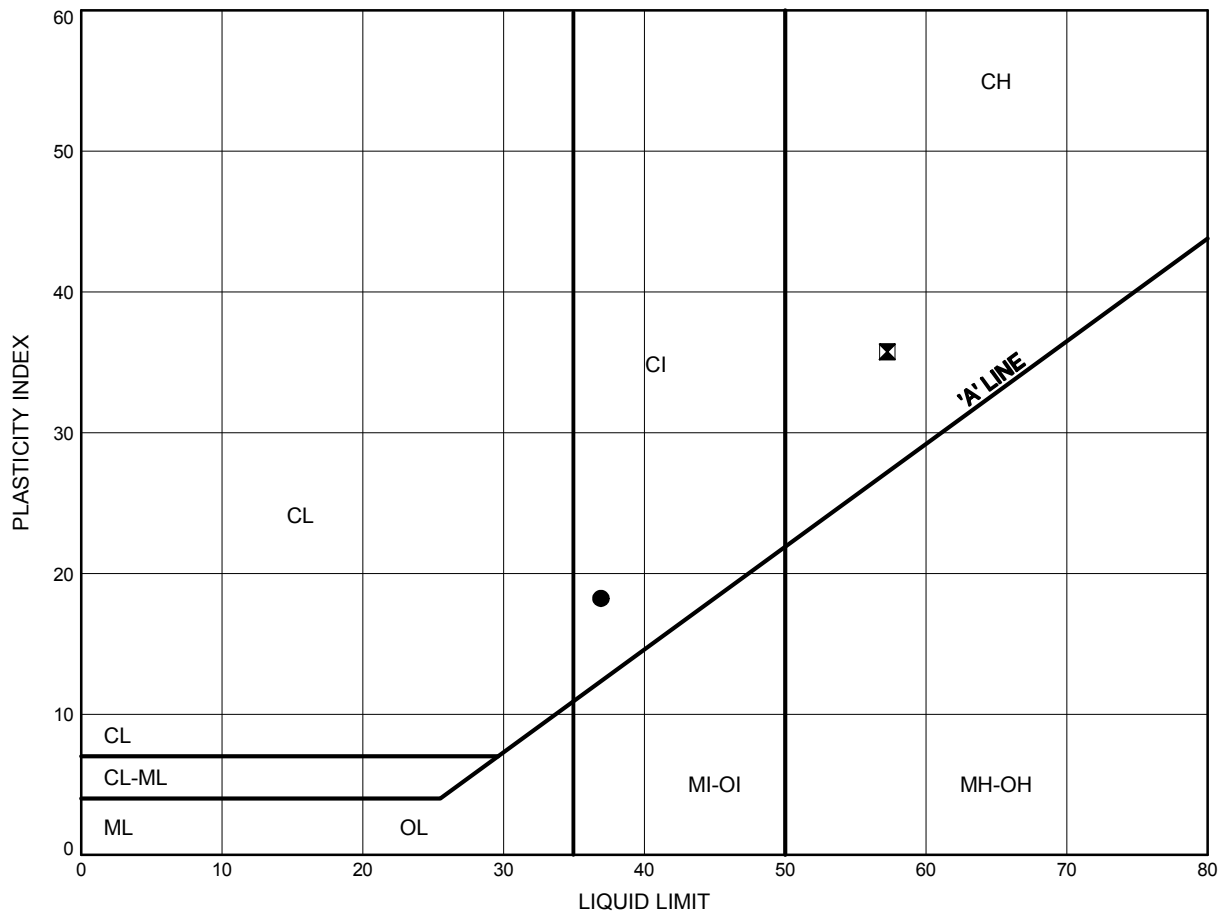


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AD2

Silty CLAY



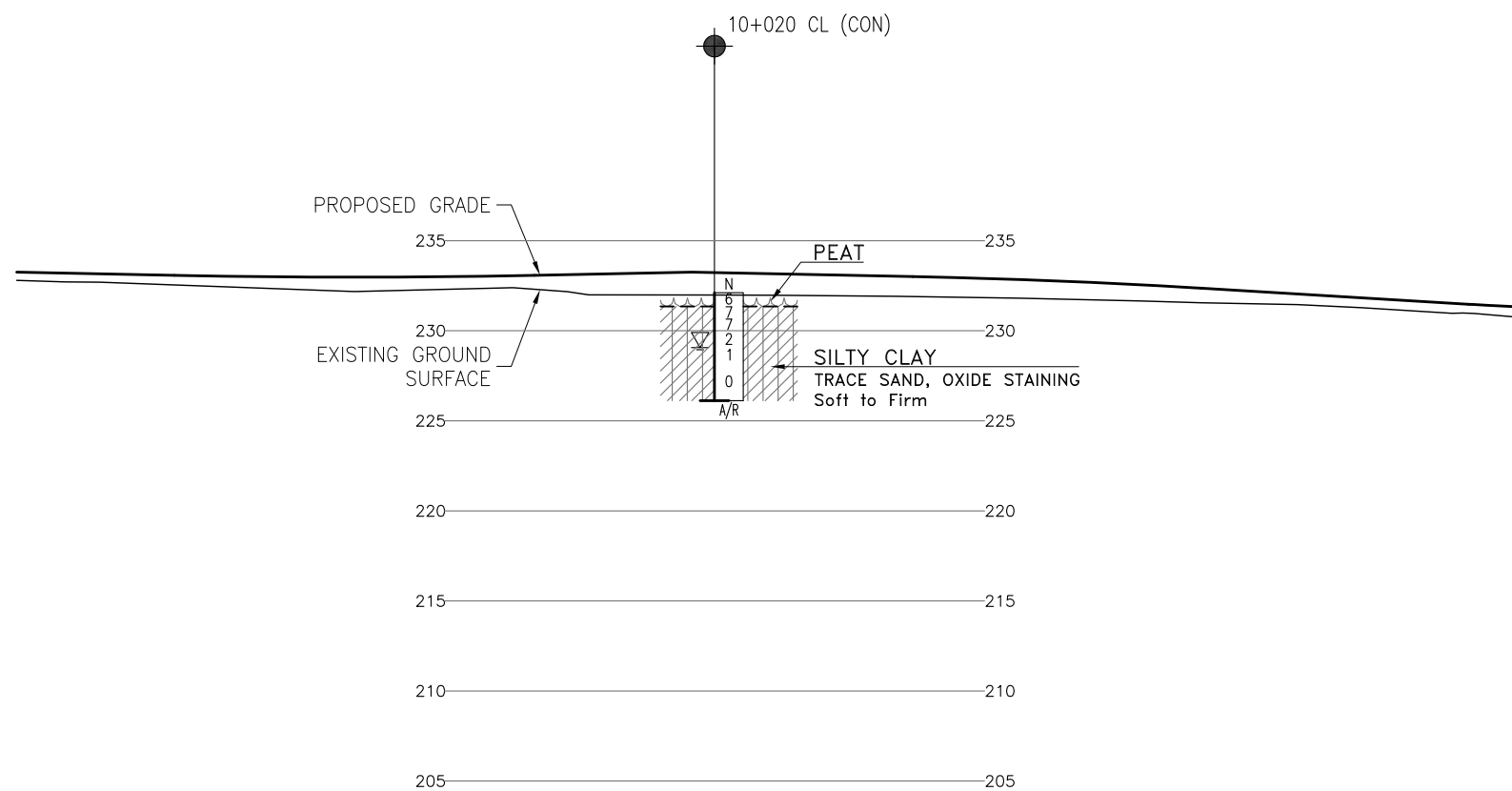
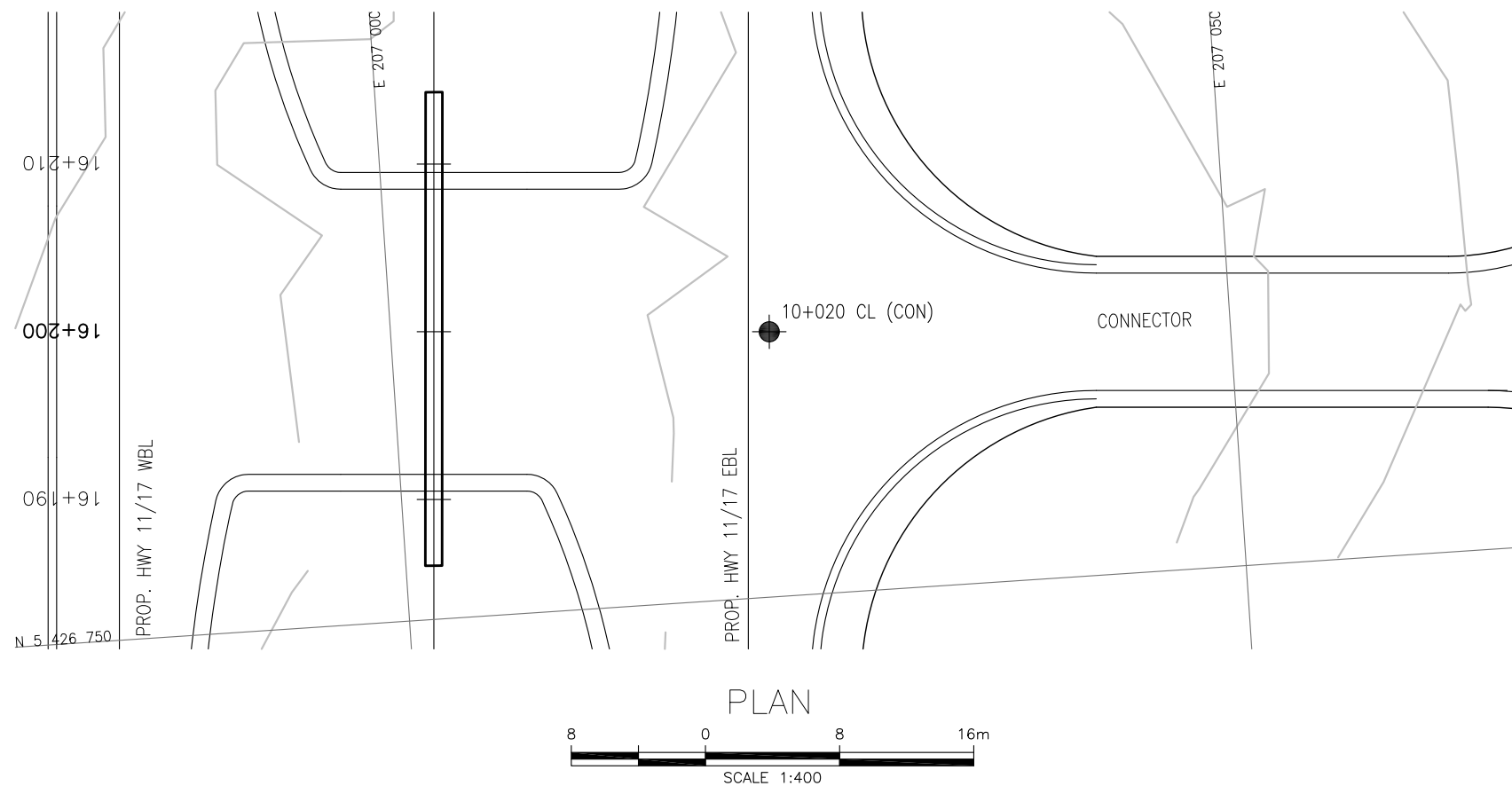
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+020 CL (CON)	2.59	229.52
⊠	10+020 CL (CON)	4.88	227.24

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

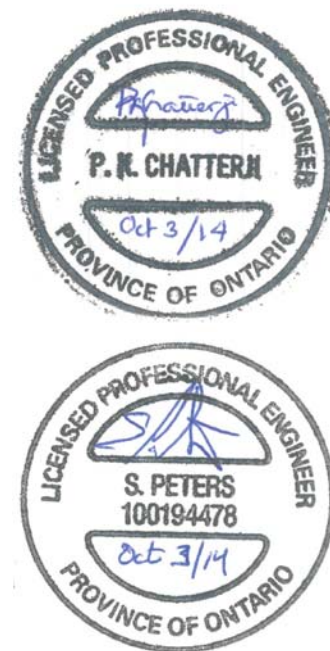


PROFILE ALONG \mathbb{Q} MEDIAN CROSSOVER AT 16+200



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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



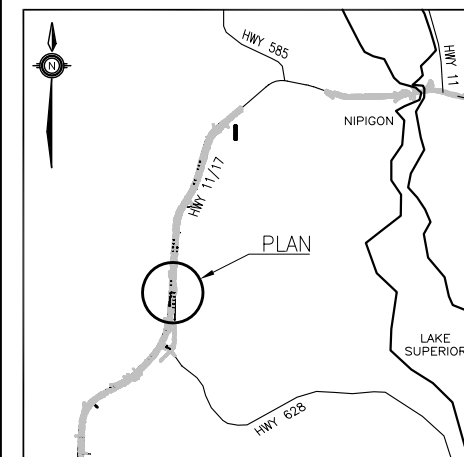
CONT No 2014-6026
GWP No 647-89-00

HWY 11/17 FOUR LANING
MEDIAN CROSSOVER
AT 16+200
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET








THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

	Borehole
	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	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. 52A-184

REVISIONS									
	DATE	BY	DESCRIPTION						
DESIGN	SBP	CHK	JPL	CODE	LOAD		DATE	OCT. 2014	
DRAWN	MFA	CHK	SBP	SITE	STRUCT	DWG	31		

Appendix AE

Highway 11/17 EBL and WBL

Sta. 16+390 to 16+470

Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

METRIC

[illegible]











+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 16+404 13R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 426 969.8 E 207 029.0 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.05 - 2014.03.05 CHECKED BY MKE

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		W P	W	W L	WATER CONTENT (%)				
233.6								20 40 60 80 100									
0.0	PEAT , trace rootlets Dark Brown Frozen		1	SS	9												
233.0							233										
0.6	Silty CLAY , trace sand Firm to Stiff Brown		2	SS	4												
	varved																
			3	SS	3		232										
	Grey		4	SS	2		231										
							230										
			5	SS	1		229										
	occasional silt seams		6	SS	2		228										
226.9							227										
6.7	END OF BOREHOLE AT 6.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 6.7m AND WATER LEVEL AT 3.0m UPON COMPLETION. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) 2014.03.27 1.1 232.5																

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 16+440 01L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 427 006.7 E 207 017.5 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.19 - 2014.02.19 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							WATER CONTENT (%)
								○ UNCONFINED	+ FIELD VANE						
								● QUICK TRIAXIAL	× LAB VANE						
232.5							20 40 60 80 100								
0.0	PEAT, trace rootlets, trace wood Dark Brown Frozen		1	SS	6		232						137		
			2	SS	3								192		
231.0							231								
1.5	Silty CLAY, sandy Firm Grey		3	SS	2									0 28 41 31	
	trace sand		4	SS	3		230								
			5	SS	1		229								
			6	SS	2		228								
							227								
			7	SS	2		226								
225.5															
7.0	END OF BOREHOLE AT 7.0m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 7.0m AND WATER LEVEL AT 3.0m UPON COMPLETION. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.														
	WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) 2014.03.27 0.4 232.1														

ONTMT4S 1237.GPJ 2012TEMPLATE(MTO).GDT 8/7/14

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

METRIC

SOIL PROFILE						GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT		UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES		SHEAR STRENGTH kPa			WATER CONTENT (%)						
			NUMBER	TYPE	"N" VALUES			○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	w P w w L					
232.9 0.0	PEAT , trace rootlets, trace wood Dark Brown Frozen		1	SS	4	▽						220		
			2	SS	6							83		
231.4 1.5	Silty CLAY , trace sand Firm to Stiff Grey		3	SS	5									
			4	SS	1									
			5	SS	0									
			6	SS	0									
			7	SS	0									
224.8 8.1			8	SS	52									
	END OF BOREHOLE AT 8.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 7.9m AND WATER LEVEL AT 4.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.													




+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 16+460 34L

1 OF 1

METRIC

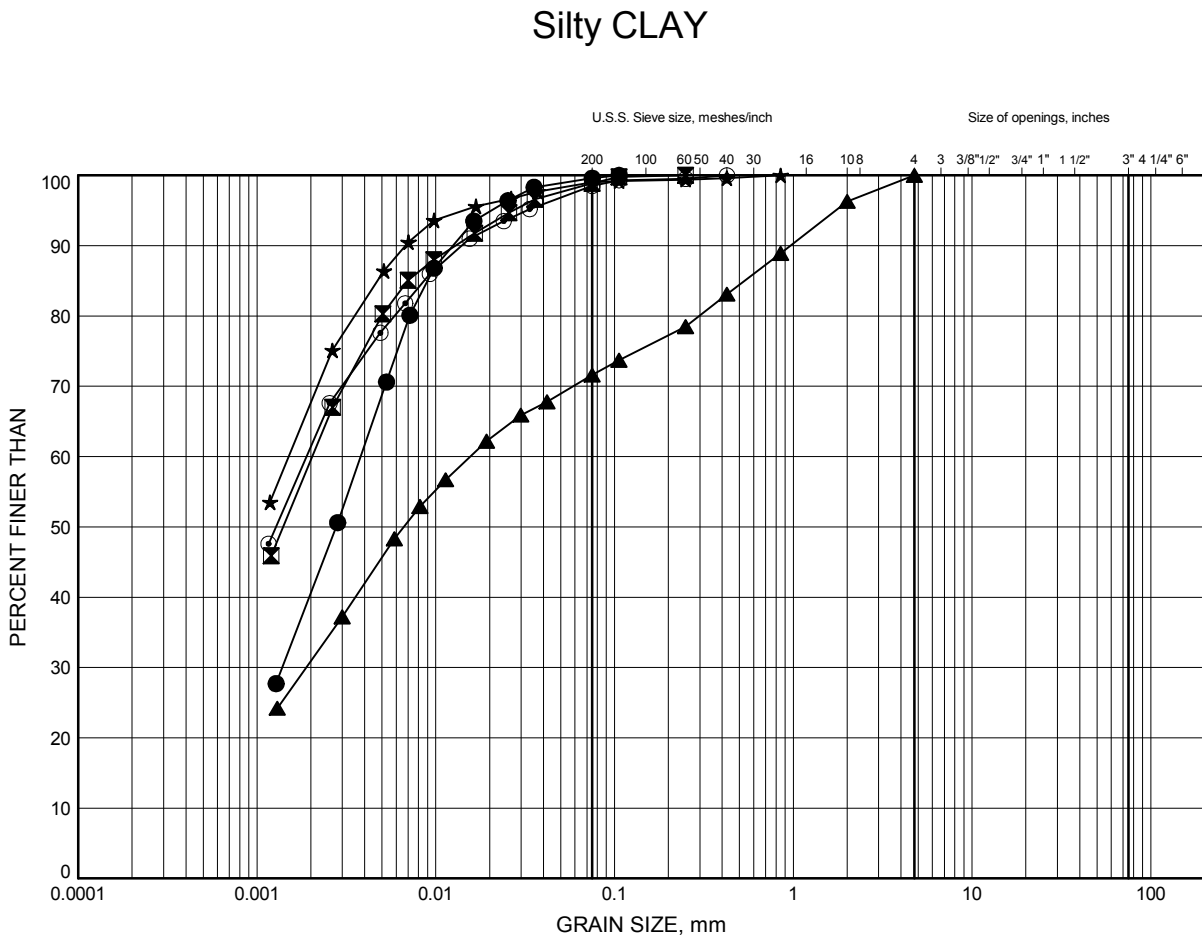
WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 427 028.8 E 206 985.9 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.19 - 2014.02.19 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT		UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		W P W W L				WATER CONTENT (%)	
								20 40 60 80 100	20 40 60						
233.2	0.0		1	SS	4		233						92		
			2	SS	2		232								103
231.7	1.5		3	SS	2		231								
			4	SS	0										
			5	SS	0		230								
							229			5.1					
			6	SS	0		228								
							227								
			7	SS	0		226			4.1					
			8	SS	0		225								
224.6															
8.7	END OF BOREHOLE AT 8.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 8.5m AND WATER LEVEL AT 4.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.									4.3					

+³, ×³: Numbers refer to Sensitivity
20
15
10
(%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AE1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	16+400 02R	1.83	232.37
⊠	16+404 13R	6.40	227.20
▲	16+440 01L	1.83	230.70
★	16+450 17L	6.40	226.52
⊙	16+460 34L	4.88	228.37

Date July 2014
 WP# 647-89-00



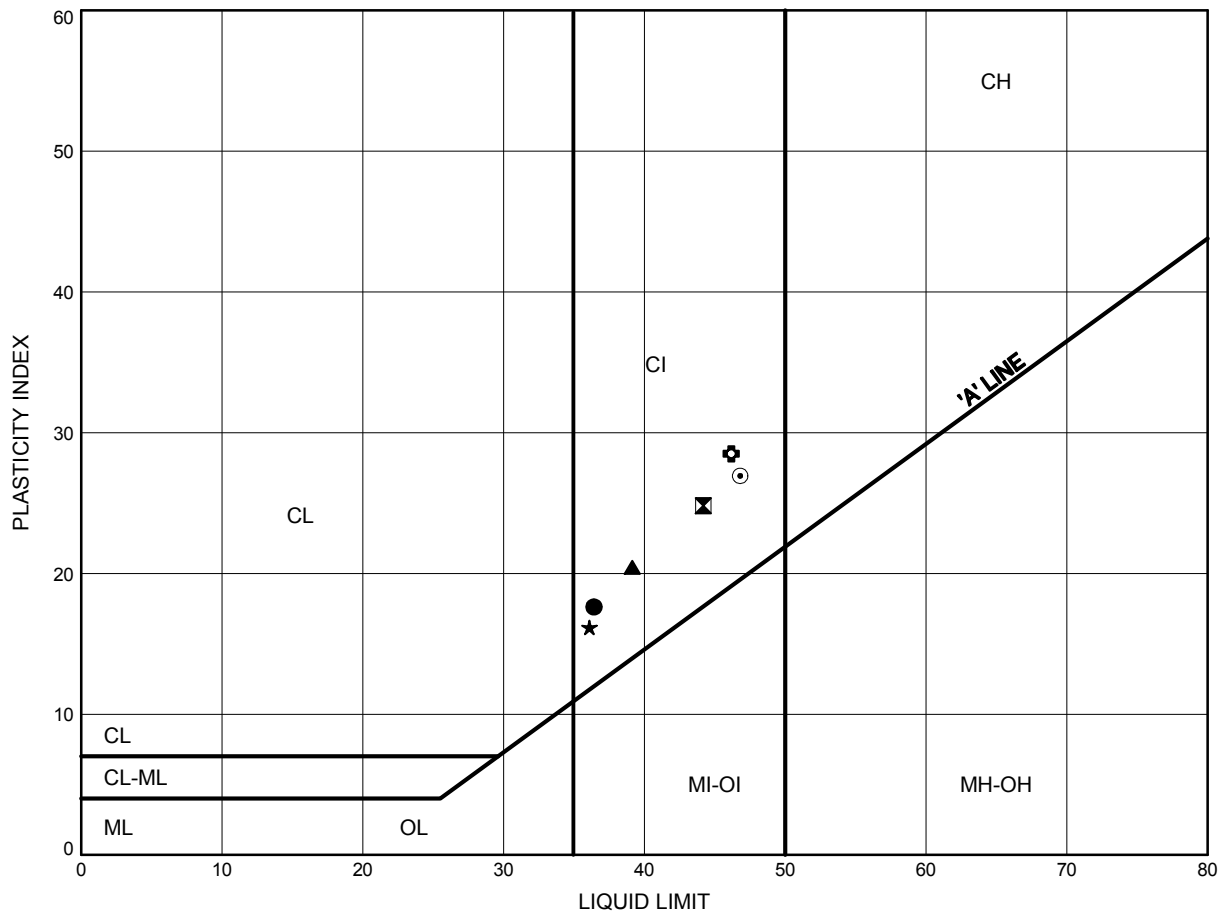
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE AE2

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	16+400 02R	1.83	232.37
⊠	16+400 02R	3.35	230.85
▲	16+404 13R	1.83	231.77
★	16+404 13R	6.40	227.20
⊙	16+440 01L	3.35	229.18
⊕	16+450 17L	2.59	230.33

Date July 2014
 WP# 647-89-00



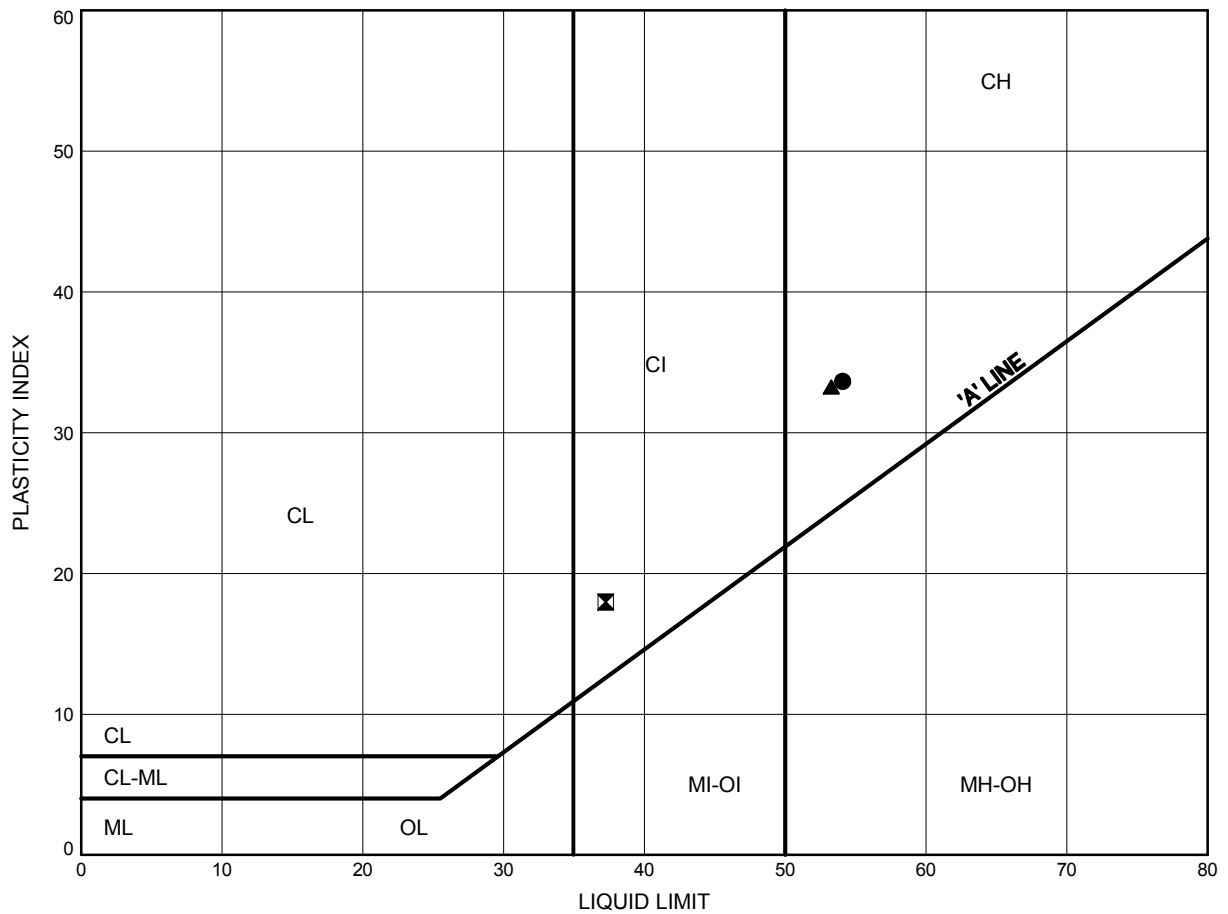
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE AE3

Silty CLAY



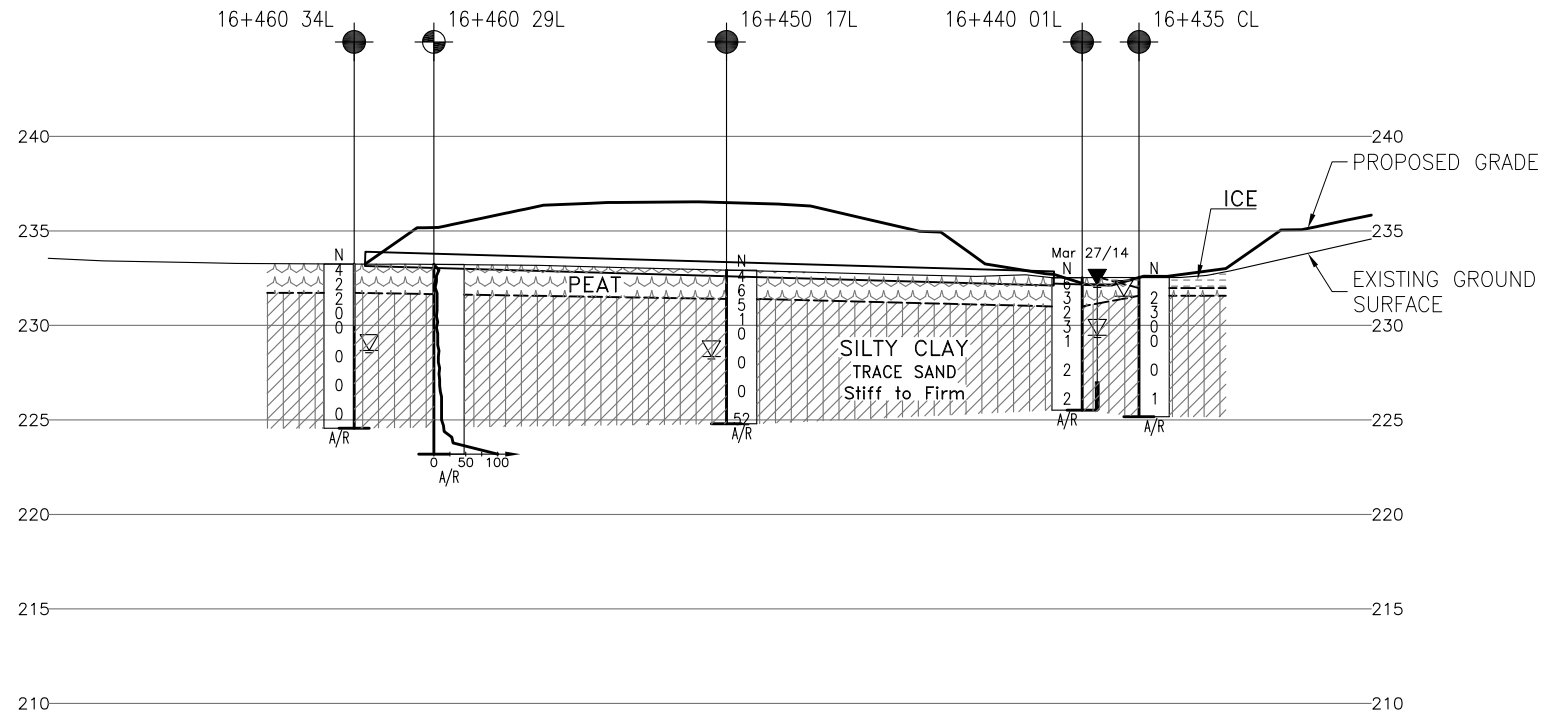
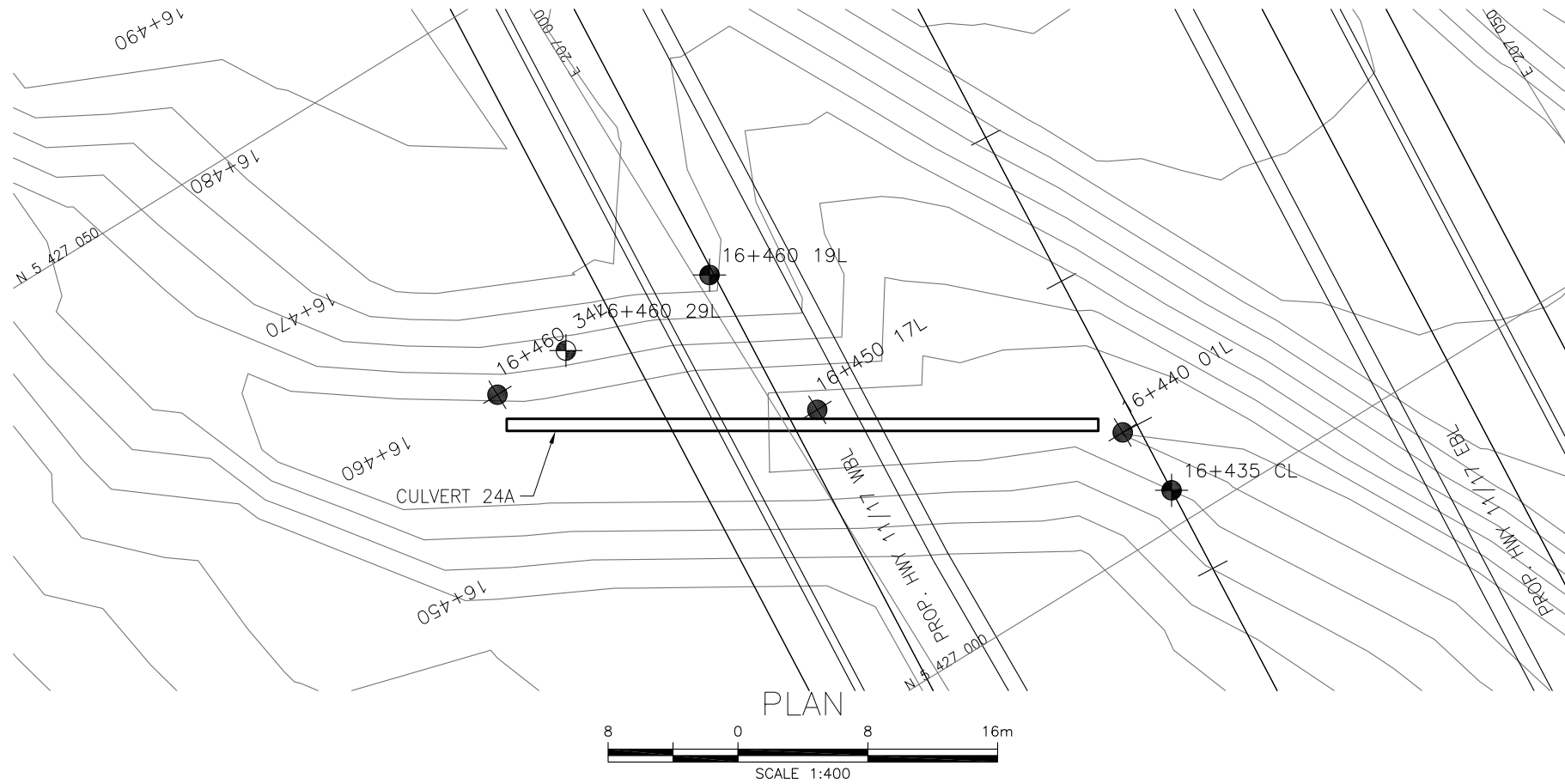
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	16+450 17L	6.40	226.52
⊠	16+460 34L	1.83	231.42
▲	16+460 34L	4.88	228.37

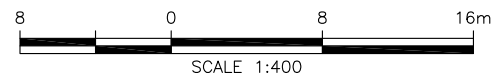
Date July 2014
 WP# 647-89-00



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 Chkd. MKE

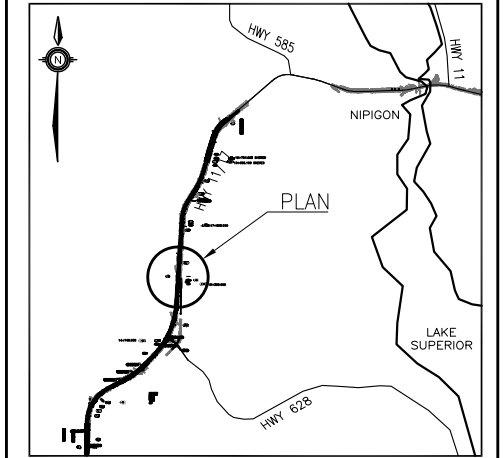


SECTION THROUGH CULVERT 24A








DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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



KEYPLAN

LEGEND

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

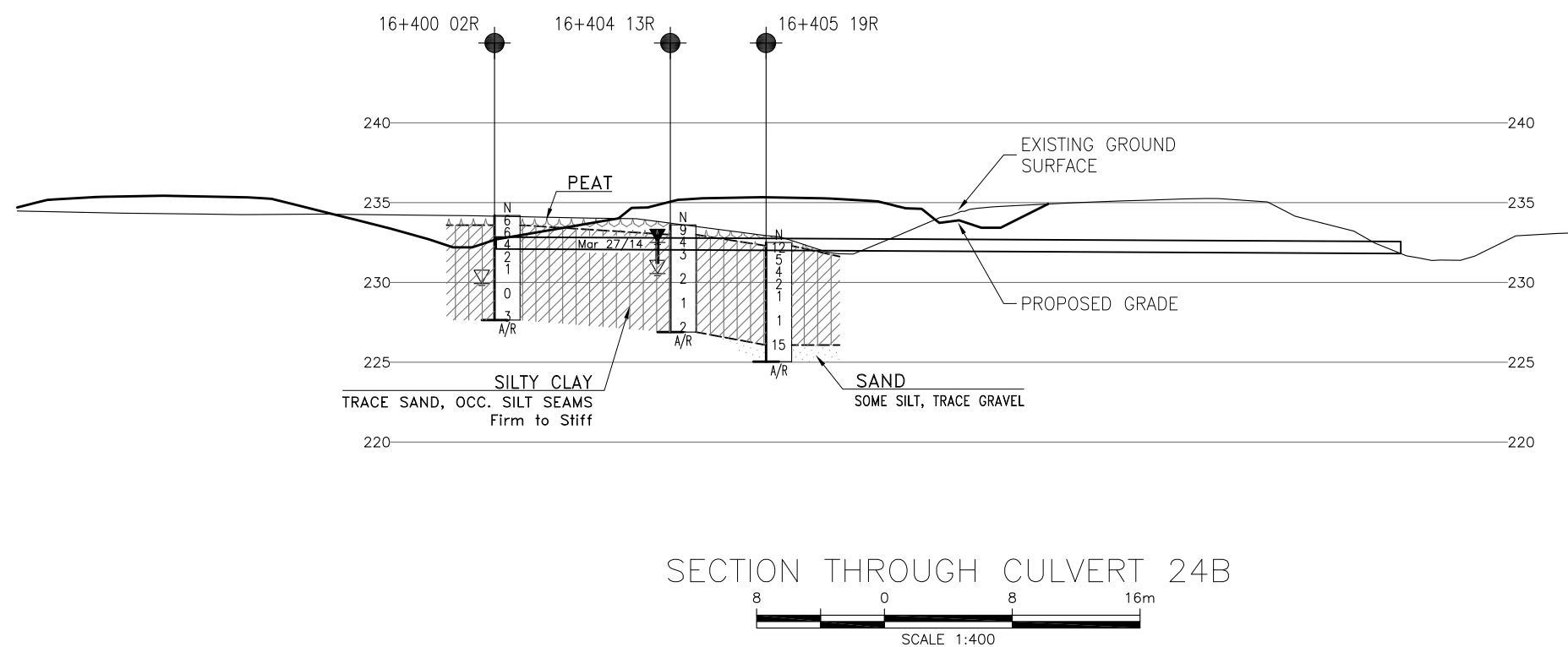
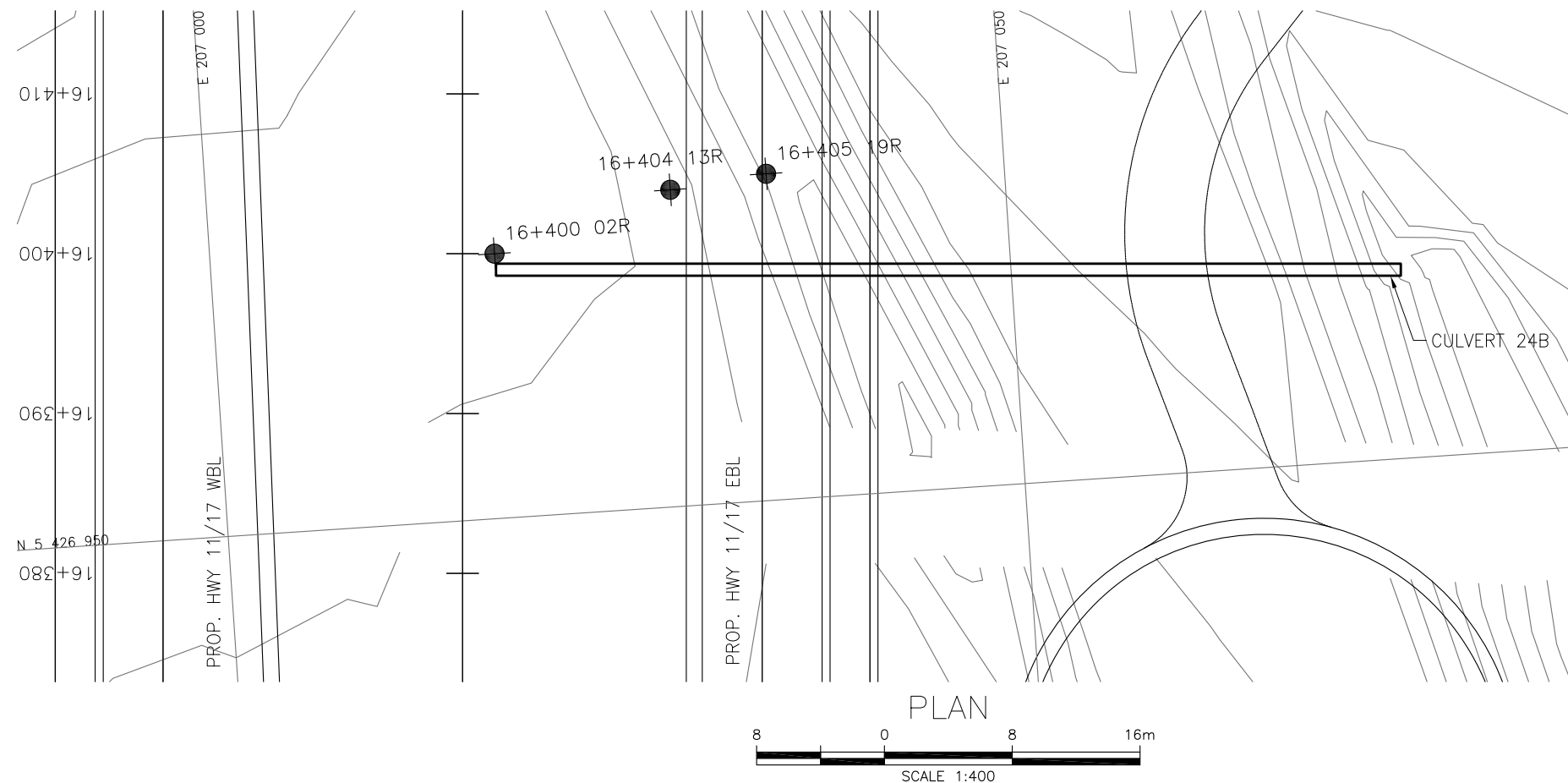
[illegible]

-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. 52A-184

[illegible]

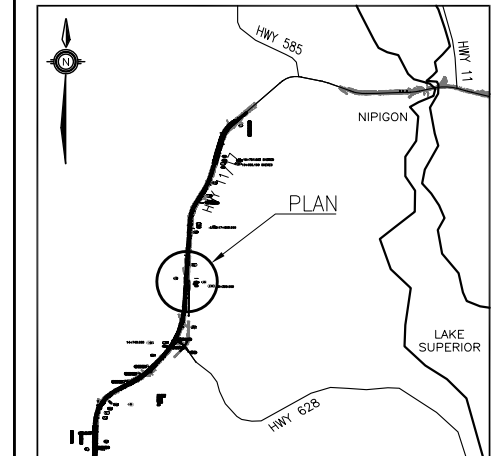


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








CONT No 2014-6026
GWP No 647-89-00

HWY 11/17 FOUR LANING
EASTBOUND LANES
CULVERT 24B
BOREHOLE LOCATIONS AND SOIL STRATA



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING
16+400 02R	234.2	5 426 966.5	207 017.8
16+404 13R	233.6	5 426 969.8	207 029.0
16+405 19R	232.5	5 426 970.4	207 035.1

-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.	52A-184
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[illegible]

Appendix AF

Highway 11/17 EBL and WBL

Sta. 16+820 to 16+900




Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 16+825 33R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 427 388.6 E 207 076.9 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.20 - 2014.02.20 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)		
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE											
								20 40 60 80 100 20 40 60 80 100									20 40 60		
242.0	PEAT , trace rootlets Dark Brown Frozen		1	SS	3		241												
			2	SS	12														
240.5																			
1.5	Silty CLAY , trace sand Firm to Stiff Brown to Grey Grey		3	SS	6				240										
			4	SS	3														
			5	SS	2														
							238												
			6	SS	1		237												
							236												
235.6			7	SS	54														
			</																

ONTMT4S 1237.GPJ 2012TEMPLATE(MTO).GDT 7/29/14

+³, ×³: Numbers refer to Sensitivity
20
15
10
(%) STRAIN AT FAILURE

METRIC

SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		NATURAL MOISTURE CONTENT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa	PLASTIC LIMIT		
242.7 0.0	PEAT , organics, trace rootlets Firm Dark Brown Frozen		1	SS	5						
	trace silt Dark Brown/Grey		2	SS	6						
241.2 1.5	Silty CLAY , trace to some sand Firm to Stiff Grey		3	SS	6						
			4	SS	2						
			5	SS	1						
			6	SS	1						
			7	SS	1						
			8	SS	5						
233.6 9.1	SAND , some silt, some gravel Compact to Dense Grey Wet		9	SS	22						

+³, ×³: Numbers refer to Sensitivity

ONTMT4S 1237.GPJ 2012TEMPLATE(MTO).GDT 7/29/14

RECORD OF BOREHOLE No 16+857 CL

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 427 422.7 E 207 046.0 ORIGINATED BY MKE
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.19 - 2014.02.20 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	20	40	60	80					
	Continued From Previous Page																
	occasional cobbles		10	SS	39		232									20 57 23 (SI+CL)	
231.0							231										
11.7	END OF BOREHOLE AT 11.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 11.4m AND WATER LEVEL AT 4.9m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No 16+875 23L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 427 442.2 E 207 024.3 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.21 - 2014.02.21 CHECKED BY MEF

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	W _P W W _L	WATER CONTENT (%)	20 40 60		
243.1								SHEAR STRENGTH kPa					
0.0	PEAT , trace clay, trace rootlets Dark Brown Frozen		1	SS	7		243						
			2	SS	11		242						
			3	SS	3		241						
240.9	trace silt Brown												
2.1	Silty CLAY , trace sand Firm to Stiff Grey		4	SS	3		241						
			5	SS	2		240						
							239						
			6	SS	1		238						
237.1													
5.9	END OF BOREHOLE AT 5.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 5.9m AND WATER LEVEL AT 1.2m UPON COMPLETION. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. <												

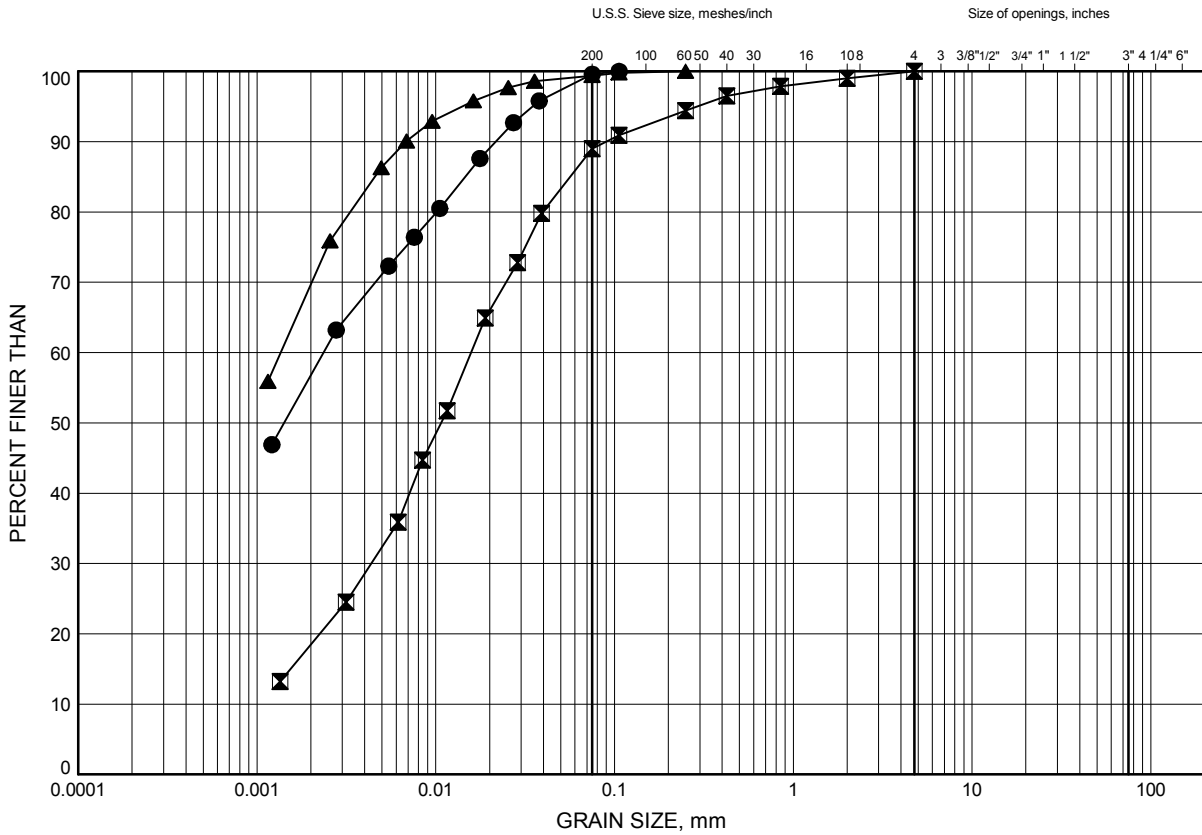
ONTMT4S 1237.GPJ 2012TEMPLATE(MTO).GDT 7/29/14

Hwy 11/17 - Red Rock to Nipigon

GRAIN SIZE DISTRIBUTION

FIGURE AF1

Silty CLAY



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

LEGEND

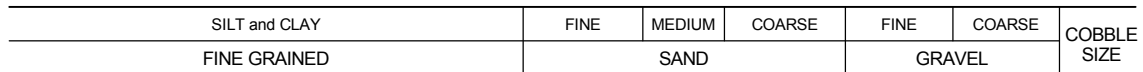
SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	16+825 33R	4.88	237.11
⊠	16+857 CL	7.92	234.78
▲	16+875 23L	4.88	238.18

Date July 2014
WP# 647-89-00



Prep'd AN
Chkd. MKE

FIGURE AF2



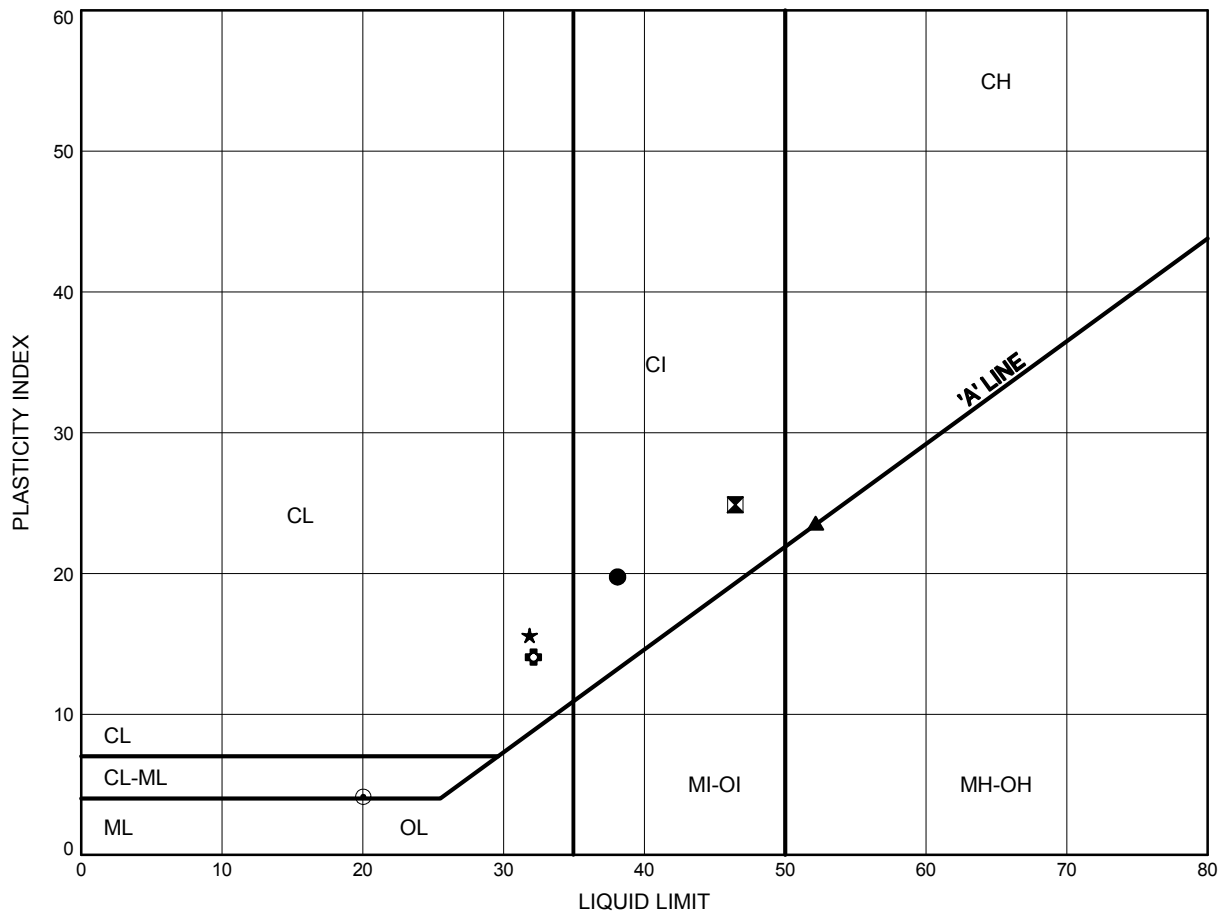
SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	16+857 CL	10.97	231.73

Prep'd AN
Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AF3

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	16+825 33R	2.59	239.39
⊠	16+825 33R	4.88	237.11
▲	16+857 CL	1.83	240.88
★	16+857 CL	3.35	239.35
⊙	16+857 CL	7.92	234.78
⊕	16+875 23L	2.59	240.47

Date July 2014
 WP# 647-89-00

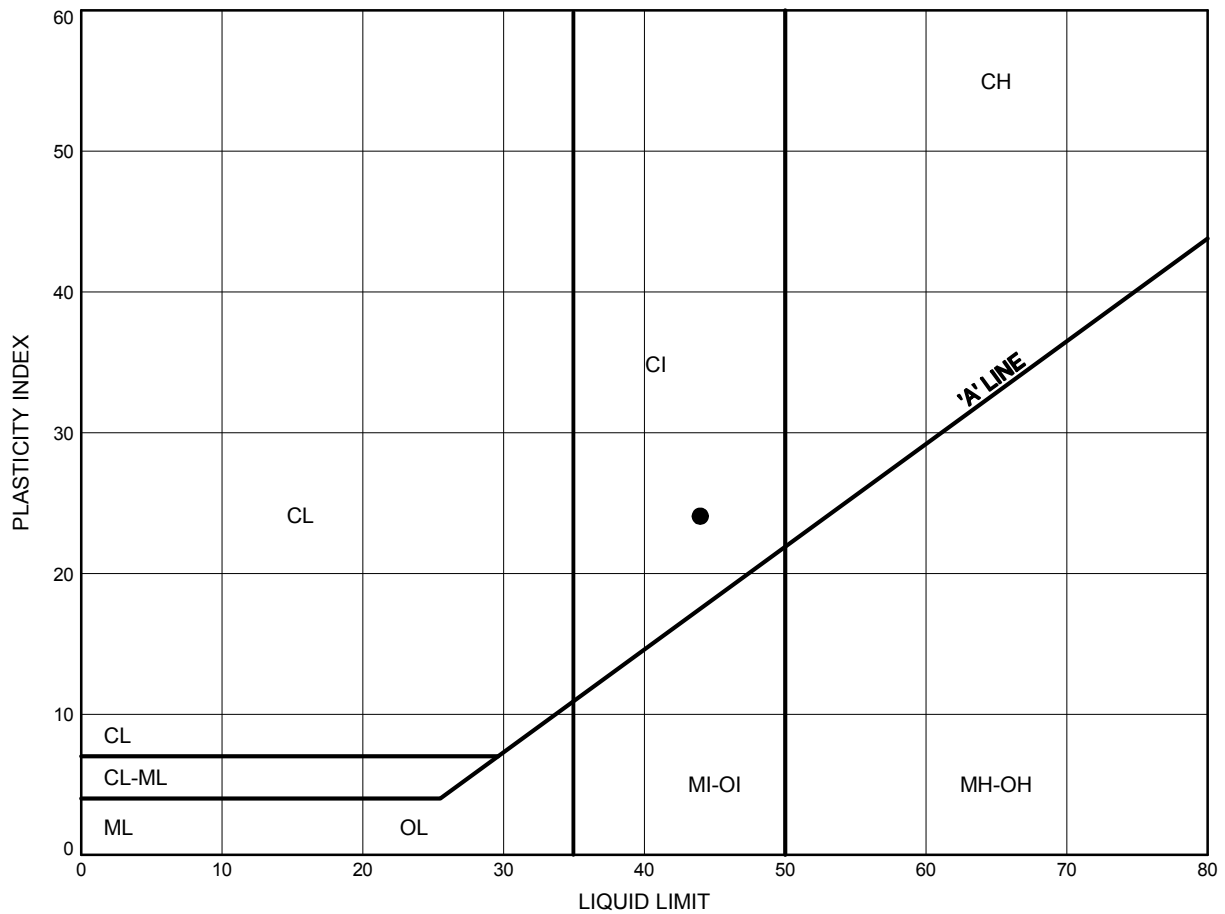


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AF4

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	16+875 23L	4.88	238.18


Date July 2014
 WP# 647-89-00



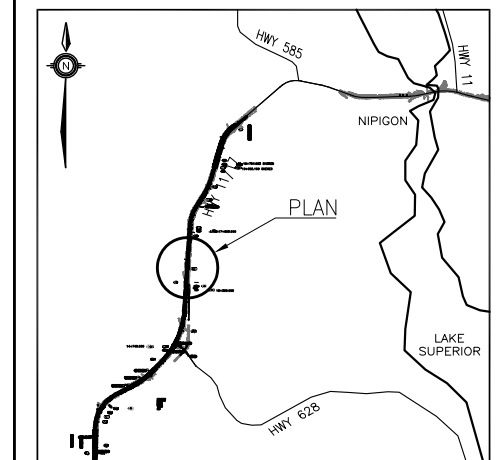
Prep'd AN
 Chkd. MKE

A circular professional engineer seal for the Province of Ontario. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "PROVINCE OF ONTARIO" at the bottom. In the center, the name "P. K. CHATTERM" is printed. Above the name is a handwritten signature in blue ink. Below the name is a handwritten date "Oct 3/14" in blue ink.

A circular professional engineer seal for the Province of Ontario. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "PROVINCE OF ONTARIO" at the bottom. The center of the seal features a stylized bridge graphic. Overlaid on the seal is a blue ink signature, the name "S. PETERS", the license number "100194478", and the date "Oct 3/14".








SHEET



KEYPLAN

LEGEND

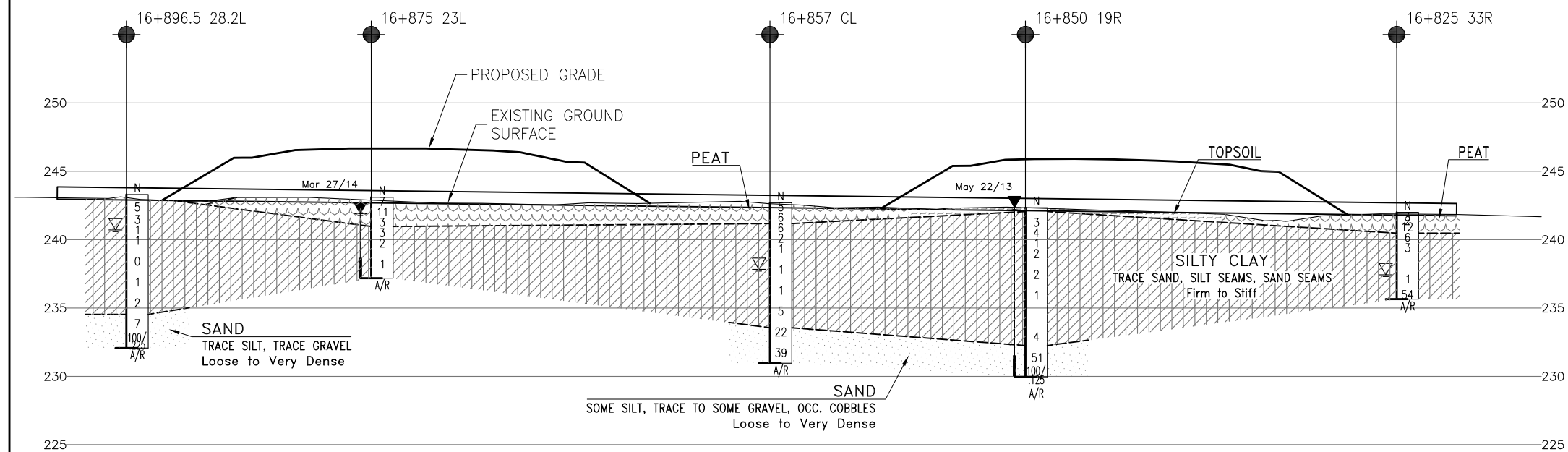
	Borehole
	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
16+825 33R	242.0	5 427 388.6	207 076.9
16+857 CL	242.7	5 427 422.7	207 046.0
16+875 23L	243.1	5 427 442.2	207 024.3
16+850 19R	242.2	5 427 414.9	207 064.6
16+863.3 23.9L	243.7	5 427 430.5	207 022.6
16+875 CL	243.4	5 427 441.1	207 047.3
16+896.5 28.2L	243.3	5 427 464.0	207 020.5

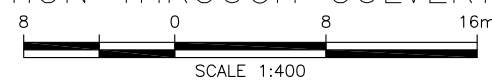
-NOTES-

- 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. 52A-184



SECTION THROUGH CULVERT 25



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

[illegible]

Appendix AG

Highway 11/17 EBL and WBL

Sta. 17+250 to 17+400






Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 17+330 24R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 427 893.1 E 207 101.3 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.04 - 2014.03.04 CHECKED BY MKE

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		W P W W L				
								20 40 60 80 100	20 40 60					
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							
254.2														
0.0	Silty CLAY , trace rootlets Firm Brown		1	SS	4		254							
253.6														
0.6	SAND , trace silt Very Loose Brown Wet		2	SS	4		253							
252.9														
1.2	Silty CLAY Firm to Stiff Grey		3	SS	11		252							
			4	SS	0		251							
	trace sand		5	SS	4									
249.9							250							
4.3	END OF BOREHOLE AT 4.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 4.3m AND WATER LEVEL AT 0.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.													

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 17+380 19L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 427 945.8 E 207 061.7 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.04 - 2014.03.04 CHECKED BY MKE

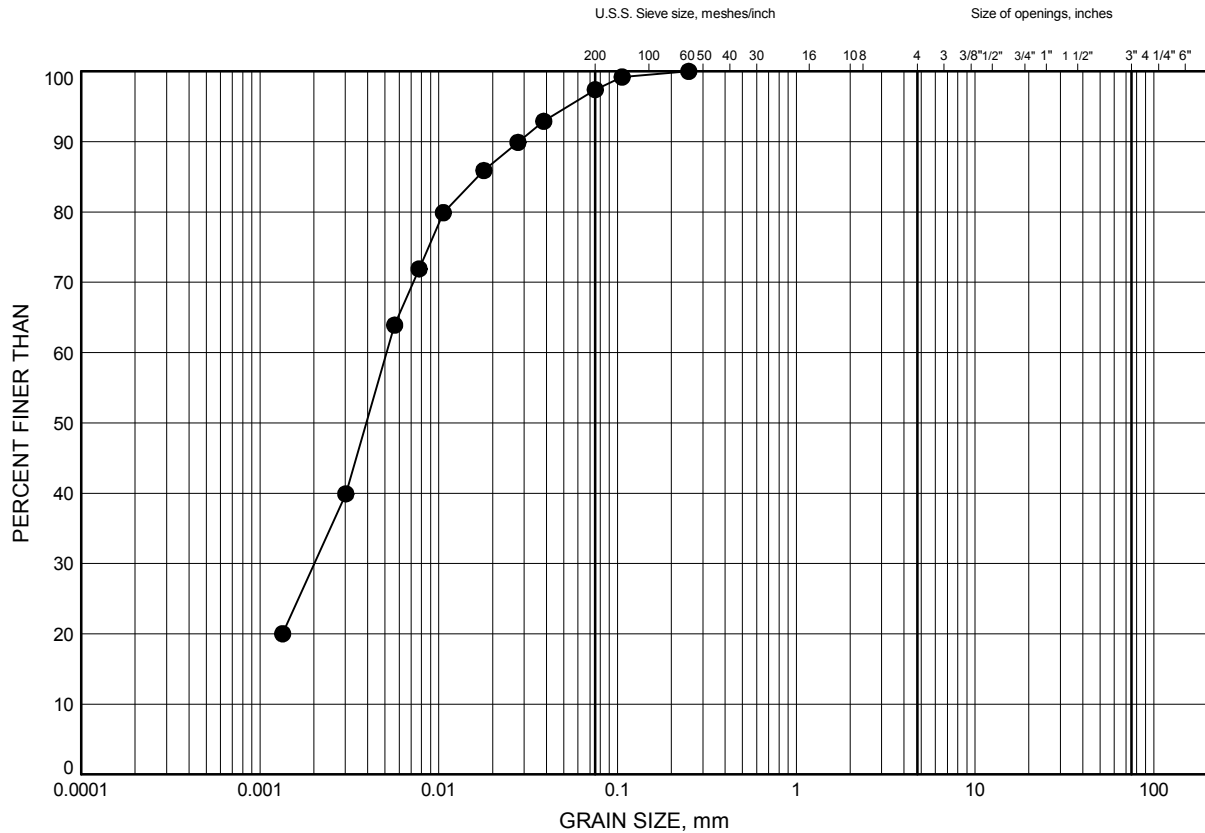
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
255.5								20 40 60 80 100							
0.0	PEAT , trace rootlets														
255.2	Dark Brown		1	SS	4		255								
0.3	Frozen														
	SILT , some sand to sandy, some clay														
	Loose to Compact		2	SS	5		254								
	Brown														
	Wet		3	SS	13										0 18 67 15
	clayey														
	Very Stiff		4	SS	4	253									
	Grey														
			5	SS	1	252									
251.4															
4.1	SAND , trace silt, trace gravel														
	Compact														
	Grey		6	SS	37	251									
	Wet														
249.4															
6.1	END OF BOREHOLE AT 6.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 6.1m AND WATER LEVEL AT 0.9m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.														

ONTMT4S 1237.GPJ 2012TEMPLATE(MTO).GDT 7/29/14

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AG1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	17+330 24R	3.35	250.82

Date July 2014
 WP# 647-89-00

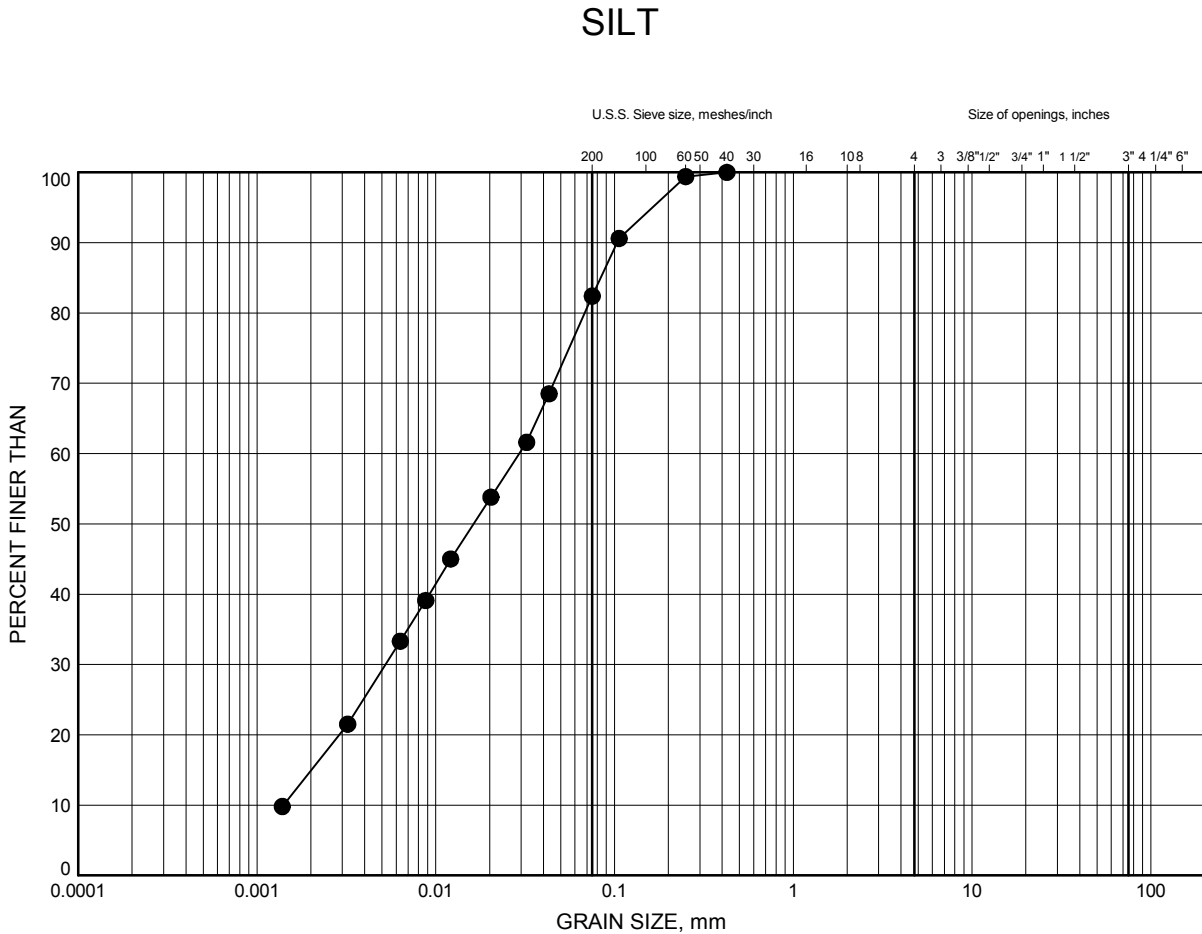


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

GRAIN SIZE DISTRIBUTION

FIGURE AG2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	17+380 19L	1.83	253.67

Date July 2014
 WP# 647-89-00

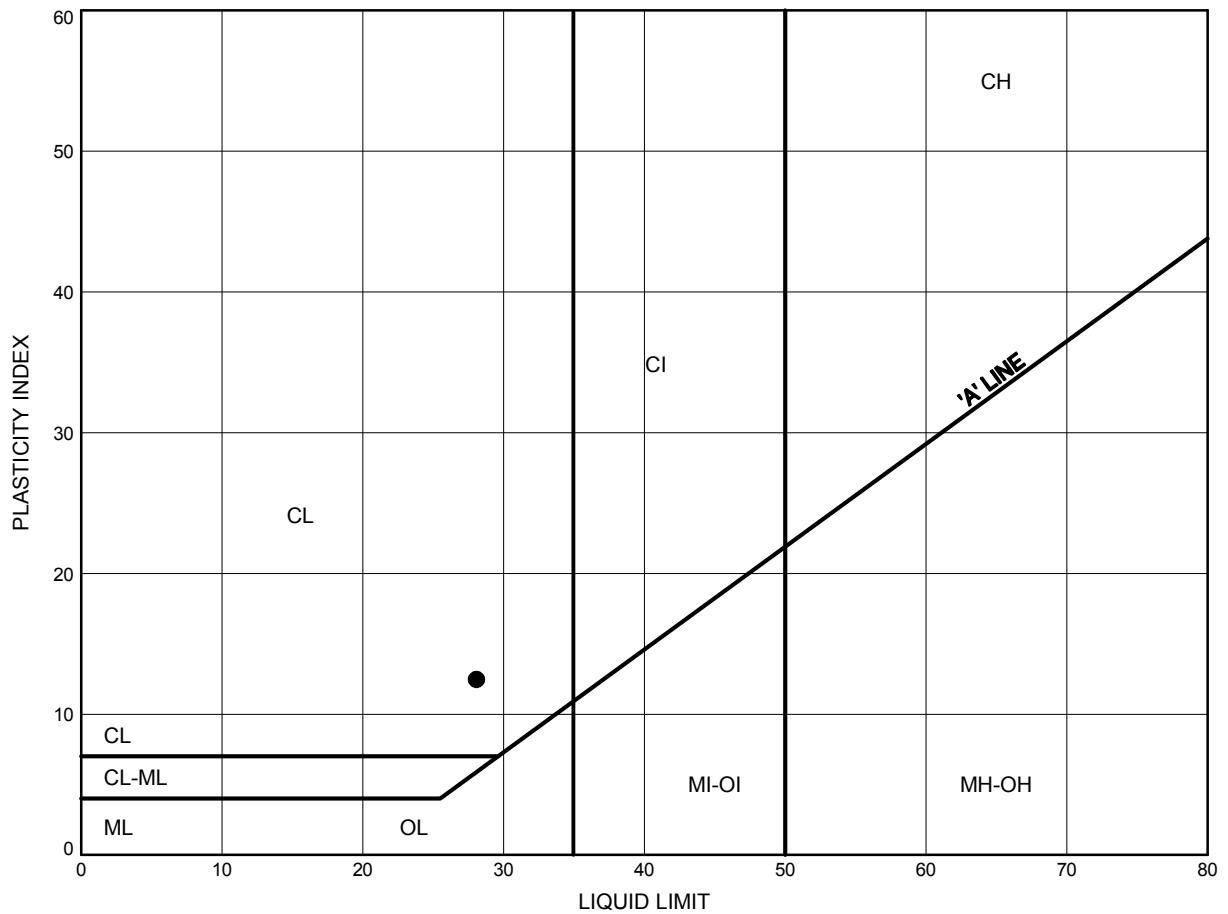


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AG3

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	17+330 24R	1.83	252.34

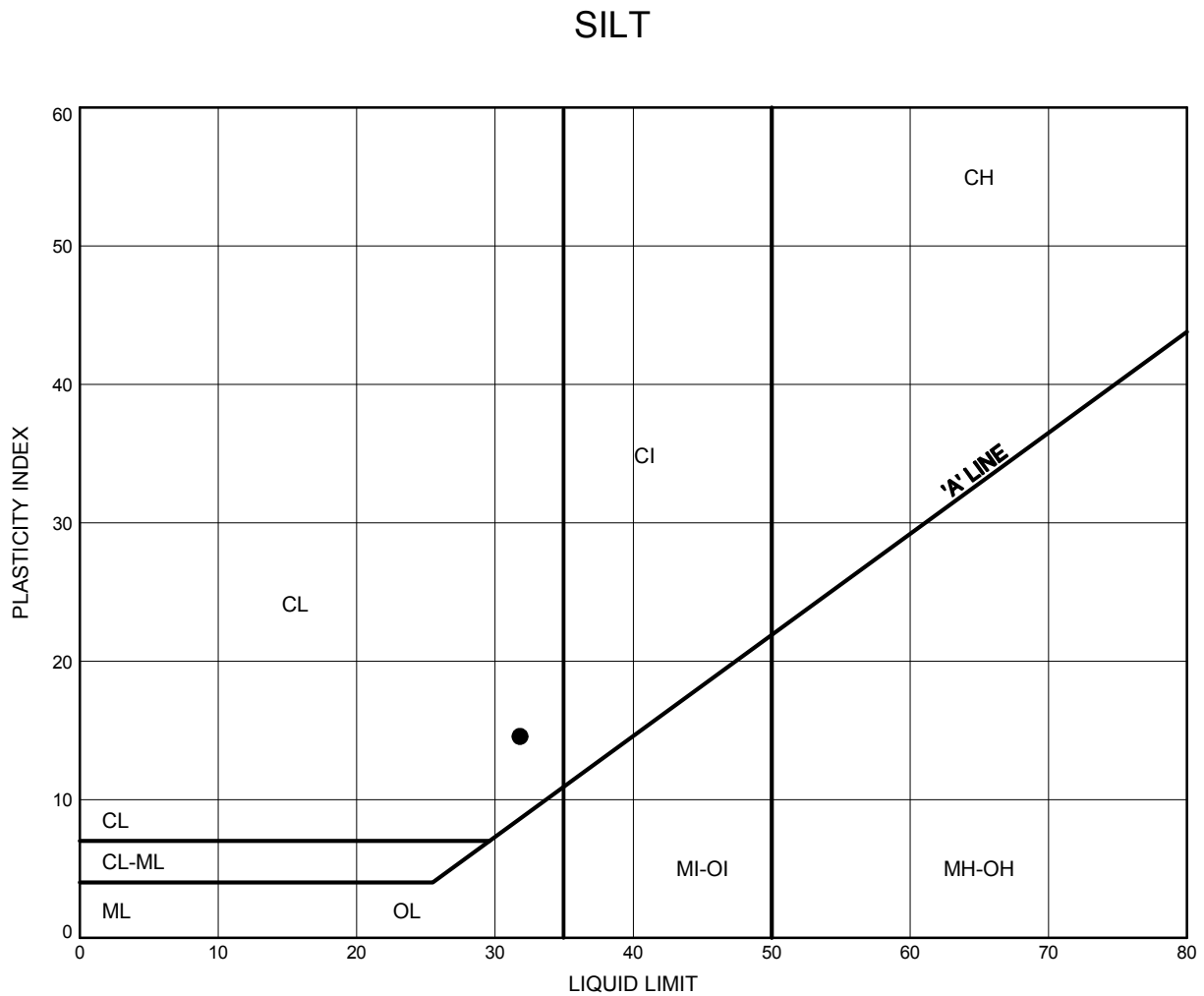
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AG4



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	17+380 19L	2.59	252.91

Date July 2014
 WP# 647-89-00

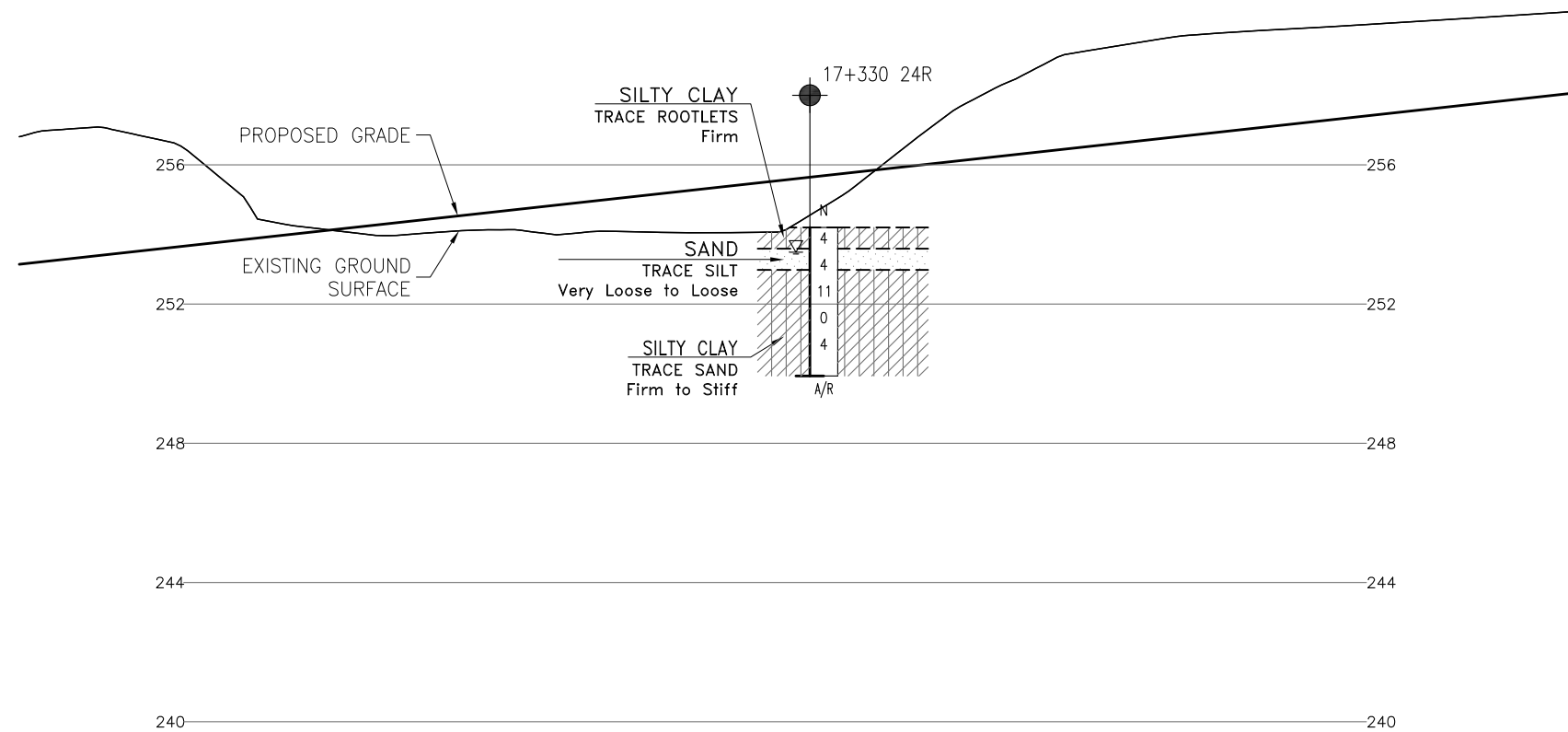


Prep'd AN
 Chkd. MKE

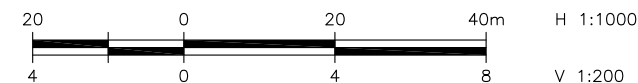
PLAN

20 0 20 40m

SCALE 1:1000



PROFILE ALONG C HIGHWAY 11/17 EBL



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

A circular professional engineer seal for the Province of Ontario. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "PROVINCE OF ONTARIO" at the bottom. In the center, the name "P. K. CHATTERJEE" is printed. Above the name, the handwritten number "49469" is visible. Below the name, the handwritten date "Oct 3/14" is present.

A circular professional engineer seal for the Province of Ontario. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "PROVINCE OF ONTARIO" at the bottom. In the center, there is a stylized drawing of a bridge. Below the bridge, the name "S. PETERS" and the license number "100194478" are printed. At the bottom of the seal, the date "Oct 3/14" is handwritten in blue ink.

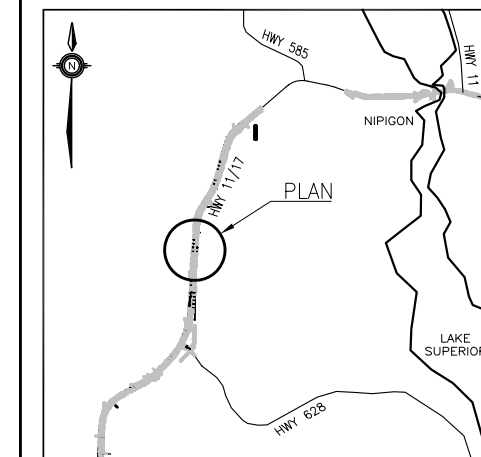
HWY 11/17 FOUR LANING
EASTBOUND LANES
(STA. 17+250 TO 17+350)
BOREHOLE LOCATIONS AND SOIL STRATA



MMM GROUP








THURBER ENGINEERING LTD



KEYPLAN

LEGEND

	Borehole
	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	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.
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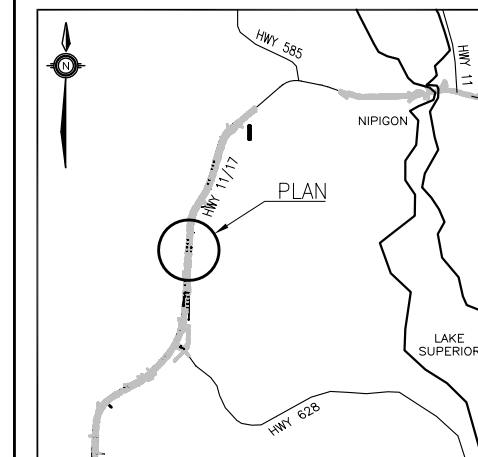
GEOCRES No. 52A-184

REVISIONS										
	DATE	BY	DESCRIPTION							
DESIGN	SBP	CHK	JPL	CODE	LOAD		DATE	OCT. 2014		
DRAWN	MFA	CHK	SBP	SITE	STRUCT	DWG	23			

CONT No 2014-6026
GWP No 647-89-00








SHEET



KEYPLAN

LEGEND

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

[illegible]

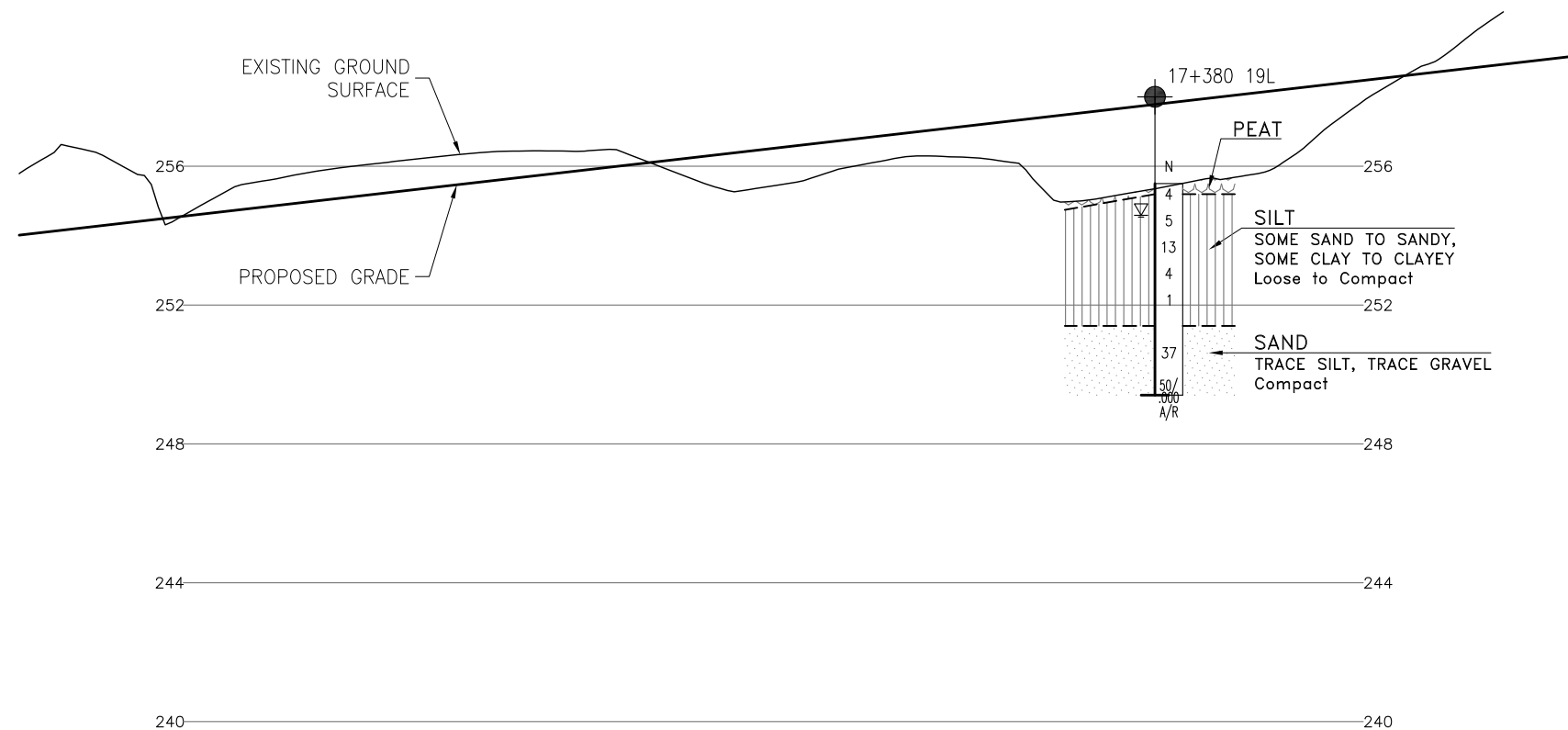
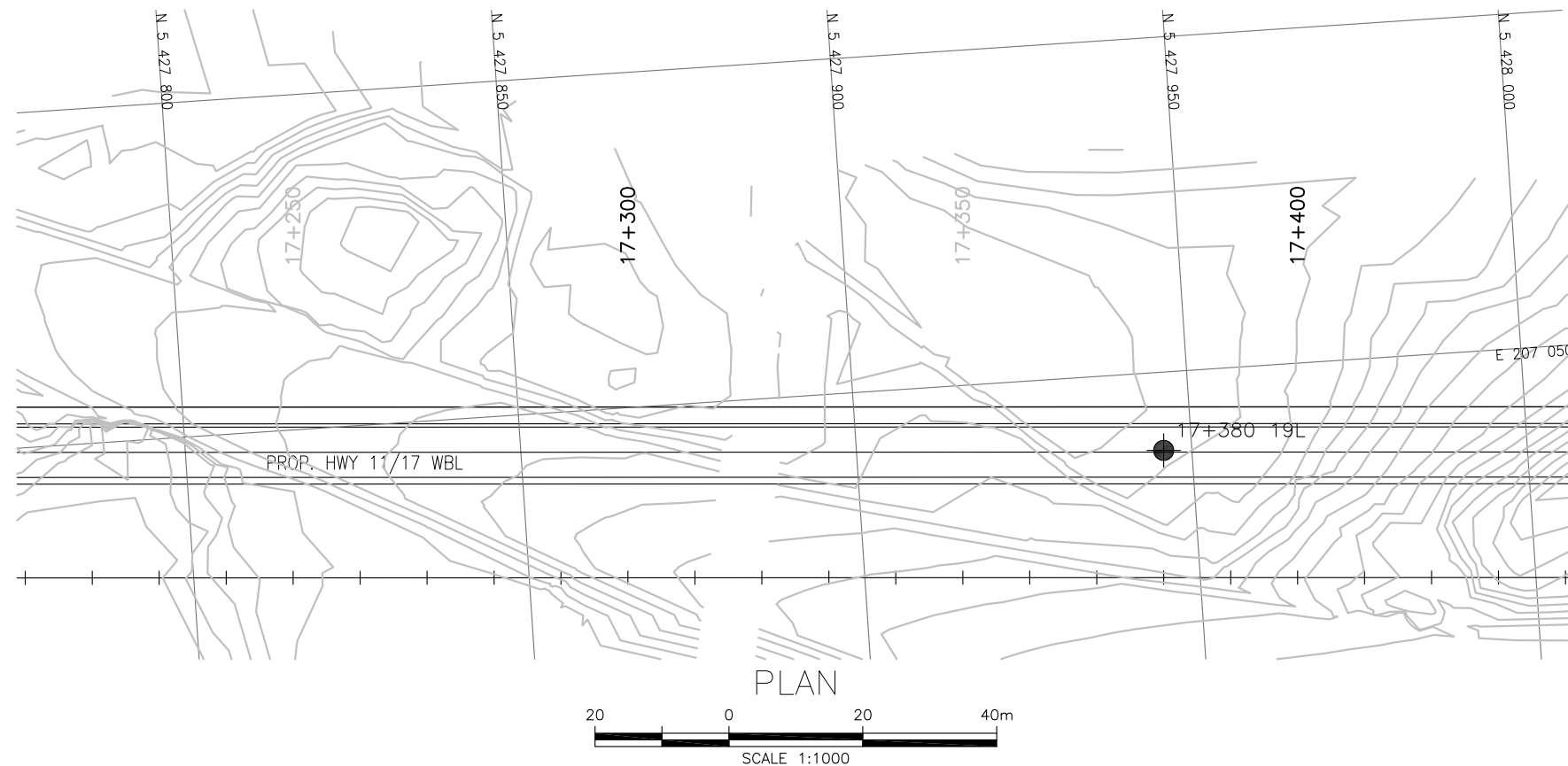
-NOTES-

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- 2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 52A-184

REVISIONS										
	DATE	BY	DESCRIPTION							
DESIGN	SBP	CHK	JPL	CODE	LOAD		DATE	OCT. 2014		
DRAWN	MFA	CHK	SBP	SITE	STRUCT	DWG	24			

FILENAME: H:\Drafting\19\1351\237\eted1237-Plan&Profiles(EMBANKMENTS2).dwg
DATE: 10/1/2014 4:07 PM



PROFILE ALONG C HIGHWAY 11/17 WBL



H 1:1000

V 1:200

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

Appendix AH

Highway 11/17 WBL

Sta. 17+550 to 17+675




Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 17+600 19L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 428 165.3 E 207 076.2 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.04 - 2014.03.04 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
								20 40 60 80 100					
								20 40 60 80 100					
261.3													
0.0	CRUSHED GRAVEL Very Dense Grey (FILL)		1	SS	50/ .050		261						
260.7													
0.6	Silty CLAY , trace sand, trace rootlets Stiff Dark Brown to Brown		2	SS	14		260						
			3	SS	14								
259.2													
2.1	Sandy SILT , trace clay Compact to Dense Brown/Grey Moist		4	SS	40		259						
			5	SS	23		258						
							257						
256.4	trace gravel		6	SS	105								
4.9	END OF BOREHOLE AT 4.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 4.9m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.												

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 17+600 29R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 428 161.9 E 207 128.1 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.29 - 2014.03.29 CHECKED BY MKE

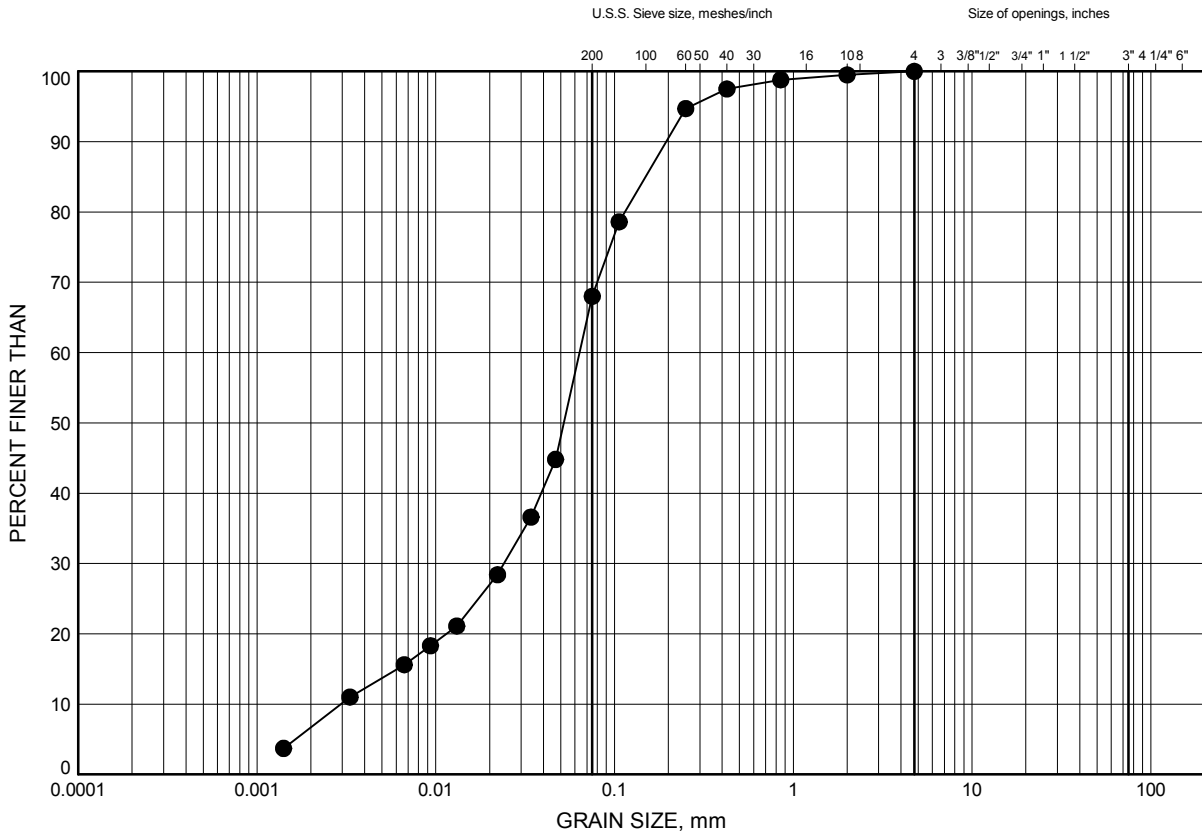
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
								20 40 60 80 100									
261.5								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W P W L				
0.0	SAND , trace to some gravel Brown Frozen (FILL)		1	GS			261	20 40 60 80 100					WATER CONTENT (%) 20 40 60				
			2	GS													
			1	SS	50/ .025												
259.9			2	SS	50/ .050		260										
259.8	Silty CLAY Brown Frozen																
1.7	END OF BOREHOLE AT 1.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 1.7m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.																

+³, ×³: Numbers refer to Sensitivity
 20
15
10
5
0
(%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AH1

Sandy SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	17+600 19L	3.35	257.95

Date July 2014
 WP# 647-89-00

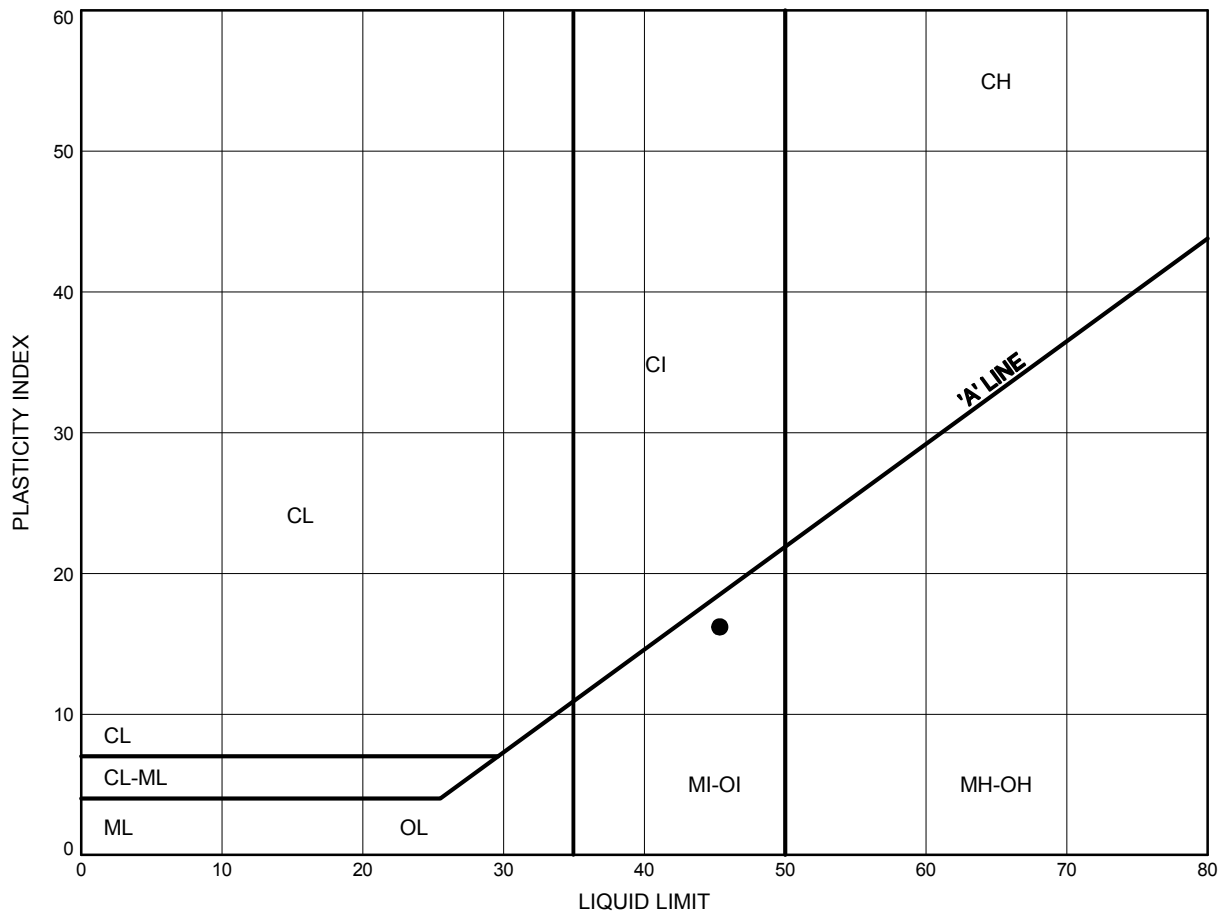


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AH2

Silty CLAY



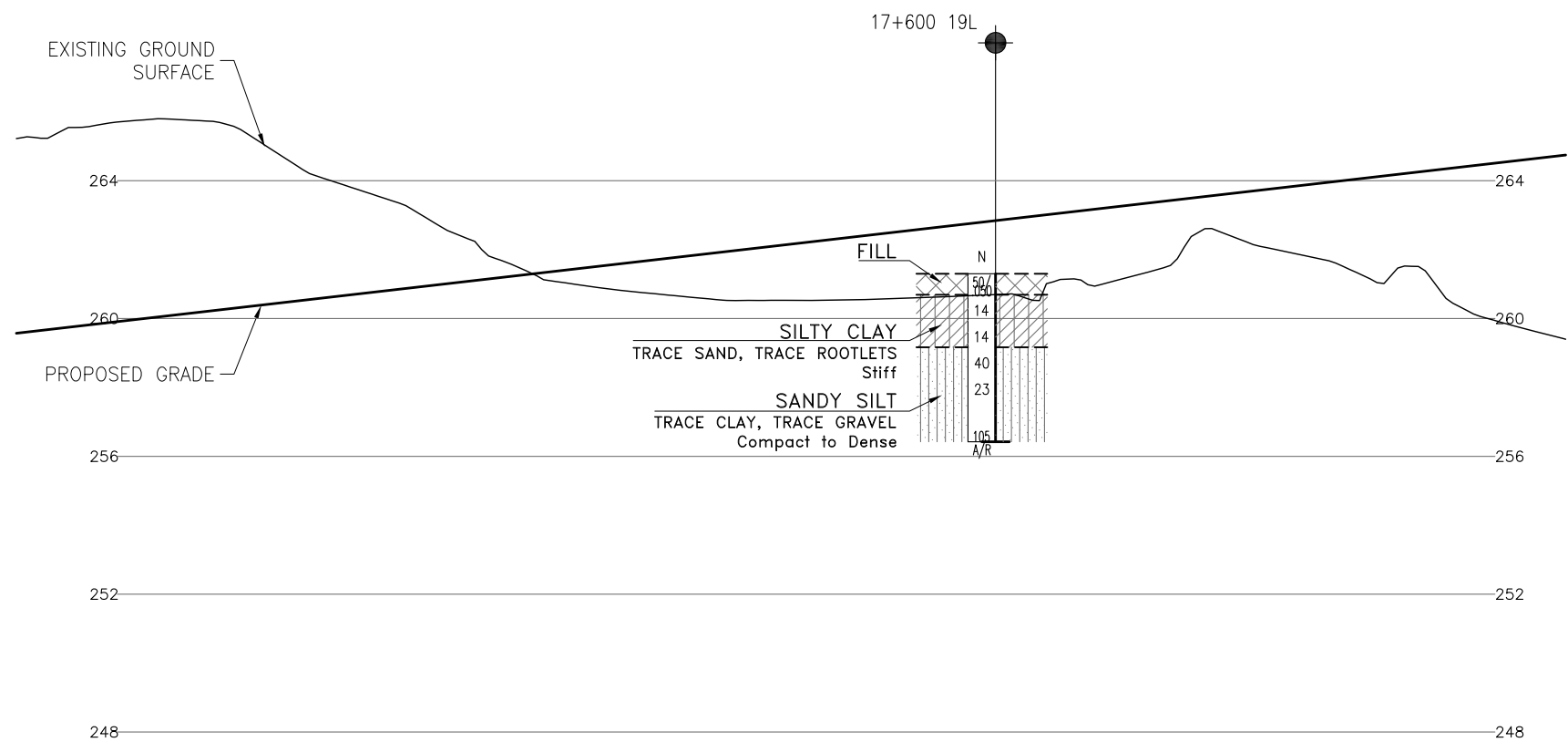
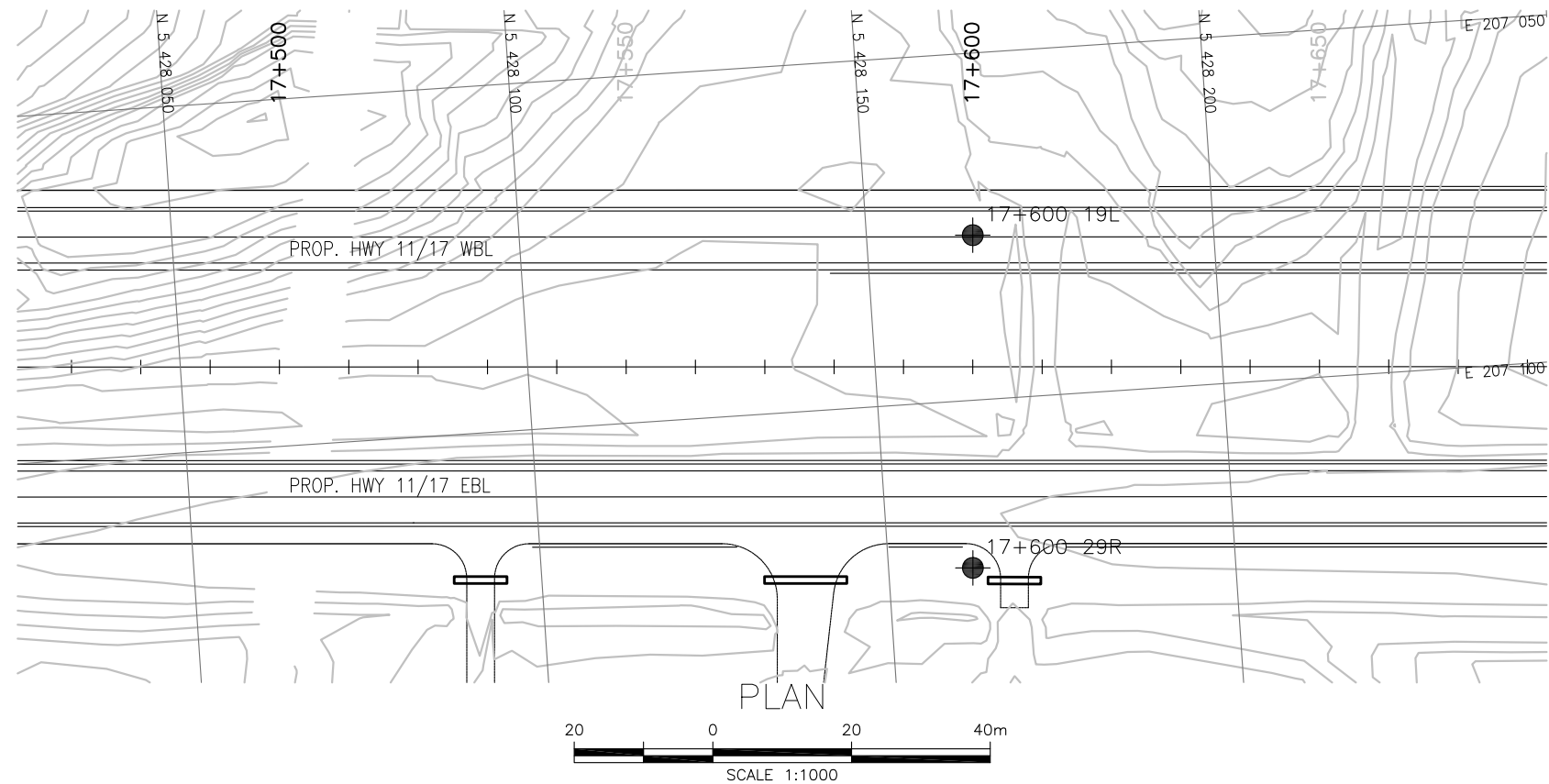
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	17+600 19L	1.07	260.23

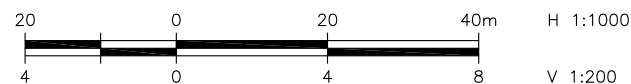
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

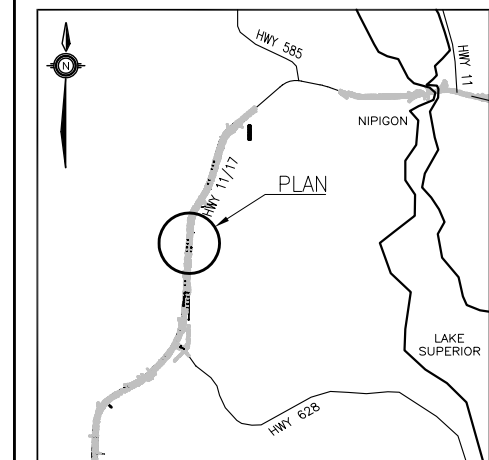


PROFILE ALONG \mathbb{C} HIGHWAY 11/17 WBL








DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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



KEYPLAN

LEGEND

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

[illegible]

-NOTES-

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GEOCRES No. 52A-184

[illegible]

Appendix AI

Highway 11/17 EBL and WBL

Sta. 17+720 to 17+750

Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 17+720 22R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 428 282.3 E 207 125.1 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.29 - 2014.03.29 CHECKED BY MEF

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					W P W W L				
262.2								20	40	60	80	100					
0.0																	
0.1	ASPHALT: (75mm)		1	GS			262							○			
	SAND, trace to some gravel																
	Brown		2	GS										○			
	Frozen																
	(FILL)		1	SS	50/									○			
	Moist				.150		261										
						</											


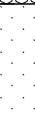

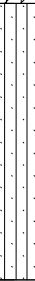

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 17+736 CL

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 428 299.8 E 207 104.2 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.05 - 2014.03.05 CHECKED BY MEF

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				W _p W W _L				
								20 40 60 80 100 20 40 60 80 100				20 40 60				
258.0						▽										
0.0	PEAT, trace rootlets Very Soft Dark Brown Wet		1	SS	2										226	
257.2																
0.8	SAND, occasional rootlets Very Loose Brown Wet		2	SS	2			257								
256.5																
1.5	Silty CLAY, trace sand seams Firm Brown		3	SS	1		256									
255.6																
2.4	Sandy SILT, trace gravel, trace clay Compact Brown Wet		4	SS	15		255									
253.7							254									
4.3	SAND, trace gravel Compact Brown Wet		5	SS	27		253									
252.8																
5.2	END OF BOREHOLE AT 5.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 5.2m AND WATER LEVEL AT 0.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.															




+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 17+750 34L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 428 316.0 E 207 071.2 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.05 - 2014.03.05 CHECKED BY MEF

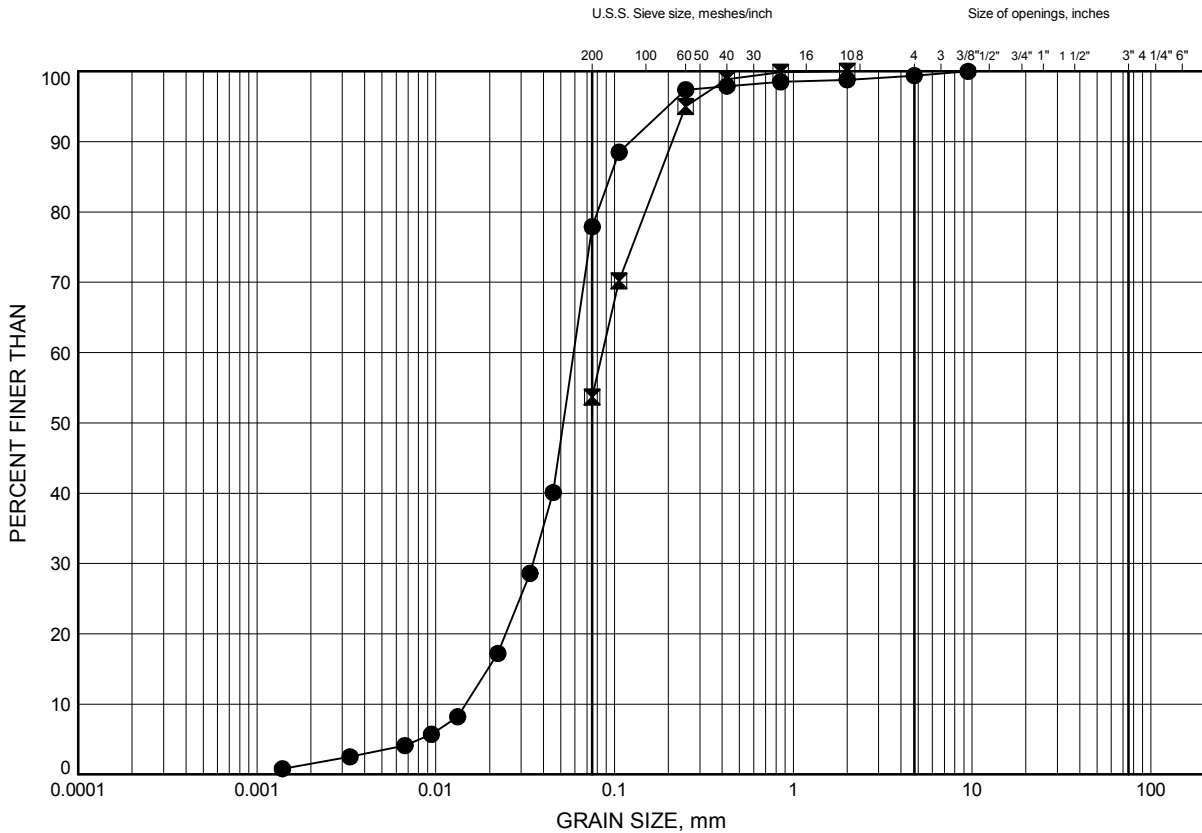
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa			WATER CONTENT (%)				GR	SA	SI	CL	
								○ UNCONFINED + FIELD VANE	● QUICK TRIAXIAL × LAB VANE										
258.6								20	40	60	80	100	20	40	60				
0.0	PEAT , trace rootlets Soft Dark Brown Wet		1	SS	3														
257.8																			
0.8	Silty CLAY , occasional sand seams Firm Grey		2	SS	2														
			3	SS	2														
255.1			4	SS	4														
3.5	SILT and SAND Compact to Loose Brown Wet																		
			5	SS	29														
			6	SS	6														
			7	SS	16														
250.1																			
8.5	END OF BOREHOLE AT 8.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 8.5m AND WATER LEVEL AT 0.9m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																		

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE A11

SILT & SAND to Sandy SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	17+736 CL	3.35	254.65
⊠	17+750 34L	4.88	253.72

Date July 2014
 WP# 647-89-00

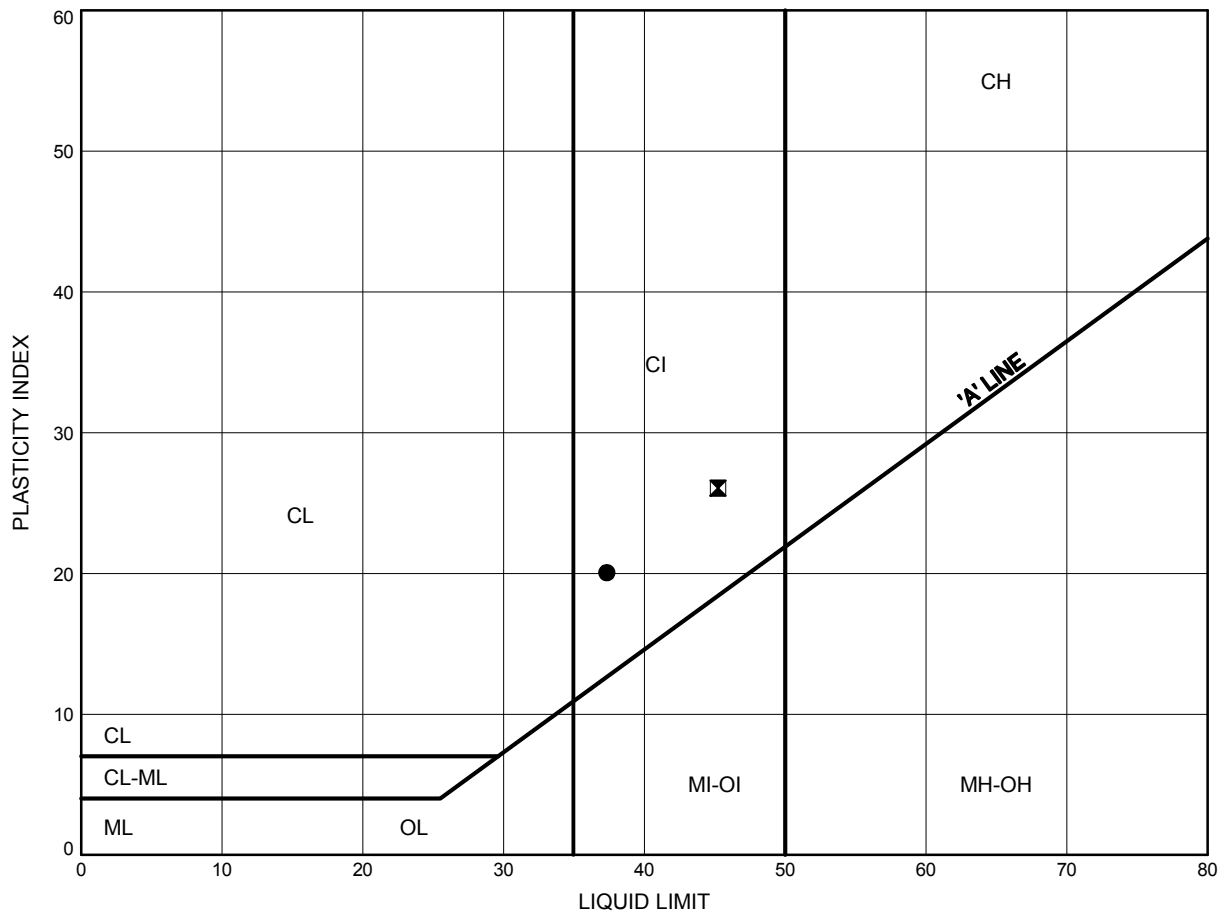


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AI2

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	17+736 CL	1.83	256.17
⊠	17+750 34L	1.07	257.53

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

A circular professional engineer seal for the Province of Ontario. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "PROVINCE OF ONTARIO" at the bottom. In the center, the name "P. K. CHATTERM" is printed. Above the name is a handwritten signature in blue ink. Below the name is a handwritten date "Oct 3/14" in blue ink.

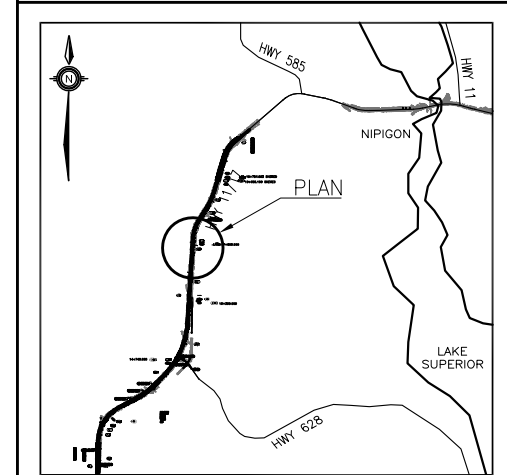
A circular professional engineer seal for the Province of Ontario. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "PROVINCE OF ONTARIO" at the bottom. In the center, the name "S. PETERS" and license number "100194478" are printed. A blue ink signature is written over the name and number. Below the license number, the date "Oct 3/14" is handwritten in blue ink.



SHEET








THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

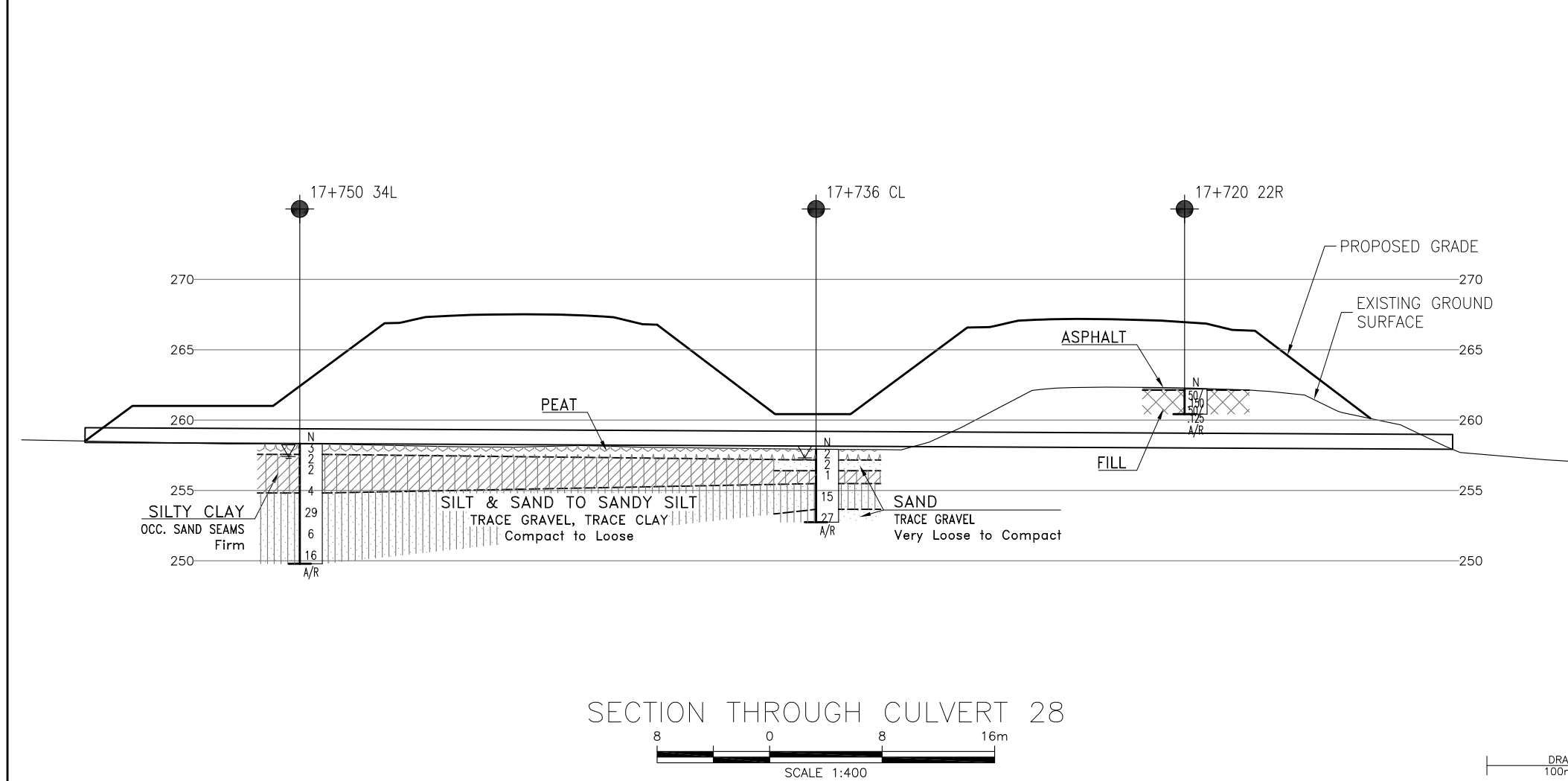
	Borehole
	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

[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. 52A-184



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

[illegible]

Appendix AJ

Highway 11/17 EBL and WBL

Sta. 17+900 to 17+910

Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 17+905 02L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 428 468.5 E 207 113.4 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.06 - 2014.03.06 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									WATER CONTENT (%)
263.0								20	40	60	80	100					
0.0	TOPSOIL, sandy, trace rootlets Compact Brown		1	SS	18												
0.2	SAND, some silt Compact to Very Dense Brown		2	SS	17												
	trace gravel		3	SS	27												
	occasional cobbles Dense to Very Dense		4	SS	37												
			5	SS	65												
258.7																	
4.3	END OF BOREHOLE AT 4.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 4.3m AND DRY UPON COMPLETION. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) 2014.03.27 Dry -																

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 17+905 16L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 428 469.4 E 207 099.4 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.06 - 2014.03.06 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
								20 40 60 80 100						
263.3								<div><div></div><div></div><div></div><div></div><div></div></div>						
0.0	SAND , some gravel, trace to some silt Dense to Compact Brown Dry 													

ONTMT4S 1237.GPJ 2012TEMPLATE(MTO).GDT 7/30/14

RECORD OF BOREHOLE No 17+905 29R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 428 466.5 E 207 144.3 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.29 - 2014.03.29 CHECKED BY MEF


SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%)						
						20	40	60	80	100	20	40	60				
269.0																	
0.0	ASPHALT: (75mm)																
0.1	SAND, trace to some gravel, occasional cobbles Brown Frozen (FILL)		1	GS													
			2	GS													
			1	SS	50/												
					.075												
267.8																	
1.2	END OF BOREHOLE AT 1.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 1.2m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH CUTTINGS TO 0.1m, THEN ASPHALT TO SURFACE.																

RECORD OF BOREHOLE No 17+905 34L

1 OF 1

METRIC

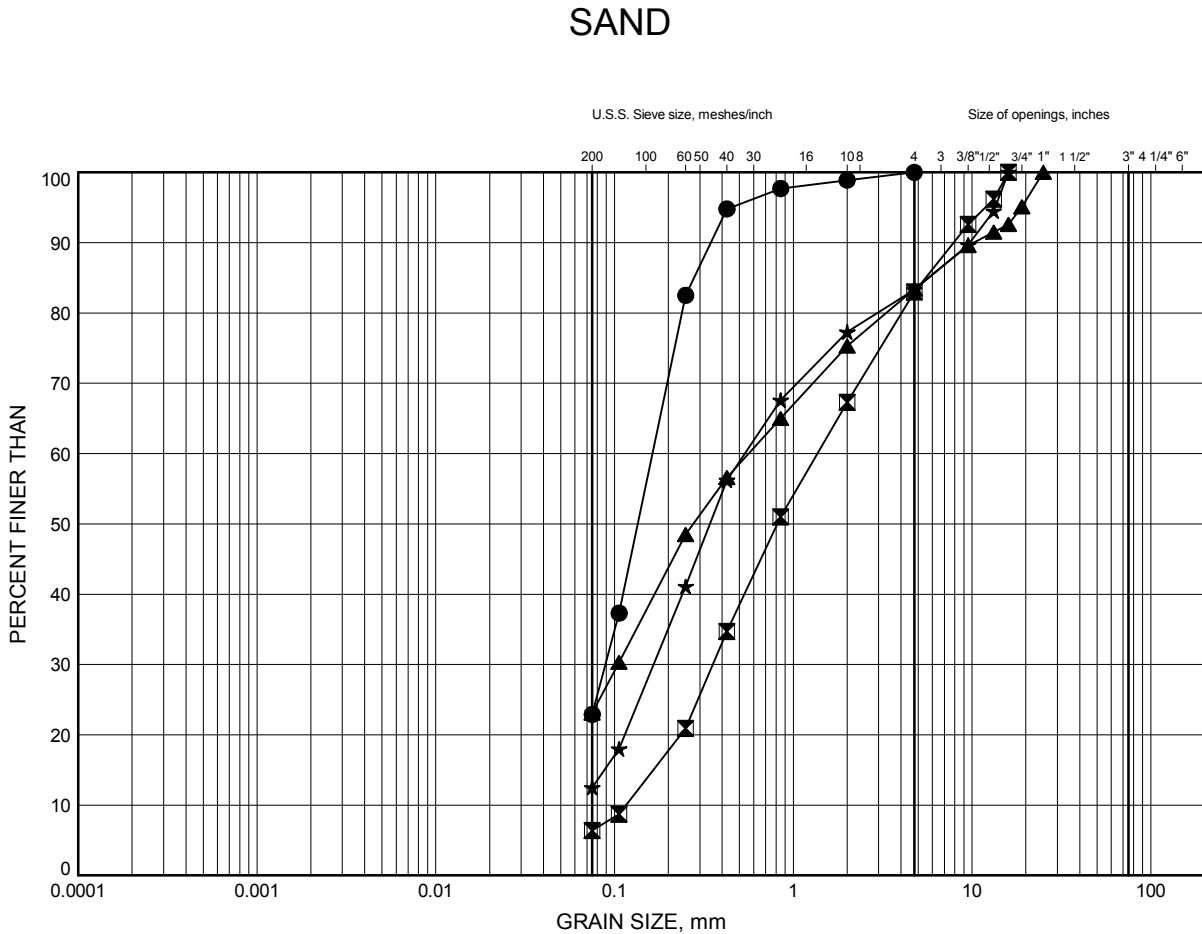
WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 428 470.5 E 207 081.1 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.06 - 2014.03.06 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								
								○ UNCONFINED + FIELD VANE								
								● QUICK TRIAXIAL × LAB VANE								
					WATER CONTENT (%)											
					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT											
					W P W W L											
					20 40 60 80 100											
					20 40 60 80 100											
263.5																
0.0	SAND , some gravel, some silt Compact to Dense Brown		1	SS	38											

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AJ1



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

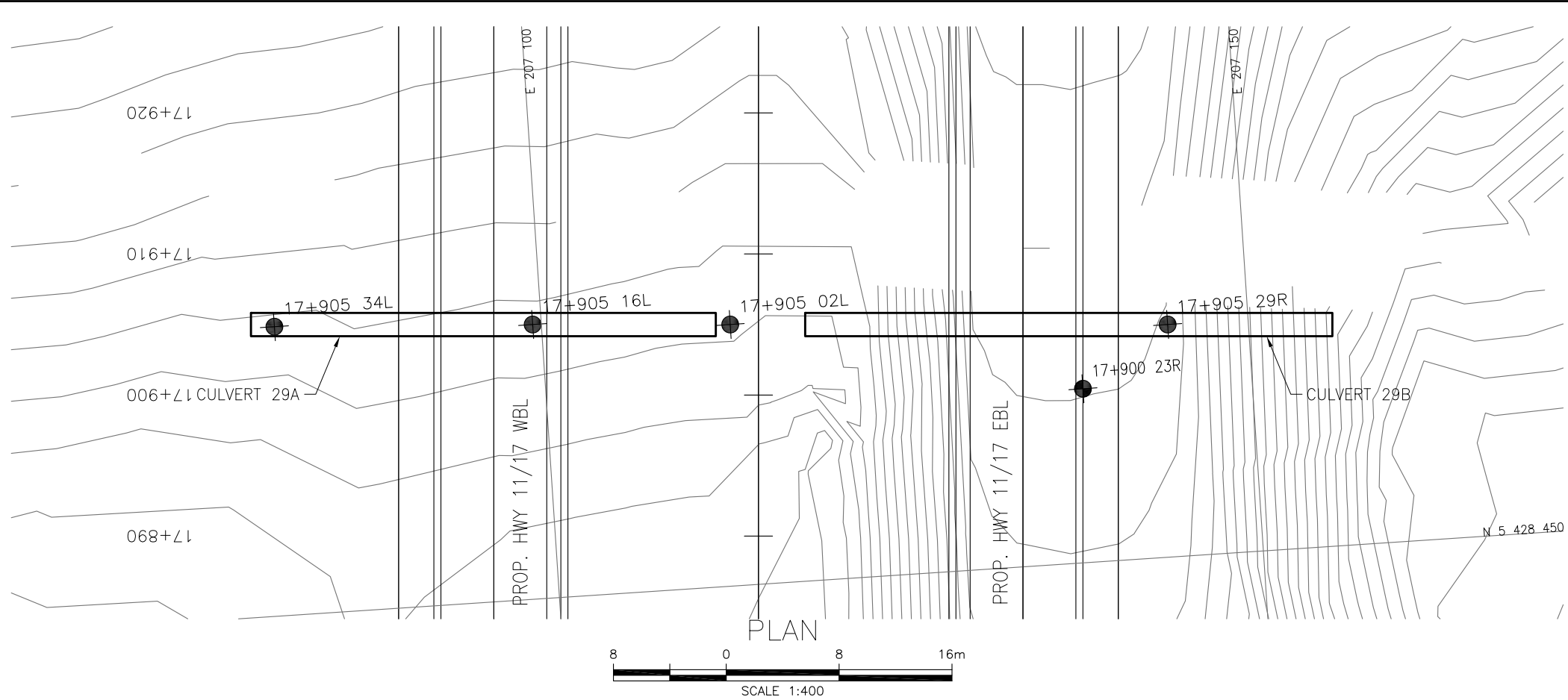
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	17+905 02L	1.07	261.93
⊠	17+905 16L	1.83	261.47
▲	17+905 16L	4.88	258.42
★	17+905 34L	2.59	260.91

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



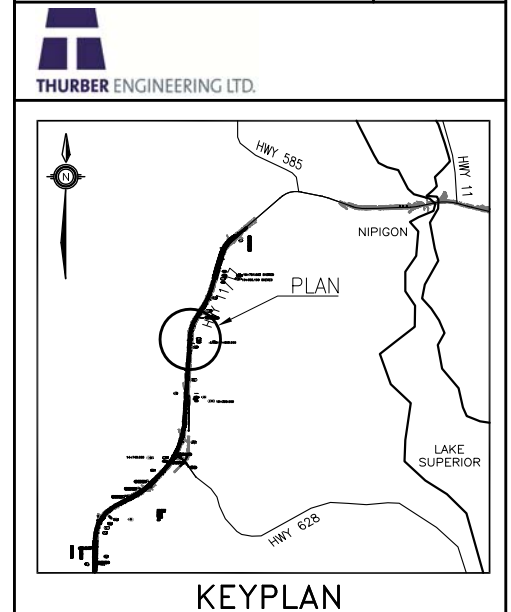
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN



CONT No 2014-6026
GWP No 647-89-00

HWY 11/17 FOUR LANING
EB AND WB LANES
CULVERT 29A AND 29B
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

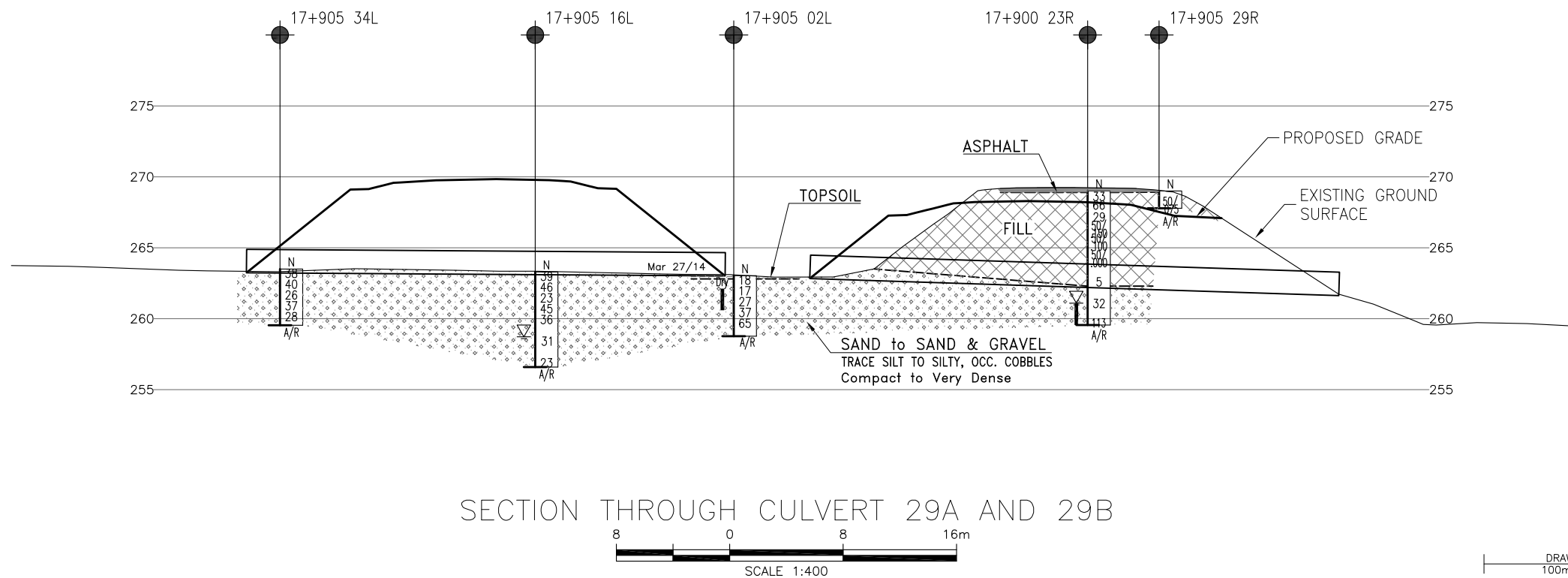


LEGEND			
	Borehole		
	Borehole and Cone		
N	Blows /0.3m (Std Pen Test, 475J/blow)		
CONE	Blows /0.3m (60' Cone, 475J/blow)		
PH	Pressure, Hydraulic		
	Water Level		
	Head Artesian Water		
	Piezometer		
90%	Rock Quality Designation (RQD)		
A/R	Auger Refusal		

NO	ELEVATION	NORTHING	EASTING
17+905 02L	263.0	5 428 468.5	207 113.4
17+905 16L	263.3	5 428 469.4	207 099.4
17+905 29R	269.0	5 428 466.5	207 144.3
17+905 34L	263.5	5 428 470.5	207 081.1
17+900 23R	269.0	5 428 462.3	207 138.0

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

GEOCRES No. 52A-184



SECTION THROUGH CULVERT 29A AND 29B

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

REVISIONS			
DATE	BY	DESCRIPTION	
DESIGN SBP	CHK JPL	CODE	LOAD
DRAWN MFA	CHK SBP	SITE	STRUCT
			DWG 14

Appendix AK

Highway 11/17 EBL and WBL

Sta. 18+740 to 18+790

Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 18+755 CL

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 429 248.4 E 207 414.7 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.06 - 2014.03.06 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
								20 40 60 80 100						
								20 40 60 80 100						
256.6														
0.0	PEAT, trace rootlets Very Soft Dark Brown Wet		1	SS	2									
			2	SS	2									
255.1														
1.5	Silty CLAY, trace sand Soft to Firm Grey		3	SS	2									
			4	SS	2									
			5	SS	0									
	varved		6	SS	0									
	occasional sand seams		7	SS	0									
								</						

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
20
15
10
(%) STRAIN AT FAILURE

METRIC

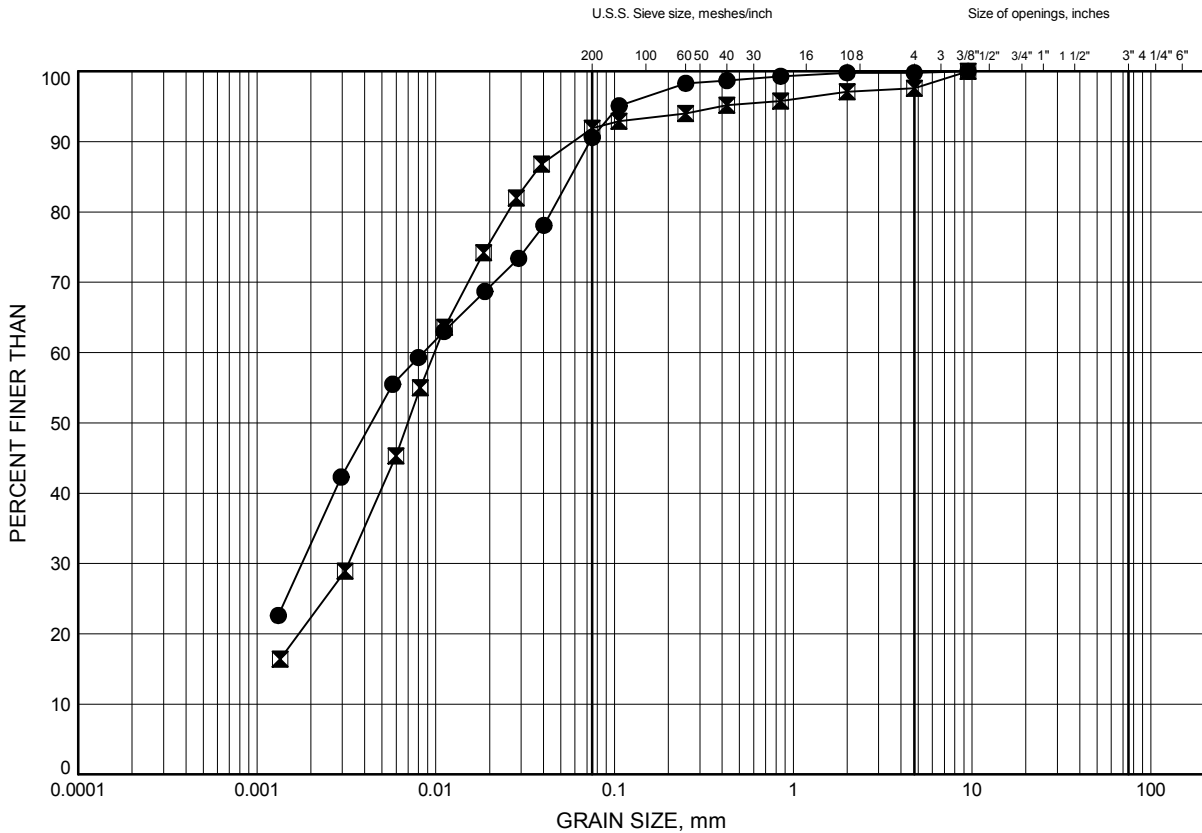
[illegible]

+³, ×³: Numbers refer to Sensitivity

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AK1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	18+755 CL	6.40	250.20
⊠	18+755 CL	10.97	245.63

Date July 2014
 WP# 647-89-00

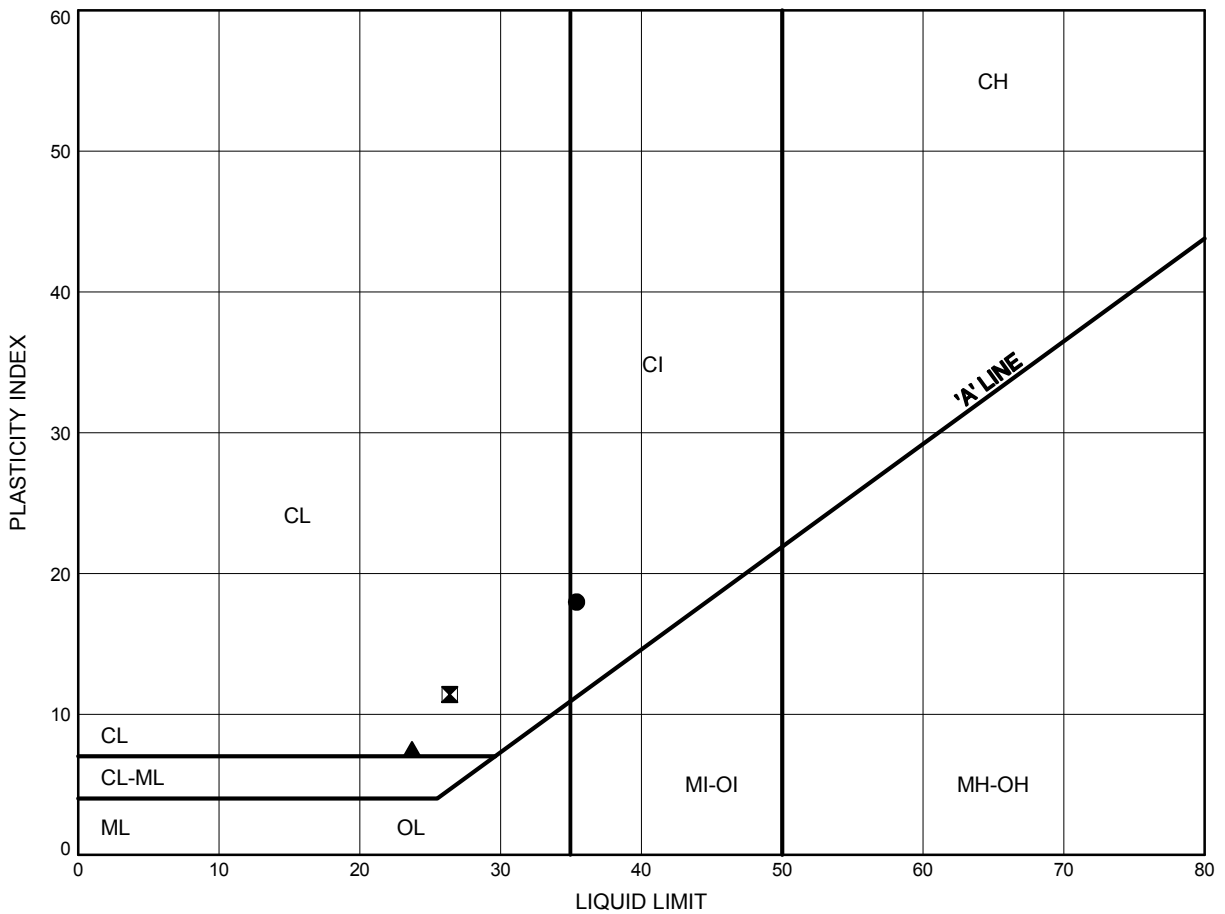


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AK2

Silty CLAY



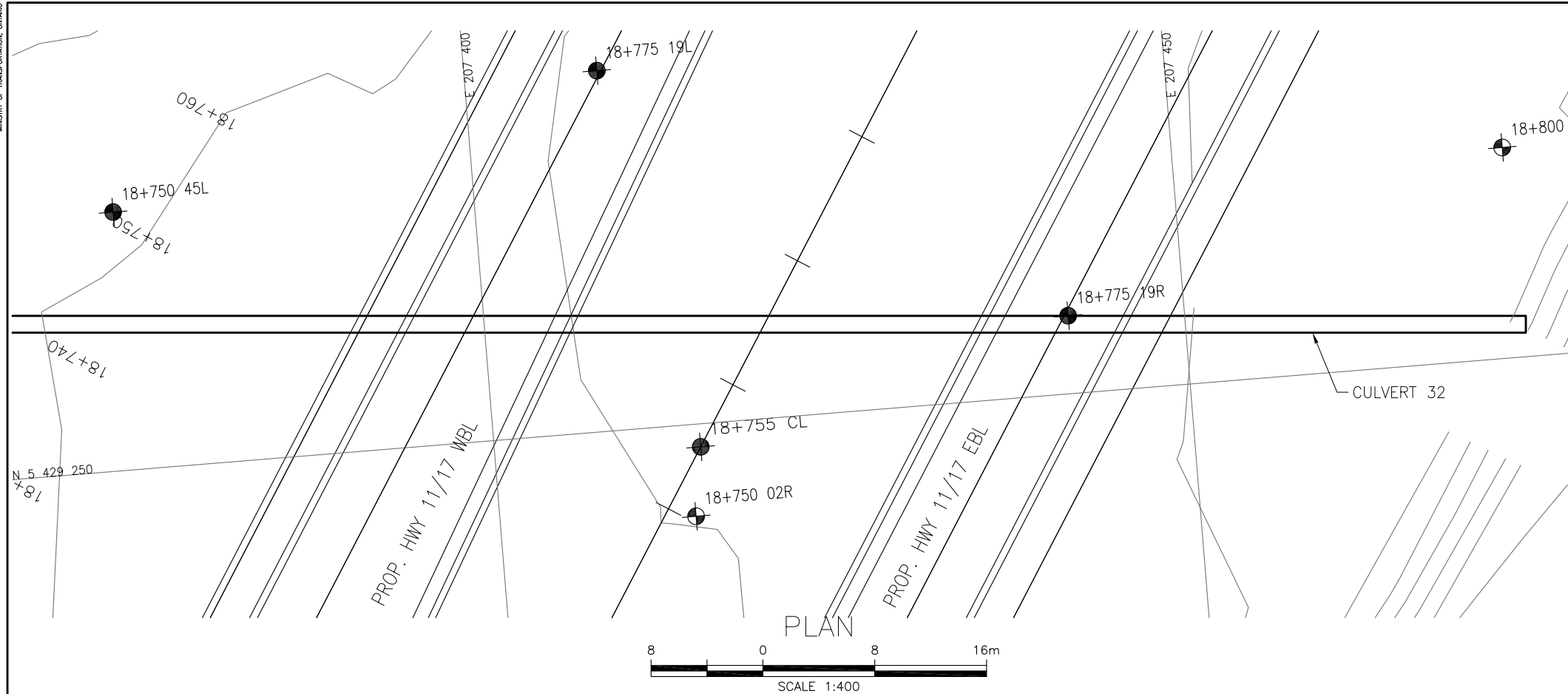
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	18+755 CL	1.83	254.77
⊠	18+755 CL	6.40	250.20
▲	18+755 CL	10.97	245.63

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



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

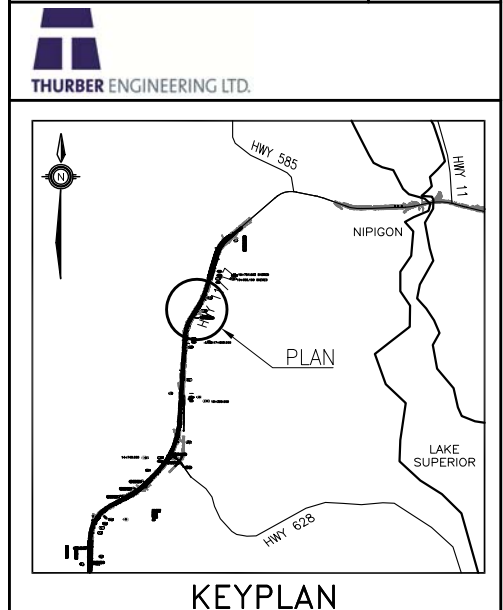
PROFESSIONAL ENGINEER
P. K. CHATTERJI
Oct 3/14
PROVINCE OF ONTARIO

PROFESSIONAL ENGINEER
S. PETERS
100194478
Oct 3/14
PROVINCE OF ONTARIO

CONT No 2014-6026
GWP No 647-89-00

HWY 11/17 FOUR LANING
EB AND WB LANES
CULVERT 32
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP



KEYPLAN

LEGEND

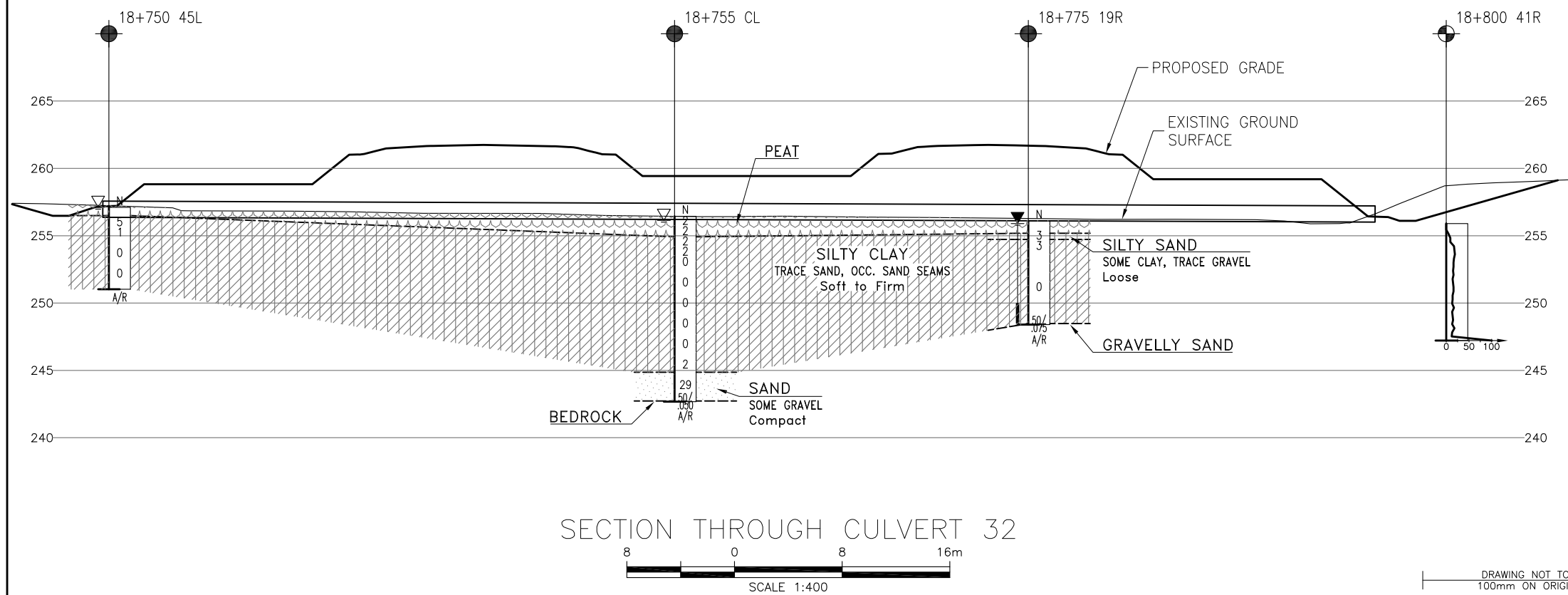
- Borehole
- Borehole and Cone
- N Blows /0.3m (Std Pen Test, 475J/blow)
- CONE Blows /0.3m (60' Cone, 475J/blow)
- PH Pressure, Hydraulic
- Water Level
- Head Artesian Water
- Piezometer
- 90% Rock Quality Designation (RQD)
- A/R Auger Refusal

NO	ELEVATION	NORTHING	EASTING
17+905 34L	263.5	5 428 470.5	207 081.1
18+750 45L	257.1	5 429 268.5	207 374.2
18+775 19R	256.1	5 429 255.6	207 441.7
18+800 41R	255.9	5 429 265.1	207 473.6

-NOTES-

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

GEOCRIS No. 52A-184



REVISIONS				DESCRIPTION			
DATE	BY	CHK	JPL	CODE	LOAD	DATE	OCT. 2014
DESIGN	SBP	CHK	JPL	CODE	LOAD	DATE	OCT. 2014
DRAWN	MFA	CHK	SBP	SITE	STRUCT	DWG	15

Appendix AL

**Highway 11/17 EBL
Sta. 19+110 to 19+120**


Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 19+115 03R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 429 560.5 E 207 594.0 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.29 - 2014.03.29 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								
268.7								20 40 60 80 100								
0.0	SAND , trace to some gravel Brown Frozen (FILL) Very Dense Moist		1	GS		268										
			2	GS												
			1	SS	50/ .075											
			2	SS	50/ .150	267										
266.4																
2.3	END OF BOREHOLE AT 2.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.3m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.															

+ ³ , × ³ : Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+115 32R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 429 548.5 E 207 620.4 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.07 - 2014.03.07 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
265.7								<div>20406080100</div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div>							
0.0	TOPSOIL: (100mm)							<div>20406080100</div> <div>PLASTIC LIMIT</div> <div>NATURAL MOISTURE CONTENT</div> <div>LIQUID LIMIT</div> <div>W P W W L</div> <div>WATER CONTENT (%)</div>							
0.1	Silty SAND , some gravel Loose Brown to Grey Wet		1	SS	4		265								
			2	SS	4										16 54 30 (SH+CL)
	becoming Dense		3	SS	30		264								
263.4															
2.3	END OF BOREHOLE AT 2.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.3m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.														

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+116 22R

1 OF 1

METRIC

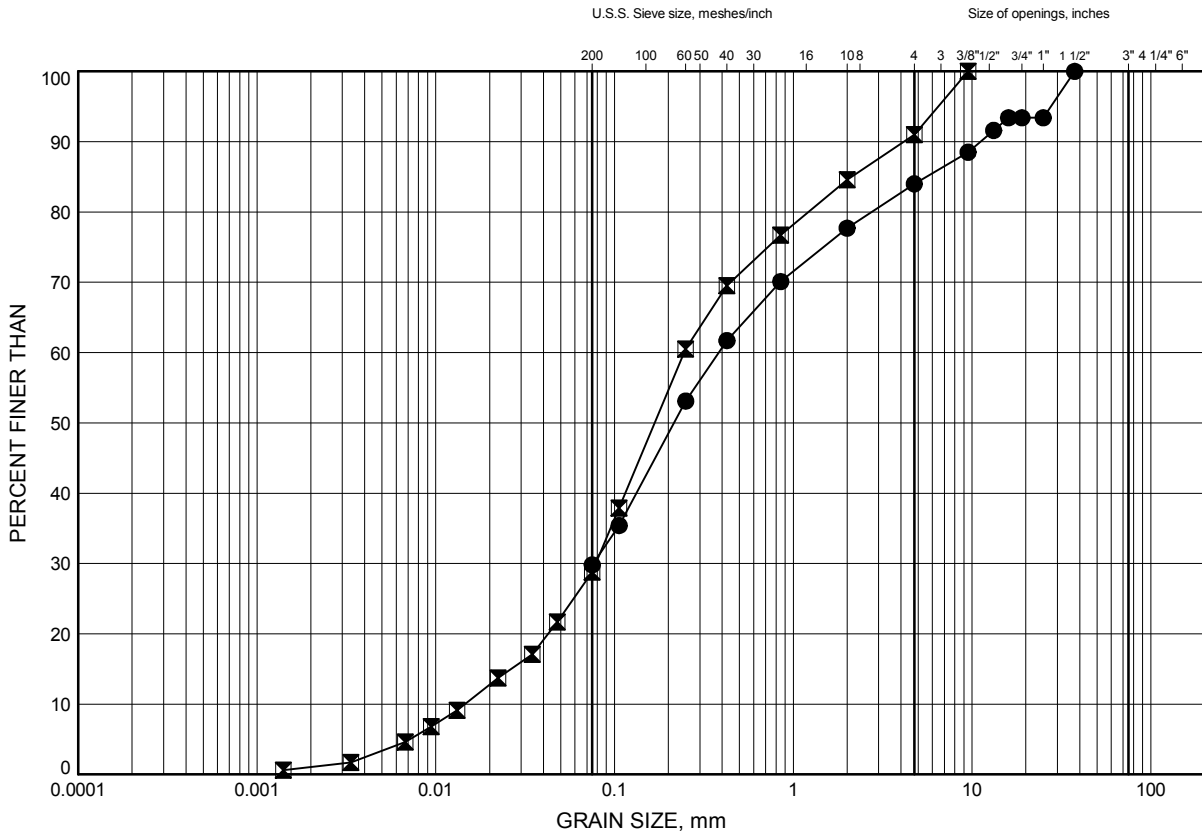
WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 429 553.5 E 207 611.7 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.07 - 2014.03.07 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
266.2																	
0.0	TOPSOIL: (150mm)																
0.2	Silty SAND , trace gravel, trace clay, occasional rootlets Compact Dark Brown Wet		1	SS	27		266									9 62 28 1	
265.4																	
0.8	END OF BOREHOLE AT 0.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 0.8m AND WATER LEVEL AT 0.8m UPON COMPLETION. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.																

Hwy 11/17 - Red Rock to Nipigon GRAIN SIZE DISTRIBUTION

FIGURE AL1

Silty SAND



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

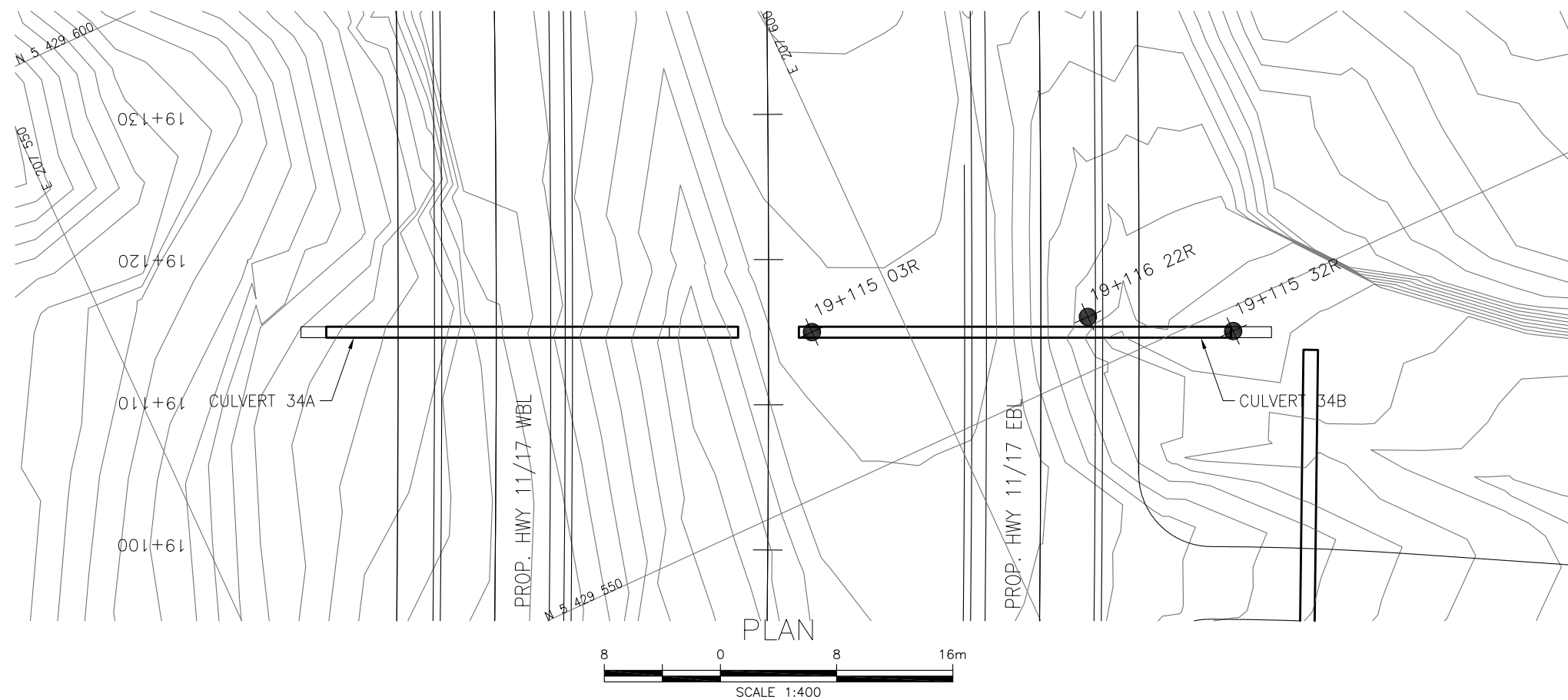
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+115 32R	1.07	264.63
⊠	19+116 22R	0.30	265.90

Date July 2014
WP# 647-89-00



Prep'd AN
Chkd. MKE

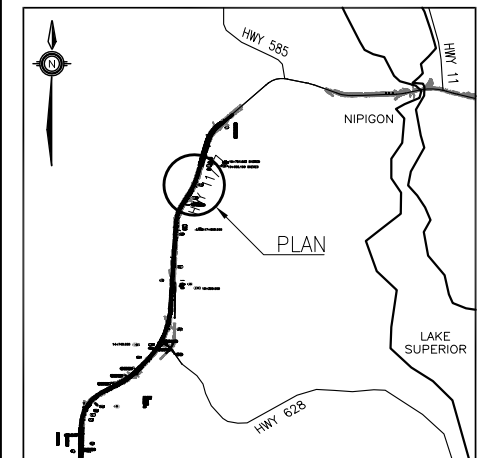


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








CONT No 2014-6026
GWP No 647-89-00

HWY 11/17 FOUR LANING
EB AND WB LANES
CULVERT 34A AND 34B
BOREHOLE LOCATIONS AND SOIL STRATA



KEYPLAN

LEGEND

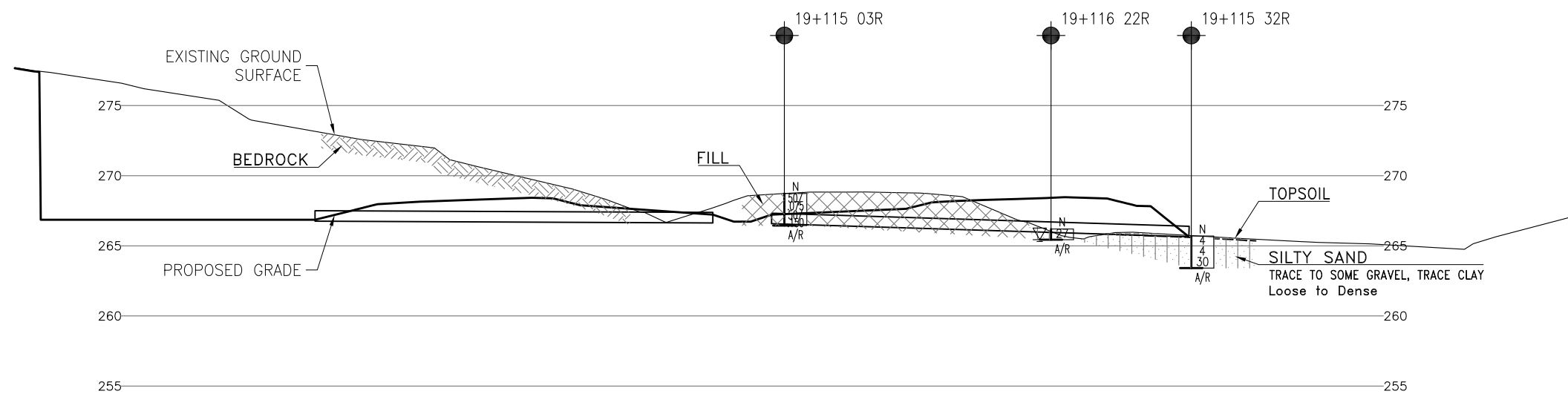
	Borehole
	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

[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. 52A-184



SECTION THROUGH CULVERT 34A AND 34B



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

REVISIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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Appendix AM

**Highway 11/17 EBL
Sta. 19+190 to 19+330**


Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 19+200 23R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 429 631.0 E 207 646.4 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.07 - 2014.03.07 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT							UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE										
								WATER CONTENT (%)										
270.0							20 40 60 80 100											
0.0			1	SS	4		269											6 54 33 7
			2	SS	6													
	Grey		3	SS	11													
267.7									268									
2.3	END OF BOREHOLE AT 2.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.3m AND WATER LEVEL AT 0.9m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																	

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+315 19R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 429 741.2 E 207 683.4 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.07 - 2014.03.07 CHECKED BY MKE

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					W P W W L							
								20	40	60	80	100								
												</								

+³, ×³: Numbers refer to
Sensitivity

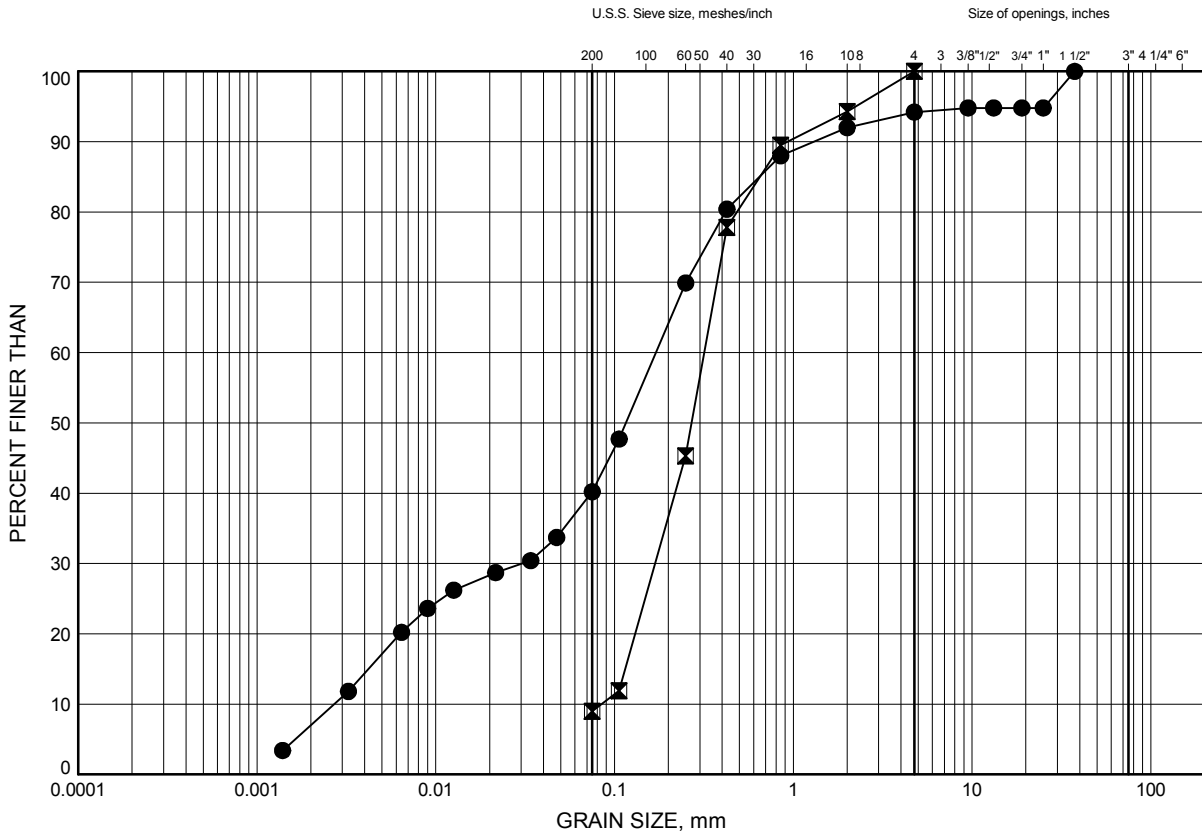
20
15
10

(%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AM1

SAND to Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+200 23R	1.07	268.96
⊠	19+315 19R	1.07	270.33

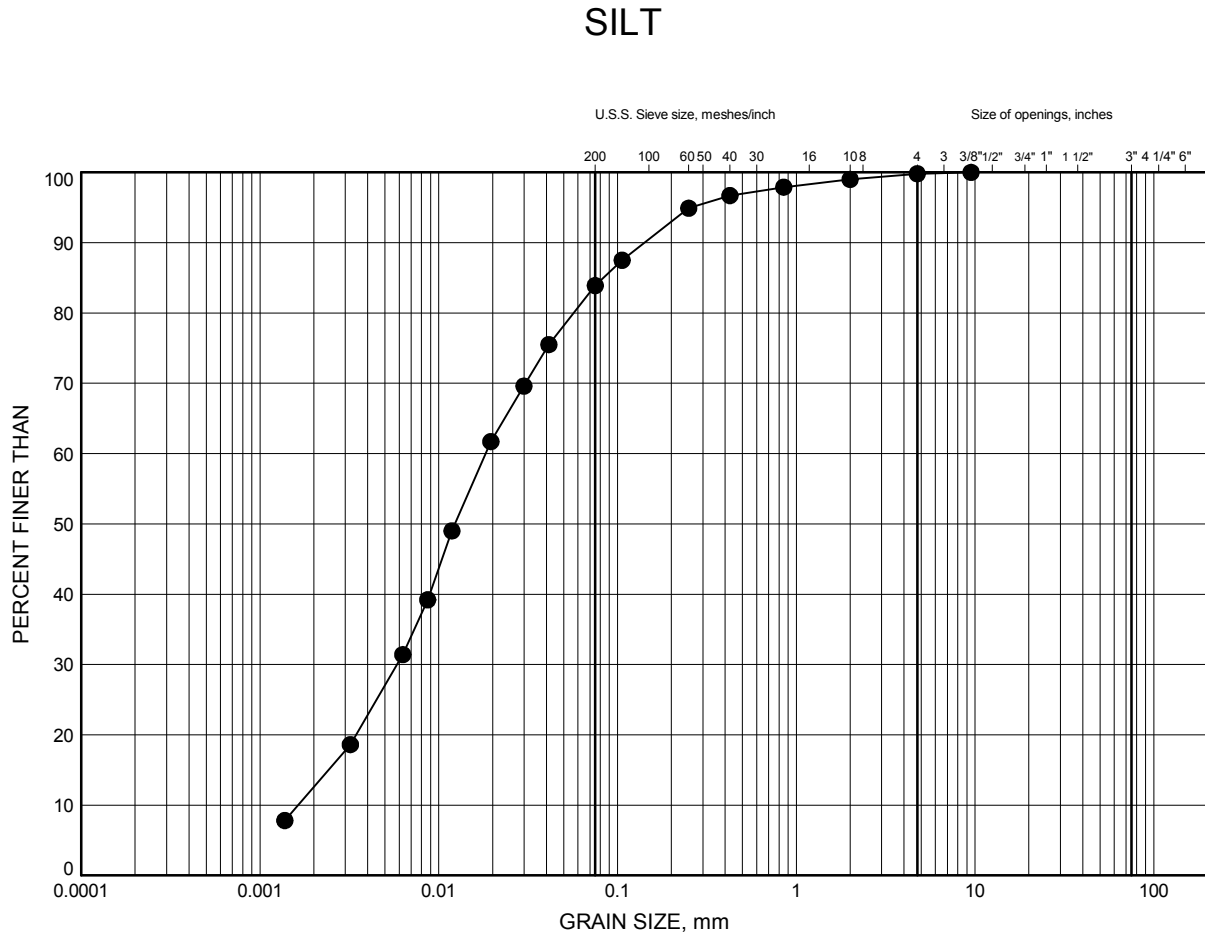
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon GRAIN SIZE DISTRIBUTION

FIGURE AM2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+315 19R	3.35	268.05

Date July 2014
WP# 647-89-00



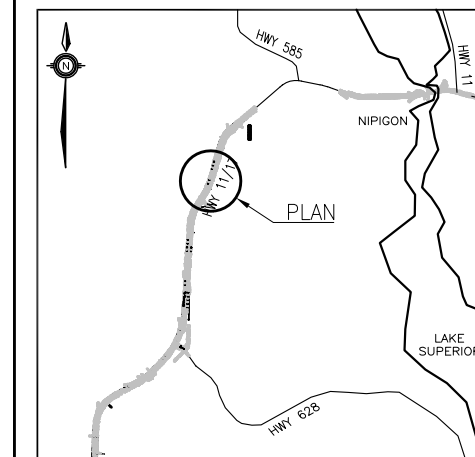
Prep'd AN
Chkd. MKE



V 1:200






DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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



KEYPLAN

LEGEND

	Borehole
	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	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. 52A-184

[illegible]

Appendix AN

Highway 11/17 EBL and WBL

Sta. 19+670 to 19+690



Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 19+672 32L

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 098.5 E 207 735.8 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.13 - 2014.03.13 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
								20 40 60 80 100										
273.6								20 40 60 80 100										
0.0	PEAT , trace rootlets Dark Brown Frozen		1	SS			273											
272.8							272											
0.8	SAND , trace to some silt Loose Brown Wet 																	

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+672 32L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 098.5 E 207 735.8 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.13 - 2014.03.13 CHECKED BY MKE





SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
262.3			10	SS	31		263									0 83 17 (SI+CL)	
11.3	END OF BOREHOLE AT 11.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 11.3m AND WATER LEVEL AT 1.2m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No 19+678 19R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 090.2 E 207 786.5 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.08 - 2014.03.08 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							WATER CONTENT (%)	
								○ UNCONFINED	+ FIELD VANE							
								● QUICK TRIAXIAL	× LAB VANE							
273.1						▽	273									
0.0	PEAT, trace rootlets Very Soft Dark Brown Wet		1	SS	2											
272.3							272									
0.8	SAND, trace silt Loose Dark Brown Wet		2	SS	4										0 94 6 (SI+CL)	
			3	SS	8			271								
	Compact Grey		4	SS	10											
								270								
			5	SS	12											
								269								
			6	SS	15			268								
267.5																
5.6	Silty SAND Compact Grey Wet		7	SS	17			267							0 72 28 (SI+CL)	
							266									
			8	SS	15		265									
							264									
			9	SS	12											

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+678 19R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 090.2 E 207 786.5 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.08 - 2014.03.08 CHECKED BY MEF




SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
263.0 10.1	Continued From Previous Page END OF BOREHOLE AT 10.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 10.1m AND WATER LEVEL AT 0.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.													

RECORD OF BOREHOLE No 19+683 01R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 100.0 E 207 770.5 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.29 - 2014.03.29 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
276.5	SAND , some gravel to gravelly, trace silt Brown Frozen to 1.5m (FILL)		1	GS			20	40	60	80	100							
0.0																		
					2		GS											
					1		SS	50/ .025										
					2		SS	50/ .100										
	Loose Moist		3	SS	8													
273.5	SAND , trace to some silt, trace gravel, with wood fragments Very Loose Brown Wet		4	SS	1													
3.0																		
			Compact to Loose		5		SS	15										
			Grey		6	SS	7											
267.4			3	GS														
9.1	END OF BOREHOLE AT 9.1m. BOREHOLE OPEN TO 3.2m AND WATER LEVEL AT 3.0m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.7m																	

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
 20
15
10
(%) STRAIN AT FAILURE

METRIC

[illegible]

RECORD OF BOREHOLE No 19+683 15L

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 104.4 E 207 755.2 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.30 - 2014.03.30 CHECKED BY MKE

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				W P W W L				
								○ UNCONFINED + FIELD VANE								
								● QUICK TRIAXIAL × LAB VANE				WATER CONTENT (%)				
						20	40	60	80	100	20	40	60			
275.1	0.0		1	GS			275									6 87 7 (SI+CL)
			2	GS			274									
	SAND, trace to some gravel, trace silt Brown Frozen to 1.0m (FILL) Very Dense		1	SS	50/.050		273									
	Moist		2	SS	50/.050		272									
	Compact		3	SS	19		271									
	Very Loose Wet		4	SS	3		270									
271.3							269									
3.8	SAND, trace silt and gravel Compact to Loose Grey Wet						268									
		5	SS	24	267											
					266											
			6	SS	6											
			7	SS	16											
266.0		3	GS													
9.1	END OF BOREHOLE AT 9.1m. BOREHOLE OPEN TO 5.0m AND WATER LEVEL AT 4.5m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.0m															

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
 20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+683 15L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 104.4 E 207 755.2 ORIGINATED BY SLL
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.30 - 2014.03.30 CHECKED BY MKE

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 ³	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 THEN CUTTINGS TO SURFACE.							20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	20 40 60 W P W W L					

RECORD OF BOREHOLE No 19+683 35R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 090.6 E 207 803.2 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.08 - 2014.03.08 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
273.3								20 40 60 80 100					
0.0	TOPSOIL , rootlets: (225mm) Firm Dark Brown Wet		1	SS	6		273	○ UNCONFINED + FIELD VANE					
0.2	SAND , trace silt Loose Brown Wet		2	SS	6		272	● QUICK TRIAXIAL × LAB VANE					
			3	SS	4		271						
271.1	Silty SAND Compact Grey Wet		4	SS	12		270						
2.2			5	SS	11		269						
			6	SS	11		268						
			7	SS	12		267						
			8	SS	10		266						
							265						
264.2	SILT , some clay, trace sand Loose Grey		9	SS	6		264						
9.1													

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+683 35R

2 OF 2

METRIC

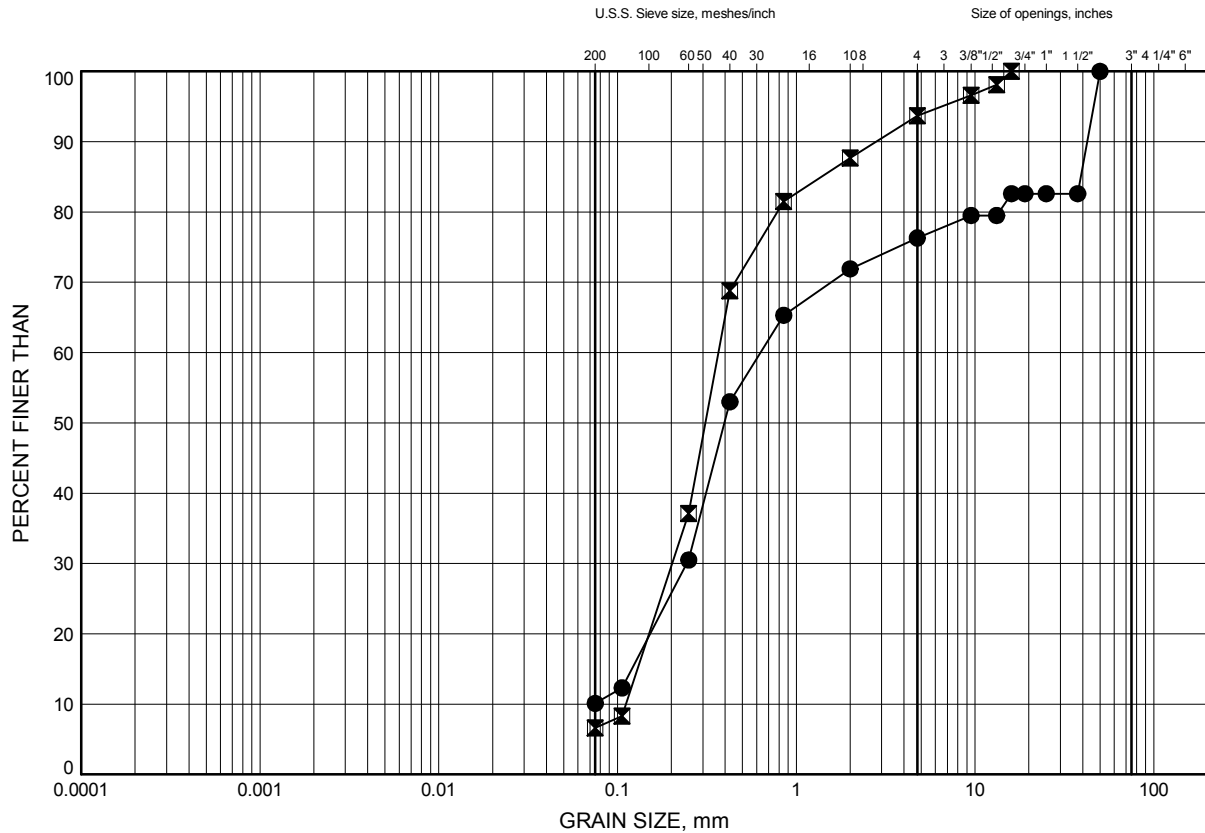
WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 090.6 E 207 803.2 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.08 - 2014.03.08 CHECKED BY MEF

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
263.2 10.1	<p>Continued From Previous Page</p> <p>END OF BOREHOLE AT 10.1m UPON AUGER REFUSAL. BOREHOLE OPEN TO 10.1m AND WATER LEVEL AT 1.5m UPON COMPLETION. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.</p> <p>WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) 2014.03.27 0.7 272.6</p>													

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AN1

SAND FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+683 01R	2.59	273.91
⊠	19+683 15L	2.59	272.51

Date July 2014
 WP# 647-89-00

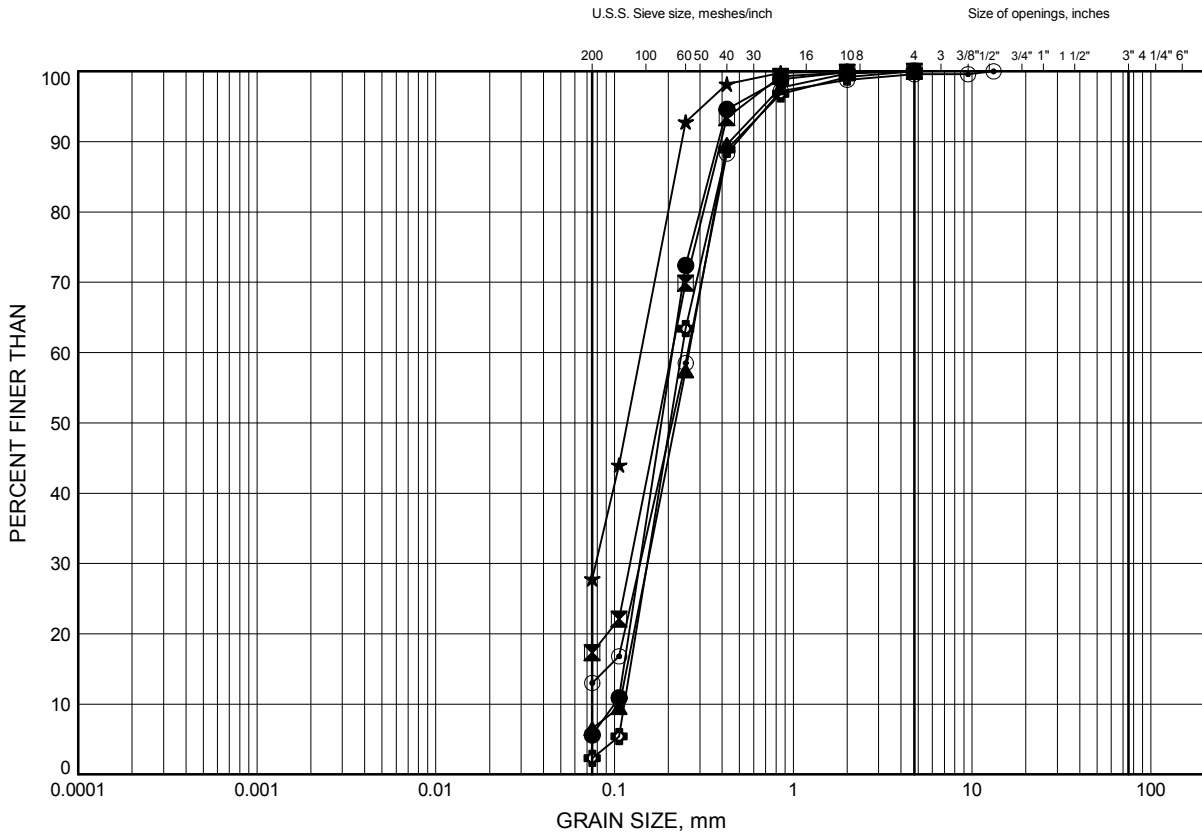


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 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AN2

SAND to Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+672 32L	2.59	271.01
⊠	19+672 32L	10.97	262.63
▲	19+678 19R	1.07	272.03
★	19+678 19R	6.40	266.70
⊙	19+683 01R	6.40	270.10
⊕	19+683 15L	6.40	268.70

Date July 2014
 WP# 647-89-00

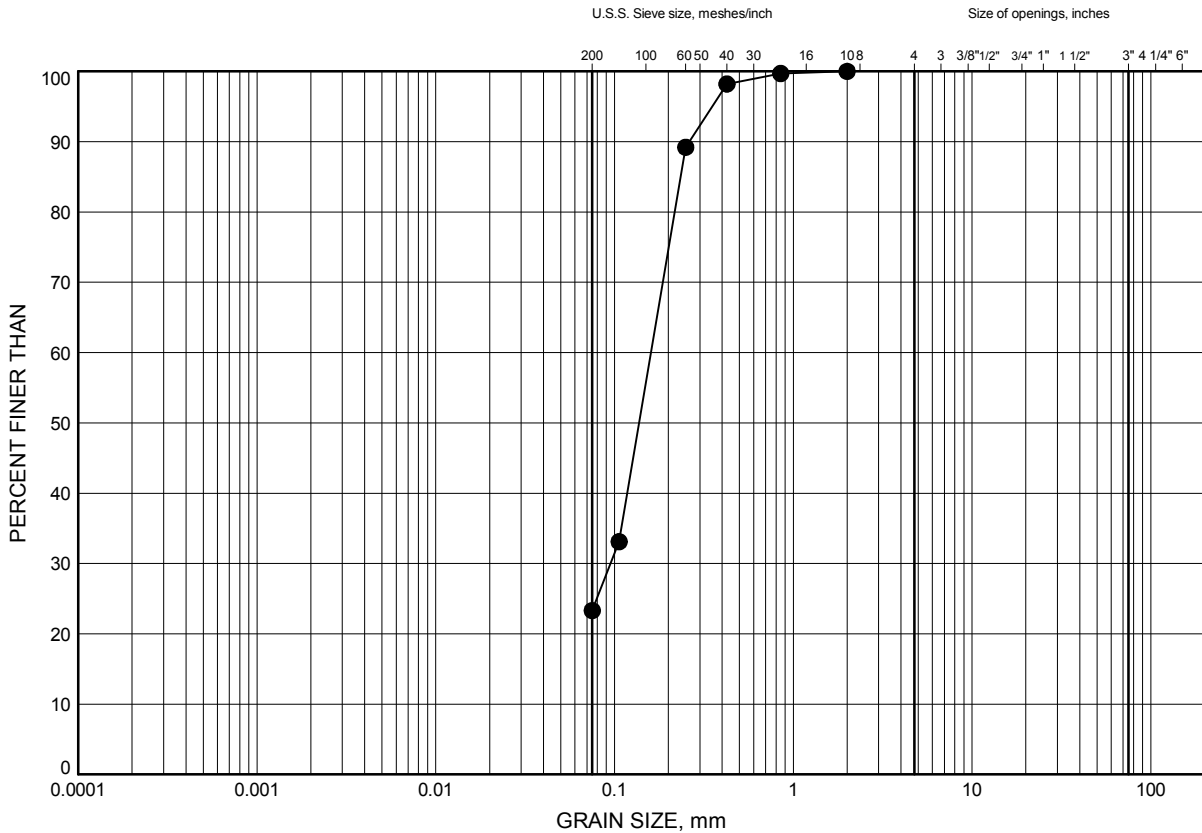


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Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AN3

SAND to Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+683 35R	2.59	270.71

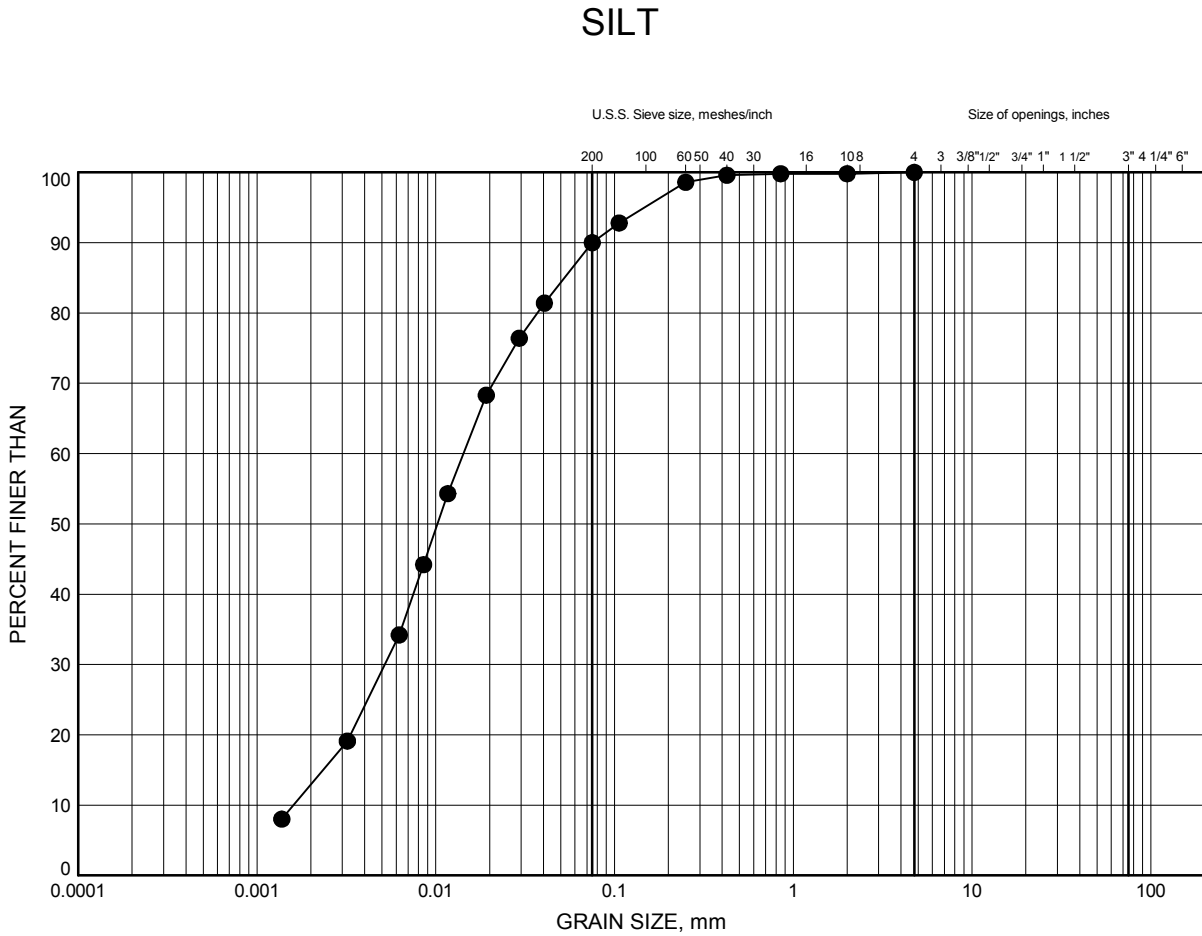
Date July 2014
 WP# 647-89-00



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Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AN4



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

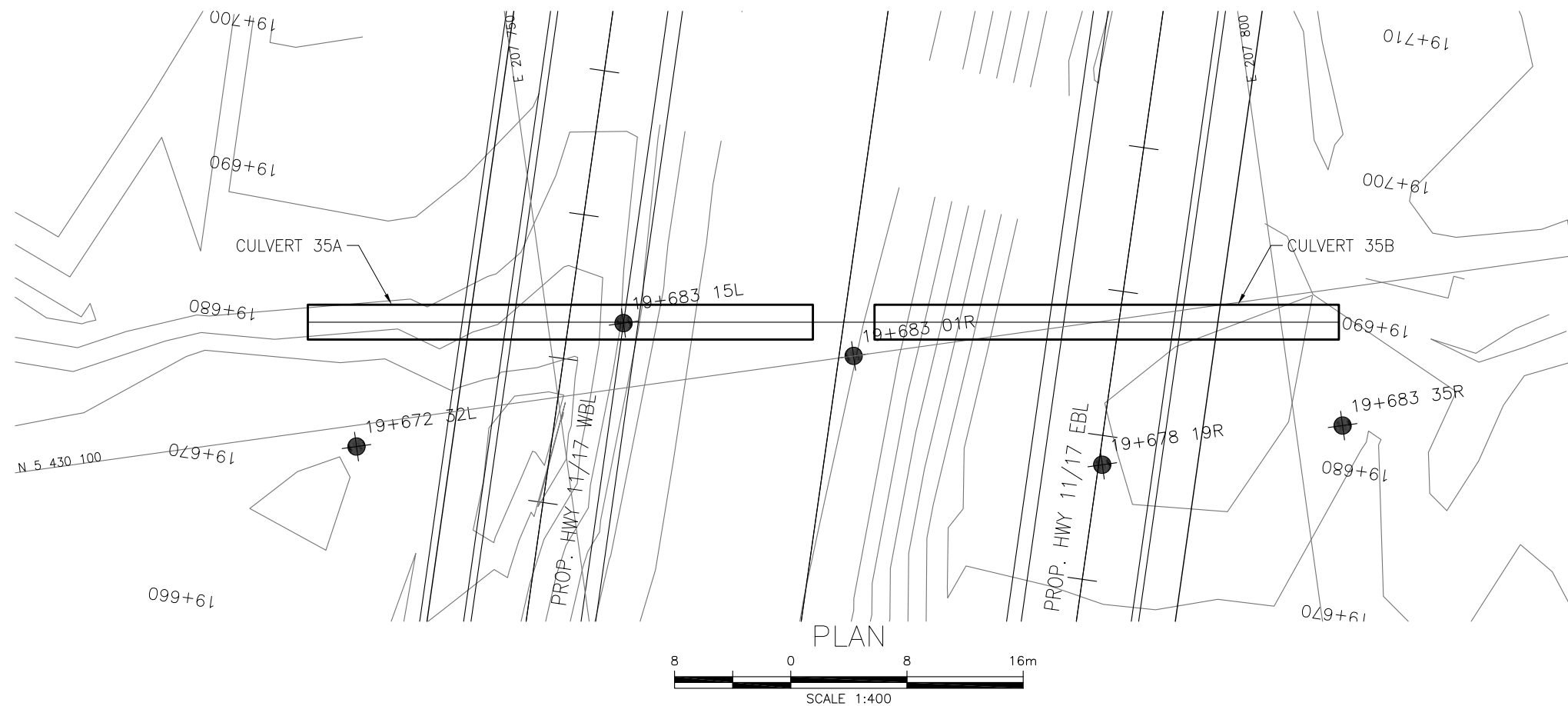
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+683 35R	9.45	263.85

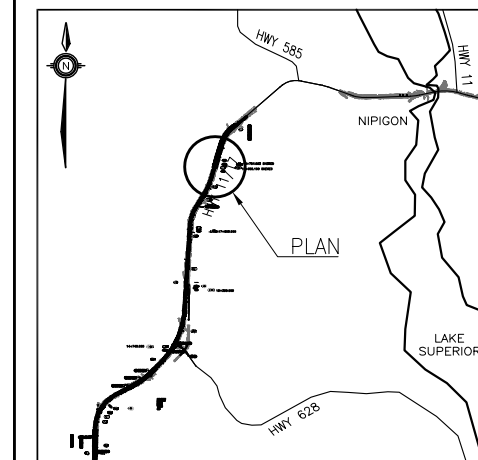
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE








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



KEYPLAN

LEGEND

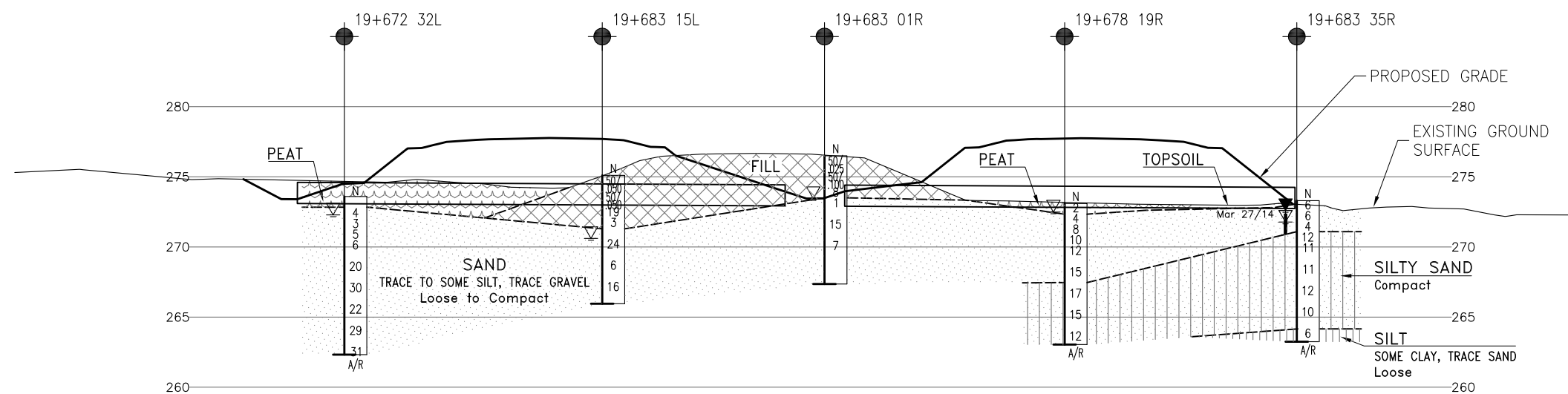
	Borehole
	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

[illegible]

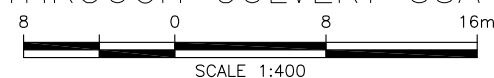
-NOTES-

- 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. 52A-184



SECTION THROUGH CULVERT 35A AND 35B



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

REVISIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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Appendix AO

Highway 11/17 EBL and WBL

Sta. 19+730 to 19+770

Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 19+736 34R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 141.8 E 207 816.9 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.11 - 2014.03.11 CHECKED BY MEF

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)				
273.1							20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	W P W W L	20 40 60					
0.0	SAND, trace silt Loose Brown Wet		1	SS	6											
			2	SS	6										0 93 7 (SI+CL)	
			3	SS	4											
			4	SS	4											
			5	SS	4											
			6	SS	14										0 92 8 (SI+CL)	
	Compact		7	SS	24											
			8	SS	16											
	Grey		9	SS	20											

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+736 34R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 141.8 E 207 816.9 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.11 - 2014.03.11 CHECKED BY MEF

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
	Continued From Previous Page																
262.4							263										
10.7	Silty CLAY , some sand, trace gravel Very Stiff Grey		10	SS	21		262									0 16 54 30	
261.8																	
11.3	END OF BOREHOLE AT 11.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 11.3m AND WATER LEVEL AT 0.9m UPON COMPLETION. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) 2014.03.27 0.5 272.6																

RECORD OF BOREHOLE No 19+748 19R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 157.5 E 207 805.8 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.11 - 2014.03.11 CHECKED BY MEF

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 ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				W P W W L				GR SA SI CL				
								○ UNCONFINED + FIELD VANE	● QUICK TRIAXIAL × LAB VANE	WATER CONTENT (%)										
273.7								20	40	60	80	100								
0.0	TOPSOIL, rootlets: (125mm)																			
0.1	Dark Brown		1	SS	6									○						
	SAND, trace silt																			
	Loose																			
	Brown		2	SS	4									○						
	Wet																			
			3	SS	5									○						
			4	SS	6									○						
			5	SS	9									○						
			6	SS	7									○						
			7	SS	9									○						
	trace gravel																			
	Compact		8	SS	13									○						
	Grey		9	SS	11									○						

Continued Next Page

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+748 19R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 157.5 E 207 805.8 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.11 - 2014.03.11 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT							UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa												
								20 40 60 80 100												
Continued From Previous 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+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+755 05L

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 170.9 E 207 784.7 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.30 - 2014.03.30 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
								20 40 60 80 100						
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
							WATER CONTENT (%)							
							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _P W W _L							
276.6														
0.0	SAND , trace to some gravel, trace silt Brown Frozen to 2.0m (FILL) <													

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
 20
 15
 10
 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+755 05L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 170.9 E 207 784.7 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.30 - 2014.03.30 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
	Continued From Previous Page													
	BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.6m, THEN CUTTINGS TO SURFACE.													

METRIC

[illegible]

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 19+759 17L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 178.0 E 207 774.2 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.12 - 2014.03.12 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
								20 40 60 80 100						
								20 40 60 80 100						
Continued From Previous Page							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W P W W L WATER CONTENT (%)			
264.0							264							
10.2	SILT and SAND Dense to Compact Grey Wet		10	SS	32		263							
							262							
			11	SS	34		261							
							260							
259.9			12	SS	21		260							
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 14.3m AND WATER LEVEL AT 1.2m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.													

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+760 33L

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 183.4 E 207 759.1 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.12 - 2014.03.12 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 19+760 33L

2 OF 2

METRIC

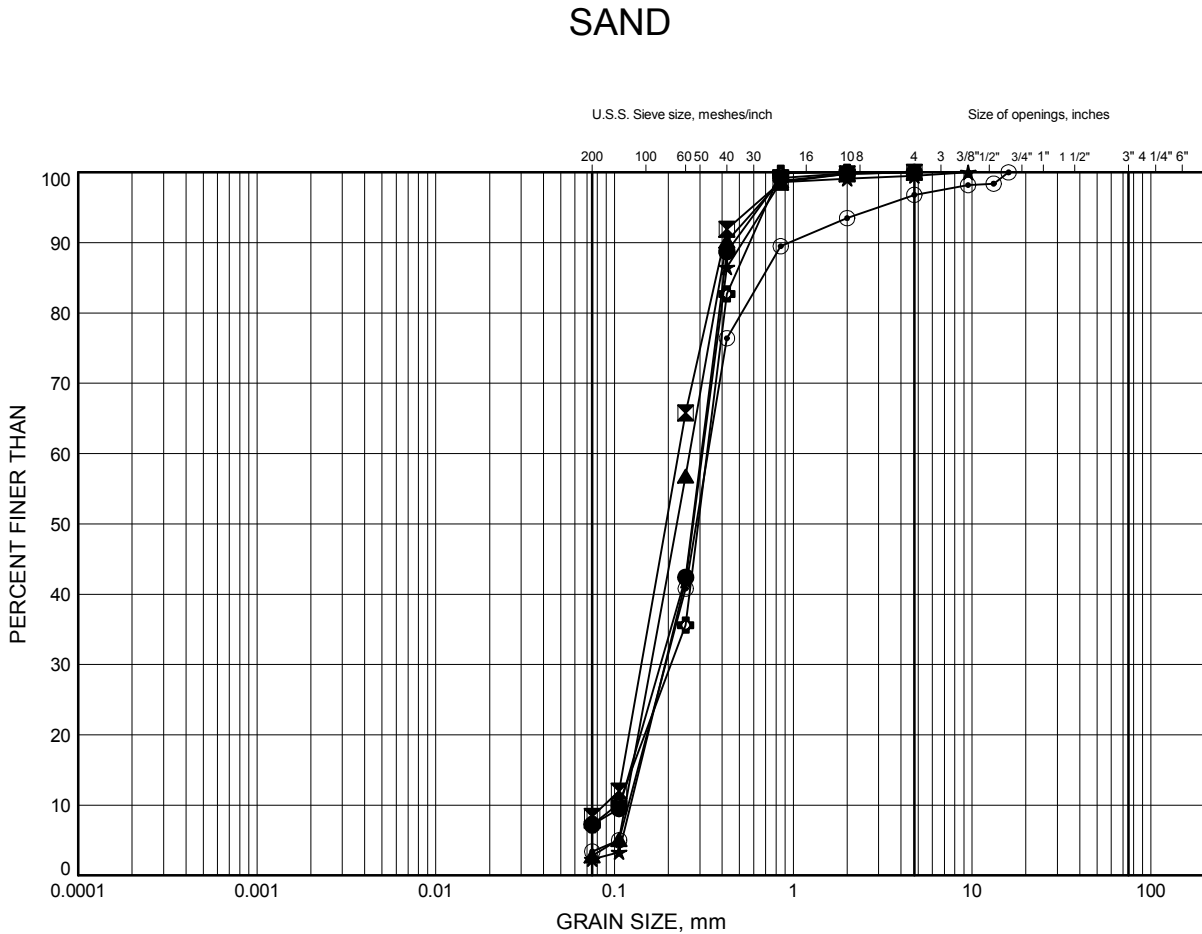
WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 430 183.4 E 207 759.1 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test COMPILED BY MFA
DATUM Geodetic DATE 2014.03.12 - 2014.03.12 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				
								20 40 60 80 100				
								20 40 60 80 100				
	Continued From Previous Page											
263.6												
10.2	SILT and SAND Dense Grey Wet		10	SS	35		263					0 44 56 (SI+CL)
							262					
			11	SS	34		261					
	Compact						260					
259.5			12	SS	11							
14.3	Begin DCPT at 14.3m.						259					
							258					
							257					
256.1												
17.7	END OF BOREHOLE AND DCPT AT 17.7m. BOREHOLE OPEN TO 17.7m AND WATER LEVEL AT 0.3m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.											

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon GRAIN SIZE DISTRIBUTION

FIGURE AO1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+736 34R	1.07	272.03
⊠	19+736 34R	4.88	268.22
▲	19+748 19R	2.59	271.11
★	19+748 19R	7.92	265.78
⊙	19+755 05L	4.88	271.72
⊕	19+759 17L	1.83	272.37

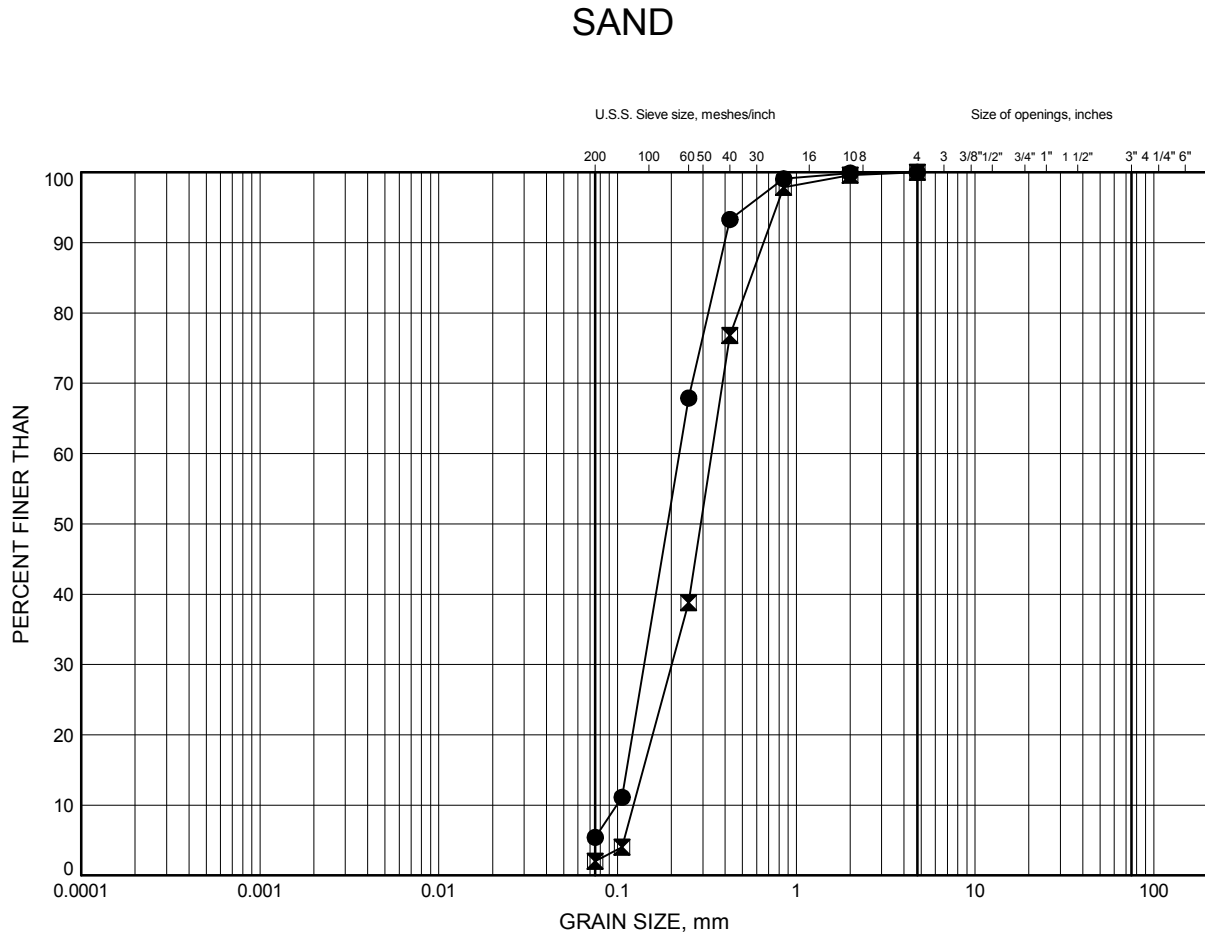
Date July 2014
WP# 647-89-00



Prep'd AN
Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon GRAIN SIZE DISTRIBUTION

FIGURE AO2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+759 17L	7.92	266.28
⊠	19+760 33L	3.35	270.45

Date July 2014
WP# 647-89-00

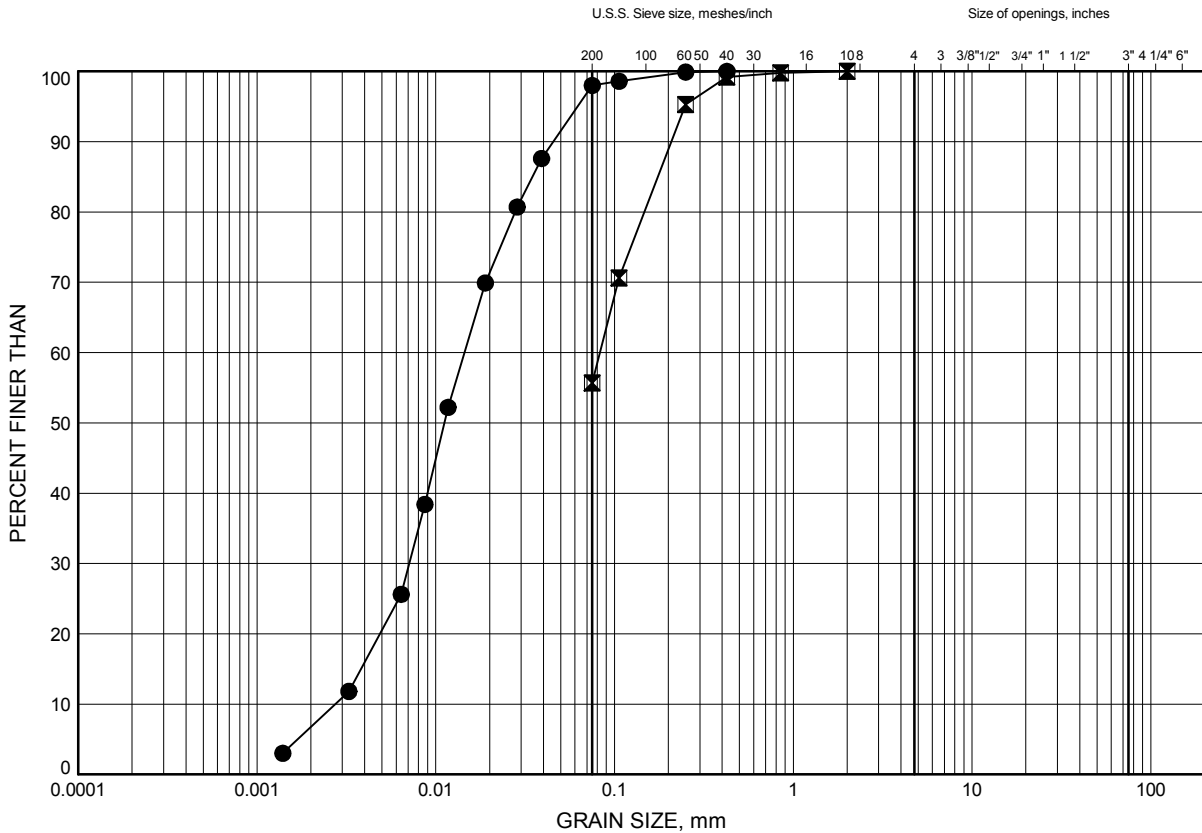


Prep'd AN
Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AO3

SILT to SILT & SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+748 19R	12.50	261.20
⊠	19+760 33L	10.97	262.83

Date July 2014
 WP# 647-89-00

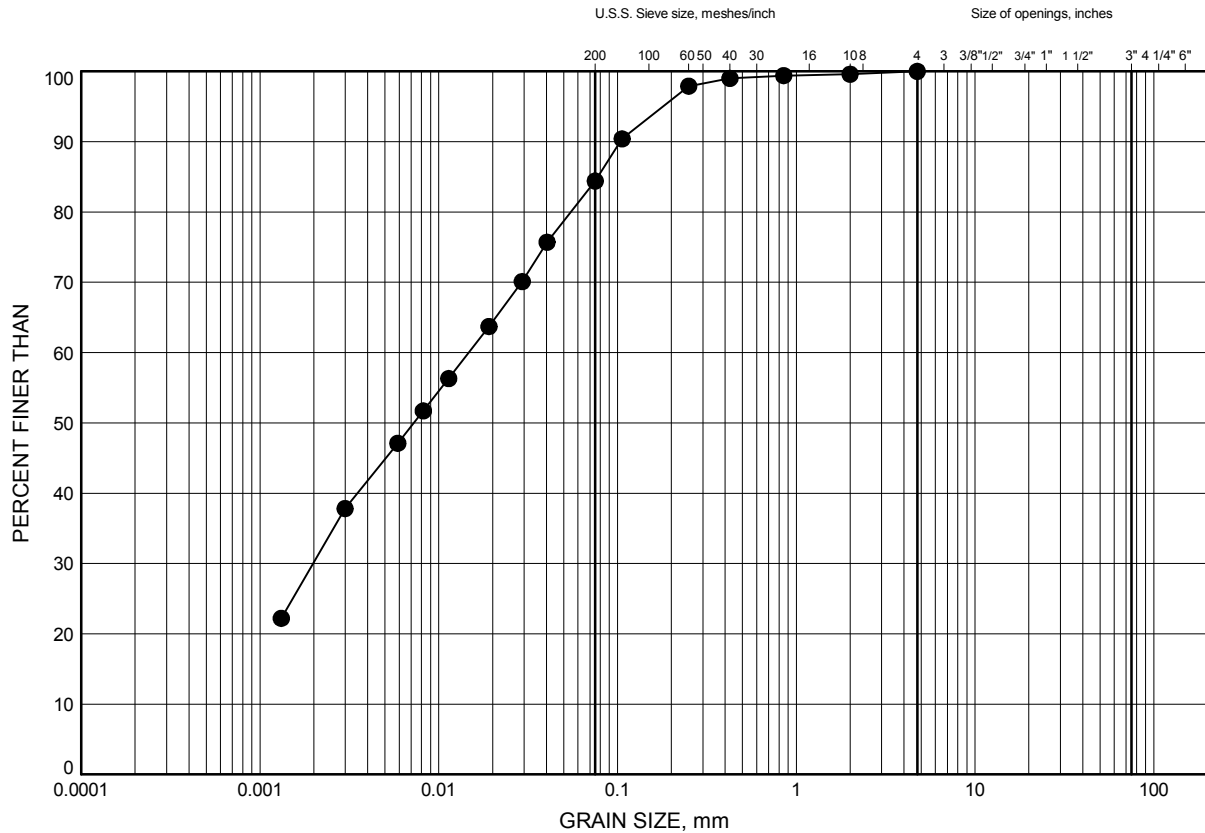


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AO4

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+736 34R	10.97	262.13

Date July 2014
 WP# 647-89-00

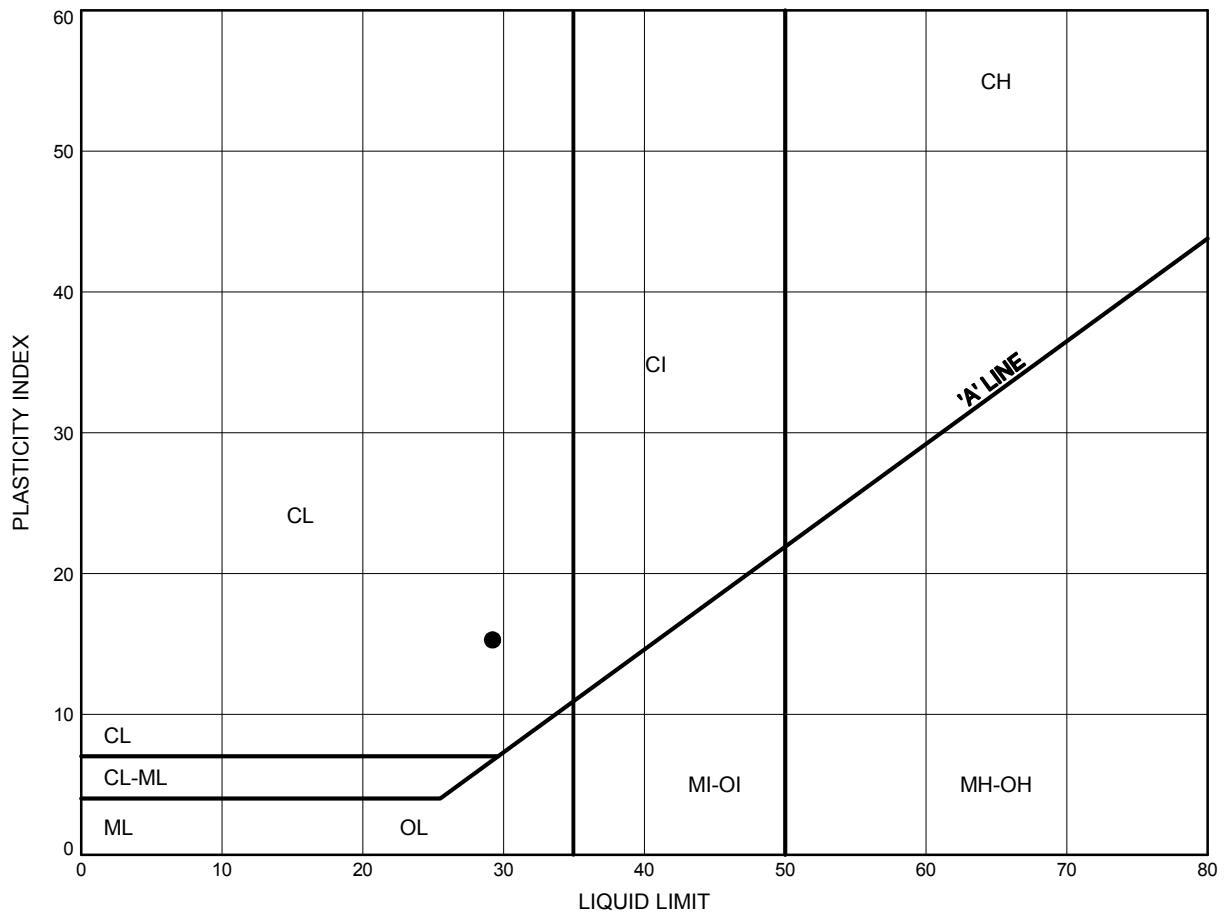


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
ATTERBERG LIMITS TEST RESULTS

FIGURE AO5

Silty CLAY



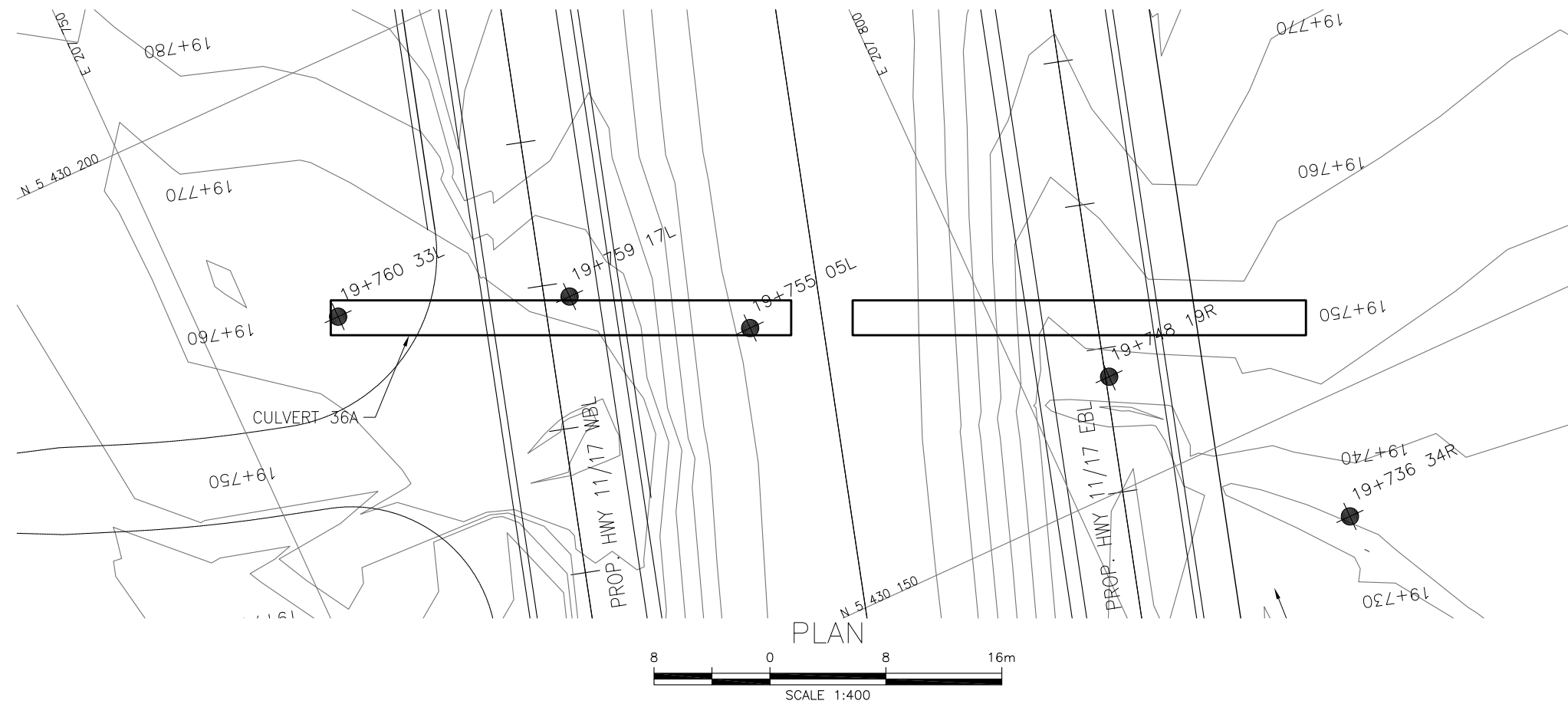
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	19+736 34R	10.97	262.13

Date July 2014
 WP# 647-89-00



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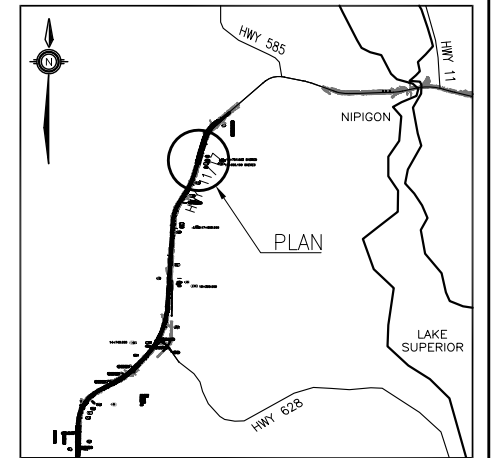


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








CONT No 2014-6026
GWP No 647-89-00

HWY 11/17 FOUR LANING
EB AND WB LANES
CULVERT 36A AND 36B
BOREHOLE LOCATIONS AND SOIL STRATA



KEYPLAN

LEGEND

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

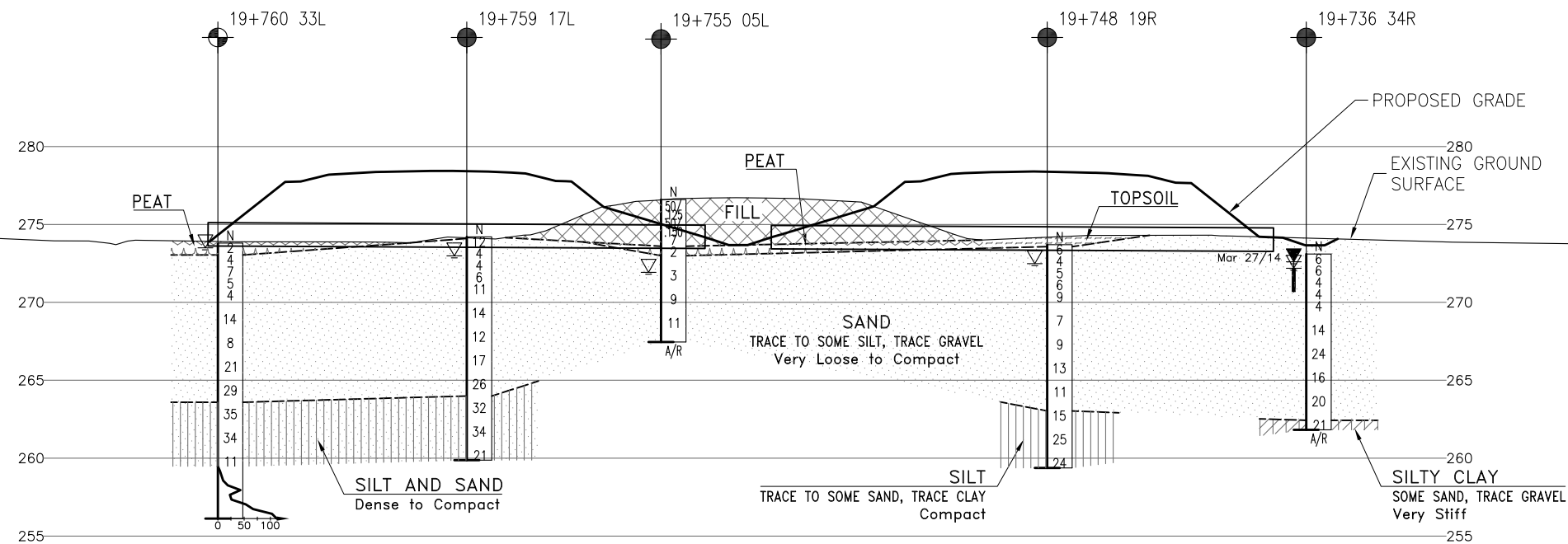
[illegible]

-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. 52A-184

SECTION THROUGH CULVERT 36A AND 36B



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

[illegible]

Appendix AP

Highway 11/17 EBL and WBL

Sta. 20+860 to 20+890

Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

METRIC

SOIL PROFILE			SAMPLES		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
269.6 0.0 0.1	ASPHALT: (65mm) SAND, trace to some gravel, trace silt Brown Frozen to 2.0m (FILL)	[Pattern]	1	GS	
			2	GS	
			1	SS	50/.100
			2	SS	50/.125
	Dense to Compact Moist		3	SS	31
			4	SS	32
	some organic staining		5	SS	13
263.7 5.9	PEAT, fibrous Stiff Black Wet	[Pattern]	6	SS	12
262.6 7.0	SAND, trace gravel, trace silt Compact Grey Wet	[Pattern]	7	SS	28
260.9 8.7	SILT and SAND Compact Brown Wet	[Pattern]	8	SS	22
			GROUND WATER CONDITIONS		
ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		SHEAR STRENGTH kPa		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT
			○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE		W P W L
	20 40 60 80 100		20 40 60 80 100		WATER CONTENT (%) 20 40 60
269					○
268					○
267					○
266					○
265					○
264					
263					○
262					○
261					
260					○
			UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
			γ	GR SA SI CL	
			kN/m³	(%)	
				11 78 11 (SI+CL)	
				0 44 56 (SI+CL)	

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 20+855 16R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 431 125.6 E 208 253.9 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.28 - 2014.03.28 CHECKED BY MEF

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 ³	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 P W W L					
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
Continued From Previous Page																	
259.4																	
10.2	SILT, trace clay, trace sand Compact Grey Wet						259										
		9	SS	30													
							258										
		10	SS	0			257										
							256										
255.3			11	SS	12										0 2 95 3		
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 6.1m AND WATER LEVEL AT 5.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.5m, CUTTINGS TO 0.2m, THEN ASPHALT TO SURFACE.																

+³, ×³: Numbers refer to Sensitivity
 20
 15
 10
 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 20+865 24L

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 431 163.0 E 208 236.5 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.13 - 2014.03.13 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				
								○ UNCONFINED + FIELD VANE				
								● QUICK TRIAXIAL × LAB VANE				
269.1							20 40 60 80 100					
0.0	TOPSOIL, trace rootlets: (100mm) Silty SAND , trace gravel Compact Brown Frozen to 1.5m Moist Brown to Grey Wet some thin silt seams 											

Continued Next Page

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 20+865 24L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 431 163.0 E 208 236.5 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.13 - 2014.03.13 CHECKED BY MEF

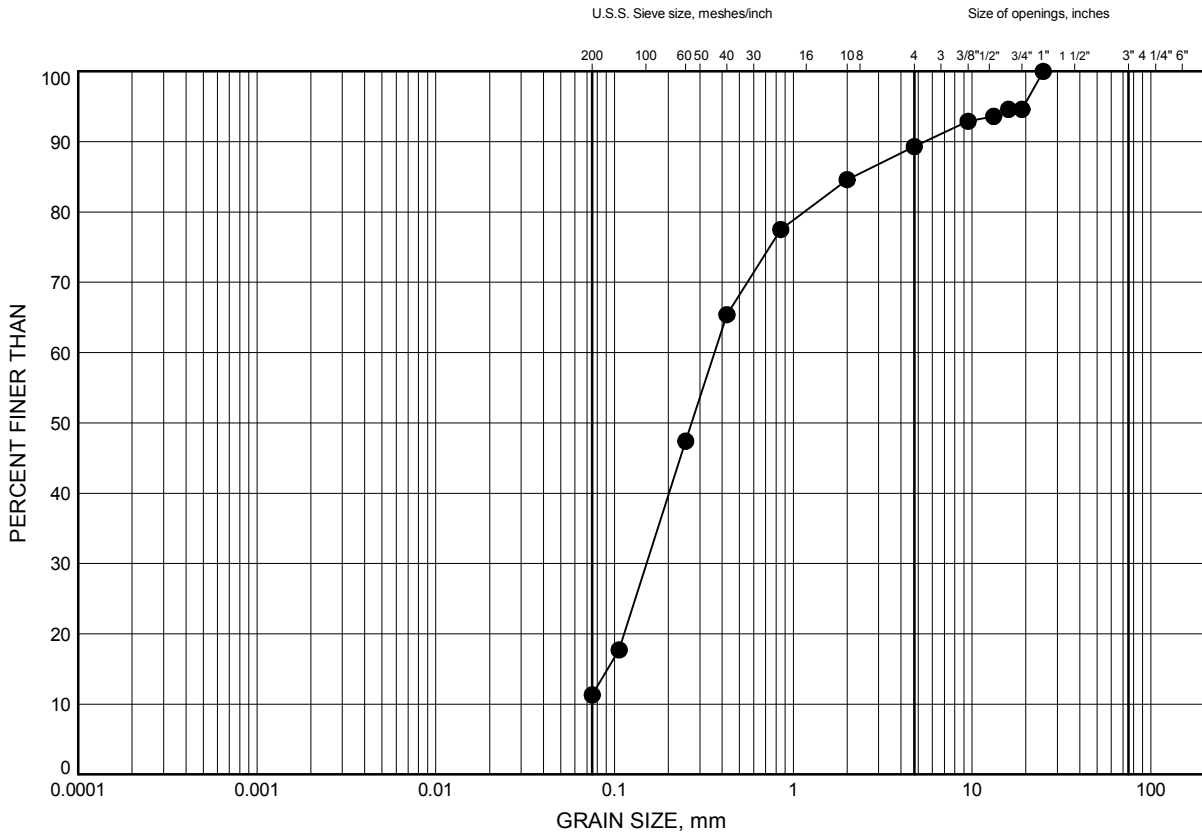
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								
								20 40 60 80 100								
	Continued From Previous Page															
							259									
			9	SS	21		258									
			10	SS	19		257									
							256									
			11	SS	42		255									
254.8																
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 4.1m AND WATER LEVEL AT 4.0m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.5m, THEN CUTTINGS TO SURFACE.															

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon GRAIN SIZE DISTRIBUTION

FIGURE AP1

SAND FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	20+855 16R	4.88	264.72

Date July 2014
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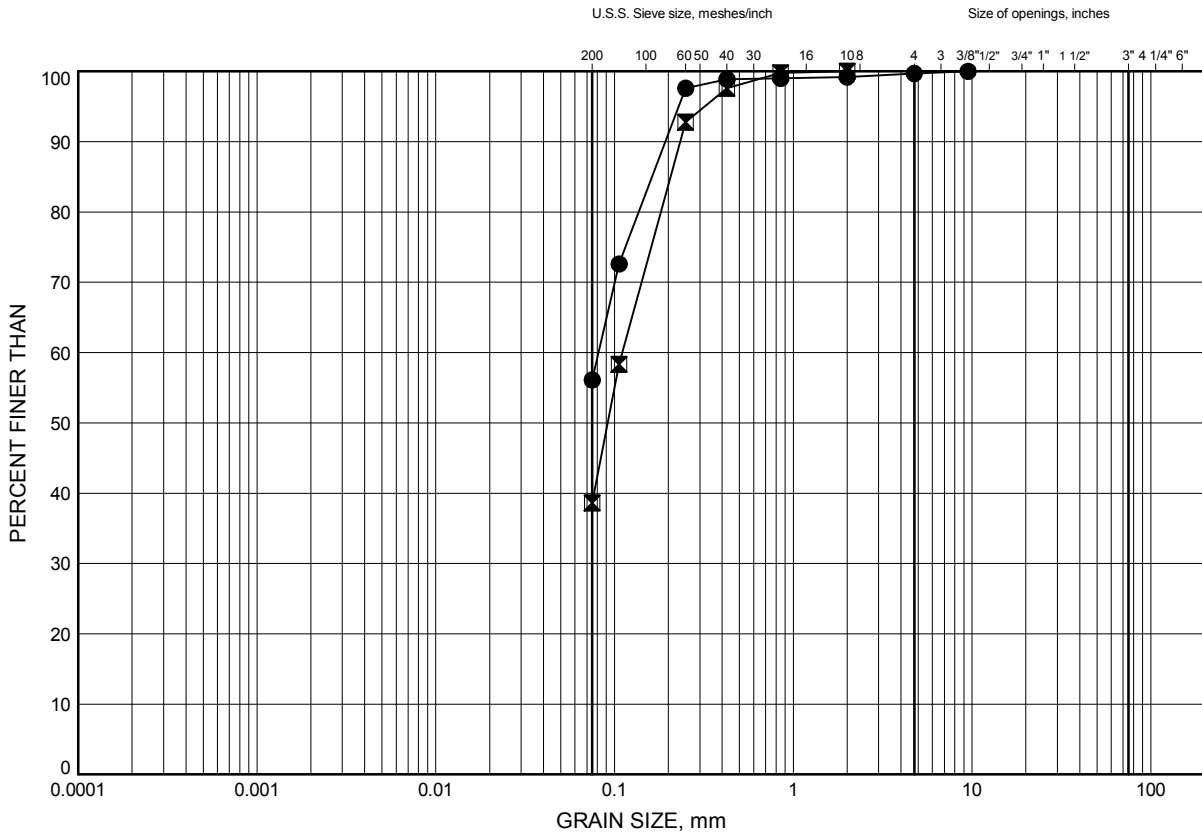


Prep'd AN
Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon
GRAIN SIZE DISTRIBUTION

FIGURE AP2

Silty SAND to SILT & SAND to SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	20+855 16R	9.45	260.15
⊠	20+865 24L	2.59	266.50

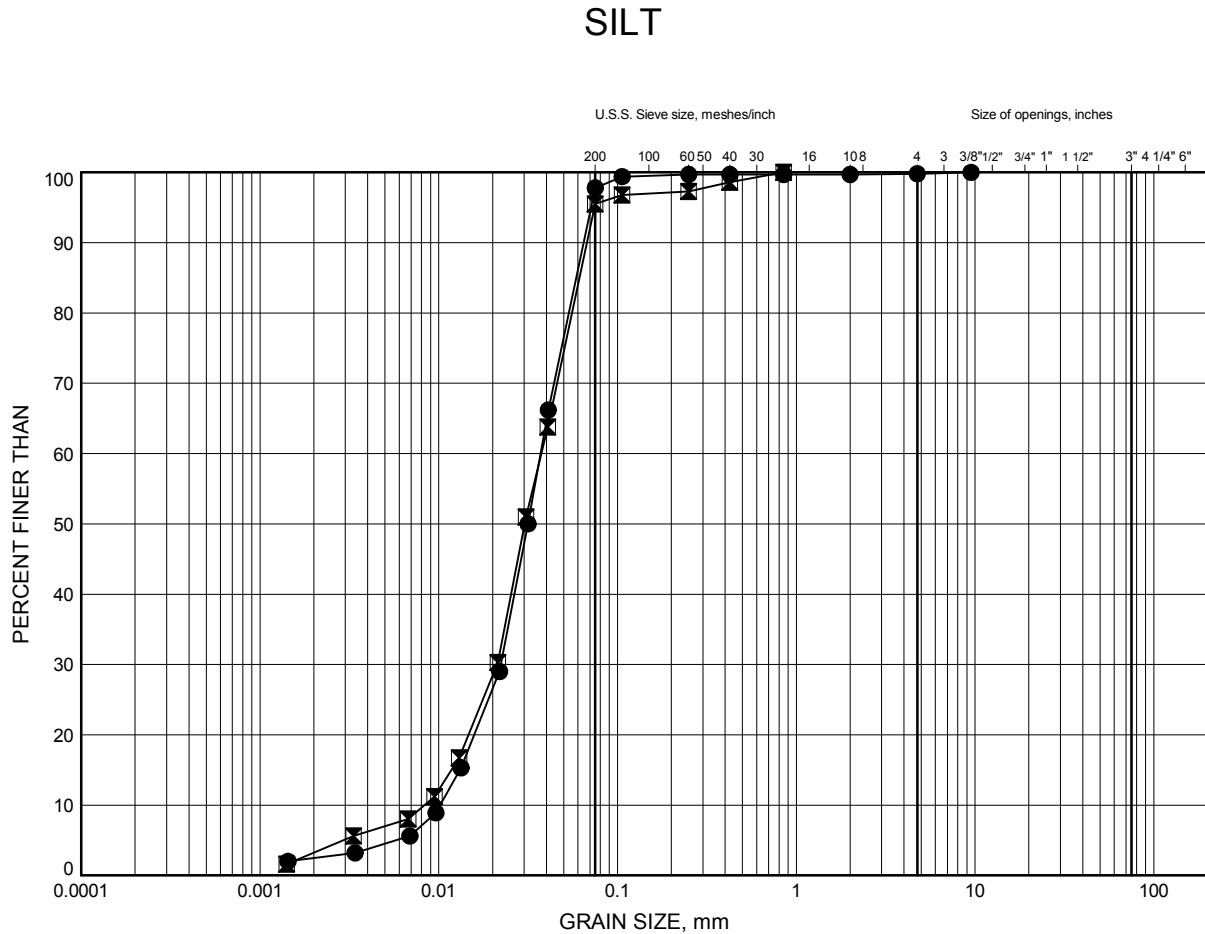
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon GRAIN SIZE DISTRIBUTION

FIGURE AP3



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	20+855 16R	14.02	255.58
⊠	20+865 24L	12.50	256.59

Date July 2014
WP# 647-89-00



Prep'd AN
Chkd. MKE

8 0 8 16m

SCALE 1:400

PLAN

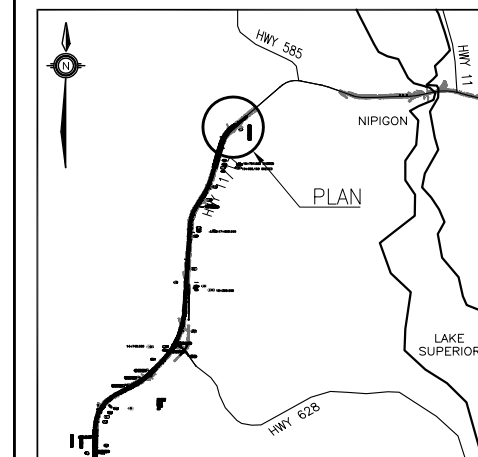
SCALE 1:400

CONT No 2014-6026
GWP No 647-89-00

HWY 11/17 FOUR LANING
EB AND WB LANES
CULVERT 37
BOREHOLE LOCATIONS AND SOIL STRATA








SHEET



KEYPLAN

LEGEND

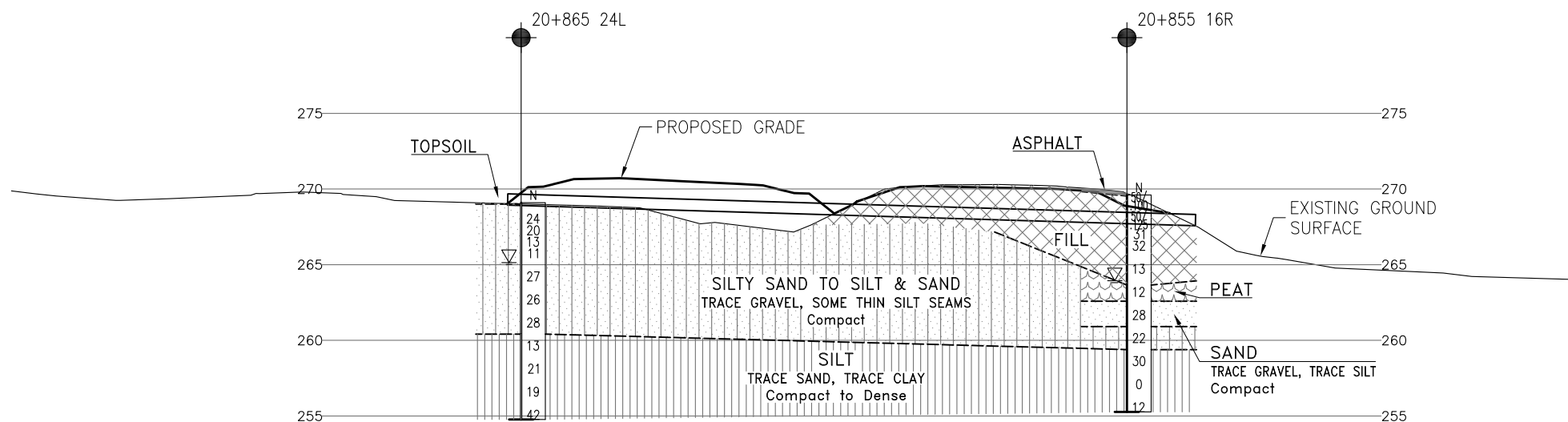
	Borehole
	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
20+855 16R	269.6	5 431 125.6	208 253
20+865 24L	269.1	5 431 163.0	208 236

-NOTES-

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GEOCRES No. 52A-184



SECTION THROUGH CULVERT 37

SCALE 1:400

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

REVISIONS									
	DATE	BY	DESCRIPTION						
DESIGN	SBP	CHK	JPL	CODE	LOAD		DATE	OCT. 20	
DRAWN	MFA	CHK	SRP	SITF	STRUCT		DWG	19	