

**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 2 / 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 B

Highway 11/17 EBL
Sta. 10+500 to 10+600



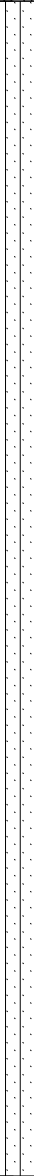
Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 10+580 05R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 143.9 E 204 586.2 ORIGINATED BY SLL
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.12.03 - 2014.03.15 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												
233.7																				
0.0	SAND , trace to some gravel, trace silt Very Dense Brown Frozen (FILL)		1	GS			233													
			2	GS																
			1	SS	88															
232.3																				
1.4	SAND , some silt to silty, trace gravel, trace clay Loose to Compact Brown Frozen to 2.2m Wet Brown to Grey Grey with thin silt seams																			
			2	SS	27															
			3	SS	6															
			4	SS	12															
														</						

Continued Next Page

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

RECORD OF BOREHOLE No 10+580 05R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 143.9 E 204 586.2 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.12.03 - 2014.03.15 CHECKED BY MEF

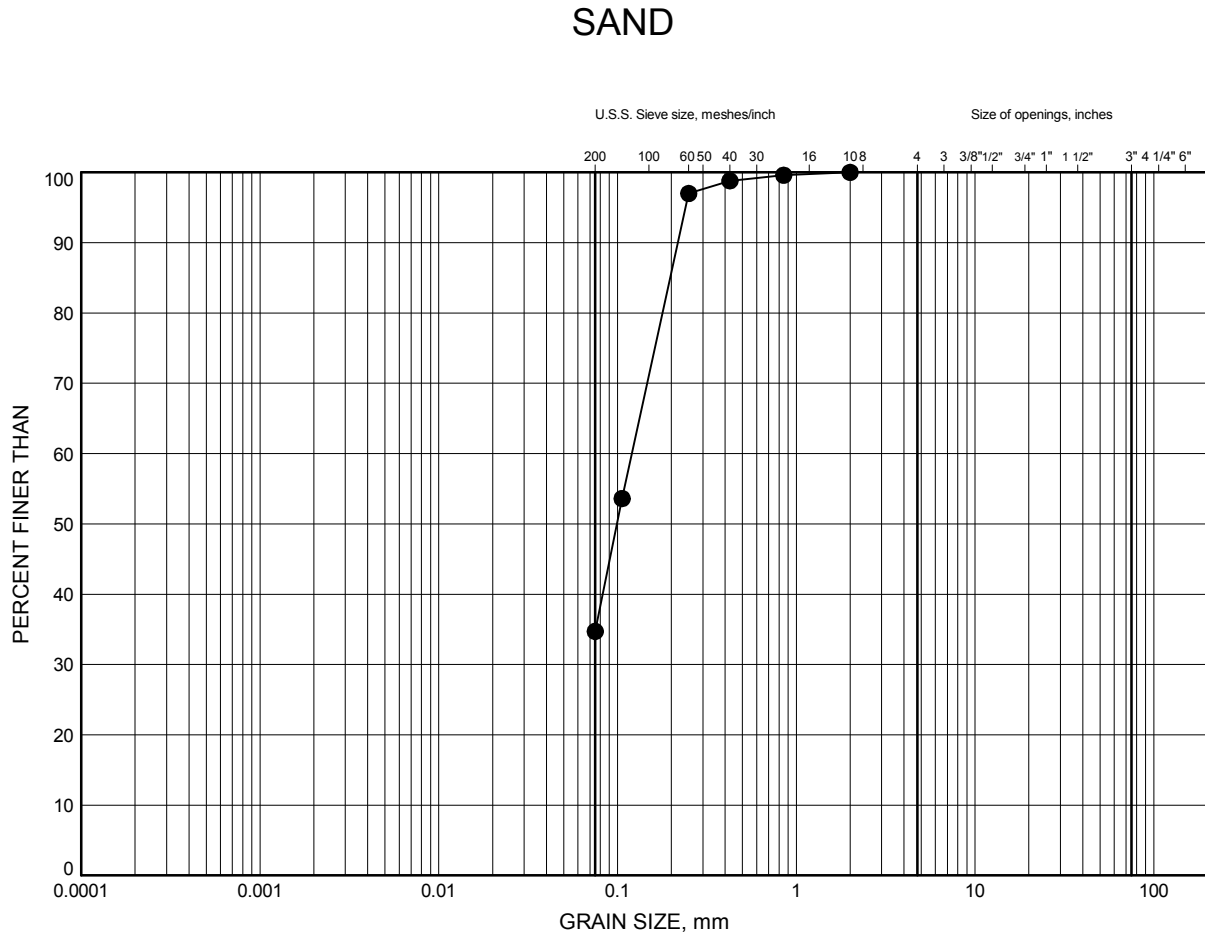
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)				
								20 40 60 80 100				W P W W L				
	Continued From Previous Page															
	SILT , trace to some sand, trace clay Loose to Compact Grey Wet		9	SS	15		223								0 8 88 4	
							222									
			10	SS	9		221									
							220									
219.3			11	SS	12											
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 6.0m AND WATER LEVEL AT 5.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.3m, 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 B1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+580 05R	2.59	231.08

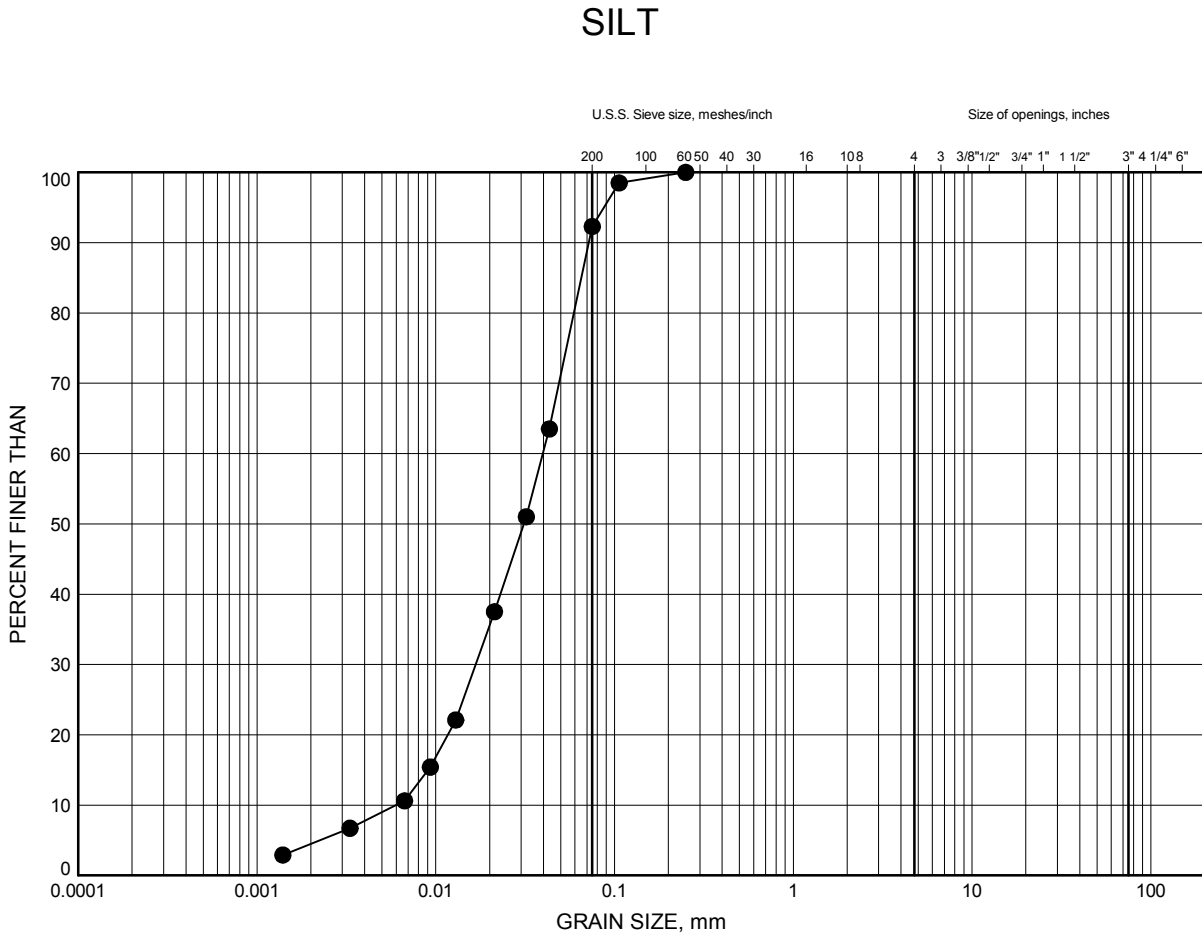
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

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

FIGURE B2



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

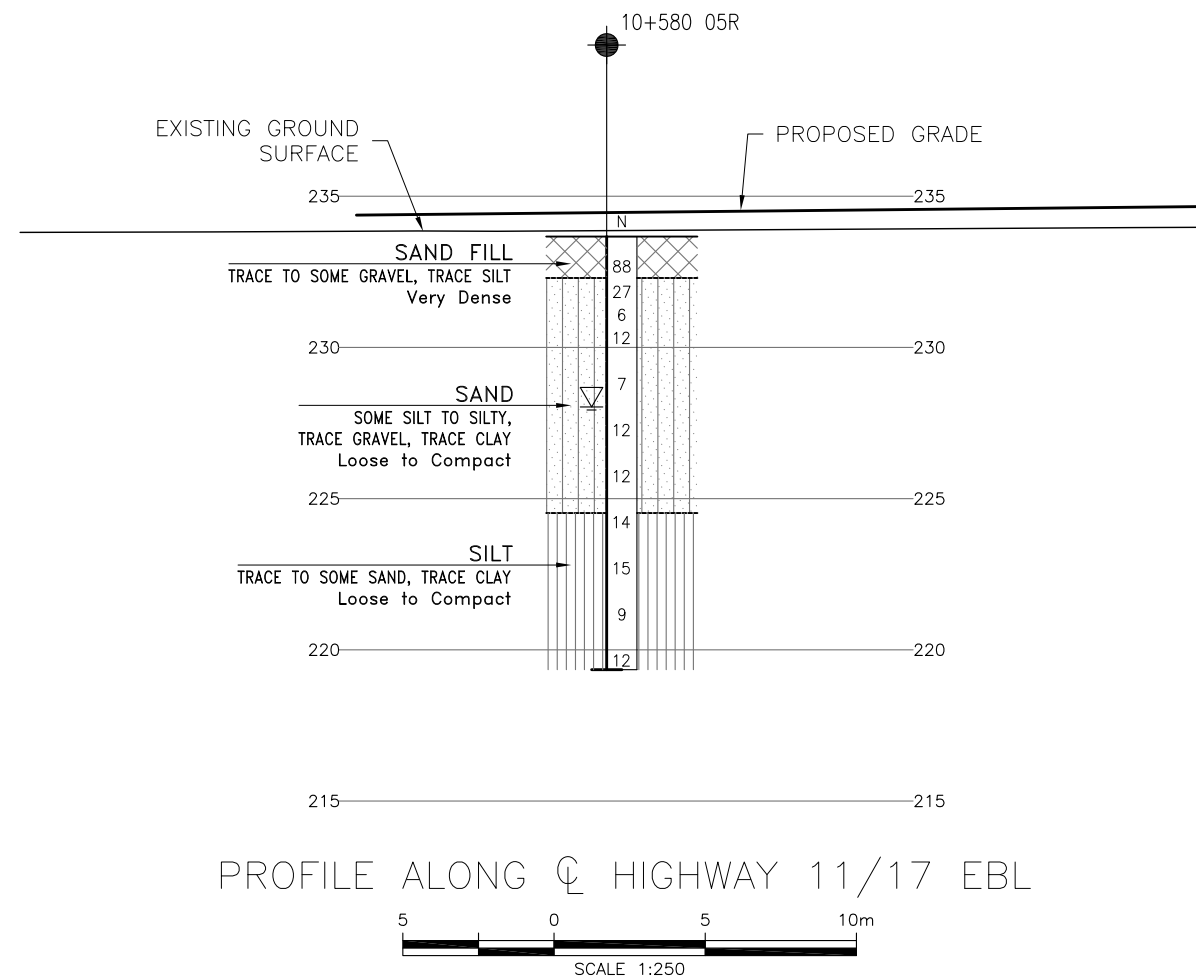
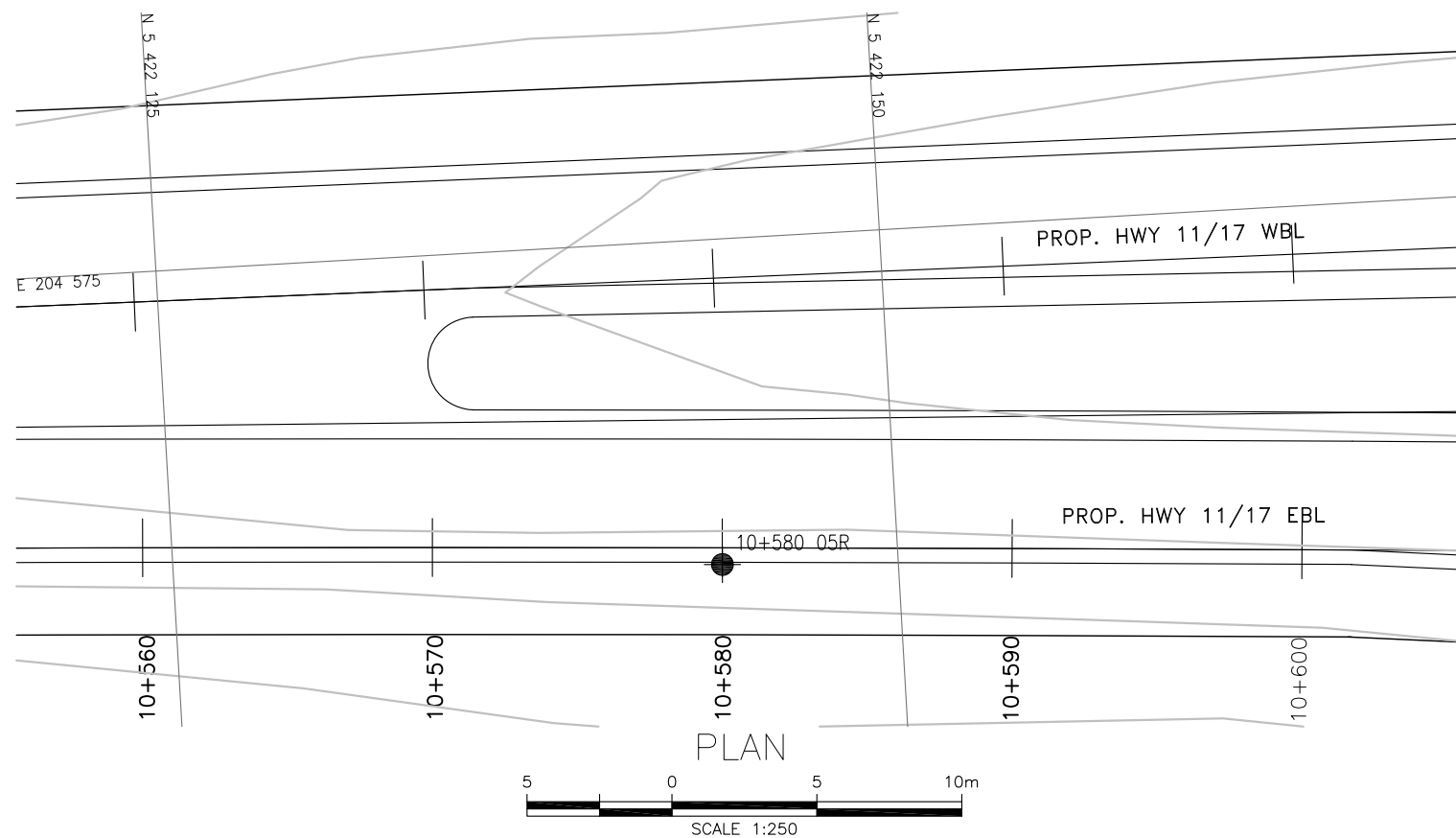
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+580 05R	10.97	222.70

Date July 2014
WP# 647-89-00



Prep'd AN
Chkd. MKE

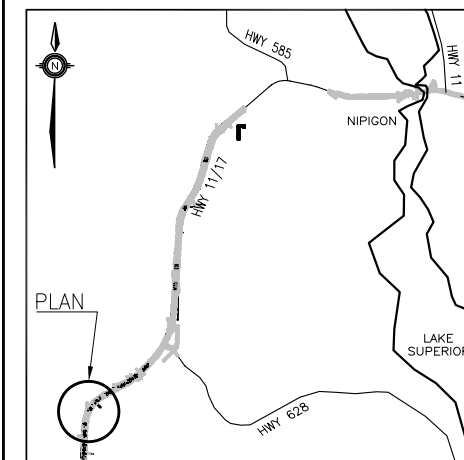


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING
EASTBOUND LANES
(STA. 10+500 TO 10+600)
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

[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. 201	
DRAWN	AN	CHK	SBP	SITE		STRUCT	DWG 1			

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

4
FILENAME: H:\Drafting\19\1351\237\ted1237-Plan&Profiles(EMBANKMENTS).dwg
PLOTDATE: 10/1/2014 3:50 PM

Appendix C

Highway 11/17 EBL and WBL

Sta. 10+600 to 10+940

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 10+750 19R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 313.5 E 204 598.1 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.04 - 2014.02.04 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					
	Continued From Previous Page																
219.3	Silty SAND to Sandy SILT , trace clay Compact Grey Wet						223										
			10	SS	14												
			11	SS	21												
12	SS	33															
14.3	END OF BOREHOLE AT 14.3m. WATER LEVEL AT 1.4m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

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

RECORD OF BOREHOLE No 10+805 22L

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 369.6 E 204 569.6 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.04 - 2014.02.04 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				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				
234.3								PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W P W W L				
0.0	TOPSOIL						234				101	
0.1	Clayey SILT, trace sand, occasional rootlets		1	SS	4							
	Firm											
233.6	Brown											
0.8	Frozen											
	SILT, trace sand to sandy, trace clay, trace rootlets, occasional sand seam		2	SS	14		233				○	
	Compact											
	Brown to Grey		3	SS	14						○	
	Wet											
	Loose		4	SS	6		232				○	
			5	SS	8		231				○	
							230					
			6	SS	17		229				○	
							228				○	
	Dense		7	SS	45							0 3 89 8
							227					
			8	SS	30		226				○	
							225				○	
			9	SS	32							

Continued Next Page

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

RECORD OF BOREHOLE No 10+805 22L

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 369.6 E 204 569.6 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.04 - 2014.02.04 CHECKED BY MEF

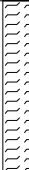



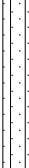

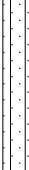
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page																
223.7	SILT, occasional sand seam Dense Grey Wet						224										
10.7	END OF BOREHOLE AT 10.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 10.7 m AND WATER LEVEL AT 1.8m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No 10+850 13R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 413.1 E 204 606.7 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.04 - 2014.02.04 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 (%)															
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																					
234.0																																
0.0	ORGANICS , trace rootlets, occasional wood fibres Compact Dark Brown Frozen		1	SS	17																											
232.9			2	SS	7															233												
1.1	Silty SAND to Sandy SILT , trace clay, trace organics Loose Brown Moist																			232												
			3	SS	10																											
	Grey		4	SS	6															231												
			5	SS	5																											
	Compact																			230												
			6	SS	22															229												
	Dense		7	SS	40	228																										
			8	SS	22	227																										
	Compact					226																										
			9	SS	24	225																										

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 10+850 13R

2 OF 2

METRIC

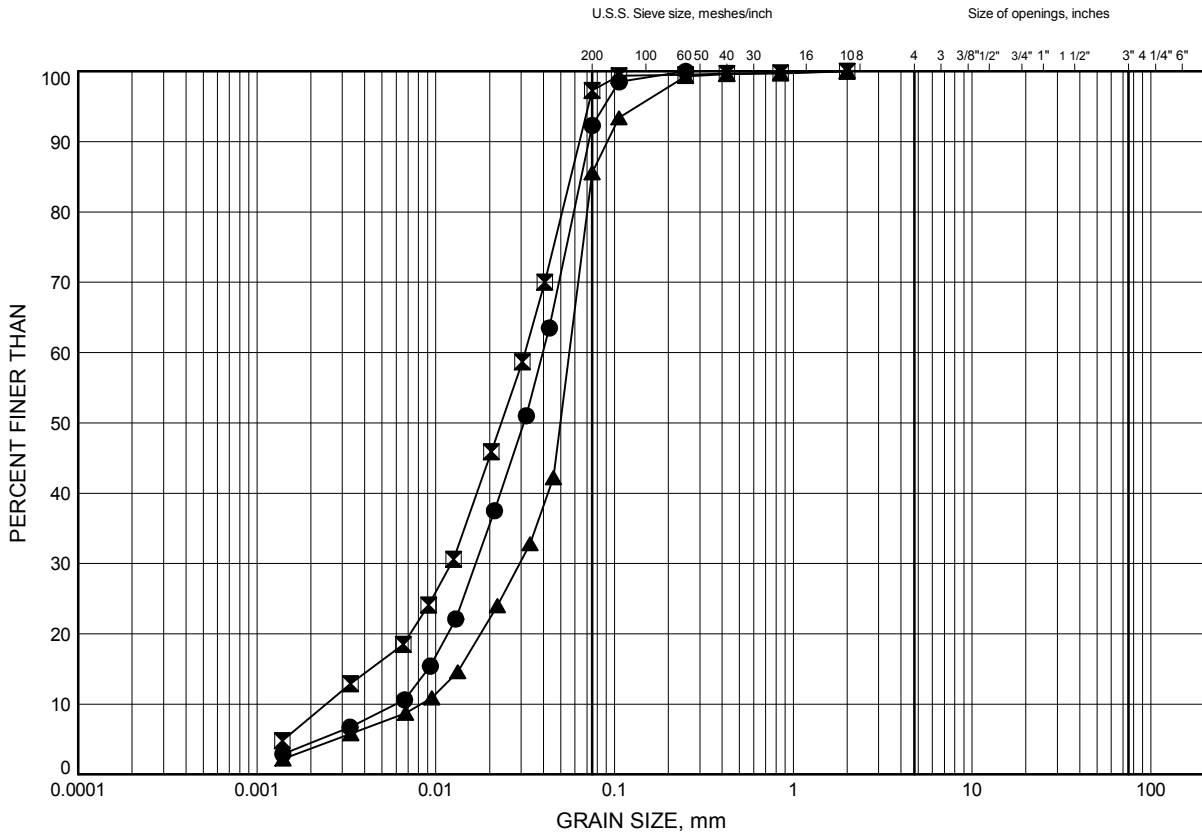
WP# 647-89-00 LOCATION N 5 422 413.1 E 204 606.7 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.04 - 2014.02.04 CHECKED BY MEF

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									
	Continued From Previous Page																
222.8	Silty SAND to Sandy SILT , trace clay Compact Grey Moist		10	SS	20		223										
11.3	END OF BOREHOLE AT 11.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. WATER LEVEL AT 1.2m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

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

FIGURE C1

SILT to Silty SAND to Sandy SILT



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

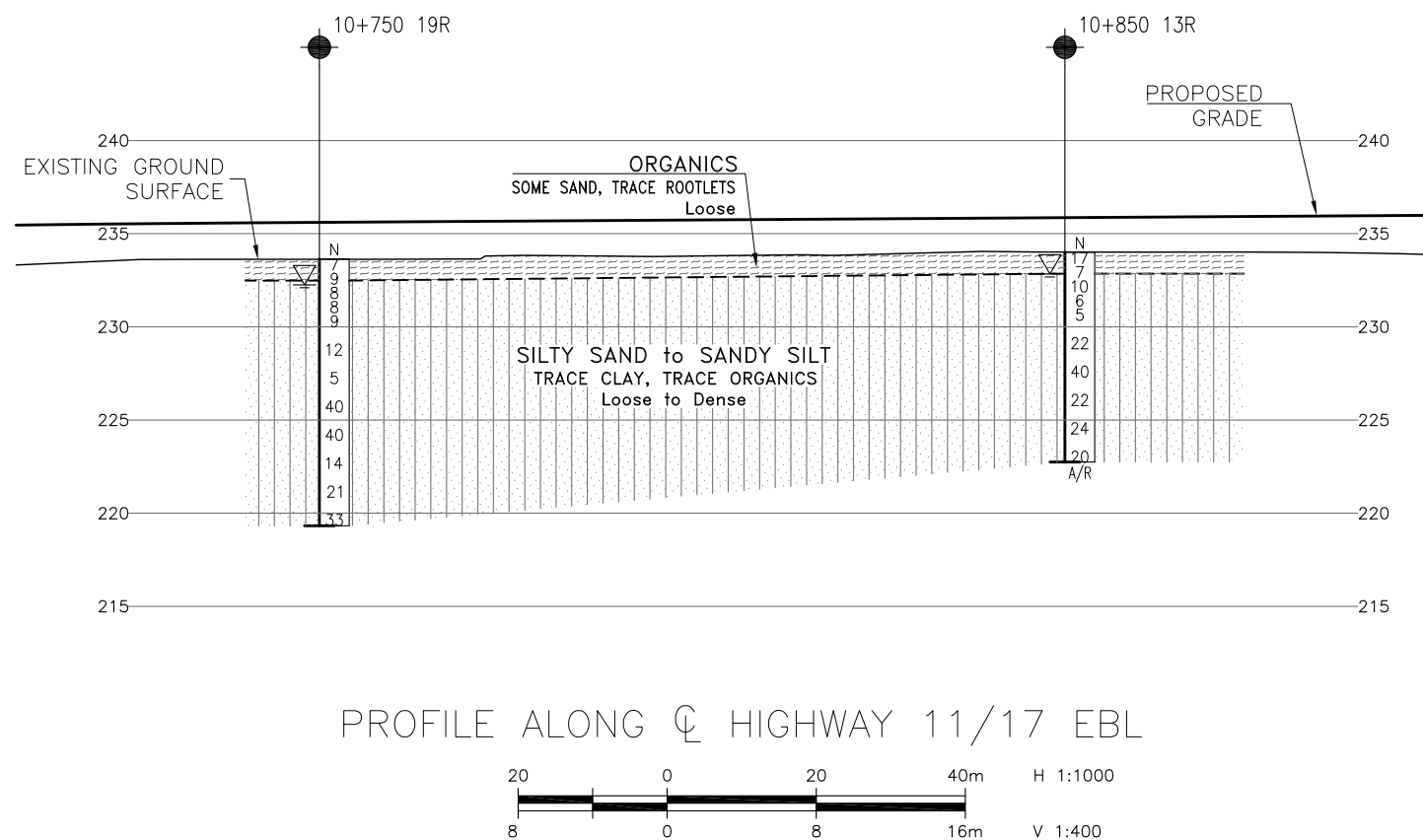
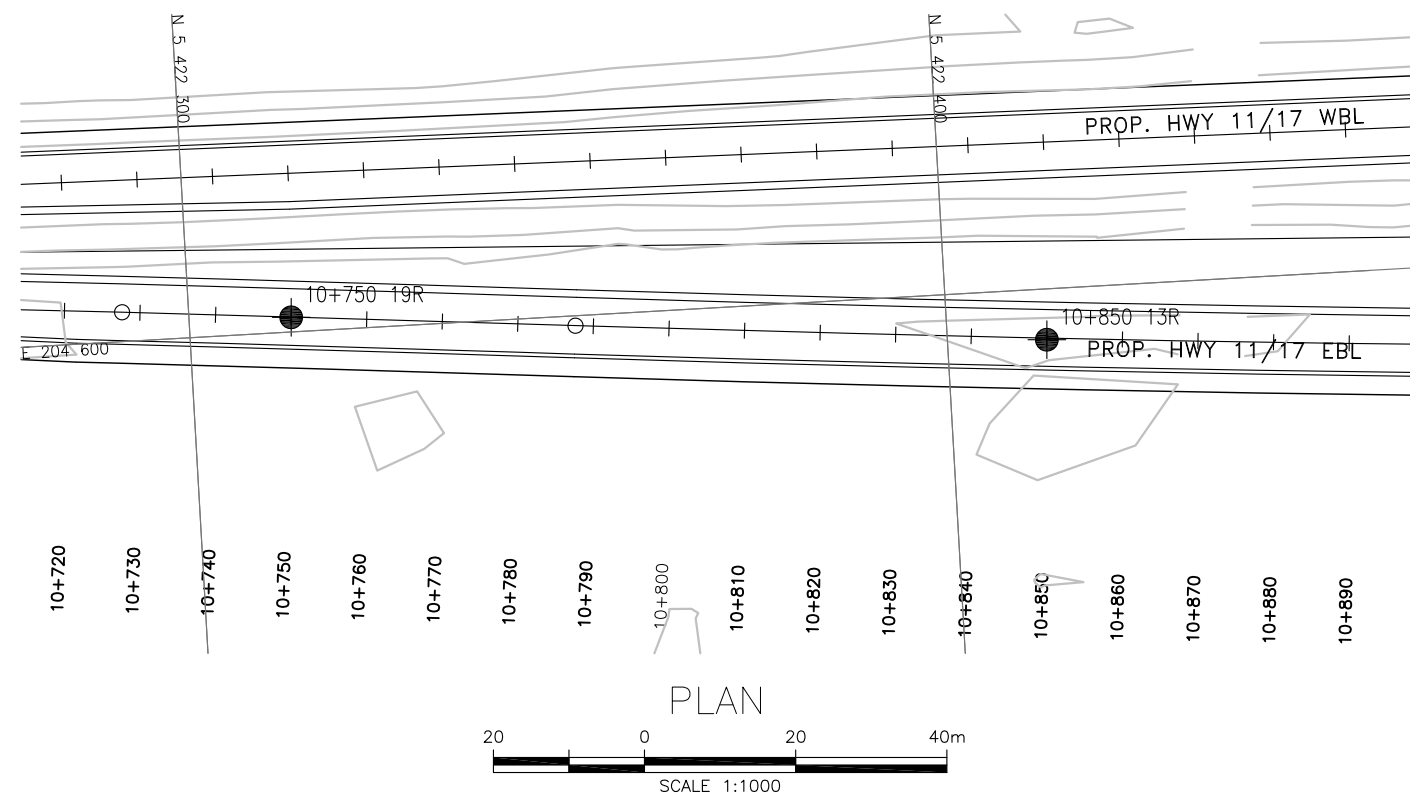
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+580 05R	10.97	222.70
⊠	10+805 22L	6.40	227.95
▲	10+850 13R	3.35	230.65

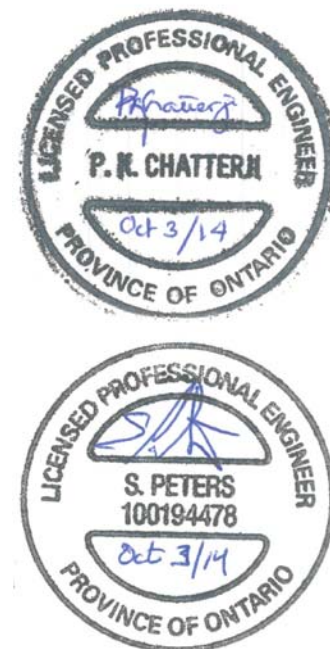
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

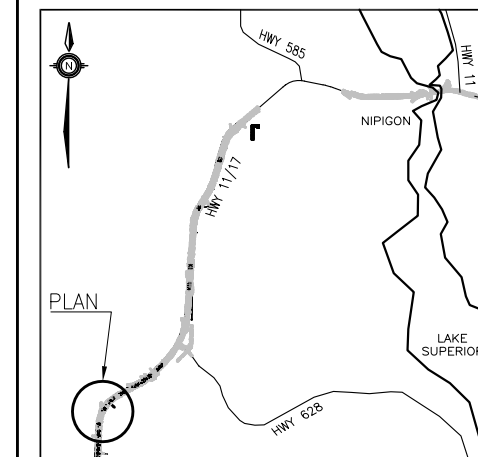


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING
EASTBOUND LANES
(STA. 10+600 TO 10+900)
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

[illegible]

-NOTES-

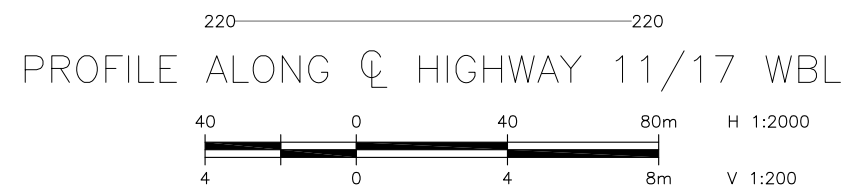
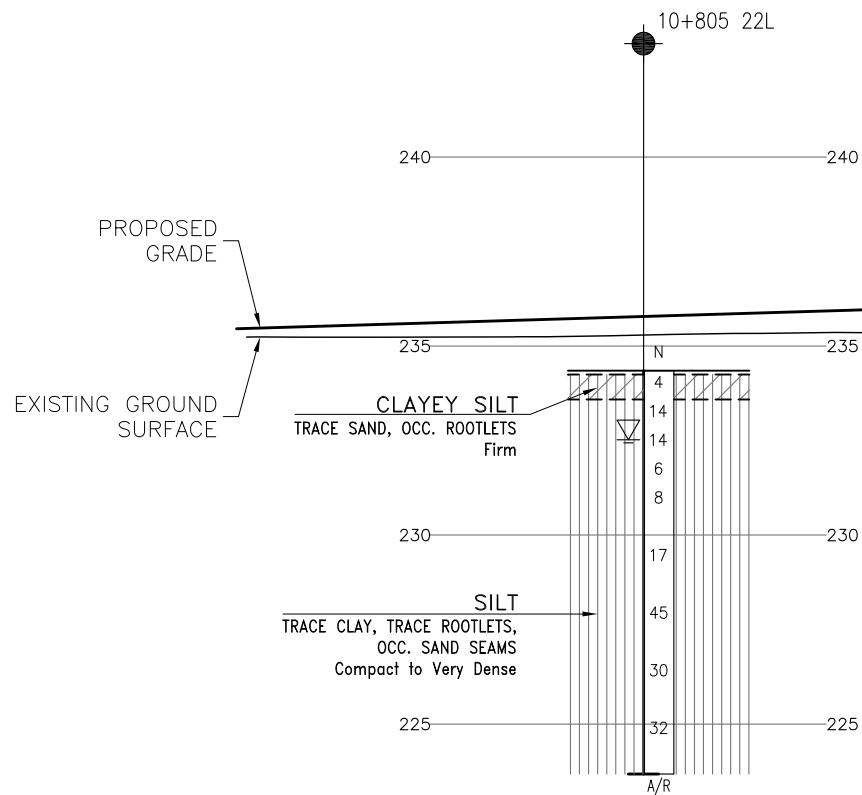
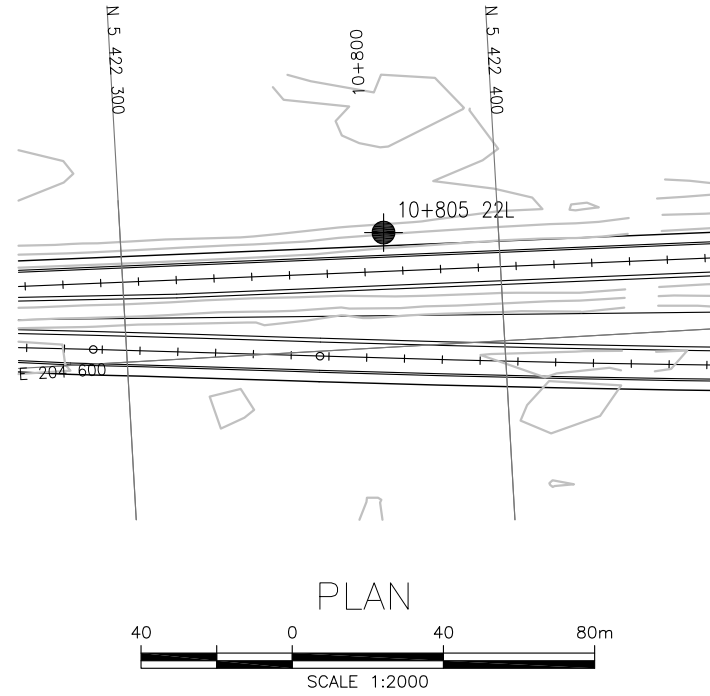
- 1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- 2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 52A-184

REVISIONS										
	DATE	BY	DESCRIPTION							
DESIGN	SBP	CHK	JPL	CODE	LOAD	DATE	OCT. 2014			
DRAWN	AN	CHK	SBP	SITE	STRUCT	DWG	2			

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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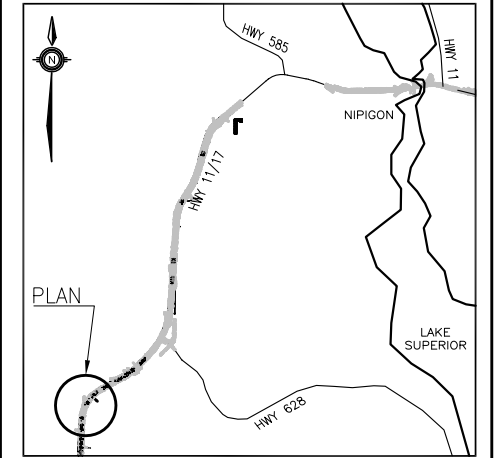


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING WESTBOUND LANES (STA. 10+750 TO 10+850) 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

[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

PLD DATE: 10/1/2014 3:30 PM

Appendix D

Highway 11/17 EBL and WBL

Sta. 10+940 to 10+950

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

RECORD OF BOREHOLE No 10+945 07R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 508.1 E 204 605.0 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.05.02 - 2014.05.02 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			20 40 60 80 100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	
233.9												
0.0	PEAT, trace roots and rootlets Dark Brown Frozen		1	SS	15							
			2	SS	4		233					
232.5												
1.4	Silty CLAY, trace sand, occasional silt seams Stiff to Soft Grey		3	SS	4		232					
								4.5				
			4	SS	0		231					
							230	1.5				
229.6												
4.3	SAND, some silt, trace clay Very Loose to Compact Grey Wet		5	SS	3		229					
							228					
			6	SS	7							
							227					
			7	SS	8		226					
							225					
			8	SS	13							
							224					

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 10+945 07R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 508.1 E 204 605.0 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.05.02 - 2014.05.02 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																
	SAND, some silt, trace clay Compact Grey Wet		9	SS	10		223										
							222										
	trace gravel		10	SS	14		221										
							220										
219.6			11	SS	14												
14.3	END OF BOREHOLE AT 14.3m. WATER LEVEL AT 1.3m 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

METRIC

[illegible]


+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 10+945 15R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 507.8 E 204 613.0 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.05.02 - 2014.05.02 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 Page							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE								
	SAND , trace silt Compact Grey Wet						223									
			10	SS	11											
			11	SS	15											
							221									
							220									
			12	SS	13											
219.5																
14.3	END OF BOREHOLE AT 14.3m. WATER LEVEL AT 1.4m 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 10+945 18L

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 509.2 E 204 580.1 ORIGINATED BY SLL
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.16 - 2014.03.16 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					
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					
WATER CONTENT (%)				20 40 60									
235.3													
0.0	SAND , trace to some gravel Brown Frozen to 1.5m (FILL)		1	GS									
	trace silt		1	SS	50/ .075								
			2	SS	50/ .025								
	Loose Moist		3	SS	8								
232.6				4	SS	2							
2.7	Silty CLAY , trace sand, trace gravel, with silt seams Stiff Grey												
			5	SS	2								
229.4													
5.9	SAND , some silt Loose Grey Wet		6	SS	4								
	Dense		7	SS	49								
	Compact		8	SS	15								

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 10+945 18L

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 509.2 E 204 580.1 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.16 - 2014.03.16 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							
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							
Continued From Previous Page							WATER CONTENT (%)								
							20 40 60								
222.0	SAND , some silt Loose to Compact Grey Wet		9	SS	8		225								
224															
223			10	SS	12										
222															
13.3	SILT , trace sand, trace clay Compact Grey Wet		11	SS	16		222								
221.0															
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 4.3m AND WATER LEVEL AT 3.9m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.7m, THEN CUTTINGS TO SURFACE.						221								






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

RECORD OF BOREHOLE No 10+945 27L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 422 509.6 E 204 571.1 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.04 - 2014.02.04 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								
234.0						▽										
0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	27										218	
233.2																
0.8	SILT, trace sand, trace rootlets Compact to Loose Brown Wet		2	SS	12		233								148	
			3	SS	7											
231.7							232									
2.3	Silty CLAY, trace sand Firm Brown		4	SS	6		231									
	frequent silt seams		5	SS	5											
230.3																
3.7	Silty SAND, trace clay Compact Brown Wet					230										
			6	SS	24	229									0 64 31 5	
228.2																
5.8	SILT, some sand Dense Brown Wet		7	SS	32	228										
227.3																
6.7	END OF BOREHOLE AT 6.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 6.7 m AND WATER LEVEL AT 1.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.															

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

METRIC

[illegible]

+³, ×³: Numbers refer to Sensitivity

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			SHEAR STRENGTH kPa		W P W W L				WATER CONTENT (%)
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
	Continued From Previous Page							20 40 60 80 100						
222.0			9	SS	9		223							
11.7	Sandy SILT, trace clay Compact Grey Wet						222							
			10	SS	16		221							
							220							
219.5			11	SS	15		219							
14.3	END OF DRILLING AT 14.3m, BEGIN DCPT.						218							
							217							
							216							
							215							
							214							

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 10+945 27R

3 OF 3

METRIC

WP# 647-89-00 LOCATION N 5 422 507.3 E 204 625.0 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.06.02 - 2014.06.02 CHECKED BY MEF

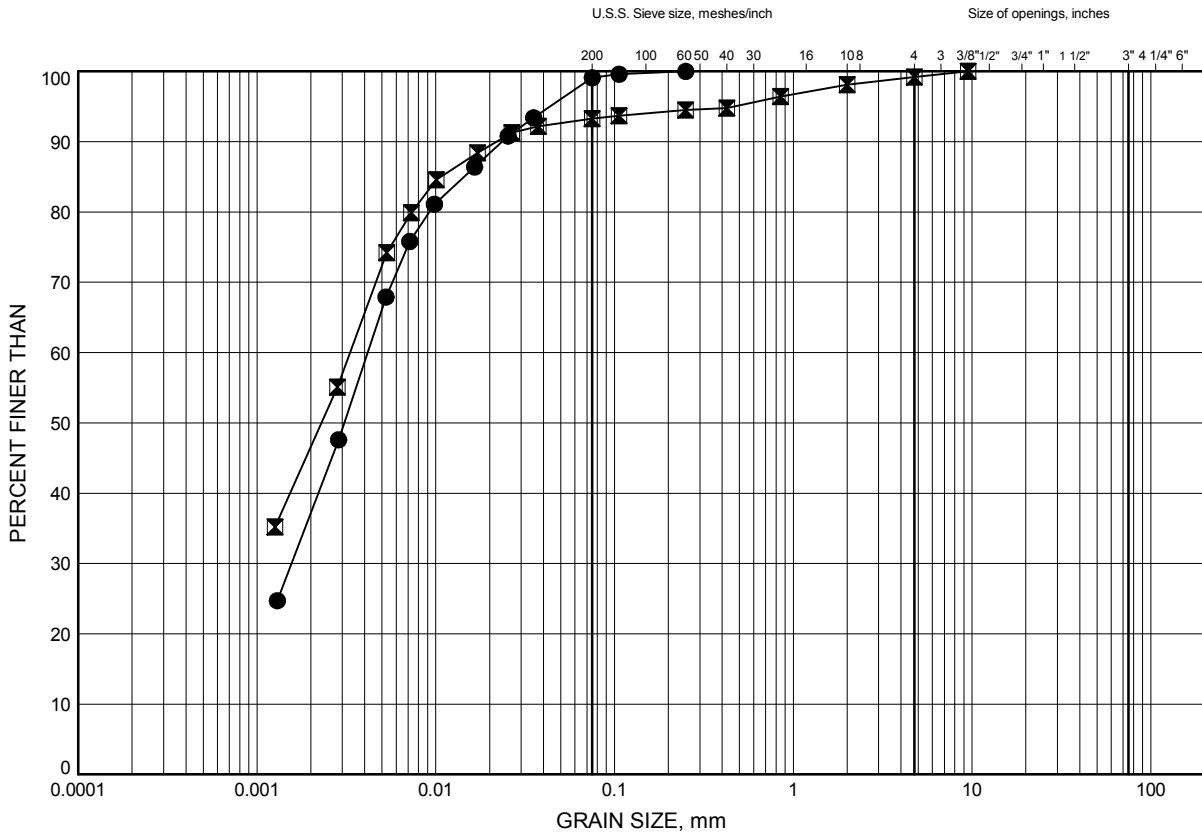
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
	Continued From Previous Page							20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	W P W W L				
212.5							213						
21.2	END OF BOREHOLE AT 21.2m UPON REFUSAL. 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 1.0 232.8												

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

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

FIGURE D1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+945 15R	1.83	231.95
⊠	10+945 18L	3.35	231.95

Date July 2014
 WP# 647-89-00

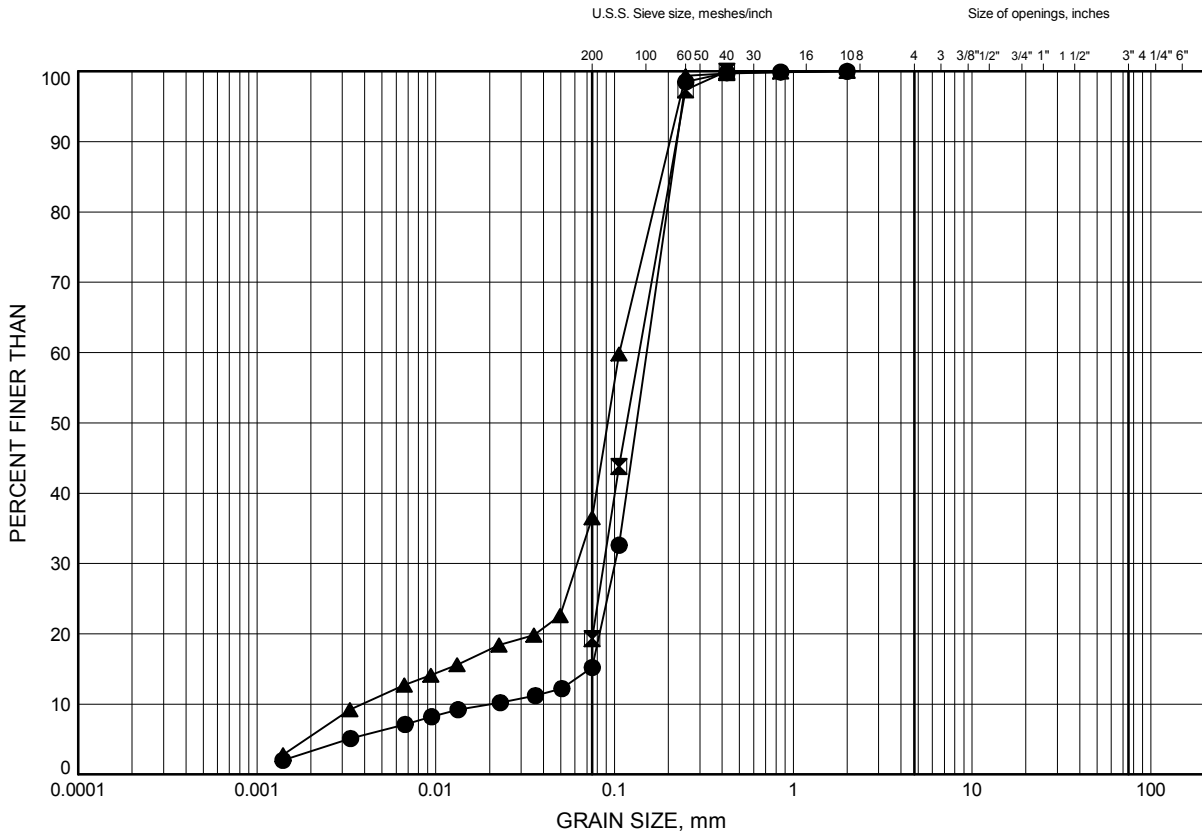


Prep'd AN
 Chkd. MKE

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

FIGURE D2

Silty SAND to SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+945 07R	6.40	227.51
⊠	10+945 18L	7.92	227.38
▲	10+945 27L	4.88	229.13

Date July 2014
 WP# 647-89-00

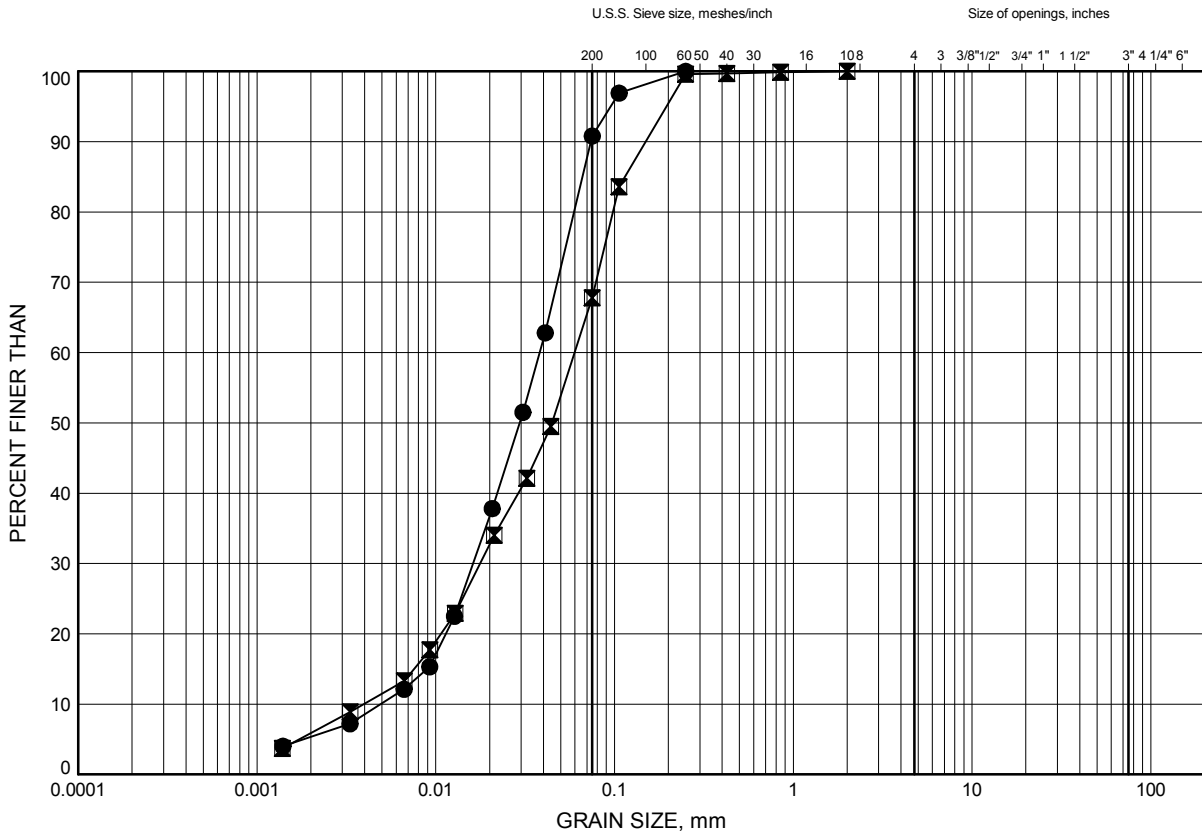


Prep'd AN
 Chkd. MKE

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

FIGURE D3

SILT to Sandy SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+945 18L	14.02	221.28
⊠	10+945 27R	12.50	221.28

Date July 2014
 WP# 647-89-00

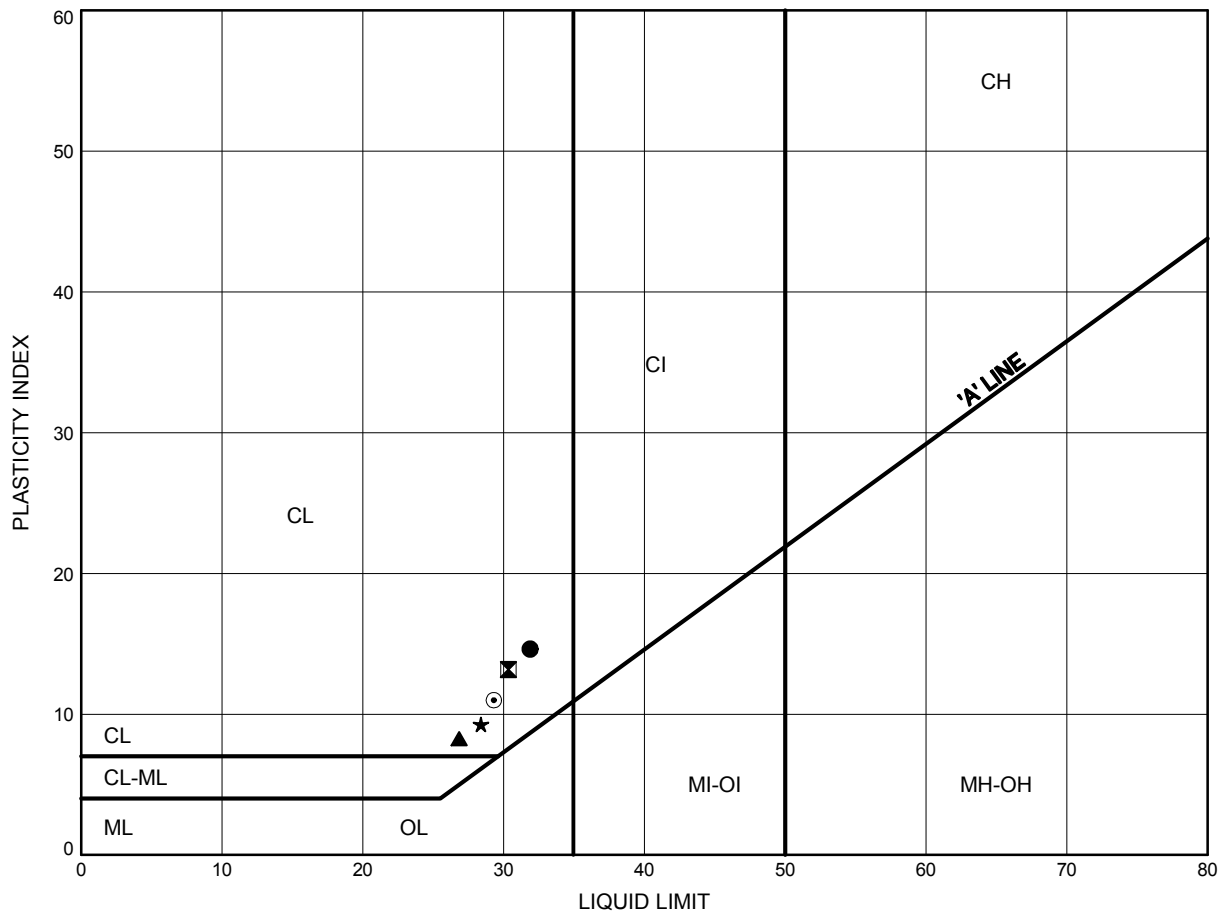


Prep'd AN
 Chkd. MKE

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

FIGURE D4

Silty CLAY



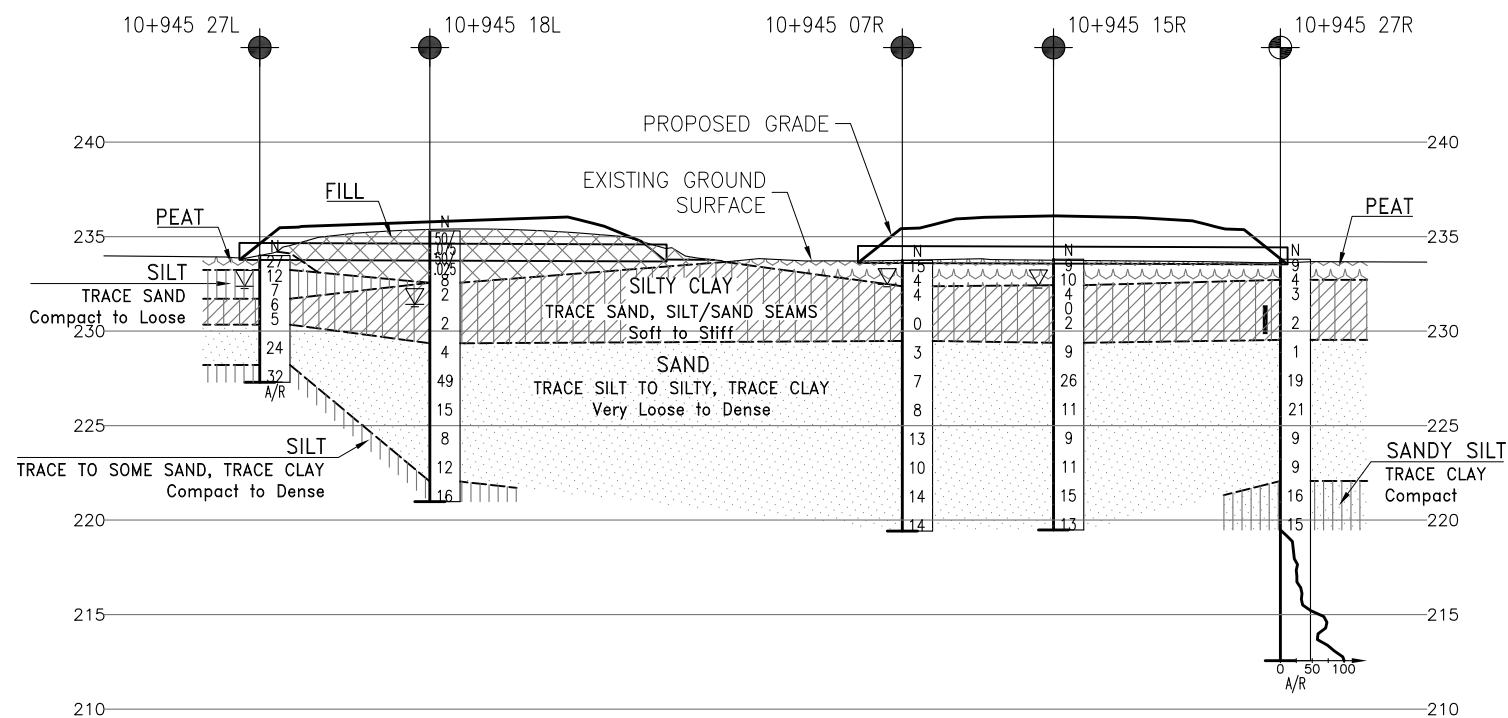
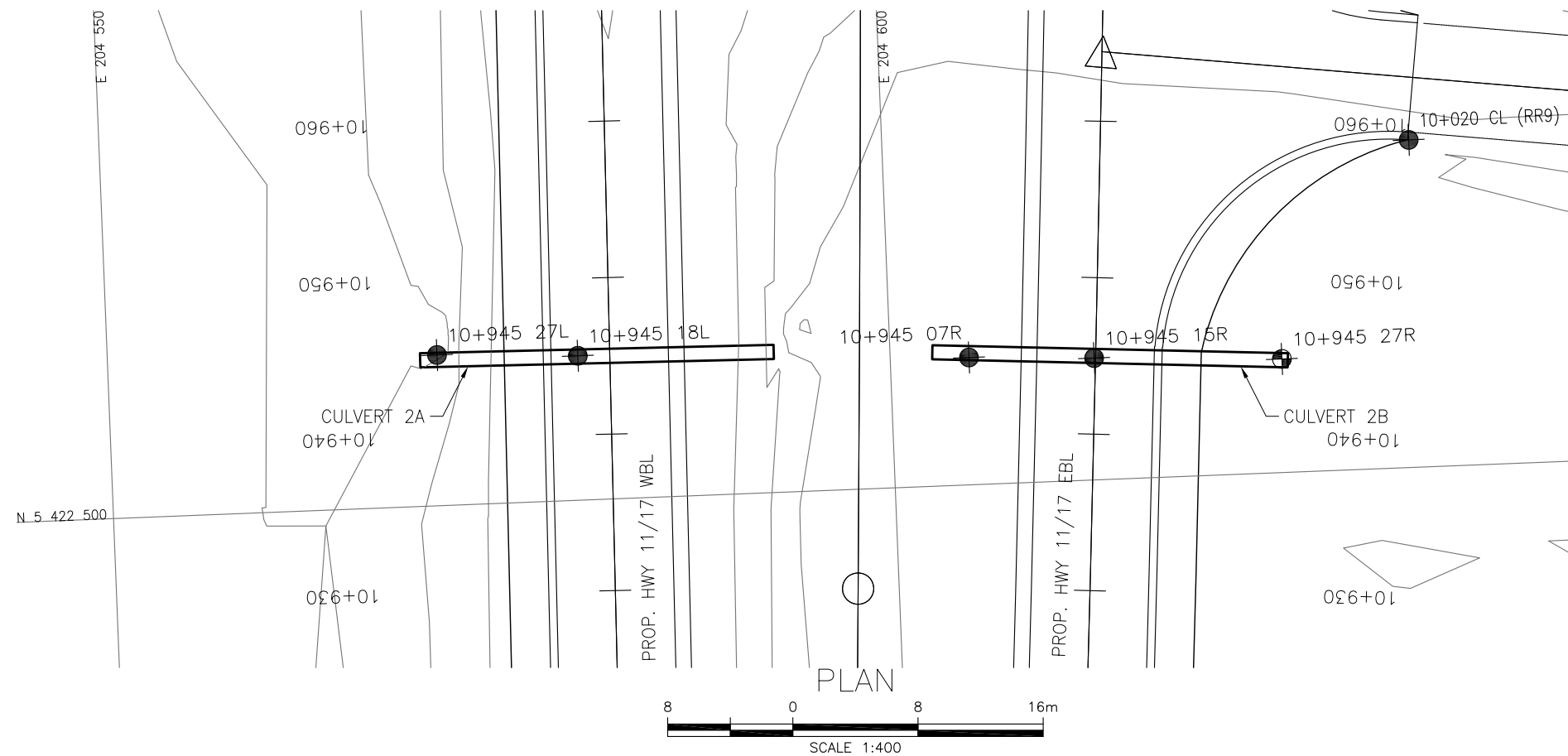
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+945 07R	1.83	232.09
⊠	10+945 15R	1.83	231.95
▲	10+945 18L	3.35	231.95
★	10+945 27L	3.35	230.65
⊙	10+945 27R	3.35	230.43

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



SECTION THROUGH CULVERT 2A AND 2B



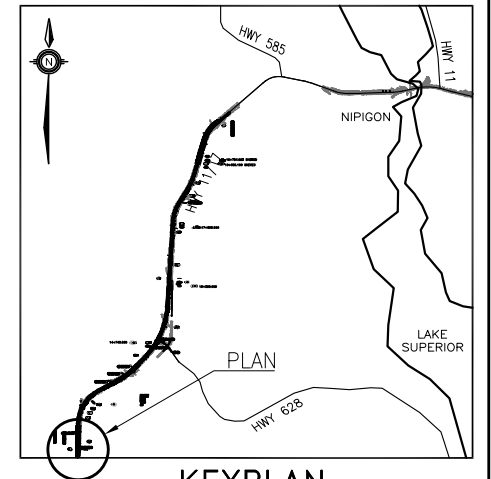
DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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
EB AND WB LANES
CULVERT 2A AND 2B
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

[illegible]

Appendix E

Off Highway 11/17 Sta. 10+965

Red Rock Road #9

Record of Borehole Sheets






Laboratory Test Results

Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 10+020 CL (RR9) 1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 426 765.8 E 207 022.5 ORIGINATED BY SLL
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.14 - 2014.03.14 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 (%)					GR	SA	SI	CL	
232.1								20	40	60	80	100										
0.0	SAND , some gravel		1	GS			232							○								
231.8	Brown																					
0.4	Frozen		2	GS																		
231.5	(FILL)																					
0.6	ORGANICS , peaty, fibrous																					
	Black		1	SS	100/																	
	Silty SAND , trace gravel, trace clay, trace rootlets				200		231							○								
	Very Dense																					
	Brown																					
	Frozen		2	SS	36									○					5	51	39	5
	with thin silt seams						230															
	Dense																					
	Loose		3	SS	4									○								
229.1																						
3.0	Silty CLAY , trace sand						229															
	Stiff		4	SS	1									○								
	Grey																					
							228			6.0												
			5	SS	2													0	1	58	41	
							227															
226.6																						
5.5	Silty SAND , trace clay						226							○								
	Loose		6	SS	0																	
	Grey																					
	Wet																					
							225															
	Compact		7	SS	15									○								
							224															
							223							○								
			8	SS	9														0	77	23 (SI+CL)	

Continued Next Page

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

RECORD OF BOREHOLE No 10+020 CL (RR9) 2 OF 2 METRIC

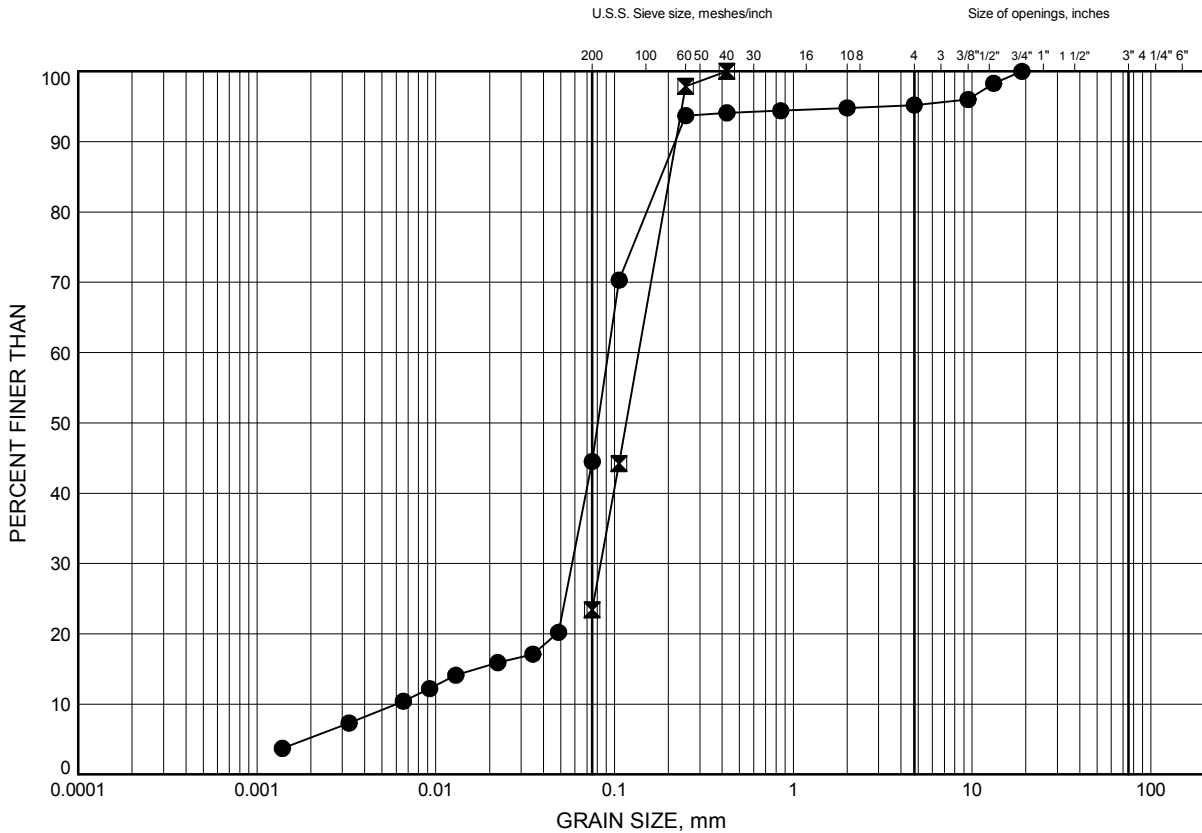
WP# 647-89-00 LOCATION N 5 426 765.8 E 207 022.5 ORIGINATED BY SLL
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.14 - 2014.03.14 CHECKED BY MKE

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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE								
	Continued From Previous Page						20 40 60 80 100									
217.8	Silty SAND Compact Grey Wet						222									
			9	SS	17		221									
							220									
			10	SS	28		219									
							218									
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 4.2m AND WATER LEVEL AT 3.3m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.7m, THEN CUTTINGS TO SURFACE.															

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

FIGURE E1

Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+020 CL (RR9)	1.83	230.29
⊠	10+020 CL (RR9)	9.45	222.67

Date July 2014
WP# 647-89-00

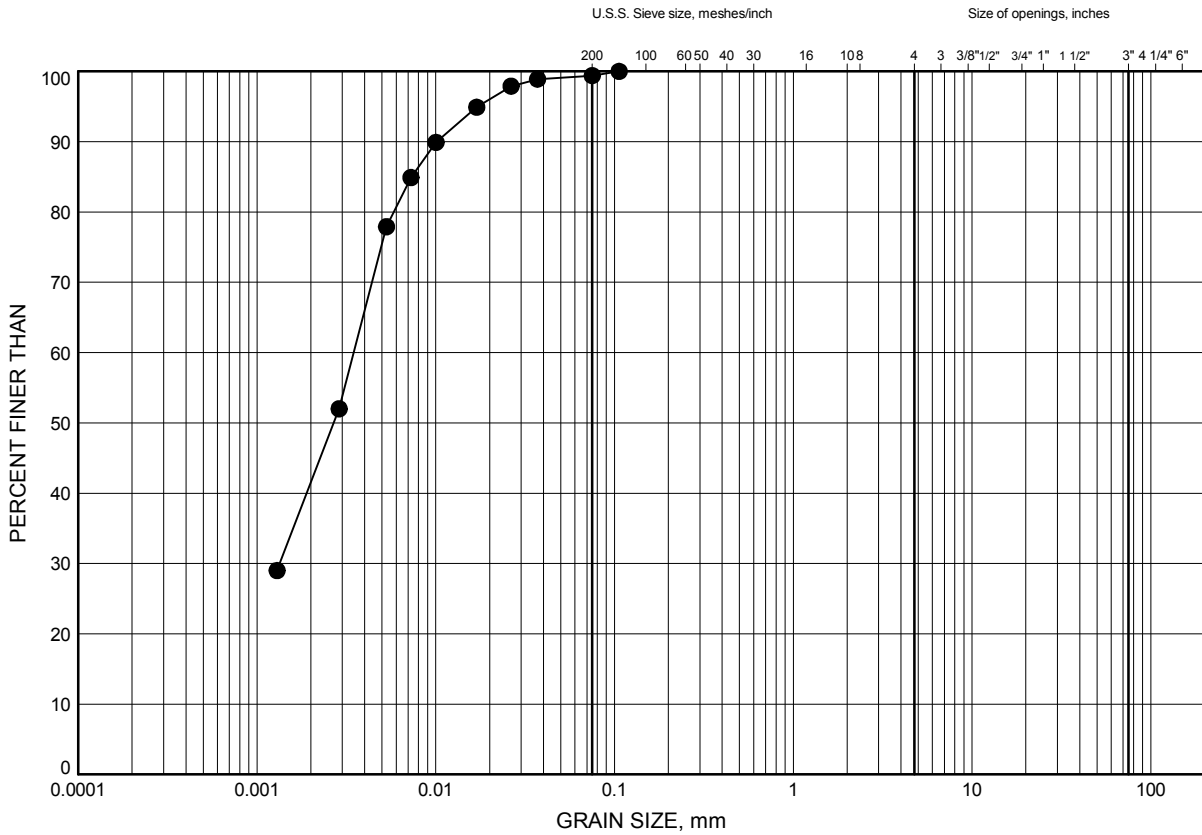


Prep'd AN
Chkd. MKE

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

FIGURE E2

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 (RR9)	4.88	227.24

Date July 2014
 WP# 647-89-00

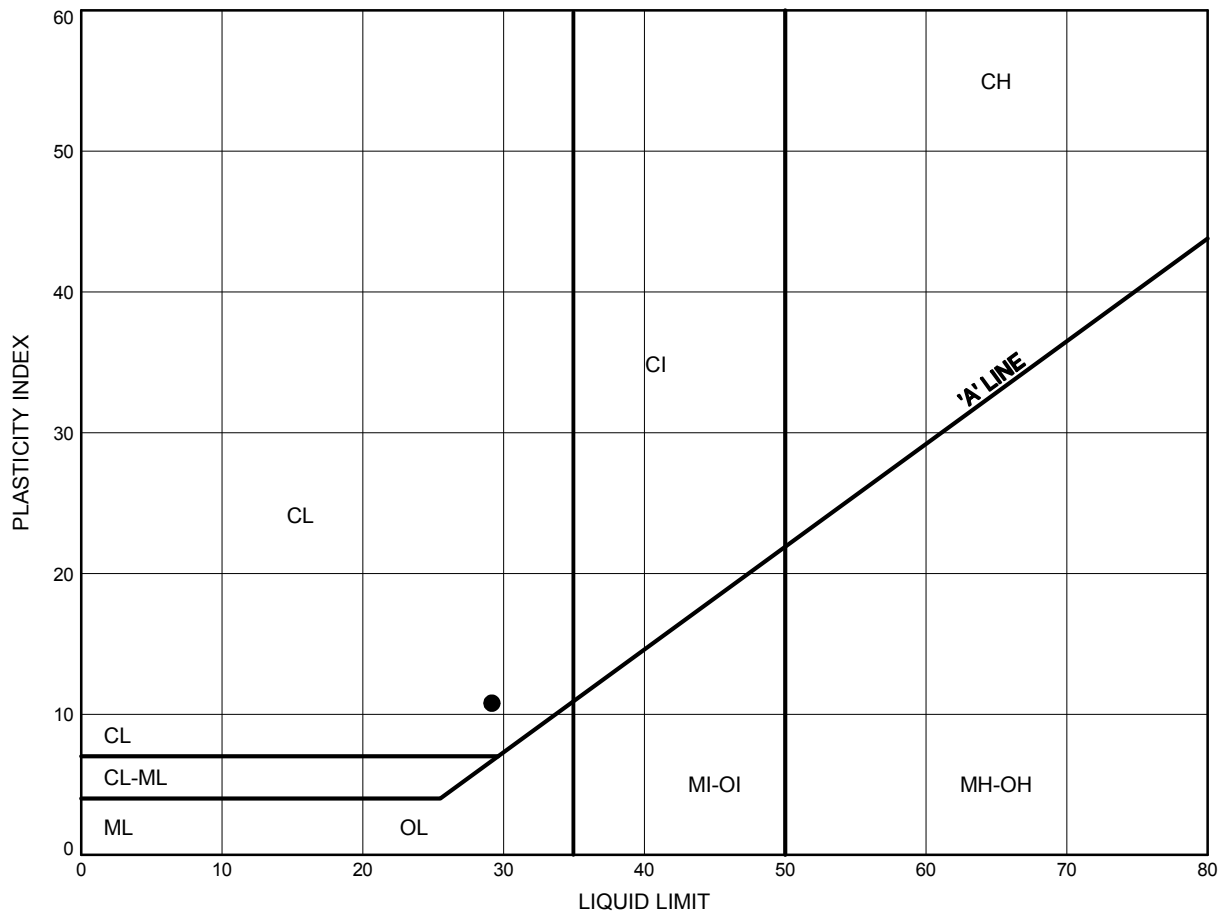


Prep'd AN
 Chkd. MKE

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

FIGURE E3

Silty CLAY



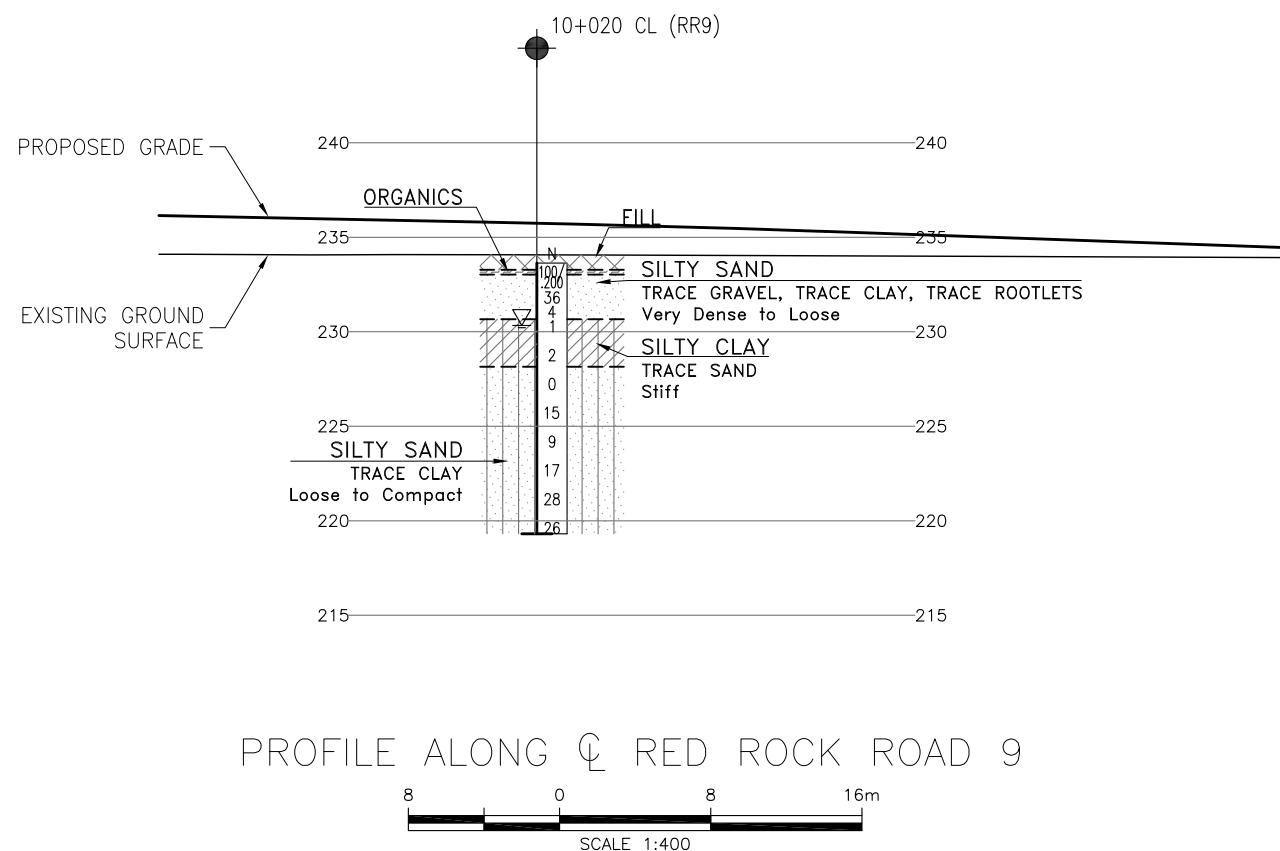
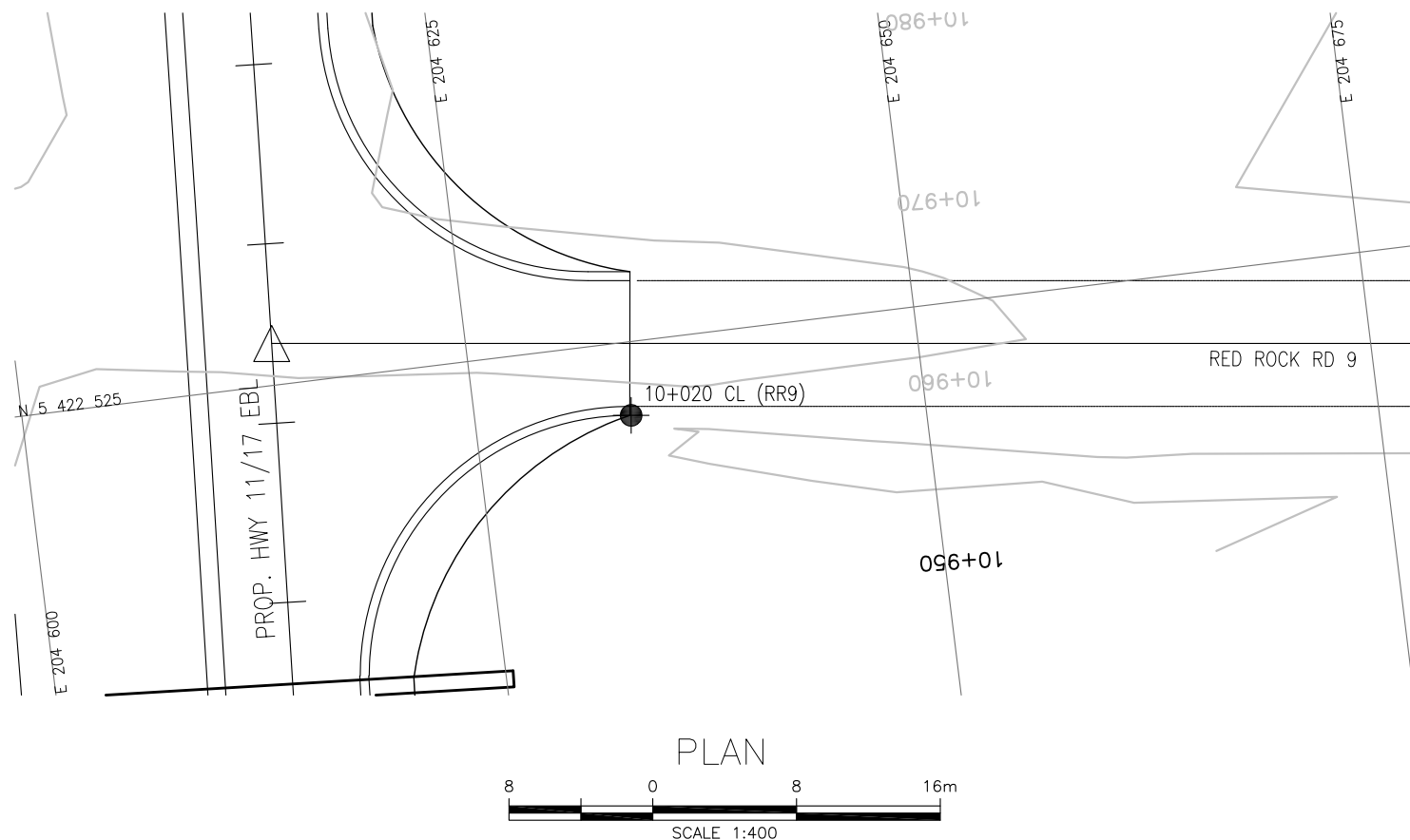
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+020 CL (RR9)	4.88	227.24

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

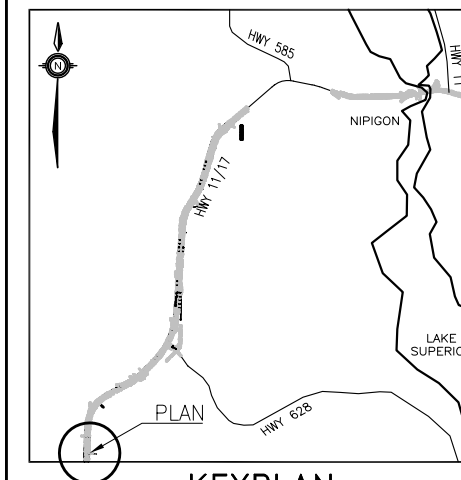


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING
RED ROCK ROAD 9
(STA. 10+010 TO 10+040)
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

[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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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Appendix F

Highway 11/17 EBL and WBL

Sta. 10+950 to 11+160

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

RECORD OF BOREHOLE No 11+050 17R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 612.8 E 204 618.9 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.07 - 2014.02.07 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 (%) 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					
234.3													
0.0	ORGANICS , trace roots and rootlets Loose Dark Brown Frozen occasional wood fibres		1	SS	7	∇	234					487	
			2	SS	5		233					500	
232.6													
1.6	Silty CLAY , trace sand Stiff to Firm Brown		3	SS	3		232						
	Grey		4	SS	0		231						
230.0							230						
4.3	Silty SAND , trace clay Very Loose Grey Wet		5	SS	3		229						
	Compact		6	SS	25	228							
	Grey to Brown Some silt		7	SS	25	227							
						226							
			8	SS	16	225							

Continued Next Page

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

RECORD OF BOREHOLE No 11+050 17R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 422 612.8 E 204 618.9 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.07 - 2014.02.07 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 (%) 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							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
								20 40 60 80 100						
								WATER CONTENT (%)						
								20 40 60						
							</							



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

RECORD OF BOREHOLE No 11+050 28L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 422 614.4 E 204 573.9 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.05.02 - 2014.05.02 CHECKED BY MEF

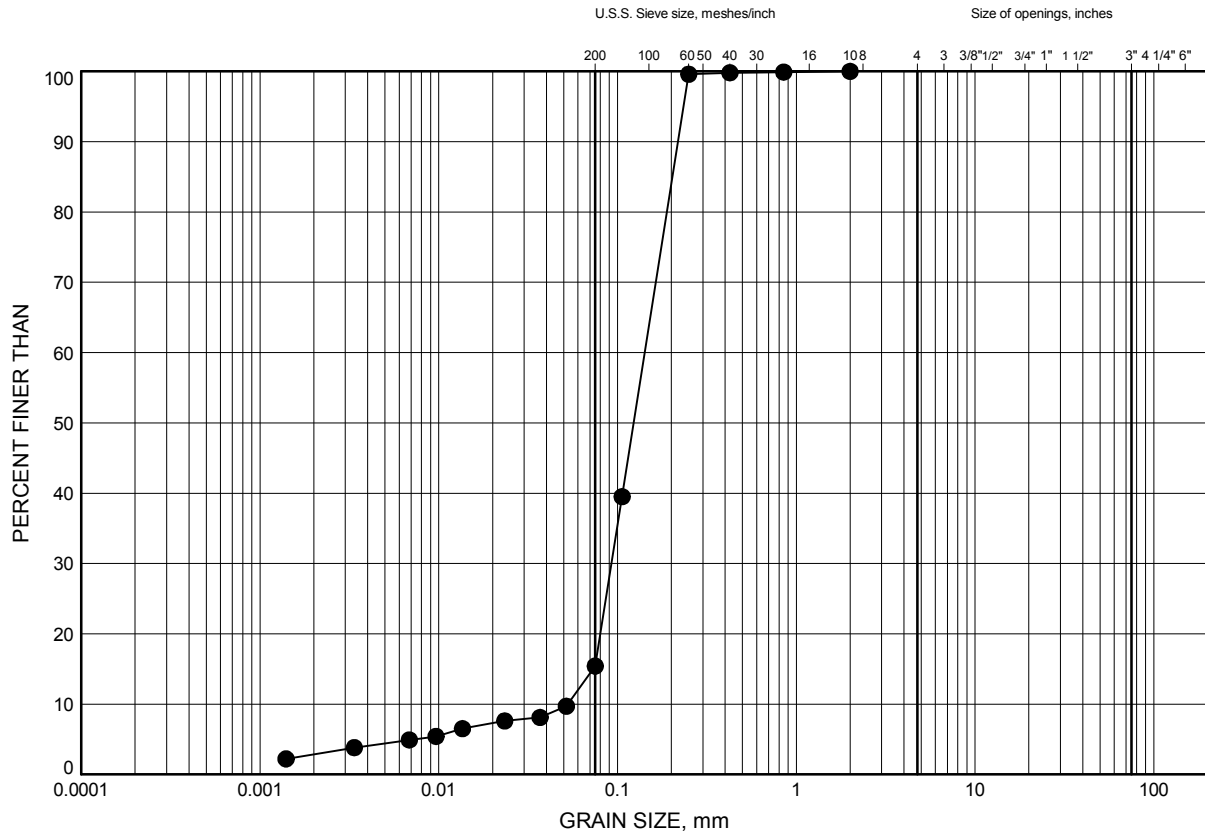
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)	
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE										
								20 40 60 80 100									20 40 60	
235.0																		
0.0	SAND , trace silt, occasional rootlets Compact Dark Brown Frozen		1	SS	28													
234.3																		
0.6	Silty CLAY Very Stiff to Firm Brown		2	SS	18		234											
			3	SS	7		233											
232.7																		
2.3	SAND , occasional silt seam Compact Brown to Black Wet Grey to Black		4	SS	13		232											
			5	SS	22													
							231											
			6	SS	25		230											
							229											
							228											
							227											
226.4																		
8.5	END OF BOREHOLE AT 8.5m. BOREHOLE OPEN TO 4.6 m AND WATER LEVEL AT 1.5m 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

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

FIGURE F1

Silty SAND to SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+050 17R	7.92	226.34

Date July 2014
 WP# 647-89-00



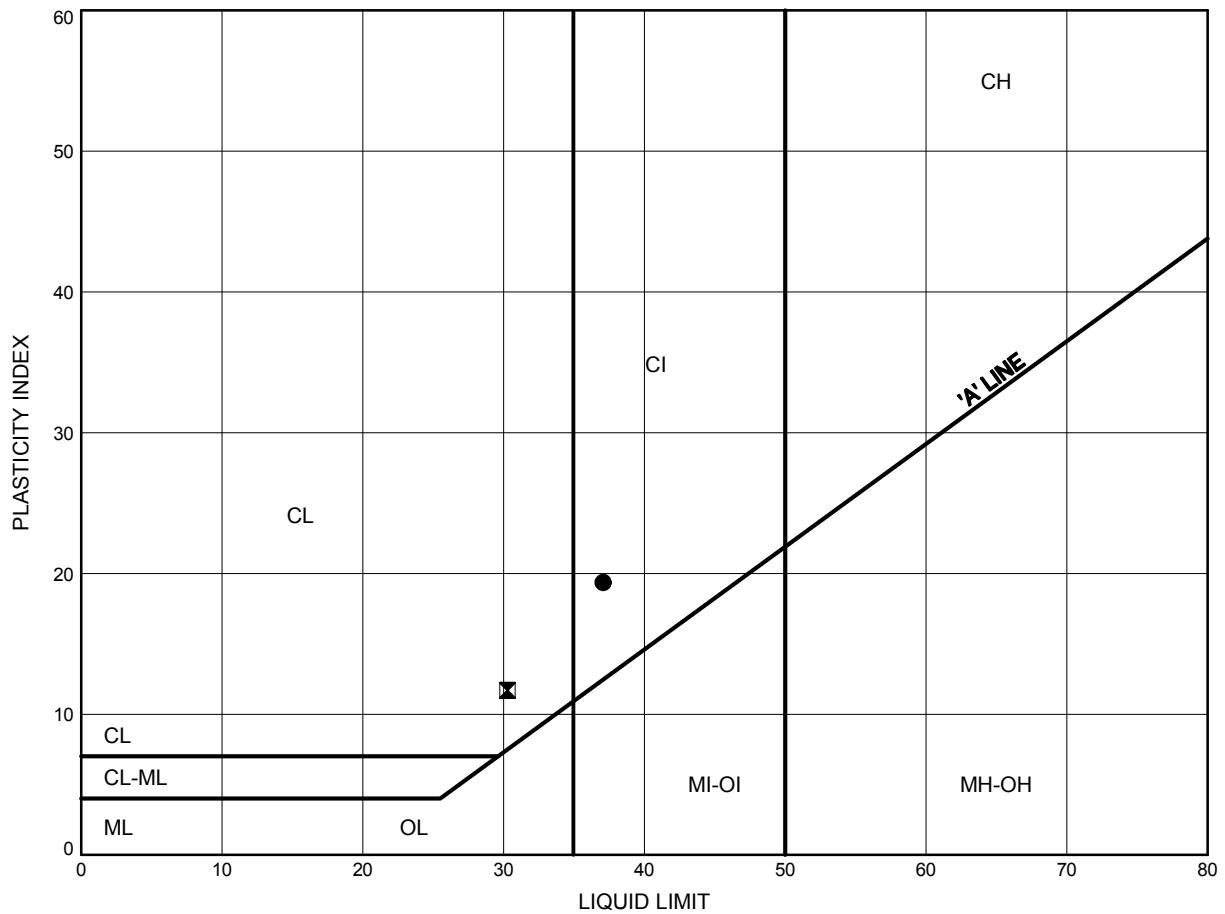
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE F2

Silty CLAY



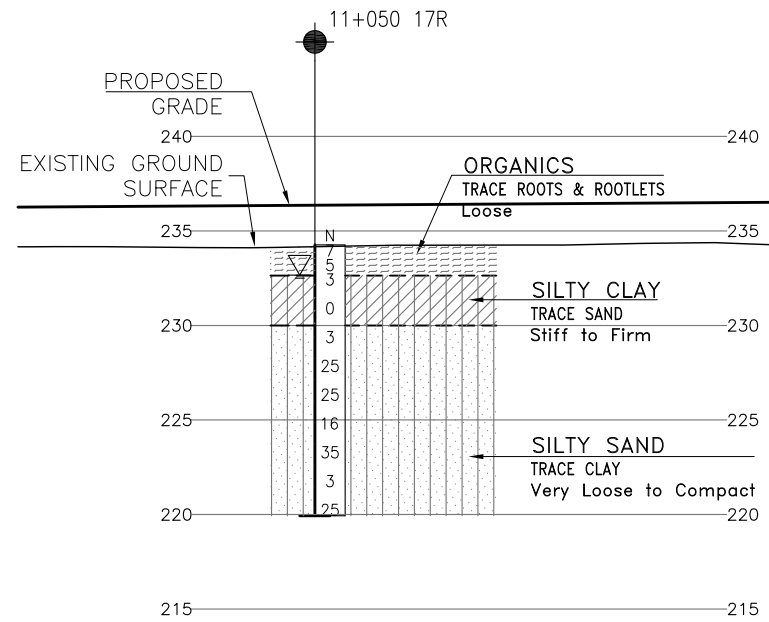
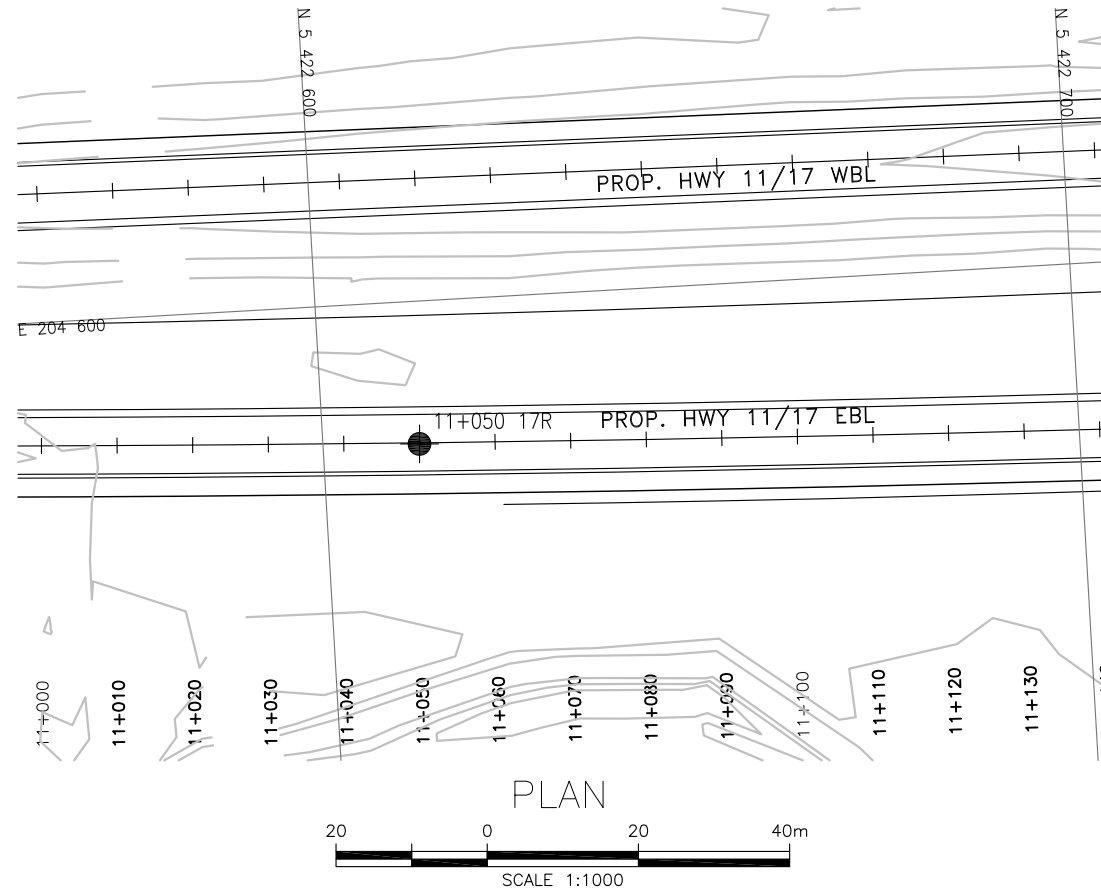
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+050 17R	1.83	232.43
⊠	11+050 28L	1.07	233.89

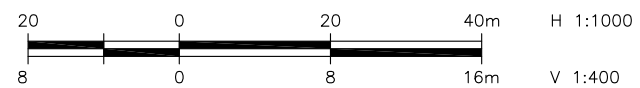
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



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

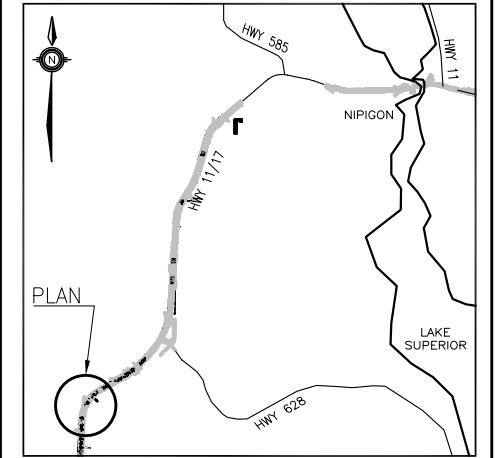


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING EASTBOUND LANES (STA. 11+000 TO 11+100) BOREHOLE LOCATIONS AND SOIL STRATA



KEYPLAN

L E G E N D

	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]

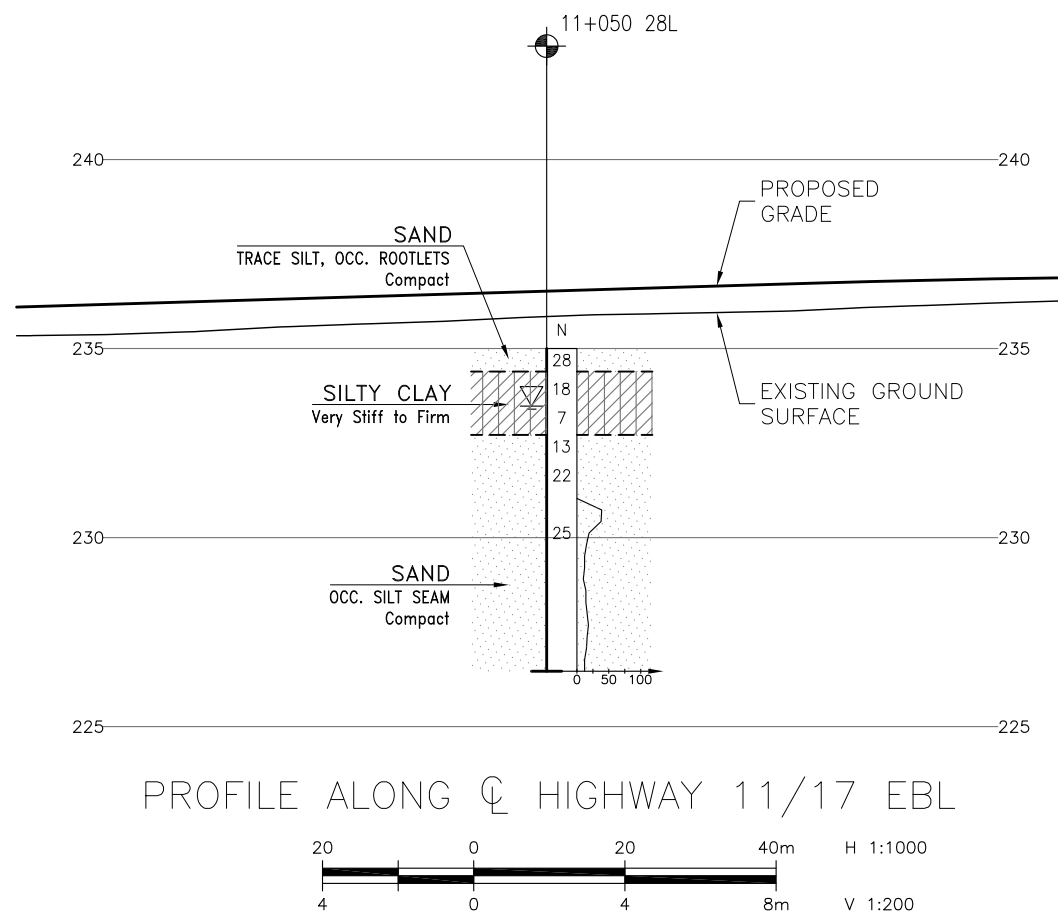
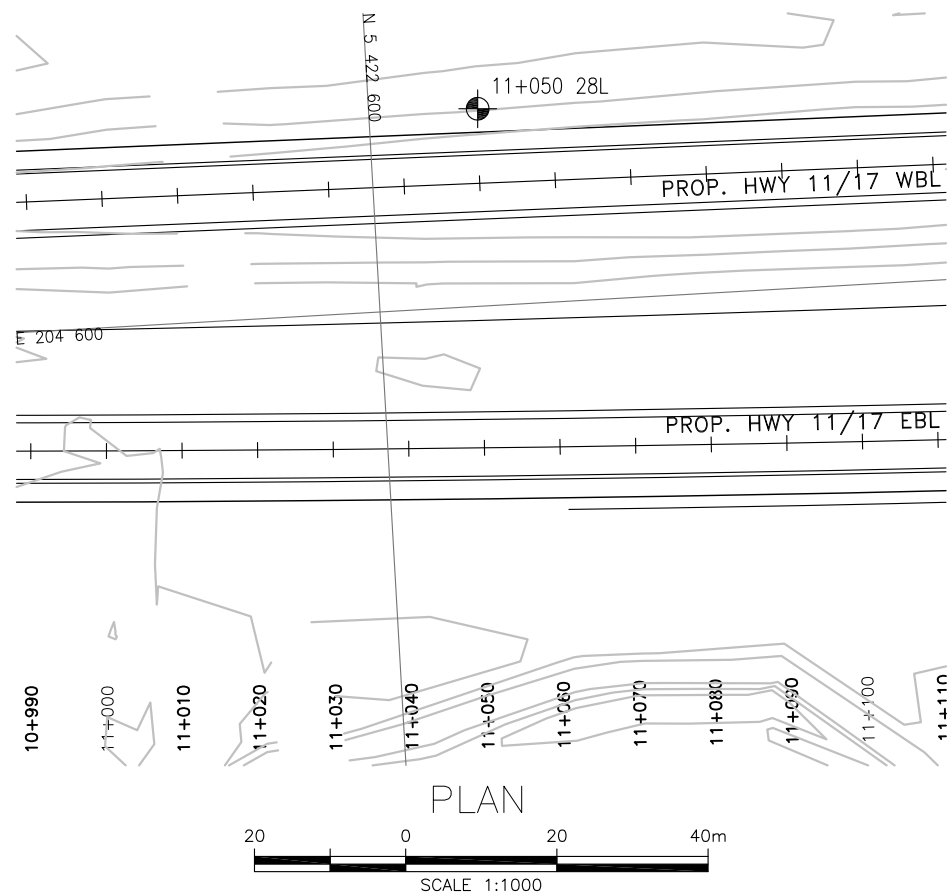
-NOTES-

- 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.

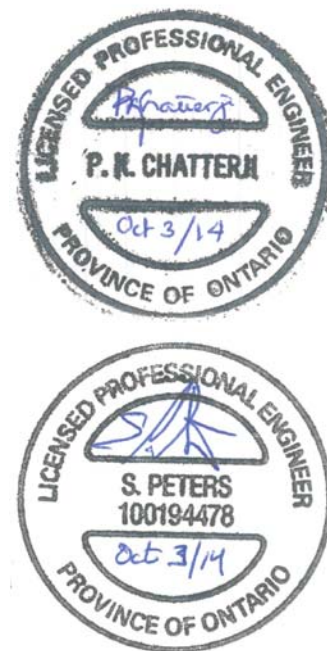
GEOCRES No. 52A-184

[illegible]

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

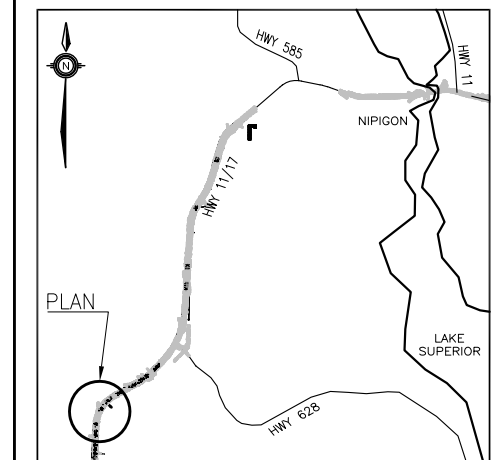


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN







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

HWY 11/17 FOUR LANING
WESTBOUND LANES
(STA. 11+000 TO 11+100)
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

[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

4

Appendix G

Highway 11/17 EBL and WBL

Sta. 11+160 to 11+170

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

METRIC

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	20 40 60			
234.3							SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100						GR SA SI CL

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 (%)					
								20 40 60 80 100	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE			W _P W W _L				
234.3	0.0		1	SS	17		234							288		
233.3																
1.0	SAND and SILT , trace clay Loose Brown to Grey Moist to Wet	2	SS	8	233									○		
		3	SS	5	232											○
		4	SS	6	231											○
231.5	2.8		5	SS	0		230			10.3 +						
229.3	5.0		6	SS	7		229									○
	SAND and SILT , trace clay Loose to Compact Grey Wet					228									○	
						227										
			8	SS	12	226									○	
							225									○
			9	SS	18											

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 11+165 05R

2 OF 3

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 728.3 E 204 609.3 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test COMPILED BY MFA
DATUM Geodetic DATE 2014.02.09 - 2014.02.09 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			20 40 60 80 100	20 40 60 80 100					
	Continued From Previous Page													
	SAND and SILT, trace clay Loose to Compact Grey Wet		10	SS	26		224							
							223							
			11	SS	14		222							
							221							
			12	SS	12		220							
220.0	END OF DRILLING AT 14.3m, BEGIN DCPT.						219							
14.3							218							
							217							
							216							
							215							

Continued Next Page

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

RECORD OF BOREHOLE No 11+165 05R

3 OF 3

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 728.3 E 204 609.3 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.09 - 2014.02.09 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	W P	W	W L	WATER CONTENT (%)		
	Continued From Previous Page						214							
213.3 21.0	END OF BOREHOLE AT 21.0m UPON DCPT REFUSAL ON PROBABLE BEDROCK OR BOULDER. WATER LEVEL AT 1.9m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.													

RECORD OF BOREHOLE No 11+165 14L

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 729.0 E 204 590.3 ORIGINATED BY SLL
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.03.24 - 2014.03.24 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						
236.1						20	40	60	80	100	PLASTIC LIMIT W P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W L			
0.0	SAND , trace to some gravel Brown Frozen to 2.0m (FILL)		1	GS							○					
			2	GS								○				
			1	SS		50/.050										
	some gravel, occasional cobbles Compact		2	SS	28						○					
233.8																
2.2	SAND and SILT , trace clay Compact to Loose Brown Moist		3	SS	16							○			0 59 39 2	
	with clayey silt seams		4	SS	7								○			
232.0																
4.1	Silty CLAY , with thin sand seams Firm Grey		5	SS	4										0 2 65 33	
230.0																
6.1	Silty SAND Very Loose Grey Wet		6	SS	0							○				
	Compact to Dense		7	SS	27								○			
			8	SS	40								○			
										</						

Continued Next Page

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

RECORD OF BOREHOLE No 11+165 14L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 729.0 E 204 590.3 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.24 - 2014.03.24 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										
Continued From Previous Page								20 40 60 80 100										
	Silty SAND , trace clay Compact to Dense Grey Wet						226											
			9	SS	12		225											
	trace gravel		10	SS	37		224											
							223											
			11	SS	22		222											
221.8																		
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 5.3m AND WATER LEVEL AT 4.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.3m, THEN CUTTINGS TO SURFACE.																	

RECORD OF BOREHOLE No 11+165 19R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 727.7 E 204 623.3 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.08 - 2014.02.08 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						
234.2								20 40 60 80 100								
0.0	PEAT , trace roots and rootlets, occasional wood fibres Dark Brown Frozen		1	SS	15		234						130			
233.6																
0.6	SAND and SILT , trace clay Loose Brown to Grey Wet		2	SS	9		233					○				
			3	SS	5							○		0 54 41 5		
			4	SS	5		232					○				
231.3												○				
2.8	Silty CLAY , occasional sand seams Soft to Firm Grey		5	SS	0		231					○				
			6	SS	1		230	+								
											</					

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 11+165 19R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 727.7 E 204 623.3 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.08 - 2014.02.08 CHECKED BY MEF

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 (%)				
								20 40 60 80 100	W P	W	W L				
Continued From Previous Page								○ UNCONFINED + FIELD VANE							
								● QUICK TRIAXIAL × LAB VANE							

METRIC

[illegible]

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 11+165 31L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 729.6 E 204 573.3 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.05 - 2014.02.05 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 Page							<div><div></div></div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div> <div>20 40 60 80 100</div>				<div><div>PLASTIC LIMIT</div><div>NATURAL MOISTURE CONTENT</div><div>LIQUID LIMIT</div></div> <div>W P W W L</div> <div>WATER CONTENT (%)</div> <div>20 40 60</div>			
220.2	SILT and SAND , trace clay Compact to Very Dense Brown Wet						224								
			10	SS	34										
								223							
			11	SS	28			222							
			12	SS	29		221								
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 13.7 m AND WATER LEVEL AT 1.8m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.														

RECORD OF BOREHOLE No 11+165 31R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 727.2 E 204 635.3 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.07 - 2014.02.07 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 (%) GR SA SI CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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0.0	PEAT , trace roots and rootlets Dark Brown Frozen		1	SS	20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

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

RECORD OF BOREHOLE No 11+165 31R

2 OF 2

METRIC

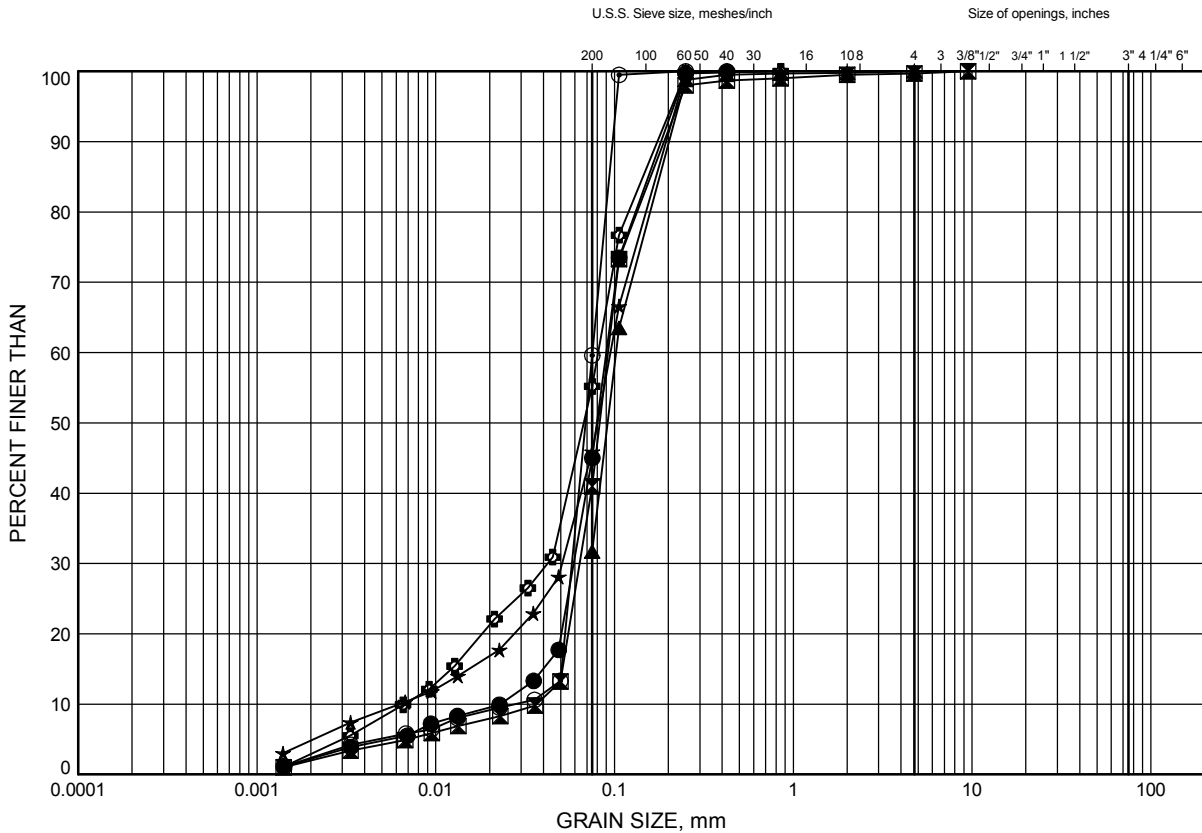
WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 727.2 E 204 635.3 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.07 - 2014.02.07 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT MOISTURE 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				W P W W L				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				WATER CONTENT (%)				
	Continued From Previous Page							20 40 60 80 100								
218.4	SILT and SAND , trace clay Compact to Dense Grey Wet		10	SS	31		222									0 45 52 3
							221									
			11	SS	18		220									
							219									
			12	SS	16											
14.3	END OF BOREHOLE AT 14.3m. WATER LEVEL AT 1.8m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.															

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

FIGURE G1

SAND & SILT to SILT & 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)
●	11+165 05R	9.45	224.85
⊠	11+165 14L	2.59	233.49
▲	11+165 14L	10.97	225.11
★	11+165 19R	1.83	232.32
⊙	11+165 31L	7.92	226.64
⊕	11+165 31R	10.97	221.79

Date October 2014
 WP# 647-89-00

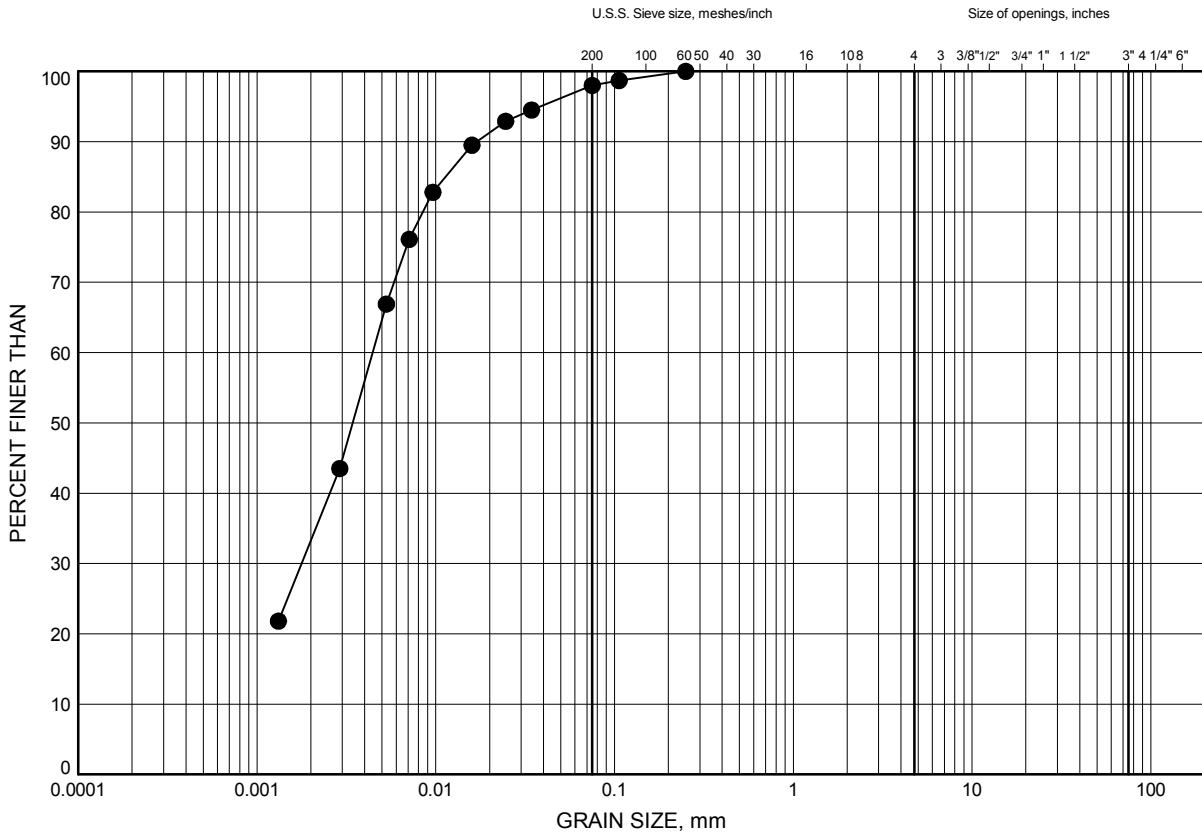


Prep'd AN
 Chkd. MKE

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

FIGURE G2

Silty CLAY to Clayey SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+165 14L	4.88	231.20

Date July 2014
 WP# 647-89-00

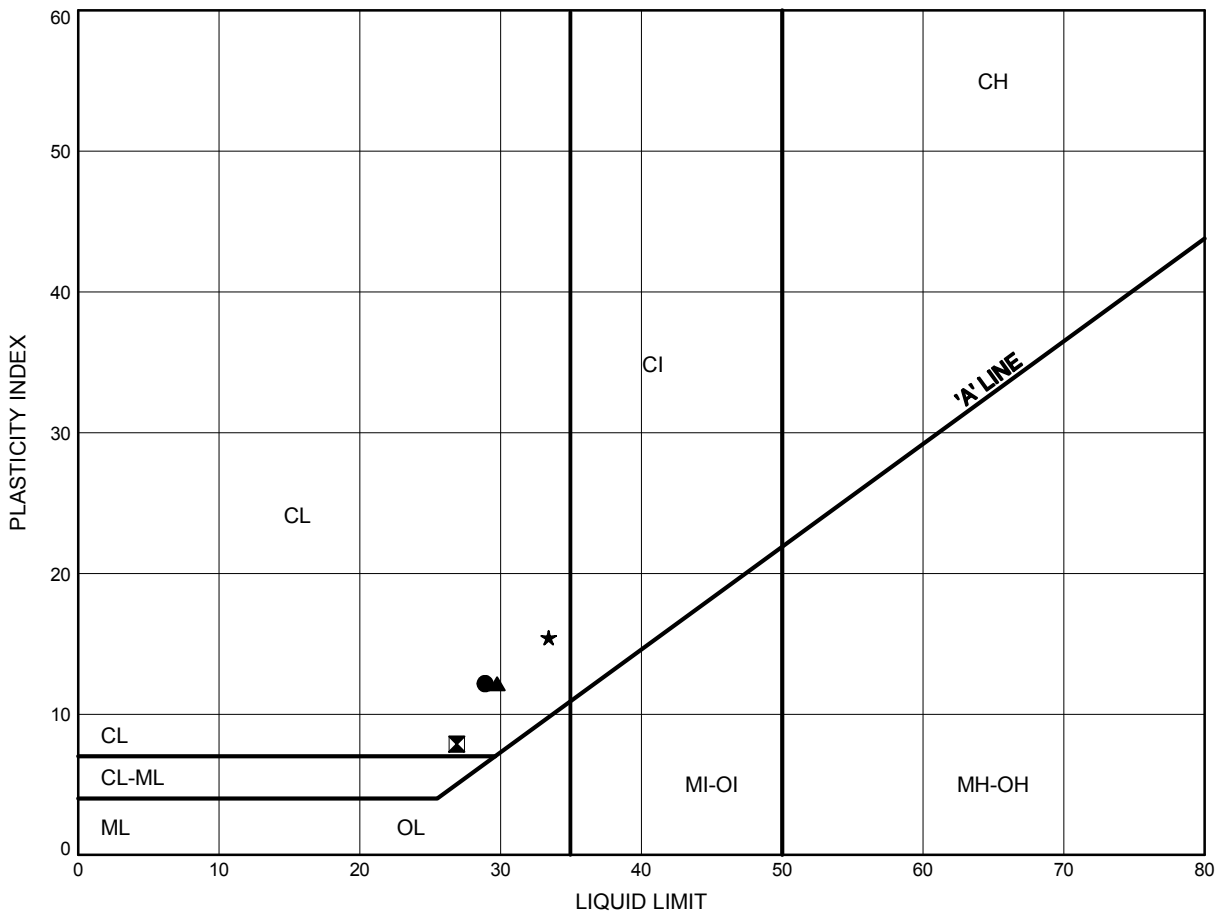


Prep'd AN
 Chkd. MKE

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

FIGURE G3

Silty CLAY to Clayey SILT



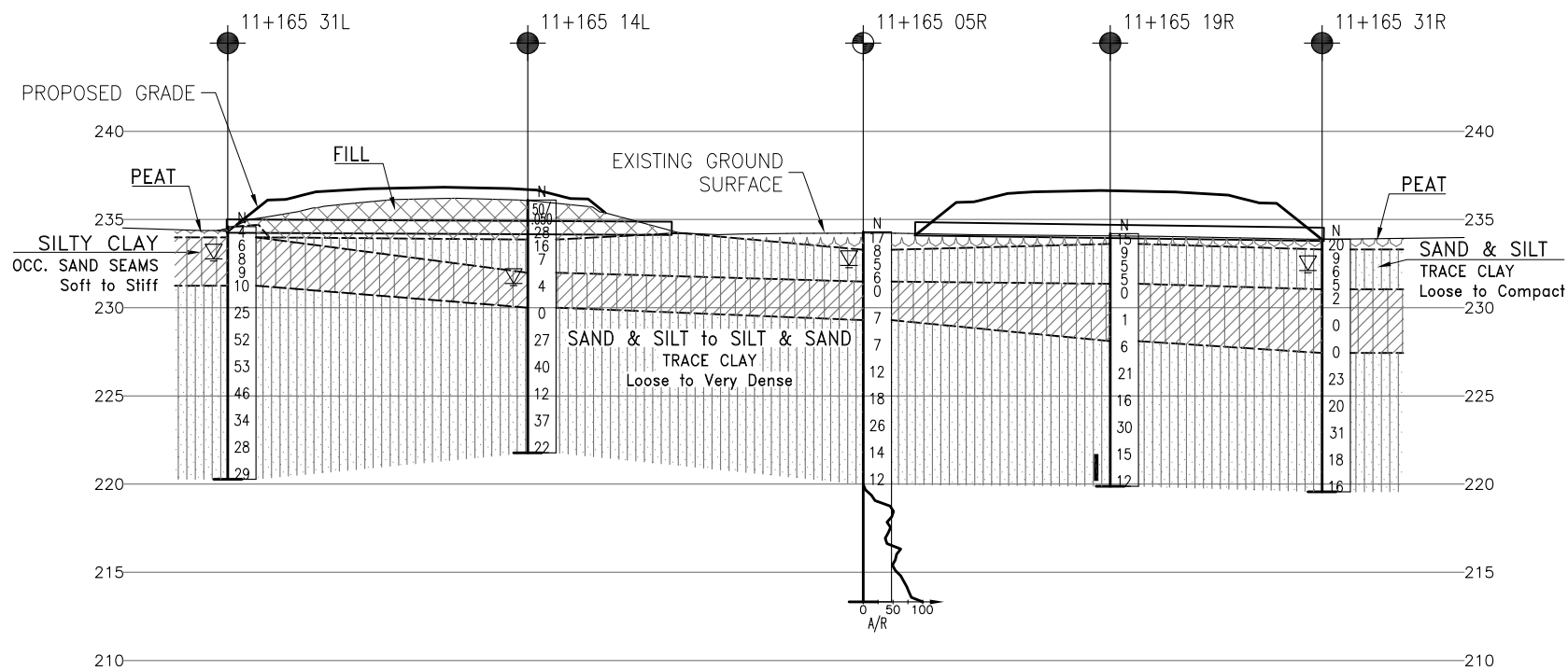
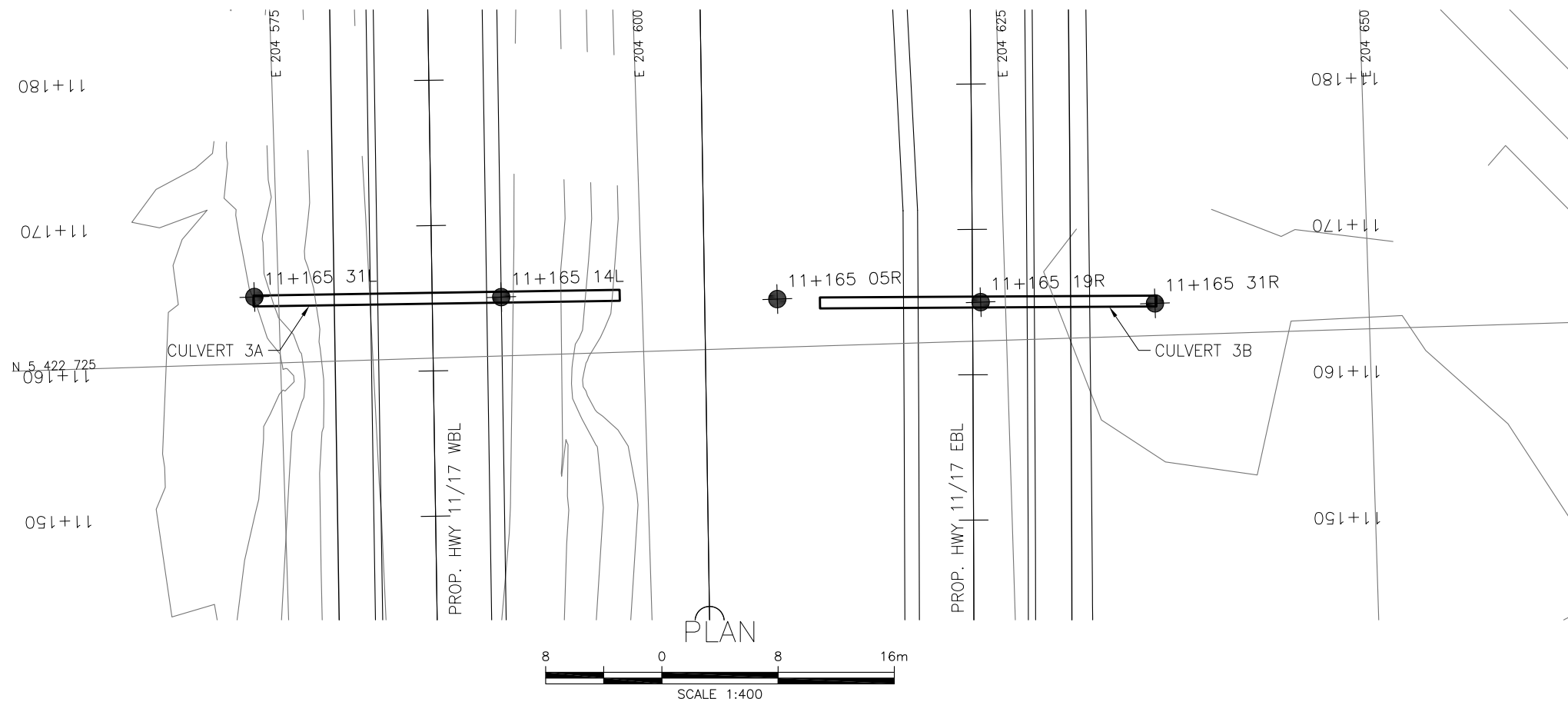
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+165 05R	3.35	230.95
⊠	11+165 14L	4.88	231.20
▲	11+165 19R	4.88	229.28
★	11+165 31L	1.07	233.50

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

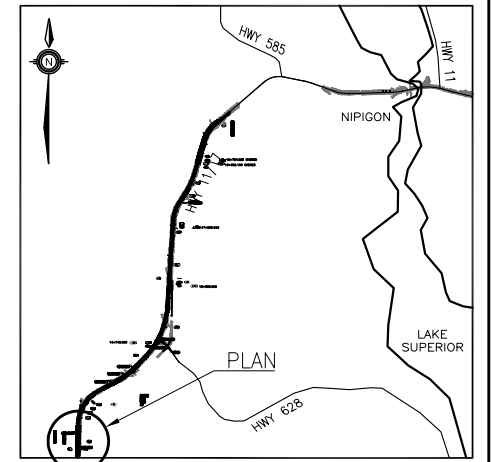


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN



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

HWY 11/17 FOUR LANE
EB AND WB LANES
CULVERT 3A AND 3B
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
11+165 05R	234.3	5 422 728.3	204 609.3
11+165 14L	236.1	5 422 729.0	204 590.3
11+165 19R	234.2	5 422 727.7	204 623.3
11+165 31L	234.6	5 422 729.6	204 573.3
11+165 31R	232.8	5 422 727.2	204 635.3

-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	DATE	OCT. 2014	
STRUCT	DWG	2	

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

Appendix H

Highway 11/17 EBL Sta. 11+170 to 11+770

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

RECORD OF BOREHOLE No 11+250 19R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 812.7 E 204 624.6 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.10 - 2014.02.10 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					
234.9													
0.0													
0.1	ORGANICS: (125mm) Dark Brown Frozen		1	SS	50								
	SAND and SILT , trace clay Loose to Compact Brown Frozen		2	SS	11								
	Moist to Wet		3	SS	8								
			4	SS	9								
	Grey		5	SS	10								
230.2													
4.7	Silty CLAY , trace sand, occasional silt seams Stiff to Firm Grey		6	SS	7								
			7	SS	1								
227.5													
7.5	SAND and SILT , trace clay Very Loose to Compact Grey to Brown Wet		8	SS	2								
			9	SS	22								

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 11+250 19R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 812.7 E 204 624.6 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.10 - 2014.02.10 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					
								20 40 60 80 100					
	Continued From Previous Page												
			10	SS	18		224						
							223						
			11	SS	29								0 54 42 4
							222						
							221						
220.6			12	SS	15								
14.3	END OF BOREHOLE AT 14.3m. WATER LEVEL AT 2.3m 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 11+405 19R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 967.7 E 204 627.1 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.10 - 2014.02.10 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				
235.3												
0.0	ORGANICS: (125mm) Dark Brown Frozen Silty SAND , trace clay, trace rootlets Compact Brown Frozen Moist to Wet		1	SS	13							
0.1												
			2	SS	30							
			3	SS	20							
			4	SS	25							
			5	SS	20							
			6	SS	13							

Continued Next Page

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

RECORD OF BOREHOLE No 11+405 19R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 967.7 E 204 627.1 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.10 - 2014.02.10 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 Page							<div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></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RECORD OF BOREHOLE No 11+450 22R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 423 012.6 E 204 630.8 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.13 - 2014.02.13 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						
								20 40 60 80 100						
233.4														
0.0	ORGANICS: (225mm)													
0.2	Silty SAND, trace clay, trace rootlets Loose to Compact Brown Frozen Wet 													

Continued Next Page

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

RECORD OF BOREHOLE No 11+450 22R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 423 012.6 E 204 630.8 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.13 - 2014.02.13 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						
								20 40 60 80 100						
								20 40 60 80 100						
Continued From Previous Page							UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W P W W L WATER CONTENT (%)			
219.1 														

RECORD OF BOREHOLE No 11+550 24R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 423 112.6 E 204 634.4 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.14 - 2014.02.14 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							
232.9						▽									
0.0	ORGANICS, roots and rootlets Dark Brown Frozen		1	SS	15										
232.6															
0.3															
	Silty SAND to Sandy SILT, trace roots and rootlets Compact to Loose Brown to grey Frozen		2	SS	9										
	Moist		3	SS	7										
			4	SS	7										
			5	SS	9										
	Grey														
			6	SS	6										
227.8															
5.1	Silty CLAY, some sand Stiff to Very Stiff Grey														
	occasional sand seams		7	SS	1										
			8	SS	0										
			9	SS	3										

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 11+550 24R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 423 112.6 E 204 634.4 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.14 - 2014.02.14 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
Continued From Previous Page								PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W P W W L WATER CONTENT (%) 20 40 60						
222.6														
10.4	SAND and SILT Loose to Compact Grey Wet		10	SS	8		222							
							221							
			11	SS	8		220							
							219							
218.6			12	SS	13									
14.3	END OF BOREHOLE AT 14.3m. WATER LEVEL AT 4.1m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.													

RECORD OF BOREHOLE No 11+700 19R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 423 261.6 E 204 634.8 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.15 - 2014.02.15 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					WATER CONTENT (%)				GR	SA	SI	CL
								○ UNCONFINED + FIELD VANE					w P w w L							
								● QUICK TRIAXIAL × LAB VANE												
231.8							20	40	60	80	100									
0.0																				
231.5																				
0.3																				
											</									

Continued Next Page

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

RECORD OF BOREHOLE No 11+700 19R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 423 261.6 E 204 634.8 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.15 - 2014.02.15 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				GR	SA	SI	CL	
								20 40 60 80 100	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE			WATER CONTENT (%)								
	Continued From Previous Page							20 40 60 80 100												
217.8	SILT, some sand to sandy Very Dense Grey Moist						221										0	6	86	8
		10	SS	55			220													
		11	SS	50/ .125			219													
14.0	END OF BOREHOLE AT 14.0m. WATER LEVEL AT 1.4m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.				.125		218													

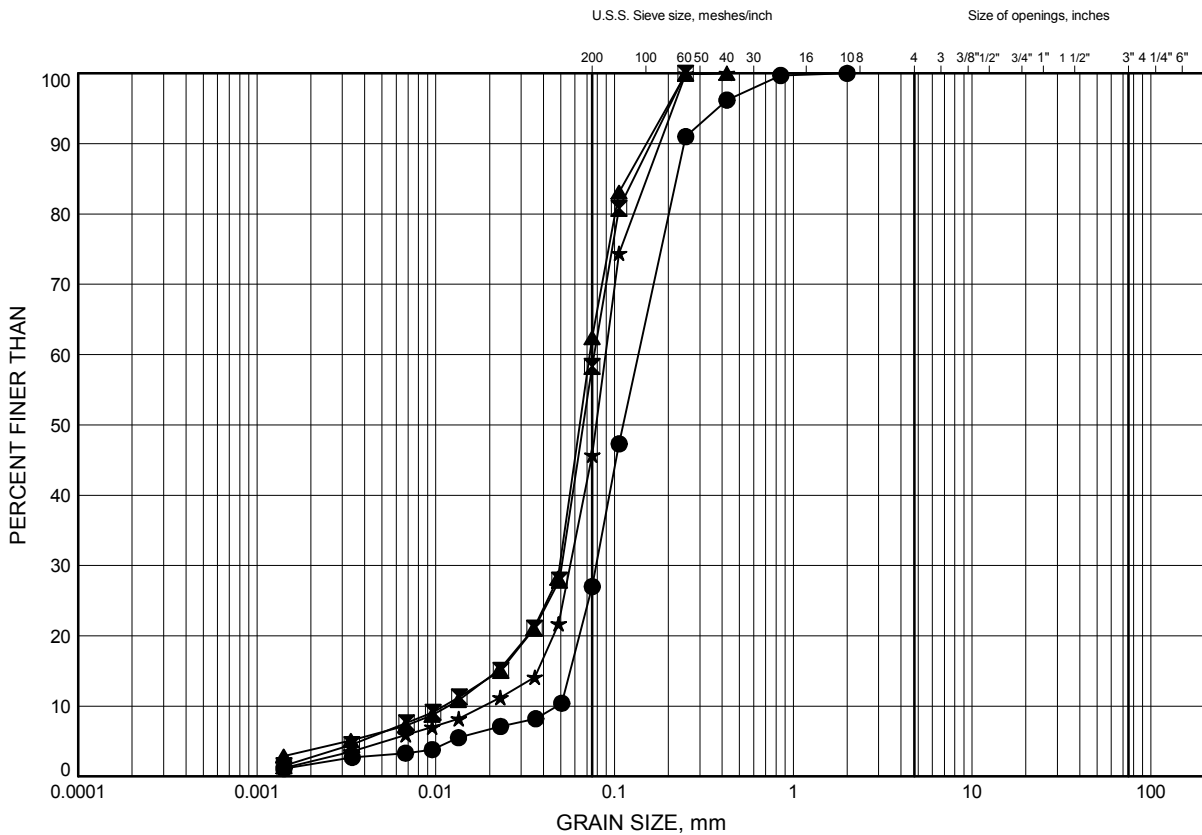
+³, ×³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon

GRAIN SIZE DISTRIBUTION

FIGURE H1

SILT to Sandy SILT to SAND & SILT to Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+405 19R	2.59	232.75
⊠	11+450 22R	2.59	230.82
▲	11+550 24R	3.35	229.57
★	11+700 19R	1.07	230.70

Date July 2014
WP# 647-89-00

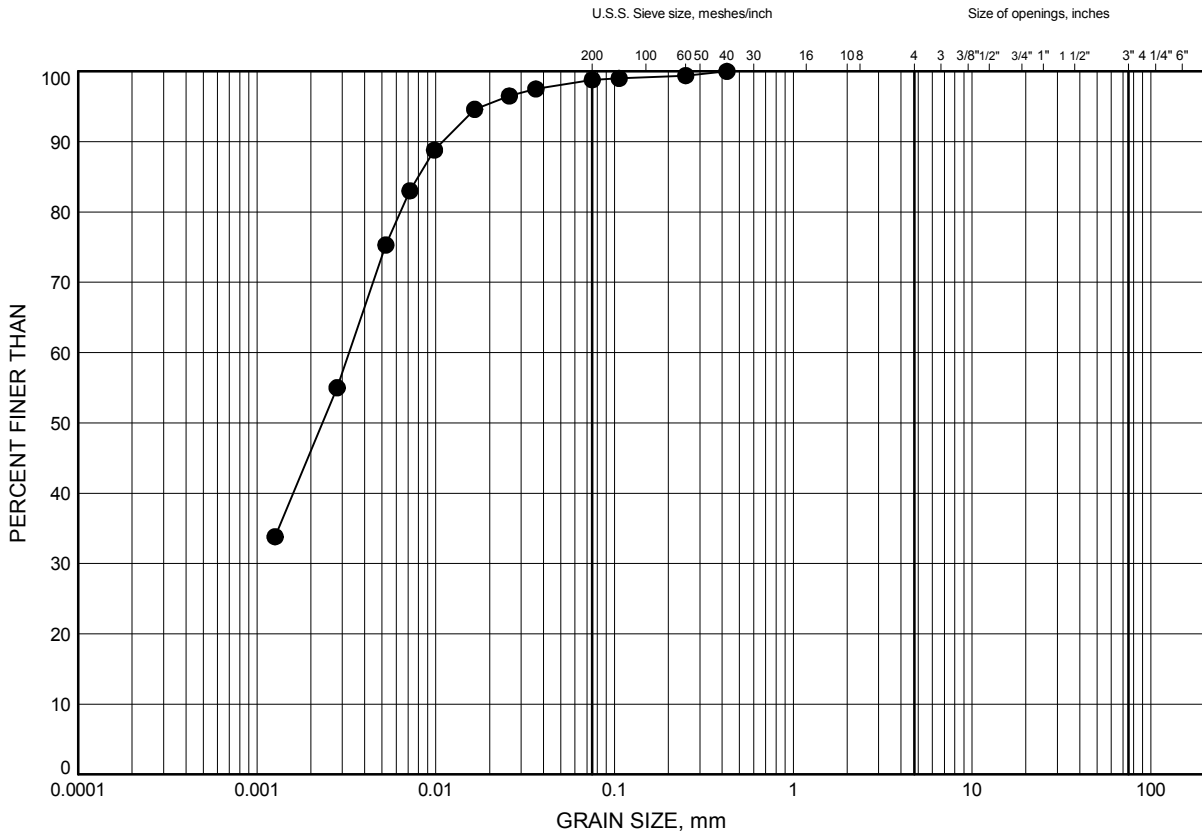


Prep'd AN
Chkd. MKE

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

FIGURE H2

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+450 22R	7.92	225.49

Date July 2014
 WP# 647-89-00

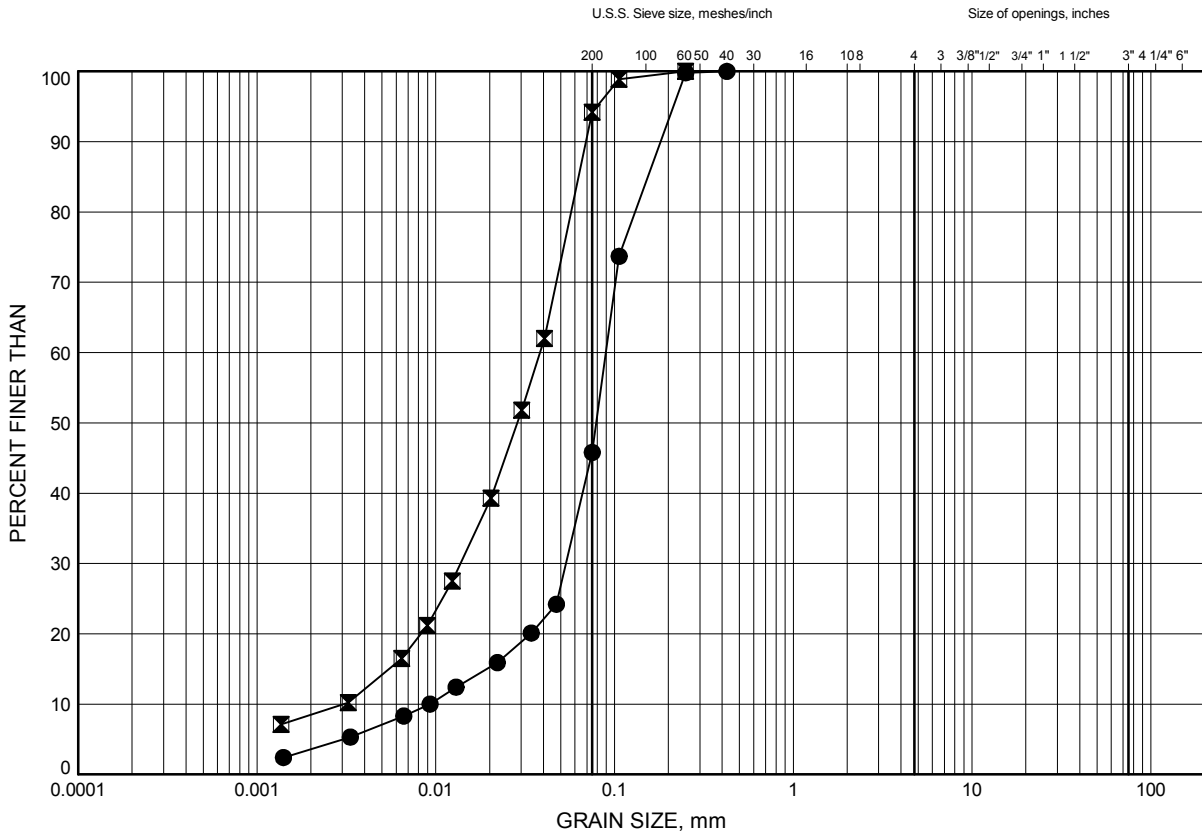


Prep'd AN
 Chkd. MKE

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

FIGURE H3

SAND & SILT to Sandy SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+250 19R	12.50	222.43
⊠	11+700 19R	10.97	220.79

Date July 2014
 WP# 647-89-00



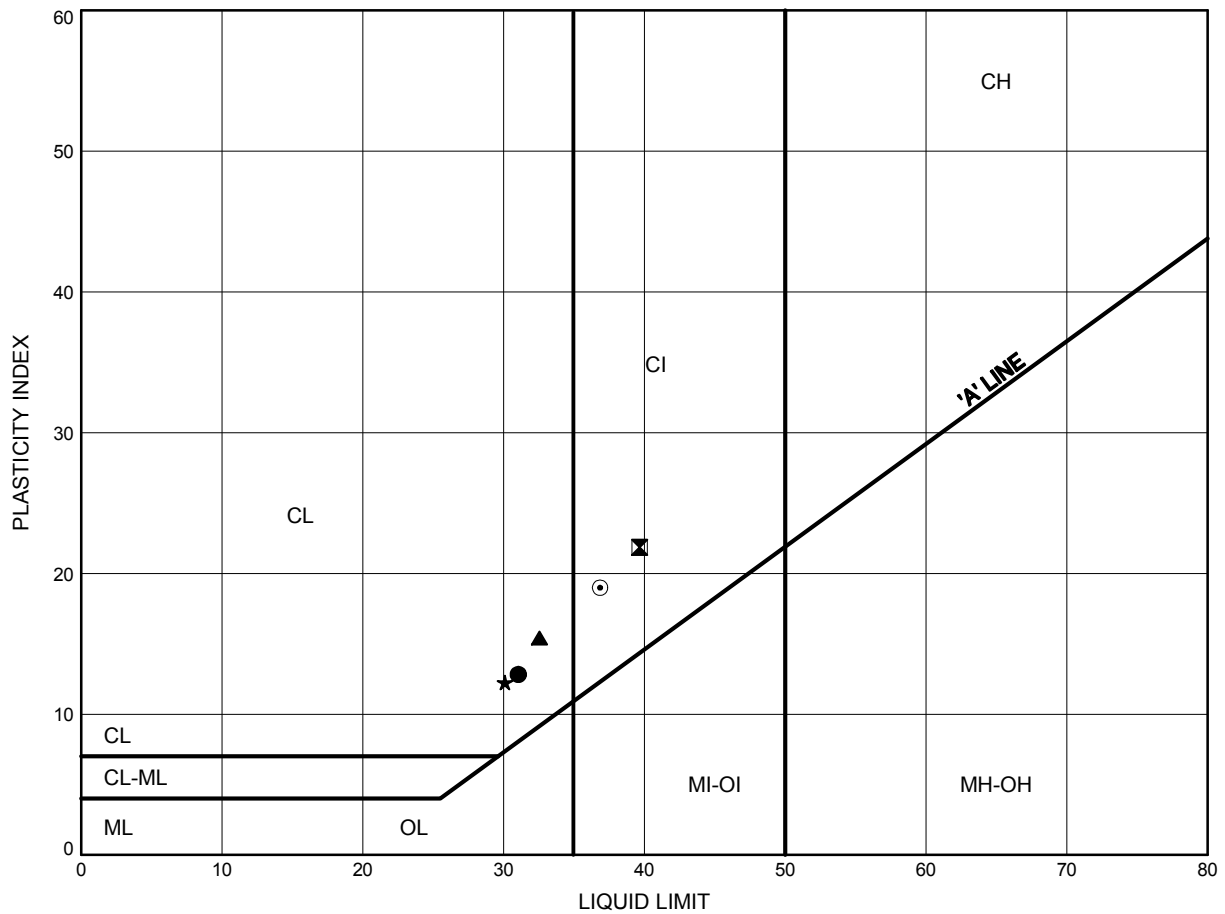
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE H4

Silty CLAY



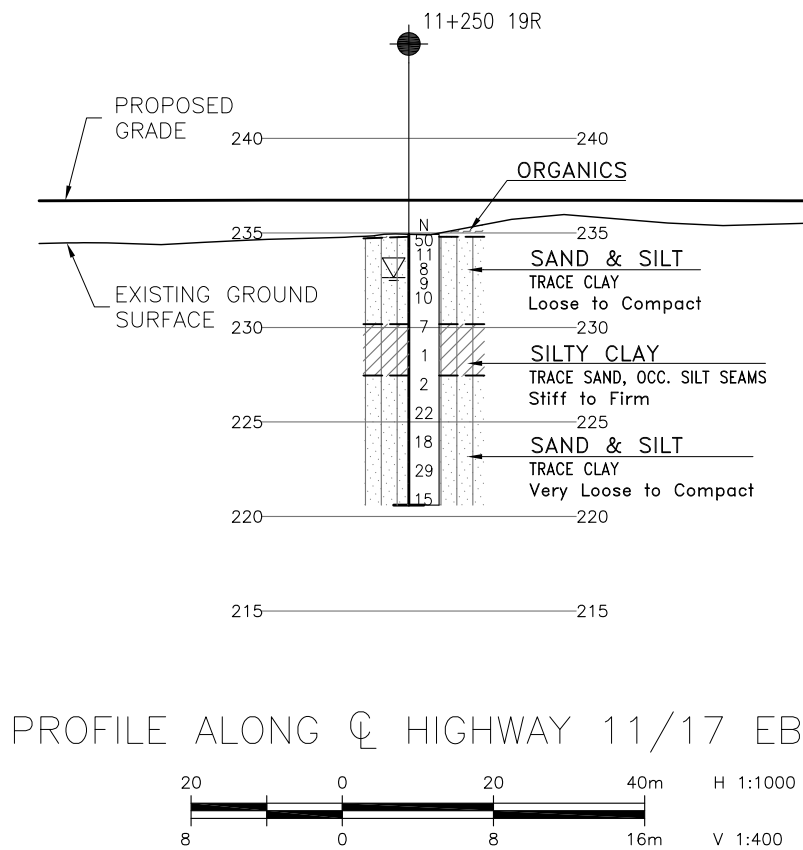
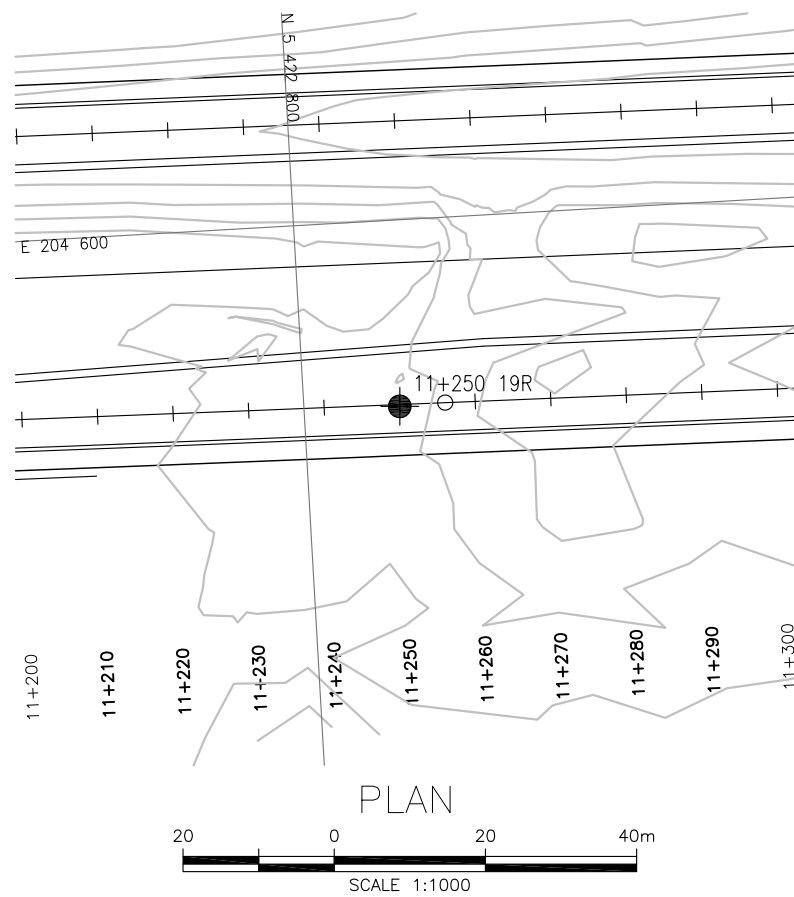
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+250 19R	6.40	228.53
⊠	11+405 19R	7.92	227.41
▲	11+450 22R	7.92	225.49
★	11+550 24R	9.45	223.48
⊙	11+700 19R	4.88	226.89

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

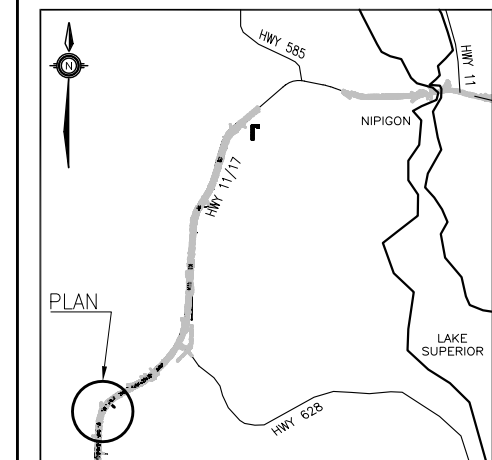


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING
EASTBOUND LANES
(STA. 11+200 TO 11+300)
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

[illegible]

-NOTES-

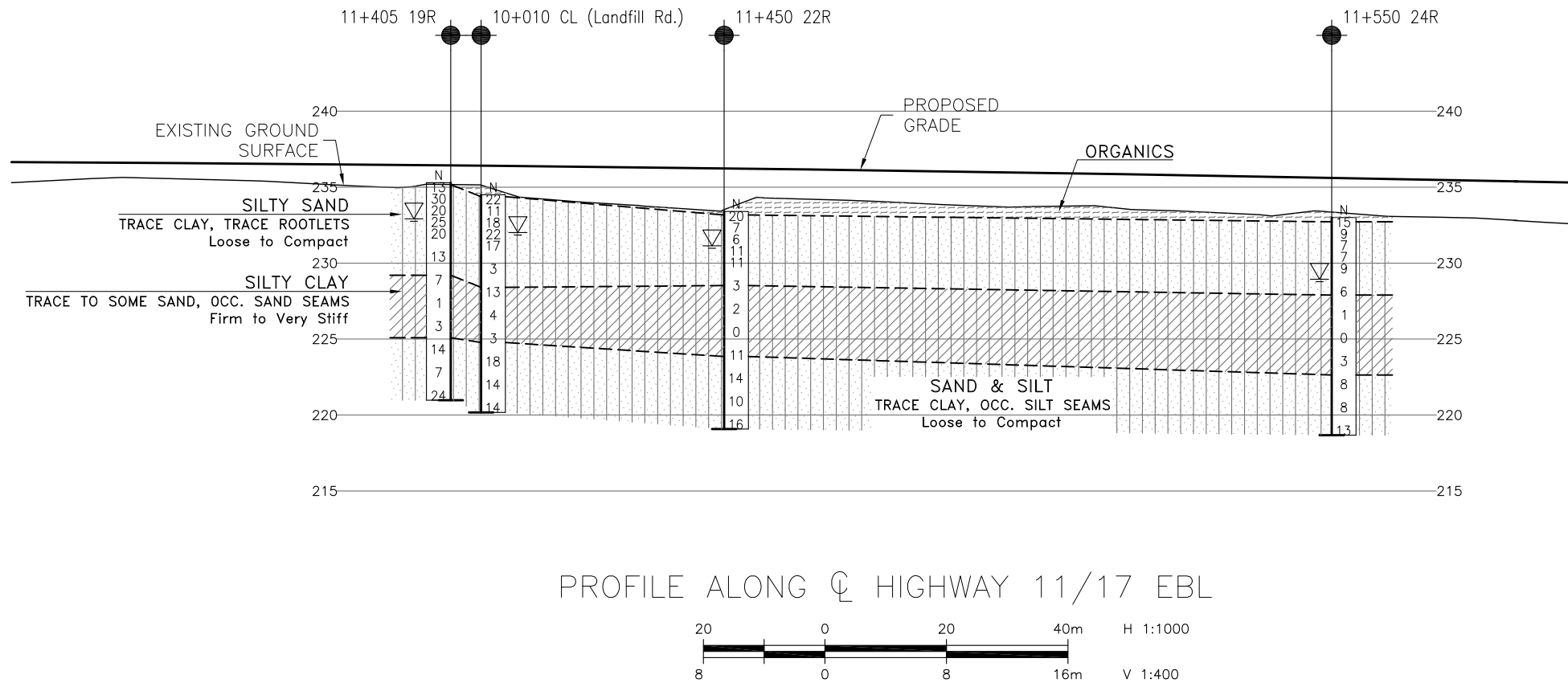
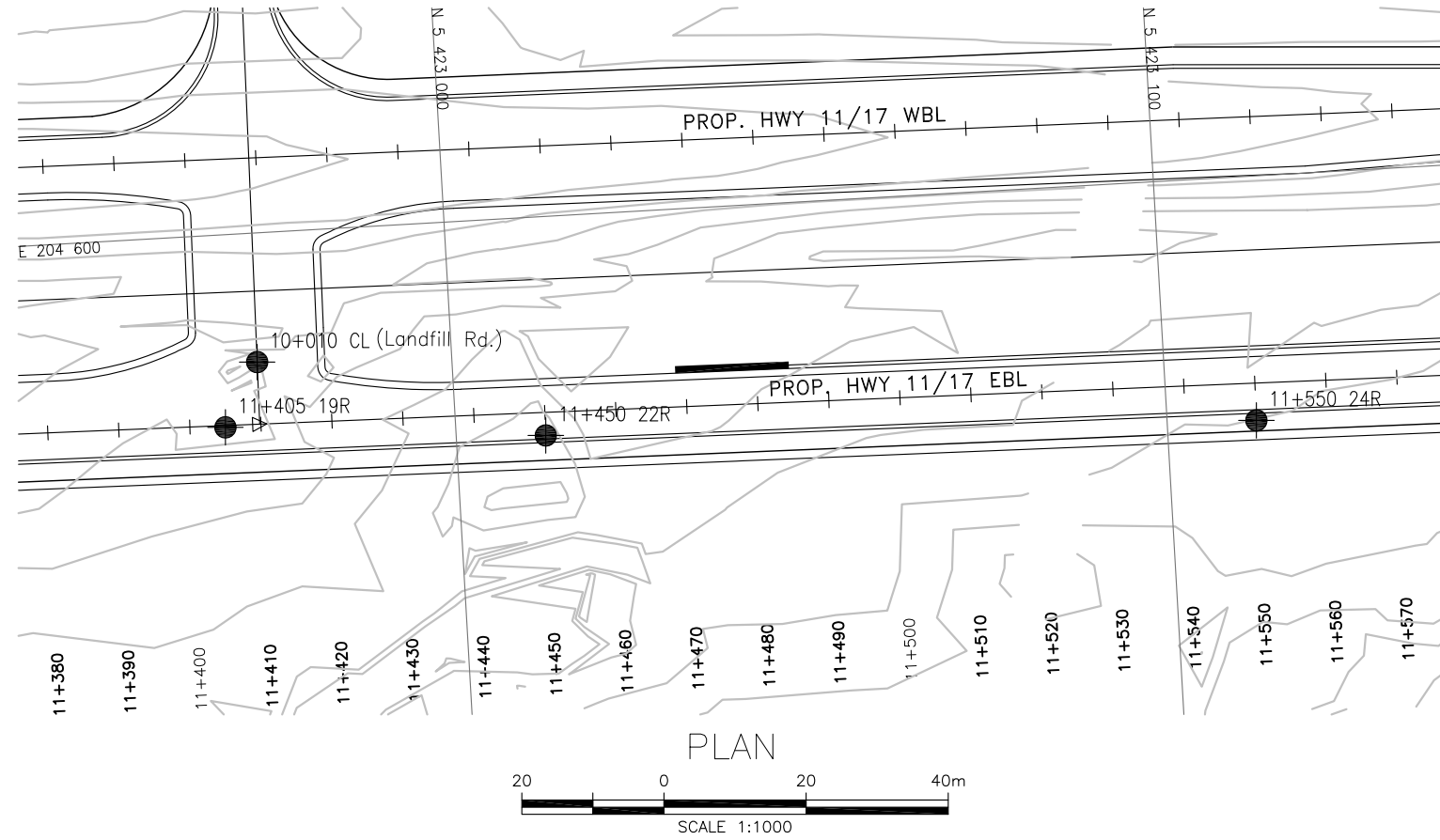
- 1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- 2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 52A-184

[illegible]

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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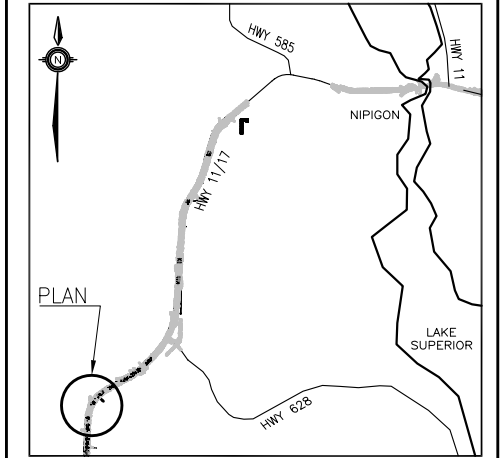


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING EASTBOUND LANES (STA. 11+400 TO 11+580) 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

[illegible]

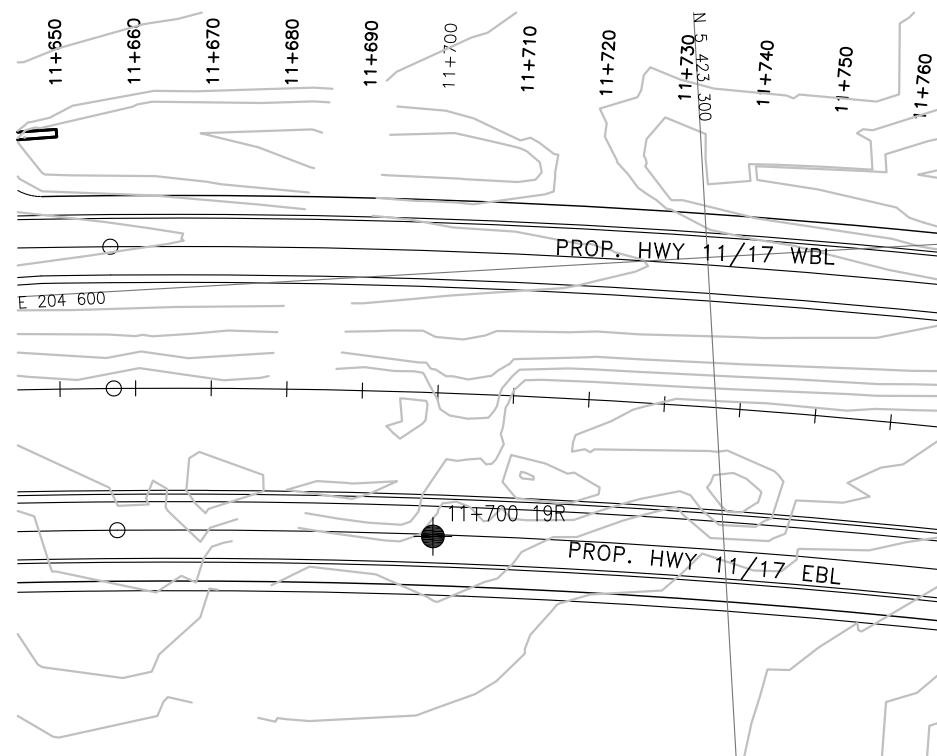
-NOTES-

- 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.

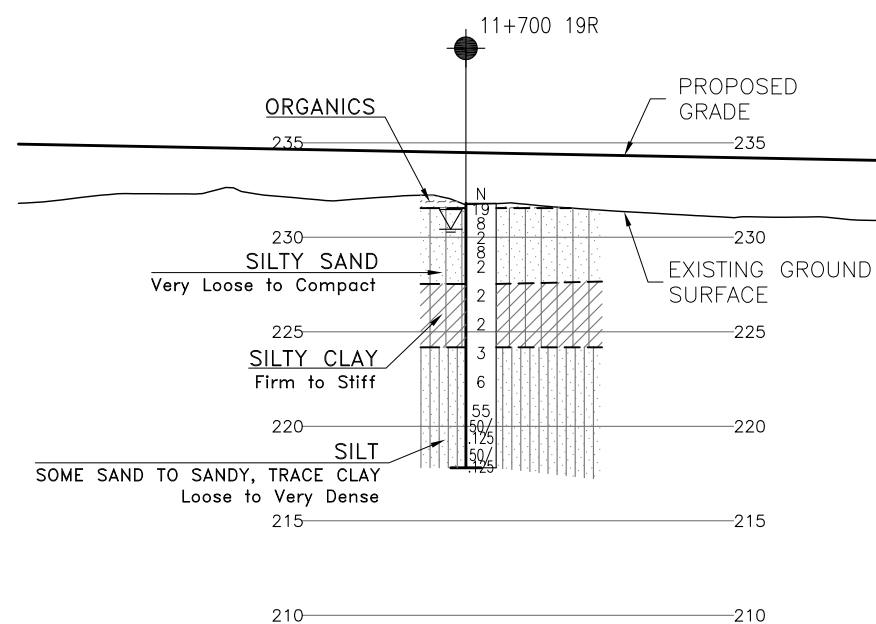
GEOCRES No. 52A-184

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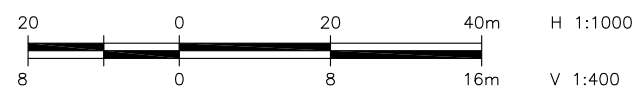
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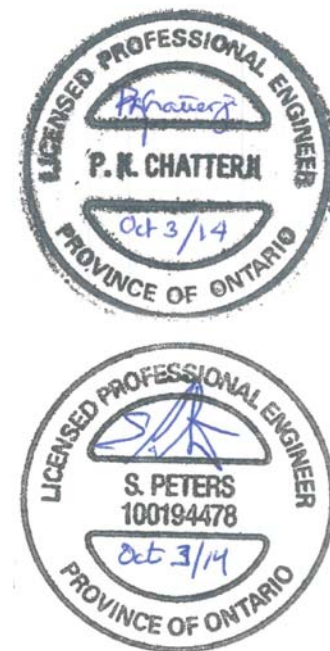
PLAN



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

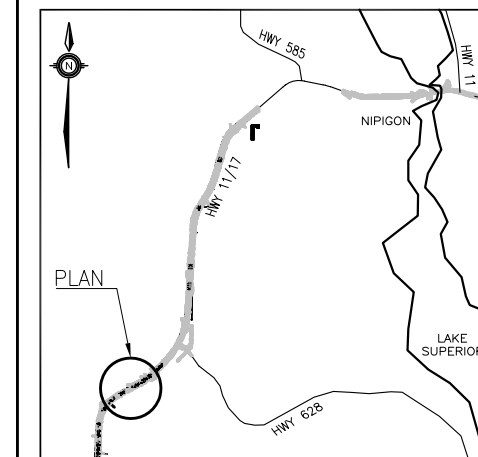


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING
EASTBOUND LANES
(STA. 11+650 TO 11+750)
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

[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

Appendix I

Off Highway 11/17 Sta. 11+410

Landfill Road

Record of Borehole Sheets

Laboratory Test Results

Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 09+965 CL (LFR) 1 OF 2 METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 973.3 E 204 573.2 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.14 - 2014.02.14 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	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 (%)										
235.4								20	40	60	80	100										
0.0	ORGANICS: (150mm)																					
0.2	Sandy SILT, trace clay Loose Brown Frozen to Wet		1	SS	24		235															
			2	SS	10		234															
			3	SS	8		233															
			4	SS	5		232															
			5	SS	8		231															
230.5			6	SS	6		230															
4.9	Silty CLAY, occasional rootlets Stiff Grey						229															
			7	SS	4		228															
227.9							227															
7.5	Silty SAND Loose to Compact Grey Wet		8	SS	8		226															
			9	SS	8																	

Continued Next Page

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

RECORD OF BOREHOLE No 09+965 CL (LFR) 2 OF 2 METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 973.3 E 204 573.2 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.14 - 2014.02.14 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								
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				WATER CONTENT (%)						
						20 40 60 80 100 20 40 60 80 100				20 40 60						
	Continued From Previous Page															
	Silty SAND Compact Grey Wet															
			10	SS	14											
			11	SS	11											
			12	SS	22											
221.1																
14.3	END OF BOREHOLE AT 14.3m. WATER LEVEL AT 4.0m 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 10+010 CL (LFR) 1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 972.6 E 204 618.2 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.13 - 2014.02.13 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				WATER CONTENT (%)				GR	SA	SI	CL
234.5								20	40	60	80	100							
0.0	ORGANICS: (125mm) Dark Brown Frozen		1	SS	22		234												
0.1	Silty SAND Compact Brown Frozen		2	SS	11		233												
	Moist to Wet		3	SS	18		232												
			4	SS	22		231												
			5	SS	17		230												
	Brown to Grey Loose		6	SS	3		229												
228.4							228												
6.1	Silty CLAY , occasional sand seams Stiff Grey		7	SS	13		227												
	Firm to Soft		8	SS	4		226												
			9	SS	3		225												
224.8																			
9.7	SAND and SILT , trace clay																		

Continued Next Page

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

RECORD OF BOREHOLE No 10+010 CL (LFR) 2 OF 2 METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 422 972.6 E 204 618.2 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.13 - 2014.02.13 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									WATER CONTENT (%)		
								20 40 60 80 100									20 40 60		
	Continued From Previous Page																		
220.2	SAND and SILT, trace clay, occasional silt seams Compact Grey Moist						224												
			10	SS	18														
			11	SS	14														
			12	SS	14		221												
14.3	END OF BOREHOLE AT 14.3m. WATER LEVEL AT 2.5m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																		

+³, ×³: Numbers refer to
Sensitivity

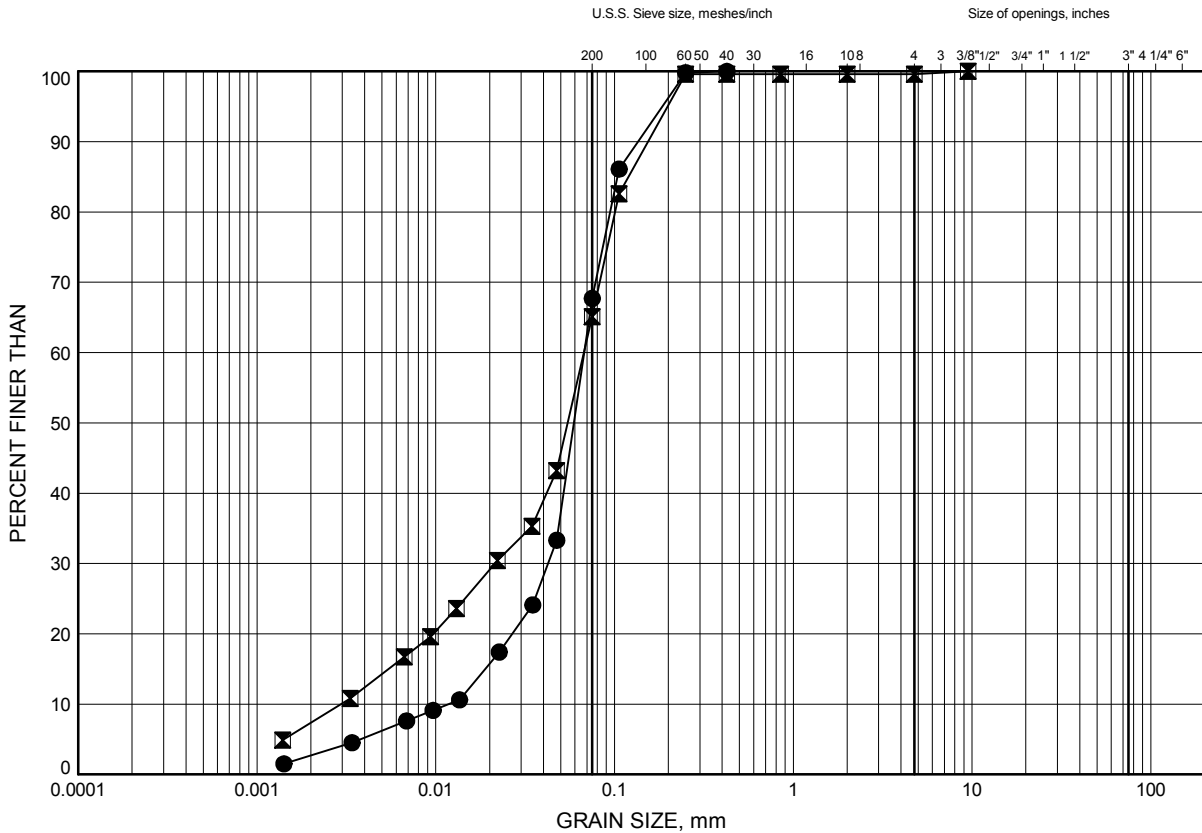
20
15
10

(%) STRAIN AT FAILURE

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

FIGURE 11

Silty 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)
●	09+965 CL (LFR)	2.59	232.82
⊠	10+010 CL (LFR)	12.50	222.01

Date July 2014
 WP# 647-89-00

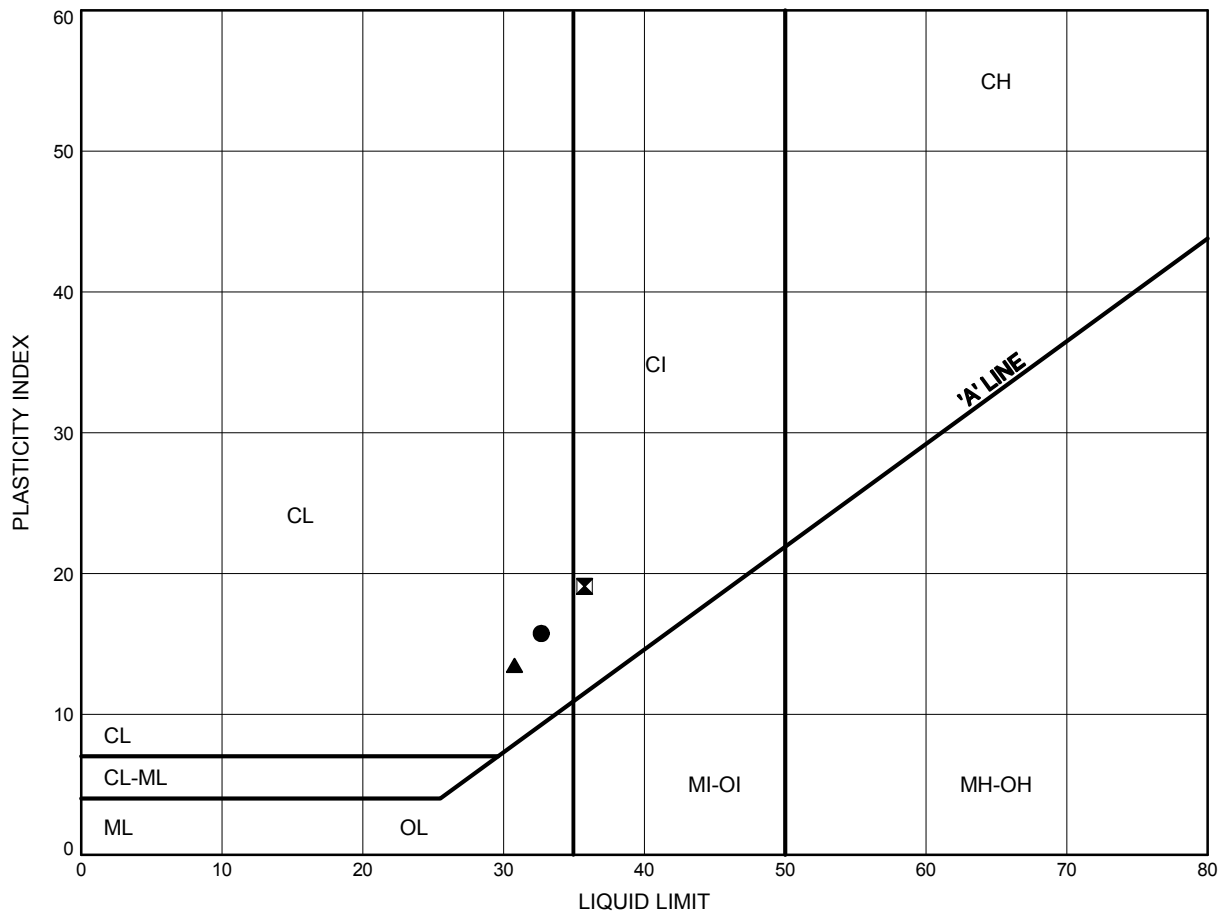


Prep'd AN
 Chkd. MKE

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

FIGURE 12

Silty CLAY



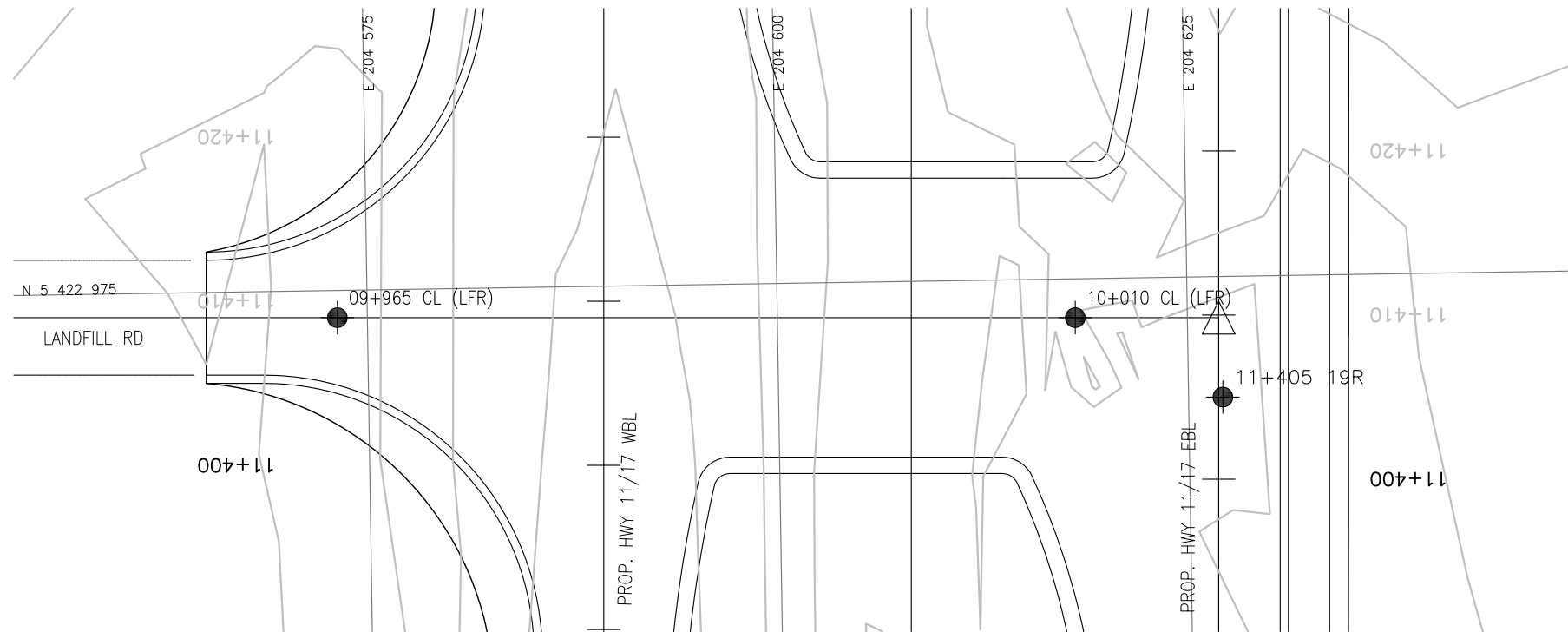
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	09+965 CL (LFR)	6.40	229.01
⊠	10+010 CL (LFR)	6.40	228.11
▲	10+010 CL (LFR)	9.45	225.06

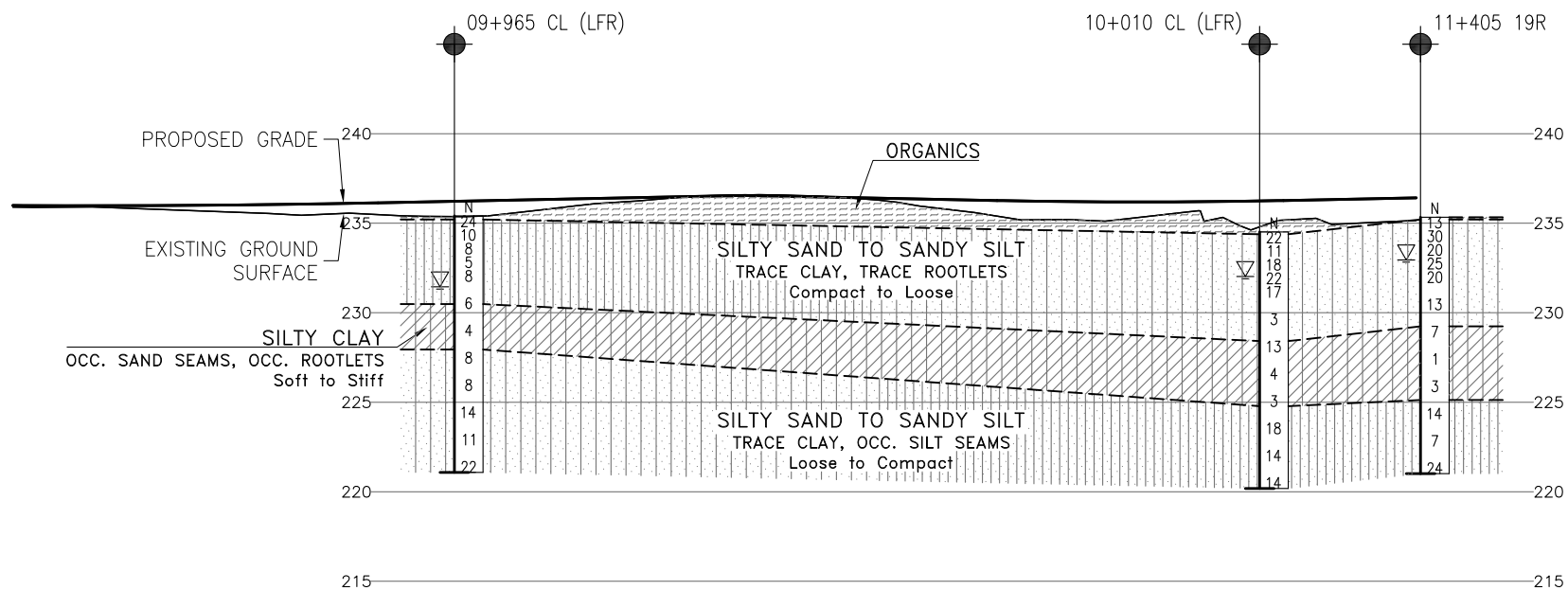
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



PLAN



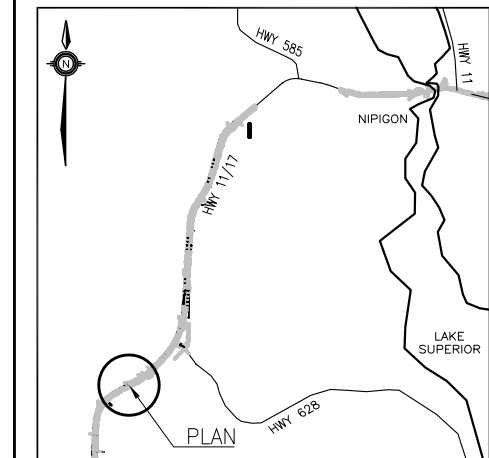
PROFILE ALONG CL LANDFILL ROAD

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
LANDFILL ROAD
MEDIAN CROSSOVER
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
09+965 CL (LFR)	235.4	5 422 973.3	204 573.2
10+010 CL (LFR)	234.5	5 422 972.6	204 618.2
11+405 19R	235.3	5 422 967.7	204 627.1

-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

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	SBP	CHK JPL	CODE
DRAWN	MFA	CHK SBP	SITE
STRUCT			
DWG	28		
DATE	OCT. 2014		

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

Appendix J

Highway 11/17 EBL and WBL

Sta. 11+770 to 11+800





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

RECORD OF BOREHOLE No 11+775 35L

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 343.5 E 204 591.0 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.06 - 2014.02.06 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					
232.2													
0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	20		232					144	
			2	SS	11		231					246	
230.8													
1.4	Silty CLAY Very Stiff Grey		3	SS	15		230						
			4	SS	16								
229.1													
3.0	SILT, trace to some sand, trace clay Compact Grey Wet		5	SS	14		229						
							228						
			6	SS	15		227						0 12 78 10
	Very Dense		7	SS	52		226						
							225						
			8	SS	73		224						
			9	SS	93		223						

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 11+775 35L

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 343.5 E 204 591.0 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.06 - 2014.02.06 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						
	Continued From Previous Page							<div><div>20406080100</div><div>○ UNCONFINED + FIELD VANE</div><div>● QUICK TRIAXIAL × LAB VANE</div></div> <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><div>204060</div></div>						
220.1	SILT, trace to some sand, trace clay Very Dense Grey Wet						222							
			10	SS	120		221							
12.1	END OF BOREHOLE AT 12.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 12.1 m 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

RECORD OF BOREHOLE No 11+780 17L

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 345.6 E 204 609.6 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.26 - 2014.03.26 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					
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					
WATER CONTENT (%)				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L									
233.9													
0.0	SAND , trace to some gravel Reddish Brown Frozen (FILL)		1	GS									
233.2			2	GS									
0.7	SAND , trace to some silt Brown Frozen to 2.0m (FILL)		1	SS	50/ .075		233						
	with clayey silt seams Compact to Loose		2	SS	16		232						
	wet		3	SS	4		231						
231.0													
2.9	PEAT , amorphous Firm Black Wet		4	SS	6		230						
230.4													
3.6	Silty CLAY , with wet silty sand seams Firm to Stiff Grey		5	SS	7		229						
							228						
			6	SS	4		227						
226.6													
7.3	SILT , trace to some sand, trace clay, with sandy silt seams Loose to Compact Grey Moist to Wet		7	SS	7		226						
							225						
			8	SS	13		224						

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 11+780 17L

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 345.6 E 204 609.6 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.26 - 2014.03.26 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				W P W W L					
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				WATER CONTENT (%)					
	Continued From Previous Page							20	40	60	80	100		20	40	60	
	SILT , trace to some sand, trace clay Very Dense Grey Moist		9	SS	78		223										
							222										
			10	SS	100												
							221										
219.9			11	SS	100/		220										
14.0	END OF BOREHOLE AT 14.0m. BOREHOLE OPEN TO 14.0m AND WATER LEVEL AT 6.2m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.7m, THEN CUTTINGS TO SURFACE.				.250												

+³, ×³: Numbers refer to
Sensitivity

20
15
10









(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 11+785 08R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 347.2 E 204 629.2 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.11 - 2014.02.12 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 (%)						
								○ UNCONFINED	+ FIELD VANE	○							
								● QUICK TRIAXIAL	× LAB VANE								
231.0							20	40	60	80	100	20	40	60			
0.0	PEAT , trace rootlets Dark Brown Frozen		1	SS	4										○		
230.2																	
0.8	Silty CLAY , trace sand Stiff to Very Stiff Grey		2	SS	4		230								○		
	varved		3	SS	13		229										
			4	SS	6		228								○		
			5	SS	3		227								○		
	occasional sand seams		6	SS	6		226								○		
224.9							225										
6.1	SILT , trace to some sand, trace clay Compact Grey Wet		7	SS	16		224								○		
			8	SS	29		223								○		0 6 86 8
	Very Dense		9	SS	103	222								○			

Continued Next Page

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

RECORD OF BOREHOLE No 11+785 08R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 347.2 E 204 629.2 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.11 - 2014.02.12 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						
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
Continued From Previous Page							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W P W W L WATER CONTENT (%)							
217.4	SILT, trace to some sand, trace clay Very Dense Grey Wet	<div></div>					220							
			10	SS	107									
			11	SS	86									
13.6	END OF BOREHOLE AT 13.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 13.6m AND WATER LEVEL AT 2.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.													

RECORD OF BOREHOLE No 11+790 20R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 348.9 E 204 647.8 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.10 - 2014.02.11 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 (%)					
								○ UNCONFINED + FIELD VANE							w P w w L					
								● QUICK TRIAXIAL × LAB VANE												
							20	40	60	80	100	20	40	60						
229.2	0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	8		229												
228.3	0.9																			
		Silty CLAY, varved Stiff Grey		2	SS	13		228												
			</																	

Continued Next Page

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

RECORD OF BOREHOLE No 11+790 20R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 348.9 E 204 647.8 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.10 - 2014.02.11 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 (%)				
								20 40 60 80 100	W P	W	W L				
Continued From Previous Page								○ UNCONFINED + FIELD VANE							
								● QUICK TRIAXIAL × LAB VANE							
214.0 15.2	SILT , trace to some sand, trace clay Dense to Very Dense Grey Wet 														




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

RECORD OF BOREHOLE No 11+795 35R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 350.9 E 204 663.4 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.12 - 2014.02.12 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 (%)		
228.9								20	40	60	80	100							
0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	4														
228.2																			
0.8	Silty CLAY, varved Stiff to Very Stiff Grey		2	SS	5														
			3	SS	11														
			4	SS	4														
			5	SS	2														
			6	SS	4														
222.8																			
6.1	SILT, trace to some sand, trace clay Compact Grey Wet		7	SS	10														
			8	SS	15														

Continued Next Page

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

METRIC

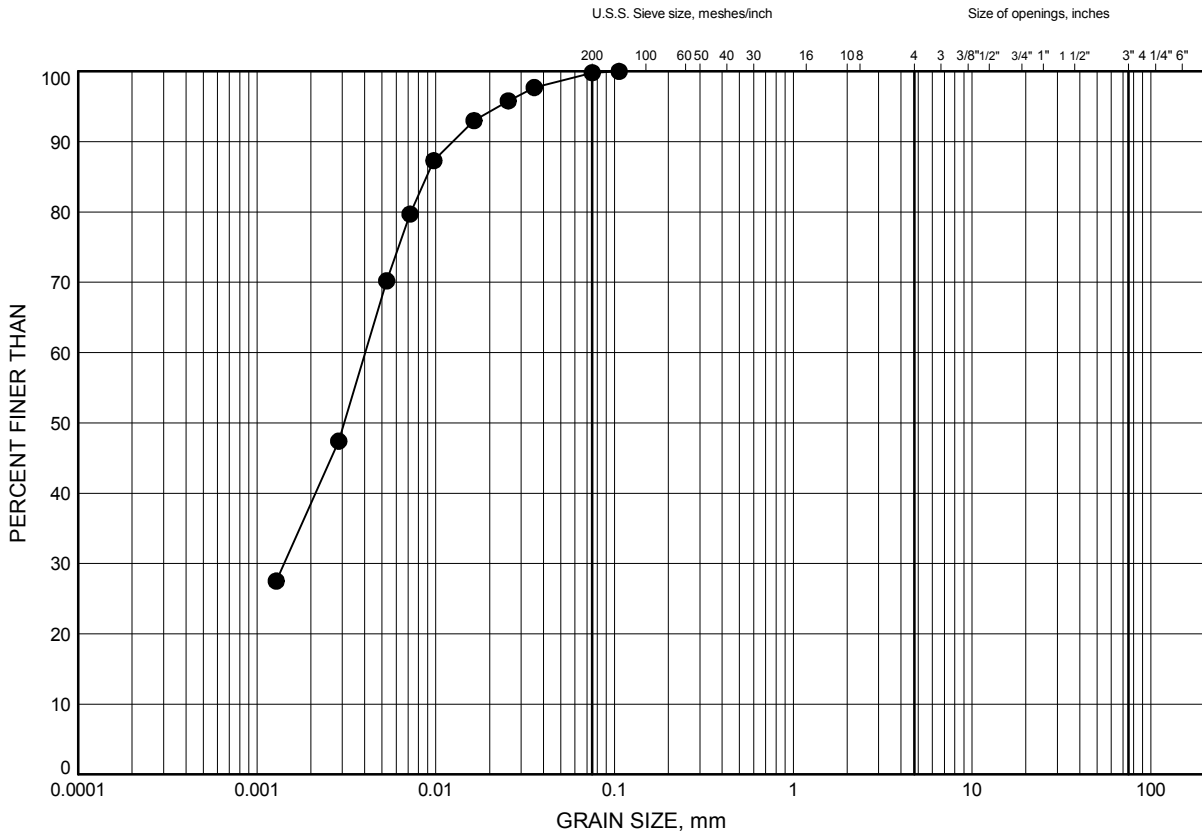
[illegible]

+³, ×³: Numbers refer to Sensitivity

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

FIGURE J1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+795 35R	4.88	224.06

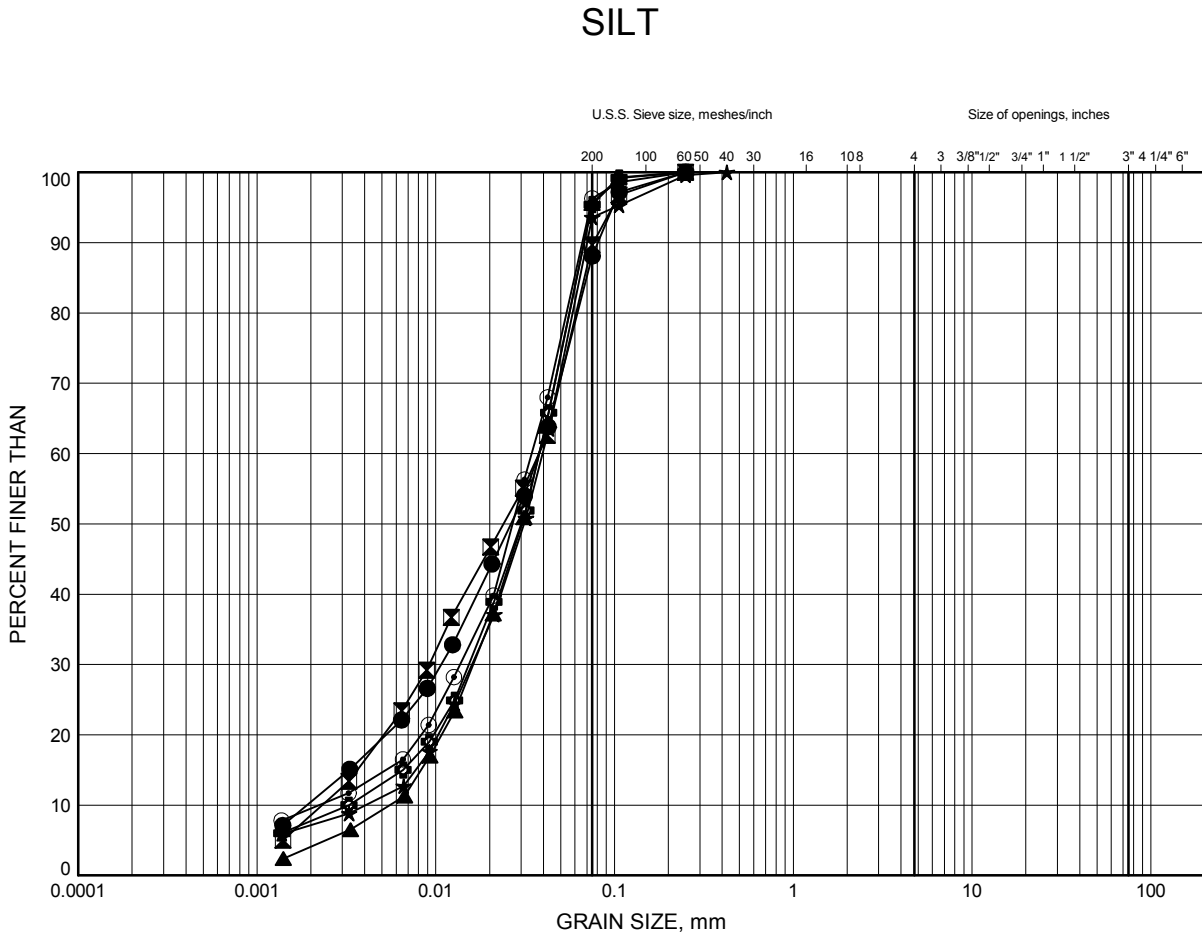
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

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

FIGURE J2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+775 35L	4.88	227.31
⊠	11+780 17L	7.92	225.99
▲	11+780 17L	12.42	221.49
★	11+785 08R	7.92	223.08
⊙	11+790 20R	12.50	216.74
⊕	11+795 35R	10.97	217.96

Date July 2014
WP# 647-89-00



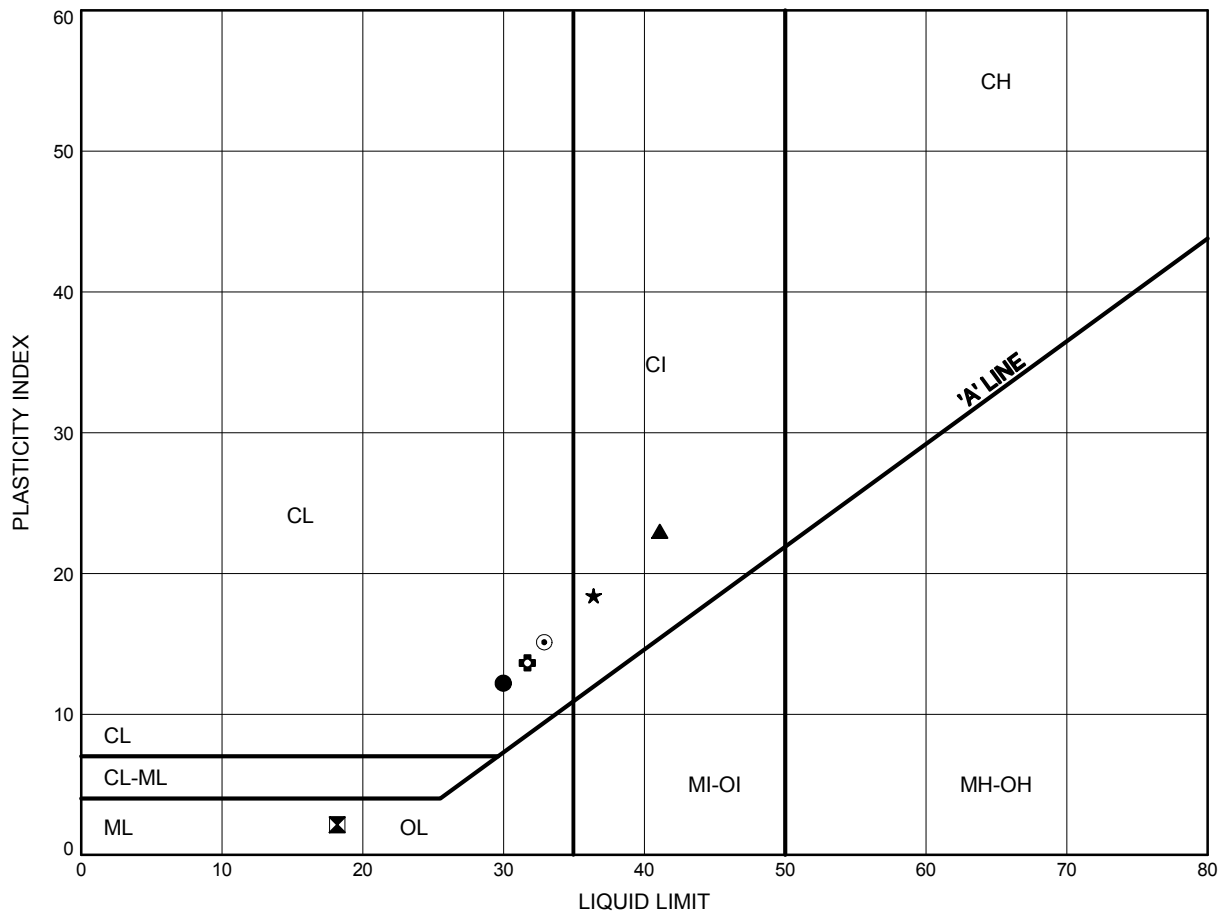
Prep'd AN
Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE J3

Silty CLAY to SILT



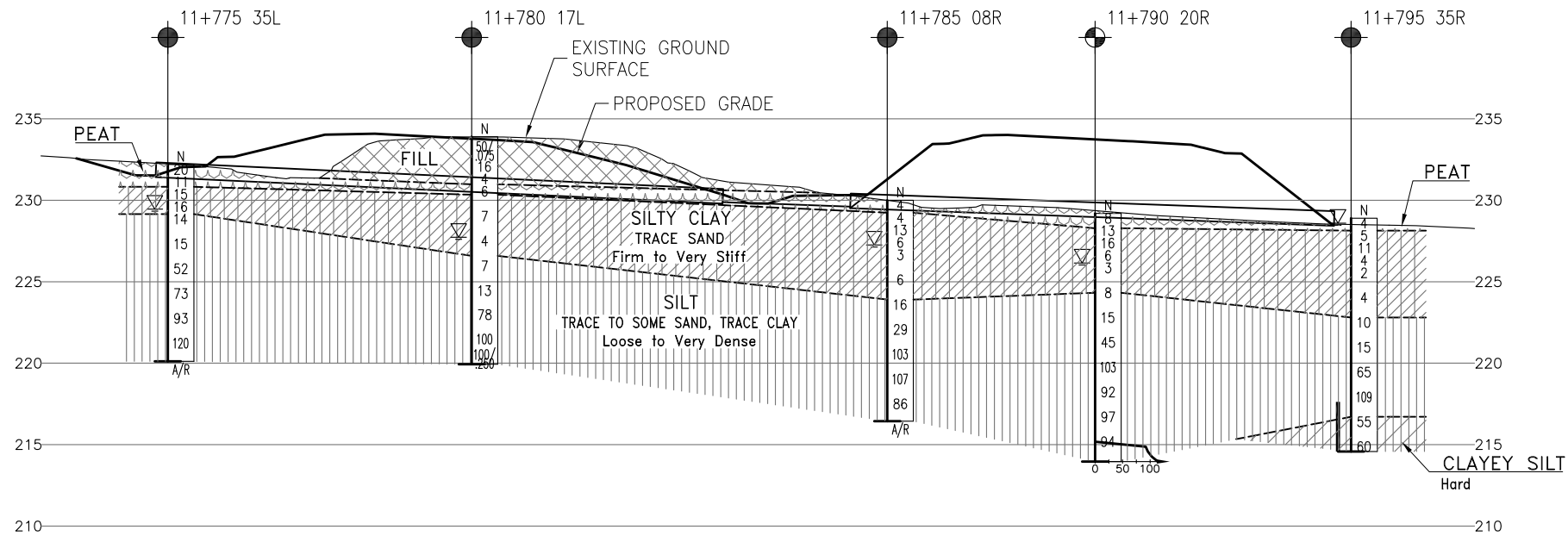
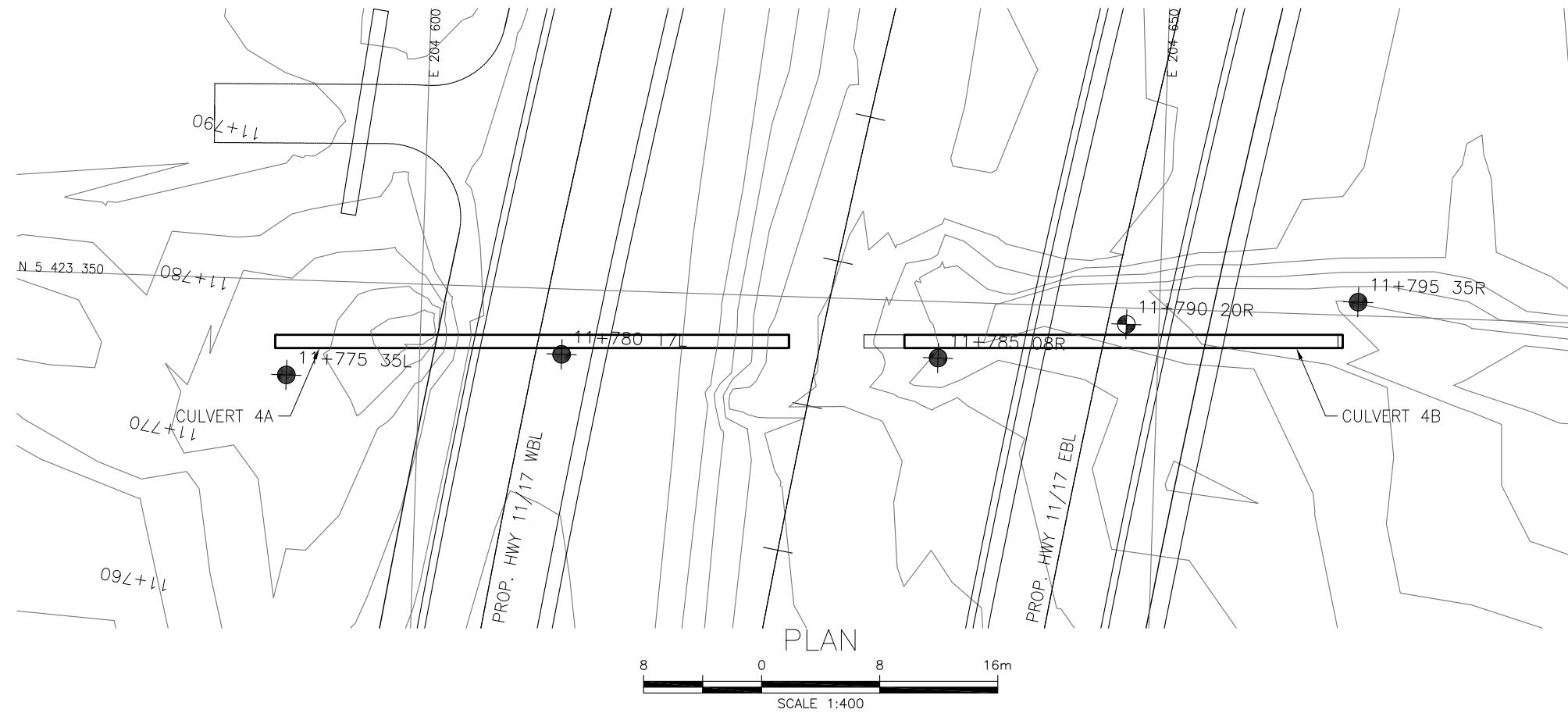
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+775 35L	1.83	230.36
⊠	11+780 17L	7.92	225.99
▲	11+785 08R	1.83	229.17
★	11+790 20R	1.07	228.17
⊙	11+790 20R	3.35	225.88
⊕	11+795 35R	4.88	224.06

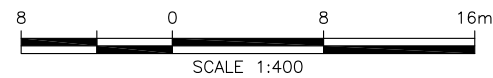
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

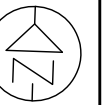


SECTION THROUGH CULVERT 4A AND 4B



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

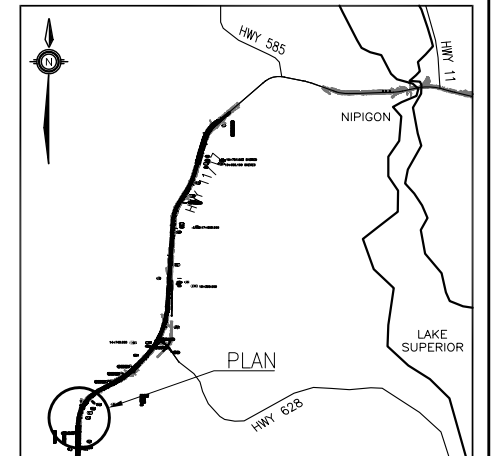
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN



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






HWY 11/17 FOUR LANING
EB AND WB LANES
CULVERT 4A AND 4B
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

[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 K

Highway 11/17 EBL and WBL

Sta. 11+900 to 11+950

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

RECORD OF BOREHOLE No 11+905 32L

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 473.5 E 204 624.8 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.26 - 2014.03.26 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 (%)									
233.2													
0.0	SAND , trace to some silt, trace to some gravel Very Dense Brown Frozen (FILL) <												

Continued Next Page

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

RECORD OF BOREHOLE No 11+905 32L

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 473.5 E 204 624.8 ORIGINATED BY SLL
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.26 - 2014.03.26 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL LIMIT 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 (%)				
								20 40 60 80 100	○ UNCONFINED + FIELD VANE	W P W W L					
	Continued From Previous Page							● QUICK TRIAXIAL × LAB VANE							
								20 40 60 80 100							

+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		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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE		WATER CONTENT (%) W P W L					
231.8 0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	6		231					88			
														97	
230.3 1.5	Silty CLAY, occasional sand seams Stiff Grey		3	SS	5		230								
			4	SS	6		229								
			5	SS	3	227									
225.5 6.2	SILT, trace clay, trace sand Loose to Compact Grey Wet		6	SS	7	226									
	sandy Very Dense		7	SS	27	224									
			8	SS	65	223									
						222									

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 11+912 19L

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 476.5 E 204 639.3 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.06.02 - 2014.07.02 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									
							20	40	60	80	100						
	Continued From Previous Page																
			9	SS	101		221										
							220										
			10	SS	70		219										
			11	SS	89		218										
217.5																	
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 14.3 m 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 11+923 02R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 480.7 E 204 662.7 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.07.02 - 2014.07.02 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							w p w w L				
								● QUICK TRIAXIAL × LAB VANE											
230.9							20	40	60	80	100	20	40	60					
0.0	PEAT , trace rootlets Dark Brown Frozen		1	SS	12														
			2	SS	6		230									207			
229.5																			
1.4	Silty CLAY , occasional sand seams Stiff Grey Soft																		
					3		SS	13	229										
					4		SS	4	228										
			5	SS	3														

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 11+923 02R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 480.7 E 204 662.7 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.07.02 - 2014.07.02 CHECKED BY MEF

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				W P W W L					
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				WATER CONTENT (%)					
	Continued From Previous Page							20	40	60	80	100		20	40	60	
216.7	Very Dense						220										
							219										
							218										
14.2	END OF BOREHOLE AT 14.2m. BOREHOLE OPEN TO 14.2m AND WATER LEVEL AT 3.9m 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 11+930 19R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 482.0 E 204 681.0 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.08.02 - 2014.09.02 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								
229.6								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE								
								20 40 60 80 100								
0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	6											
			2	SS	4											
228.0																
1.5	Silty CLAY, trace sand, occasional rootlets Stiff Grey		3	SS	12											
			4	SS	4											
			5	SS	3											
			6	SS	2											
			7	SS	12											
222.9																
6.7	SILT, trace clay, trace sand Compact Grey Wet															
			8	SS	26											
			9	SS	21											

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 11+930 19R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 482.0 E 204 681.0 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.08.02 - 2014.09.02 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								
							20	40	60	80	100					
	Continued From Previous Page															
			10	SS	52											
			11	SS	37											
			12	SS	30											
215.2																
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 14.3m AND WATER LEVEL AT 1.2m 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) 2014.03.19 2.2 227.4 2014.03.27 2.2 227.4															

RECORD OF BOREHOLE No 11+940 33R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 486.7 E 204 697.4 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.09.02 - 2014.10.02 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								WATER CONTENT (%)		
								○ UNCONFINED	+	FIELD VANE								
								● QUICK TRIAXIAL	×	LAB VANE								
228.9								20	40	60	80	100						
0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	9										140			
228.1																		
0.8	Silty CLAY, trace sand, varved, occasional rootlets Firm Grey		2	SS	6		228											
			3	SS	7		227											
			4	SS	3		226											
			5	SS	2		225											
224.0																		
4.9	SILT, trace sand, trace clay Loose Grey Wet		6	SS	9		224											
222.8							223											
6.1	Silty CLAY, varved Stiff Grey		7	SS	3		222											
	frequent silt seams																	
			8	SS	4		221											
220.4																		
8.5	SILT, trace to some sand, trace clay Loose Grey Wet		9	SS	6		220											
							219											

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 11+940 33R

2 OF 2

METRIC

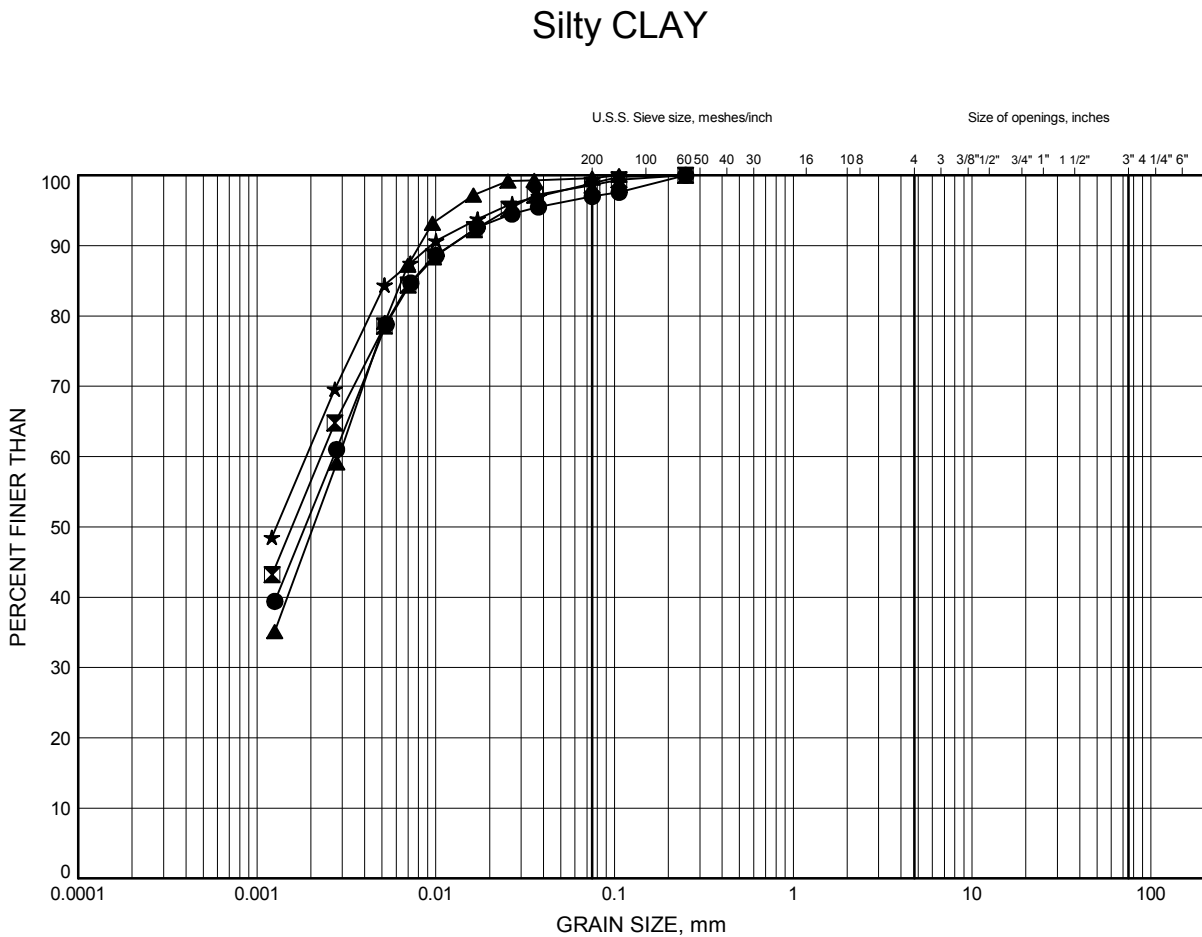
WP# 647-89-00 LOCATION N 5 423 486.7 E 204 697.4 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.09.02 - 2014.10.02 CHECKED BY MEF

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					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L WATER CONTENT (%)
	Continued From Previous Page							20 40 60 80 100					
	Dense to Very Dense		10	SS	47		218						
			11	SS	102		217						
			12	SS	101		216						
214.6							215						
14.3	END OF DRILLING AT 14.3m, BEGIN DCPT.						214						
213.3													
15.5	END OF BOREHOLE AT 15.5m. BOREHOLE OPEN TO 15.5m AND WATER LEVEL AT 13.1m 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 K1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+905 32L	3.35	229.87
⊠	11+912 19L	2.59	229.21
▲	11+923 02R	3.35	227.54
★	11+940 33R	3.35	225.54

Date July 2014
WP# 647-89-00

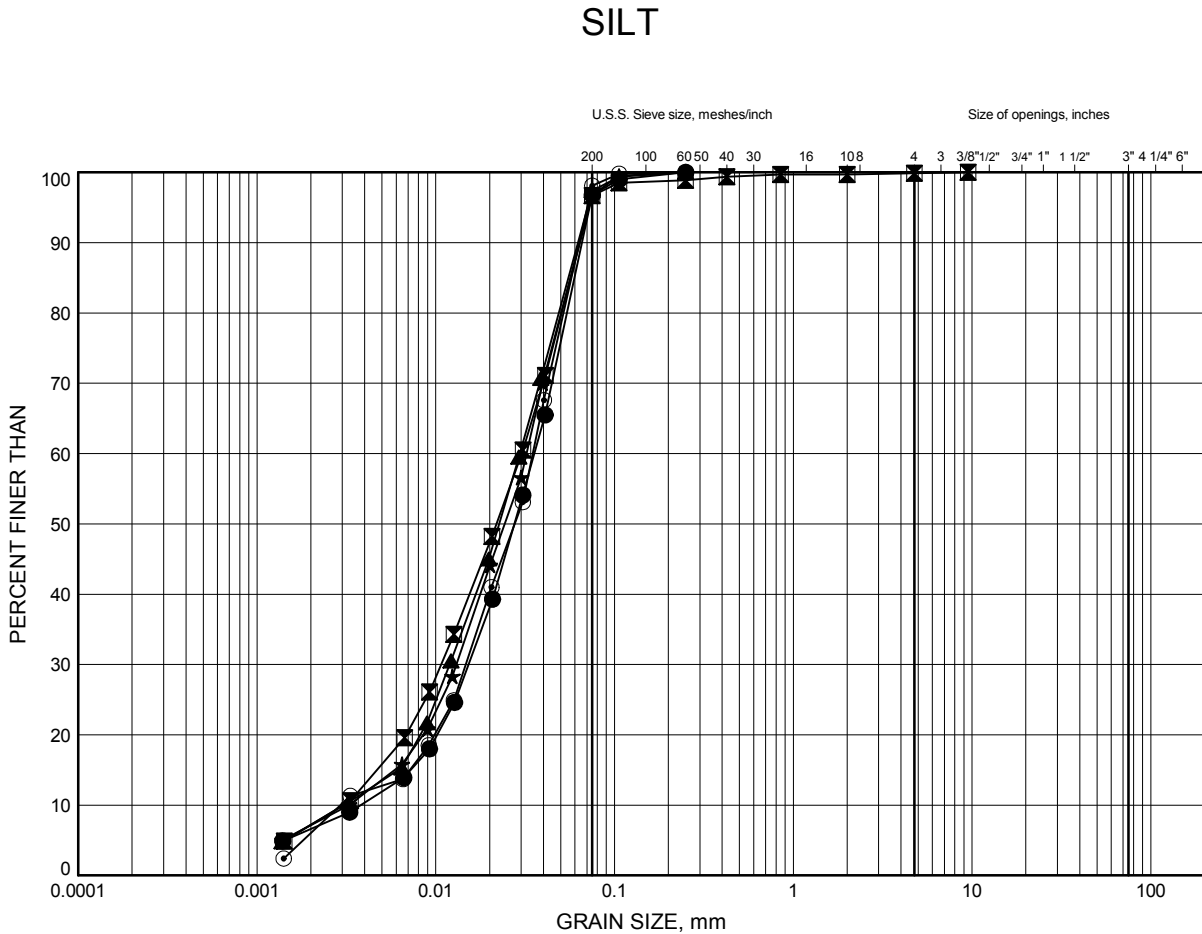


Prep'd AN
Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

GRAIN SIZE DISTRIBUTION

FIGURE K2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+905 32L	9.45	223.78
⊠	11+905 32L	14.02	219.20
▲	11+912 19L	6.40	225.40
★	11+923 02R	6.40	224.49
⊙	11+930 19R	9.45	220.11

Date July 2014
 WP# 647-89-00



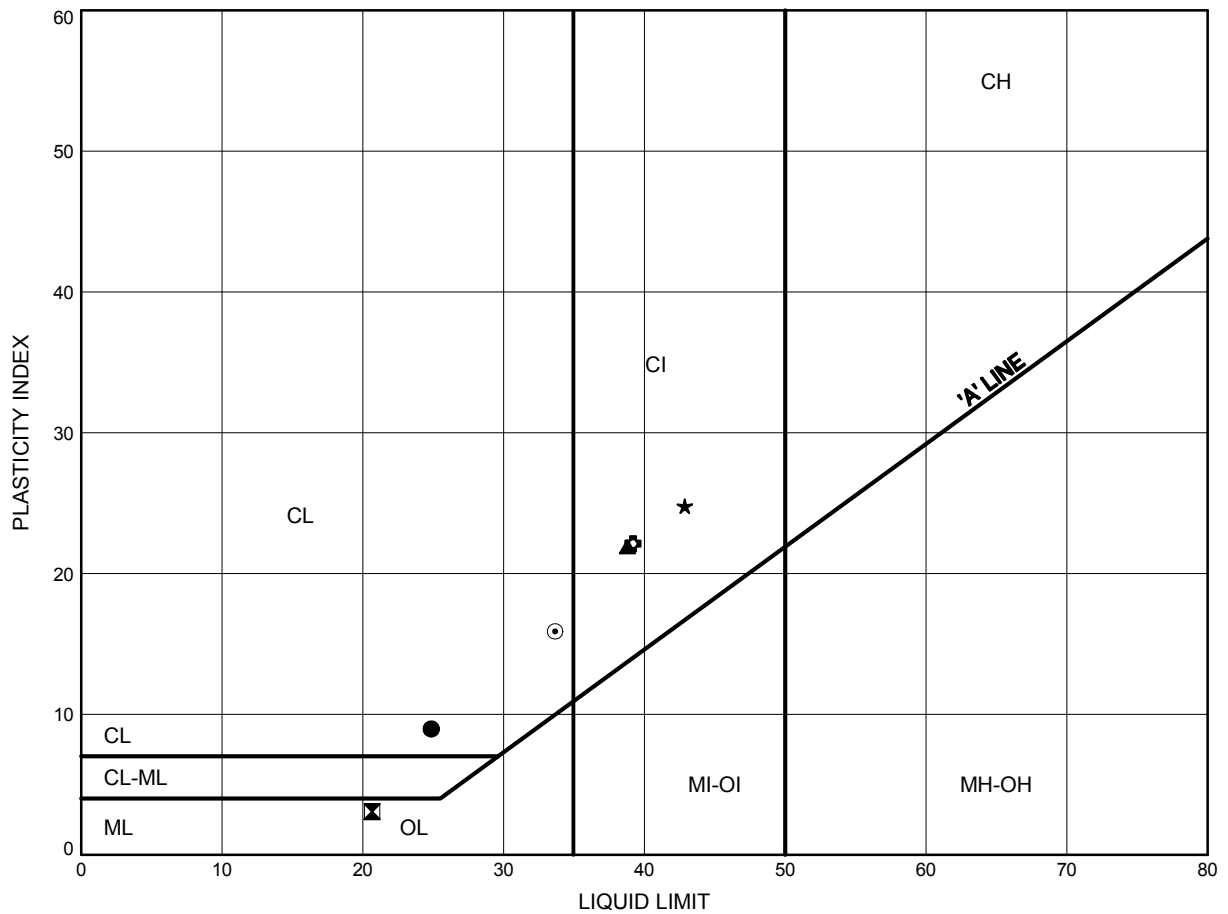
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE K3

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+905 32L	3.35	229.87
⊠	11+905 32L	14.02	219.20
▲	11+912 19L	2.59	229.21
★	11+923 02R	1.83	229.07
⊙	11+923 02R	3.35	227.54
⊕	11+930 19R	3.35	226.21

Date July 2014
 WP# 647-89-00

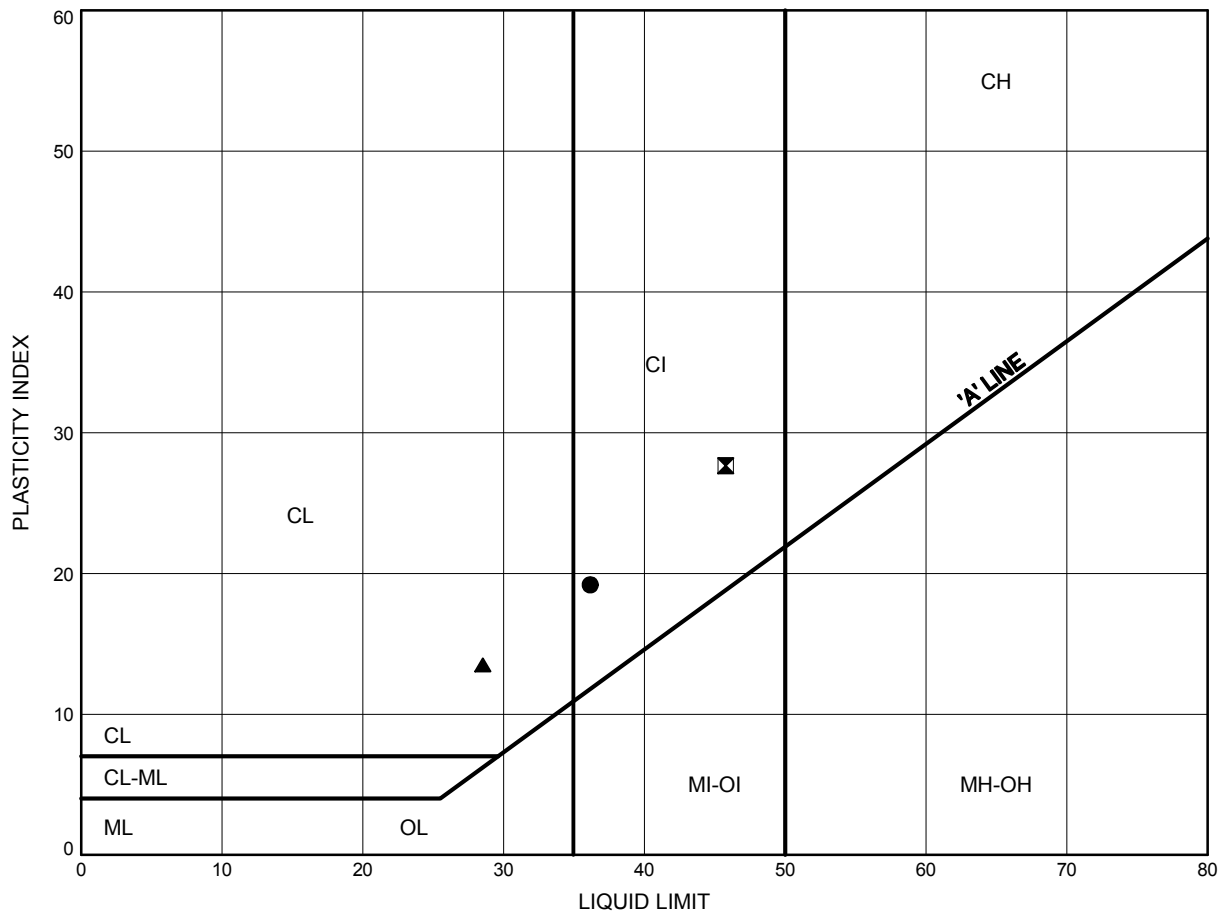


Prep'd AN
 Chkd. MKE

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

FIGURE K4

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11+940 33R	1.83	227.06
⊠	11+940 33R	3.35	225.54
▲	11+940 33R	7.92	220.97

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.

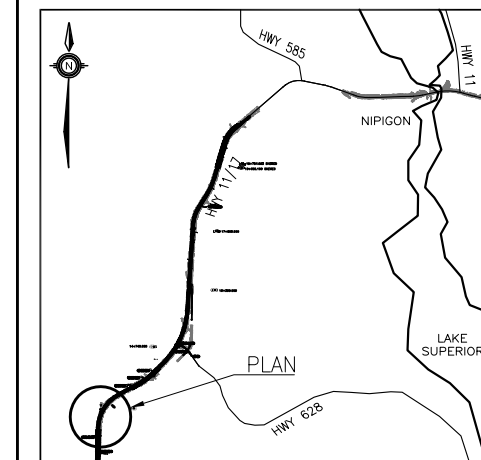
A circular professional engineer seal for the Province of Ontario. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "PROVINCE OF ONTARIO" at the bottom. The center of the seal features a stylized bridge graphic. Overlaid on the bridge is a blue ink signature. Below the signature, 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.



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 |

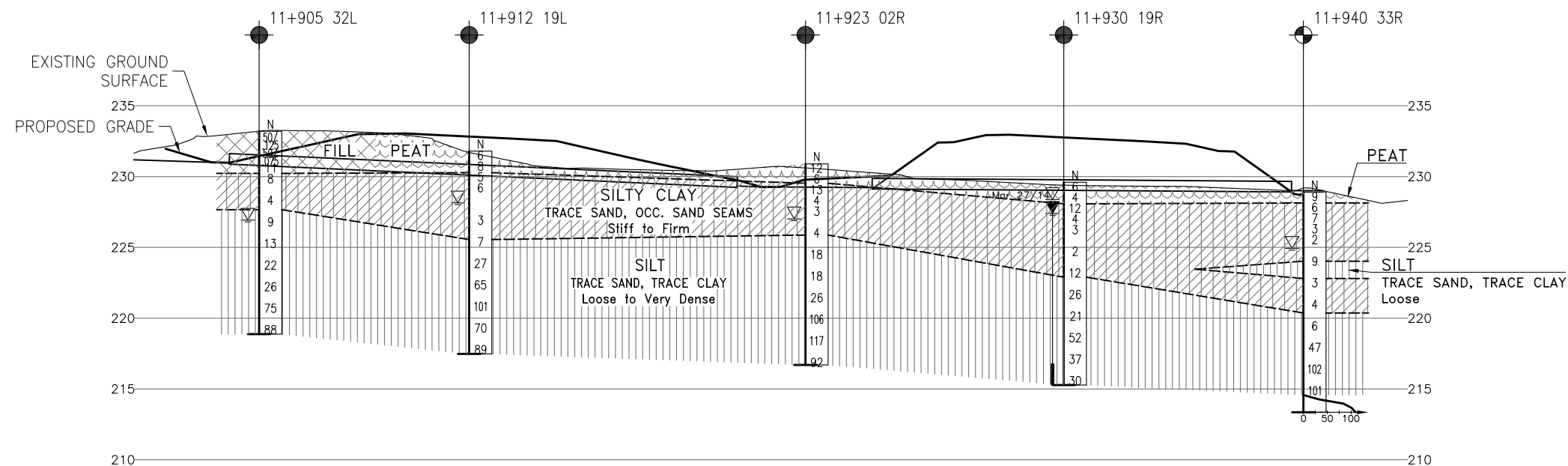
[illegible]

-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

SECTION THROUGH CULVERT 5A AND 5B

[illegible]

FILENAME: H:\Drafting\19\1351\237\ted1237-Plan&Profiles(Culverts).dwg
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Appendix L

Highway 11/17 EBL and WBL

Sta. 12+070 to 12+080

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

METRIC

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	SHEAR STRENGTH kPa	w _p	w	w _L				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	WATER CONTENT (%)							
227.7 0.0	Silty CLAY , trace sand, trace gravel Brown Frozen (FILL)		1	SS	38		227							GR SA SI CL		
226.9 0.8	PEAT , trace rootlets, trace sand Loose Dark Brown Wet		2	SS	5		226									
226.1 1.5	Silty CLAY , trace organics, trace roots Stiff Grey		3	SS	10		226									
					4		SS	2	225							
					5		SS	0	224							
223.1 4.6	SILT , trace to some clay, trace sand Loose to Compact Grey Wet		6	SS	5		223									
								222								
					7		SS	15	221							
								220								
					8	SS	13	219								
					9	SS	19	218								



+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 12+075 05R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 619.5 E 204 723.2 ORIGINATED BY GA/MKE
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.13 - 2014.02.13 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								
	Continued From Previous Page							20 40 60 80 100								
215.5	Dense						217									
			10	SS	33											
12.2	Silty CLAY Very Stiff to Hard Grey		11	SS	20		215									0 0 70 30
							214									
213.6			12	SS	100											
14.1	END OF BOREHOLE AT 14.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 14.0m AND WATER LEVEL AT 7.6m 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 12+075 06L

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 624.4 E 204 713.3 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.13 - 2014.02.13 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					
								20 40 60 80 100					
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					
						PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L			WATER CONTENT (%)				
227.9													
0.0	Sandy SILT , trace gravel, trace clay		1	SS	9								
227.6	Loose Brown (FILL)												
0.3	PEAT , occasional rootlets Soft Dark Brown Wet												
226.4													
1.5	Silty CLAY , occasional sand seams Stiff Grey		3	SS	5								
	varved												
			4	SS	2								
			5	SS	1								
223.3													
4.6	SILT , trace to some clay, trace sand Loose to Compact Grey Wet		6	SS	9								
			7	SS	14								
			8	SS	12								
			9	SS	11								

Continued Next Page

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

RECORD OF BOREHOLE No 12+075 06L

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 624.4 E 204 713.3 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.13 - 2014.02.13 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				WATER CONTENT (%)				
								20 40 60 80 100				W P W W L				
	Continued From Previous Page															
	Very Dense to Dense						217									
		10	SS	60												
							216									
		11	SS	42												
							215									
214.5																
13.4	END OF BOREHOLE AT 13.4m. BOREHOLE OPEN TO 13.4m 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 12+075 33L

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 636.6 E 204 689.2 ORIGINATED BY GA
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.12 - 2014.02.12 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					
228.4							20 40 60 80 100						
0.0	PEAT , trace rootlets Dark Brown Frozen to 0.6m		1	SS	23								
	Soft Wet		2	SS	3								
227.0													
1.4	Silty CLAY , varved Firm Grey		3	SS	4								
			4	SS	3								
225.4													
3.0	SILT , trace to some clay, trace sand Compact Grey Wet		5	SS	10								
			6	SS	14								
	Dense to Very Dense		7	SS	37								
			8	SS	39								
			9	SS	110								

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 12+075 33L

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 636.6 E 204 689.2 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.12 - 2014.02.12 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									
	Continued From Previous Page																
217.2			10	SS	125		218										
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 2.4m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No 12+075 35R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 606.0 E 204 750.0 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.14 - 2014.02.14 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				
226.1												
0.0	PEAT , trace rootlets Dark Brown Frozen		1	SS	7							
			2	SS	4							
	Wet		3	SS	2							
224.0												
2.1	Silty CLAY , trace organics, trace roots Stiff Grey		4	SS	0							
			5	SS	0							
			6	SS	4							
			7	SS	8							
218.5												
7.6	SILT , trace to some clay, trace sand Compact Grey Wet		8	SS	12							
	Very Dense to Dense		9	SS	77							

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 12+075 35R

2 OF 2

METRIC

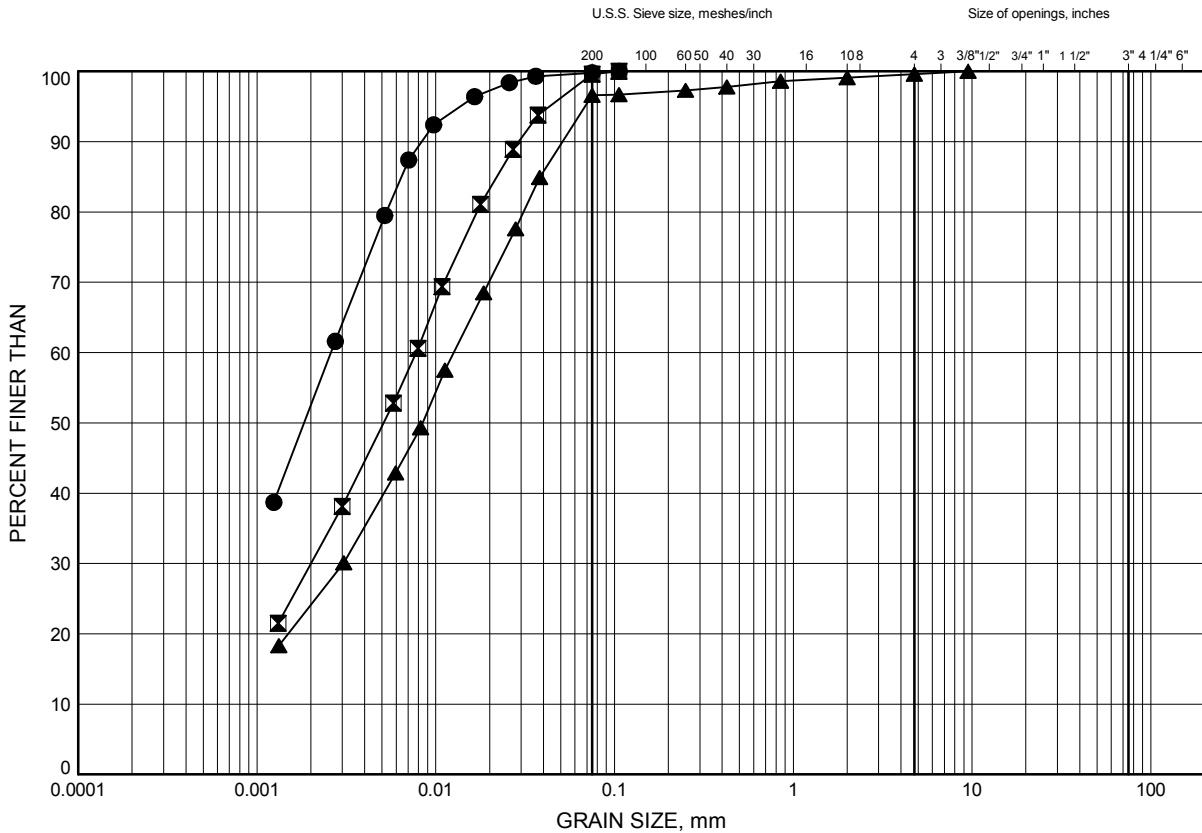
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HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.14 - 2014.02.14 CHECKED BY MEF

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	W P	W	W L	WATER CONTENT (%)		
	Continued From Previous Page													
			10	SS	76									
			11	SS	40									
212.4														
13.7	Silty CLAY , trace sand, pockets of sandy silt Stiff Grey Start of DCPT at 14.3m.		12	SS	12									0 3 72 25
210.4														
15.7	END OF BOREHOLE AT 15.7m. 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 2.0 224.1													

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

FIGURE L1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+075 05R	2.59	225.06
⊠	12+075 05R	12.50	215.15
▲	12+075 35R	14.02	212.10

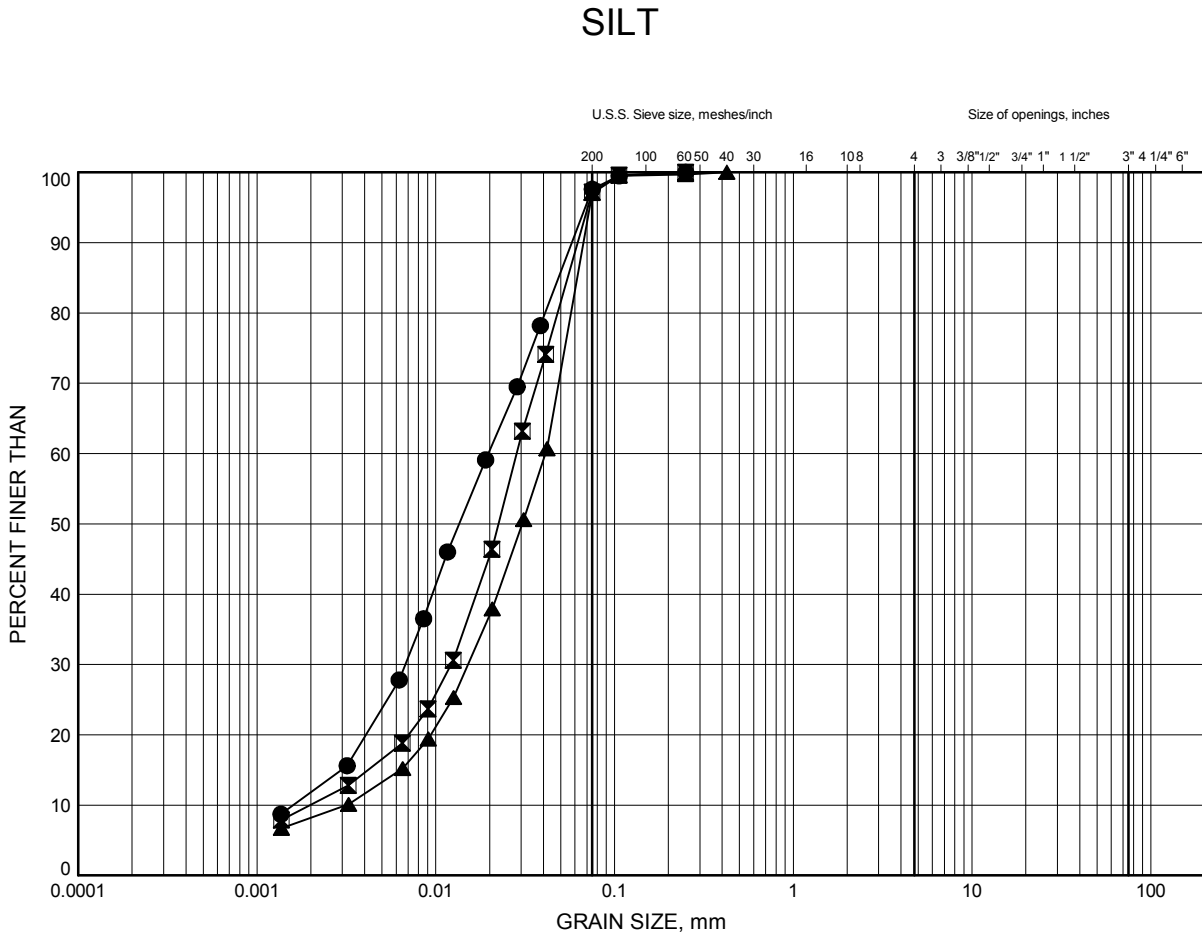
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

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

FIGURE L2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+075 06L	4.88	223.00
⊠	12+075 33L	7.92	220.50
▲	12+075 35R	9.45	216.67

Date July 2014
WP# 647-89-00



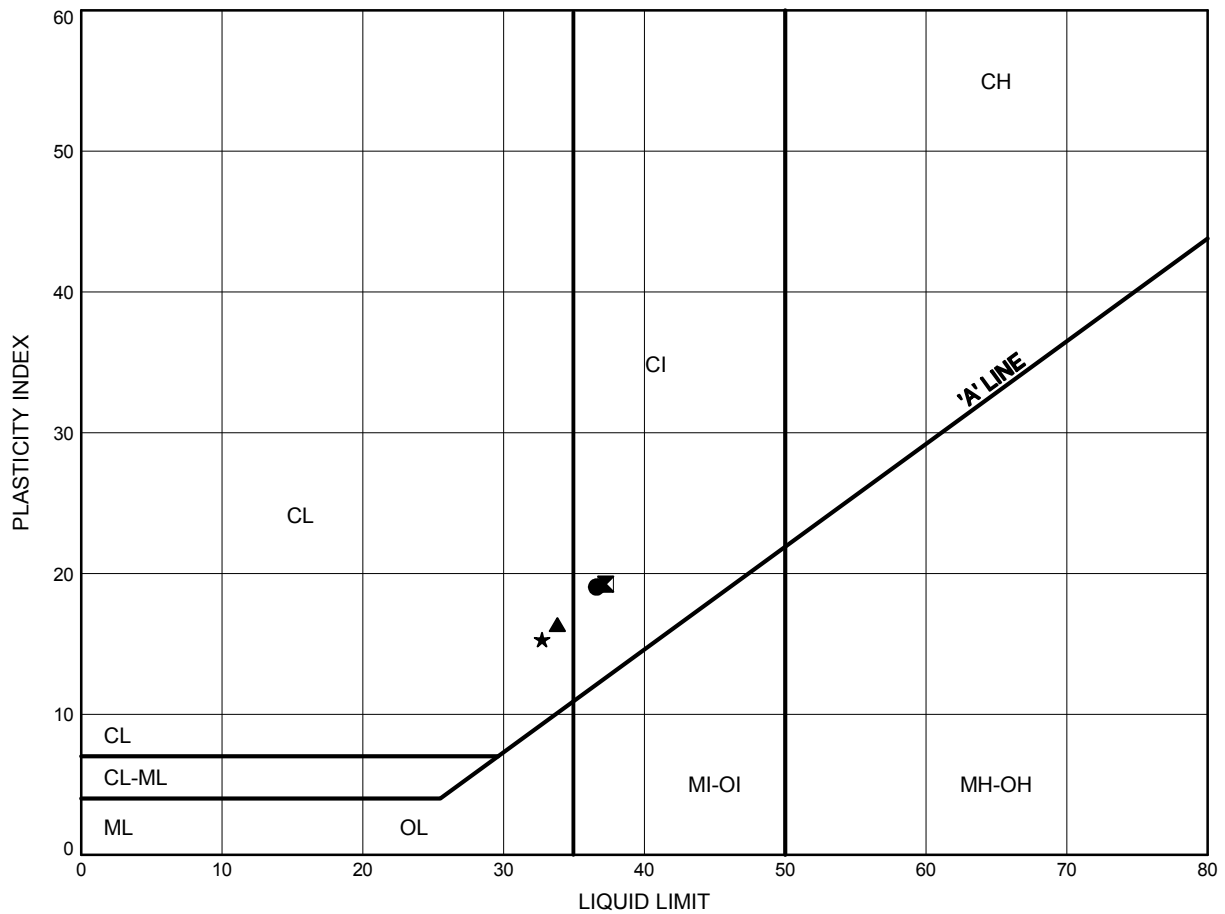
Prep'd AN
Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE L3

Silty CLAY



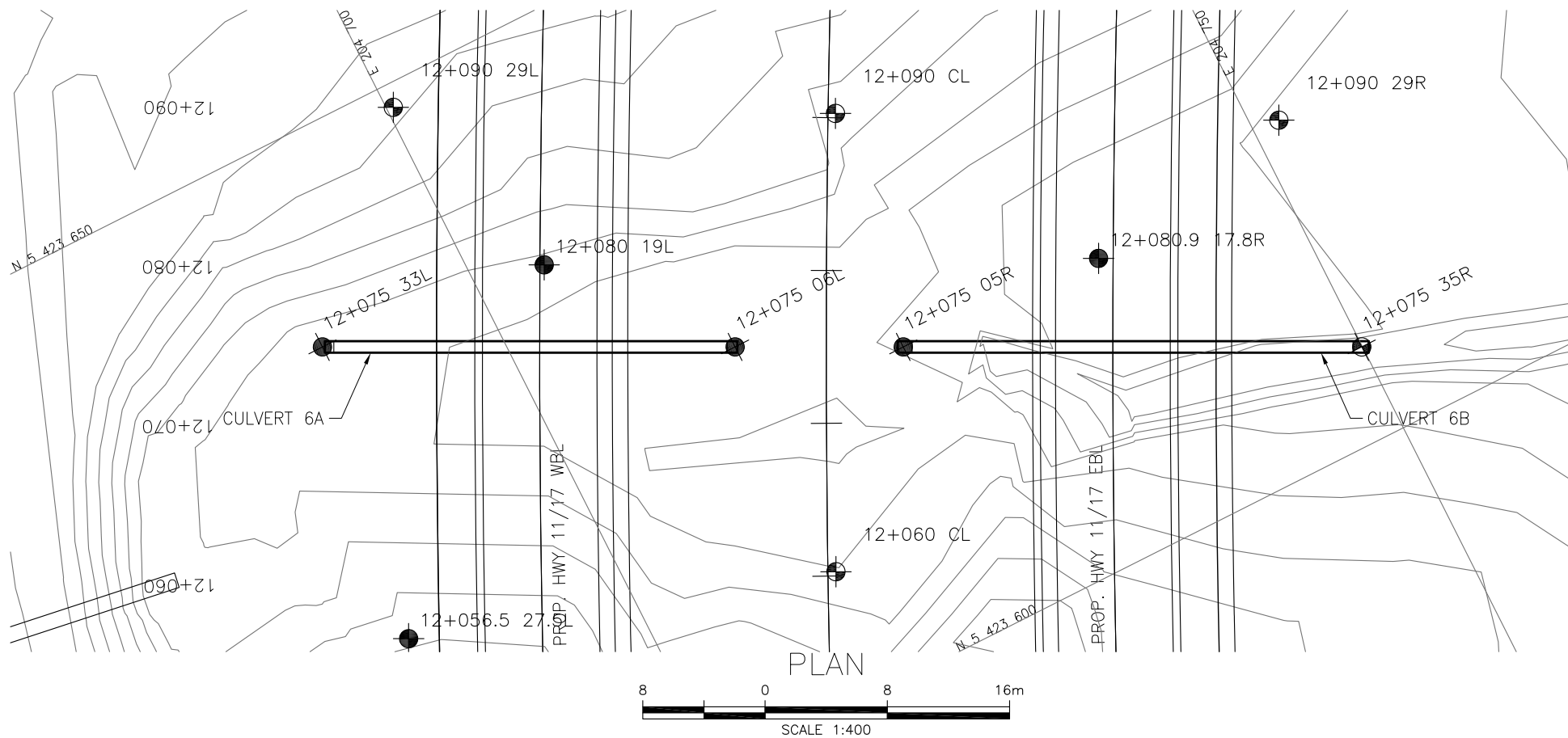
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+075 05R	2.59	225.06
⊠	12+075 06L	2.59	225.29
▲	12+075 33L	1.83	226.60
★	12+075 35R	3.35	222.77

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

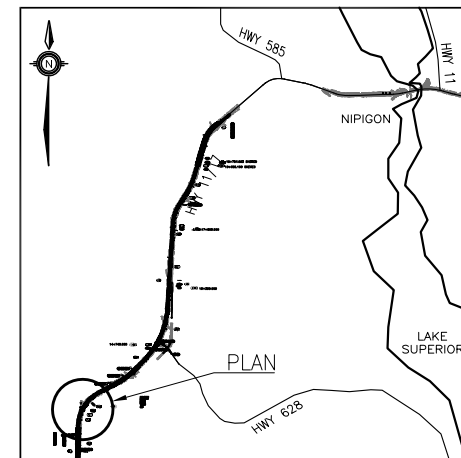
HWY 11/17 FOUR LANE
EB AND WB LANES
CULVERT 6A AND 6B
BOREHOLE LOCATIONS AND SOIL STRATA



SHEET



THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

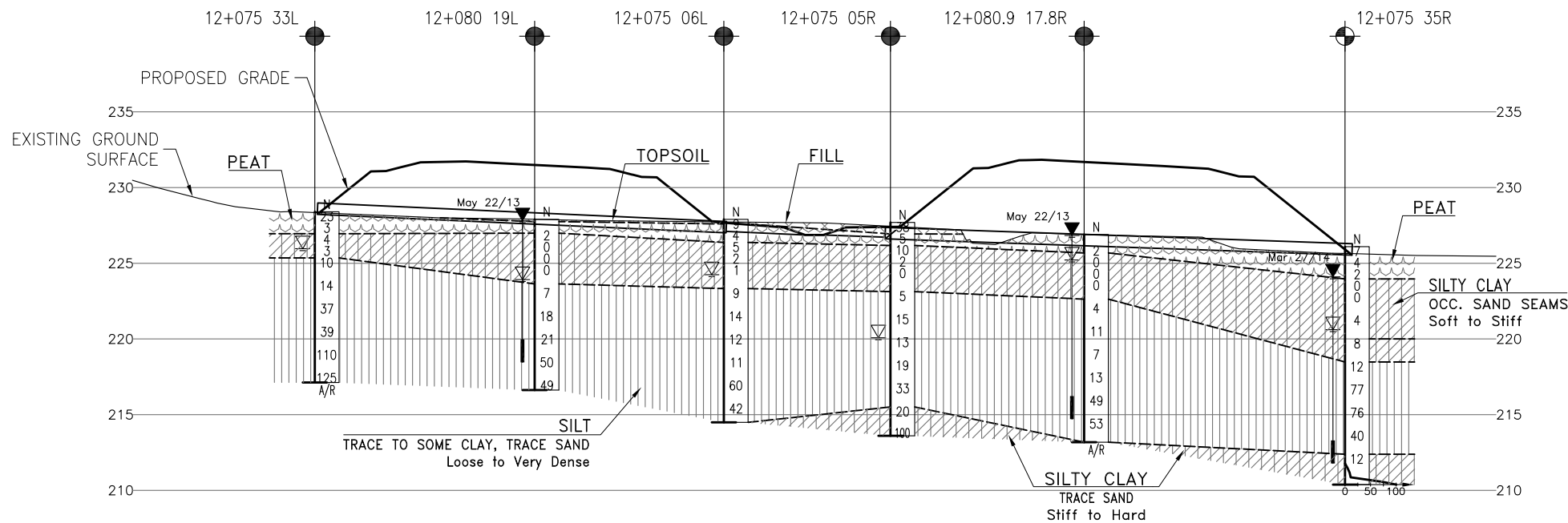
	Borehole
	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60' Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
12+075 05R	227.7	5 423 619.5	204 723.2
12+075 06L	227.9	5 423 624.4	204 713.3
12+075 33L	228.4	5 423 636.6	204 689.2
12+075 35R	226.1	5 423 606.0	204 750.0
12+080 19L	228.4	5 423 634.8	204 704.6
12+080.9 17.8R	226.8	5 423 618.9	204 737.2

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 6A AND 6B



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	SBP	CHK JPL	CODE
DRAWN	MFA	CHK SBP	SITE
STRUCT	DATE	OCT. 2014	DWG 5

Appendix M

Highway 11/17 EBL Sta. 12+100 to 12+170

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

RECORD OF BOREHOLE No 12+130 15R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 662.7 E 204 757.8 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.14 - 2014.02.15 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			WATER CONTENT (%)						
								20 40 60 80 100	W P W W L								
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE											
229.4																	
0.0	ORGANICS , trace rootlets, trace wood Soft Dark Brown Moist		1	SS	3		229										
228.7																	
0.8	SILT , trace to some sand, trace clay, trace roots Very Loose to Compact Brown Moist to Wet		2	SS	3		228										
			3	SS	11												
227.1							227										
2.3	Silty CLAY , trace sand Stiff Brown to Grey		4	SS	3												
			5	SS	0												
			6	SS	0												

Continued Next Page

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

RECORD OF BOREHOLE No 12+130 15R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 662.7 E 204 757.8 ORIGINATED BY MKE
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.14 - 2014.02.15 CHECKED BY MEF

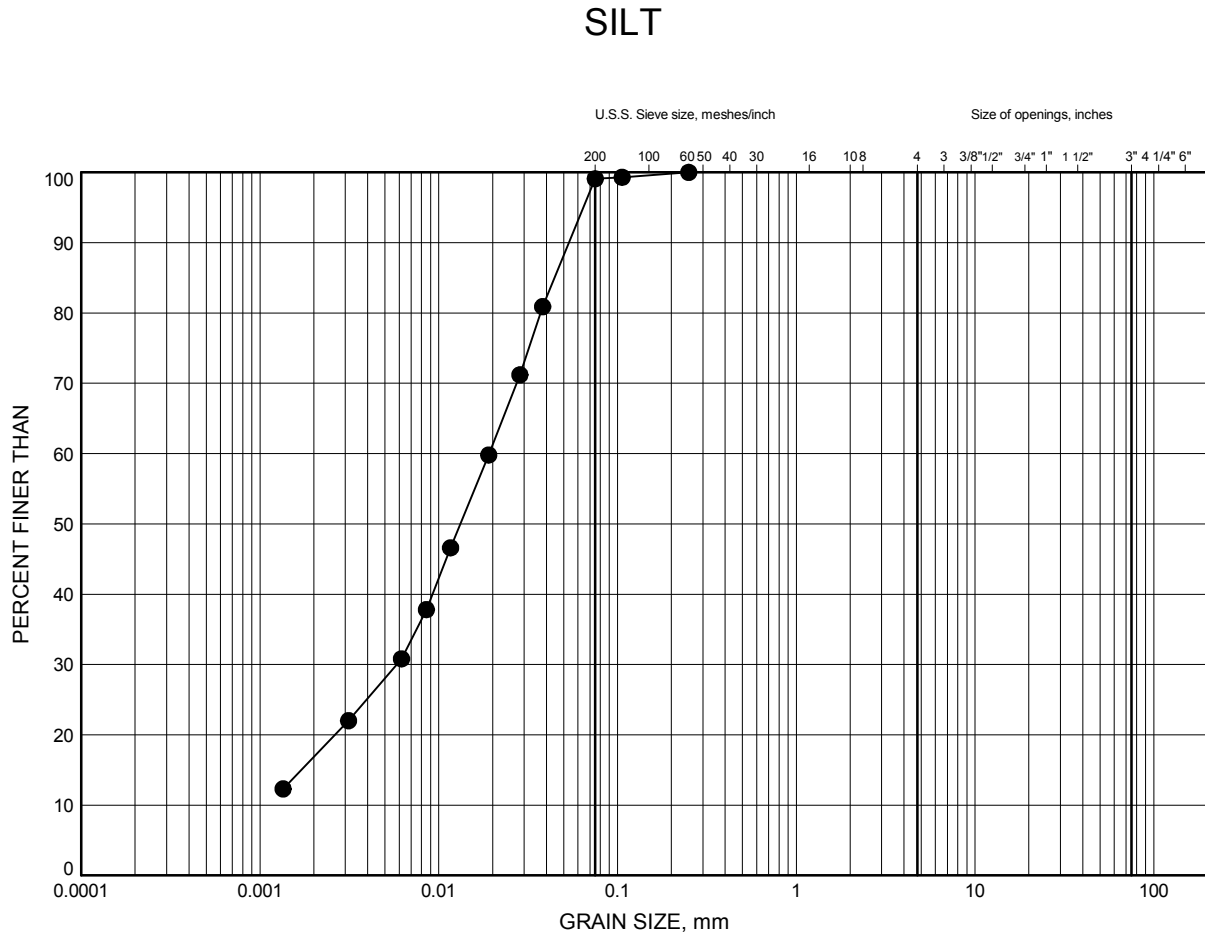
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
	Continued From Previous Page							20 40 60 80 100						
								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 M1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+130 15R	7.92	221.49

Date July 2014
 WP# 647-89-00



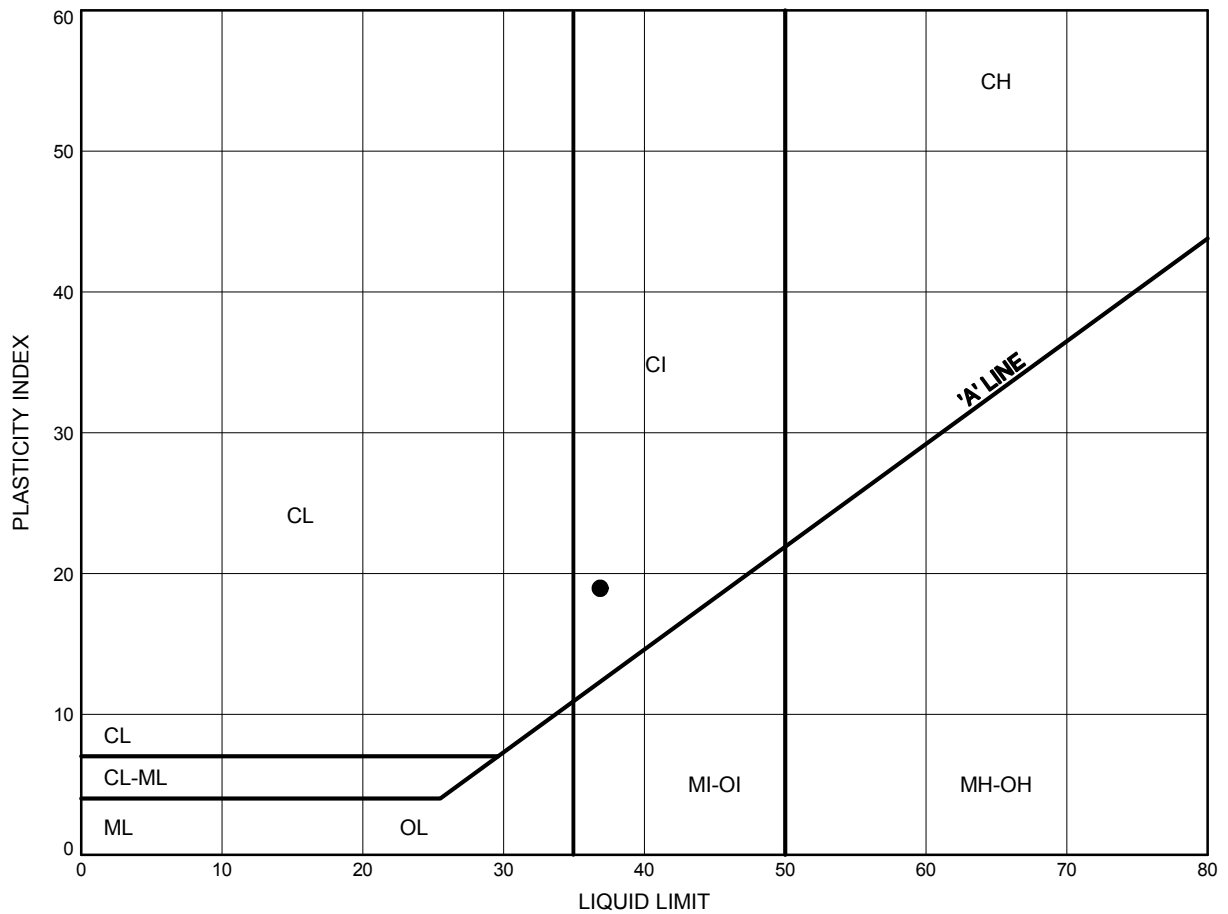
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE M2

Silty CLAY



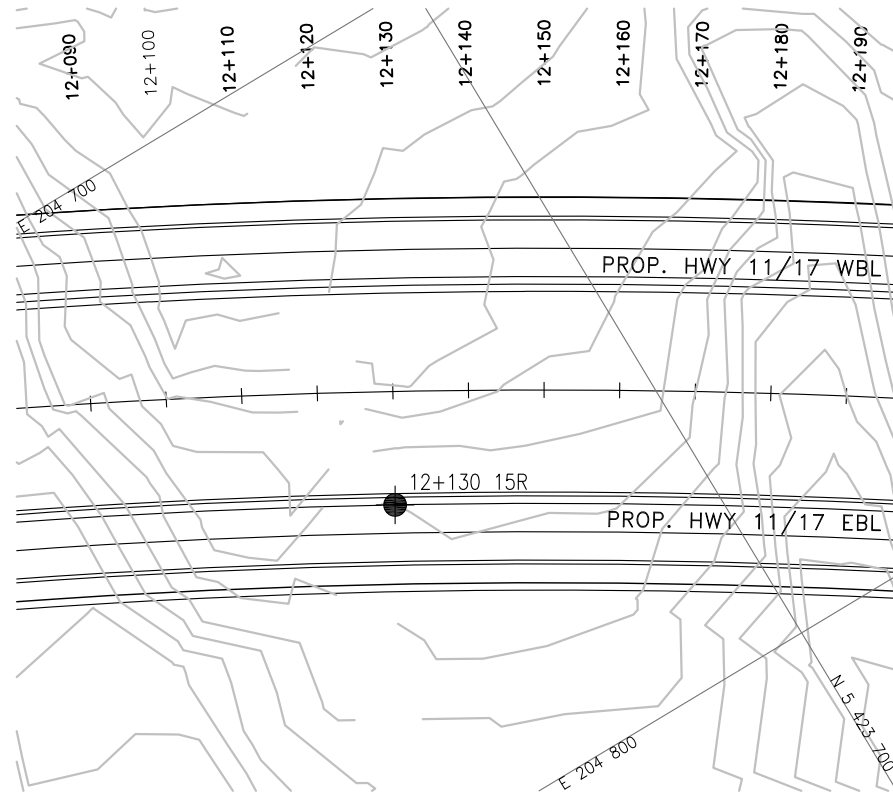
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+130 15R	4.88	224.54

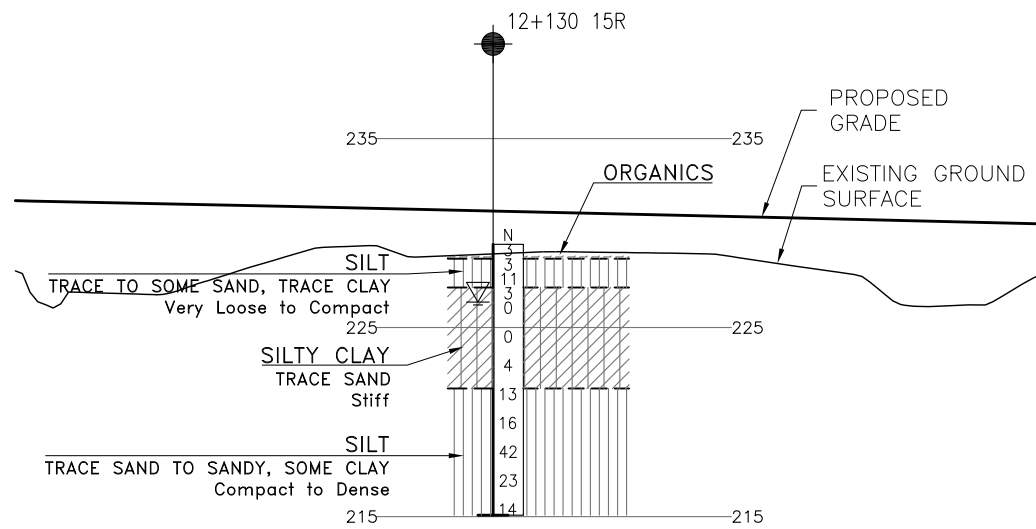
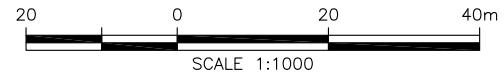
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



PLAN



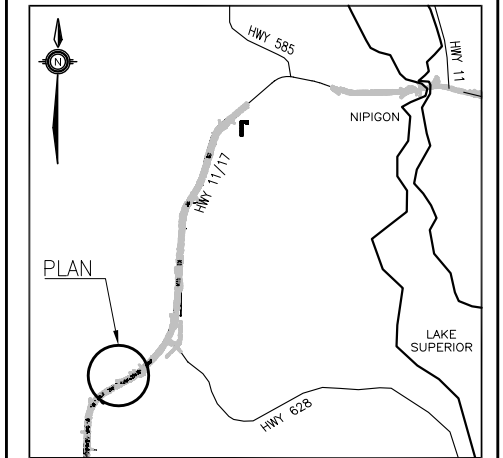
PROFILE ALONG \mathbb{C} HIGHWAY 11/17 EBL



H 1:1000






V 1:400

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



KEYPLAN

L E G E N D

	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

Appendix N

Highway 11/17 EBL and WBL

Sta. 12+230 to 12+250

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

RECORD OF BOREHOLE No 12+230 43R

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 729.1 E 204 833.8 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.15 - 2014.02.15 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							
224.4								20 40 60 80 100							
0.0	PEAT, trace rootlets Soft to Firm Dark Brown		1	SS	3		224							91	
	some sand, trace silt Brown to Grey		2	SS	5									178	
222.9							223								
1.5	Silty CLAY Firm to Stiff Grey		3	SS	4										
			4	SS	0		222								
			5	SS	4		221								
							220								
			6	SS	5		219								
			7	SS	3		218								
							217								
			8	SS	4										
							216								
	occasional cobbles														
215.3															
9.1	Silty SAND Very Dense Grey Moist to Wet		9	SS	97		215								

Continued Next Page

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

RECORD OF BOREHOLE No 12+230 43R

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 423 729.1 E 204 833.8 ORIGINATED BY MKE
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.15 - 2014.02.15 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 (%)					
214.4 10.1	<p>Continued From Previous Page</p> <p>END OF BOREHOLE AT 10.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER.</p> <p>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 1.6* 222.8 *(Frozen)</p>													

RECORD OF BOREHOLE No 12+235 CL

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 423 758.2 E 204 801.8 ORIGINATED BY MKE
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.16 - 2014.02.16 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			W P W W L							
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE			WATER CONTENT (%)							
226.8								20 40 60 80 100										
0.0	PEAT, trace rootlets, trace wood fragments Soft to Firm Dark Brown		1	SS	2		226								125			
																	132	
225.1																		
1.7	Silty CLAY, trace sand, occasional sand seams Firm to Stiff Grey		3	SS	2		225											
									224									
								223										
								222										
						221												
						220												
						219												
218.2																		
8.6	END OF BOREHOLE AT 8.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 8.6m AND WATER LEVEL AT 5.5m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																	

ONTMT4S 1237.GPJ 2012TEMPLATE(MTO).GDT 7/28/14






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

RECORD OF BOREHOLE No 12+240 42L

1 OF 1

METRIC

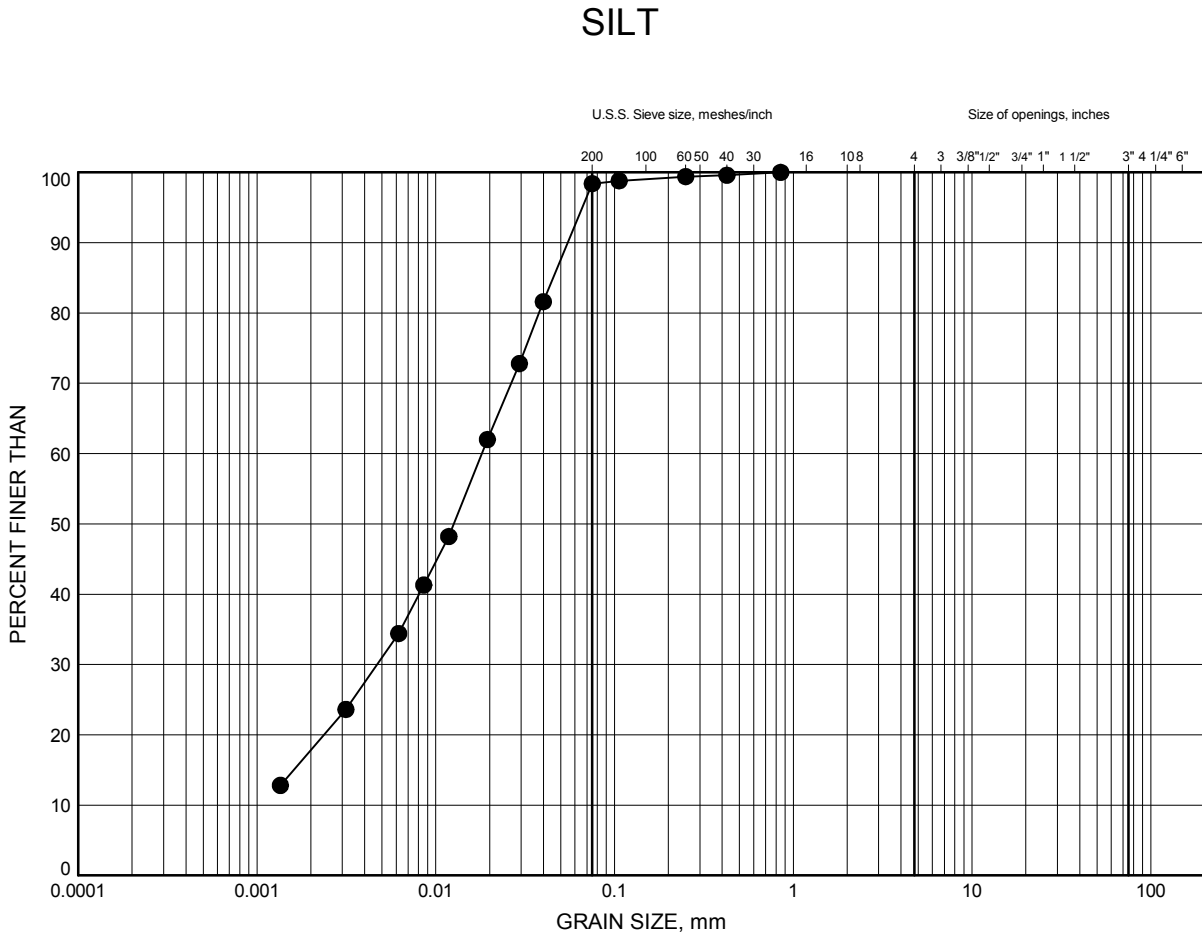
WP# 647-89-00 LOCATION N 5 423 787.1 E 204 770.8 ORIGINATED BY MKE
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.15 - 2014.02.15 CHECKED BY MEF

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 (%)		
								20 40 60 80 100	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
226.1	PEAT, trace rootlets, trace wood fragments Very Soft to Firm Dark Brown Wet		1	SS	2		226							132	0 2 81 17			
0.0																94		
			2	SS	5		225											
224.5																		
1.5	SILT, some clay, trace sand, trace organics Very Loose Grey		3	SS	3		224											
223.8																		
2.3	Silty CLAY, trace sand Firm Grey		4	SS	7		223											
			5	SS	10		222											
221.3	occasional cobbles		6	SS	50/													
4.7	END OF BOREHOLE AT 4.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 4.7m AND WATER LEVEL AT 3.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.				.150													

+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 N1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+240 42L	1.83	224.24

Date July 2014
 WP# 647-89-00

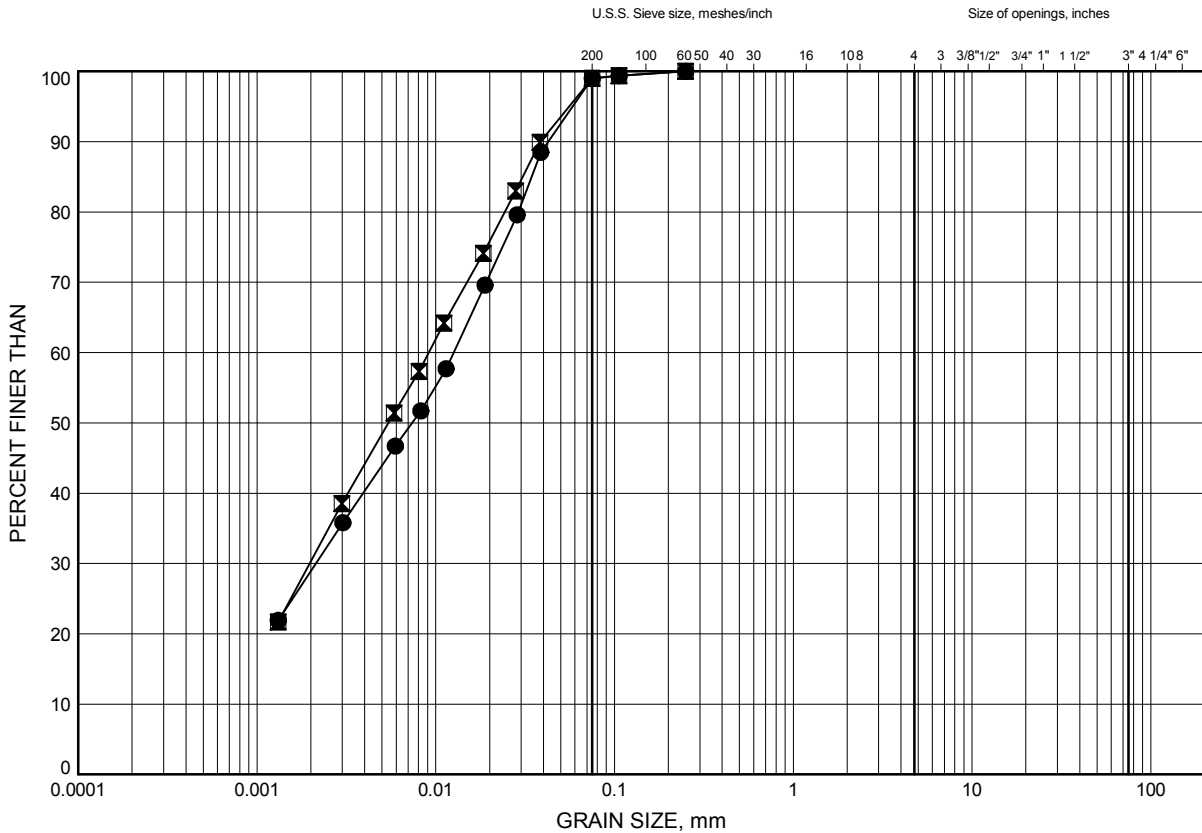


Prep'd AN
 Chkd. MKE

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

FIGURE N2

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+230 43R	4.88	219.56
⊠	12+235 CL	3.35	223.43

Date July 2014
 WP# 647-89-00

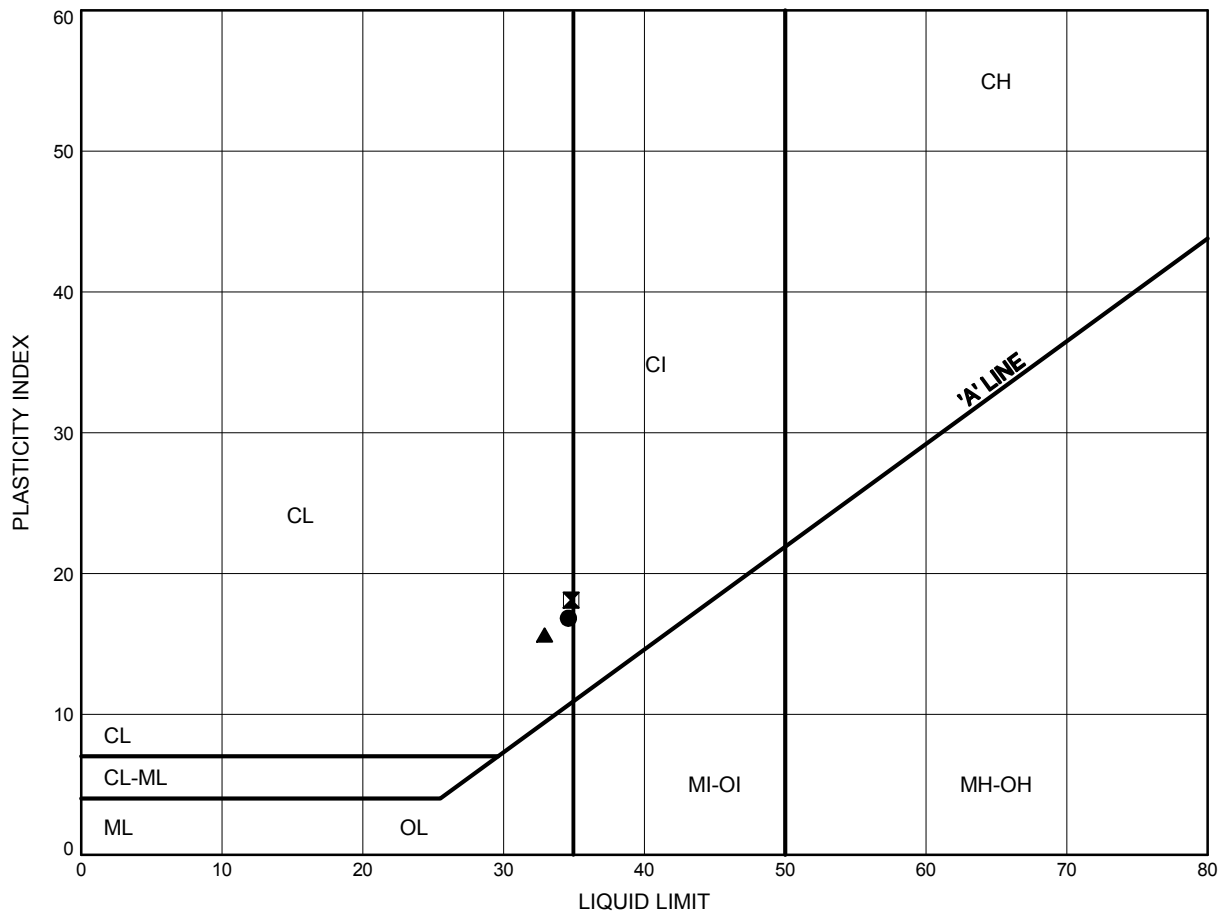


Prep'd AN
 Chkd. MKE

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

FIGURE N3

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+230 43R	2.59	221.84
⊠	12+230 43R	7.92	216.51
▲	12+235 CL	1.83	224.96

Date July 2014
 WP# 647-89-00



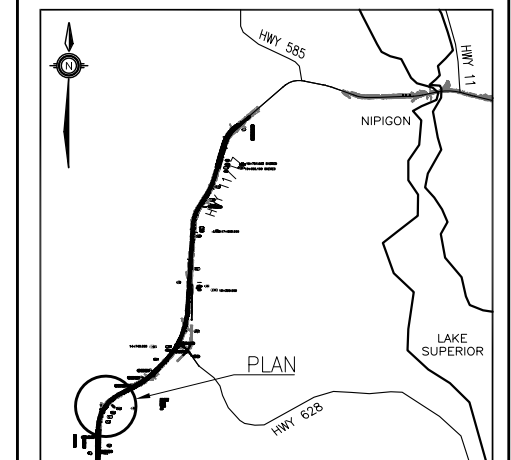
Prep'd AN
 Chkd. MKE

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".



THURBER ENGINEERING LTD.



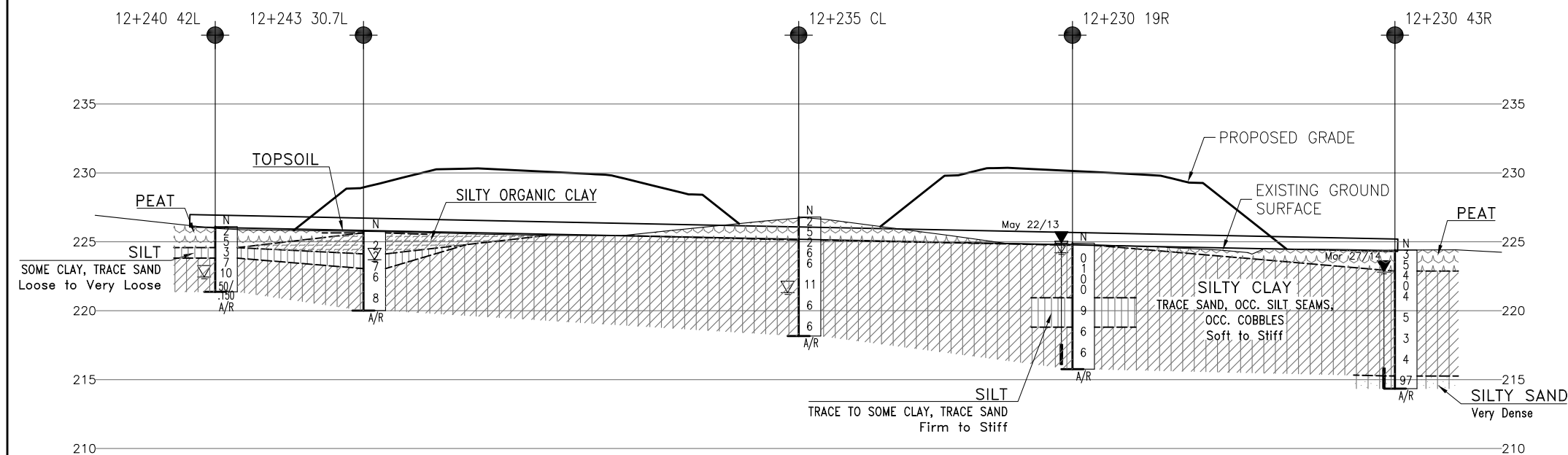
LEGEND

	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		6	



SECTION THROUGH CULVERT 7



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

Appendix O

Highway 11/17 EBL
Sta. 12+270 to 12+420

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 12+350 19R

2 OF 2

METRIC

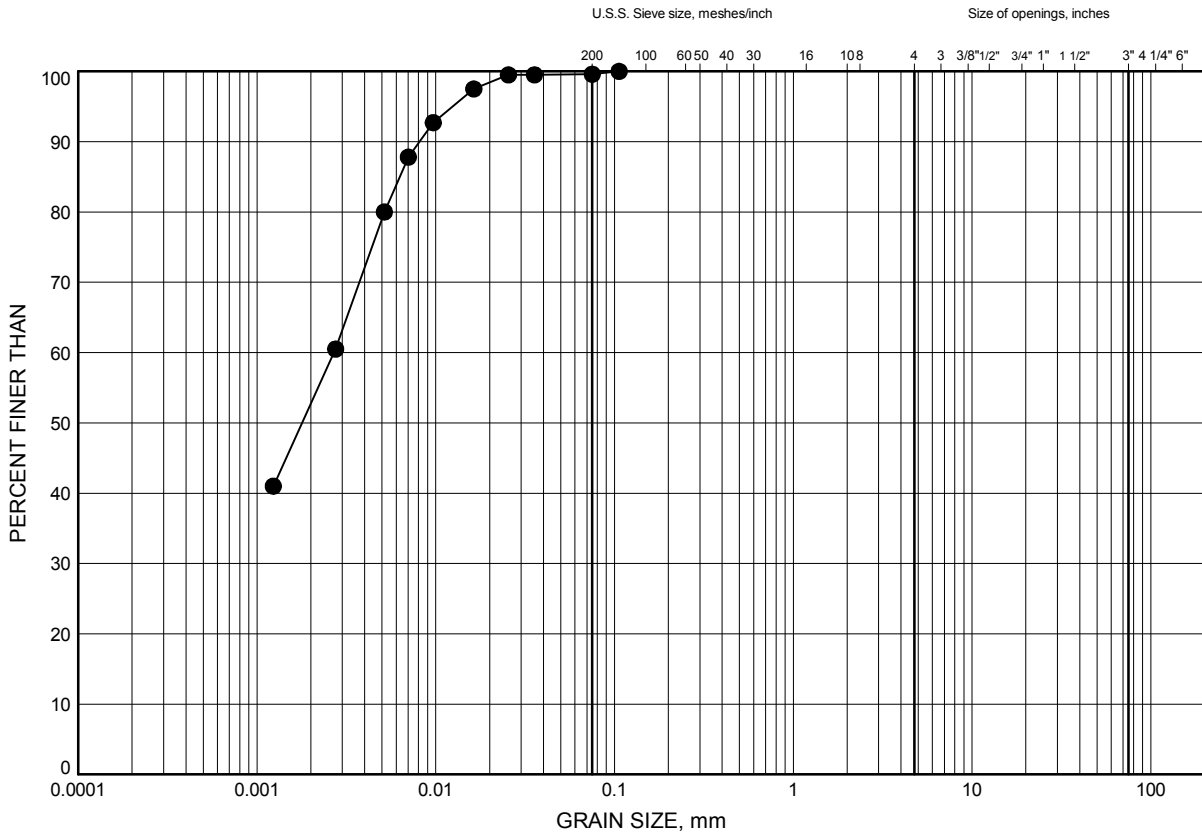
WP# 647-89-00 LOCATION N 5 423 834.4 E 204 888.5 ORIGINATED BY MKE
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.16 - 2014.02.16 CHECKED BY MEF

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									
	Continued From Previous Page																
216.9							217										
10.7	SAND, trace silt Very Dense Grey Wet		10	SS	84		216										
215.4																	
12.2	END OF BOREHOLE AT 12.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 12.0m AND WATER LEVEL AT 3.0m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

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

FIGURE 01

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+350 19R	3.35	224.23

Date July 2014
 WP# 647-89-00



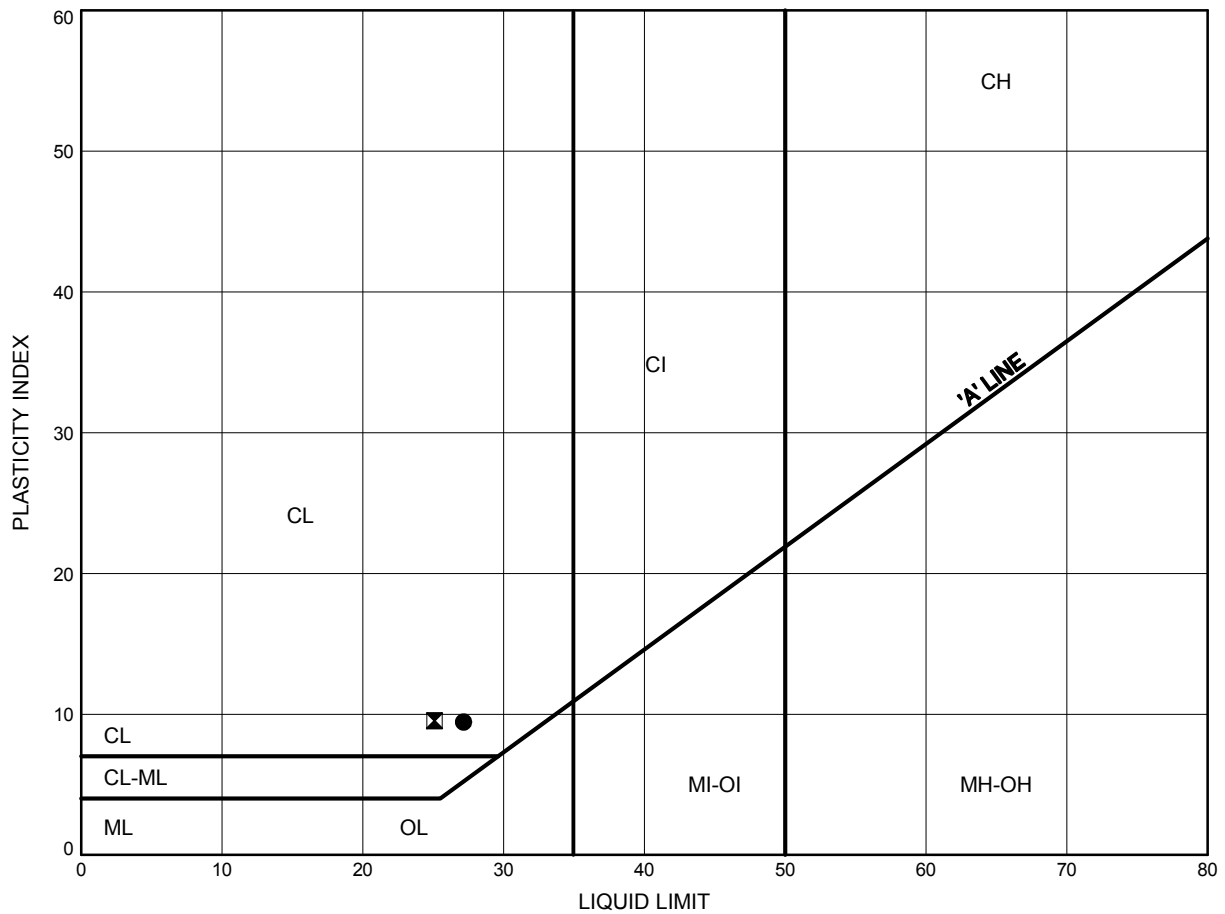
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE 02

Silty CLAY



LEGEND

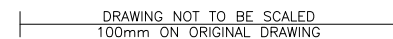
SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+350 19R	3.35	224.23
⊠	12+350 19R	7.92	219.66

THURBALT 1237.GPJ 7/28/14

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. The center of the seal features the name "P. K. CHATTERJEE" in bold capital letters. Above the name is a handwritten signature in blue ink. Below the name is the date "Oct 3/14" handwritten in blue ink. The seal also includes the license number "10000" at the top and "10000" at the bottom, which are partially obscured by the signature and date.

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 signature of "S. Peters" in blue ink. Below the signature, the license number "100194478" is printed. At the bottom of the seal, the date "Oct 3/14" is handwritten in blue ink.



LEGEND

[illegible]

GEOCRES No. 52A-184

[illegible]

Appendix P

Highway 11/17 EBL
Sta. 12+540 to 12+590




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

RECORD OF BOREHOLE No 12+540 21R

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 423 957.5 E 205 027.9 ORIGINATED BY MKE
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.16 - 2014.02.16 CHECKED BY MEF

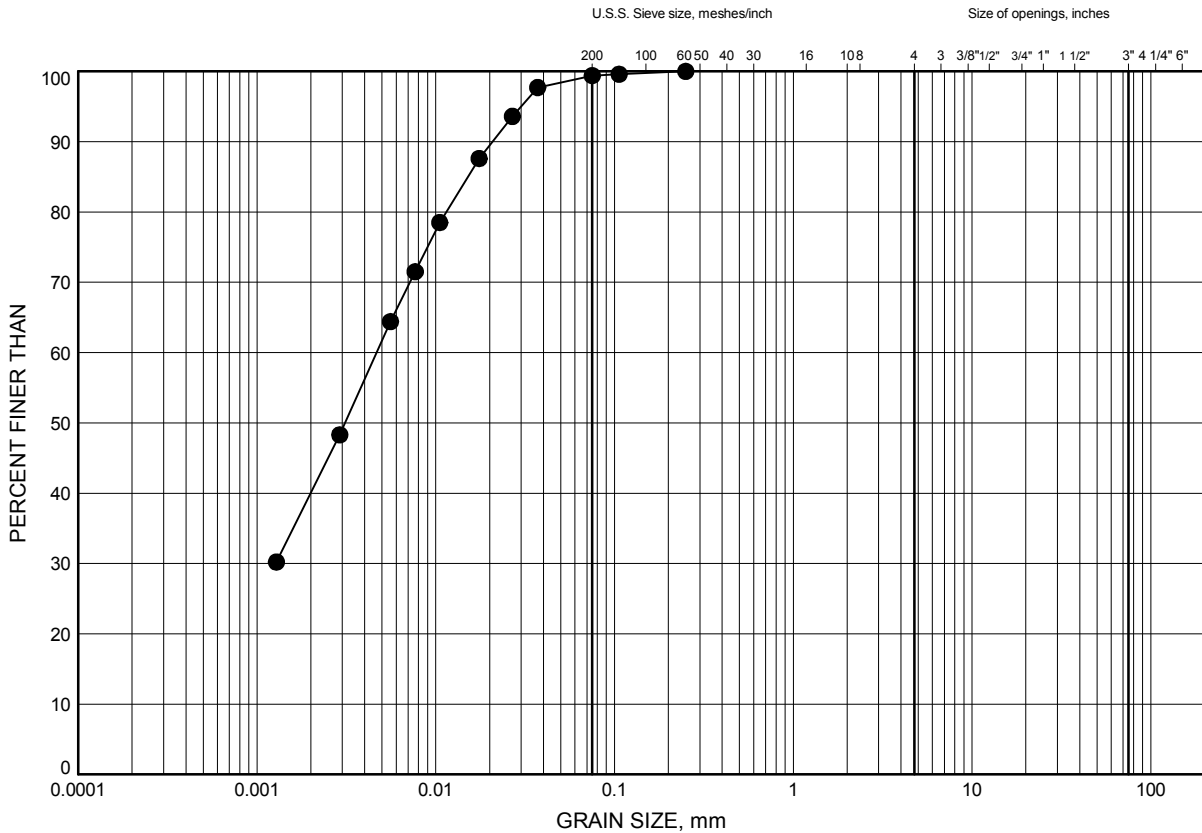
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE								WATER CONTENT (%)	
224.2								20	40	60	80	100					
0.0	PEAT , trace rootlets, trace wood Soft Dark Brown Frozen		1	SS	4		224										
223.4																	
0.8	Silty CLAY Stiff to Soft Brown		2	SS	9		223										
	Occasional oxide staining		3	SS	8		222										
	Brown to Grey		4	SS	4		221										
	Very Soft		5	SS	0												
220.5																	
3.7	END OF BOREHOLE AT 3.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 3.7m AND WATER LEVEL AT 3.4m 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 P1

Silty CLAY



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

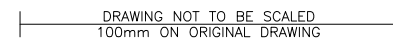
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+540 21R	1.83	222.36

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. The center of the seal features the name "P. K. CHATTERJEE" in bold capital letters. Above the name is a handwritten signature in blue ink. Below the name is a handwritten date "Oct 3/14" in blue ink. The seal is stamped in black ink on a white background.

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 signature of "S. Peters" in blue ink. Below the signature, the license number "100194478" is printed. At the bottom of the seal, the date "Oct 3/14" is handwritten in blue ink.



LEGEND

[illegible]

GEOCRES No. 52A-184

[illegible]

Appendix Q

Highway 11/17 WBL

Sta. 12+730 to 12+900









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

RECORD OF BOREHOLE No 12+770 23L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 113.6 E 205 200.7 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 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									WATER CONTENT (%)	
222.3								20	40	60	80	100						
0.0	SAND , some gravel, occasional cobbles Very Dense Brown Frozen (FILL)		1	GS			222							○				
															○			
			1	SS	50/ .050													
220.9								221										
1.4	Clayey SILT Very Hard Brown Frozen (FILL)		2	SS	72											○		
219.9							220											
2.4	PEAT , amorphous Stiff Black Moist		3	SS	13										○			
219.4																		
2.9	Silty CLAY , occasional oxide staining Firm to Stiff Brown Moist		4	SS	11		219										1 2 64 33	
	With thin silt seams		5	SS	6		218											
																		
216.9							217											
5.4	END OF BOREHOLE AT 5.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 5.4m AND WATER LEVEL AT 3.1m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.3m, THEN CUTTINGS TO SURFACE.																	






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

RECORD OF BOREHOLE No 12+845 20L

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 424 147.3 E 205 267.8 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 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						
221.0								20 40 60 80 100						
0.0	SAND , some gravel Very Dense Brown to Reddish Brown Frozen (FILL)		1	GS										
			2	GS										
			1	SS	50/ .050									
			2	SS	50/ .125									
218.9														
2.1	Silty SAND , occasional clayey silt pocket, occasional peat pocket Compact to Loose Grey Wet		3	SS	12									
			4	SS	2									
216.9														
4.1	Clayey SILT , trace peat Stiff Grey Wet		5	SS	2									
	With thin silt seams		6	SS	4									
213.7														
7.3	Silty CLAY Stiff Grey		7	SS	2									
	With sandy silt seams		8	SS	2									

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10
5
0
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 12+845 20L

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 424 147.3 E 205 267.8 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 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				WATER CONTENT (%)				GR	SA	SI	CL	
								20 40 60 80 100	W _P W W _L											
	Continued From Previous Page							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE												
			9	SS	4		210													
			10	SS	3		209													
							208													
			11	SS	1		207													
206.7																				
14.3	END OF BOREHOLE AT 14.3m. BOREHOLE OPEN TO 12.4m AND WATER LEVEL AT 6.9m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.8m, THEN CUTTINGS TO SURFACE.																			

+³ ×³: Numbers refer to
Sensitivity

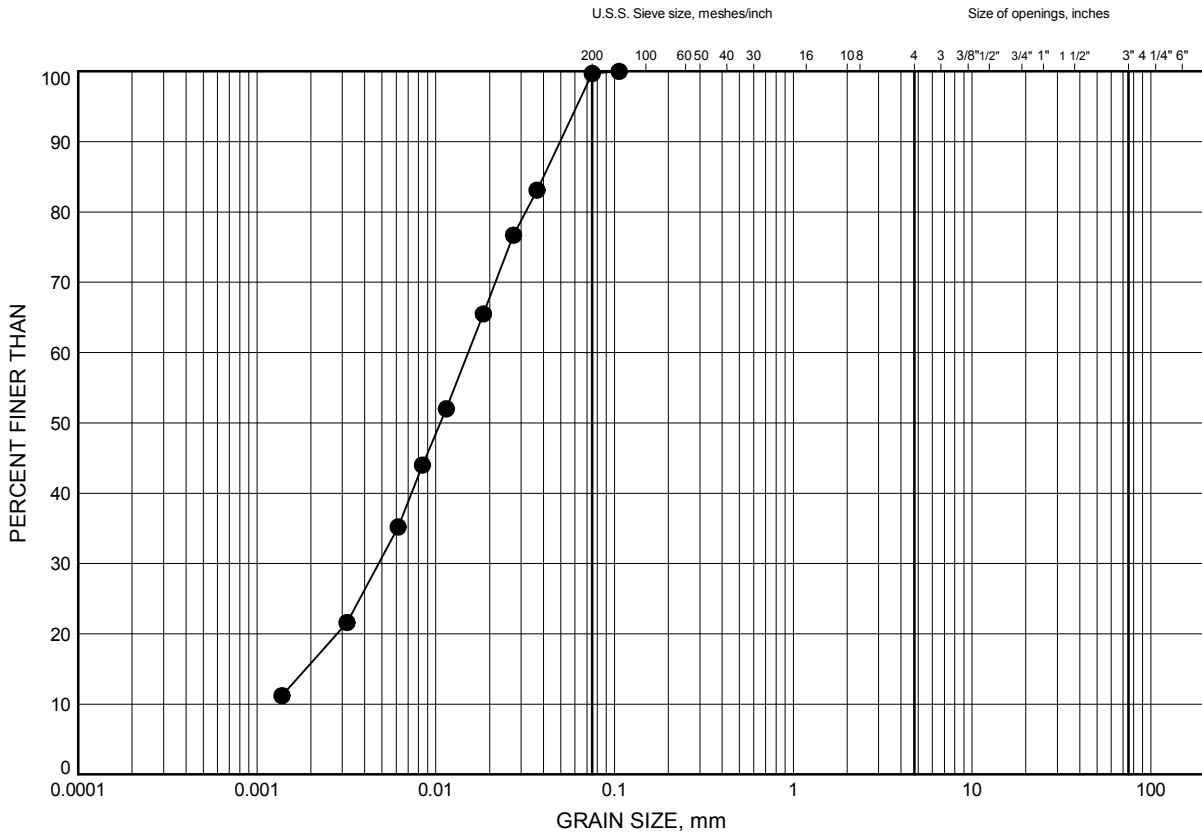
20
15
10

(%) STRAIN AT FAILURE

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

FIGURE Q1

Clayey SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+845 20L	4.88	216.14

Date July 2014
 WP# 647-89-00

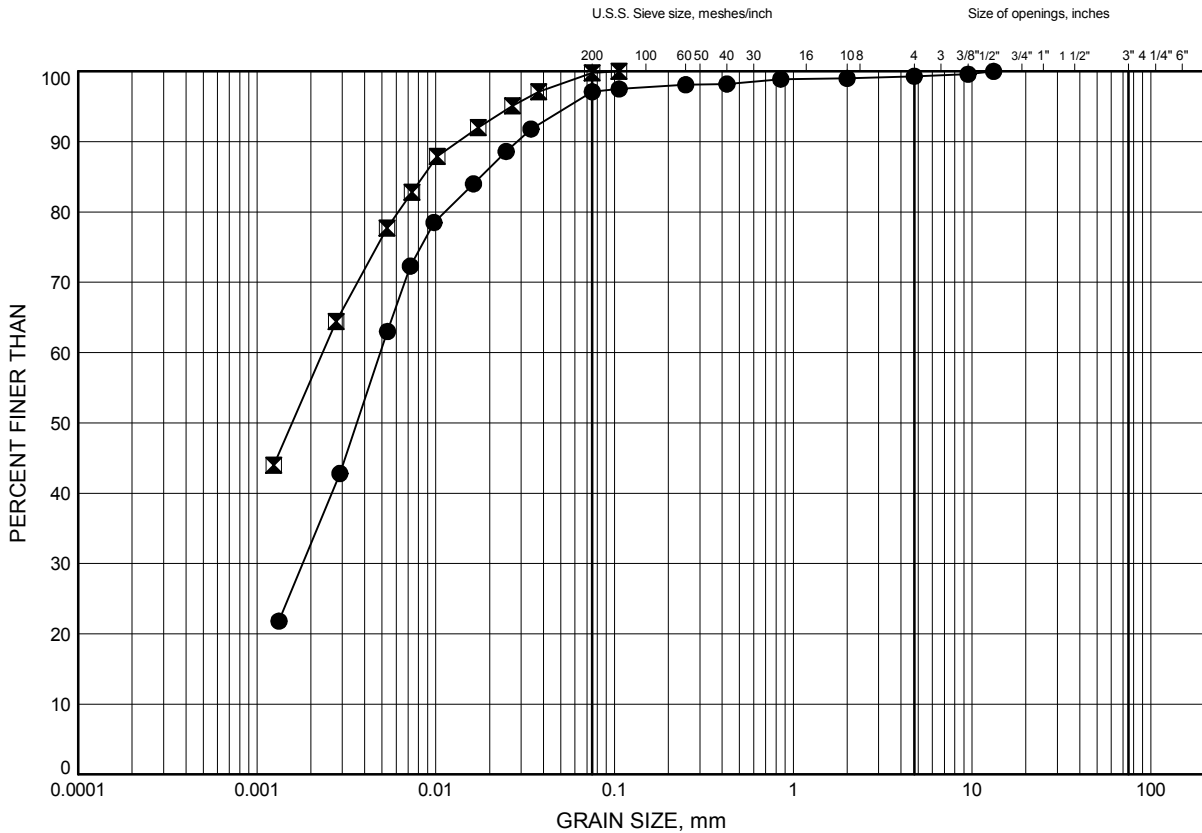


Prep'd AN
 Chkd. MKE

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

FIGURE Q2

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+770 23L	3.35	218.95
⊠	12+845 20L	12.50	208.52

Date July 2014
 WP# 647-89-00

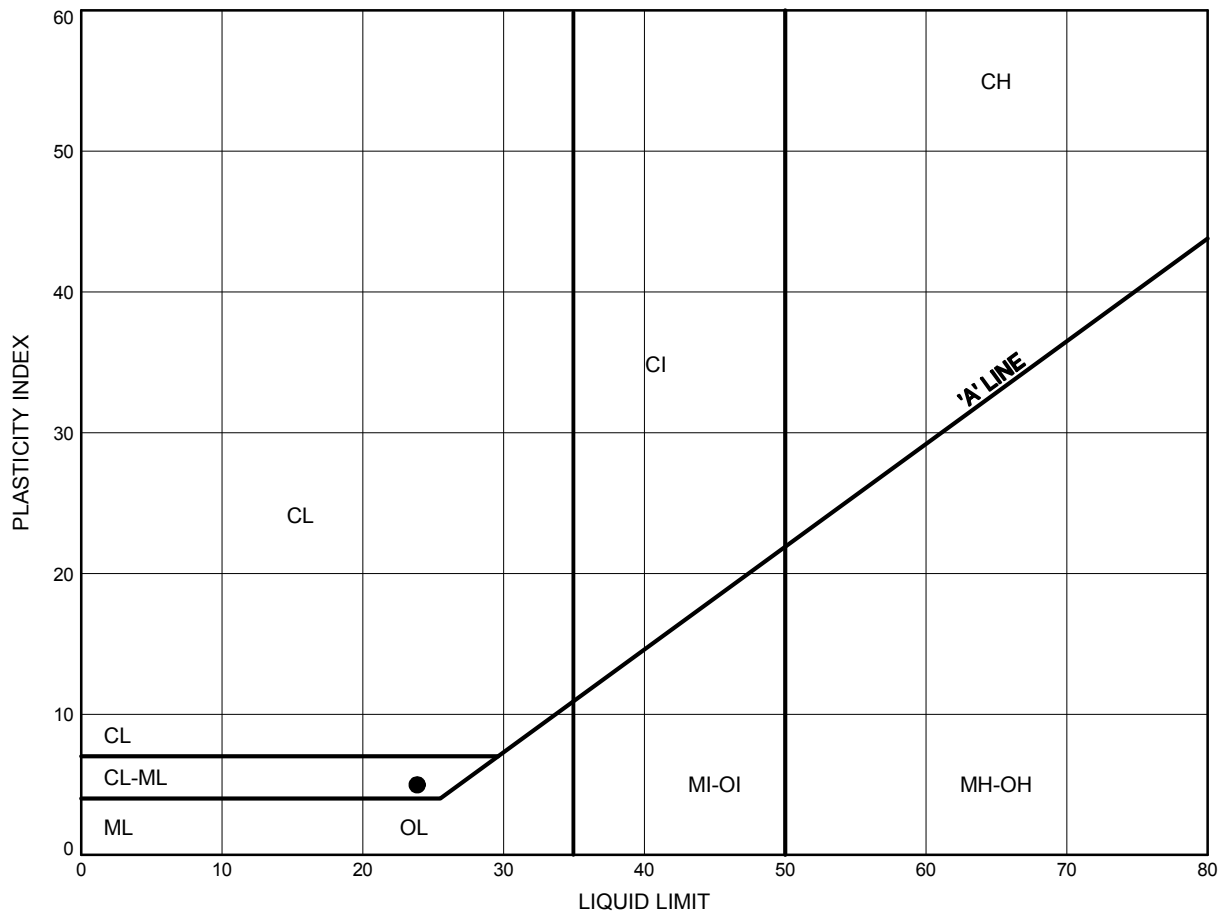


Prep'd AN
 Chkd. MKE

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

FIGURE Q3

Clayey SILT



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+845 20L	4.88	216.14

Date July 2014
 WP# 647-89-00



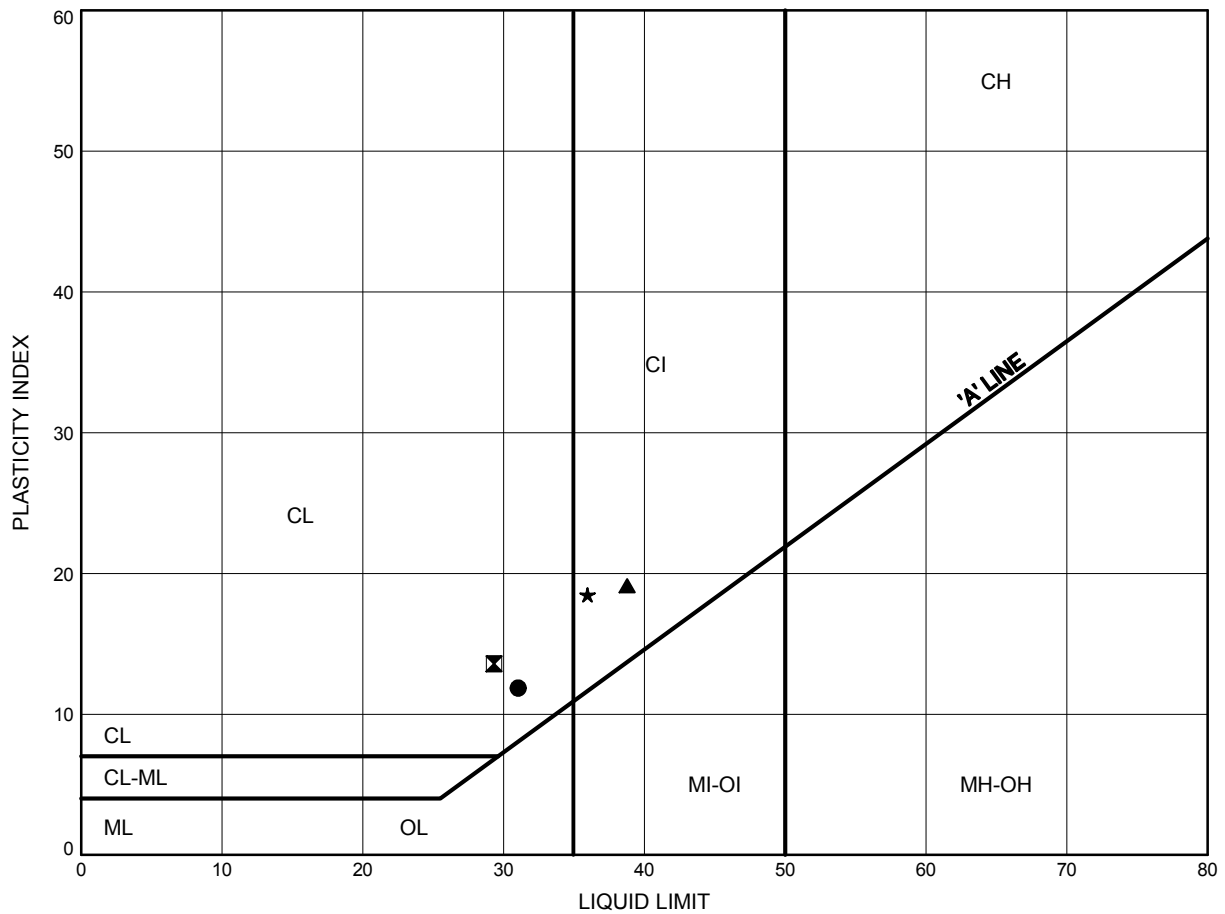
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE Q4

Silty CLAY



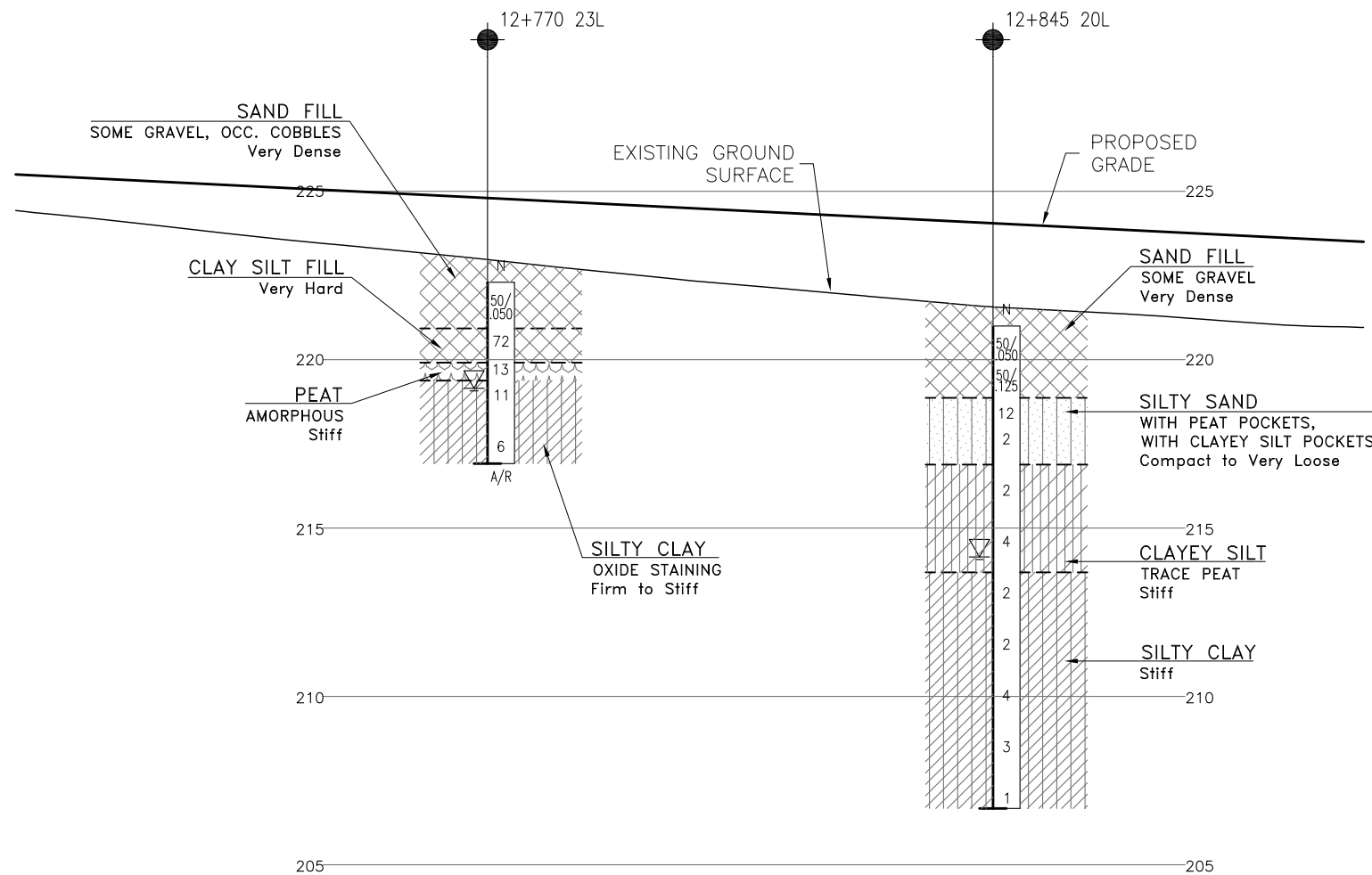
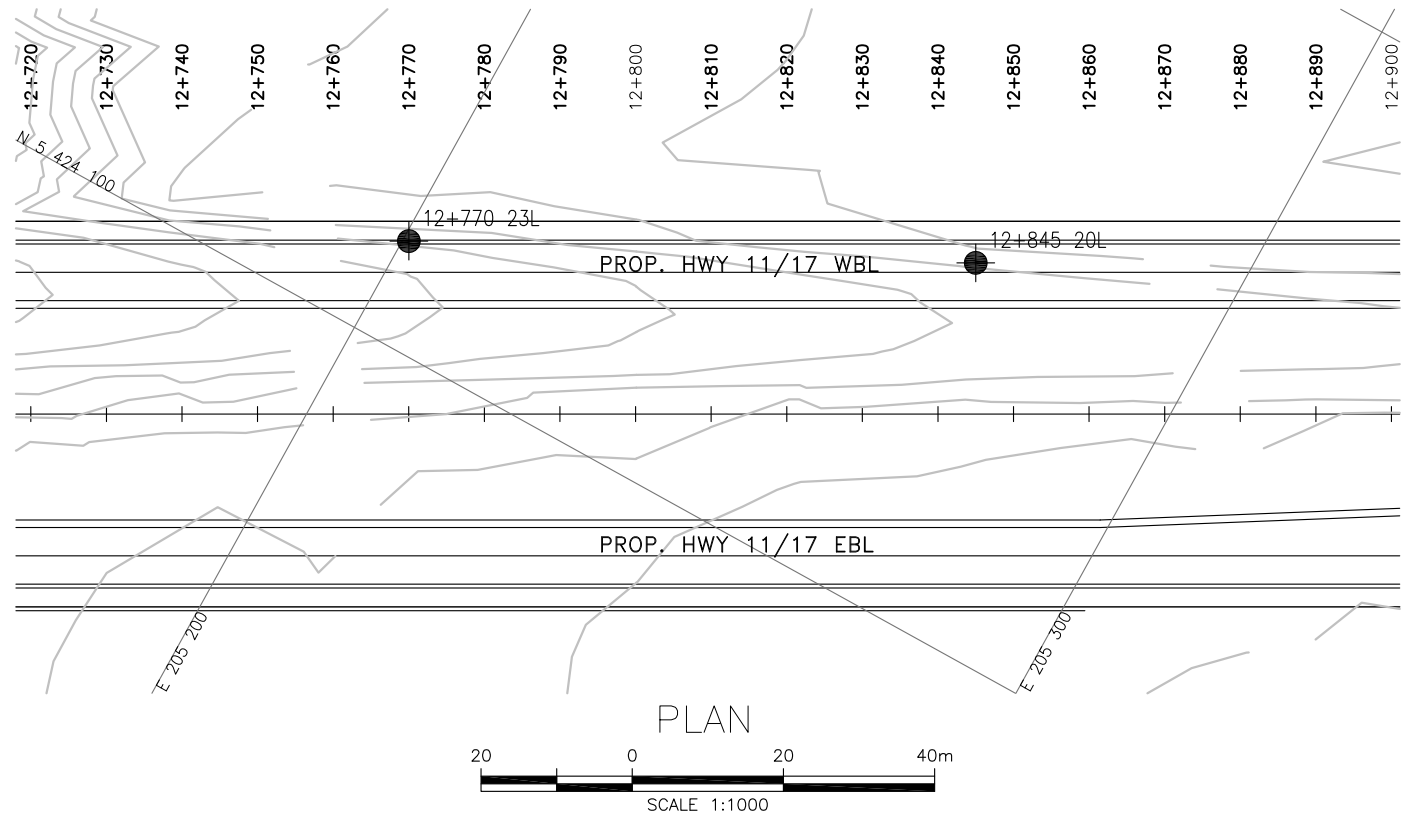
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	12+770 23L	3.35	218.95
⊠	12+770 23L	4.88	217.42
▲	12+845 20L	7.92	213.09
★	12+845 20L	12.50	208.52

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



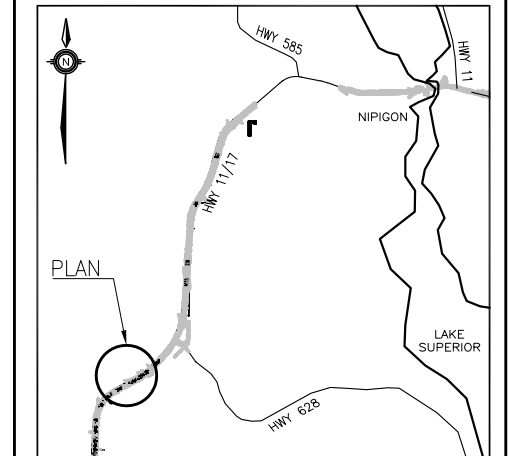
PROFILE ALONG CL HIGHWAY 11/17 WBL

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
WESTBOUND LANES
(STA. 12+730 TO 12+900)
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
12+770 23L	222.3	5 424 113.6	205 200.7
12+845 20L	221.0	5 424 147.3	205 267.8

-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				DESCRIPTION			
DATE	BY	CHK	JPL	CODE	LOAD	DATE	OCT. 2014
DRAWN	AN	CHK	SBP	SITE	STRUCT	DWG	11

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

Appendix R

Off Highway 11/17 Sta. 13+100

Red Rock Road #8

Record of Borehole Sheets

Laboratory Test Results

Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 09+965 CL (RR8) 1 OF 2 METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 283.9 E 205 483.6 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.15 - 2014.02.15 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					
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					
WATER CONTENT (%)				20 40 60									
PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT				W P W W L									
218.8													
0.0	ORGANICS: (350mm)		1	SS	10								
218.5													
0.4	Clayey SILT, some sand, trace organics, trace rootlets Firm Brown		2	SS	5								
	varved Brown to Grey		3	SS	1								
215.8													
3.0	Silty CLAY, trace sand Stiff to Firm Grey		4	SS	0								
			5	SS	0								
			6	SS	1								
			7	SS	1								

Continued Next Page

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

RECORD OF BOREHOLE No 09+965 CL (RR8) 2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 283.9 E 205 483.6 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.15 - 2014.02.15 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							
							20 40 60 80 100				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _P W W _L				
							20 40 60 80 100				WATER CONTENT (%)				
	Continued From Previous Page														
	Silty CLAY , trace sand Stiff Grey		9	SS	2		208								0 1 46 53
206.7							207								
12.2	SAND , some gravel Compact Grey Moist		10	SS	16										
							206								
							205								
204.7			11	SS	105/ 225										
14.1	END OF BOREHOLE AT 14.1m ON PROBABLE BEDROCK OR BOULDER. WATER LEVEL AT 3.1m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.														

+³, ×³: Numbers refer to
Sensitivity

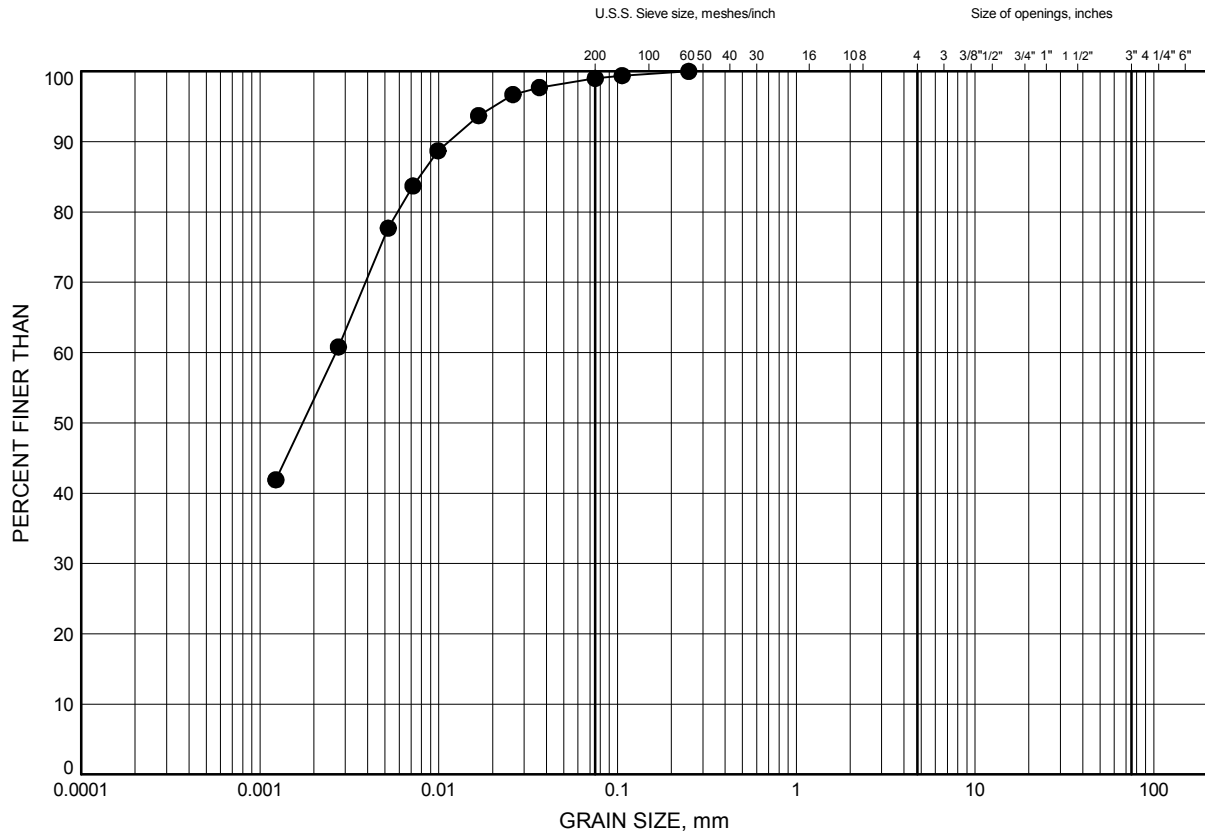
20
15
10

(%) STRAIN AT FAILURE

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

FIGURE R1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	09+965 CL (RR8)	10.97	207.87

Date July 2014
 WP# 647-89-00

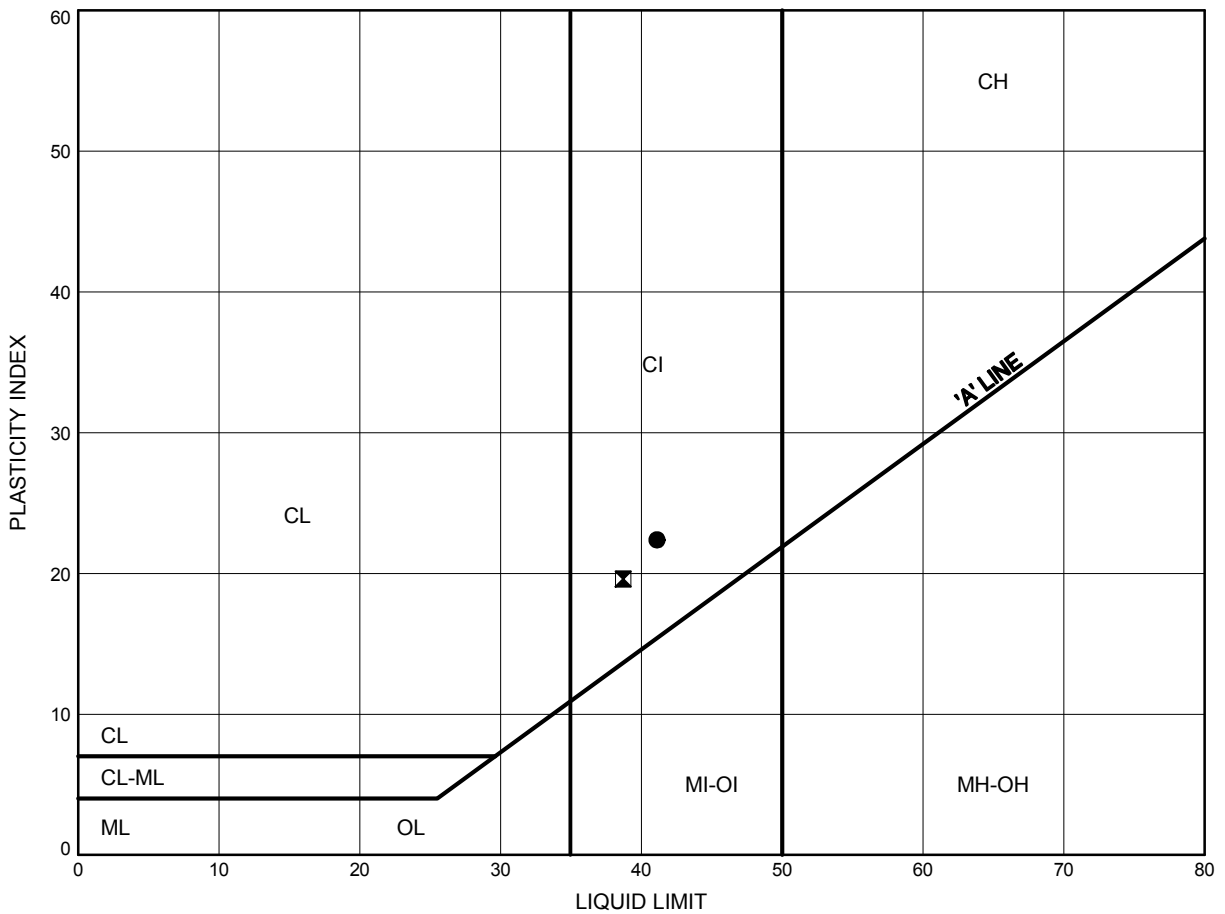


Prep'd AN
 Chkd. MKE

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

FIGURE R2

Silty CLAY



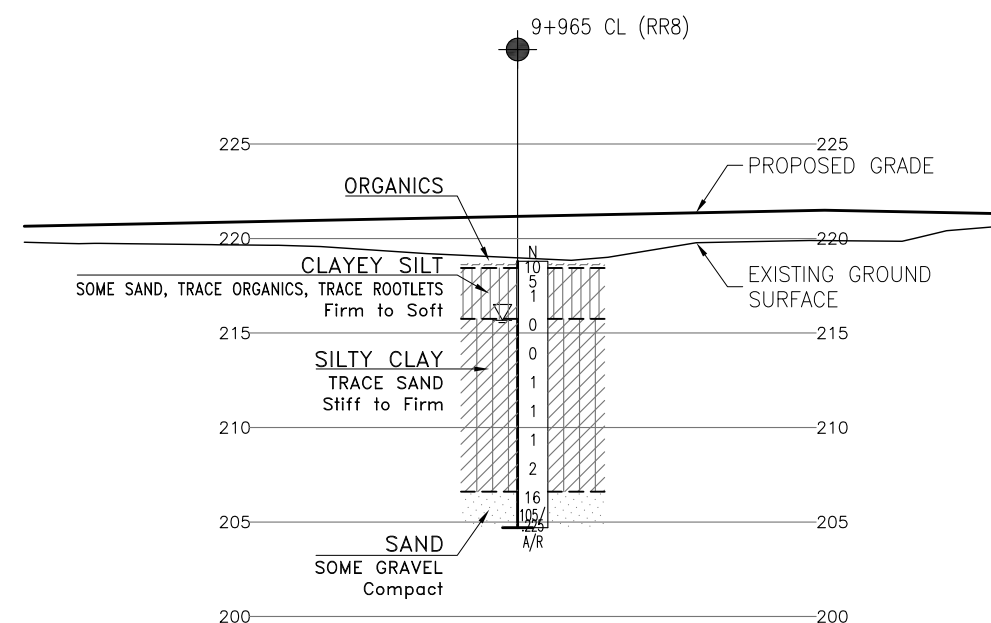
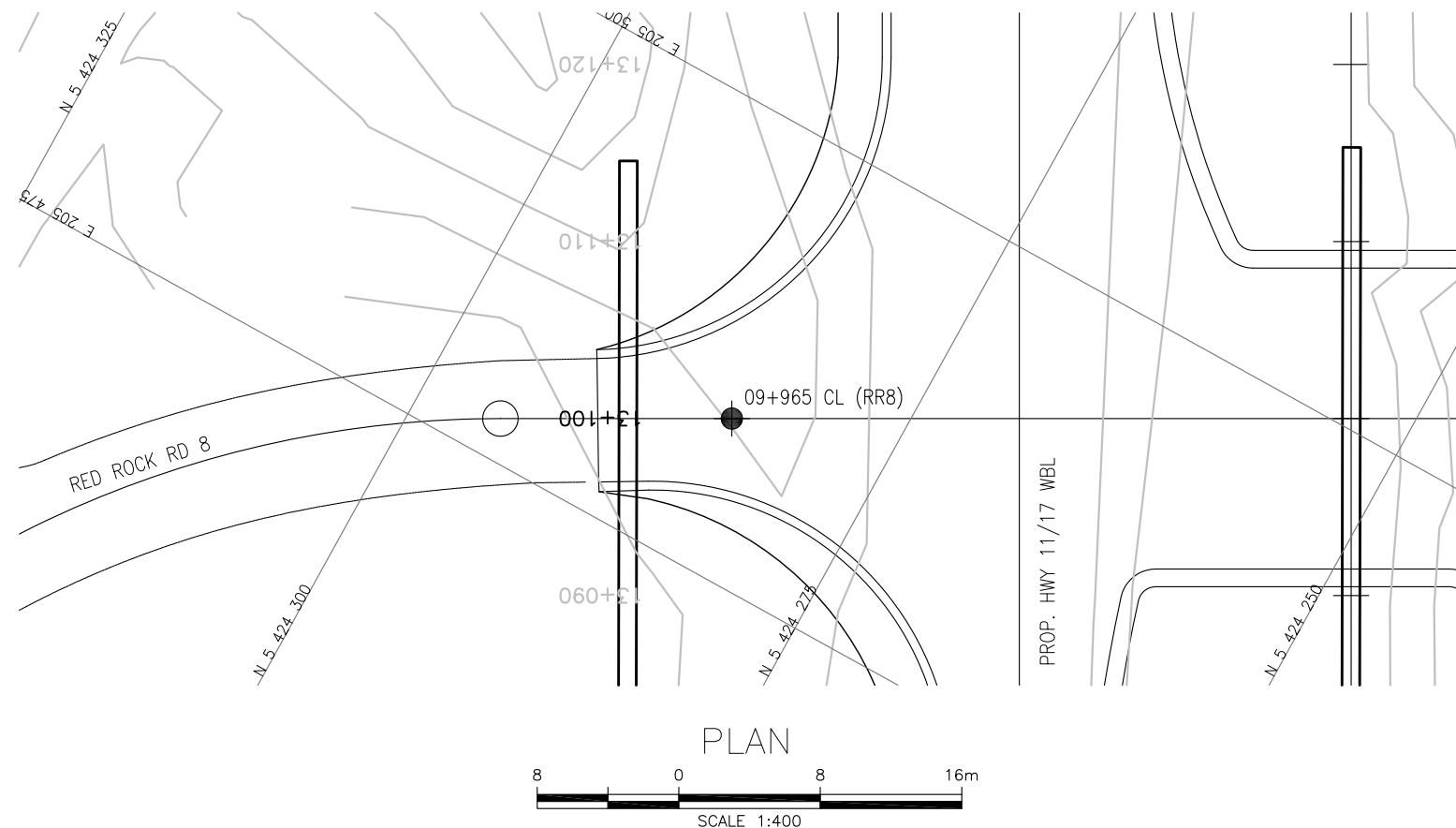
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	09+965 CL (RR8)	4.88	213.97
⊠	09+965 CL (RR8)	10.97	207.87

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



PROFILE ALONG C RED ROCK ROAD 8



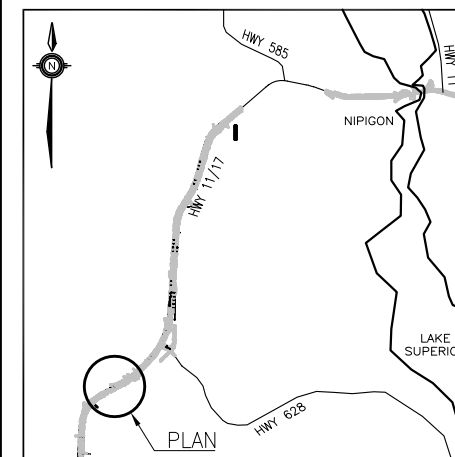
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN



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






HWY 11/17 FOUR LANING
RED ROCK ROAD 8
(STA. 9+950 TO 9+980)
BOREHOLE LOCATIONS AND SOIL STRATA

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-

- 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 S

Highway 11/17 EBL and WBL

Sta. 13+100 to 13+300

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

RECORD OF BOREHOLE No 13+150 20R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 260.0 E 205 554.1 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.16 - 2014.02.16 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 (%)			GR	SA	SI	CL
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL						× LAB VANE						
219.2																						
0.0	ORGANICS , trace roots and rootlets Dark Brown Frozen		1	SS	17		219															
218.8																						
0.5	Silty CLAY , some sand, trace organics Firm to Stiff Brown		2	SS	6		218											0	8	40	52	
		Occasional wood fibres		3	SS		4	217														
	Occasional sand seams Grey		4	SS	1		216															
				5	SS		0	215														
			6	SS	0	214																
						213																
			7	SS	0	212																
						211																
			8	SS	1	210																
			9	SS	1																	

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 13+150 20R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 260.0 E 205 554.1 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.16 - 2014.02.16 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									
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%)						
						20	40	60	80	100	20	40	60				
	Continued From Previous Page																
207.4			10	SS	2												
11.9	SAND, some silt, trace gravel, occasional cobbles Compact Grey Moist		11	SS	21												
205.5			12	SS	100/												
13.8	END OF BOREHOLE AT 13.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. WATER LEVEL AT 1.3m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.				.050												

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

RECORD OF BOREHOLE No 13+205 19L

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 320.7 E 205 583.3 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.15 - 2014.02.16 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					
219.1							20 40 60 80 100						
0.0	ORGANICS , trace roots: (200mm) Dark Brown Frozen		1	SS	13								
0.2													
	Silty CLAY , varved, some sand, occasional sand seams Firm to Stiff Brown Moist		2	SS	8								
			3	SS	4								
			4	SS	1								
			5	SS	0								
			6	SS	0								
			7	SS	2								
			8	SS	2								

Continued Next Page

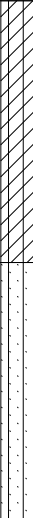
+³, ×³: Numbers refer to Sensitivity
20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 13+205 19L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 320.7 E 205 583.3 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.15 - 2014.02.16 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						PLASTIC LIMIT W P W W L NATURAL MOISTURE CONTENT LIQUID LIMIT WATER CONTENT (%)		
	Continued From Previous Page						20	40	60	80	100	20	40	60		
207.3	Silty SAND , some gravel, trace clay Compact Grey Wet		9	SS	3		209			10.6 +						
11.7							208							○		
								207			8.9 +			○		
205.6			10	SS	10		206									
13.4	END OF BOREHOLE AT 13.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. WATER LEVEL AT 2.9m 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 13+250 20R

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 308.7 E 205 642.2 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.16 - 2014.02.16 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 (%)						
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						
218.6																					
0.0																					
0.1																					
	ORGANICS: (125mm) Dark Brown Frozen		1	SS	10								○								
	Silty CLAY, some sand Firm to Stiff Brown		2	SS	8								○								
	Occasional sand and silt seams		3	SS	5								○								
	Brown to Grey		4	SS	0								○								
	Grey		5	SS	0								○								
			6	SS	0								○								
			7	SS	0								○								
			8	SS	0								○								

Continued Next Page

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

RECORD OF BOREHOLE No 13+250 20R

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 308.7 E 205 642.2 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.16 - 2014.02.16 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									
								● QUICK TRIAXIAL × LAB VANE									
	Continued From Previous Page							20 40 60 80 100				W P W W L					

+³, ×³: Numbers refer to
Sensitivity

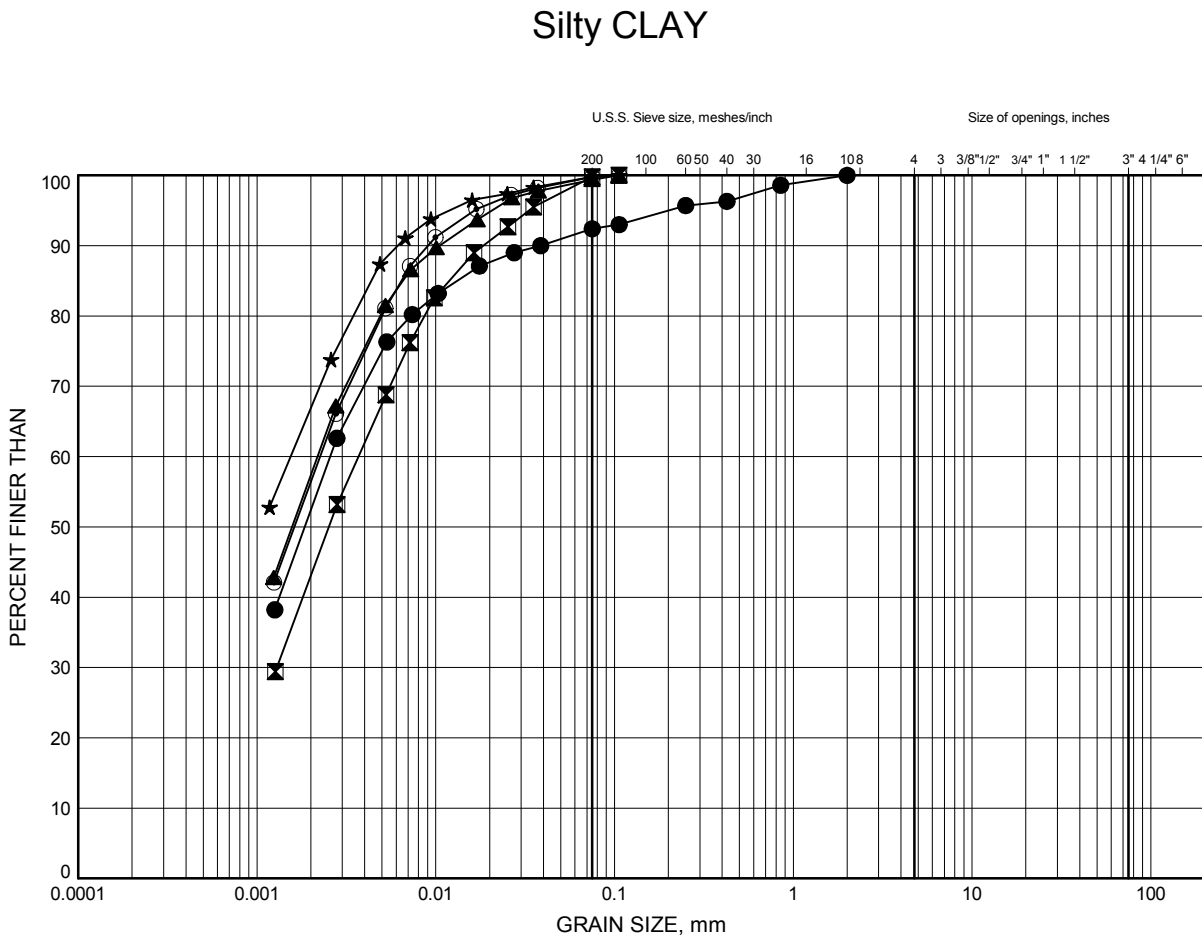
20
15
10

(%) STRAIN AT FAILURE

Hwy 11/17 - Red Rock to Nipigon

GRAIN SIZE DISTRIBUTION

FIGURE S1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+150 20R	1.07	218.17
⊠	13+150 20R	6.40	212.84
▲	13+205 19L	3.35	215.73
★	13+250 20R	4.88	213.70
⊙	13+250 20R	9.45	209.13

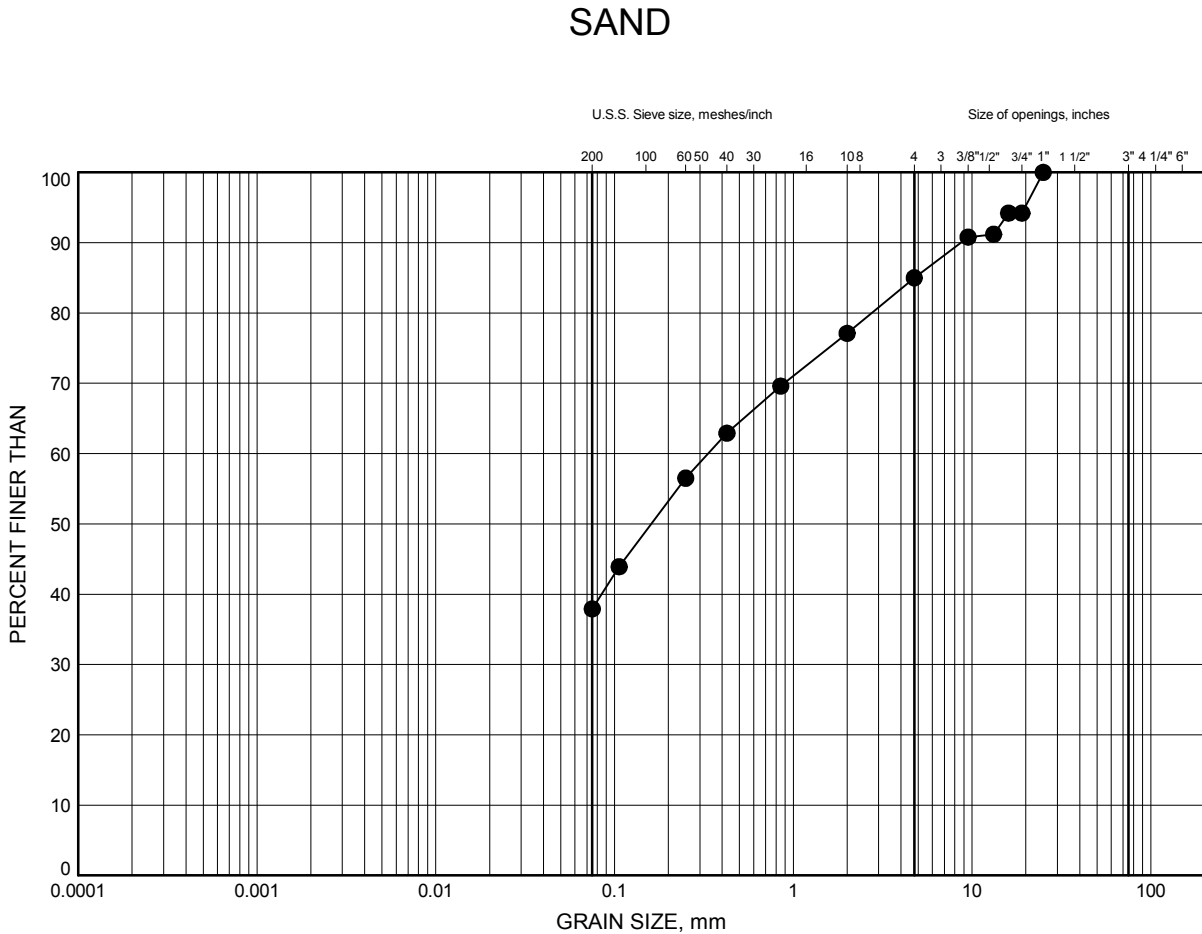
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

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

FIGURE S2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+205 19L	12.50	206.59

Date July 2014
 WP# 647-89-00



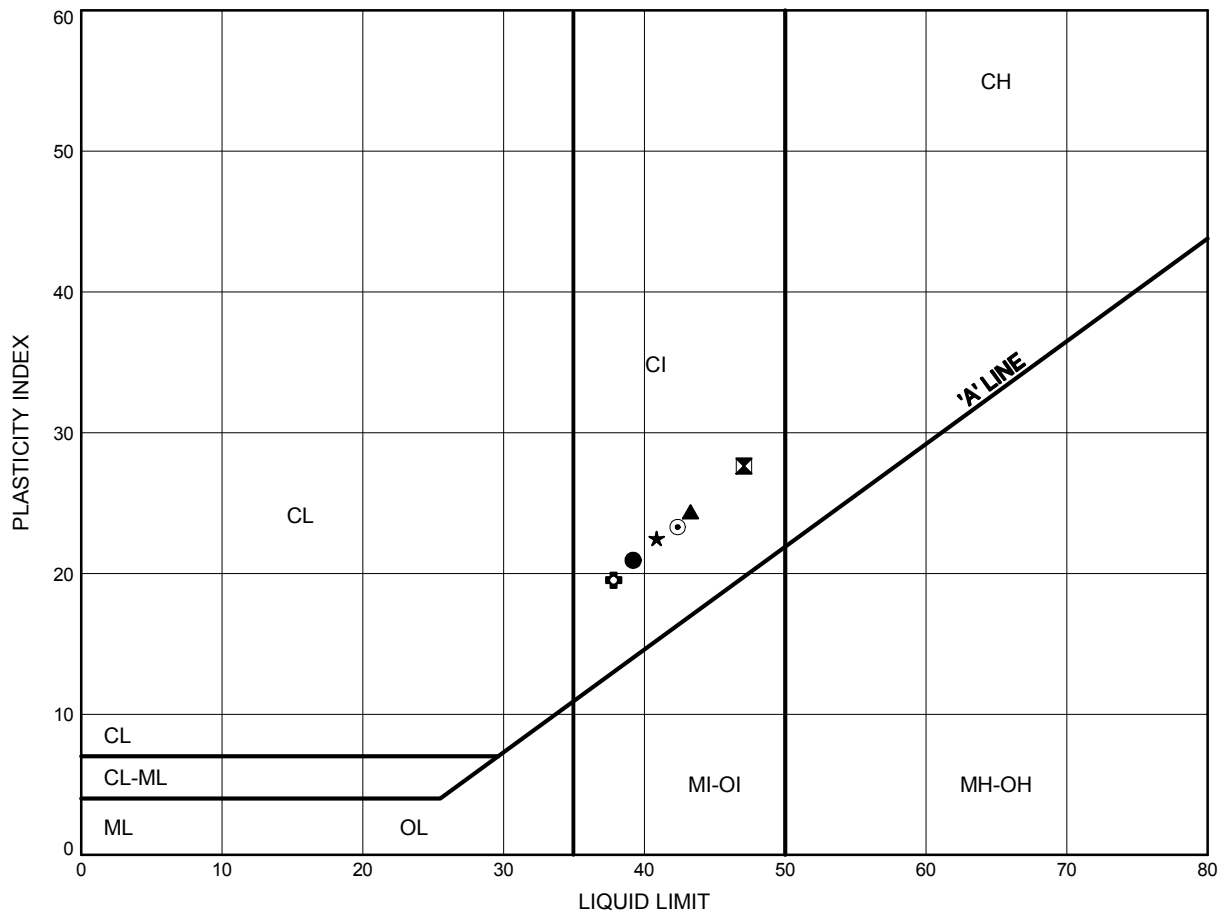
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE S3

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+150 20R	6.40	212.84
⊠	13+150 20R	10.97	208.27
▲	13+205 19L	3.35	215.73
★	13+205 19L	6.40	212.68
⊙	13+250 20R	1.83	216.75
⊕	13+250 20R	9.45	209.13

Date July 2014
 WP# 647-89-00

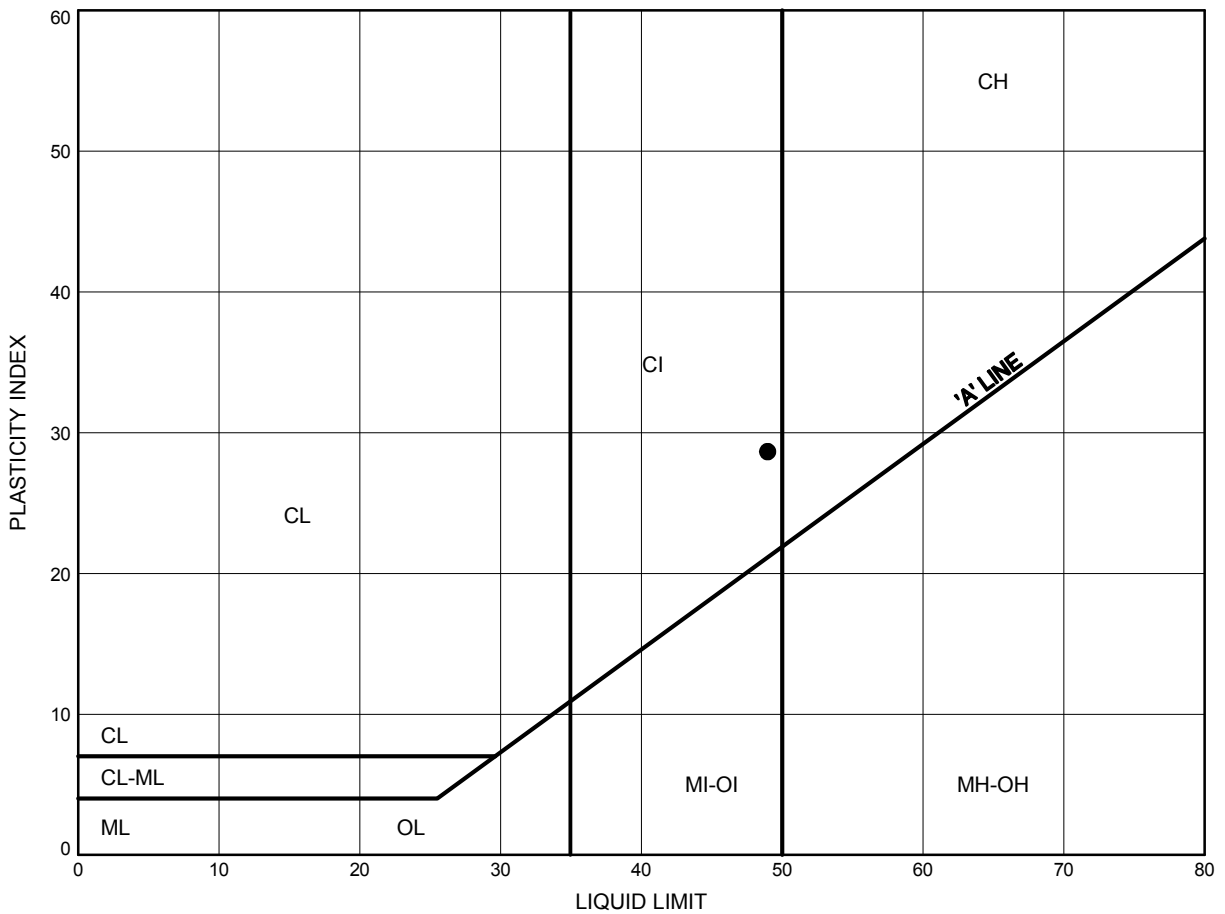


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 Chkd. MKE

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

FIGURE S4

Silty CLAY



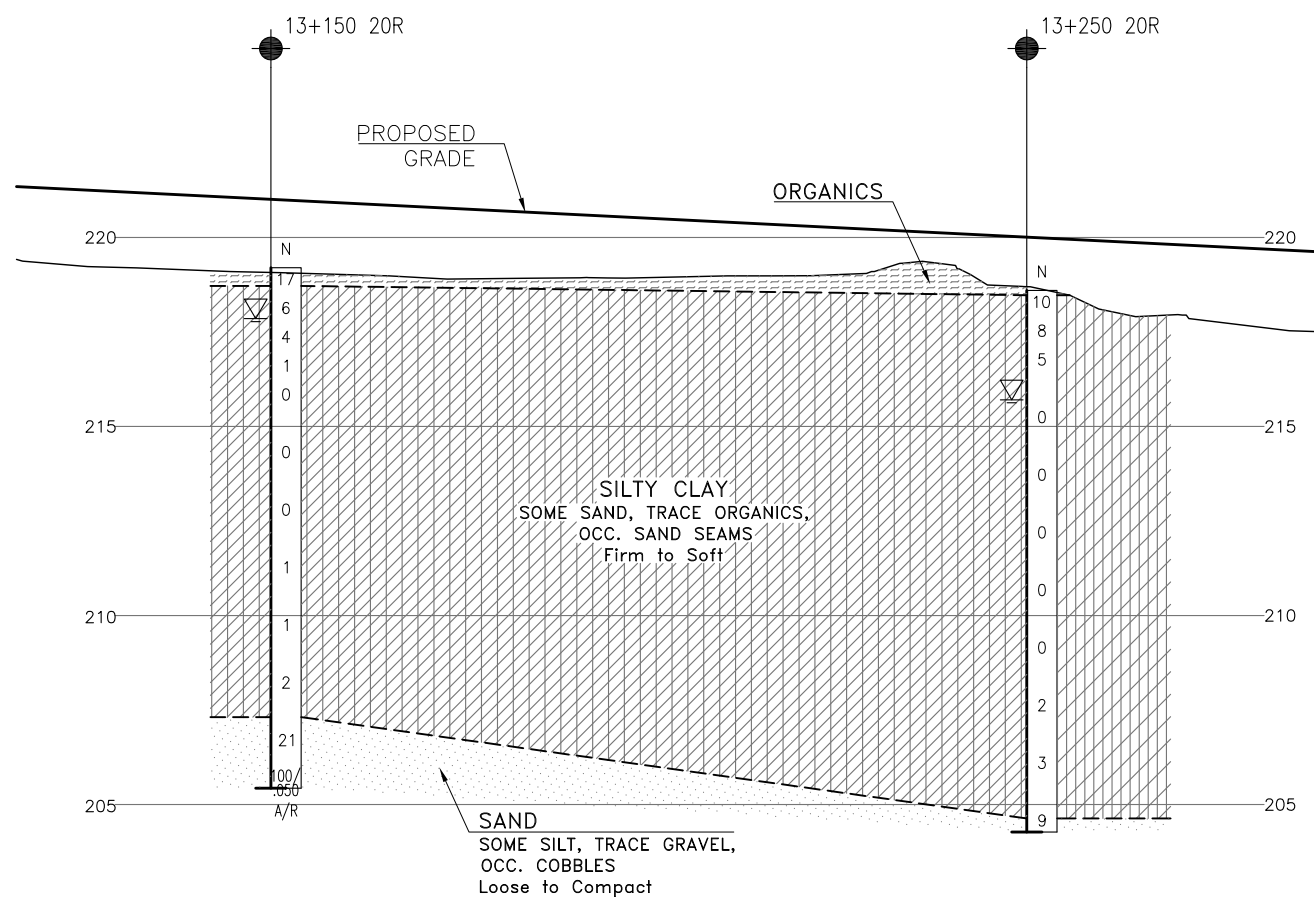
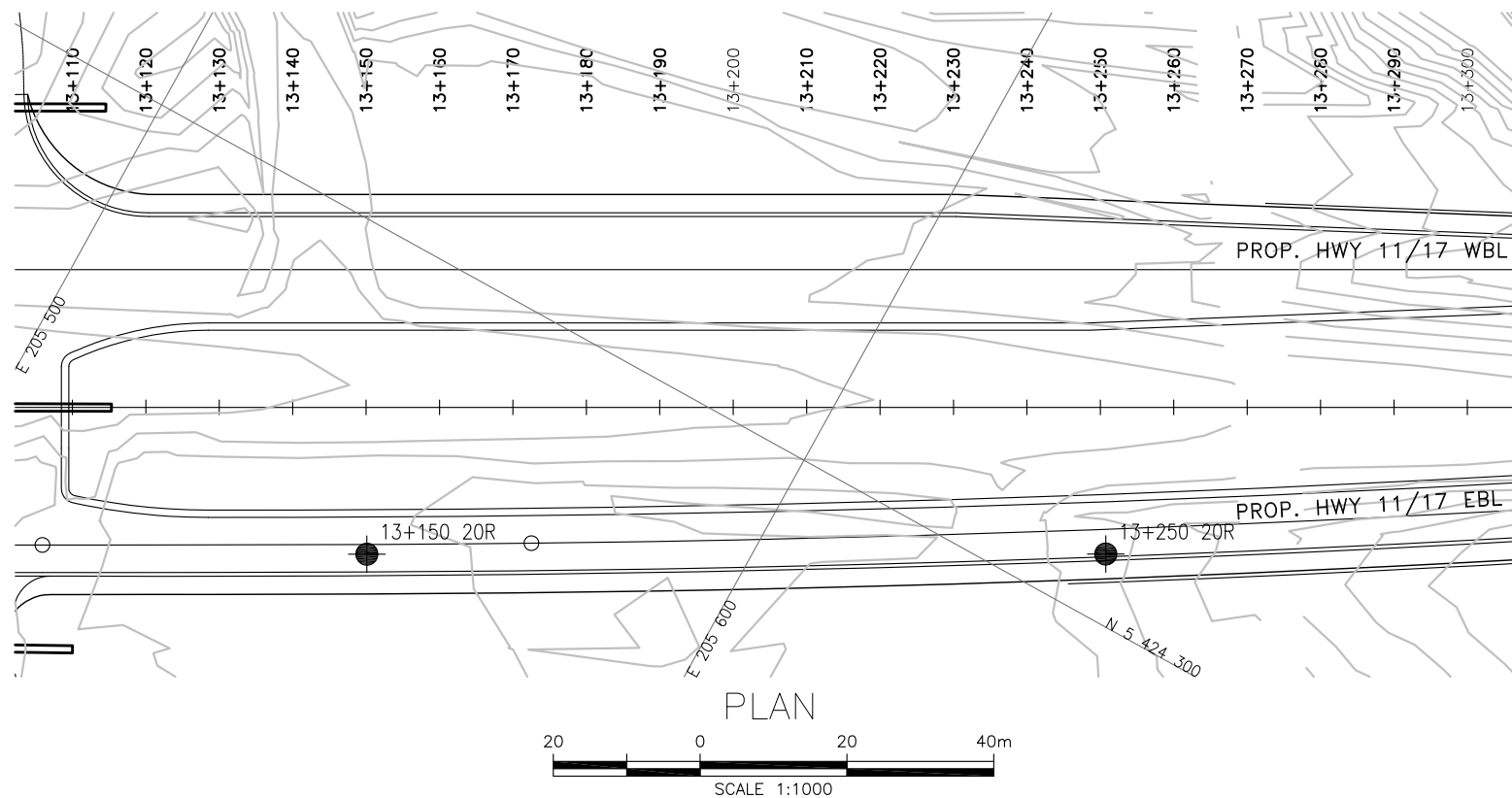
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+250 20R	12.50	206.08

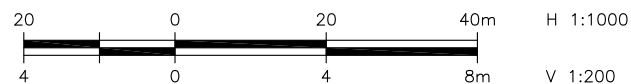
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



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



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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

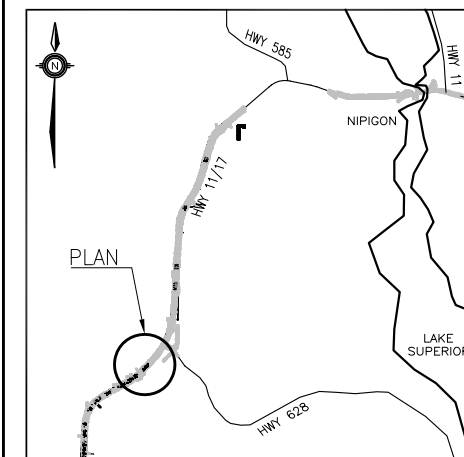


CONT No 2014-6026
GWP No 647-89-00

HWY 11/17 FOUR LANING
EASTBOUND LANES
(STA. 13+100 TO 13+300)
BOREHOLE LOCATIONS AND SOIL STRATA








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

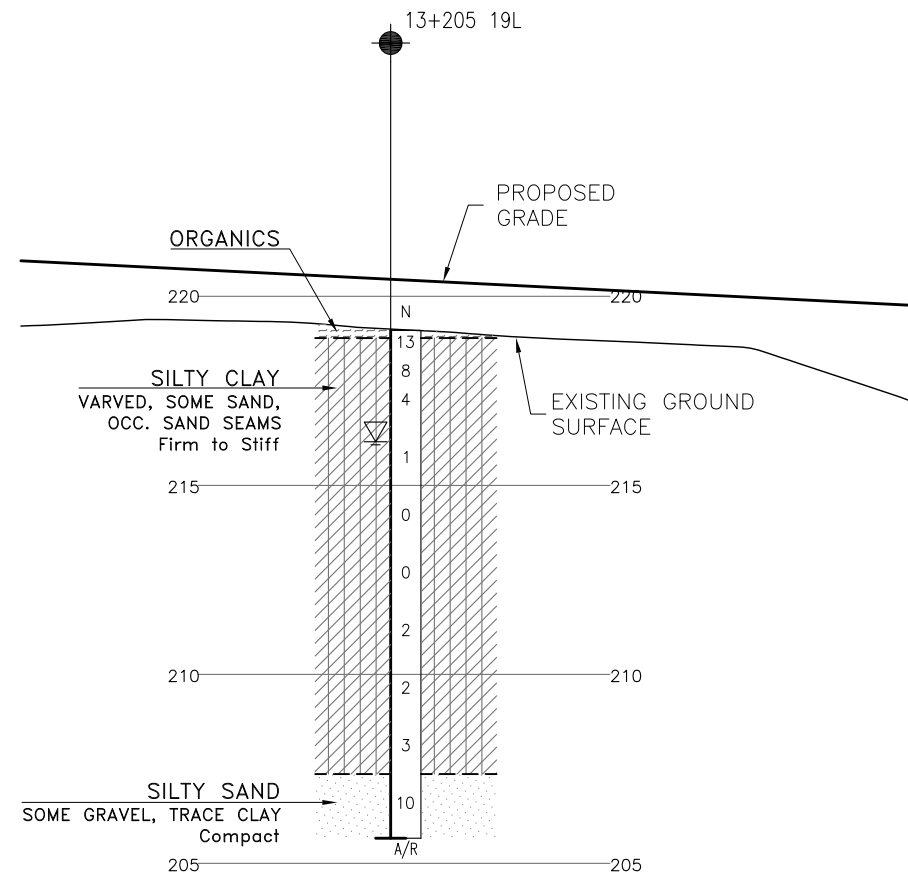
NO	ELEVATION	NORTHING	EASTING
13+150 20R	219.2	5 424 260.0	205 554.1
13+250 20R	218.6	5 424 308.7	205 642.2

-NOTES-

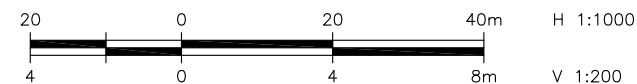
- 1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- 2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 52A-184

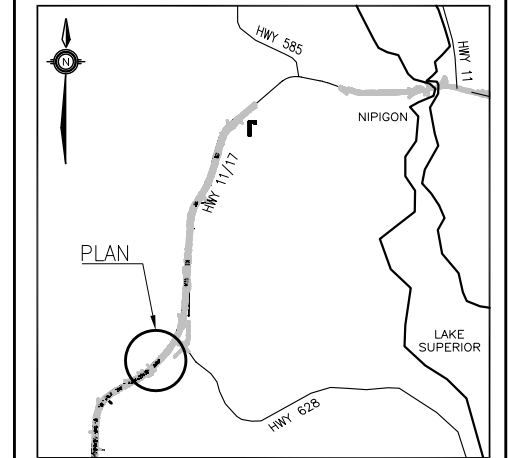
[illegible]



PROFILE ALONG C HIGHWAY 11/17 WBL








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]

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

Appendix T

Highway 11/17 WBL

Sta. 13+450 to 13+550



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

RECORD OF BOREHOLE No 13+455 39L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 461.7 E 205 787.4 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2013.11.14 - 2013.11.14 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								
								20 40 60 80 100								
218.7																
0.0	ORGANICS , occasional roots and rootlets, wood fibres Loose Dark Brown Moist SILT , some sand to sandy, some clay, trace rootlets Loose Brown Moist Grey Trace sand		1	SS	3											
0.1																
			2	SS	3											
			3	SS	4											
			4	SS	1											
			5	SS	0											
214.6																
4.1	Silty CLAY , occasional sand seams Firm Grey															
			6	SS	0											
213.1																
5.6	END OF BOREHOLE AT 5.6m. BOREHOLE OPEN TO 5.6m 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 13+505 40L

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 490.0 E 205 827.0 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2013.11.14 - 2013.11.14 CHECKED BY MKE

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa			WATER CONTENT (%)					
								20	40	60	80	100	W _P			W
219.3	0.0		1	SS	3		219							82	GR SA SI CL	
218.4																
0.9			2	SS	5		218								0 0 26 74	
			3	SS	7											
			4	SS	0											
			5	SS	0											
			6	SS	0										0 0 44 56	
			7	SS	0											
210.6	8.7															
										</						

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

RECORD OF BOREHOLE No 13+520 19L

1 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 481.4 E 205 851.2 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.17 - 2014.02.17 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							
								○ UNCONFINED + FIELD VANE							
								● QUICK TRIAXIAL × LAB VANE							
219.1							20 40 60 80 100								
0.0							20 40 60 80 100								
0.1	ORGANICS: (75mm)														
	Silty SAND, mixed with organics		1	SS	12										
	Compact														
218.5	Dark Brown														
0.6	Frozen														
	Silty CLAY, some sand, trace organics, occasional wood fibres		2	SS	8										
	Firm to Stiff														
	Brown														
			3	SS	3										
			4	SS	1										

Continued Next Page


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

RECORD OF BOREHOLE No 13+520 19L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 424 481.4 E 205 851.2 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.17 - 2014.02.17 CHECKED BY MKE

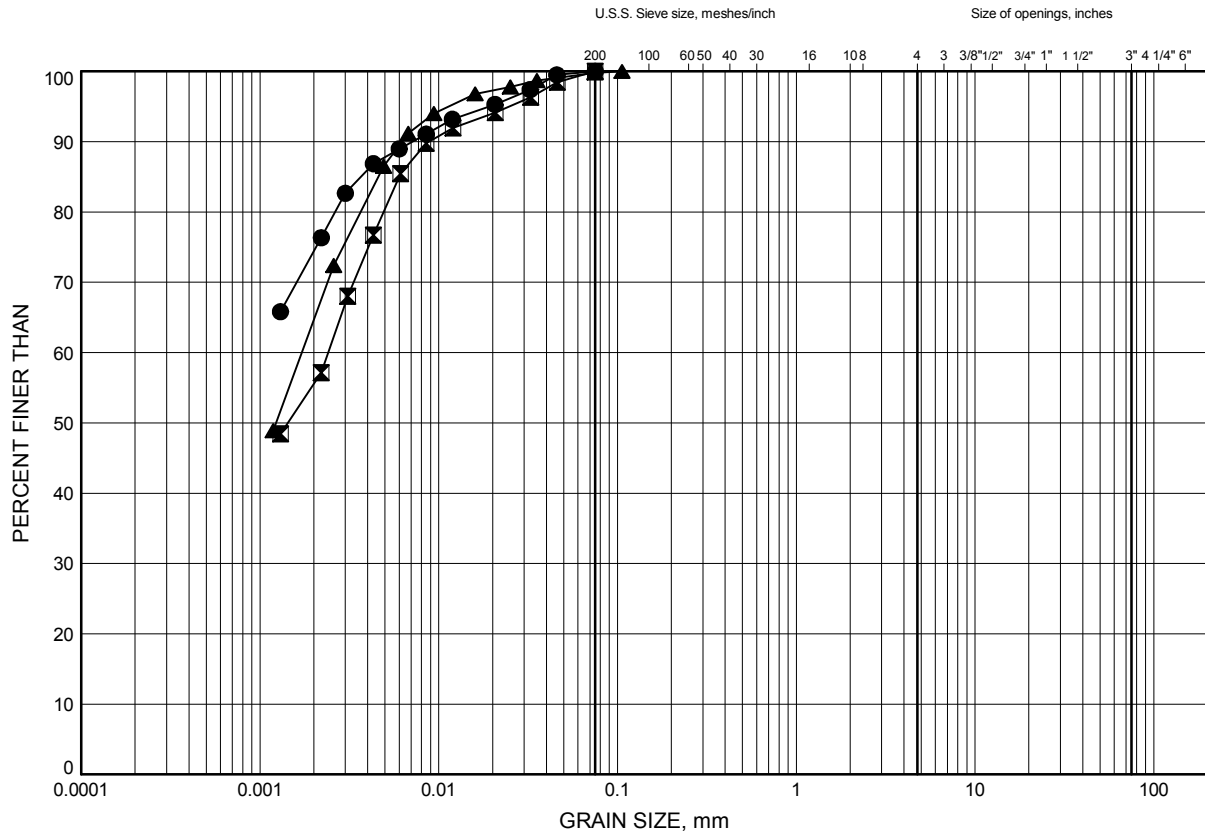
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
								20 40 60 80 100										
Continued From Previous Page							20 40 60 80 100				20 40 60							
208.2	Silty SAND , trace gravel Dense Grey Wet						209									4 37 59 (SI+CL)		
10.9			9	SS	28		208											
							207											
			10	SS	41		206											
205.3	cobble at 13.7m		11	SS	50/													
13.8	END OF BOREHOLE AT 13.8m. WATER LEVEL AT 2.3m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.				.100													

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

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

FIGURE T1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+505 40L	1.83	217.50
⊠	13+505 40L	6.40	212.93
▲	13+520 19L	7.92	211.15

Date July 2014
 WP# 647-89-00

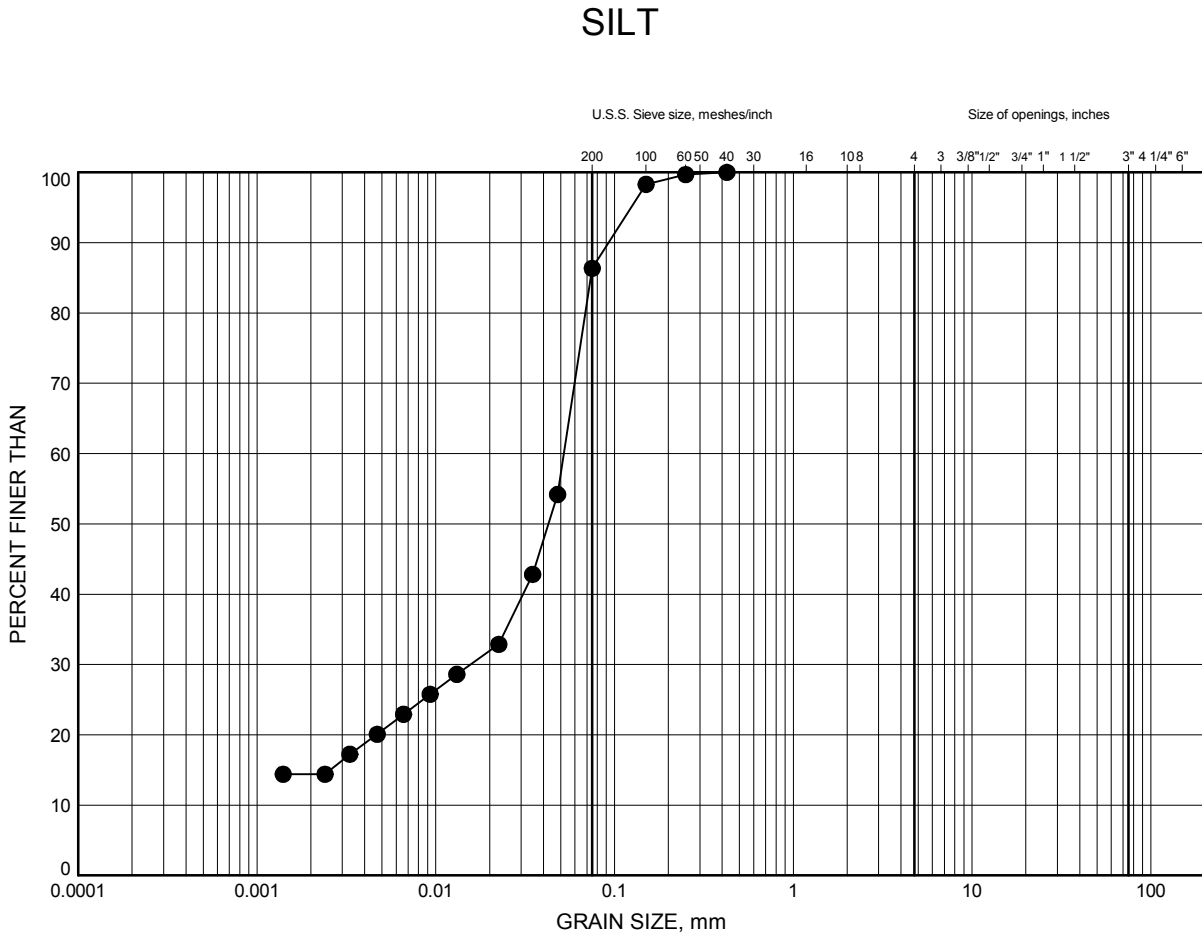


Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

GRAIN SIZE DISTRIBUTION

FIGURE T2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+455 39L	1.83	216.91

Date July 2014
 WP# 647-89-00

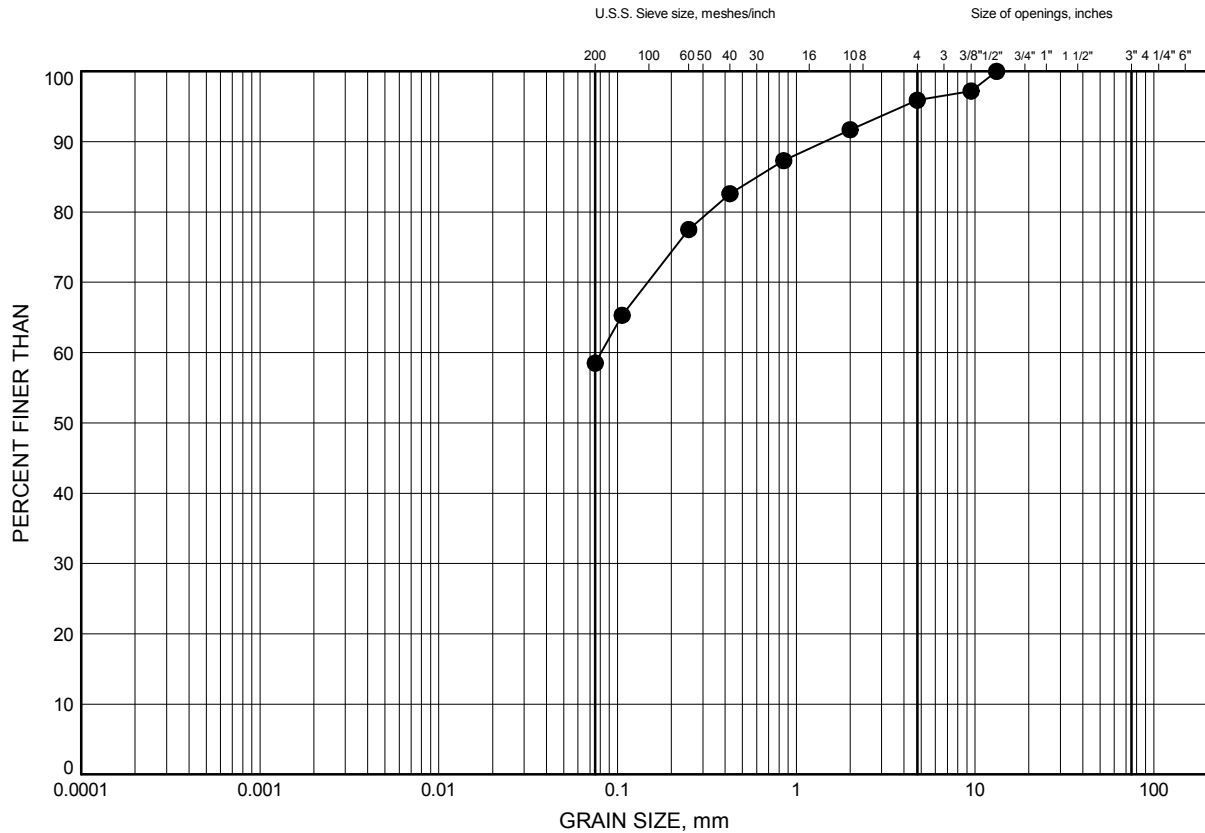


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 Chkd. MKE

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

FIGURE T3

Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+520 19L	12.50	206.58

Date July 2014
 WP# 647-89-00



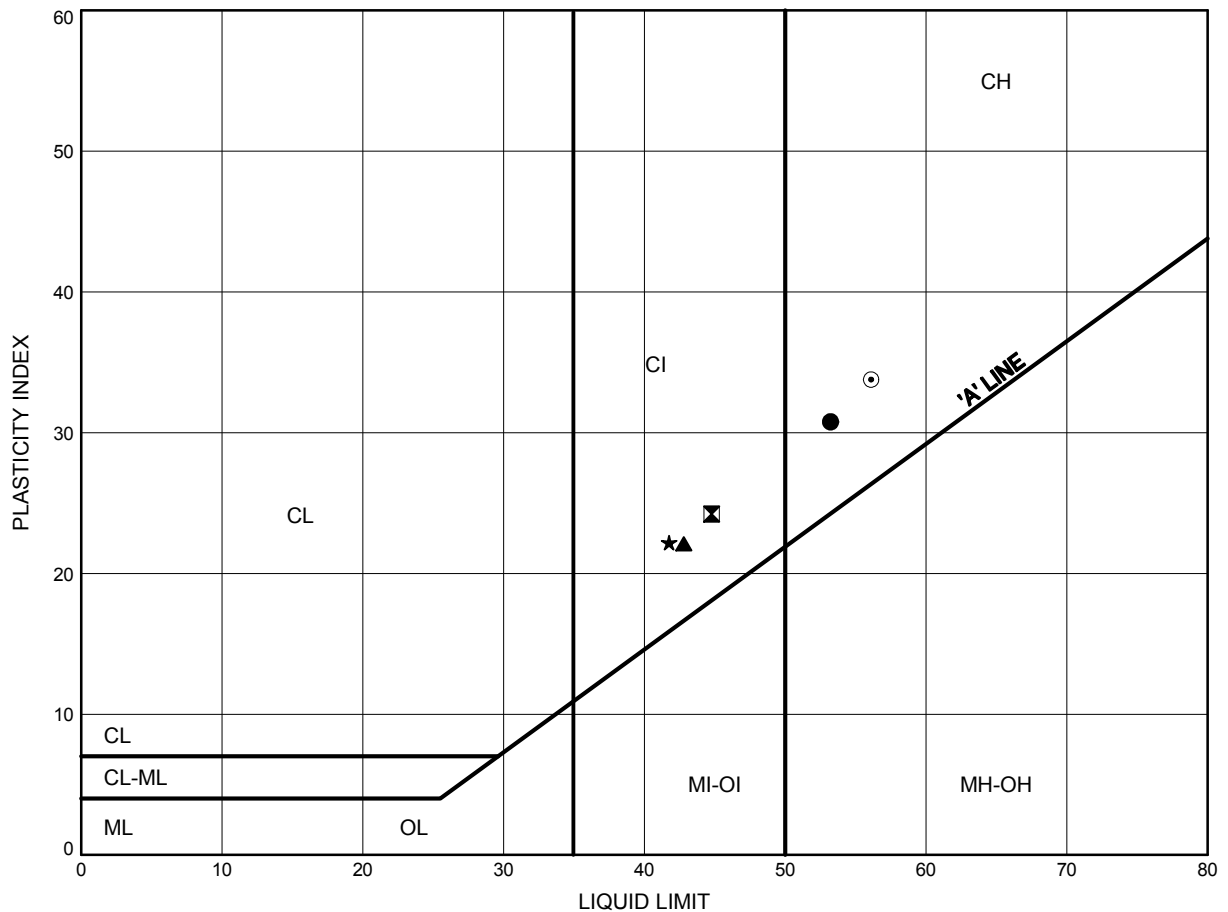
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE T4

Silty CLAY



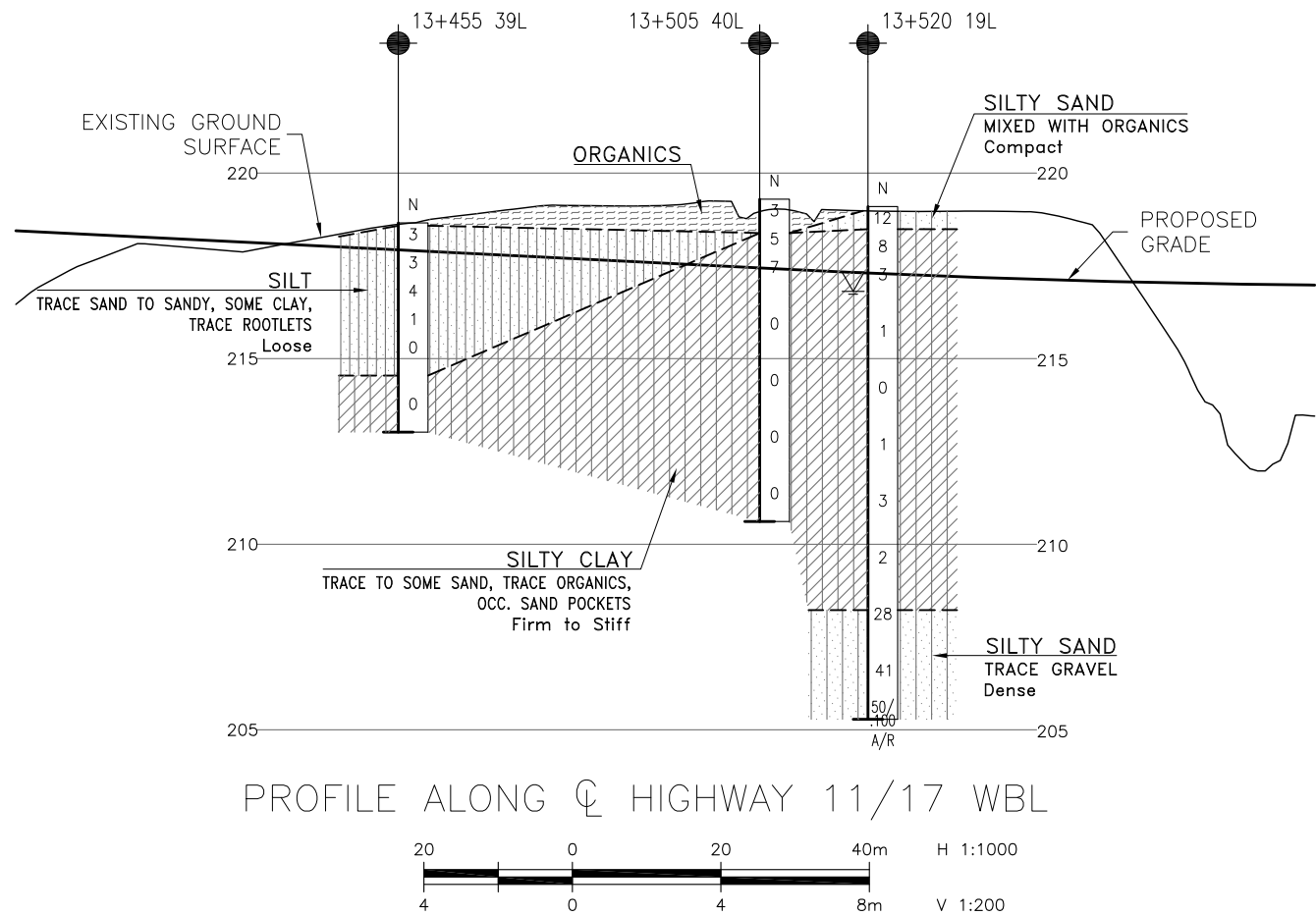
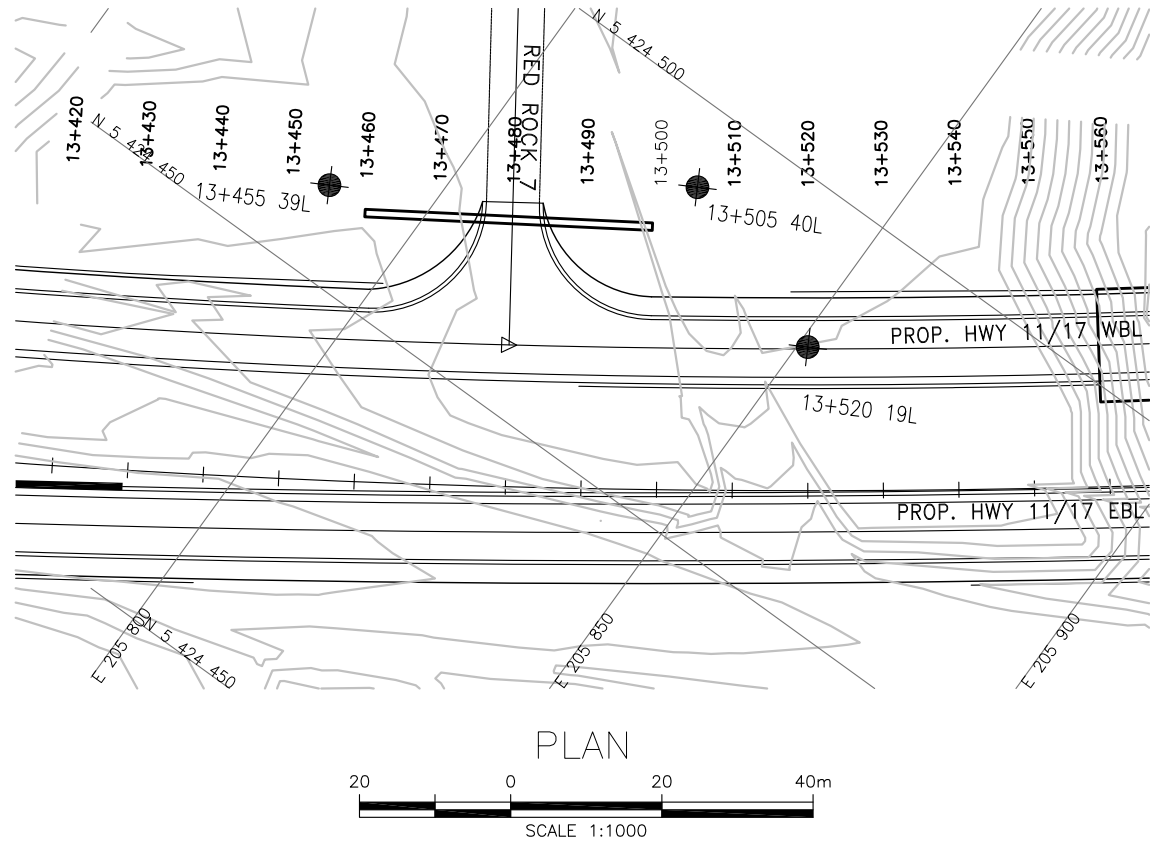
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+505 40L	1.83	217.50
⊠	13+505 40L	6.40	212.93
▲	13+520 19L	1.07	218.01
★	13+520 19L	4.88	214.20
⊙	13+520 19L	7.92	211.15

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

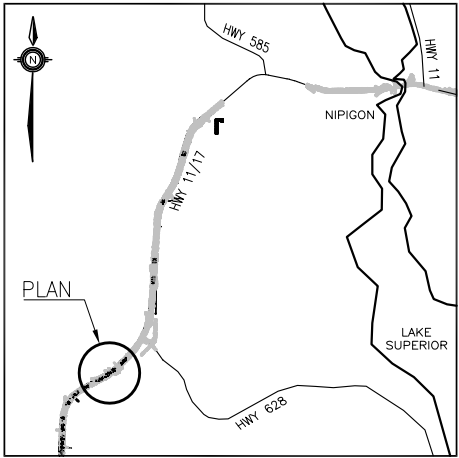


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN



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

HWY 11/17 FOUR LANING
WESBOUND LANES
(STA. 13+450 TO 13+530)
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
13+455 39L	218.7	5 424 461.7	205 787.4
13+505 40L	219.3	5 424 490.0	205 827.0
13+520 19L	219.1	5 424 481.4	205 851.2

-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

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	SBP	CHK JPL	CODE
DRAWN	MFA	CHK SBP	SITE
			LOAD
			STRUCT
			DWG 14
			DATE OCT. 2014

Appendix U

Highway 11/17 WBL

Sta. 13+590 to 13+660

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

RECORD OF BOREHOLE No 13+650 40L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 576.9 E 205 938.1 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2013.11.13 - 2013.11.13 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								WATER CONTENT (%)		
								20 40 60 80 100								20 40 60		
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE										
218.8																		
0.0																		
0.1	ORGANICS , occasional roots and rootlets Loose Dark Brown Moist		1	SS	7													
218.0																		
0.8			Sandy SILT , trace clay Loose Brown Moist Silty CLAY , some sand Firm to Very Stiff Brown	2	SS	8												
	3	SS		5														
			4	SS	4													
214.6																		
4.2	SAND , trace gravel, occasional cobbles Very Dense Brown Moist		5	SS	51													

ONTMT4S 1237.GPJ 2012TEMPLATE(MTO).GDT 7/28/14

RECORD OF BOREHOLE No 13+660 15R

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 541.6 E 205 981.2 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2013.11.13 - 2013.11.13 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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
								WATER CONTENT (%)					
216.7													
0.0													
0.1	ORGANICS Dark Brown		1	SS	4		216						
	Silty CLAY , some sand, trace organics, occasional wood fibres Firm to Very Stiff Brown												
			2	SS	4		215						
	Cobbles at 2.1m						214						
			3	SS	3		213						
212.7													
4.0	SAND , some silt, trace gravel, trace clay Dense to Very Dense Brown Moist		4	SS	39		212						
			5	SS	73/ 0.250		211						
210.2													
6.5	END OF BOREHOLE AT 6.5m. BOREHOLE OPEN TO 6.5m AND WATER LEVEL AT 3.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.												

+³, ×³: Numbers refer to
Sensitivity

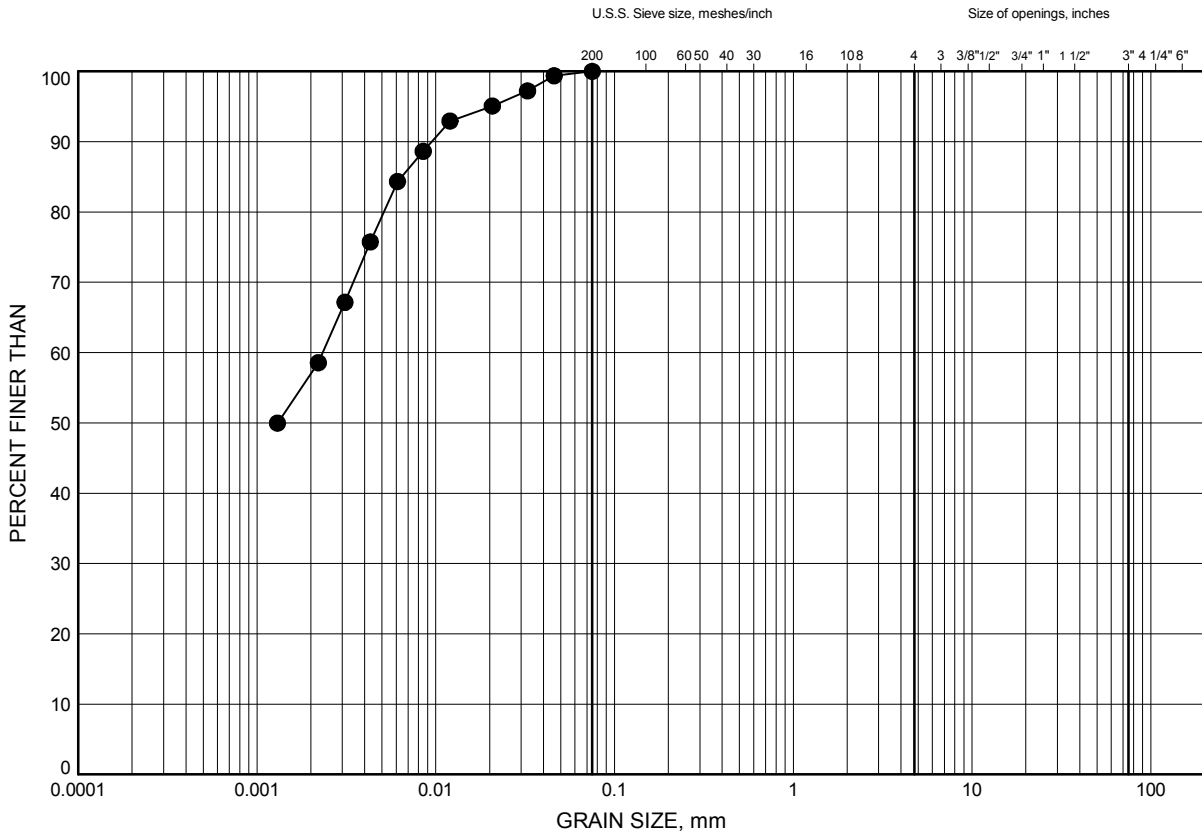
20
15
10

(%) STRAIN AT FAILURE

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

FIGURE U1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+650 40L	1.07	217.74

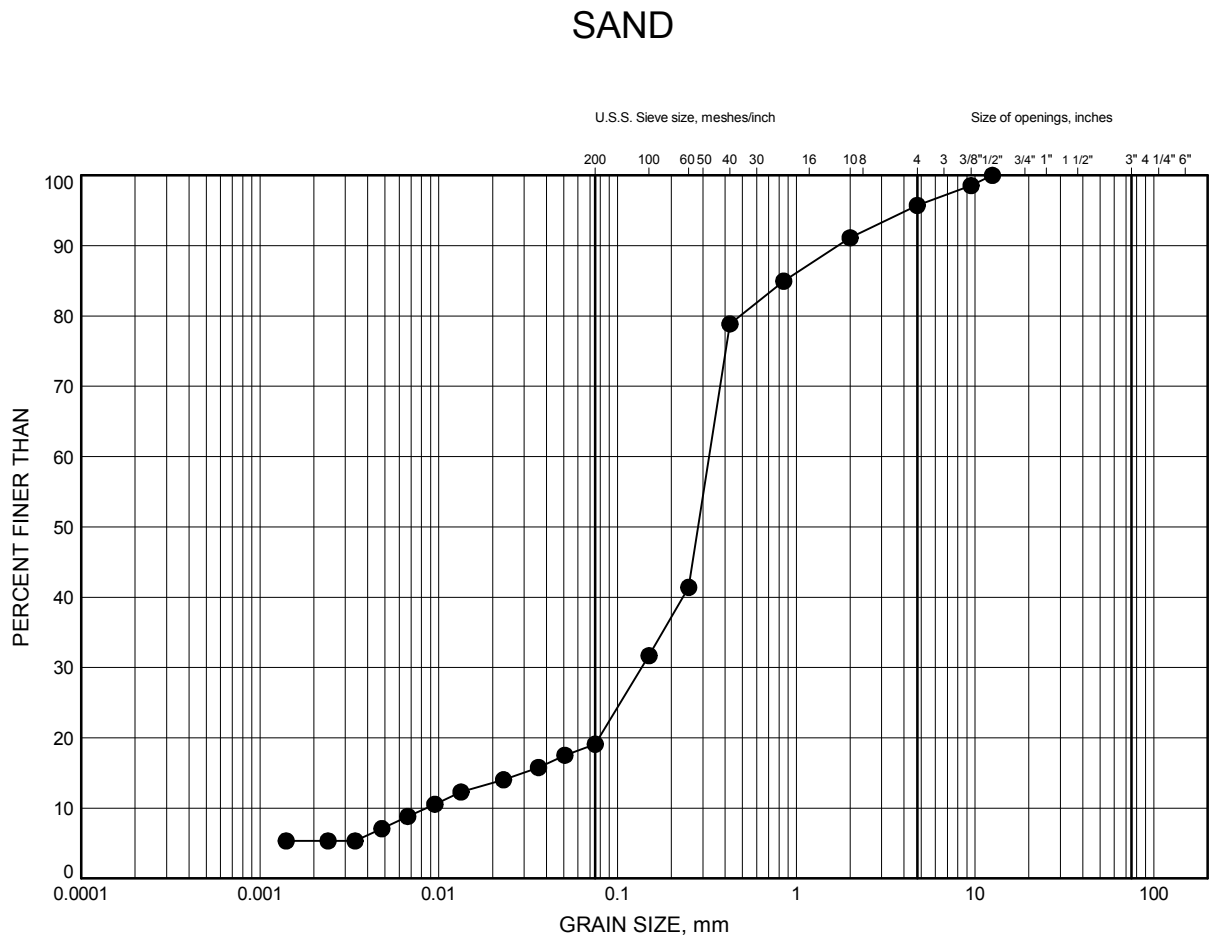
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

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

FIGURE U2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+660 15R	4.88	211.78

Date July 2014
WP# 647-89-00



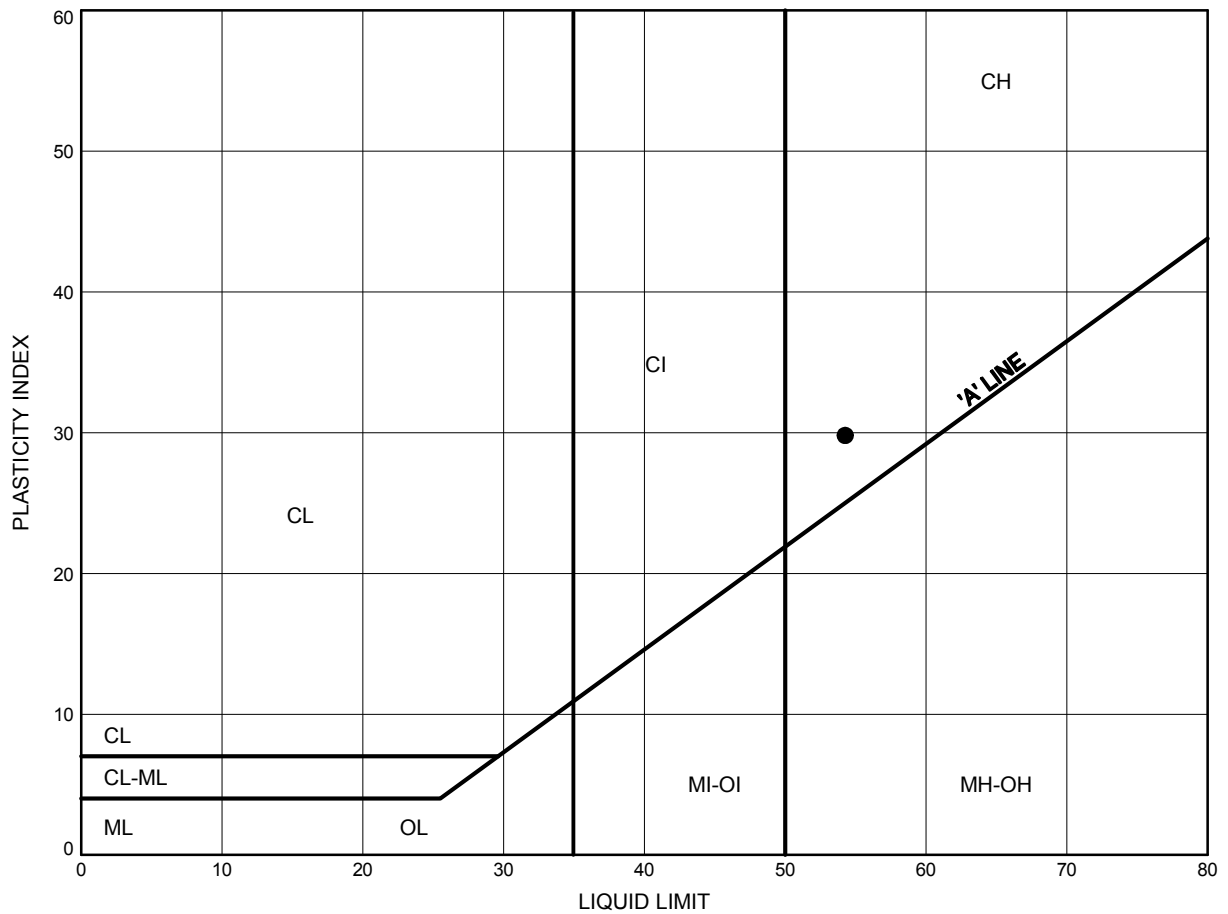
Prep'd AN
Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE U3

Silty CLAY



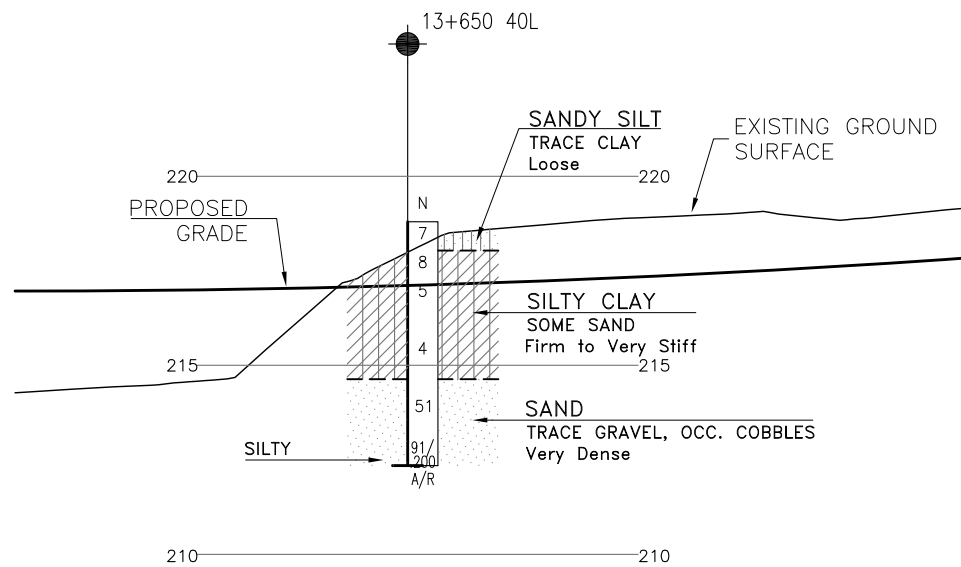
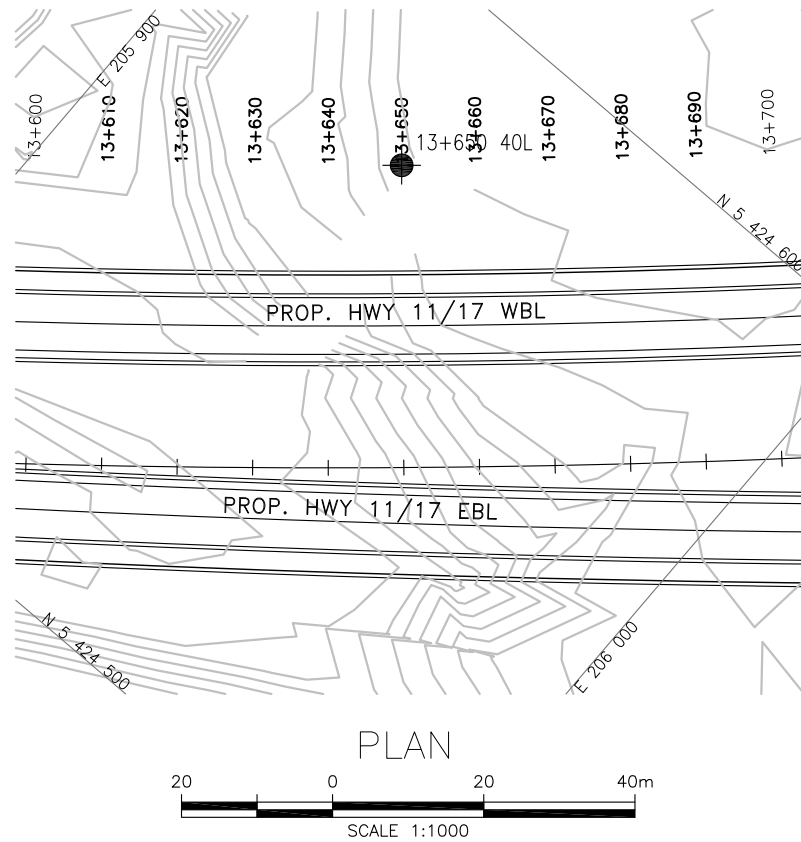
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+650 40L	1.07	217.74

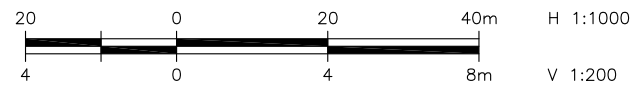
Date July 2014
 WP# 647-89-00



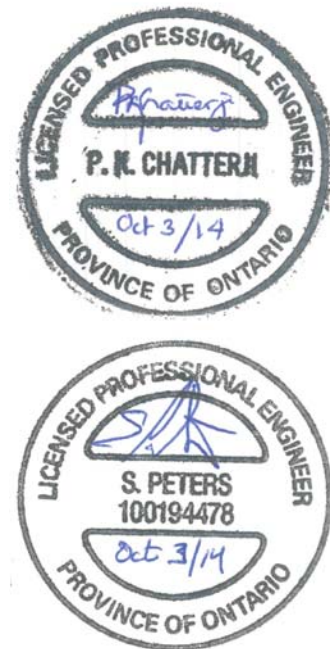
Prep'd AN
 Chkd. MKE



PROFILE ALONG C HIGHWAY 11/17 WBL

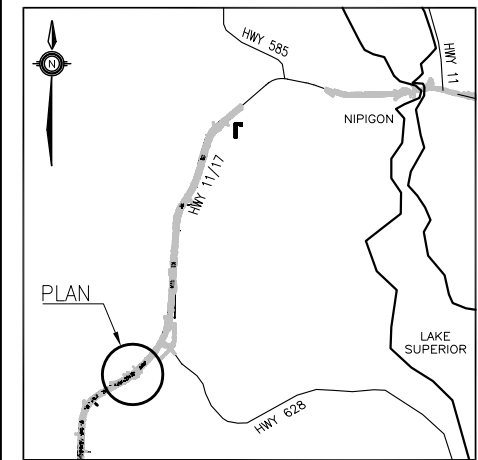


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING
WESBOUND LANES
(STA. 13+640 TO 13+660)
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

[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



V 1:200

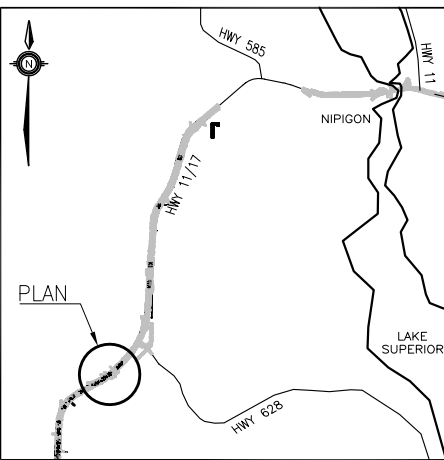
DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

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. 13+650 TO 13+670)
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

[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 V

Highway 11/17 EBL and WBL

Sta. 13+875 to 14+190



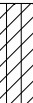


Record of Borehole Sheets
Laboratory Test Results
Borehole Locations and Soil Strata Drawings

RECORD OF BOREHOLE No 13+925 19L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 750.3 E 206 149.7 ORIGINATED BY ES
HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
DATUM Geodetic DATE 2014.02.18 - 2014.02.18 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							WATER CONTENT (%)		
219.0																	
0.0	ORGANICS , trace clay, trace roots and rootlets, occasional wood fibres Dark Brown Frozen		1	SS	19												
218.2																	
0.8	Silty CLAY , trace sand Firm Brown		2	SS	2												
			3	SS	1												
216.1																	
2.9	Gravelly SAND , occasional cobbles Compact Grey Moist		4	SS	17												
214.4																	
4.7	SILT , some sand, trace clay Very Dense Grey Moist		5	SS	50/ .125												
212.7			6	SS	50/ .100												
6.3	END OF BOREHOLE AT 6.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. WATER LEVEL AT 3.5m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

ONTMT4S 1237.GPJ 2012TEMPLATE(MTO).GDT 7/28/14

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 13+955 19R

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 744.1 E 206 197.7 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.18 - 2014.02.18 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						
218.7														
0.0	ORGANICS , trace roots and rootlets Dark Brown Frozen		1	SS	10								132 ○	
217.8														
0.9	Sandy SILT , trace gravel, mixed with organics Very Loose to Compact Brown Moist		2	SS	2								132 ○	
			3	SS	31							○		4 48 48 (SI+CL)
			4	SS	94/ 250									
216.0														
2.7	END OF BOREHOLE AT 2.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. 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 14+000 19L

1 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 424 802.7 E 206 203.3 ORIGINATED BY ES
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 NATURAL MOISTURE LIMIT 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			WATER CONTENT (%)						
								○ UNCONFINED + FIELD VANE	● QUICK TRIAXIAL × LAB VANE								
								20 40 60 80 100	20 40 60 80 100	W P	W	W L					
220.0	0.0	ORGANICS, mixed with clay, trace roots Dark Brown Frozen	1	SS	17	▽								165	0 23 73 4		
219.3	0.6	Silty CLAY, some sand Firm Brown	2	SS	5		219										
		occasional cobbles	3	SS	2		218										
217.8	2.1	Gravelly SAND Dense Brown Wet	4	SS	33		217										
217.3	2.7	Sandy SILT, trace gravel Compact to Dense Brown/Grey Moist occasional sand pockets	5	SS	25		216										
			6	SS	45		215										
							214										
			7	SS	29		213										
		Very Dense	8	SS	70	212											
						211											
210.8	9.2	END OF BOREHOLE AT 9.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. WATER LEVEL AT 5.0m UPON COMPLETION.	9	SS	50/ .050												

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 14+000 19L

2 OF 2

METRIC

WP# 647-89-00 LOCATION N 5 424 802.7 E 206 203.3 ORIGINATED BY ES
 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									
	Continued From Previous Page																
	BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No 14+050 20R

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 809.7 E 206 266.4 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.18 - 2014.02.18 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
219.8														
0.0	ORGANICS Dark Brown Frozen		1	SS	22									
219.5														
0.4	Silty CLAY , trace sand Stiff to Firm Brown Damp		2	SS	9									
			3	SS	3									
			4	SS	4									
216.2														
3.6	Sandy SILT , trace gravel, occasional bedrock fragments Very Dense Grey/Red Moist													
			5	SS	65									
214.5														
5.3	END OF BOREHOLE AT 5.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. 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 14+105 19L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 875.9 E 206 278.3 ORIGINATED BY ES
 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				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					
220.5													
0.0	ORGANICS: (200mm)												
0.2	Silty CLAY, some sand Stiff to Firm Brown trace gravel		1	SS	9		220						
			2	SS	10		219						
			3	SS	6		218						
			4	SS	6		217						
217.0			5	SS	13								
3.5	Sandy SILT, trace gravel, occasional bedrock fragments												
216.6	Compact Brown												
3.9	Moist END OF BOREHOLE AT 3.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.												

+³, ×³: Numbers refer to
Sensitivity

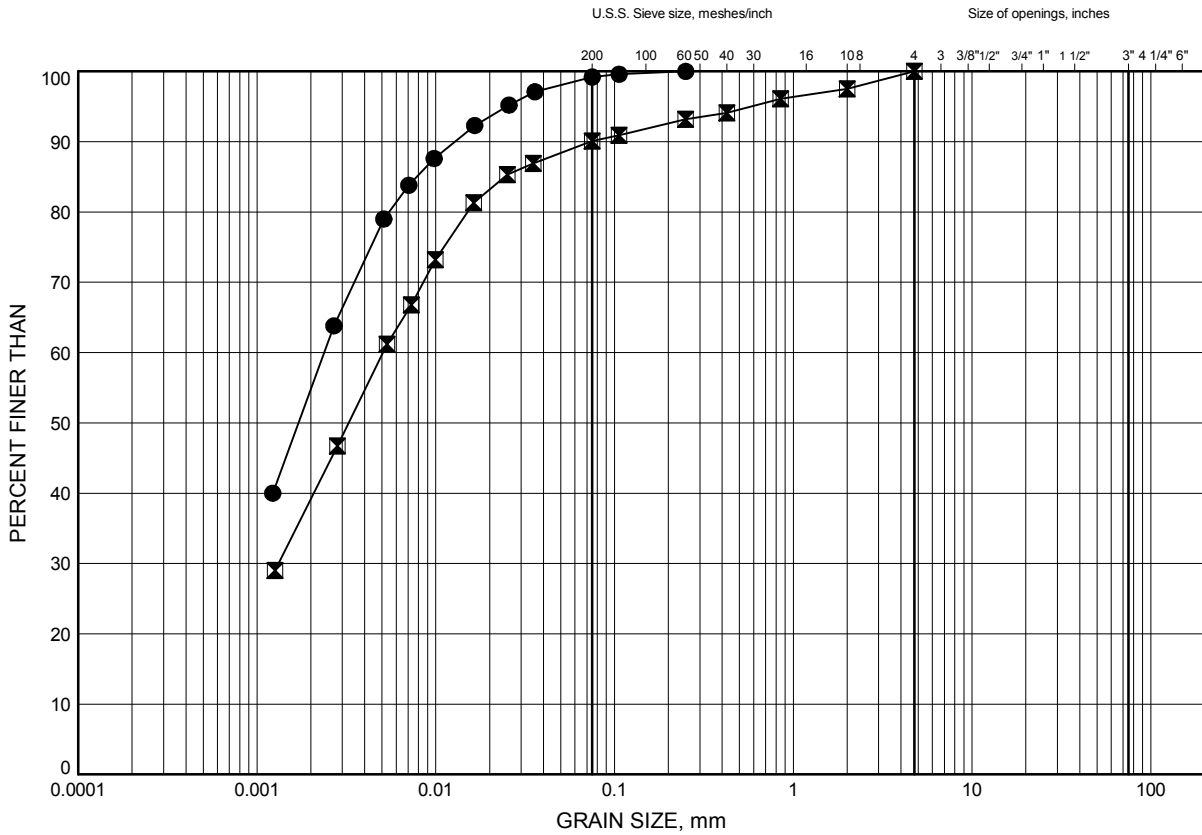
20
15
10

(%) STRAIN AT FAILURE

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

FIGURE V1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+050 20R	1.83	218.01
◻	14+105 19L	2.59	217.91

Date July 2014
 WP# 647-89-00

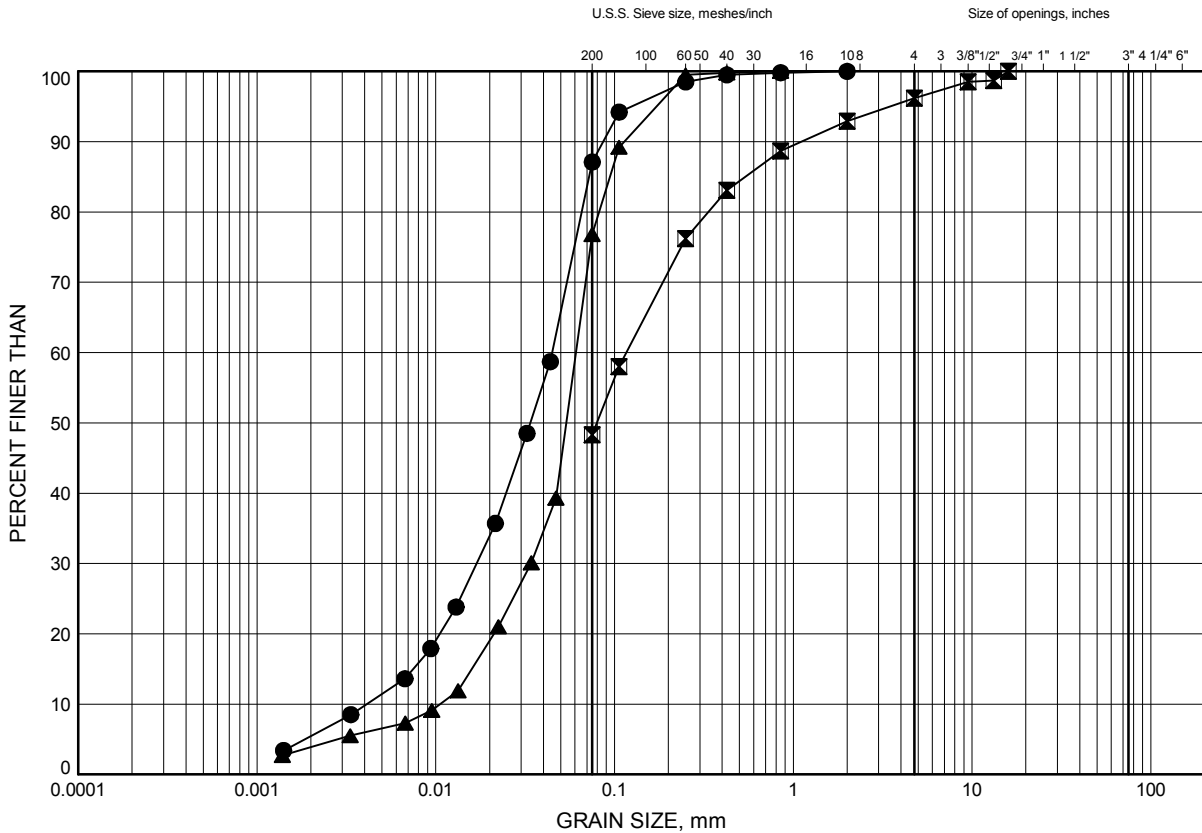


Prep'd AN
 Chkd. MKE

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

FIGURE V2

SILT to Sandy SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+925 19L	4.88	214.15
⊠	13+955 19R	1.83	216.85
▲	14+000 19L	6.40	213.56

Date July 2014
 WP# 647-89-00



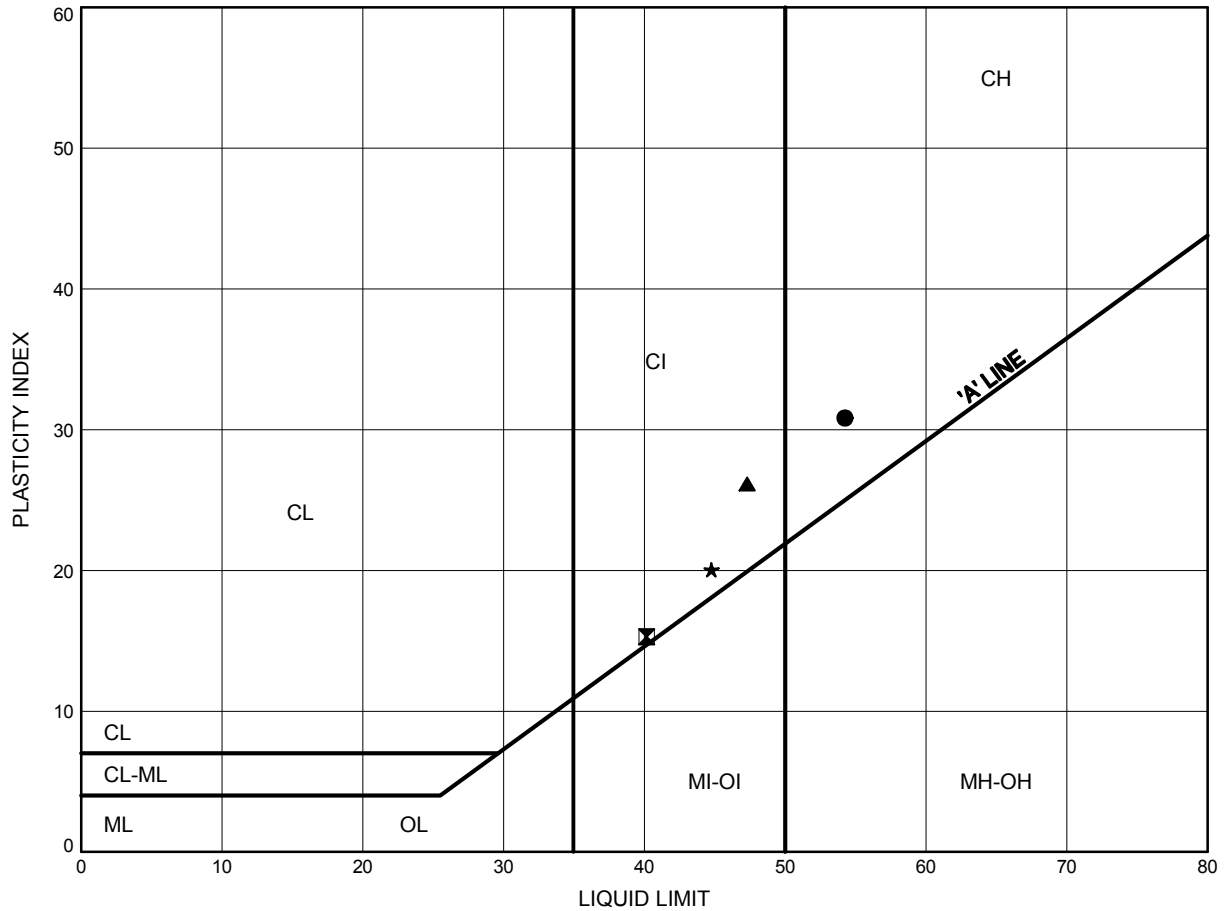
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE V3

Silty CLAY



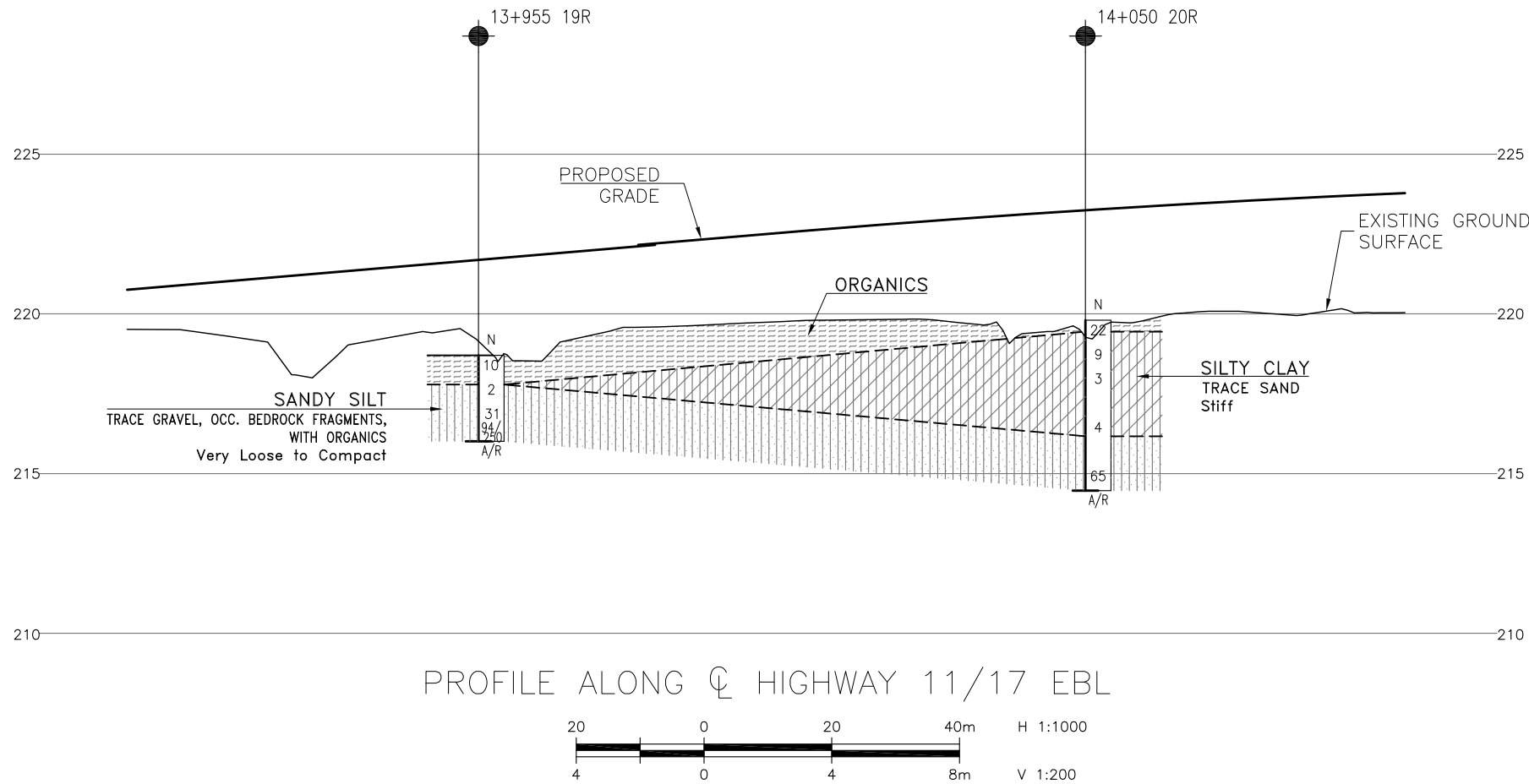
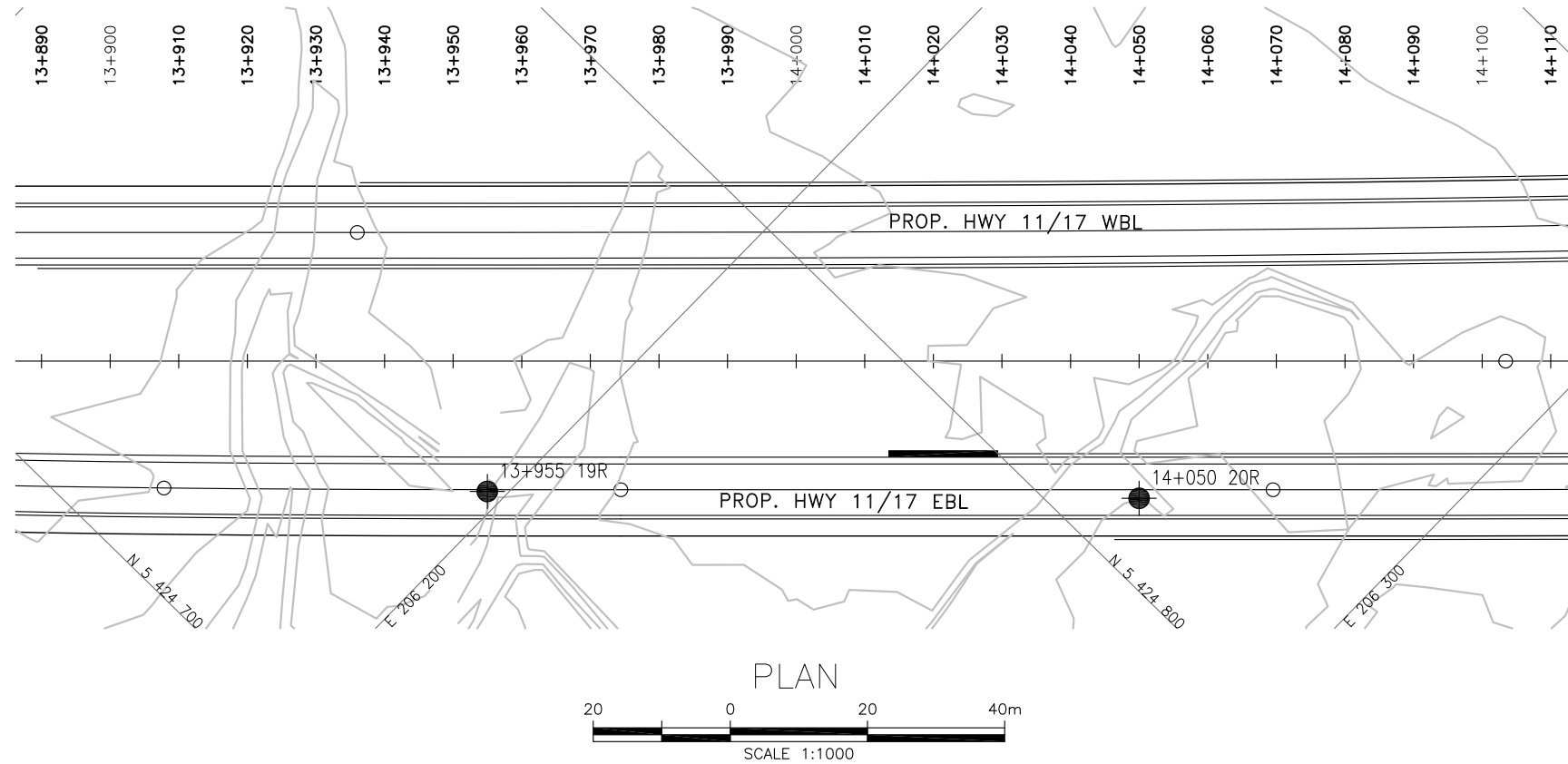
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	13+925 19L	1.83	217.20
⊠	14+000 19L	1.07	218.89
▲	14+050 20R	1.83	218.01
★	14+105 19L	1.07	219.44

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

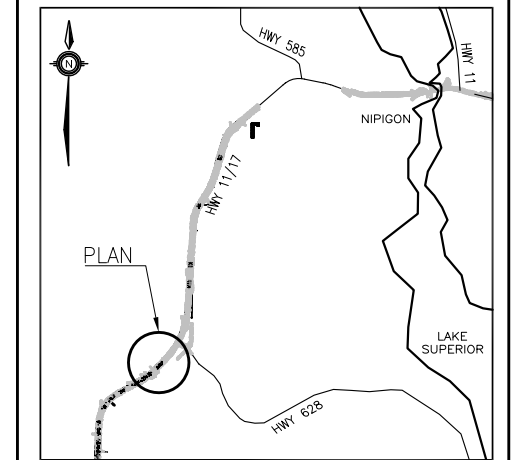


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN



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

HWY 11/17 FOUR LANE
EASBOUND LANES
(STA. 13+875 TO 14+100)
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
13+955 19R	218.7	5 424 744.1	206 197.7
14+050 20R	219.8	5 424 809.7	206 266.4

-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				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	17

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING



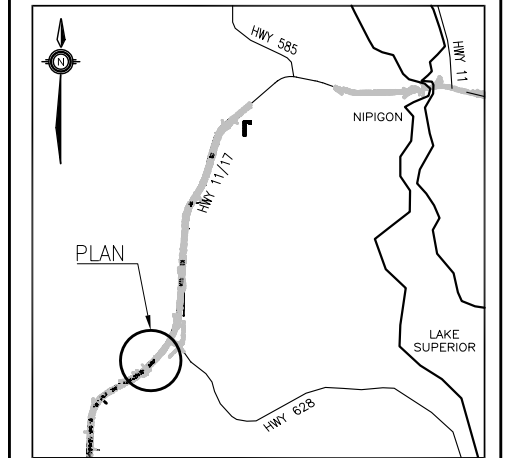
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN



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






HWY 11/17 FOUR LANING WESBOUND LANES (STA. 13+880 TO 14+110) BOREHOLE LOCATIONS AND SOIL STRATA	
--	--

SHEET |



KEYPLAN

LEGEND

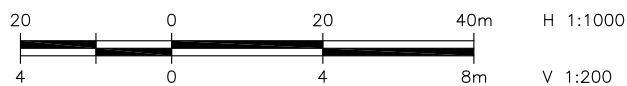
	Borehole
	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
13+925 19L	219.0	5 424 750.3	206 149.7
14+000 19L	220.0	5 424 802.7	206 203.3
14+105 19L	220.5	5 424 875.9	206 278.3

-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



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

DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

[illegible]

Appendix W

Highway 11/17 EBL and WBL

Sta. 14+190 to 14+210

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

RECORD OF BOREHOLE No 14+201 19L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 943.3 E 206 345.9 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.19 - 2014.02.19 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									
220.5																	
0.0 220.2 0.3	ORGANICS , some clay, trace roots and rootlets: (250mm) Dark Brown Frozen END OF BOREHOLE AT 0.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.		1	GS													

RECORD OF BOREHOLE No 14+201 35L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 954.3 E 206 334.3 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.19 - 2014.02.19 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									
221.4								20	40	60	80	100					
0.0	ORGANICS: (175mm)																
0.2	Silty CLAY , some sand Stiff Dark Brown to Brown		1	SS	15		221										
220.5																	
0.9	Silty SAND , some clay, some gravel, occasional bedrock fragments Compact Brown		2	SS	12		220										
219.8	Wet		3	SS	50/												
1.6	END OF BOREHOLE AT 1.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. WATER LEVEL AT 0.9m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.				.075												

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

RECORD OF BOREHOLE No 14+201 37R

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 904.3 E 206 386.1 ORIGINATED BY ES
 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					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													
217.5								20 40 60 80 100													
0.0	ORGANICS: (100mm)							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT w _P w w _L WATER CONTENT (%)								
0.2	Silty CLAY , some sand, trace gravel, trace organics, occasional wood fibres Firm Dark Brown to Brown		1	GS			217														
			1	SS	6														0 11 61 28		
216.1																					
1.3	Silty SAND , some clay, some gravel, occasional cobbles Very Dense Brown Moist (TILL)						216														
			2	SS	63																
215.3																					
2.2	END OF BOREHOLE AT 2.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. 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 14+201 CL

1 OF 1

METRIC

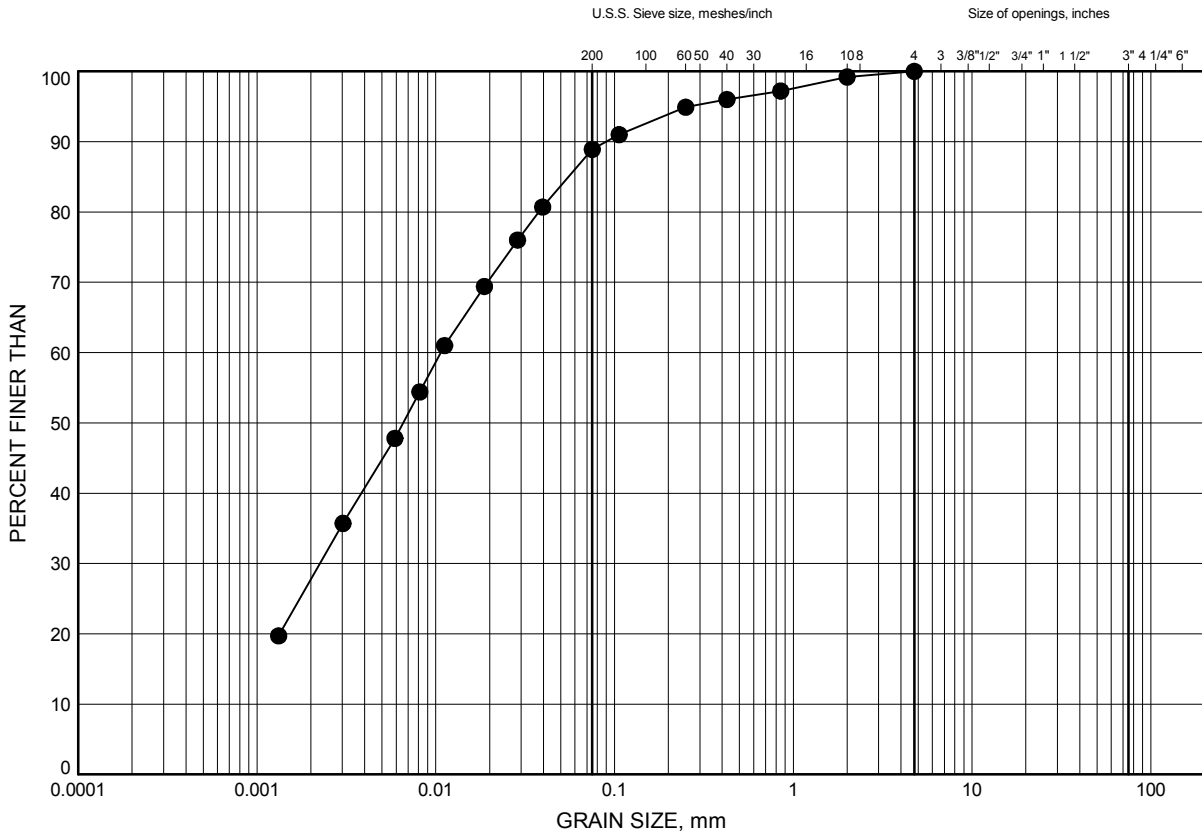
WP# 647-89-00 LOCATION N 5 424 930.3 E 206 359.7 ORIGINATED BY ES
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.02.19 - 2014.02.19 CHECKED BY MEF

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						
219.1																	
0.0	ORGANICS, some clay, trace roots and rootlets Dark Brown						219										
218.6																	
0.5	END OF BOREHOLE AT 0.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.																

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

FIGURE W1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+201 37R	1.07	216.42

Date July 2014
 WP# 647-89-00



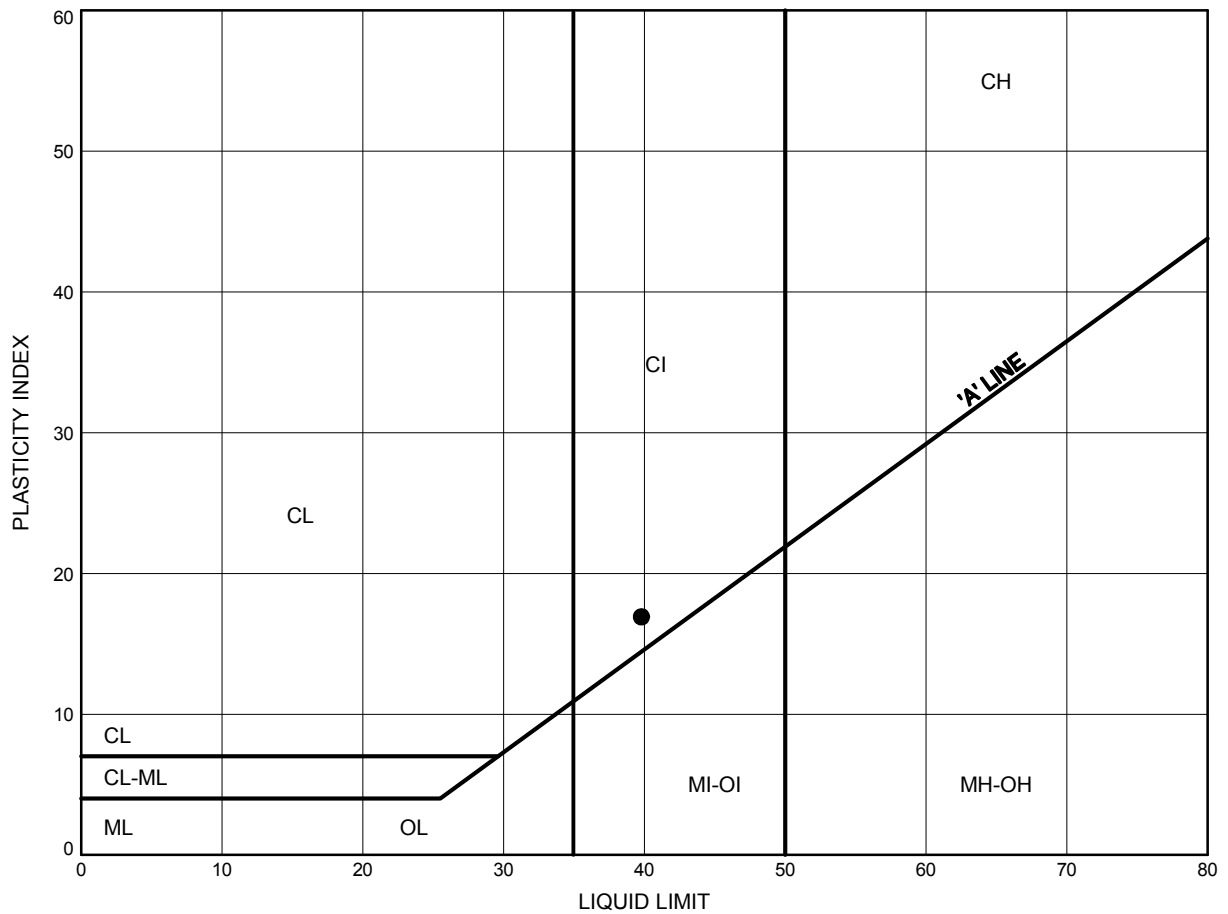
Prep'd AN
 Chkd. MKE

Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE W2

Silty CLAY



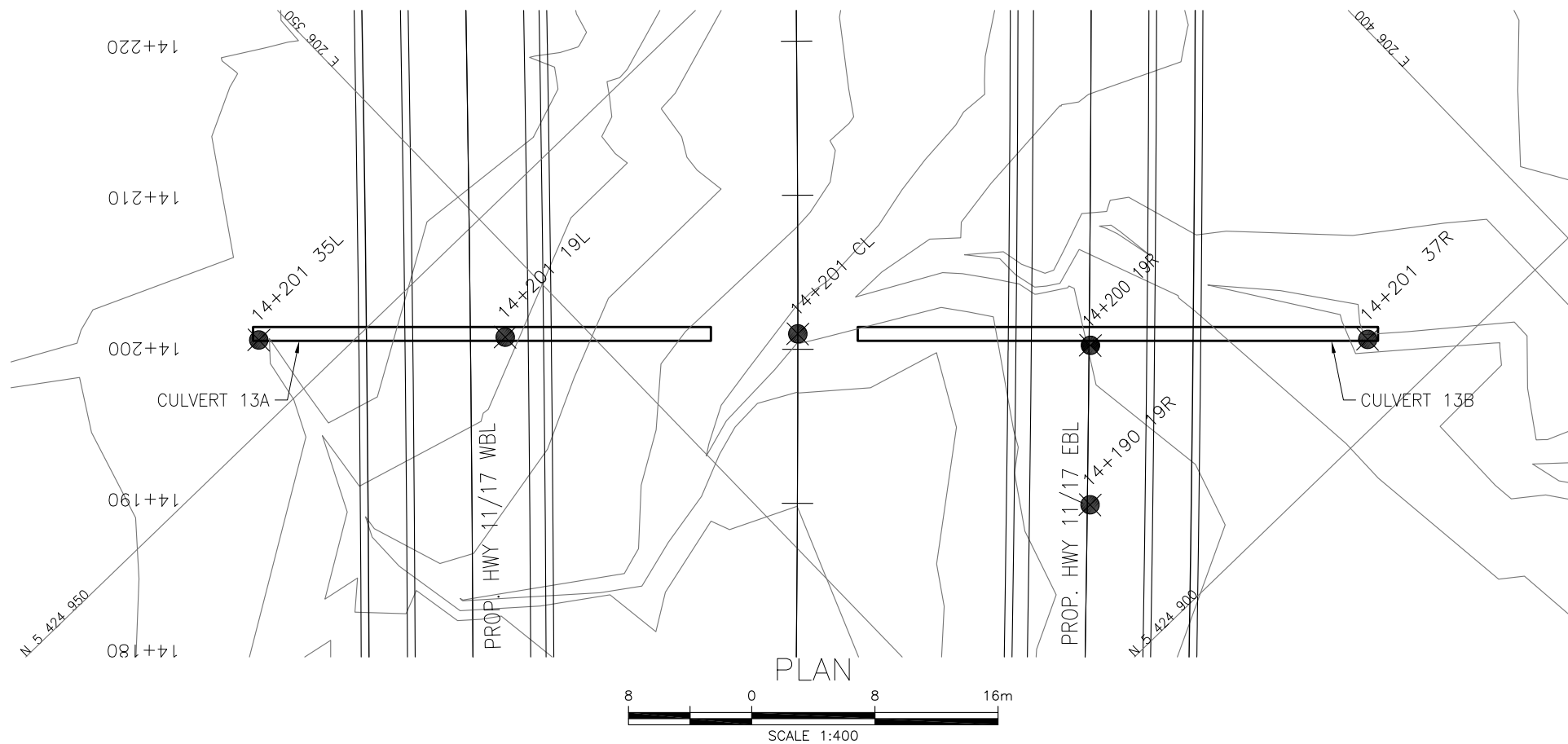
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+201 35L	0.30	221.05

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

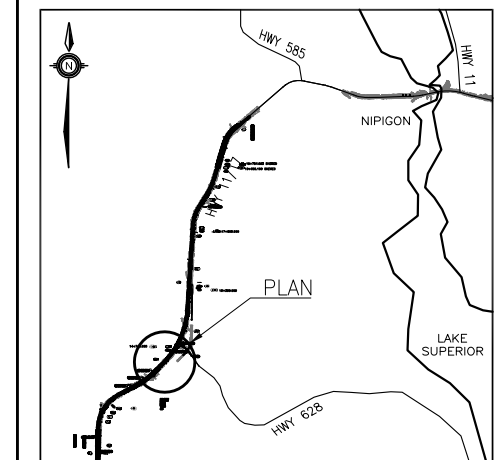


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN







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

HWY 11/17 FOUR LANING
EB AND WB LANES
CULVERT 13A AND 13B
BOREHOLE LOCATIONS AND SOIL STRATA



KEYPLAN

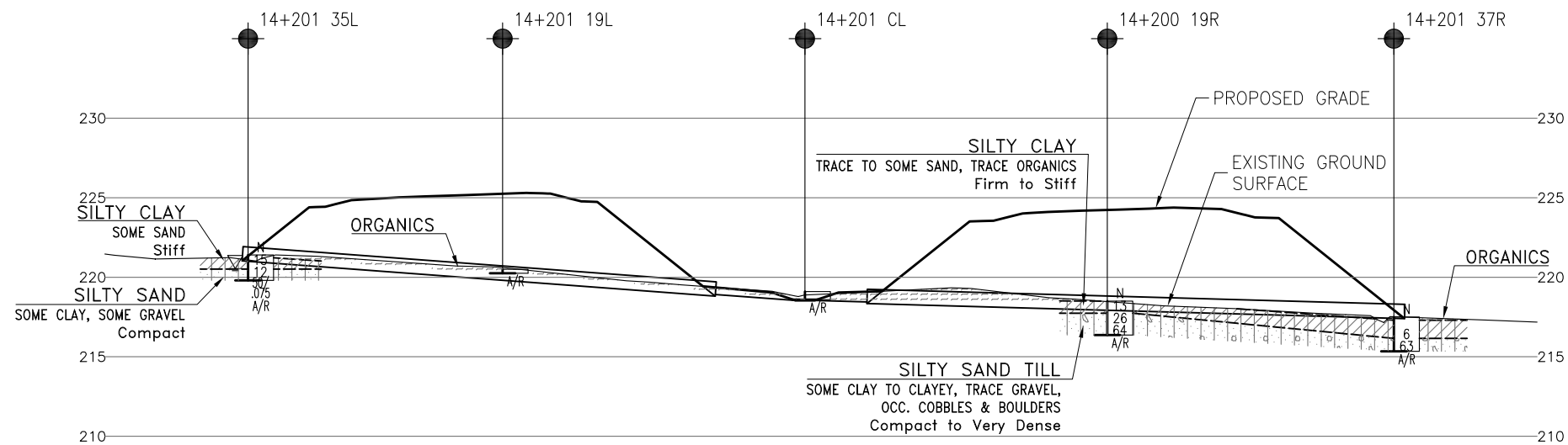
LEGEND

	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

-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 13A AND 13B



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

REVISIONS										
	DATE	BY	DESCRIPTION							
DESIGN	SBP	CHK	JPL	LOAD			DATE	OCT. 2014		
DRAWN	MFA	CHK	SBP	SITE	STRUCT	DWG	7			

Appendix X

Highway 11/17 WBL

Sta. 14+210 to 14+410

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

RECORD OF BOREHOLE No 14+255 19L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 424 982.4 E 206 382.7 ORIGINATED BY ES
 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	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									
221.5																	
0.0	ORGANICS: (125mm)																
0.1	Silty CLAY , some sand, trace gravel Brown		1	GS													
220.8																	
0.7	SAND , some gravel, trace silt, occasional bedrock fragments Dense Brown Moist		1	SS	49											29 48 23 (SI+CL)	
220.1																	
1.4	END OF BOREHOLE AT 1.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.																

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

RECORD OF BOREHOLE No 14+300 49L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 425 035.4 E 206 390.1 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.15 - 2014.03.15 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			
228.2								20 40 60 80 100					
0.0	TOPSOIL: (100mm)							○ UNCONFINED + FIELD VANE					
0.1	Silty CLAY Stiff Brown		1	SS	11			● QUICK TRIAXIAL × LAB VANE					
			2	SS	12								
			3	SS	14								
			4	SS	11								
			5	SS	31								
224.6													
3.7	END OF BOREHOLE AT 3.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 3.7m 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

RECORD OF BOREHOLE No 14+350 48L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 425 072.1 E 206 422.7 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.15 - 2014.03.15 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							
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							
							WATER CONTENT (%)								
							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L								
226.4															
0.0	Silty CLAY , occasional silt seams Stiff to Very Stiff Brown		1	SS	17		226								
				2	SS	11		225							
			3	SS	22										
224.3															
2.1	END OF BOREHOLE AT 2.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.1m 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 14+375 23L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 425 074.6 E 206 457.6 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.14 - 2014.03.14 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						
228.3								20 40 60 80 100						
0.0	Silty CLAY , trace sand Stiff Brown Frozen		1	SS	29		228							
	Moist		2	SS	11		227							
	occasional silt seams		3	SS	13									
226.0			4	SS	50/.000		226							
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 HOLEPLUG AND CUTTINGS TO SURFACE.													

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

RECORD OF BOREHOLE No 14+400 33L

1 OF 1

METRIC

WP# 647-89-00 LOCATION N 5 425 100.2 E 206 465.5 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.14 - 2014.03.14 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									
							20	40	60	80	100						
229.8																	
0.0	Silty CLAY , trace gravel, trace sand, occasional rootlets and wood fibres Very Stiff to Stiff Brown Moist (FILL)		1	SS	20												
			2	SS	11												
228.3			3	SS	50/.000												
1.5	END OF BOREHOLE AT 1.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 1.5m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.																

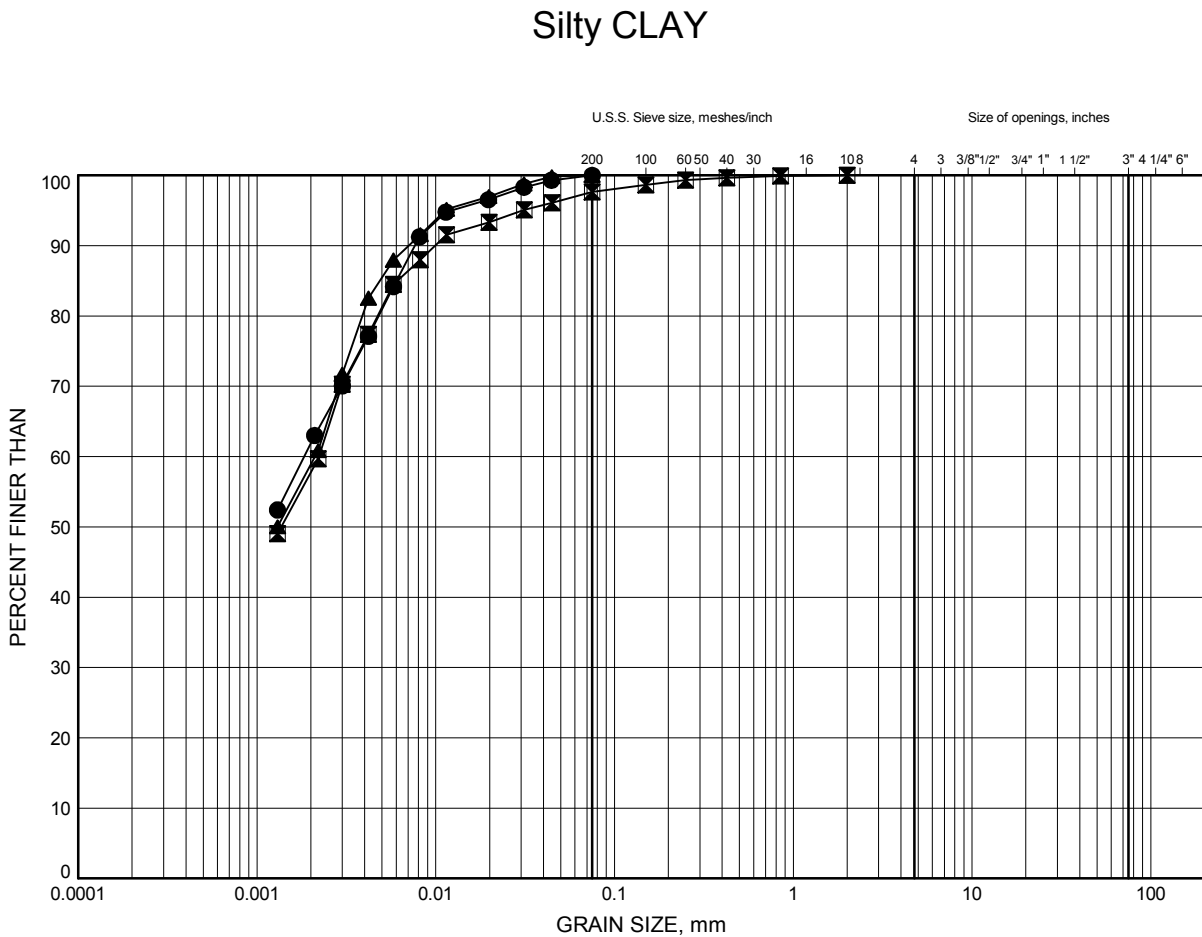
+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

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

FIGURE X1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+300 49L	1.83	226.38
◻	14+350 48L	1.07	225.36
▲	14+375 23L	1.07	227.18

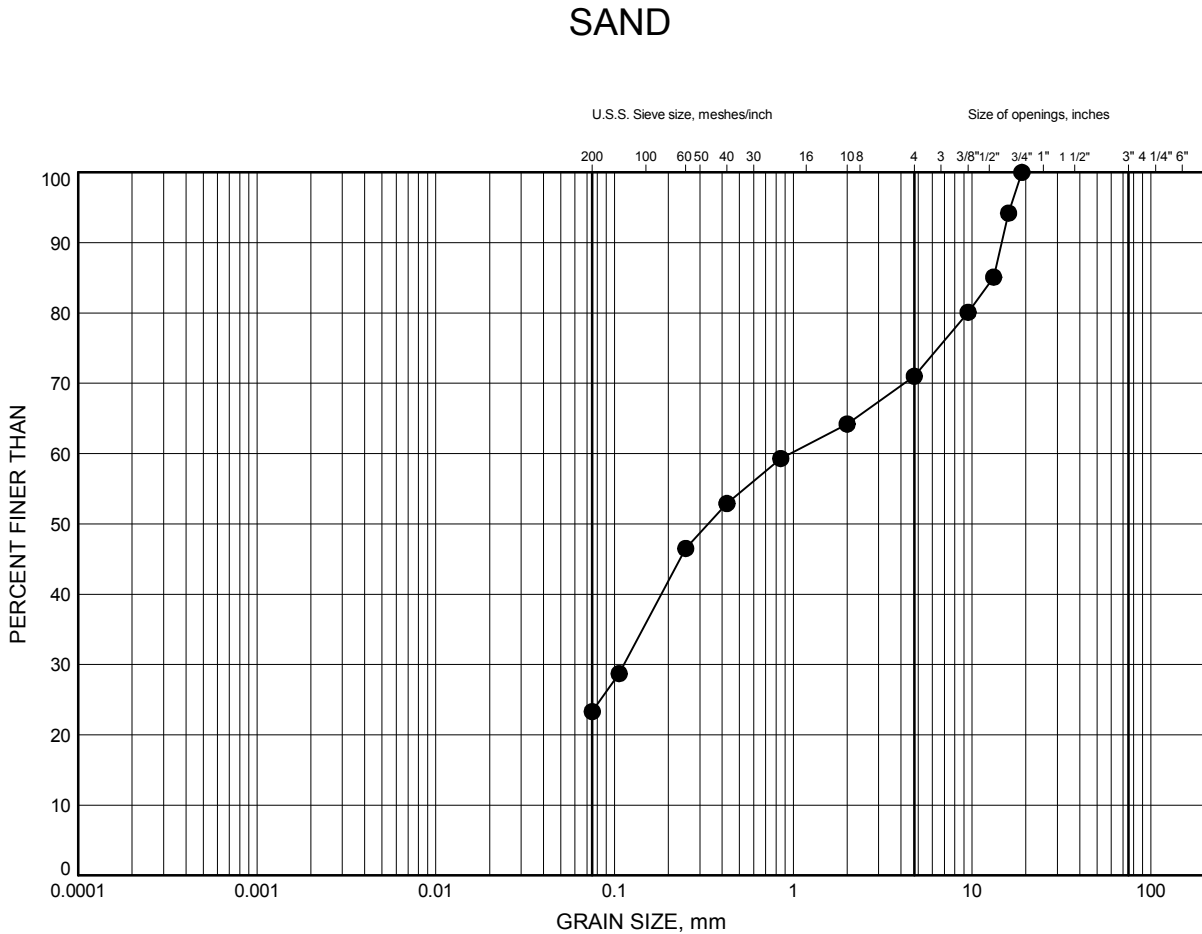
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

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

FIGURE X2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+255 19L	1.07	220.43

Date July 2014
 WP# 647-89-00

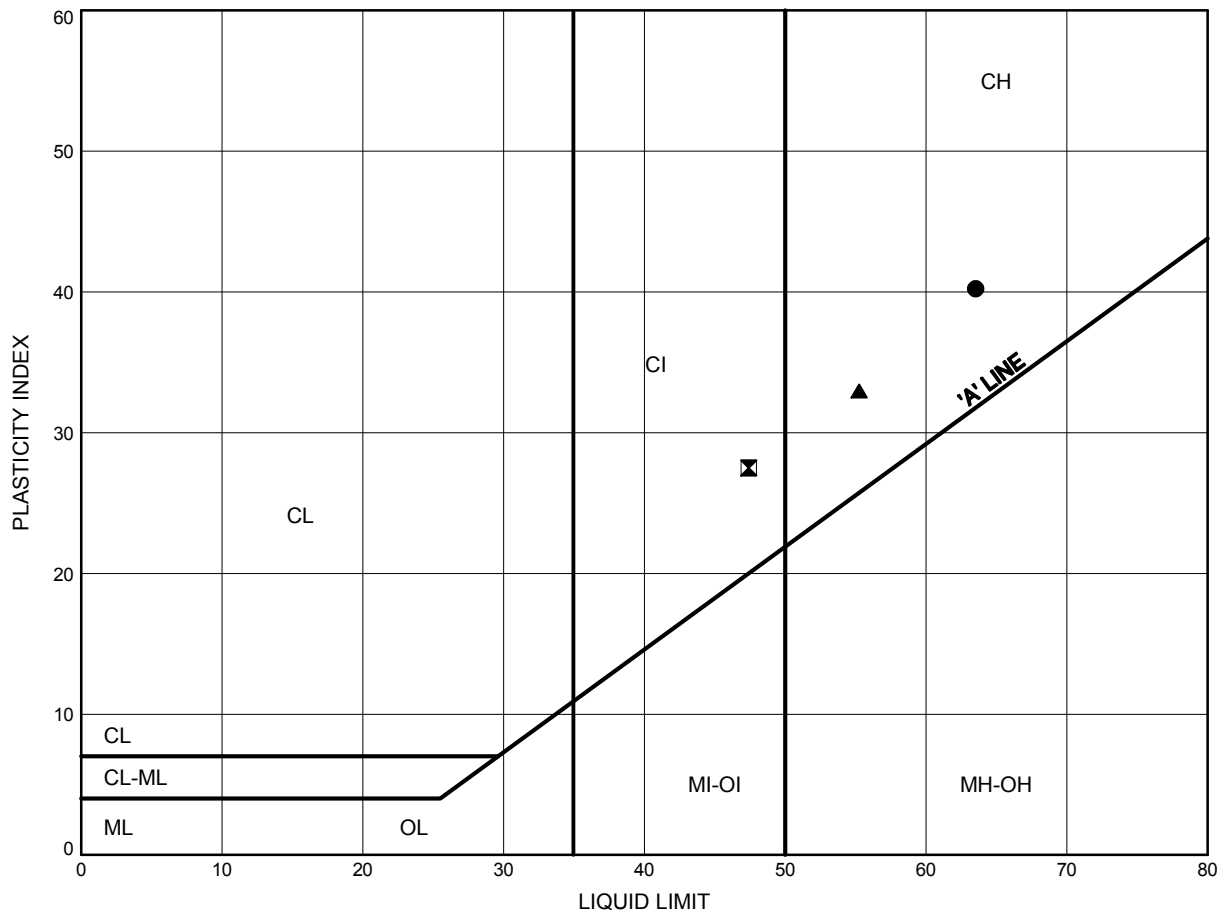


Prep'd AN
 Chkd. MKE

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

FIGURE X3

Silty CLAY



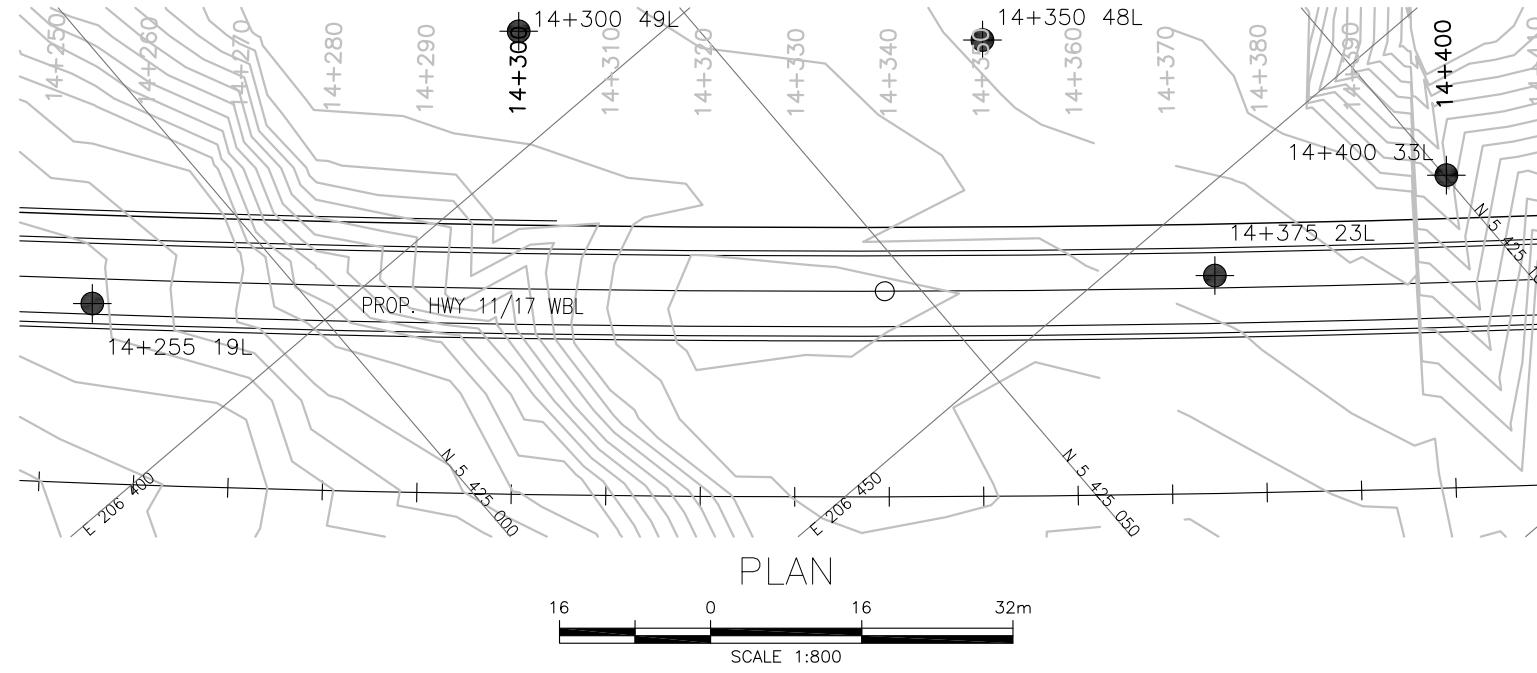
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+300 49L	1.83	226.38
⊠	14+350 48L	1.07	225.36
▲	14+375 23L	1.07	227.18

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

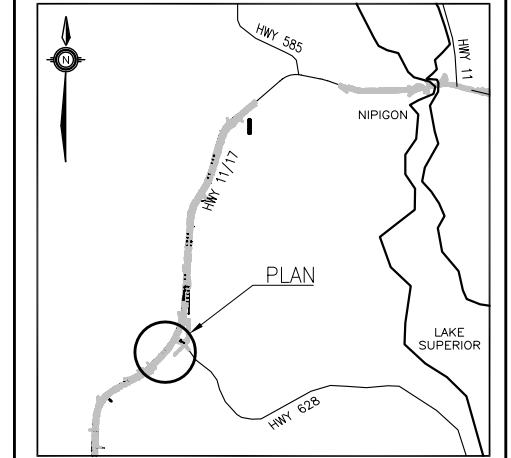


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING WESTBOUND LANES (STA. 14+255 TO 14+410) BOREHOLE LOCATIONS AND SOIL STRATA	\$
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KEYPLAN

LEGEND

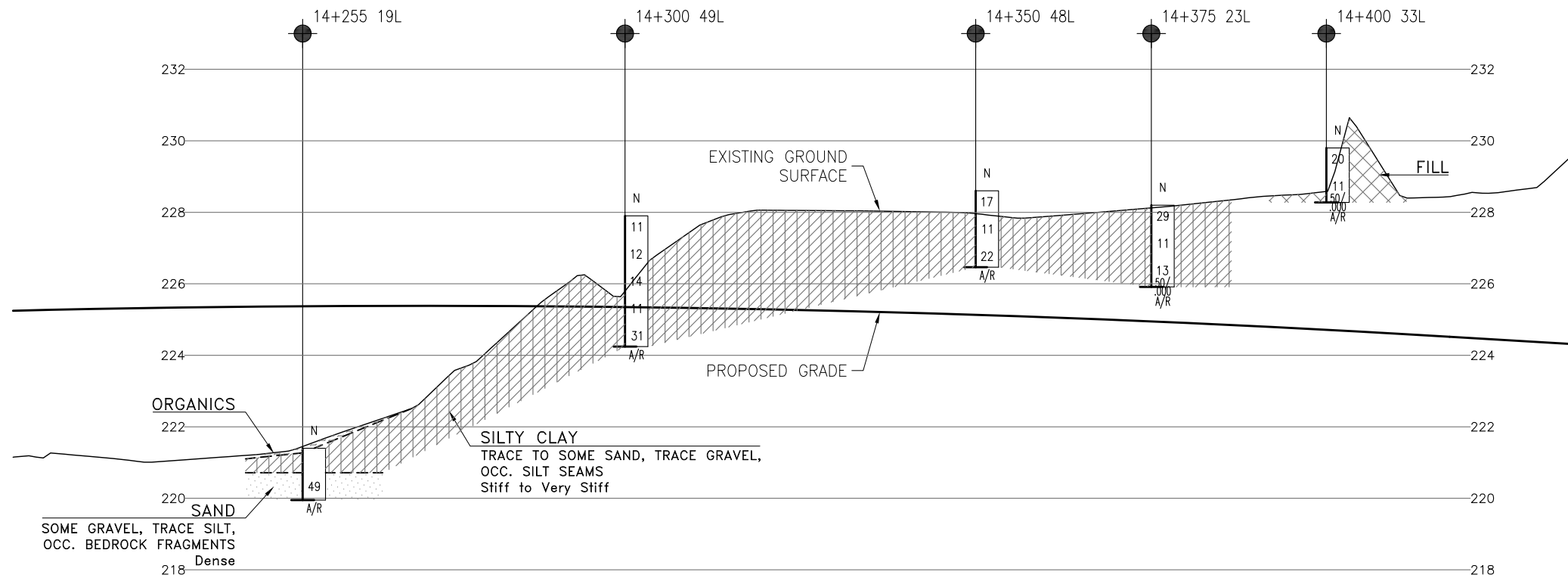
	Borehole
	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

[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



PROFILE ALONG C HIGHWAY 11/17 WBL



DRAWING NOT TO BE SCALED
100mm ON ORIGINAL DRAWING

[illegible]

Appendix Y

Highway 11/17 EBL and WBL

Sta. 14+720 to 14+760

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

RECORD OF BOREHOLE No 14+739 58R

1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 329.8 E 206 732.9 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.03 - 2014.03.03 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									
217.0																	
0.0	TOPSOIL, trace rootlets		1	SS	36												
216.5	Hard Dark Brown Frozen																
0.5	END OF BOREHOLE AT 0.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 0.5m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.																

METRIC

SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	"N" VALUES	
218.4					
0.0	PEAT: (150mm)				
0.2	Silty CLAY Firm to Very Stiff Brown		1	SS	6
	varved		2	SS	6
			3	SS	2
	Grey		4	SS	2
			5	SS	1
			6	SS	0
			7	SS	0
209.3					
9.1	SILT, some clay to clayey Compact Grey Wet		8	SS	14

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 14+741 43L

2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 382.0 E 206 646.3 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.02 - 2014.03.02 CHECKED BY MEF

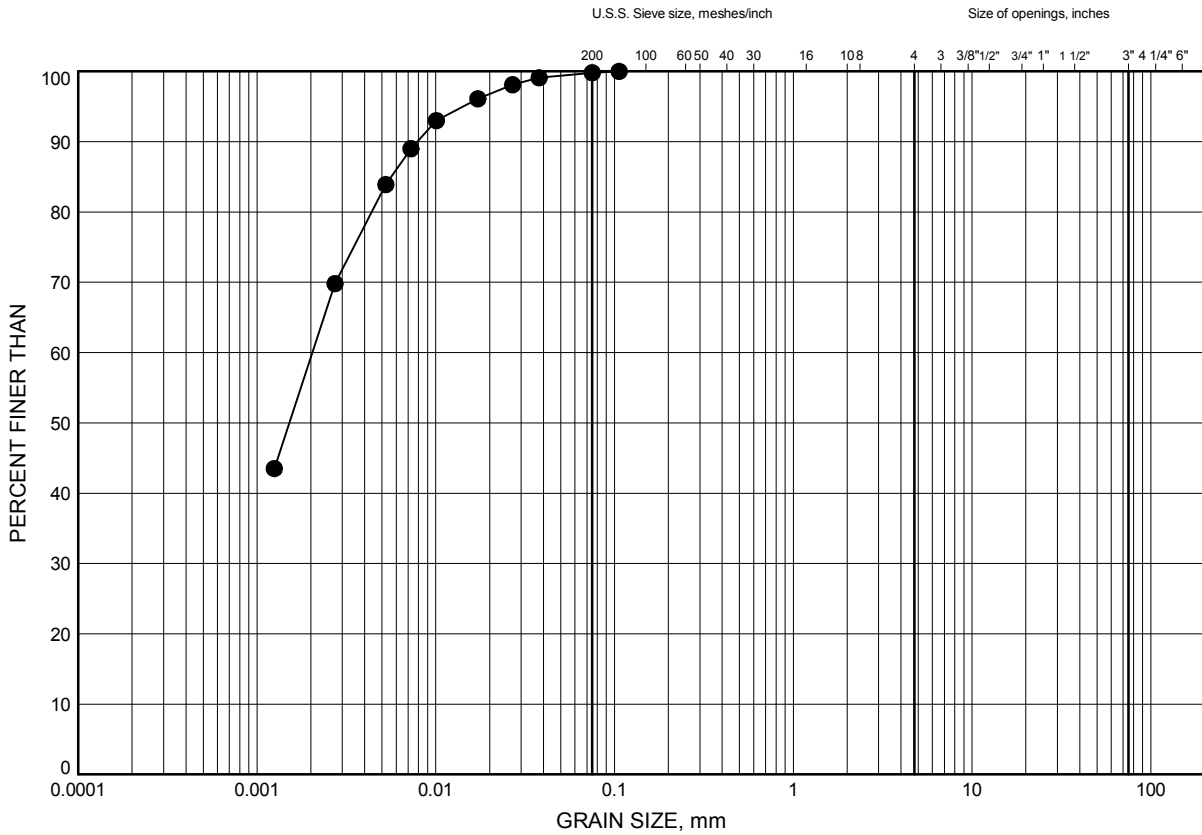
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					
	Continued From Previous Page							20 40 60 80 100	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT		
									W P	W	W L		
									WATER CONTENT (%)				
								20 40 60 80 100					
208.0							208						
10.4	Silty CLAY Stiff Grey		9	SS	1		207						
								10.0					
206.2							206						
12.2	SILT , trace clay, trace sand Very Dense Grey Wet		10	SS	50/								
205.9													
12.5	END OF BOREHOLE AT 12.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 12.5m AND WATER LEVEL AT 11.4m 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 Y1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+741 43L	7.92	210.48

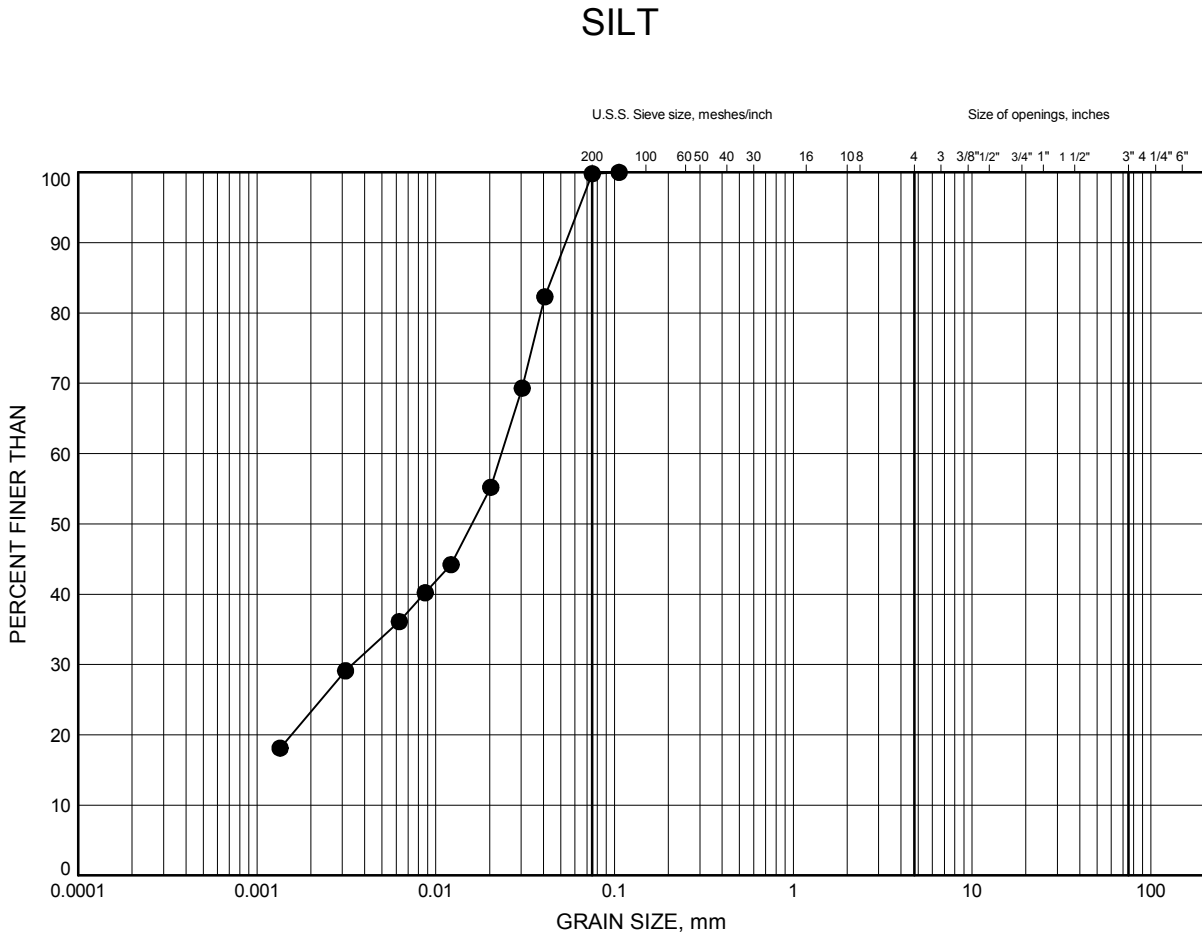
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

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

FIGURE Y2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+741 43L	9.45	208.95

Date July 2014
WP# 647-89-00

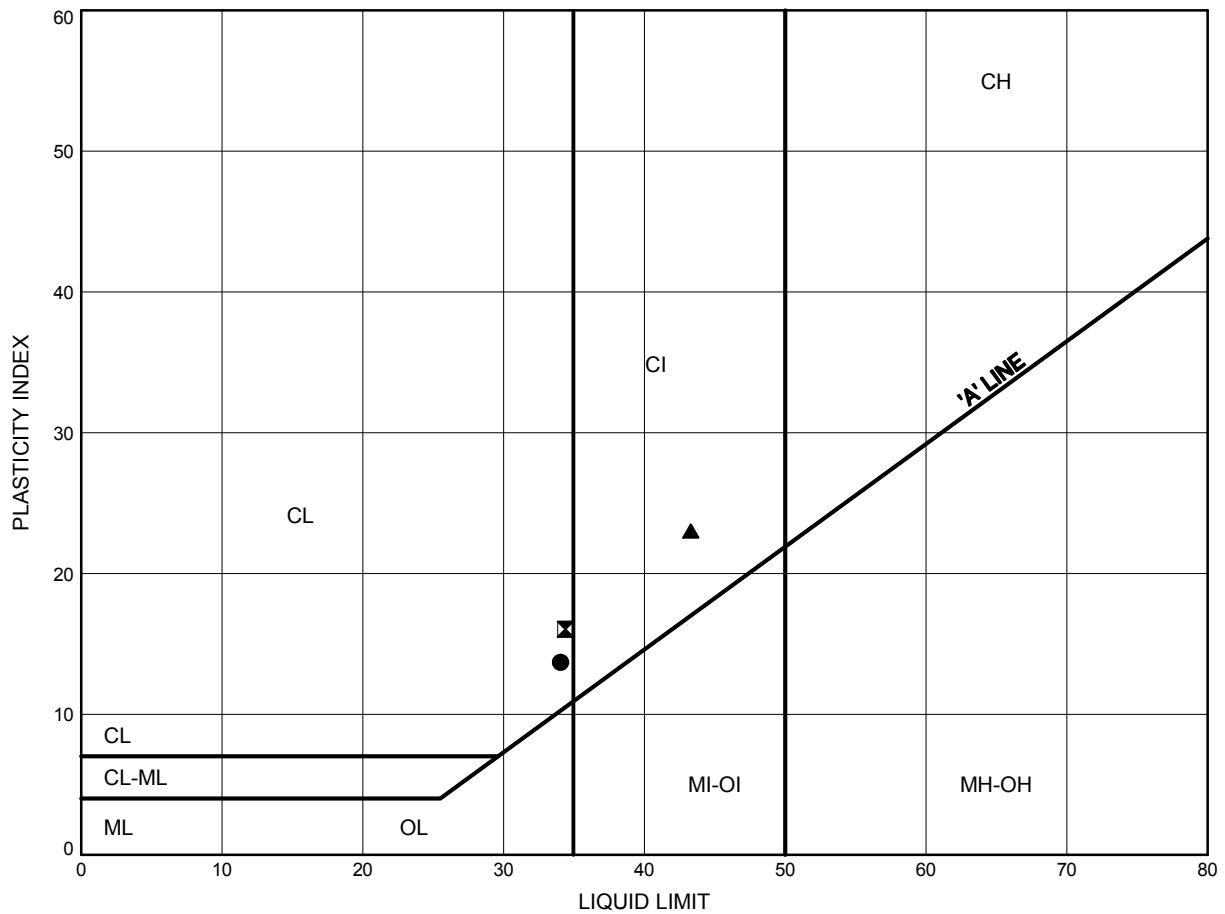


Prep'd AN
Chkd. MKE

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

FIGURE Y3

Silty CLAY



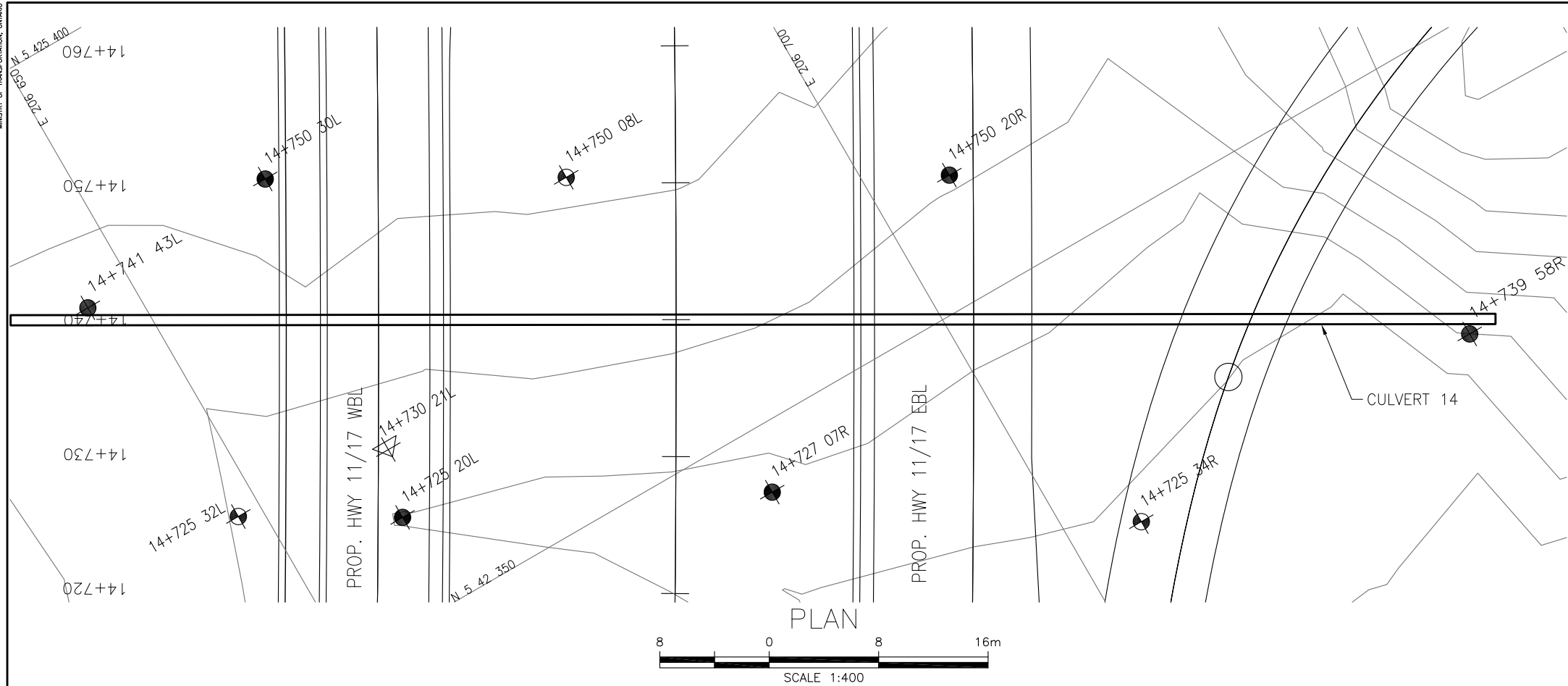
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	14+741 43L	1.83	216.57
⊠	14+741 43L	7.92	210.48
▲	14+741 43L	10.97	207.43

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE



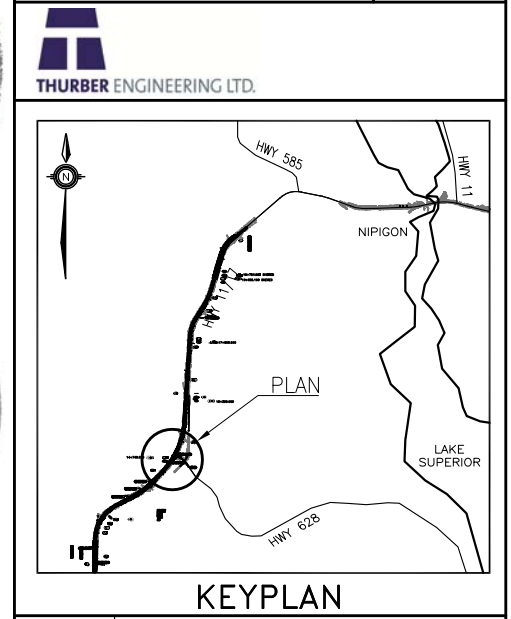
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN



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

HWY 11/17 FOUR LANING
EB AND WB LANES
CULVERT 14
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

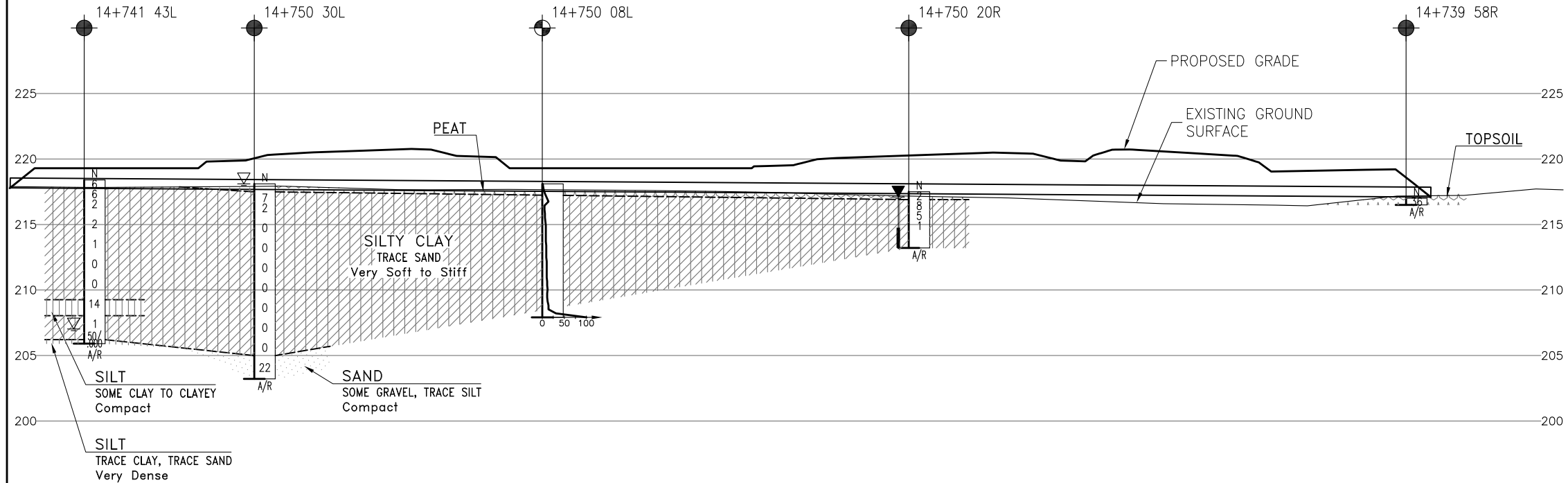


LEGEND			
	Borehole		
	Borehole and Cone / Piezo-Cone		
N	Blows /0.3m (Std Pen Test, 475J/blow)		
CONE	Blows /0.3m (60' Cone, 475J/blow)		
PH	Pressure, Hydraulic		
	Water Level		
	Head Artesian Water		
	Piezometer		
90%	Rock Quality Designation (RQD)		
A/R	Auger Refusal		

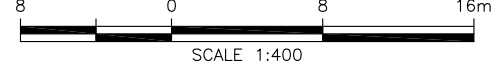
NO	ELEVATION	NORTHING	EASTING
14+400 33L	229.8	5 425 100.2	206 465.5
14+739 58R	217.0	5 425 329.8	206 732.9
14+725 20L	217.0	5 425 357.3	206 658.6
14+725 32L	217.5	5 425 363.3	206 648.3
14+750 08L	218.1	5 425 372.8	206 681.4
14+750 30L	218.1	5 425 383.7	206 662.3
14+725 34R	216.4	5 425 330.0	206 705.2
14+727 07R	216.9	5 425 345.3	206 682.9
14+750 20R	217.5	5 425 358.9	206 705.7

- 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 14



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 8

Appendix Z

Off Highway 11/17 Sta. 14+800

Highway 628

Record of Borehole Sheets

Laboratory Test Results

Borehole Locations and Soil Strata Drawings

METRIC

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 (%)		w _p	w			w _L
						○ UNCONFINED + FIELD VANE	● QUICK TRIAXIAL × LAB VANE									
214.8 0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	4									348		
214.0 0.8	Silty CLAY Stiff Brown		2	SS	4											
			3	SS	2											
	trace sand Grey		4	SS	3										2 0 58 40	
			5	SS	1											
			6	SS	1											
			7	SS	3											
	occasional silt seams		8	SS	0											

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 10+160 16R (628) 2 OF 2

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 319.3 E 206 842.0 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 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 (%)					
	Continued From Previous Page													
	Silty CLAY , occasional silt seams Stiff Grey		9	SS	2		204							
							203	6.7						
			10	SS	1		202							
201.2														
13.6	Gravelly SAND , some silt Compact Grey Wet		11	SS	19		201							35 46 19 (SI+CL)
199.8							200							
14.9	END OF BOREHOLE AT 14.9m. BOREHOLE OPEN TO 14.9m AND WATER LEVEL AT 1.6m 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 1.7 213.1													

RECORD OF BOREHOLE No 10+160 18L (628) 1 OF 1 METRIC



WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 347.2 E 206 861.5 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.02 - 2014.03.02 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						
214.5														
0.0	PEAT, trace rootlets Dark Brown Frozen		1	SS	14								275	
213.8														
0.7	Silty CLAY Firm Brown		2	SS	4									
	occasional oxide staining		3	SS	50									
212.7														
1.8	END OF BOREHOLE AT 1.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 1.8m 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

RECORD OF BOREHOLE No 10+160 CL (628) 1 OF 1 METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 332.5 E 206 851.2 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			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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RECORD OF BOREHOLE No 10+210 05L (628) 1 OF 1 METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 308.8 E 206 896.1 ORIGINATED BY GA
 HWY 11/17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MFA
 DATUM Geodetic DATE 2014.03.02 - 2014.03.02 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							
214.2						20	40	60	80	100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L		
0.0	PEAT , trace rootlets Dark Brown Frozen		1	SS	19										
213.6															
0.6	Silty CLAY , trace sand Firm Brown		2	SS	5										
212.7															
1.5	SILT , some clay, occasional oxide staining Loose Brown		3	SS	5										
212.1	Wet														
2.1	Silty CLAY Firm to Stiff Grey		4	SS	1										
			5	SS	1										
	occasional silt seams		6	SS	2										
208.4															
5.8	END OF BOREHOLE AT 5.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 5.8m AND WATER LEVEL AT 4.3m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.														

RECORD OF BOREHOLE No 10+260 05L (628) 1 OF 1

METRIC

WP# 647-89-00 LOCATION Hwy 11/17 - Red Rock to Nipigon N 5 425 277.2 E 206 935.2 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

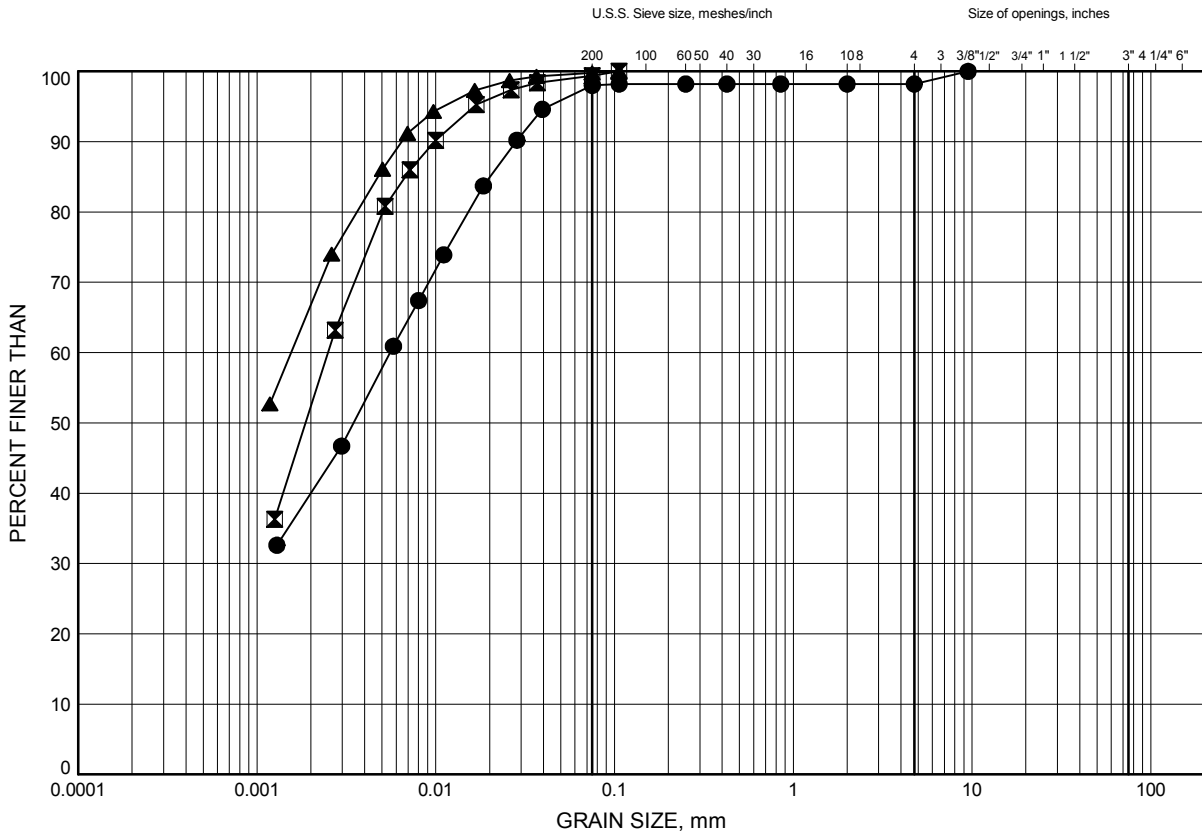
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)					
213.7								20	40	60	80	100					
0.0	PEAT , trace rootlets Dark Brown Frozen		1	SS	23											153	
213.0							213										
0.8	Silty CLAY , trace sand Firm to Stiff Brown		2	SS	6												
			3	SS	2	▽	212										
	Grey		4	SS	2		211				+						
							210										
	occasional silt seams																
208.7			5	SS	2		209										
208.0	SAND , trace gravel Grey																
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 1.8m 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 Z1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+160 16R (628)	3.35	211.43
⊠	10+160 CL (628)	1.83	212.59
▲	10+260 05L (628)	3.35	210.38

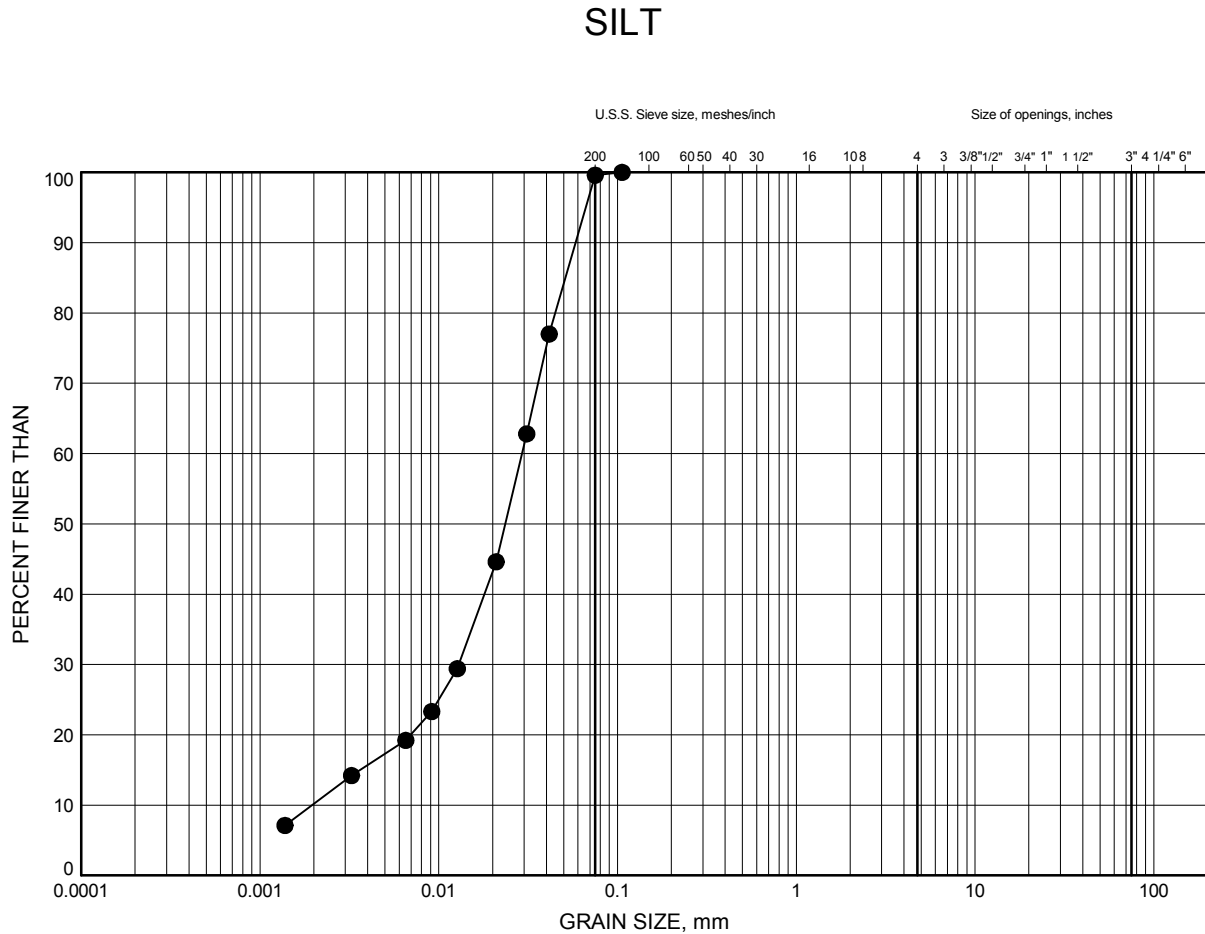
Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

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

FIGURE Z2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+210 05L (628)	1.83	212.37

Date July 2014
WP# 647-89-00

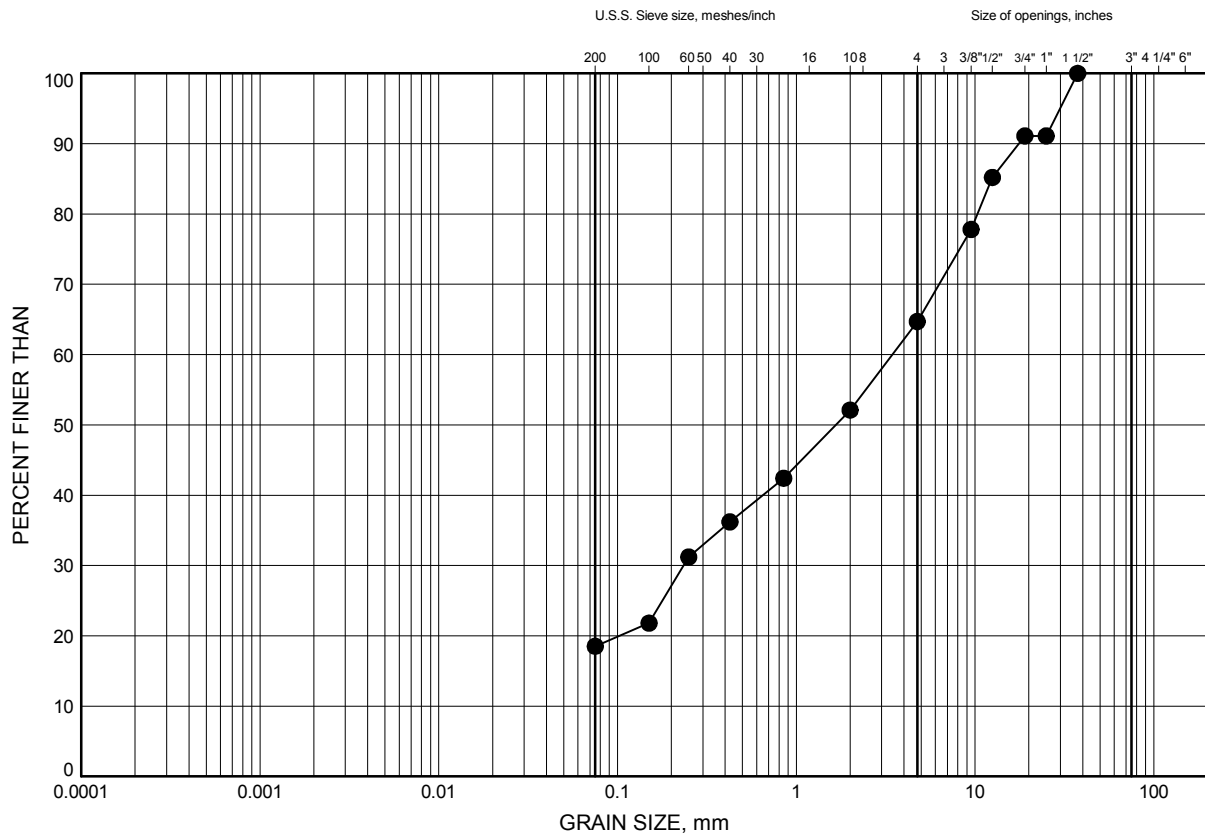


Prep'd AN
Chkd. MKE

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

FIGURE Z3

Gravelly SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+160 16R (628)	14.02	200.76

Date July 2014
 WP# 647-89-00

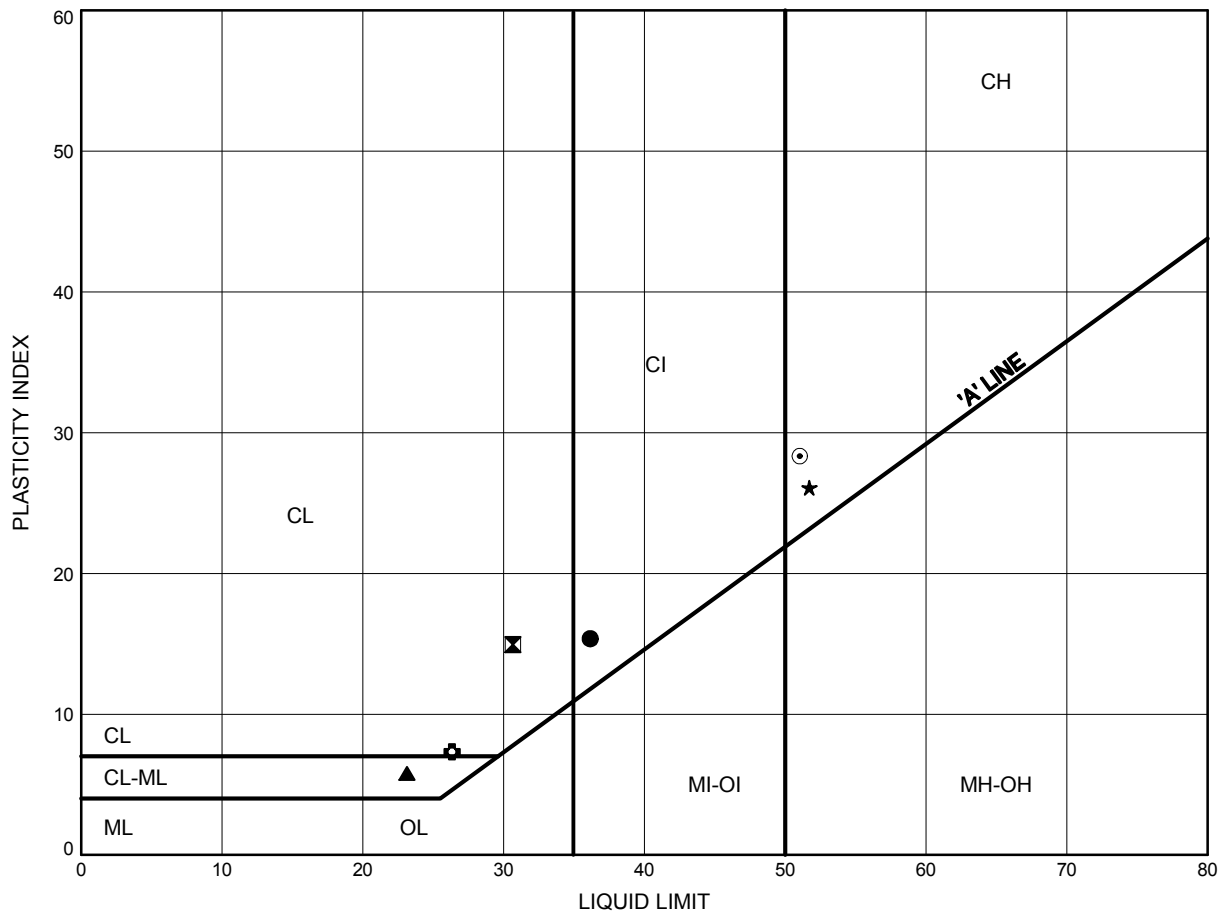


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 Chkd. MKE

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

FIGURE Z4

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+160 16R (628)	1.83	212.95
⊠	10+160 16R (628)	3.35	211.43
▲	10+160 16R (628)	9.45	205.33
★	10+160 18L (628)	1.07	213.46
⊙	10+160 CL (628)	1.83	212.59
⊕	10+210 05L (628)	1.07	213.14

Date July 2014
 WP# 647-89-00



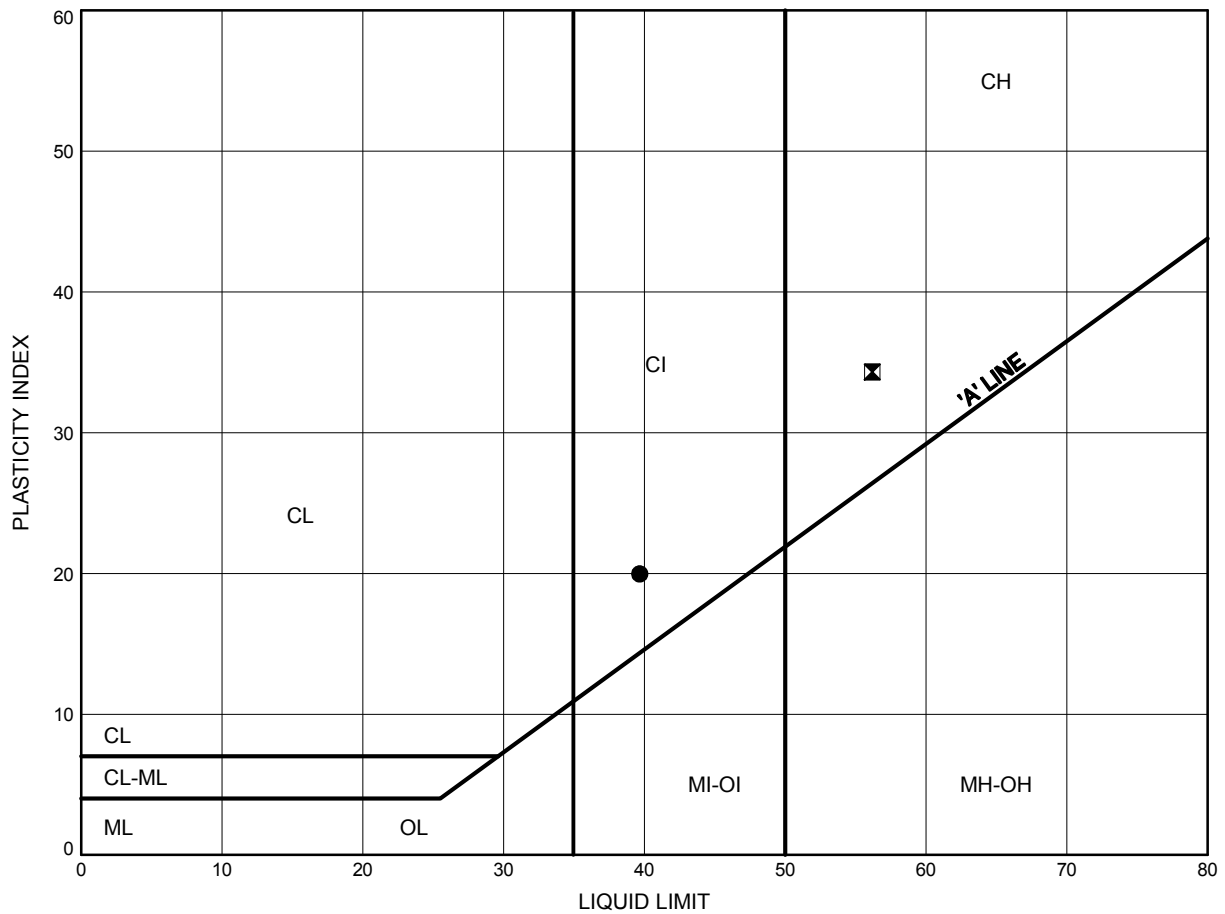
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Hwy 11/17 - Red Rock to Nipigon

ATTERBERG LIMITS TEST RESULTS

FIGURE Z5

Silty CLAY



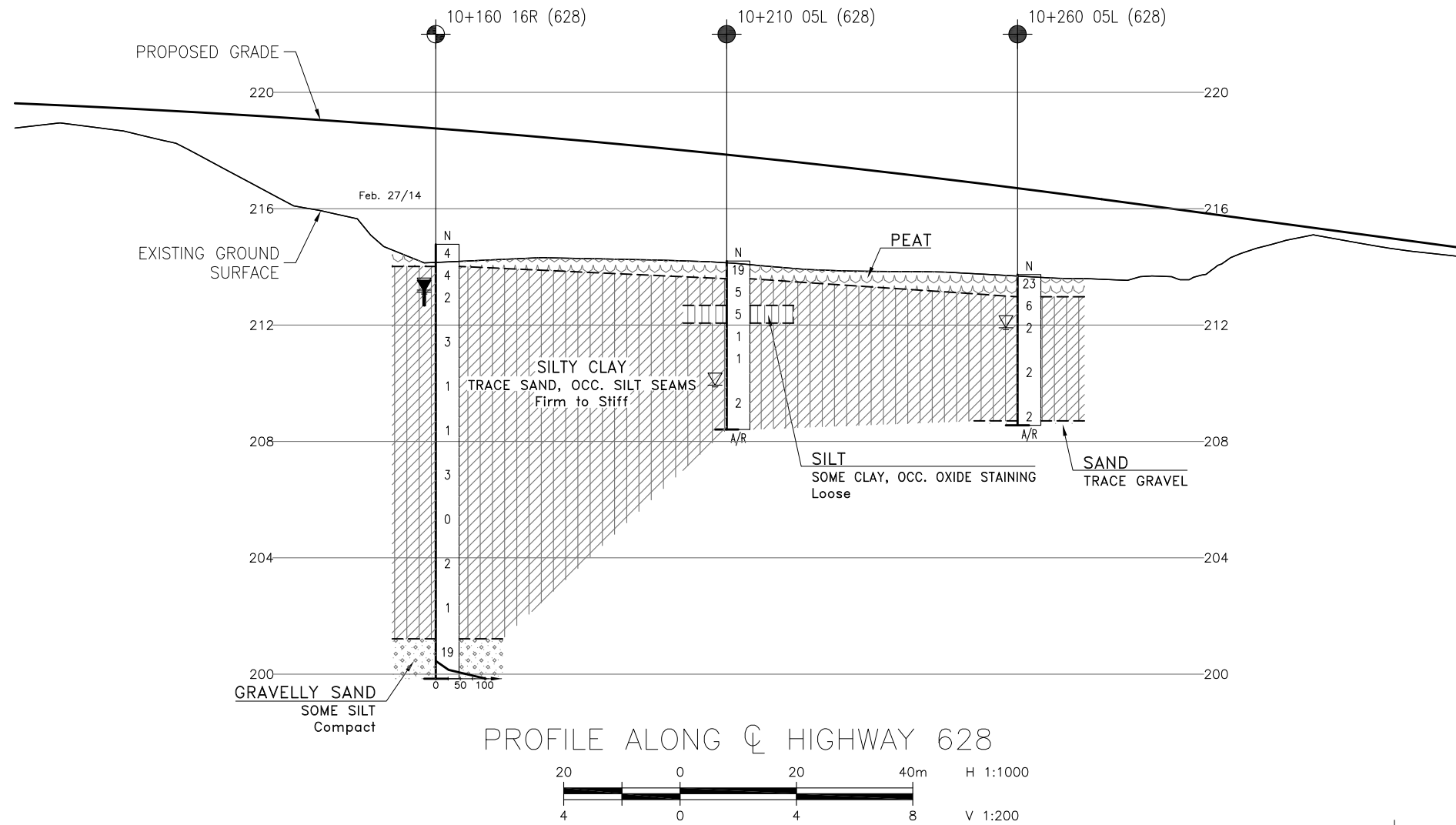
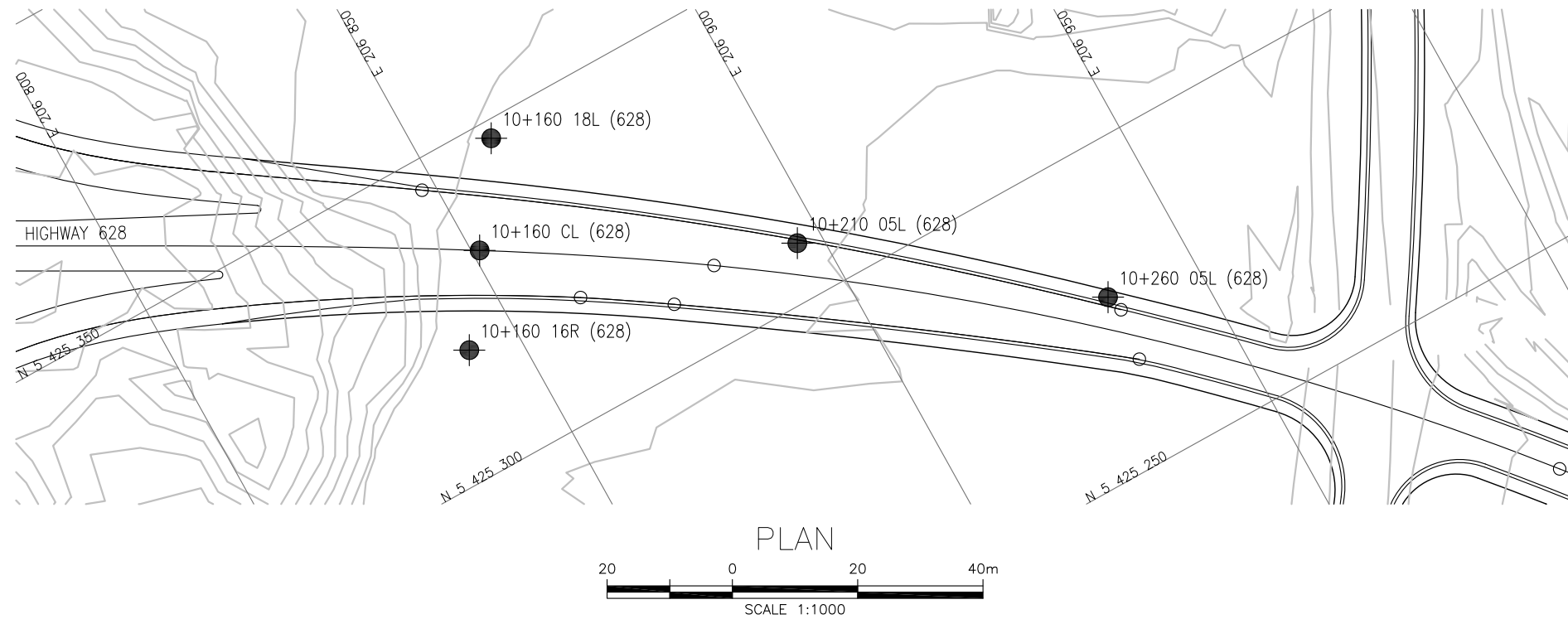
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	10+210 05L (628)	3.35	210.85
⊠	10+260 05L (628)	3.35	210.38

Date July 2014
 WP# 647-89-00



Prep'd AN
 Chkd. MKE

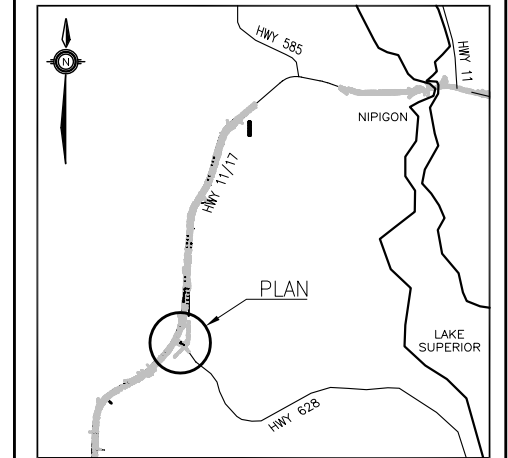


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








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

HWY 11/17 FOUR LANING HIGHWAY 628 (STA. 10+130 TO 10+300) 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]