

**FOUNDATION INVESTIGATION REPORT
SWAMP CROSSINGS AND HIGH FILL EMBANKMENTS
HIGHWAY 69 FOUR-LANING
FROM THE SOUTH JUNCTION OF HIGHWAY 529 NORTHERLY 15 KM
G.W.P. 5076-06-00
NORTH SECTION - NAISCOOT LAKE TO NORTH PROJECT LIMIT
VOLUME 2 of 4**

Geocres Number: 41H-99

Report to

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Appendix B

**Highway 69 NBL & SBL
Sta. 21+710 to 22+135 Township of Harrison**

**Boreholes 15-01 to 15-09L, 15A-01R to 15A-05R, 16-01 to 16-14L,
C104-1 to C104-3, C105-1 to C105-3
DCPTs D15-01L to D15-04R, D15A-01L to D15A-05L, D16-01R to D16-07R**

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

SYMBOLS, ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES

1. TEXTURAL CLASSIFICATION OF SOILS

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

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

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

3. TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

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

NOTE: Hierarchy of Soil Strength Prediction

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

4. TERMS DESCRIBING DENSITY (COHESIONLESS SOILS ONLY)

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

5. LEGEND FOR RECORDS OF BOREHOLES

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

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


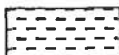



 Water Level
 C_{pen} Shear Strength Determination by Pocket Penetrometer

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

UNIFIED SOILS CLASSIFICATION

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

EXPLANATION OF ROCK LOGGING TERMS

ROCK WEATHERING CLASSIFICATION		SYMBOLS	
Fresh (FR)	No visible signs of weathering.		
Fresh Jointed (FJ)	Weathering limited to the surface of major discontinuities.		CLAYSTONE
Slightly Weathered (SW)	Penetrative weathering developed on open discontinuity surfaces, but only slight weathering of rock material.		SILTSTONE
Moderately Weathered (MW)	Weathering extends throughout the rock mass, but the rock material is not friable.		SANDSTONE
Highly Weathered (HW)	Weathering extends throughout the rock mass and the rock is partly friable.		COAL
Completely Weathered (CW)	Rock is wholly decomposed and in a friable condition, but the rock texture and structure are preserved.		Bedrock (general)

DISCONTINUITY SPACING		STRENGTH CLASSIFICATION			
Bedding	Bedding Plane Spacing	Rock Strength	Approximate Uniaxial Compressive Strength		Field Estimation of Hardness*
			(MPa)	(psi)	
Very thickly bedded	Greater than 2m	Extremely Strong	Greater than 250	Greater than 36,000	Specimen can only be chipped with a geological hammer
Thickly bedded	0.6 to 2m				
Medium bedded	0.2 to 0.6m	Very Strong	100-250	15,000 to 36,000	Requires many blows of geological hammer to break
Thinly bedded	60mm to 0.2m				
Very thinly bedded	20 to 60mm	Strong	50-100	7,500 to 15,000	Requires more than one blow of geological hammer to break
Laminated	6 to 20mm				
Thinly Laminated	Less than 6mm	Medium Strong	25.0 to 50.0	3,500 to 7,500	Breaks under single blow of geological hammer.
		Weak	5.0 to 25.0	750 to 3,500	Can be peeled by a pocket knife with difficulty
		Very Weak	1.0 to 5.0	150 to 750	Can be peeled by a pocket knife, crumbles under firm blows of geological pick.
		Extremely Weak (Rock)	0.25 to 1.0	35 to 150	Indented by thumbnail

TERMS	
Total Core Recovery: (TCR)	Core recovered as a percentage of total core run length.
Solid Core Recovery: (SCR)	Percent Ratio of solid core of full cylindrical shape recovered. Expressed with respect to the total length of core run.
Rock Quality Designation: (RQD)	Total length of sound core recovered in pieces 0.1m in length or larger as a percentage of total core run length.
Uniaxial Compressive Strength (UCS)	Axial stress required to break the specimen
Fracture Index: (FI)	Frequency of natural fractures per 0.3m of core run.

RECORD OF BOREHOLE No BH15-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+751 C/L, SBL ORIGINATED BY JM
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009.02.07 - 2009.02.07 CHECKED BY RPR

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
186.6	Ground Surface							20 40 60 80 100		20 40 60			GR SA SI CL	
0.0	ORGANICS: (200mm)							20 40 60 80 100		20 40 60				
0.2	Silty CLAY , trace sand Soft to Stiff Grey to Brown		1	SS	2	▽	186							
			2	SS	9									
			3	SS	9									
			4	SS	3		185						0 6 36 58	
			5	TW	PH		184						0 5 26 69	
182.2							183							
4.4	END OF BOREHOLE (SAMPLER BOUNCING) AT 4.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 2.8m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS UPON COMPLETION.													

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

RECORD OF BOREHOLE No BH15-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+763.5 O/S 11 5R, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009 02 07 - 2009 02 07 CHECKED BY RPR

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		
186.2	Ground Surface												
0.0	ORGANICS, trace peat: (150mm)												
0.2	Silly CLAY, trace sand Very Soft to Stiff Brown		1	SS	2		186						
			2	SS	10		185						0 7 53 40
			3	SS	5		184						
	Grey		4	SS	3		183						0 2 32 66
			5	TW	PH		182						
			6	SS	0		181						
	Occasional cobbles		7	TW	PH		180						
180.0	END OF BOREHOLE AT 6.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.		8	SS	50/		180						
6.2	WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Apr 21/09 Ground Surface Jun 04/09 Ground Surface Aug 17/09 0.1 186.1 Aug 25/09 0.1 186.1 Oct 27/09 0.1 186.1 Nov 20/09 0.3 185.9				.150								

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH15-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+776 C/L, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.07 - 2009.02.07 CHECKED BY RPR

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				
186.4	Ground Surface							20 40 60 80 100				
0.0	ORGANICS: (100mm)							20 40 60 80 100				
0.1	Silly CLAY , trace to some sand Soft to Firm Brown		1	SS	5		186					
			2	SS	7		185					
			3	SS	8							
	Grey		4	SS	3		184					
	Very Soft		5	SS	1		183					
182.0												
4.4	END OF BOREHOLE (SAMPLER BOUNCING) AT 4.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS UPON COMPLETION.											

METRIC

[illegible]

RECORD OF BOREHOLE No BH15-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+801 C/L, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.07 - 2009.02.07 CHECKED BY RPR

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							WATER CONTENT (%)	
								20 40 60 80 100	20 40 60							
186.9	Ground Surface															
0.0	ORGANICS, peaty Firm Dark Brown Moist (800mm)		1	SS	6											
186.1																
0.8	Silty CLAY, sandy Stiff Brown to Grey		2	SS	13		186									
185.0			3	SS	56/ 250									0 26 47 27		
1.9	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION. DCPT CONDUCTED 0.3m EAST OF BOREHOLE LOCATION. REFUSAL TO DCPT AT 1.9m.															

RECORD OF BOREHOLE No BH15-06R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+806 O/S 11.8R, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.07 - 2009.02.07 CHECKED BY RPR

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		
185.4	Ground Surface																	
0.0	ORGANICS: (100mm)																	
0.1	Sandy SILT, trace gravel, trace clay Loose to Compact Brown Moist		1	SS	4													
			2	SS	14										0 30 55 15			
183.9																		
1.5	Silty CLAY, trace sand Soft to Firm Brown to Grey		3	SS	4													
			4	SS	3										0 4 37 59			
182.3																		
3.1	END OF BOREHOLE (SAMPLER BOUNCING) AT 3.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 2.6m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																	

+ 3, X 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH15-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+811 C/L, SBL ORIGINATED BY JM
HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY LG
DATUM Geodetic DATE 2009.02.07 - 2009.02.07 CHECKED BY RPR

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 (%)				
187.0	Ground Surface													
0.0 0.1	ORGANICS , occasional peat: (100mm) BEDROCK AT 0.1m.													

RECORD OF BOREHOLE No BH15-08

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+725 C/L, SBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
DATUM Geodetic DATE 2010.11.12 - 2010.11.12 CHECKED BY MRA

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		
188.2	Ground Surface													
0.0	ORGANICS: (125mm)													
0.1	SAND, some silt		1	SS	24		188							
187.5	Compact													
	Brown		2	SS	18/									
0.7	Moist				.050									
	END OF BOREHOLE (SAMPLER BOUNCING) AT 0.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.													

RECORD OF BOREHOLE No BH15-09L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+737.5 O/S 12.0L, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.12 - 2010.11.12 CHECKED BY MRA

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		
188.3	Ground Surface													
0.0	ORGANICS: (125mm)													
0.1	Silly CLAY, trace rootlets Firm Brown		1	SS	4		188							
187.5														
0.8	SAND, some silt		2	SS	25/ 0.275									
187.3	Very Dense Brown													
1.0	Wet													
	END OF BOREHOLE AT 1.0m UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND WATER LEVEL AT 0.6m ON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO SURFACE.													

METRIC

[illegible]

RECORD OF BOREHOLE No BH15A-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+750 O/S 16 0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.12 - 2010.11.12 CHECKED BY MRA



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 (%)				
186.6	Ground Surface							20 40 60 80 100		w _P w w _L				
0.0 0.1	ORGANICS , fibrous: (75mm)		1	SS	4		186	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE		20 40 60				
	Silty CLAY , some sand, trace roots and rootlets Firm to Stiff Brown		2	SS	8					20 40 60				0 13 45 42
185.4														
1.2 185.2	SAND , some silt Dense Brown Moist		3	SS	21		185			20 40 60				
1.4	Silty CLAY , some sand Very Stiff Brown		4	SS	15					20 40 60				
184.1			5	SS	18/					20 40 60				
2.5	END OF BOREHOLE AT 2.5m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN AND WATER LEVEL AT 0.1m. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.				0.050									

RECORD OF BOREHOLE No BH15A-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+760 O/S 16.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.13 - 2010.11.13 CHECKED BY MRA

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								
185.8	Ground Surface							20	40	60	80	100				
0.0	ORGANICS, fibrous: (150mm)							20	40	60	80	100				
0.2	Silty CLAY, some sand Firm to Very Stiff Brown to Grey		1	SS	7		185									
			2	SS	6											
	with thin sand seams		3	SS	26											
			4	SS	21				184							
			5	SS	21											
182.8							183									
3.0	END OF BOREHOLE AT 3.0m. BOREHOLE OPEN TO 2.3m AND WATER LEVEL AT 0.5m. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.															

RECORD OF BOREHOLE No BH15A-04L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+800 O/S 16.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.12 - 2010.11.12 CHECKED BY MRA

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 x LAB VANE								WATER CONTENT (%)	
185.3	Ground Surface							20	40	60	80	100					
0.0 185.0	PEAT, fibrous: (250mm)																
0.3	Silty CLAY , some sand Soft to Very Stiff Brown to Grey with thin sand seams		1	SS	1		185									0 11 40 49	
			2	SS	12												
			3	SS	18												
			4	SS	12												
			5	SS	2												
182.0																	
3.3	END OF BOREHOLE AT 3.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND WATER LEVEL AT SURFACE UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.																

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

RECORD OF BOREHOLE No BH15A-05R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+810 O/S 16.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.13 - 2010.11.13 CHECKED BY MRA

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 (%)					
186.2	Ground Surface													GR SA SI CL	
0.0	ORGANICS , fibrous, with wet sand Black (150mm)		1	SS	2										
0.2	SAND , trace roots and rootlets, rock fragments Loose to Very Loose Dark Brown Moist to Wet (FILL)		2	SS	4										
184.8															
1.4	SAND , some silt, trace gravel, some organics Compact Dark Brown Wet		3	SS	11										
			4	SS	10									3 82 11 4	
183.8							184								
2.4	END OF BOREHOLE AT 2.4m UPON REFUSAL ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN AND WATER LEVEL AT 0.7m BELOW SURFACE UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.														

RECORD OF BOREHOLE No D15-01L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+763.5 O/S 11.5L, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY LG
 DATUM Geodetic DATE 2009.02.07 - 2009.02.07 CHECKED BY RPR

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					WATER CONTENT (%)							
187.8	Ground Surface																	
0.0																		
187.2																		
0.6	BEDROCK AT 0.6m.																	

RECORD OF BOREHOLE No D15-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+788.5 O/S 11.4R, SBL ORIGINATED BY JM
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY LG
DATUM Geodetic DATE 2009.02.07 - 2009.02.07 CHECKED BY RPR

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 (%)				
185.7	Pond Surface							20 40 60 80 100	○ UNCONFINED + FIELD VANE	20 40 60				
0.0	WATER AND ICE AT SURFACE DCPT started at 0.3m							20 40 60 80 100	● QUICK TRIAXIAL × LAB VANE					

METRIC

[illegible]

RECORD OF BOREHOLE No D15-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+737.5 O/S 12.0R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.11.12 - 2010.11.12 CHECKED BY MRA

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE LIQUID 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 w _L						
186.7	Ground Surface														
0.0	DCPT from surface.														


+³, X³: Numbers refer to Sensitivity 20 15 10 (% STRAIN AT FAILURE

RECORD OF BOREHOLE No D15A-01L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+725 O/S 16.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.11.12 - 2010.11.12 CHECKED BY MRA

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 (%)						
187.5	Ground Surface							20 40 60 80 100		w _P w w _L					
0.0	DCPT from surface							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							
								20 40 60 80 100		20 40 60					
															
187															
186															
185.1															
2.4	END OF DCPT AT 2.4m UPON REFUSAL ON PROBABLE BEDROCK														

RECORD OF BOREHOLE No D15A-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+735 O/S 16.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.11.13 - 2010.11.13 CHECKED BY MRA

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										
186.3	Ground Surface								20 40 60 80 100							
0.0	DCPT from surface								20 40 60 80 100							
				</												

RECORD OF BOREHOLE No D15A-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+775 O/S 16.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.11.12 - 2010.11.12 CHECKED BY MRA

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 (%)			
186.2	Ground Surface							20 40 60 80 100		w _P w w _L			
0.0	DCPT from surface							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE					
184.7	END OF DCPT AT 1.5m UPON REFUSAL ON PROBABLE BEDROCK							20 40 60 80 100		20 40 60			
1.5													

RECORD OF BOREHOLE No D15A-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+785 O/S 16.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.11.13 - 2010.11.13 CHECKED BY MRA

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			WATER CONTENT (%)									
186.2	Ground Surface								20	40	60	80	100	20	40	60	kN/m ³	GR SA SI CL
0.0	DCPT from surface.																	
184.8																		
1.4	END OF DCPT AT 1.4m UPON REFUSAL ON PROBABLE BEDROCK.																	

+ 3, X 3 : Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D15A-05L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+825 O/S 16.0L, NBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2010.11.12 - 2010.11.12 CHECKED BY MRA

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											
185.2	Ground Surface																
0.0	DCPT from surface																

+ 3 x 3: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH16-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+826 C/L, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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 (%)			
186.2	Ground Surface							20 40 60 80 100		W _P W W _L			
0.0	ORGANICS, trace peat: (125mm)							20 40 60 80 100					
0.1	Silty CLAY, some sand Soft to Stiff Brown		1	SS	2	186							
			2	SS	13								
185.0													
1.2	END OF BOREHOLE AT 1.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.												

ONTMT4S 6121 GPJ 12/11/12

RECORD OF BOREHOLE No BH16-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+851 O/S 13.3L, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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 (%)				
187.2	Ground Surface													
0.0	ORGANICS, trace peat: (125mm)													
0.1	SAND and SILT, trace gravel, trace clay		1	SS	10		187							
186.6	Compact Brown Moist													
0.6	SAND, trace gravel, some silt, some clay		2	SS	21									1 78 21 (SI+CL)
	Compact Brown Moist						186							
185.3			3	SS	9									
1.9	Silty CLAY, trace sand													
	Firm to Stiff Brown						185							0 6 47 47
184.4			4	SS	14									
2.8	END OF BOREHOLE (SAMPLER BOUNCING) AT 2.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.													

RECORD OF BOREHOLE No BH16-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+876 C/L, SBL ORIGINATED BY JM
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009 02 08 - 2009 02 08 CHECKED BY RPR

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		
184.9	Ground Surface													
0.0 0.1	ORGANICS: (75mm)													
	SAND and SILT, some clay Loose Grey Moist		1	SS	2									
183.7			2	SS	5		184							0 50 30 20
1.2	Silty CLAY, some sand Soft to Firm Brown to Grey													
			3	SS	8		183							0 20 49 31
182.6														
2.3	END OF BOREHOLE AT 2.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 1.2m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.													

METRIC

[illegible]

+³, ×³: Numbers refer to Sensitivity

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
								SHEAR STRENGTH kPa	○ UNCONFINED + FIELD VANE			WATER CONTENT (%)
186.7	Ground Surface							● QUICK TRIAXIAL × LAB VANE	20 40 60		GR SA SI C	

ONTMT4S 6121.GPJ 12/11/12

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No BH16-06L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+951 O/S 12.3L, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE			WATER CONTENT (%) w _p w w _L					
184.5	Ground Surface															
0.0	PEAT, fibrous Very Soft Dark Brown Wet (800mm)		1	SS	3		184								0 20 59 21	
183.7																
0.8	Silty CLAY, some sand Soft to Stiff Dark Brown		2	SS	4		183									
			3	SS	9											
182.2																
2.3	SAND and SILT, some clay Very Loose Grey Moist to Wet		4	SS	3	182								0 45 40 15		
			5	SS	1		181									
180.8																
3.7	Gravelly SAND, some silt, trace clay Grey Very Loose to Loose Wet		6	SS	2		180							16 69 15 (SI+CL)		
			7	SS	7		179									
178.6																
5.9	END OF BOREHOLE AT 5.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 1.4m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS UPON COMPLETION.															

METRIC

[illegible]

RECORD OF BOREHOLE No BH16-08R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+001 O/S 18.4R, NBL ORIGINATED BY JM
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009 02 07 - 2009 02 07 CHECKED BY RPR

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		
189.0	Ground Surface													
0.0	ORGANICS, trace sand: (150mm)						189							
0.2	SAND and SILT, some clay Loose to Compact Brown Moist		1	SS	4									
			2	SS	15		188							0 36 45 19
187.5														
1.5	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.													

+³ ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH16-09

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harison Twp., Station 22+026 C/L, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009 02 08 - 2009 02 08 CHECKED BY RPR





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								
183.7	Ground Surface							20	40	60	80	100				
0.0	ORGANICS, trace to some clay: (150mm)		1	SS	8	▽	183									
0.2	SAND, some clay, some silt, trace gravel Loose to Compact Brown Moist		2	SS	11											
			3	SS	6											
181.3	Silty CLAY, trace sand Very Soft Grey		4	SS	2	181										
2.4			5	SS	50/											
180.4	END OF BOREHOLE (SAMPLER BOUNCING) AT 3.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL IS 1.2m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.				.050											
3.3																

RECORD OF BOREHOLE No BH16-10L

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+051 O/S 20.3L, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.09 - 2009.02.09 CHECKED BY RPR

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 (%)	
								○ UNCONFINED + FIELD VANE								
						● QUICK TRIAXIAL × LAB VANE										
182.5	Ground Surface					▽		20 40 60 80 100		20 40 60				GR SA SI CL		
0.0	PEAT, fibrous Very Soft Dark Brown Wet (800mm)		1	SS	1		182									
181.7																
0.8	Silty CLAY, some sand Very Soft to Soft Brown		2	SS	2								○			
							181									
			3	SS	3								○		0 11 55 34	
	Sandy, trace gravel Grey		4	SS	3		180						○			
			5	SS	1		179						○			
			6	SS	0								○		1 24 48 27	
							178									
			7	SS	0										0 18 55 27	
	Trace sand		8	TW	PH	177						○		0 1 33 66		
			9	AS		176										
			10	TW	PH											
			11	AS		175						○				
			12	TW	PH											
			13	AS		174						○				
			14	SS	0								○			
			15	SS	1	173						○				
172.8																
9.7	END OF BOREHOLE AT 9.7m UPON AUGER REFUSAL ON PROBABLE															

Continued Next Page

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

RECORD OF BOREHOLE No BH16-10L

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+051 O/S 20.3L, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.09 - 2009.02.09 CHECKED BY RPR

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 (%) 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	20 40 60				
							○ UNCONFINED + FIELD VANE						
							● QUICK TRIAXIAL X LAB VANE						
	Continued From Previous Page												
	BEDROCK. WATER LEVEL AT 0.6m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS UPON COMPLETION.												

RECORD OF BOREHOLE No BH16-11

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+076 C/L, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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 (%)				
183.6	Ground Surface							○ UNCONFINED + FIELD VANE						
0.0	ORGANICS, trace sand, trace to some clay (150mm)		1	SS	11			● QUICK TRIAXIAL × LAB VANE						
0.2	SAND and SILT Compact Dark Brown Moist													
182.8			2	SS	3									
0.8	Silty CLAY, some sand Soft Brown		3	SS	2									
181.3														
2.3	Silty SAND, some clay Loose to Very Loose Grey Wet		4	SS	8									
			5	SS	1									
179.8														
3.8	Silty CLAY, trace sand Very Soft Grey		6	SS	0									
			7	SS	0									
			1	TW										
			2	TW										
176.9														
6.7	SAND and SILT, some clay, trace gravel Grey Moist to Wet		1	AS										
176.2														
7.4	END OF BOREHOLE AT 7.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Apr 21/09 Ground Surface Jun 04/09 Ground Surface Aug 17/09 0.1 183.5 Aug 25/09 0.2 183.4 Oct 27/09 0.2 183.4 Nov 20/09 0.5 183.1													

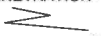

+ 3, × 3: Numbers refer to
Sensitivity

20
15
10
5
0
(%) STRAIN AT FAILURE

1 OF 1

METRIC

DATUM	Geodetic	DATE	2009.02.04 - 2009.02.04	CHECKED BY	RPR
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SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL LIMIT MOISTURE LIQUID CONTENT LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES								
193.9	Ground Surface						SHEAR STRENGTH kPa		WATER CONTENT (%)			kN/m ³	GR SA SI CL		
0.0	BEDROCK AT SURFACE						20	40	60	80	100	20	40	60	
													</		

+ 3, x 3: Numbers refer to Sensitivity

METRIC

[illegible]

METRIC

[illegible]

RECORD OF BOREHOLE No D16-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+851 O/S 13.3R, SBL ORIGINATED BY JM
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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			20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	
185.1 0.0	Pond Surface ICE AND WATER TO 0.3m DCPT started at 0.3m.						185	SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE				
							184					
							183					
							182					
							181					
							180					
							179					
178.6 6.5	END OF DCPT AT 6.5m UPON REFUSAL ON PROBABLE BEDROCK.											

METRIC

SOIL PROFILE					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES	GROUND WATER CONDITIONS	ELEVATION SCALE
185.6	Ground Surface		NUMBER	TYPE	"N" VALUES
0.0	BEDROCK AT 0.2m.				
0.2					
<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div>SHEAR STRENGTH kPa</div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div> <div>WATER CONTENT (%)</div> <div>PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT</div> <div>UNIT WEIGHT γ</div> <div>kN/m³</div> <div>GR SA SI CL</div>					

RECORD OF BOREHOLE No D16-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 21+951 O/S 12.3R, SBL ORIGINATED BY JM
HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY LG
DATUM Geodetic DATE 2009.02.04 - 2009.02.04 CHECKED BY RPR

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		
191.9	Ground Surface						20 40 60 80 100	○ UNCONFINED + FIELD VANE					
0.0	BEDROCK AT SURFACE.						20 40 60 80 100	● QUICK TRIAXIAL X LAB VANE					

RECORD OF BOREHOLE No D16-04L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+001 O/S 18.4L, SBL ORIGINATED BY JM
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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 (%)	W _p	W		
182.9 0.0	Ground Surface DCPT from surface.						20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	20 40 60					
176.3 6.6	END OF DCPT AT 6.6m UPON REFUSAL ON PROBABLE BEDROCK.												

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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa			WATER CONTENT (%)				
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	w _p	w		
191.3 0.0	Ground Surface DCPT started from 0.3m.														
							191								
							190								
							189								
							188								
							187								
185.5 5.8	END OF DCPT AT 5.8m UPON REFUSAL ON PROBABLE BEDROCK.						186								

METRIC

[illegible]

+ 3, X 3: Numbers refer to Sensitivity

RECORD OF BOREHOLE No D16-07R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+136 O/S 13.1R, SBL ORIGINATED BY JM
HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY LG
DATUM Geodetic DATE 2009.02.04 - 2009.02.04 CHECKED BY RPR

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 (%)	W _P	W		
195.8	Ground Surface						20 40 60 80 100	20 40 60					
0.0	BEDROCK AT SURFACE												

RECORD OF BOREHOLE No C104-1

1 OF 1

METRIC

WP# 5134-12-07 LOCATION N 5 057 553.7 E 234 075.8 ORIGINATED BY ES
 HWY 69 BOREHOLE TYPE Wash Boring COMPILED BY AN
 DATUM Geodetic DATE 2011.03.10 - 2011.03.10 CHECKED BY RPR

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	20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	
185.2	Ground Surface												
185.0	ICE: (25mm)		1	SS	1		185						
	PEAT, some sand Very Soft Dark Brown Wet												
184.1			2	SS	5		184						
1.1	Silty CLAY, trace sand to sandy Firm to Stiff Grey												
			3	SS	8								
							183						
			1	TW									
182.2													
3.0	SAND, some gravel Loose Grey Wet		4	SS	10		182						
181.3			5	SS	100/								
3.9	END OF BOREHOLE AT 3.9m UPON REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 0.3m UPON COMPLETION.				0.100								

RECORD OF BOREHOLE No C104-2

1 OF 1

METRIC

WP# 5134-12-07 LOCATION N 5 057 566.9 E 234 096.5 ORIGINATED BY ES/GM
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2012.06.14 - 2012.06.14 CHECKED BY LRB

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		
189.8	Ground Surface													
0.0	ASPHALT: (50mm)													
	SAND and GRAVEL, some silt, occasional cobbles Dense to Loose Brown Dry to Moist (FILL)		1	GS										
			1	SS	39		189							32 56 12 (SI+CL)
			2	SS	29		188							
			3	SS	5		187							
			4	SS	7		186							
			5	SS	16		185							
184.7			6	SS	16									
5.1	SAND and GRAVEL, some cobbles Very Dense Brown Wet		7	SS	63/ 0.225									
184.1														
5.7	END OF BOREHOLE AT 5.7m UPON REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 5.1m DURING DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO SURFACE.													

+³ . x³ : 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 LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT w _p w w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40				60	80	100
185.9	Ground Surface								SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100					WATER CONTENT (%) 20 40 60	

ONTMT4S 6121(CULVERTS).GPJ 12/14/12

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No C105-1

1 OF 1

METRIC

WP# 5134-12-08 LOCATION N 5 057 624.7 E 233 956.0 ORIGINATED BY ES
HWY 69 BOREHOLE TYPE Wash Boring COMPILED BY AN
DATUM Geodetic DATE 2011.03.12 - 2011.03.12 CHECKED BY RPR

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					
185.8	Pond Surface												
0.0	ICE: (350mm)												
185.4													
0.4	WATER												
184.9													
0.9	PEAT												
184.6	Very Soft		1	SS	2								
1.2	Dark Brown												
	Wet												
	Silty CLAY, trace sand to sandy												
	Soft to Firm		2	SS	5								
	Grey												
	Layer of sand (400mm) at 1.9m												
	Occasional wood fibres		3	SS	3								
			4	SS	3								
182.1													
3.7	Gravelly SAND, trace silt												
	Dense												
	Grey												
	Wet		5	SS	45								
181.3													
4.5	END OF BOREHOLE AT 4.5m UPON REFUSAL ON PROBABLE BEDROCK												

+ 3 . X 3 : Numbers refer to
Sensitivity 20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No C105-2

1 OF 1

METRIC

WP# 5134-12-08 LOCATION N 5 057 605.5 E 234 003.2 ORIGINATED BY ES
HWY 69 BOREHOLE TYPE Wash Boring COMPILED BY AN
DATUM Geodetic DATE 2011.03.12 - 2011.03.12 CHECKED BY RPR

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 (%) w _P w w _L
185.3	Pond Surface												
0.0	ICE: (225mm)												
188.2	WATER: (150mm)												
0.4	PEAT, fibrous Very Soft Dark Brown Wet		1	SS	0		185					1576	
183.8			2	SS	1		184						
1.5	Silty CLAY, some sand Very Soft Grey		3	SS	1		183						0 20 65 15
182.9			4	SS	29								17 68 15 (SI+CL)
2.4	SAND, some gravel to gravelly, trace to some silt and clay Compact Grey Wet												
182.0													
3.3	END OF BOREHOLE AT 3.3m UPON REFUSAL ON PROBABLE BEDROCK.												

RECORD OF BOREHOLE No C105-3

1 OF 1

METRIC

WP# 5134-12-08 LOCATION N 5 057 589.5 E 234 042.3 ORIGINATED BY ES
HWY 69 BOREHOLE TYPE Wash Boring COMPILED BY AN
DATUM Geodetic DATE 2011.03.09 - 2011.03.09 CHECKED BY RPR

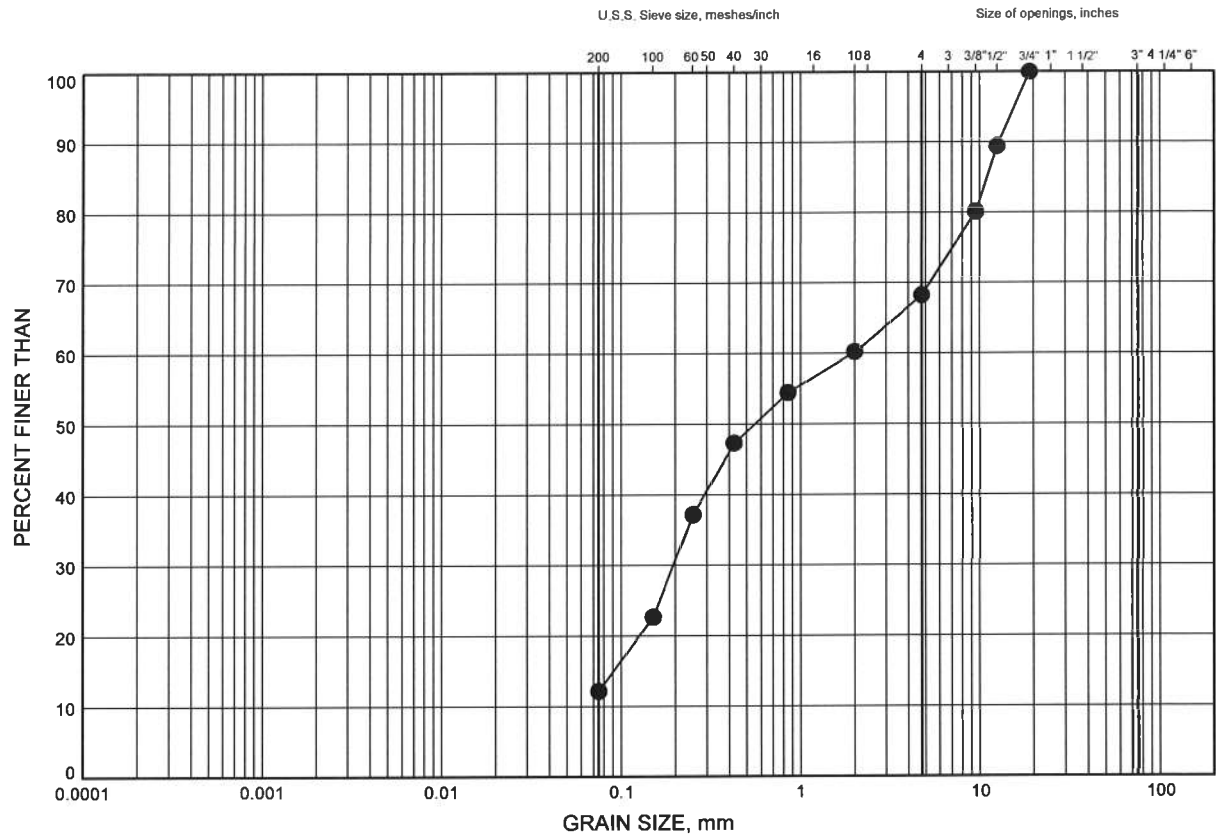
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)							
								○ UNCONFINED + FIELD VANE	w _p w w _L								
						● QUICK TRIAXIAL × LAB VANE											
185.8	Pond Surface							20	40	60	80	100	20	40	60		
0.0	ICE: (350mm)																
185.4																	
0.4	WATER																
185.2																	
185.0	PEAT: (50mm)																
0.7	Silty CLAY, trace to some sand Soft to Firm Brown/Grey		1	SS	3		185							○			
			2	SS	8		184							○			0 5 31 64
			1	TW			183										
	Very Soft		3	SS	0		182							○			0 13 55 32
181.1							181										
4.7	Gravelly SAND Grey Wet																
180.5														○			
5.3	END OF BOREHOLE AT 5.3m UPON REFUSAL ON PROBABLE BEDROCK		4	SS	100/	0.125											

+³, X³: Numbers refer to Sensitivity 20 15 10 5 0 (%) STRAIN AT FAILURE

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE B1

SAND and GRAVEL FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	C104-2	1.07	188.73

Date December 2012
GWP# 5294-08-00

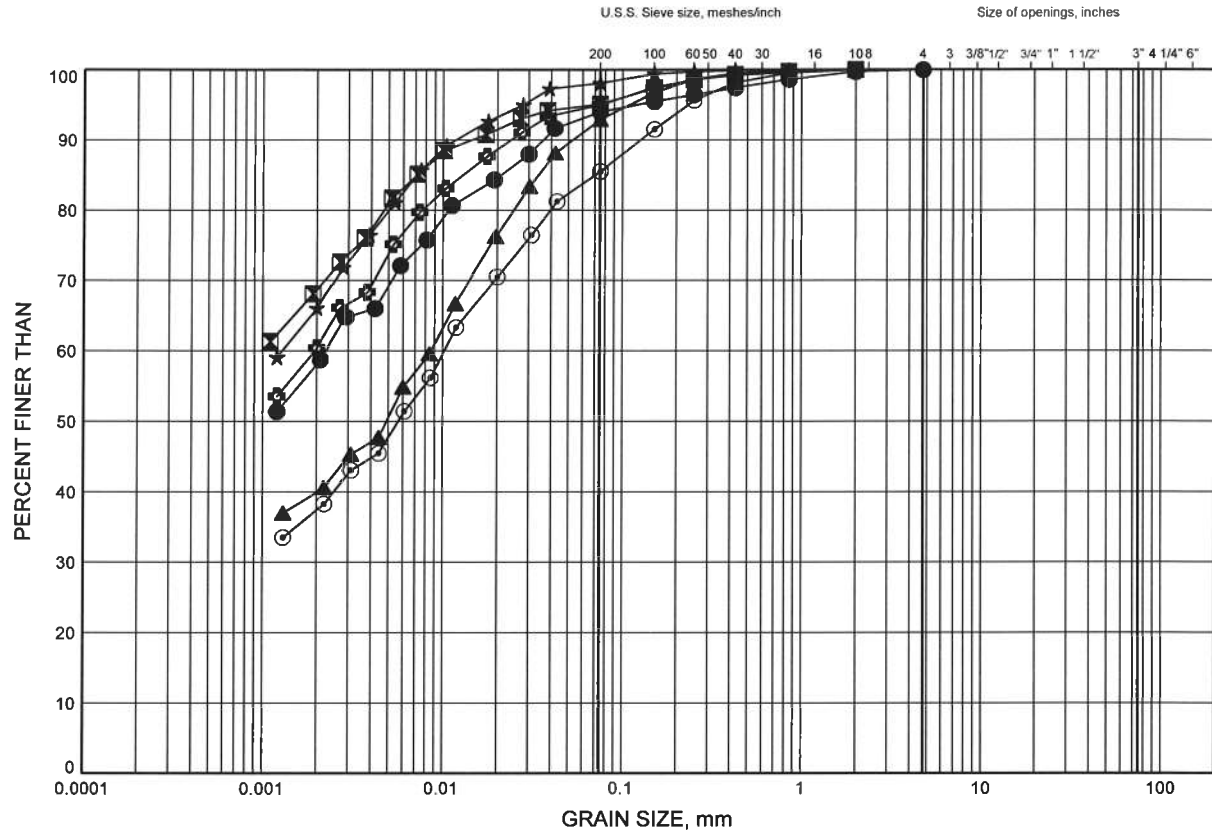


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Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE B2

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH15-01	1.83	184.77
⊠	BH15-01	2.59	184.01
▲	BH15-02R	1.07	185.13
★	BH15-02R	2.59	183.61
⊙	BH15-03	1.83	184.57
⊕	BH15-03	3.35	183.05

Date December 2012

GWP# 5294-08-00

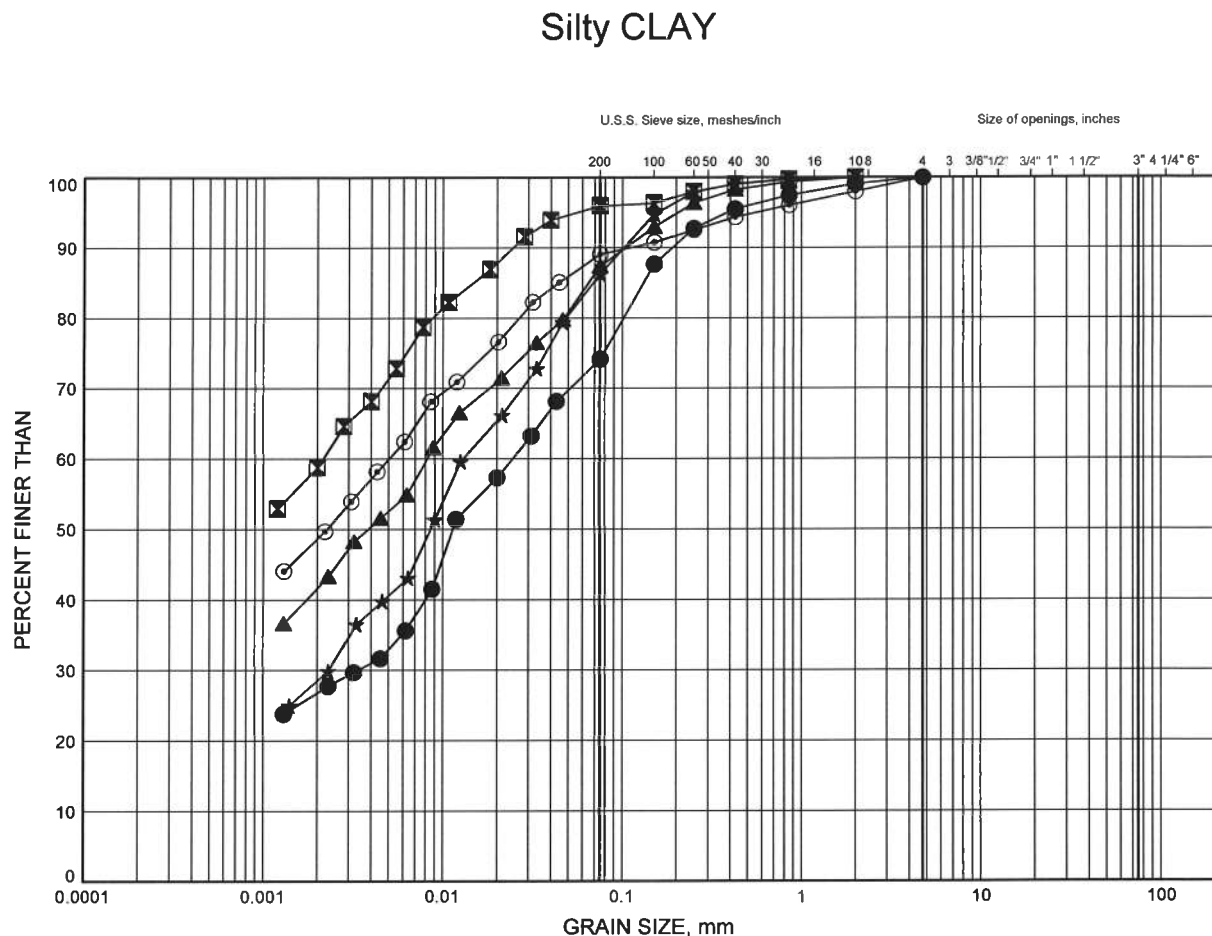


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Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE B3



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH15-05	1.73	185.17
⊠	BH15-06R	2.59	182.81
▲	BH15A-02L	0.91	185.68
★	BH15A-03R	1.52	184.28
⊙	BH15A-04L	1.52	183.78

Date December 2012

GWP# 5294-08-00

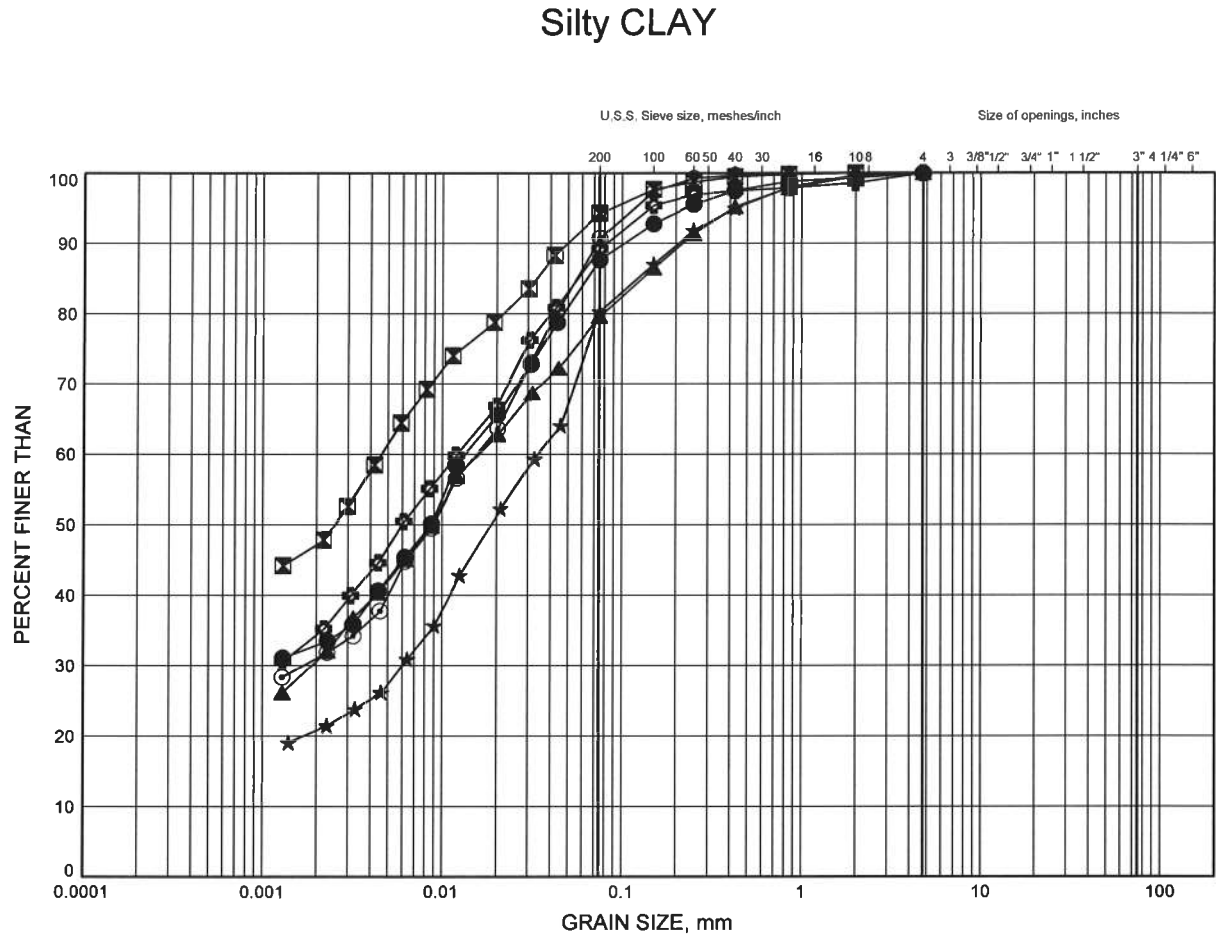


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Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE B4



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH16-01	0.91	185.29
⊠	BH16-02L	2.02	185.18
▲	BH16-03	1.83	183.07
★	BH16-06L	1.07	183.43
⊙	BH16-09	2.67	181.03
⊕	BH16-10L	1.83	180.67

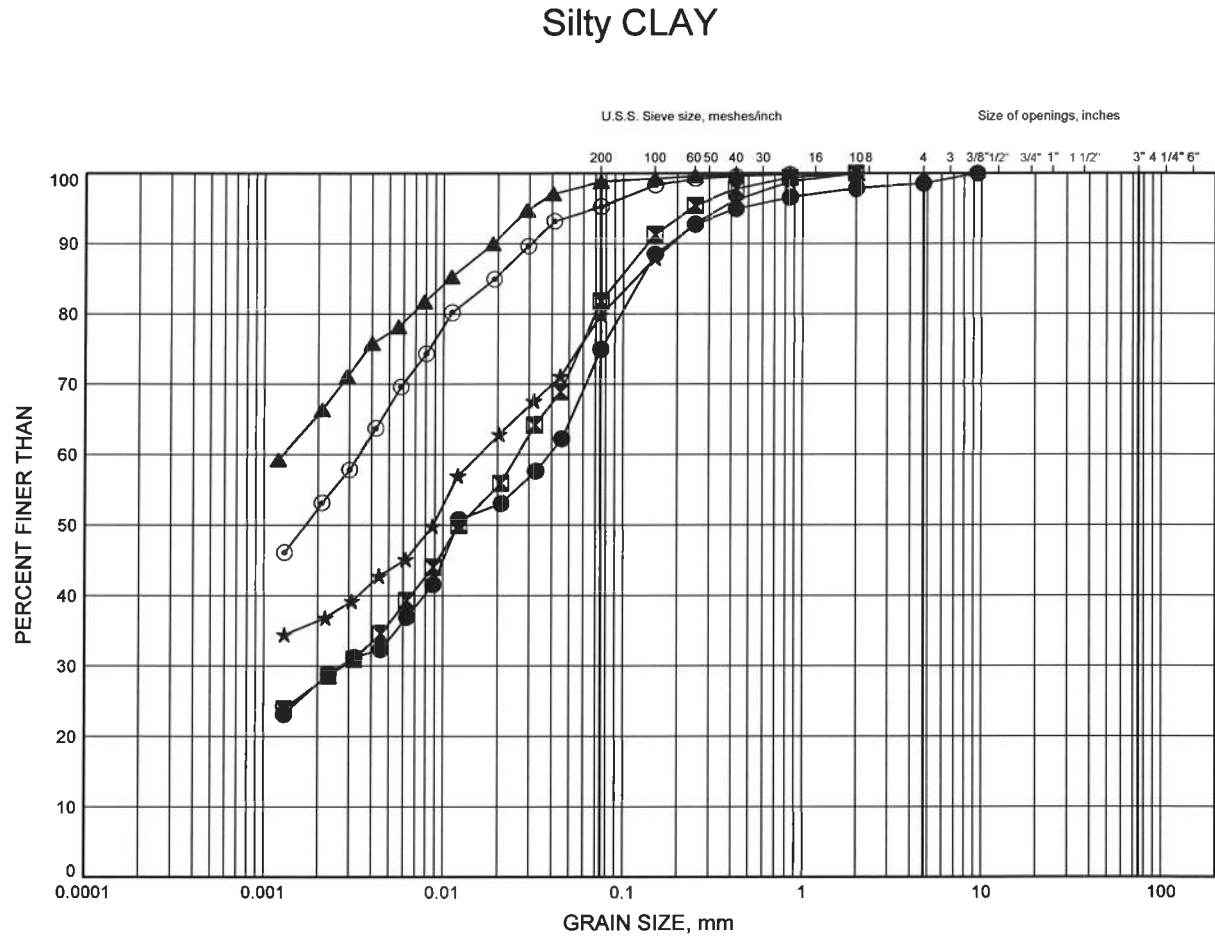
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GWP# 5294-08-00



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Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE B5



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH16-10L	4.11	178.39
⊠	BH16-10L	4.88	177.62
▲	BH16-10L	5.64	176.86
★	BH16-11	1.83	181.77
⊙	BH16-11	4.88	178.72

Date December 2012
GWP# 5294-08-00

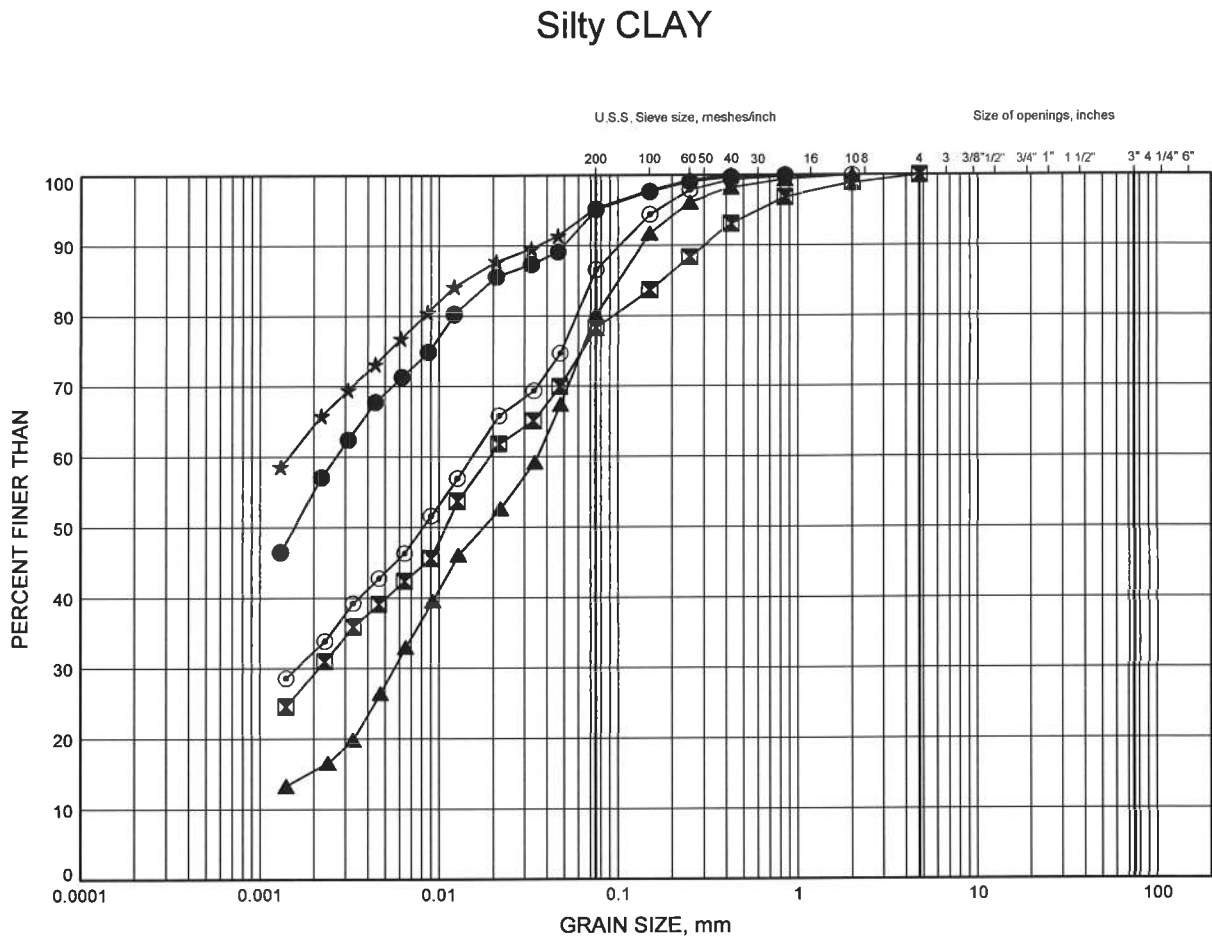


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Hwy 69 Four-Laning North of Hwy 529

GRAIN SIZE DISTRIBUTION

FIGURE B6



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	C104-1	1.98	183.22
⊠	C105-1	2.72	183.08
▲	C105-2	2.21	183.09
★	C105-3	1.70	184.10
⊙	C105-3	3.99	181.81

GRAIN SIZE DISTRIBUTION - THURBER 6121(CULVERTS).GPJ 12/14/12

Date December 2012
GWP# 5294-08-00

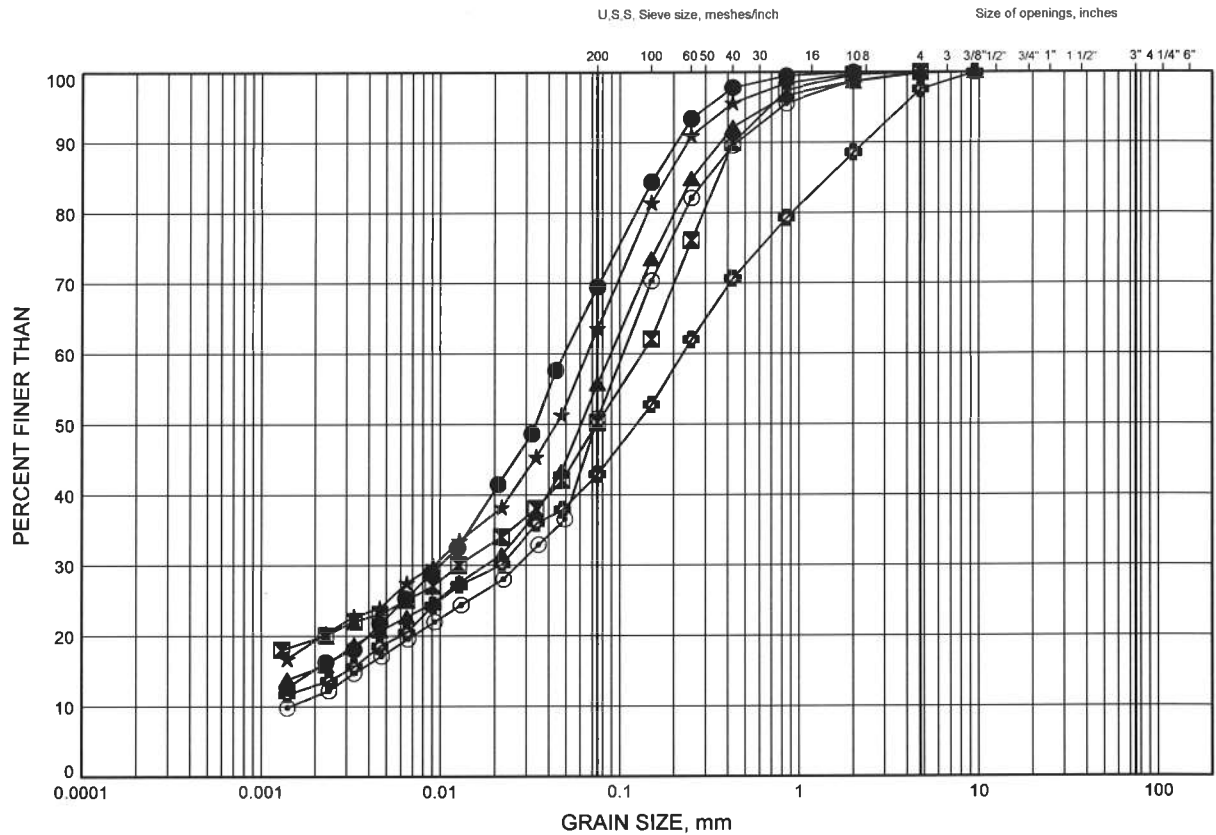


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Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE B7

Sandy 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)
●	BH15-06R	1.07	184.33
⊠	BH16-03	0.99	183.91
▲	BH16-06L	2.59	181.91
★	BH16-08R	1.07	187.93
⊙	BH16-11	3.28	180.32
⊕	BH16-11	7.24	176.36

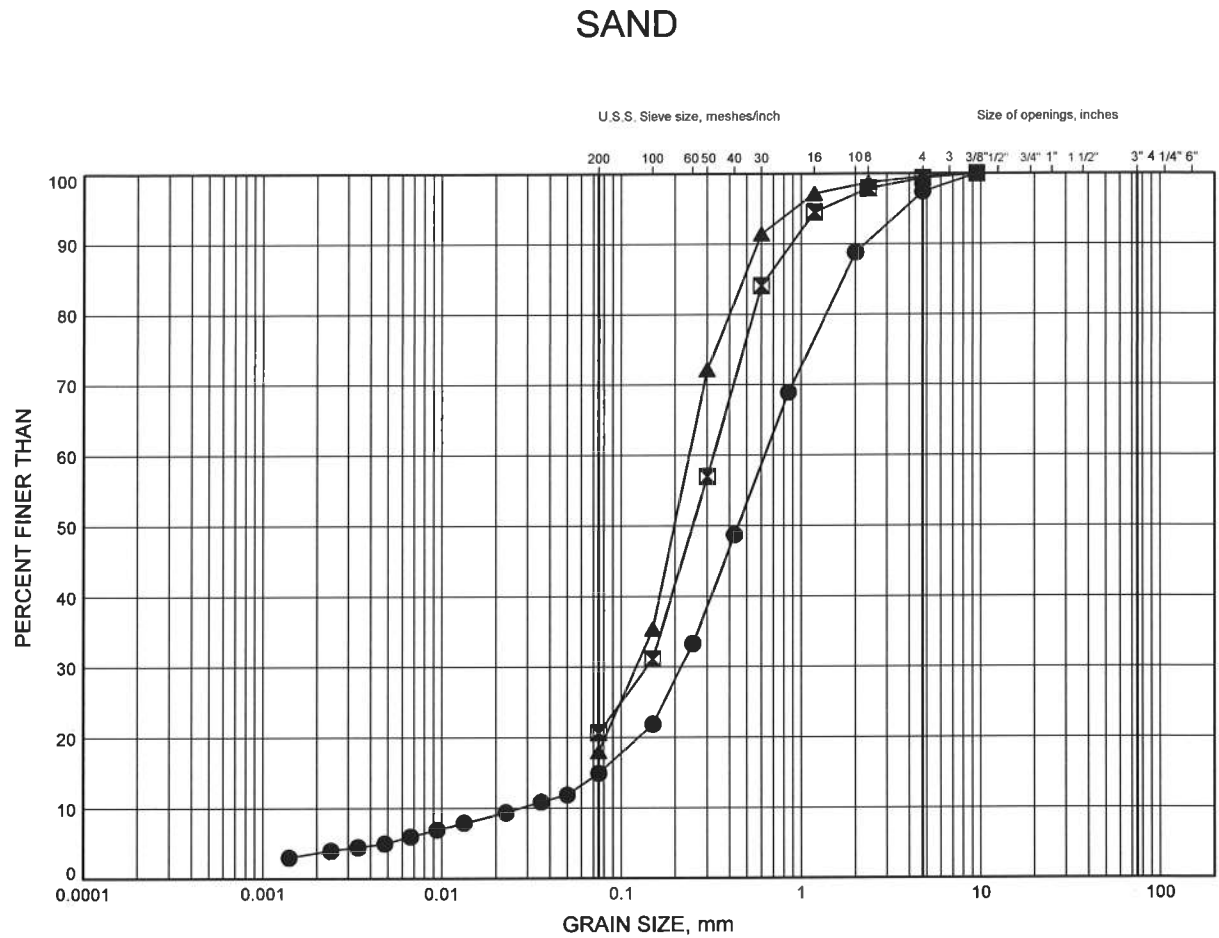
Date December 2012
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Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE B8



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH15A-05R	2.12	184.08
⊠	BH16-02L	0.91	186.29
▲	BH16-09	1.07	182.63

GRAIN SIZE DISTRIBUTION - THURBER 6121.GPJ 12/14/12

Date December 2012
GWP# 5294-08-00

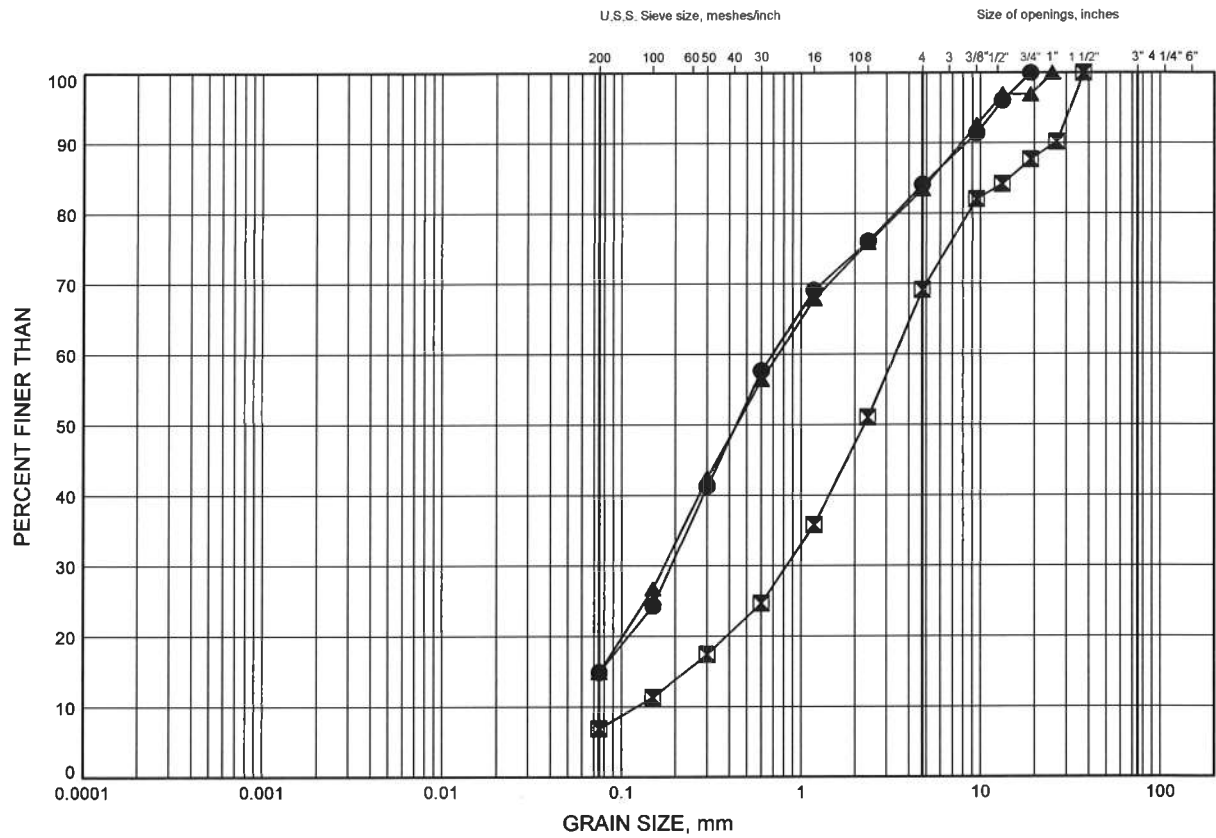


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Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE B9

Gravelly SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH16-06L	4.11	180.39
■	C105-1	4.23	181.57
▲	C105-2	2.96	182.34

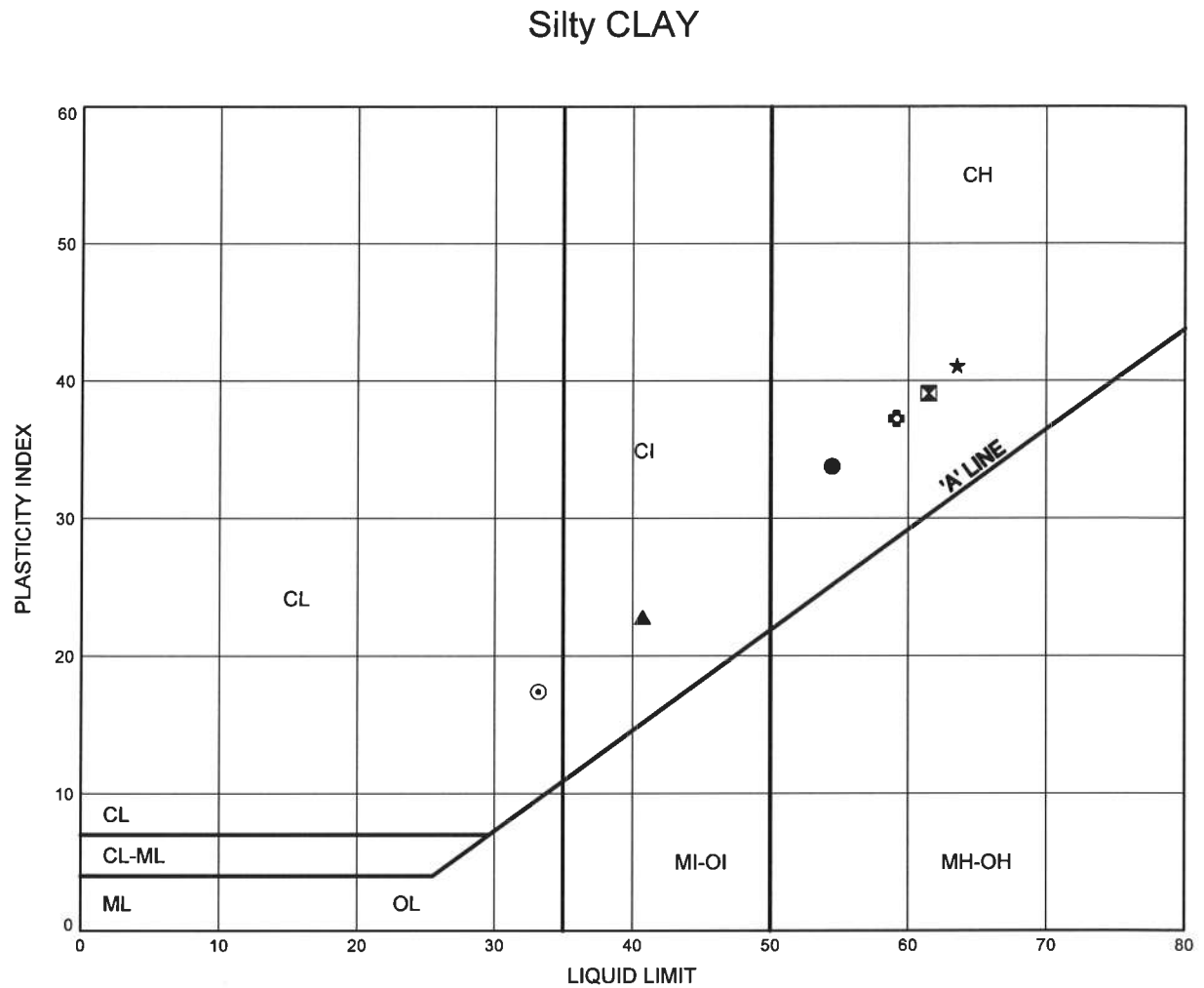
Date December 2012
GWP# 5294-08-00



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Hwy 69 Four-Laning North of Hwy 529
ATTERBERG LIMITS TEST RESULTS

FIGURE B10



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH15-01	1.83	184.77
⊠	BH15-01	2.59	184.01
▲	BH15-02R	1.07	185.13
★	BH15-02R	2.59	183.61
⊙	BH15-03	1.83	184.57
⊕	BH15-03	3.35	183.05

Date December 2012

GWP# 5294-08-00



Prep'd MFA

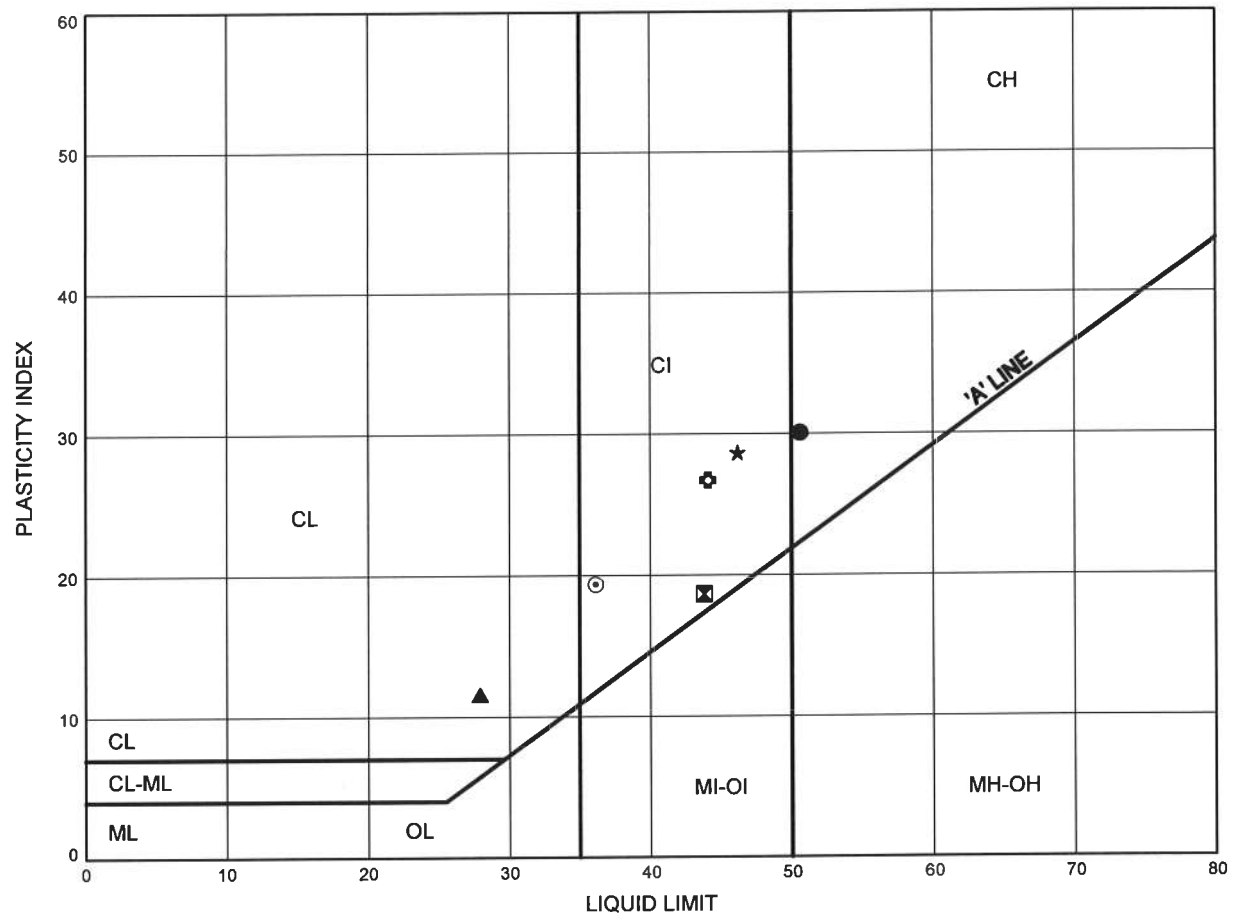
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529

ATTERBERG LIMITS TEST RESULTS

FIGURE B11

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH15-06R	2.59	182.81
⊠	BH15A-02L	0.91	185.68
▲	BH15A-03R	1.52	184.28
★	BH15A-04L	1.52	183.78
⊙	BH16-01	0.91	185.29
⊗	BH16-02L	2.02	185.18

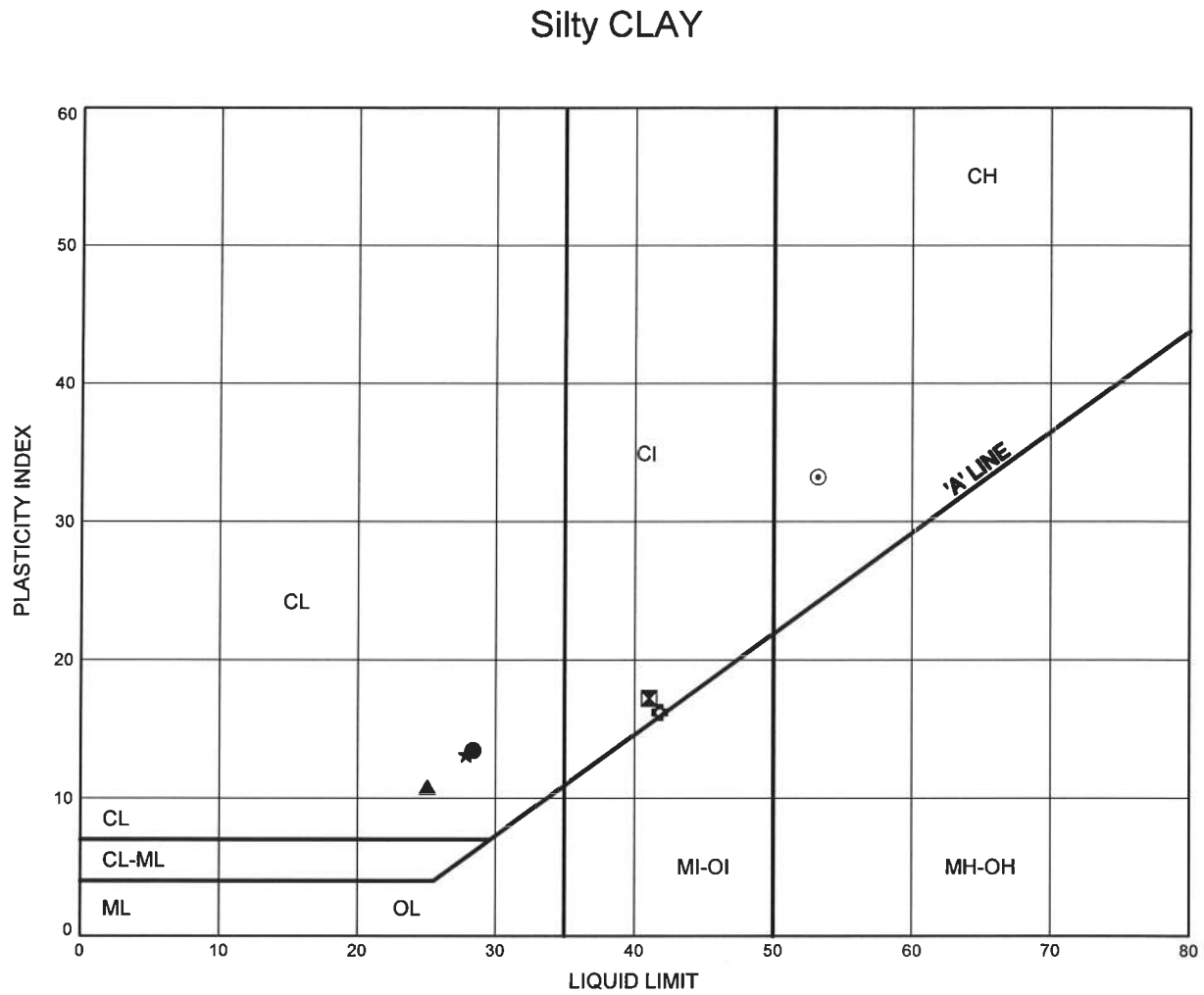
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529
ATTERBERG LIMITS TEST RESULTS

FIGURE B12



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH16-03	1.83	183.07
⊠	BH16-10L	1.83	180.67
▲	BH16-10L	4.11	178.39
★	BH16-10L	4.88	177.62
⊙	BH16-10L	5.64	176.86
⊕	BH16-11	1.83	181.77

Date December 2012

GWP# 5294-08-00



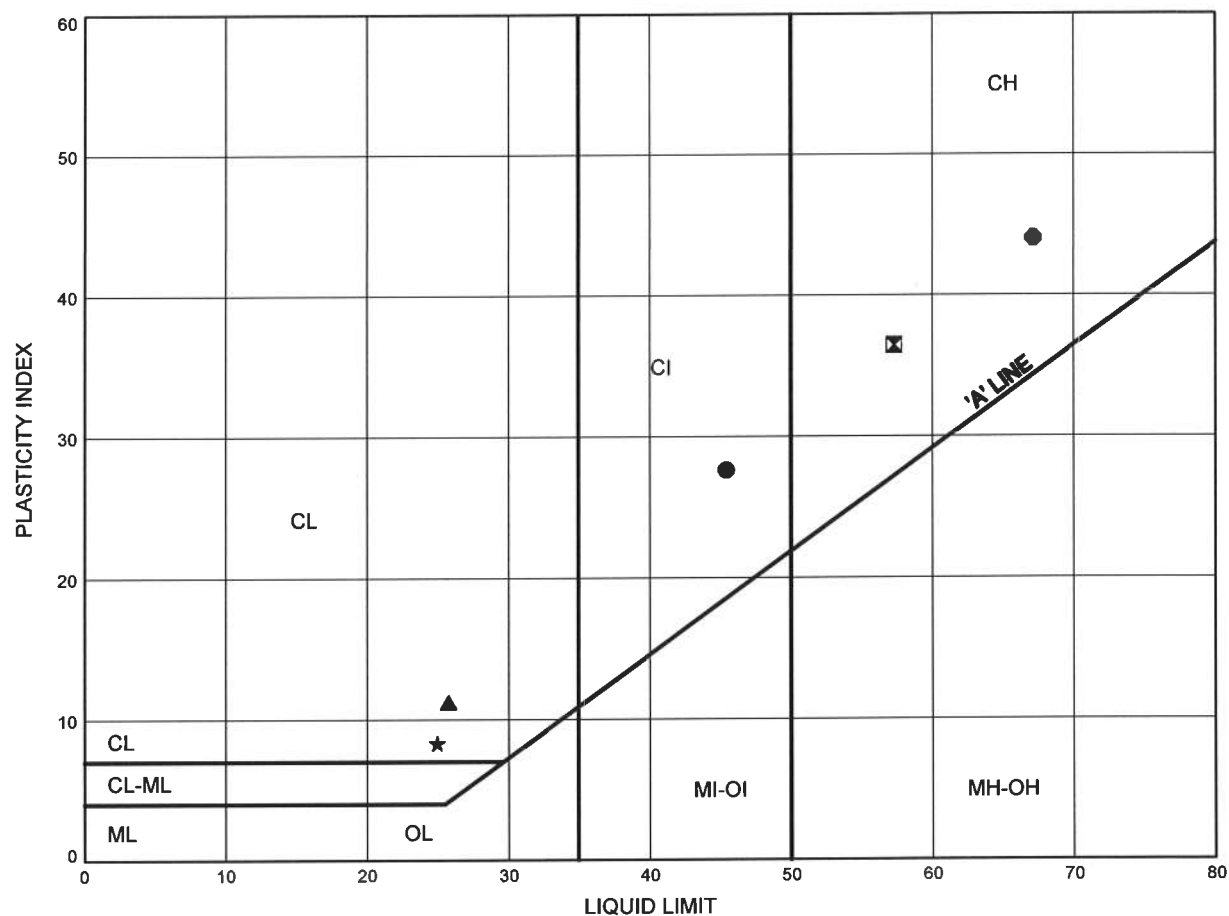
Prep'd MFA

Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529
ATTERBERG LIMITS TEST RESULTS

FIGURE B13

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH16-11	4.88	178.72
⊠	C104-1	1.98	183.22
▲	C105-1	2.72	183.08
★	C105-2	2.21	183.09
⊙	C105-3	1.70	184.10
⊕	C105-3	3.99	181.81

Date December 2012

GWP# 5294-08-00



Prep'd MFA

Chkd. MRA



Consolidation Test Report

CLIENT: **MMM GROUP LIMITED**

FILE NUMBER: 19-5161-21

PROJECT: Hwy 69 Four-Laning North of Hwy 529

REPORT DATE: 30-Jul-09

TEST DATES: July 16, 2009 - July 28, 2009

SAMPLE: BH16-10L-TW8 (17' 6" - 19' 6")

Clay, Silty, trace sand, brown, (CH), Grain Size: 66% Clay, 33% Silt, 1% Sand

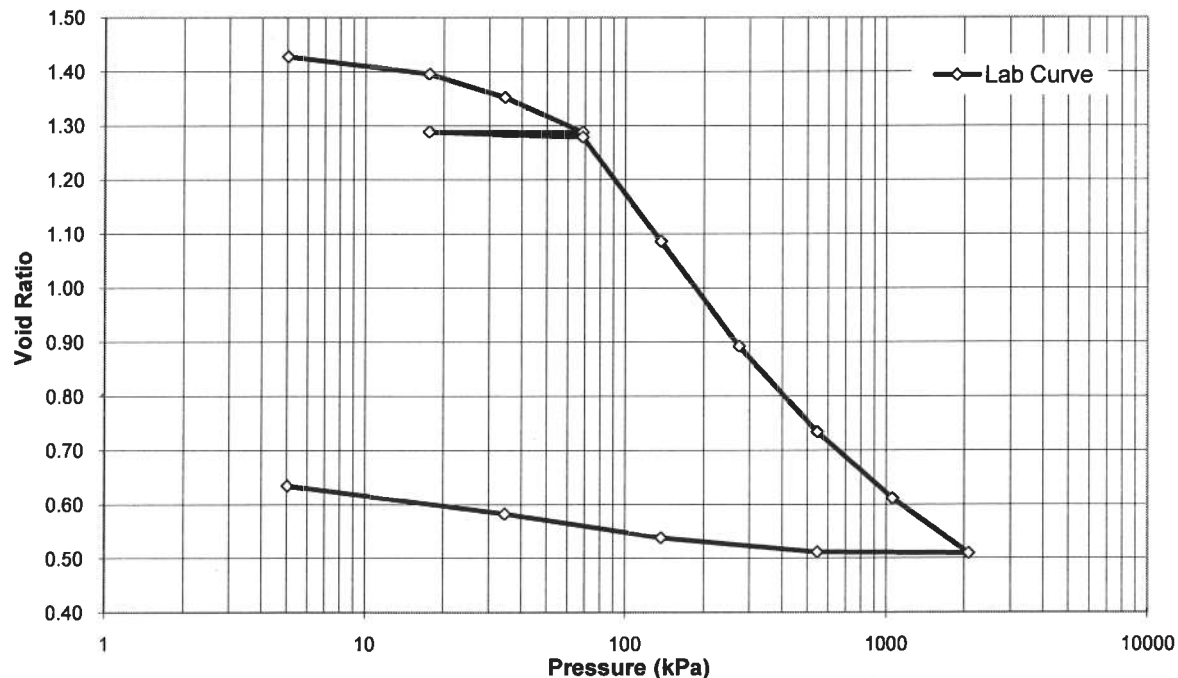
PROCEDURE: Test carried out in accordance with Standard Test Method for One-Dimensional Consolidation Properties of Soils, ASTM D 2435-04, method B

	Start of Test	End of Test
Wet Dens. (kg/m ³)	1704.8	2114.3
Dry Dens. (kg/m ³)	1121.9	1670.3
Moisture Cont. (%)	52.0	26.6
Void Ratio	1.433	0.634
Saturation (%)	99.1	

Note: A Specific Gravity of 2.73 was measured for the void ratio and saturation calculations.

Void Ratio vs. Pressure

Project #: 19-5161-21
Client: MMM GROUP LIMITED
Project Name: Hwy 69 Four-Laning North of Hwy 529
Sample: BH16-10L-TW8 (17' 6" - 19' 6")
Oedometer Consolidation Test



Consolidation Test Report

Hwy 69 Four-Laning North of Hwy 529
19-5161-21

BH16-10L-TW8 (17' 6" - 19' 6")

TRIMMING: The Specimen was manually trimmed to the size of consolidation ring, then mounted in a fixed ring consolidometer.

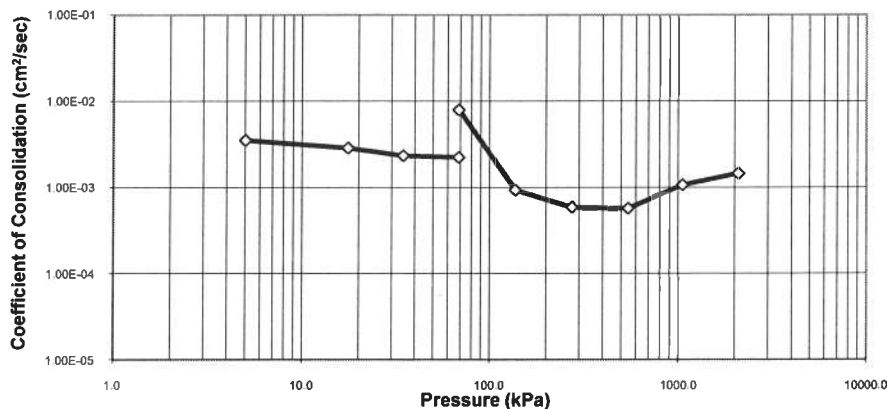
LOADING: A seating load of 5 kPa was applied and the consolidometer was flooded with distilled water. Sample was monitored to ensure no swelling effect occurred before the start of the test. Subsequent loads were applied after 100% primary consolidation was reached.

CALCULATIONS: Coefficients of Consolidation were calculated by the square root time method.

Pressure (kPa)	Corr. H. (mm)	Avg. H. (mm)	d_{90} (mm)	t_{90} (min)	c_v (cm ² /s)	Void Ratio	m_v (m ² /kN)	k (cm/s)
0.0	20.000					1.433		
5.0	19.953	19.977	0.104	4.000	3.53E-03	1.428	4.68E-04	1.62E-07
17.6	19.692	19.823	0.259	4.840	2.87E-03	1.396	1.04E-03	2.94E-07
34.5	19.334	19.513	0.165	5.760	2.34E-03	1.352	1.07E-03	2.45E-07
68.5	18.807	19.071	0.275	5.760	2.23E-03	1.288	8.03E-04	1.76E-07
17.6	18.813	18.810				1.289		
68.5	18.731	18.772	0.166	1.563	7.97E-03	1.279	8.56E-05	6.69E-08
136.9	17.148	17.940	0.800	12.250	9.28E-04	1.086	1.24E-03	1.13E-07
273.2	15.556	16.352	1.185	16.000	5.90E-04	0.893	6.81E-04	3.94E-08
545.5	14.253	14.905	0.882	13.690	5.73E-04	0.734	3.08E-04	1.73E-08
1057.7	13.243	13.748	0.640	6.250	1.07E-03	0.611	1.38E-04	1.45E-08
2080.1	12.410	12.827	0.525	4.000	1.45E-03	0.510	6.15E-05	8.77E-09
545.5	12.426	12.418				0.512		
136.9	12.643	12.535				0.538		
34.5	13.007	12.825				0.583		
5.0	13.434	13.221				0.634		

Coefficient of Consolidation vs. Pressure

Project #: 19-5161-21
Client: MMM GROUP LIMITED
Project Name: Hwy 69 Four-Laning North of Hwy 529
Sample: BH16-10L-TW8 (17' 6" - 19' 6")
Oedometer Consolidation Test



Notes: c_v and k calculated using t_{90} values

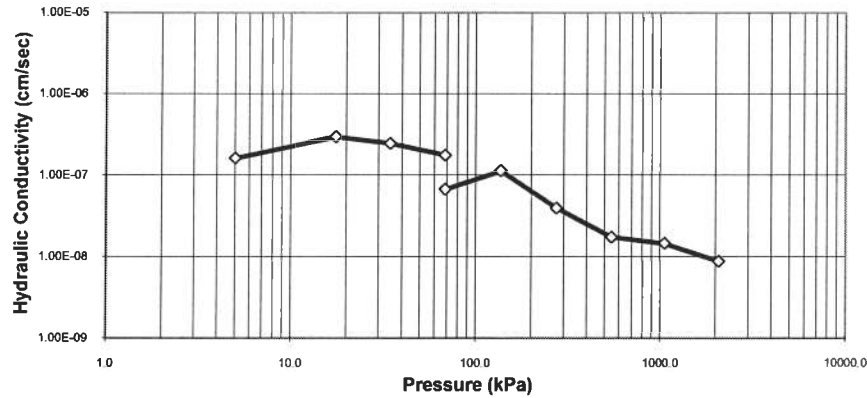


Consolidation Test Report

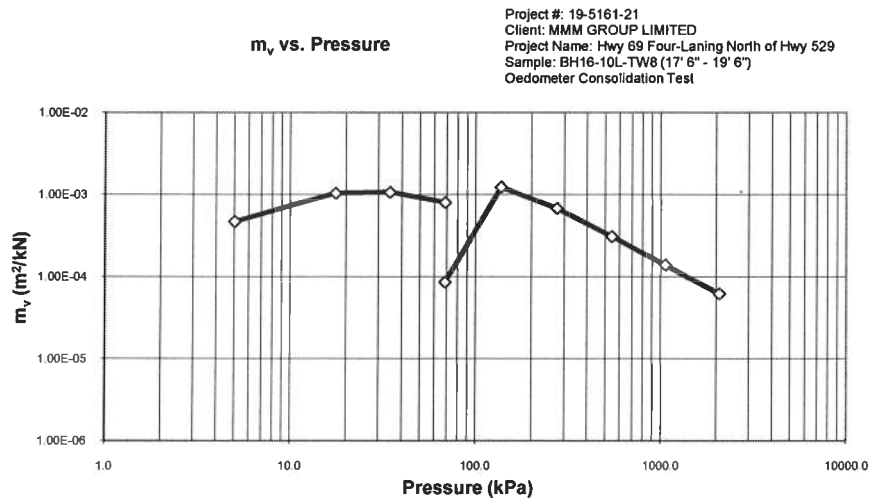
Hwy 69 Four-Laning North of Hwy 529
19-5161-21

BH16-10L-TW8 (17' 6" - 19' 6")

Hydraulic Conductivity vs. Pressure



m_v vs. Pressure



CONSOLIDATED UNDRAINED TRIAXIAL WITH PORE PRESSURE MEASUREMENTS SHEET 1 OF 4		FIGURE	
TEST STAGE	A	B	C
BOREHOLE NUMBER	16-10L	16-10L	16-10L
SAMPLE	TW8	TW8	TW8
SPECIMEN DIAMETER, cm	5.16	5.13	5.21
SPECIMEN HEIGHT, cm	9.82	9.90	9.80
WATER CONTENT BEFORE CONSOLIDATION, %	38.1	46.2	34.9
CELL PRESSURE, σ_3 , kPa	185.0	285.0	365.0
BACK PRESSURE, kPa	135.0	135.0	65.0
PORE PRESSURE PARAMETER "B"	0.96	0.96	1.00
CONSOLIDATION PRESSURE, σ_c , kPa	50.0	150.0	300.0
VOLUMETRIC STRAIN DURING CONSOLIDATION, %	6.2	15.0	18.8
WATER CONTENT AFTER CONSOLIDATION, %	33.3	33.8	22.3
AVERAGE RATE OF STRAIN, %/hr	0.4	0.5	0.5
TIME TO FAILURE, DAYS	1	1	1
WATER CONTENT AFTER TEST, %	33.5	32.8	20.5
MAX. DEVIATOR STRESS, $(\sigma_1 - \sigma_3)$, kPa	41.2	104.5	221.9
AXIAL STRAIN AT $(\sigma_1 - \sigma_3)$ MAXIMUM, %	6.2	6.7	12.3
MAX EFFECTIVE PRINCIPAL STRESS			
RATIO, (σ_1 / σ_3) MAXIMUM	4.3	3.7	3.8
DEVIATOR STRESS AT (σ_1 / σ_3) MAXIMUM, kPa	44.3	104.2	221.7
AXIAL STRAIN AT (σ_1 / σ_3) MAXIMUM, %	12.9	11.7	8.3
PORE PRESSURE PARAMETER, A_f , AT $(\sigma_1 - \sigma_3)$ MAXIMUM	0.87	1.02	1.00
PORE PRESSURE PARAMETER, A_f , AT (σ_1 / σ_3) MAXIMUM	0.83	1.07	1.00
NATURAL WATER CONTENT, %	39.0	45.7	31.7
DRY DENSITY, Mg/m^3	1.31	1.22	1.49
FILTER DRAINS USED, y/n	y	y	y
TEST NOTES:			
CHANGED RATE OF STRAIN, %/hr	-	-	-
AXIAL STRAIN WHERE RATE OF STRAIN WAS CHANGED, %	-	-	-
FAILURE PLANE NUMBER	bulged	bulged	-
ANGLE OF FAILURE, DEGREES	-	-	-

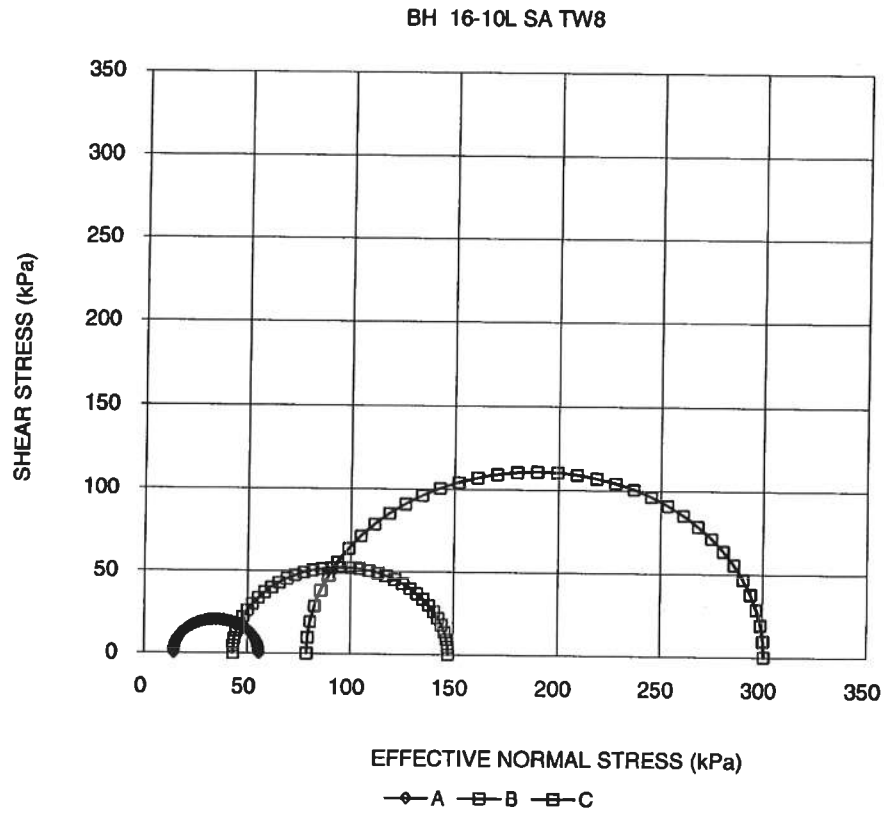
Date: 07/30/2009
 Project No. 09-1116-0029

Golder Associates

Prepared By: LH
 Checked By: MM

CONSOLIDATED UNDRAINED TRIAXIAL
WITH PORE PRESSURE MEASUREMENTS
SHEET 2 OF 4

FIGURE



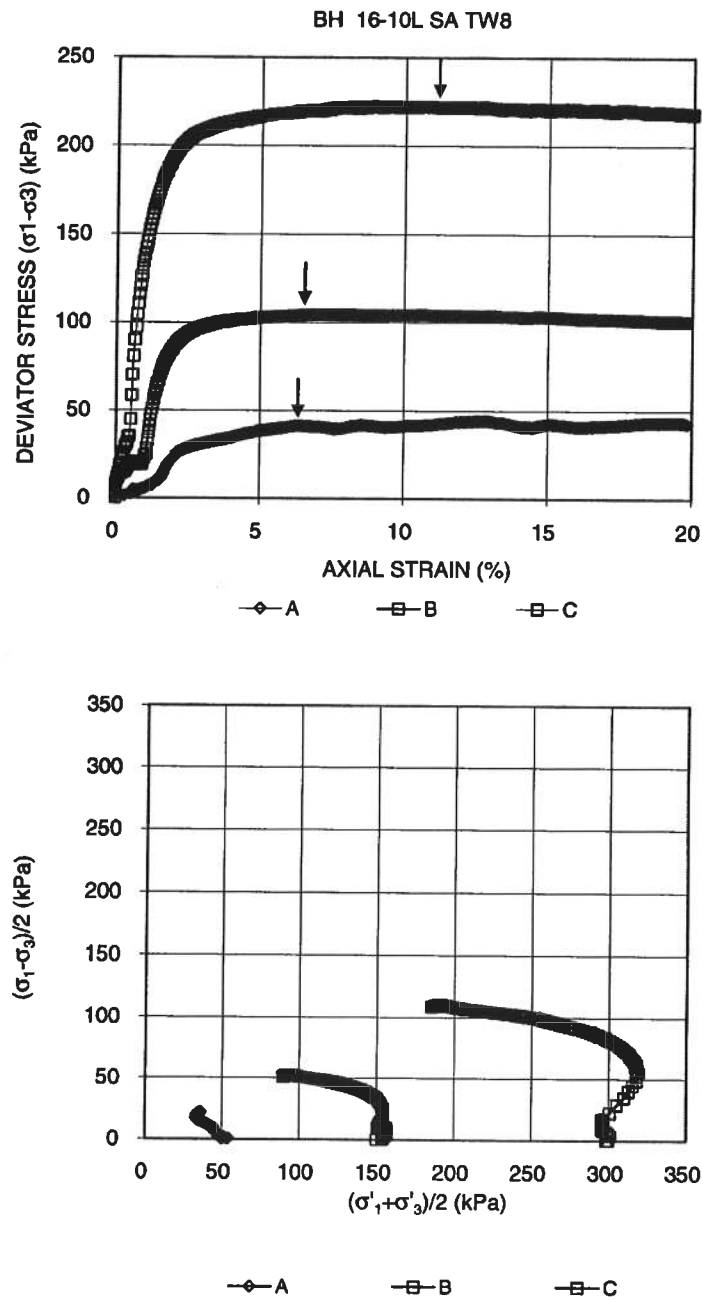
Date: 07/30/2009
Project No. 09-1116-0029

Golder Associates

Prepared By: LH
Checked By: MM

**CONSOLIDATED UNDRAINED TRIAXIAL
WITH PORE PRESSURE MEASUREMENTS
SHEET 3 OF 4**

FIGURE



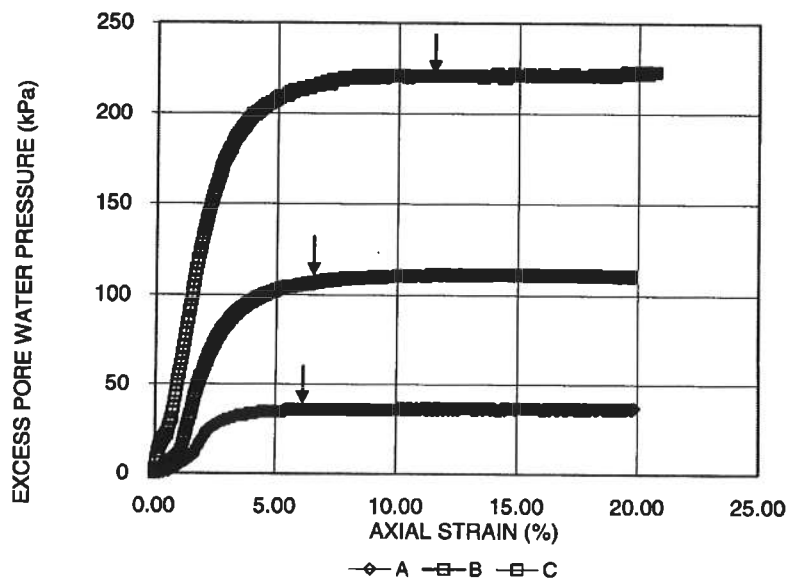
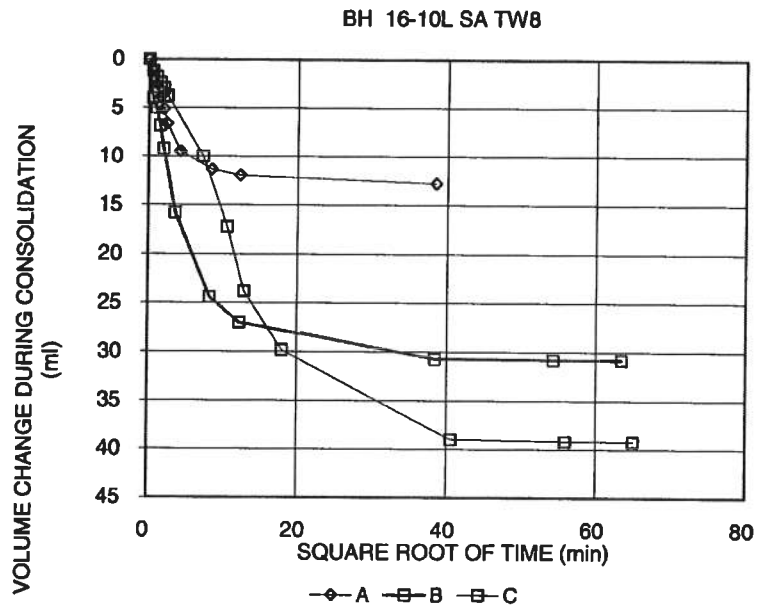
Date: 07/30/2009
Project No. 09-1116-0029

Golder Associates

Prepared By: LH
Checked By: MM

**CONSOLIDATED UNDRAINED TRIAXIAL
WITH PORE PRESSURE MEASUREMENTS
SHEET 4 OF 4**

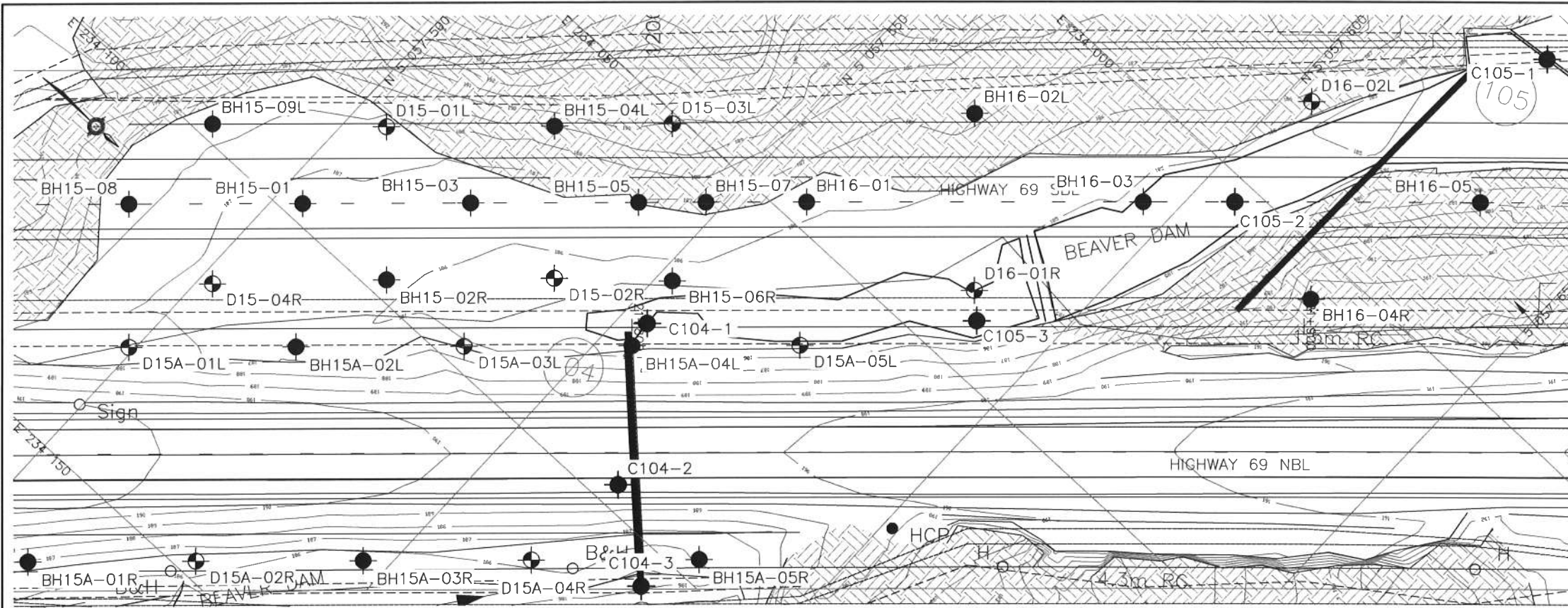
FIGURE



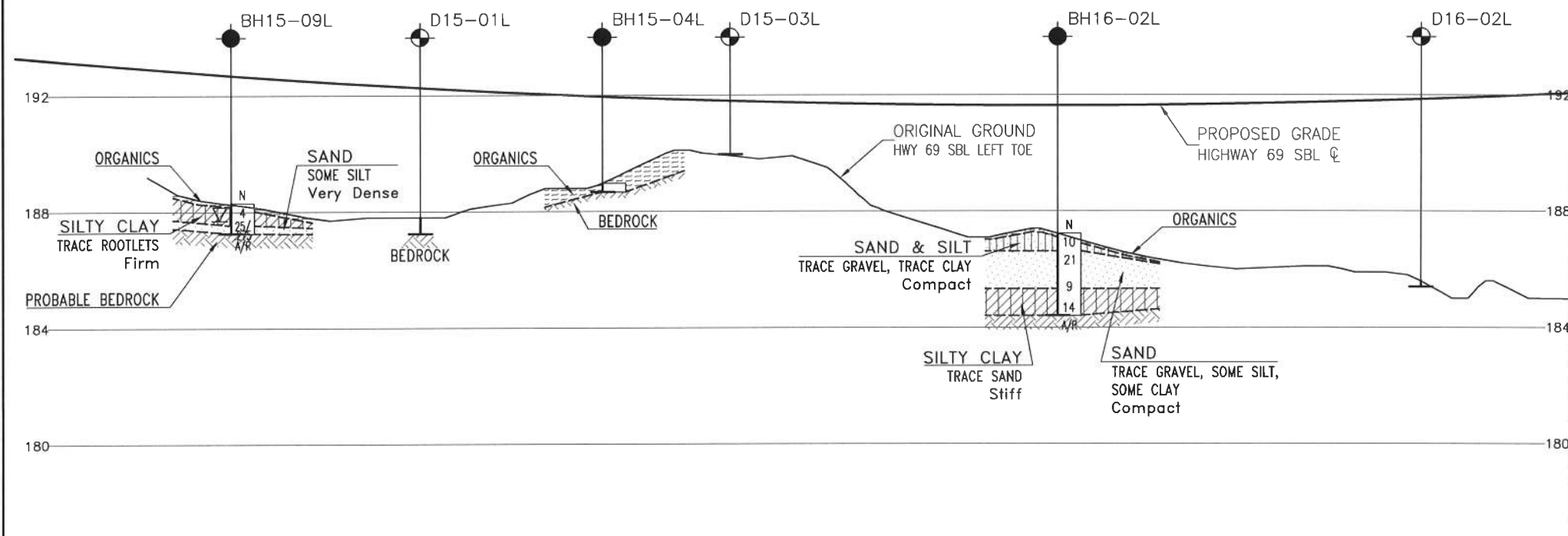
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Project No. 09-1116-0029

Golder Associates

Prepared By: LH
Checked By: MM



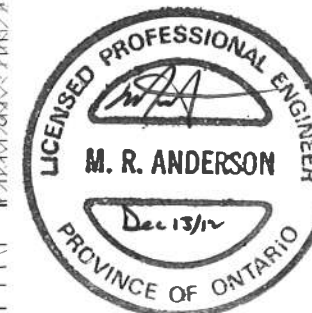
PLAN

0 16 32 48m
SCALE 1:800

PROFILE ALONG LEFT TOE HIGHWAY 69 SBL

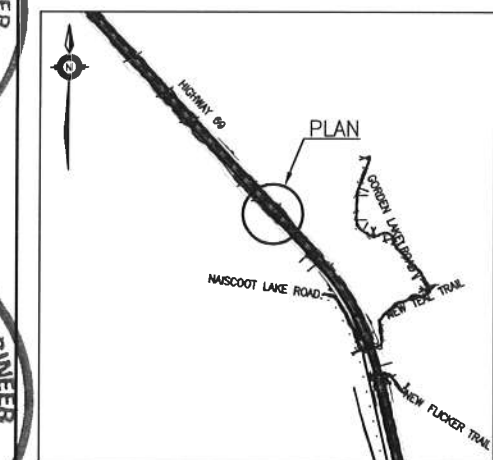
0 16 32 48m
0 4 8 12m
H 1:800
V 1:200

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-LT TOE
(STA 21+710 - 21+940)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.

KEYPLAN
LEGEND

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

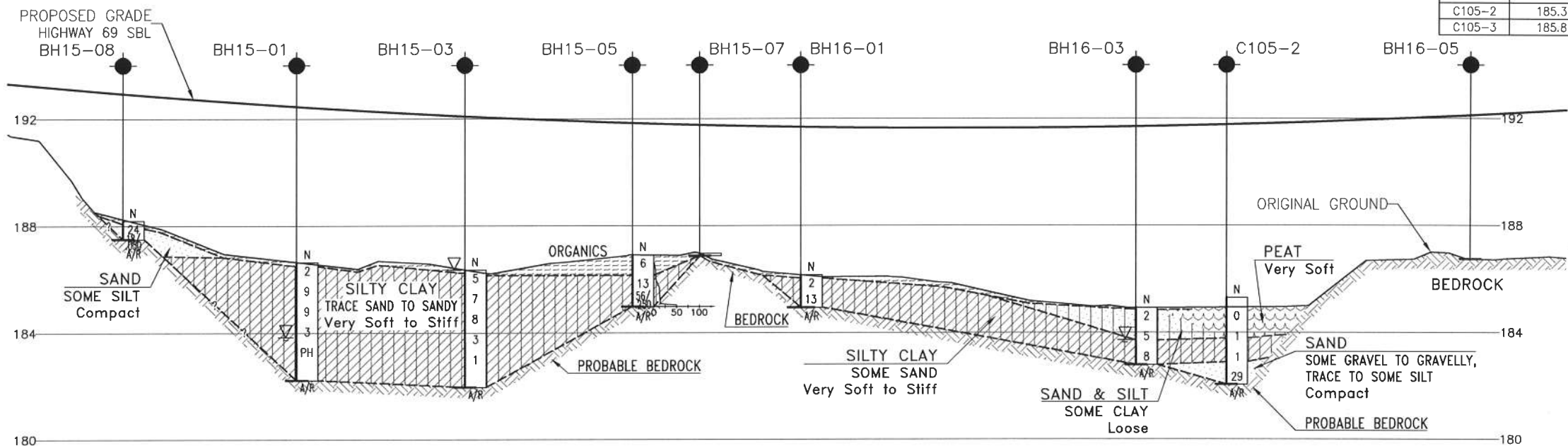
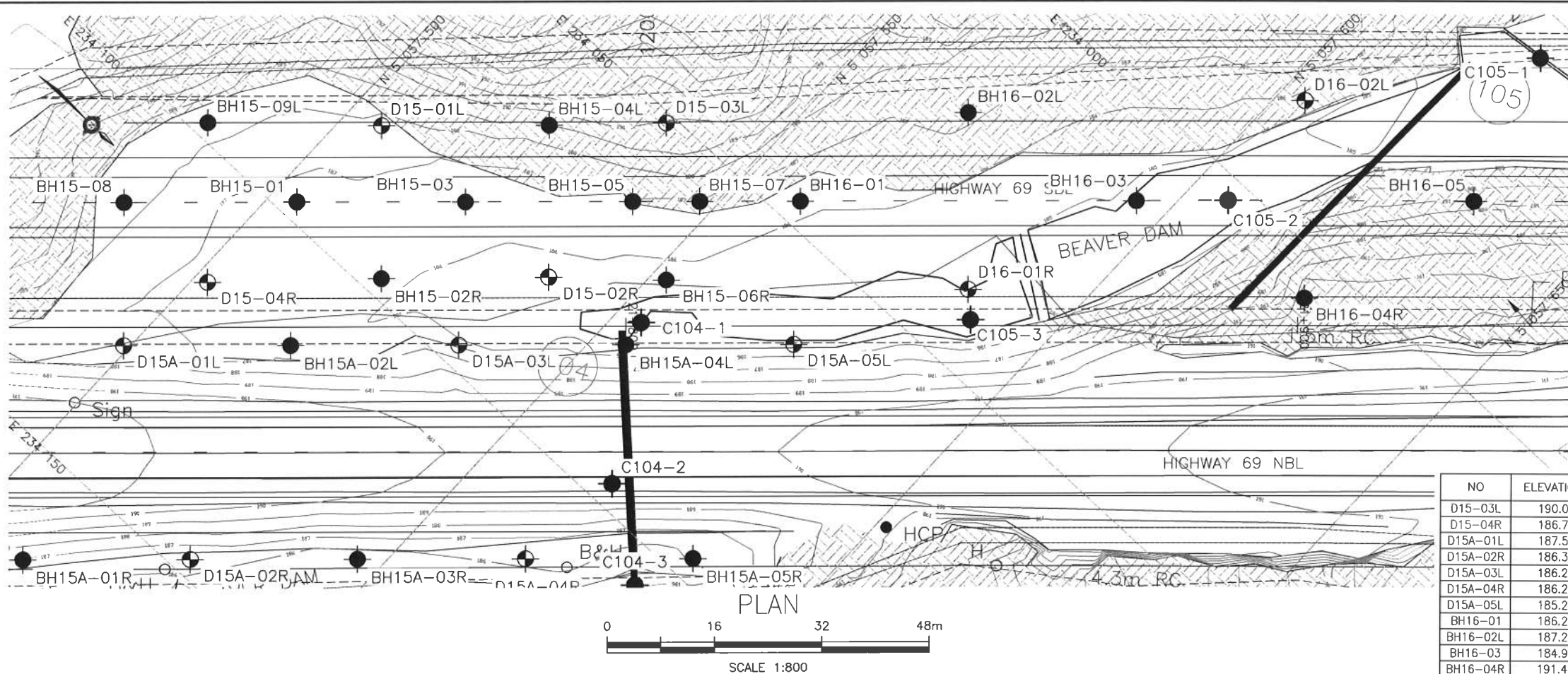
NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D15-03L	190.0	5 057 536.1	234 051.3	BH15-01	186.6	5 057 503.7	234 097.3
D15-04R	186.7	5 057 502.0	234 115.3	BH15-02R	186.2	5 057 520.7	234 097.3
D15A-01L	187.5	5 057 499.2	234 130.8	BH15-03	186.4	5 057 522.1	234 080.3
D15A-02R	186.3	5 057 528.3	234 147.5	BH15-04L	189.0	5 057 523.4	234 063.4
D15A-03L	186.2	5 057 535.9	234 096.8	BH15-05	186.9	5 057 540.4	234 063.4
D15A-04R	186.2	5 057 565.0	234 113.5	BH15-06R	185.4	5 057 552.1	234 068.6
D15A-05L	185.2	5 057 572.6	234 062.8	BH15-07	187.0	5 057 547.8	234 056.6
BH16-01	186.2	5 057 558.8	234 046.4	BH15-08	188.2	5 057 484.6	234 115.0
BH16-02L	187.2	5 057 568.1	234 019.6	BH15-09L	188.3	5 057 485.7	234 097.7
BH16-03	184.9	5 057 595.5	234 012.4	BH15A-01R	186.9	5 057 510.0	234 164.4
BH16-04R	191.4	5 057 623.7	234 006.2	BH15A-02L	186.6	5 057 517.6	234 113.8
BH16-05	186.7	5 057 632.2	233 978.5	BH15A-03R	185.8	5 057 546.7	234 130.5
D16-01R	185.1	5 057 586.2	234 039.2	BH15A-04L	185.3	5 057 554.3	234 079.8
D16-02L	185.6	5 057 603.6	233 984.4	BH15A-05R	186.2	5 057 583.4	234 096.5
C104-1	185.2	5 057 553.7	234 075.8	D15-01L	187.8	5 057 505.1	234 080.4
C104-2	189.8	5 057 566.9	234 096.5	D15-02R	185.7	5 057 539.0	234 080.2
C104-3	185.9	5 057 579.7	234 105.3				
C105-1	185.8	5 057 624.7	233 956.0				
C105-2	185.3	5 057 605.5	234 003.2				
C105-3	185.8	5 057 589.5	234 042.3				

NOTES

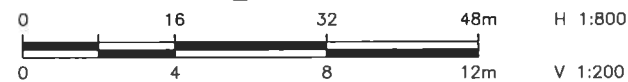
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
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GEOCRES No. 41H-99

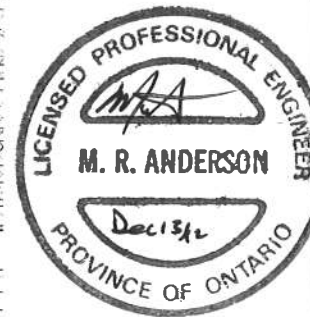
REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



PROFILE ALONG CL HIGHWAY 69 SBL

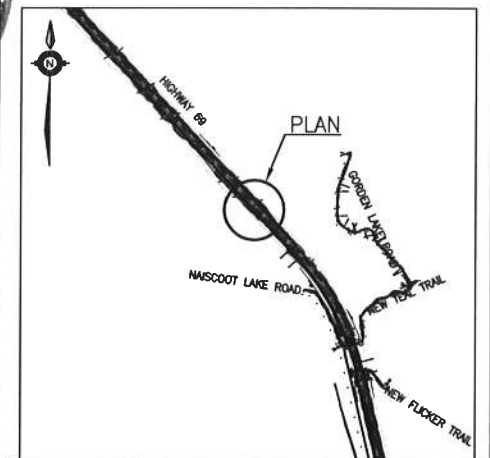


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN



CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-CL
(STA 21+710 - 21+940)
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
W	Water Level
HA	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
BH15-01	186.6	5 057 503.7	234 097.3
BH15-02R	186.2	5 057 520.7	234 097.3
BH15-03	186.4	5 057 522.1	234 080.3
BH15-04L	189.0	5 057 523.4	234 063.4
BH15-05	186.9	5 057 540.4	234 063.4
BH15-06R	185.4	5 057 552.1	234 068.6
BH15-07	187.0	5 057 547.8	234 056.6
BH15-08	188.2	5 057 484.6	234 115.0
BH15-09L	188.3	5 057 485.7	234 097.7
BH15A-01R	186.9	5 057 510.0	234 164.4
BH15A-02L	186.6	5 057 517.6	234 113.8
BH15A-03R	185.8	5 057 546.7	234 130.5
BH15A-04L	185.3	5 057 554.3	234 079.8
BH15A-05R	186.2	5 057 583.4	234 096.5
D15-01L	187.8	5 057 505.1	234 080.4
D15-02R	185.7	5 057 539.0	234 080.2

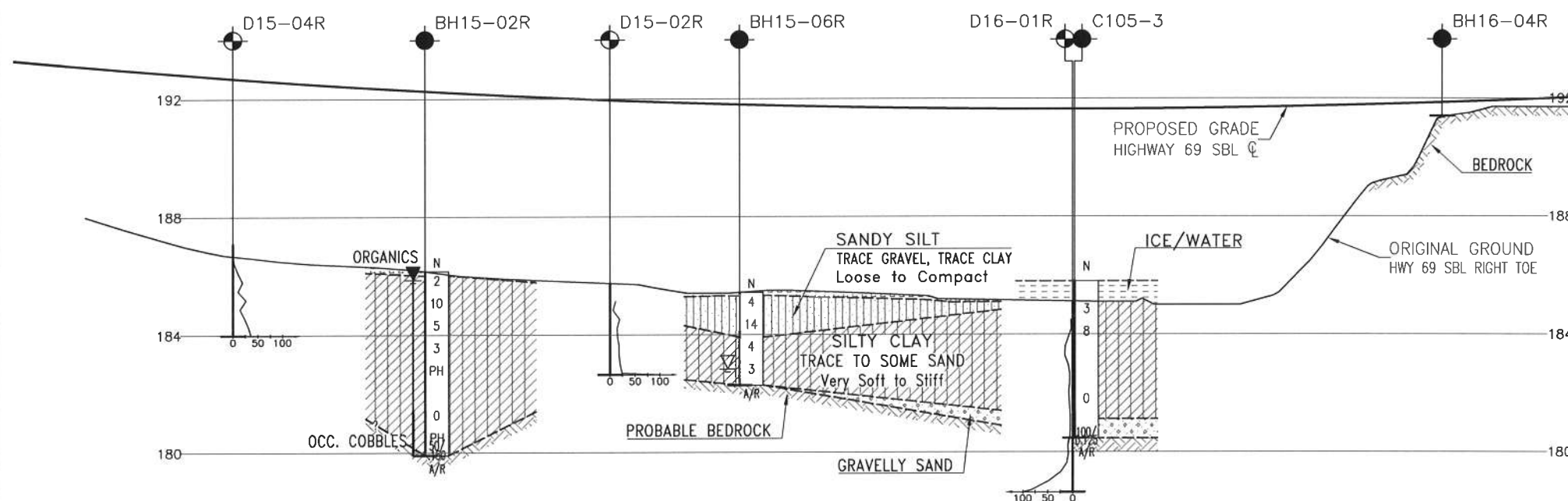
NOTES-

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GEOCRES No. 41H-99



REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



PROFILE ALONG RIGHT TOE HIGHWAY 69 SBL

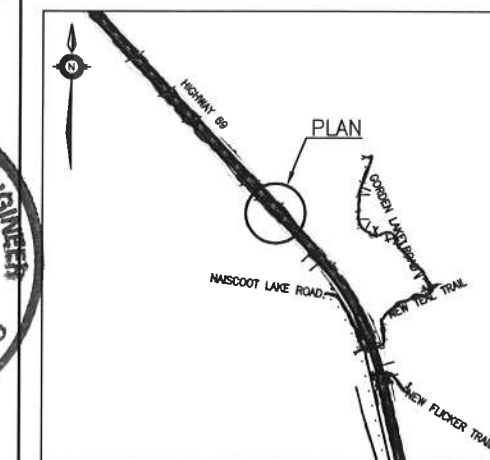


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN








CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-RT TOE
(STA 21+710 - 21+940)
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	NO	ELEVATION	NORTHING	EASTING
D15-03L	190.0	5 057 536.1	234 051.3	BH15-01	186.6	5 057 503.7	234 097.3
D15-04R	186.7	5 057 502.0	234 115.3	BH15-02R	186.2	5 057 520.7	234 097.3
D15A-01L	187.5	5 057 499.2	234 130.8	BH15-03	186.4	5 057 522.1	234 080.3
D15A-02R	186.3	5 057 528.3	234 147.5	BH15-04L	189.0	5 057 523.4	234 063.4
D15A-03L	186.2	5 057 535.9	234 096.8	BH15-05	186.9	5 057 540.4	234 063.4
D15A-04R	186.2	5 057 565.0	234 113.5	BH15-06R	185.4	5 057 552.1	234 068.6
D15A-05L	185.2	5 057 572.6	234 062.8	BH15-07	187.0	5 057 547.8	234 056.6
BH16-01	186.2	5 057 558.8	234 046.4	BH15-08	188.2	5 057 484.6	234 115.0
BH16-02L	187.2	5 057 568.1	234 019.6	BH15-09L	188.3	5 057 485.7	234 097.7
BH16-03	184.9	5 057 595.5	234 012.4	BH15A-01R	186.9	5 057 510.0	234 164.4
BH16-04R	191.4	5 057 623.7	234 006.2	BH15A-02L	186.6	5 057 517.6	234 113.8
BH16-05	186.7	5 057 632.2	233 978.5	BH15A-03R	185.8	5 057 546.7	234 130.5
D16-01R	185.1	5 057 586.2	234 039.2	BH15A-04L	185.3	5 057 554.3	234 079.8
D16-02L	185.6	5 057 603.6	233 984.4	BH15A-05R	186.2	5 057 583.4	234 096.5
C104-1	185.2	5 057 553.7	234 075.8	D15-01L	187.8	5 057 505.1	234 080.4
C104-2	189.8	5 057 566.9	234 096.5	D15-02R	185.7	5 057 539.0	234 080.2
C104-3	185.9	5 057 579.7	234 105.3				
C105-1	185.8	5 057 624.7	233 956.0				
C105-2	185.3	5 057 605.5	234 003.2				
C105-3	185.8	5 057 589.5	234 042.3				

-NOTES-

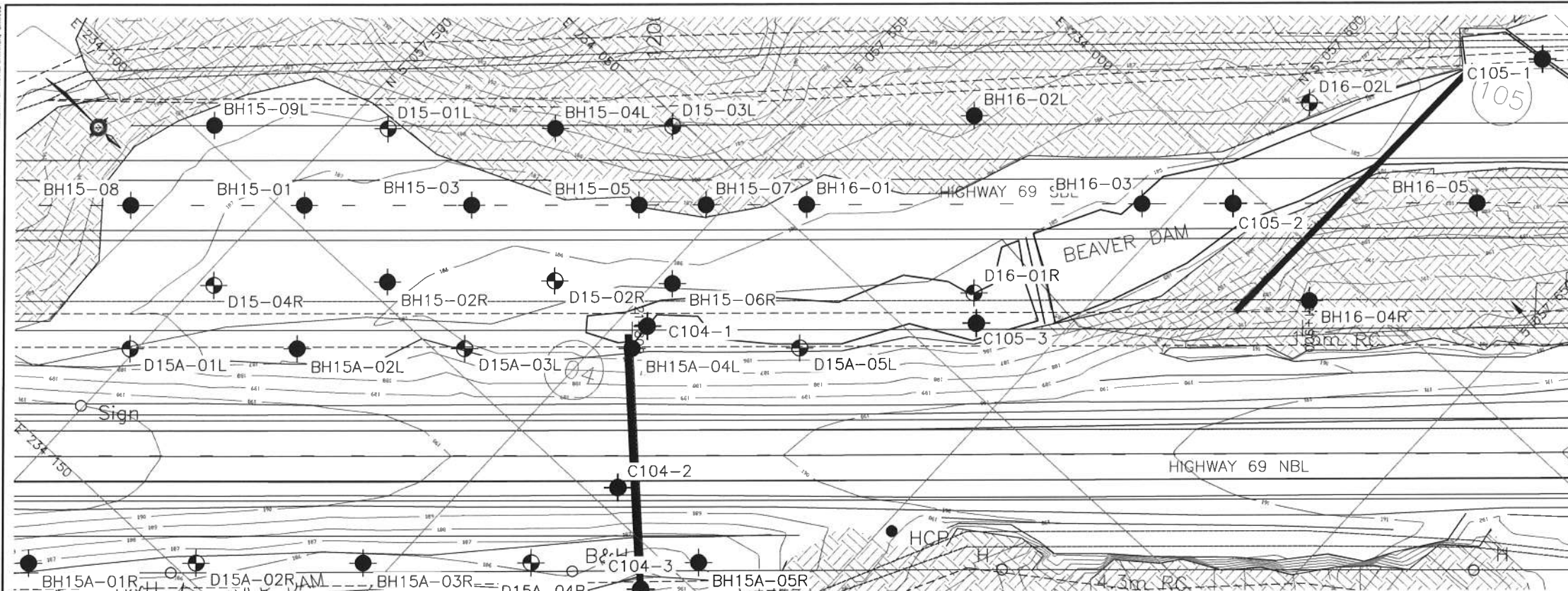
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-NOTES-

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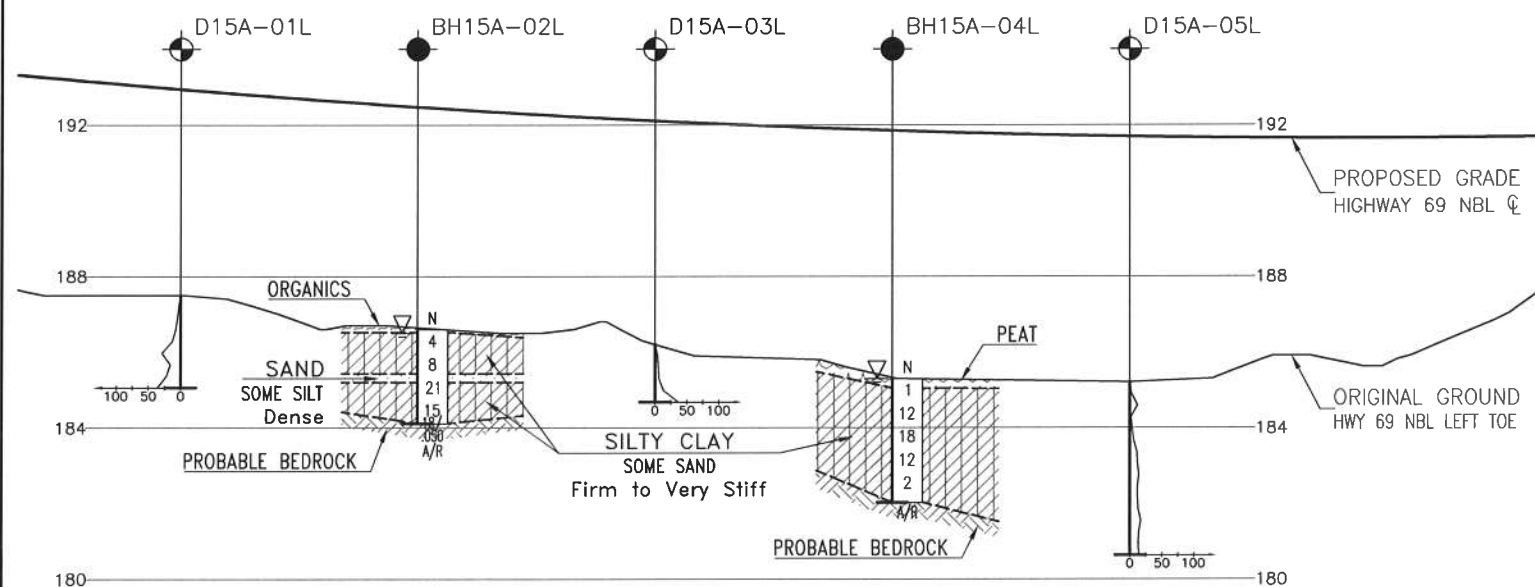
GEOCRES No. 41H-99

REVISIONS									DESCRIPTION		DATE	DEC. 2012
	DATE	BY										
DESIGN	RPR	CHK	AEG	CODE					LOAD			
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PLAN

SCALE 1:800



PROFILE ALONG LEFT TOE HIGHWAY 69 NBL



H 1:800

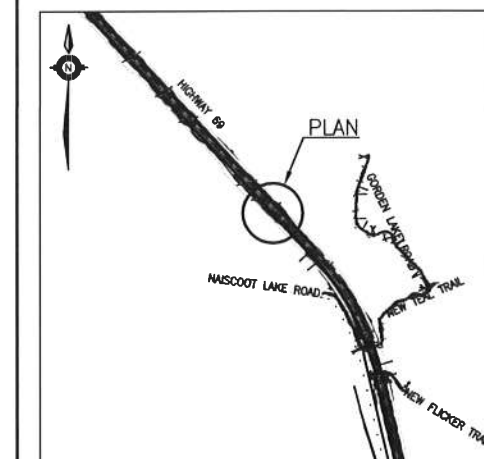
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METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-LT TOE
(STA 21+710 - 21+940)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D15-03L	190.0	5 057 536.1	234 051.3	BH15-01	186.6	5 057 503.7	234 097.3
D15-04R	186.7	5 057 502.0	234 115.3	BH15-02R	186.2	5 057 520.7	234 097.3
D15A-01L	187.5	5 057 499.2	234 130.8	BH15-03	186.4	5 057 522.1	234 080.3
D15A-02R	186.3	5 057 528.3	234 147.5	BH15-04L	189.0	5 057 523.4	234 063.4
D15A-03L	186.2	5 057 535.9	234 096.8	BH15-05	186.9	5 057 540.4	234 063.4
D15A-04R	186.2	5 057 565.0	234 113.5	BH15-06R	185.4	5 057 552.1	234 068.6
D15A-05L	185.2	5 057 572.6	234 062.8	BH15-07	187.0	5 057 547.8	234 056.6
BH16-01	186.2	5 057 558.8	234 046.4	BH15-08	188.2	5 057 484.6	234 115.0
BH16-02L	187.2	5 057 568.1	234 019.6	BH15-09L	188.3	5 057 485.7	234 097.7
BH16-03	184.9	5 057 595.5	234 012.4	BH15A-01R	186.9	5 057 510.0	234 164.4
BH16-04R	191.4	5 057 623.7	234 006.2	BH15A-02L	186.6	5 057 517.6	234 113.8
BH16-05	186.7	5 057 632.2	233 978.5	BH15A-03R	185.8	5 057 546.7	234 130.5
D16-01R	185.1	5 057 586.2	234 039.2	BH15A-04L	185.3	5 057 554.3	234 079.8
D16-02L	185.6	5 057 603.6	233 984.4	BH15A-05R	186.2	5 057 583.4	234 096.5
C104-1	185.2	5 057 553.7	234 075.8	D15-01L	187.8	5 057 505.1	234 080.4
C104-2	189.8	5 057 566.9	234 096.5	D15-02R	185.7	5 057 539.0	234 080.2
C104-3	185.9	5 057 579.7	234 105.3				
C105-1	185.8	5 057 624.7	233 956.0				
C105-2	185.3	5 057 605.5	234 003.2				
C105-3	185.8	5 057 589.5	234 042.3				

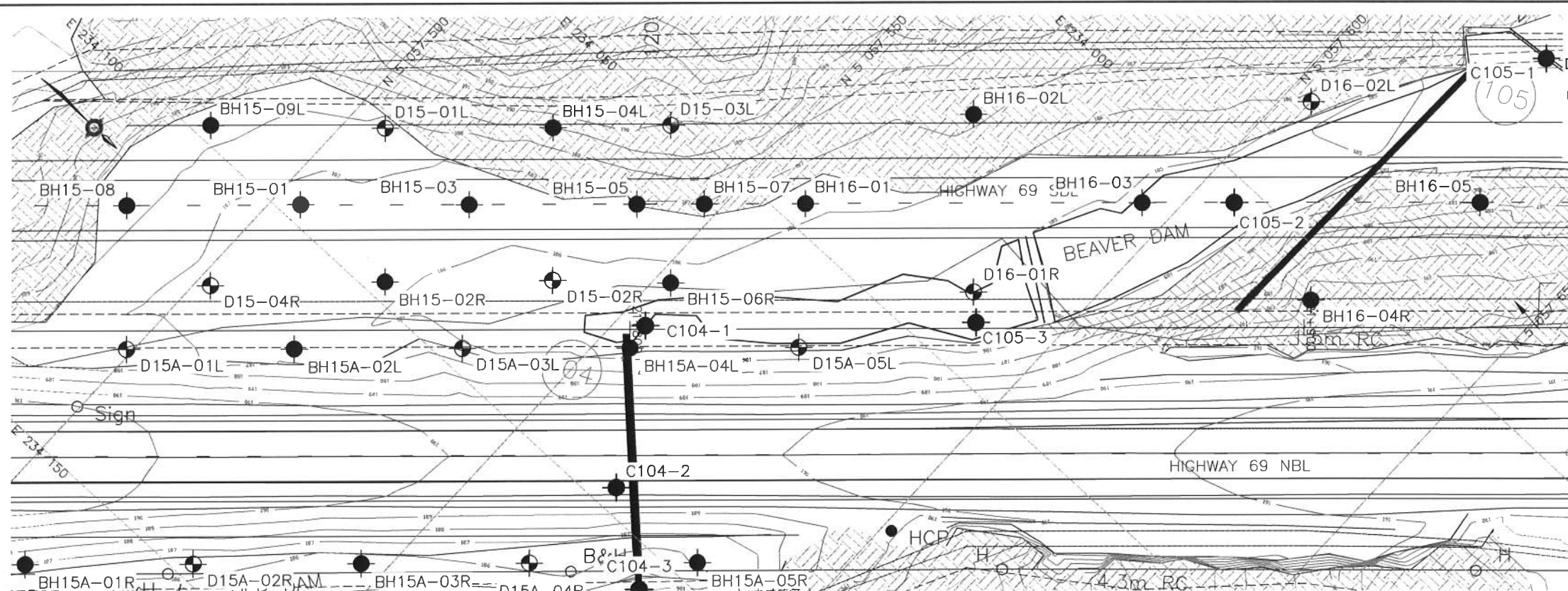
-NOTES-

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GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			DATE
			DEC. 2012
			DWG





METRIC

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



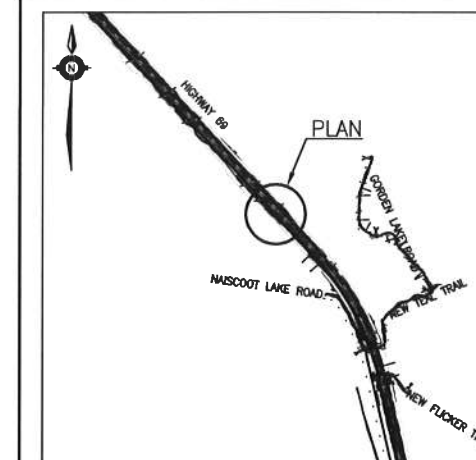
CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-RT TOE
(STA 21+710 - 21+940)
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET



THURBER ENGINEERING LTD.



KEYPLAN

LEGEND



Borehole



Cone

N

Blows /0.3m (Std Pen Test, 475J/blow)

CONE

Blows /0.3m (60° Cone, 475J/blow)

PH

Pressure, Hydraulic



Water Level



Head Artesian Water



Piezometer

90%

Rock Quality I

NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D15-03L	190.0	5 057 536.1	234 051.3	BH15-01	186.6	5 057 503.7	234 097.3
D15-04R	186.7	5 057 502.0	234 115.3	BH15-02R	186.2	5 057 520.7	234 097.3
D15A-01L	187.5	5 057 499.2	234 130.8	BH15-03	186.4	5 057 522.1	234 080.3
D15A-02R	186.3	5 057 528.3	234 147.5	BH15-04L	189.0	5 057 523.4	234 063.4
D15A-03L	186.2	5 057 535.9	234 096.8	BH15-05	186.9	5 057 540.4	234 063.4
D15A-04R	186.2	5 057 565.0	234 113.5	BH15-06R	185.4	5 057 552.1	234 068.4
D15A-05L	185.2	5 057 572.6	234 062.8	BH15-07	187.0	5 057 547.8	234 056.6
BH16-01	186.2	5 057 558.8	234 046.4	BH15-08	188.2	5 057 484.6	234 115.0
BH16-02L	187.2	5 057 568.1	234 019.6	BH15-09L	188.3	5 057 485.7	234 097.7
BH16-03	184.9	5 057 595.5	234 012.4	BH15A-01R	186.9	5 057 510.0	234 164.4
BH16-04R	191.4	5 057 623.7	234 006.2	BH15A-02L	186.6	5 057 517.6	234 113.8
BH16-05	186.7	5 057 632.2	233 978.5	BH15A-03R	185.8	5 057 546.7	234 130.5
D16-01R	185.1	5 057 586.2	234 039.2	BH15A-04L	185.3	5 057 554.3	234 079.8
D16-02L	185.6	5 057 603.6	233 984.4	BH15A-05R	186.2	5 057 583.4	234 096.3
C104-1	185.2	5 057 553.7	234 075.8	D15-01L	187.8	5 057 505.1	234 080.4
C104-2	189.8	5 057 566.9	234 096.5	D15-02R	185.7	5 057 539.0	234 080.2
C104-3	185.9	5 057 579.7	234 105.3				
C105-1	185.8	5 057 624.7	233 956.0				
C105-2	185.3	5 057 605.5	234 003.2				
C105-3	185.8	5 057 589.5	234 042.3				

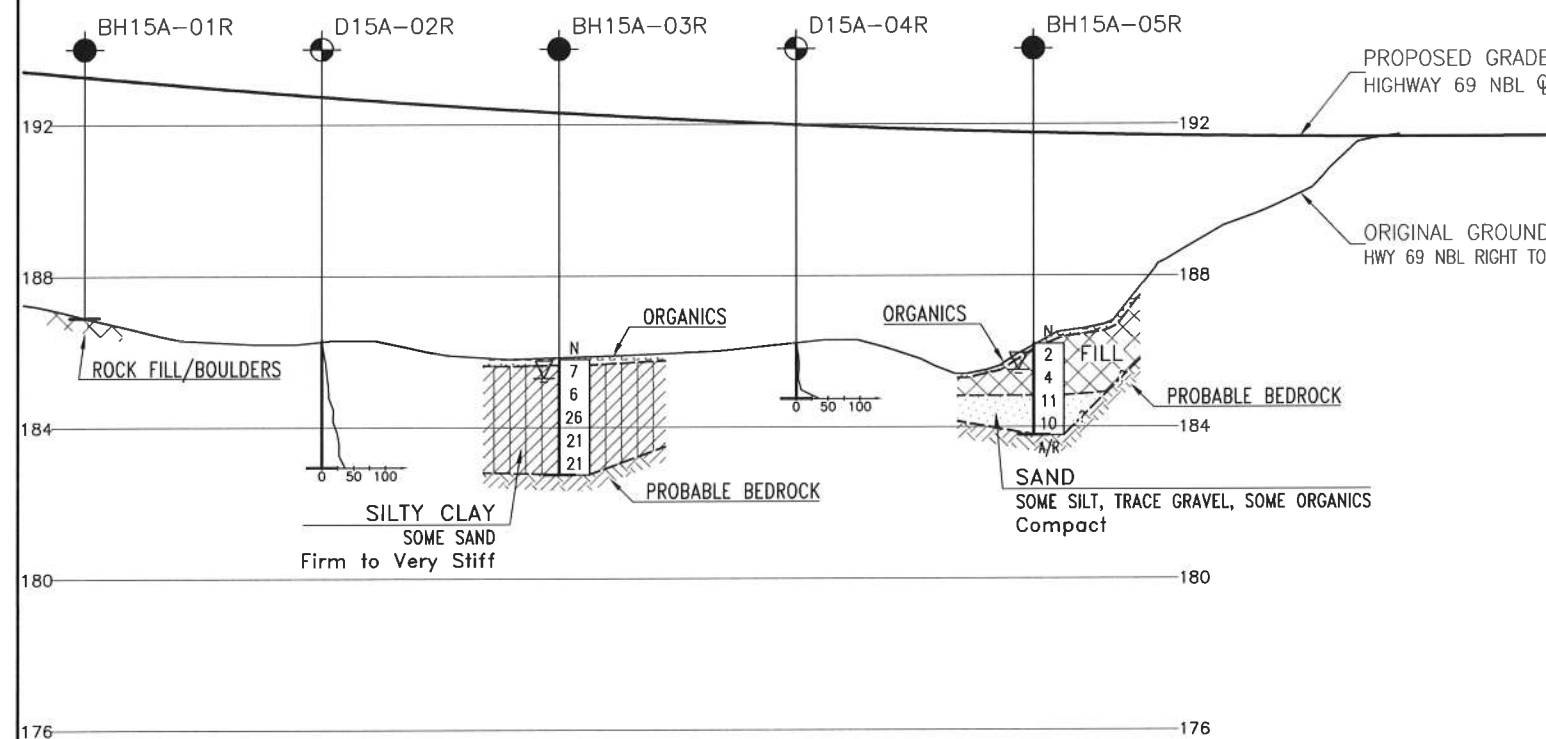
-NOTES-

1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.

-NOTES-

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GEOCRES No. 41H-99

[illegible]

PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL

H 1:800

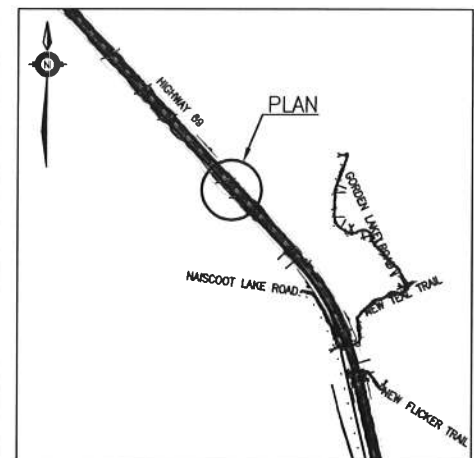
Y 1:200



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





CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-LT TOE
(STA 21+940 - 22+135)
BOREHOLE LOCATIONS AND SOIL STRATA



KEYPLAN

LEGEND

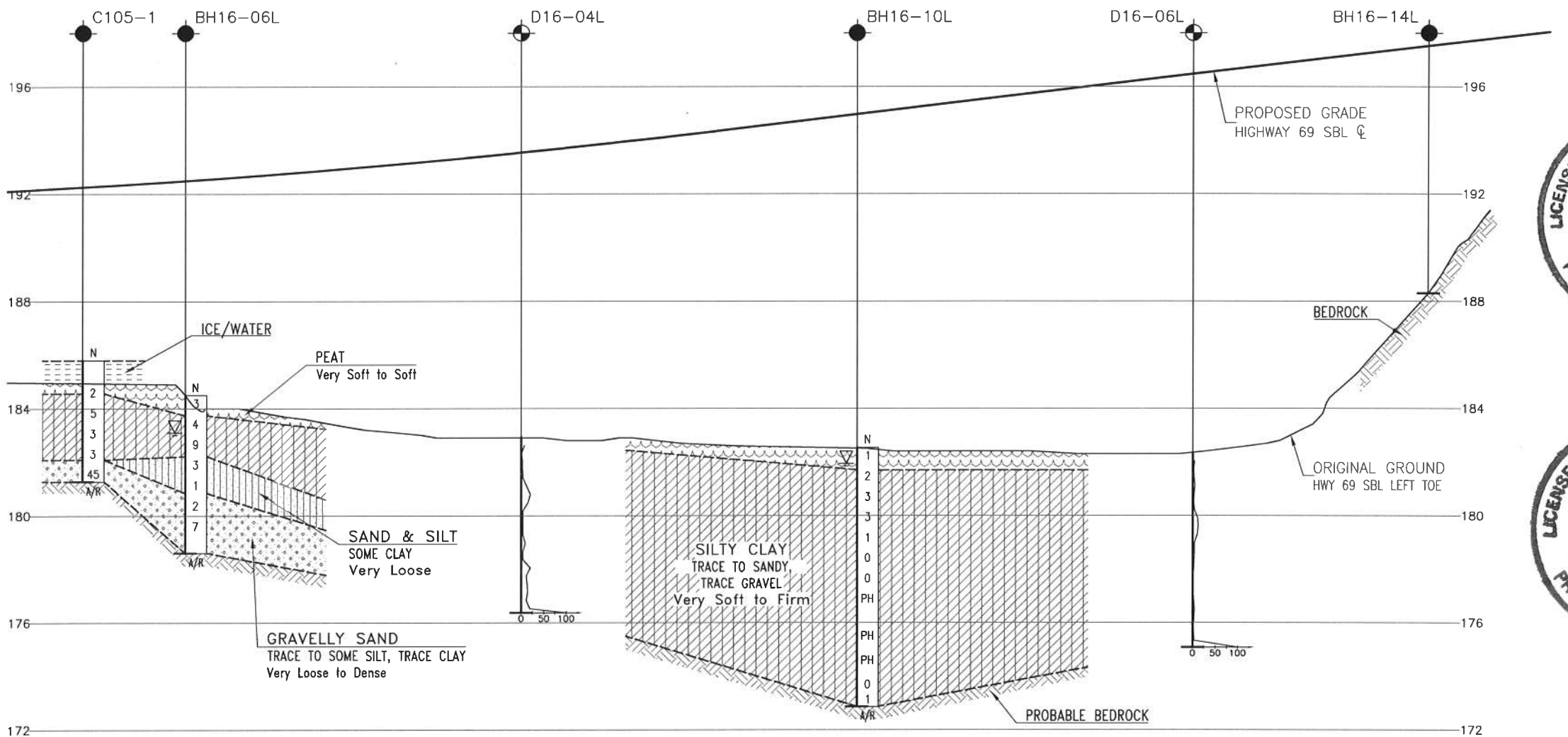
- | | |
|---|---------------------------------------|
|  | Borehole |
|  | Cone |
| N | Blows /0.3m (Std Pen Test, 475J/blow) |
| CONE | Blows /0.3m (60° Cone, 475J/blow) |
| PH | Pressure, Hydraulic |
|  | Water Level |
|  | Head Artesian Water |
| | Piezometer |
| 90% | Rock Quality Designation (RQD)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

NO	ELEVATION	NORTHING	EASTING
BH16-06L	184.5	5 057 642.2	233 952.5
BH16-07	185.1	5 057 668.9	233 944.5
BH16-08R	189.0	5 057 699.7	233 941.0
BH16-09	183.7	5 057 705.6	233 910.6
BH16-10L	182.5	5 057 713.5	233 882.4
BH16-11	183.6	5 057 742.3	233 876.6
BH16-12R	193.9	5 057 773.0	233 873.0
BH16-13	190.4	5 057 779.0	233 842.6
BH16-14L	188.3	5 057 777.4	233 826.2
D16-03R	191.9	5 057 658.9	233 970.5
D16-04L	182.9	5 057 674.7	233 914.0
D16-05R	191.3	5 057 737.7	233 908.5
D16-06L	182.3	5 057 747.5	233 845.5
D16-07R	195.8	5 057 795.2	233 845.5
C105-	185.8	5 057 624.7	233 956.0

-NOTES-

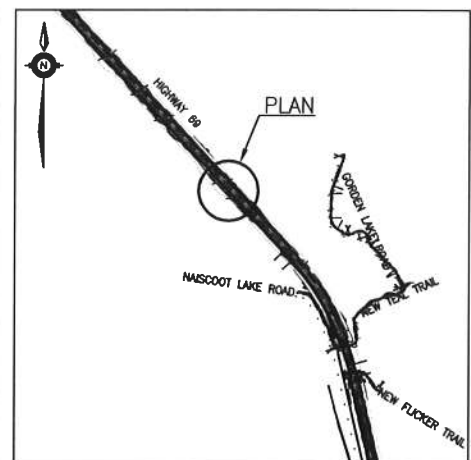
- 1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- 2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 41H-99

[illegible]







THURBER ENGINEERING LTD



KEYPLAN

LEGEND

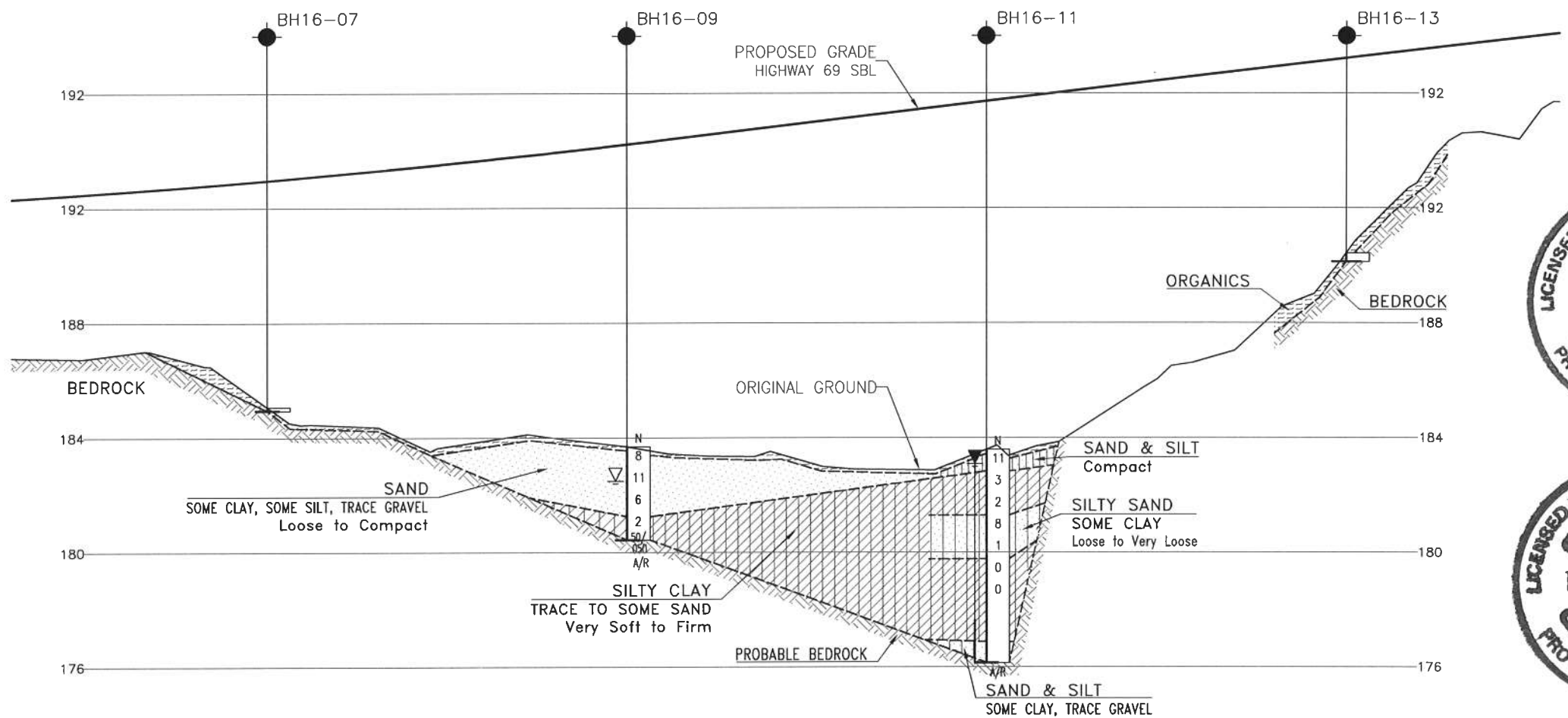
- | | |
|---|---------------------------------------|
|  | Borehole |
|  | Cone |
| N | Blows /0.3m (Std Pen Test, 475J/blow) |
| CONE | Blows /0.3m (60° Cone, 475J/blow) |
| PH | Pressure, Hydraulic |
|  | Water Level |
|  | Head Artesian Water |
| | Piezometer |
| 90% | Rock Quality Designation (RQD)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

NO	ELEVATION	NORTHING	EASTING
BH16-06L	184.5	5 057 642.2	233 952.5
BH16-07	185.1	5 057 668.9	233 944.5
BH16-08R	189.0	5 057 699.7	233 941.0
BH16-09	183.7	5 057 705.6	233 910.6
BH16-10L	182.5	5 057 713.5	233 882.4
BH16-11	183.6	5 057 742.3	233 876.6
BH16-12R	193.9	5 057 773.0	233 873.0
BH16-13	190.4	5 057 779.0	233 842.6
BH16-14L	188.3	5 057 777.4	233 826.2
D16-03R	191.9	5 057 658.9	233 970.5
D16-04L	182.9	5 057 674.7	233 914.0
D16-05R	191.3	5 057 737.7	233 908.5
D16-06L	182.3	5 057 747.5	233 845.5
D16-07R	195.8	5 057 795.2	233 845.5
C105-1	185.8	5 057 624.7	233 956.0

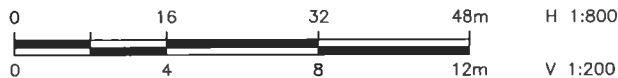
-NOTES-

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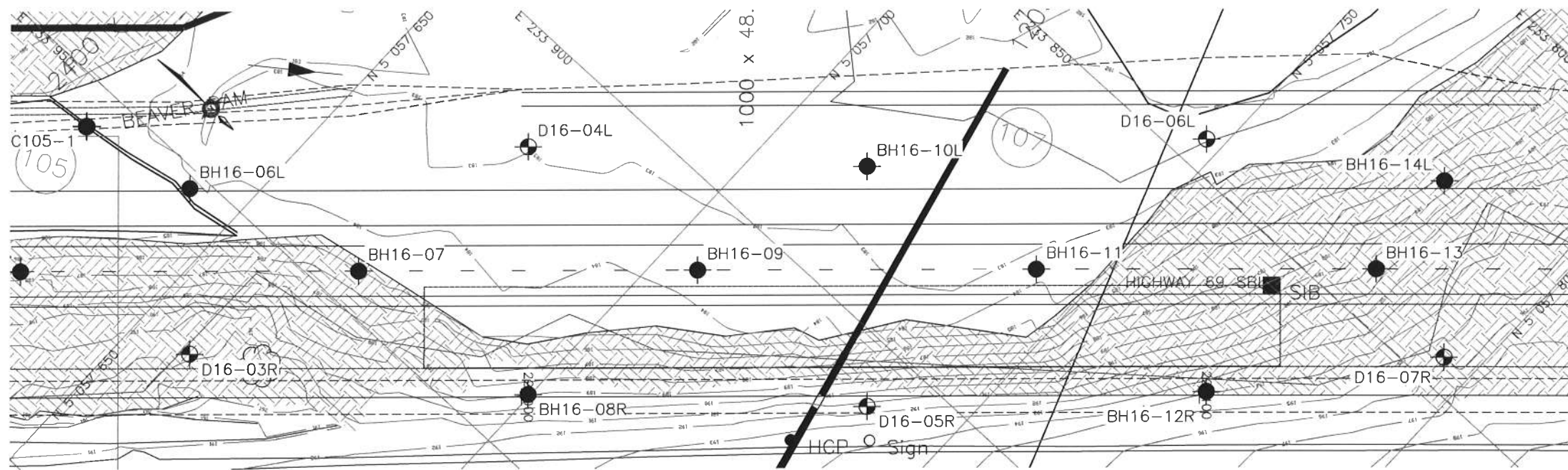
GEOCRES No. 41H-99



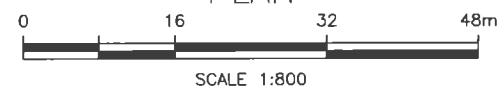
PROFILE ALONG C HIGHWAY 69 SBL



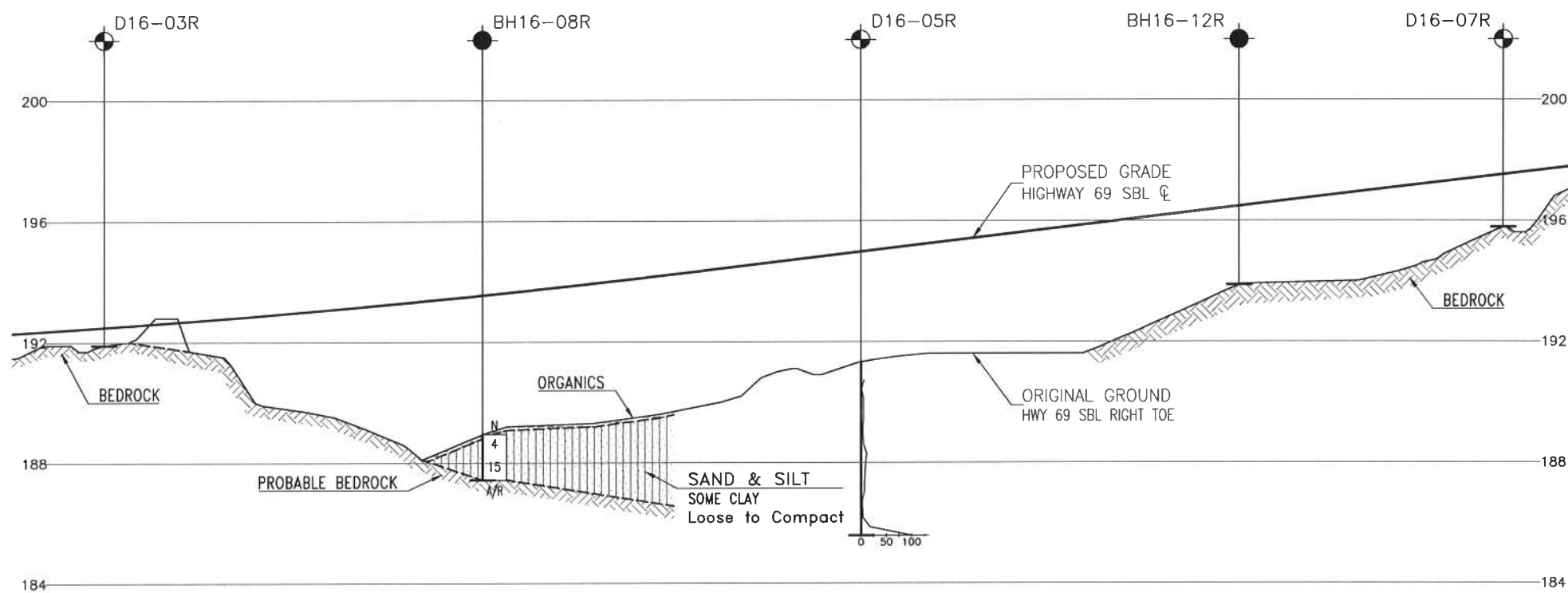
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	DATE	BY	DESCRIPTION							
	DESIGN	RPR	CHK	AEG	CODE	LOAD		DATE	DEC. 2012	
	DRAWN	MFA	CHK	PKC	SITE	STRUCT	DWG			



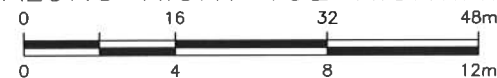
PLAN



SCALE 1:800



PROFILE ALONG RIGHT TOE HIGHWAY 69 SBL



H 1:800

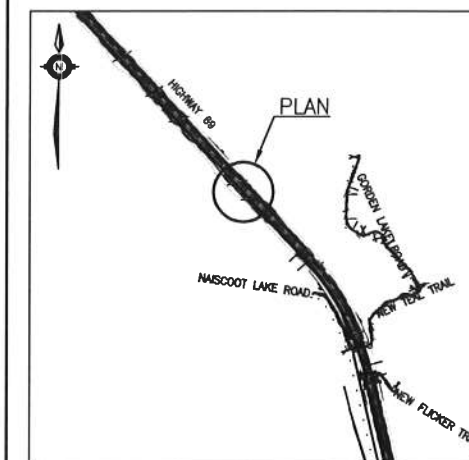
V 1:200

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-RT TOE
(STA 21+940 - 22+135)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING
BH16-06L	184.5	5 057 642.2	233 952.5
BH16-07	185.1	5 057 668.9	233 944.5
BH16-08R	189.0	5 057 699.7	233 941.0
BH16-09	183.7	5 057 705.6	233 910.6
BH16-10L	182.5	5 057 713.5	233 882.4
BH16-11	183.6	5 057 742.3	233 876.6
BH16-12R	193.9	5 057 773.0	233 873.0
BH16-13	190.4	5 057 779.0	233 842.6
BH16-14L	188.3	5 057 777.4	233 826.2
D16-03R	191.9	5 057 658.9	233 970.5
D16-04L	182.9	5 057 674.7	233 914.0
D16-05R	191.3	5 057 737.7	233 908.5
D16-06L	182.3	5 057 747.5	233 845.5
D16-07R	195.8	5 057 795.2	233 845.5
C105-3	185.8	5 057 589.5	234 042.3

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GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



Appendix C

**Highway 69 SBL
Sta. 22+350 to 22+410 Township of Harrison**


**Boreholes 17-01 to 17-07
DCPTs D17-01L to D17-03L**

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

METRIC

[illegible]

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				<p>W_p W W_L</p> <p>WATER CONTENT (%)</p> <p>20 40 60</p>		
203.9	Ground Surface						SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100				GR SA SI CL

[illegible]

METRIC


[illegible]

RECORD OF BOREHOLE No BH17-04L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+388.5 O/S 7.9L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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	
200.9	Ground Surface							20	40	60	80	100						
0.0	PEAT, some sand Firm Brown Wet (600mm)		1	SS	5													
200.3																		
0.6	END OF BOREHOLE (SAMPLER BOUNCING) AT 0.6m ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																	

+³, X³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

1 OF 1

METRIC

DATUM	Geodetic	DATE	2008.10.05 - 2008.10.05	CHECKED BY	RPR
-------	----------	------	-------------------------	------------	-----

[illegible]

+ $^3, \times^3$: Numbers refer to Sensitivity

METRIC

[illegible]

+ $^3 \times ^3$: Numbers refer to Sensitivity

METRIC

[illegible]

RECORD OF BOREHOLE No D17-01L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+363.5 O/S 6.3L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2009.10.05 - 2009.10.05 CHECKED BY RPR

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		
203.1	Ground Surface															
0.0	BEDROCK AT SURFACE.															

RECORD OF BOREHOLE No D17-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+388.5 O/S 7.9R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2009.10.05 - 2009.10.05 CHECKED BY RPR

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				
201.8	Ground Surface							20 40 60 80 100						
0.0														
201.4														
0.4	BEDROCK AT 0.4m.													
				</										

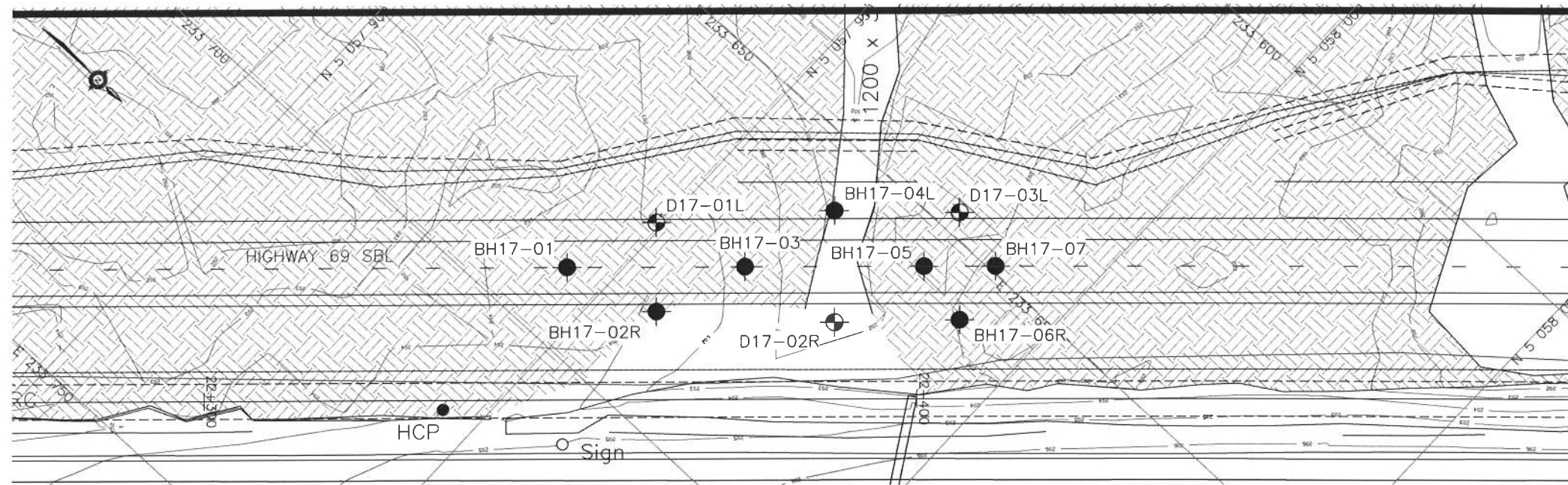
RECORD OF BOREHOLE No D17-03L

1 OF 1

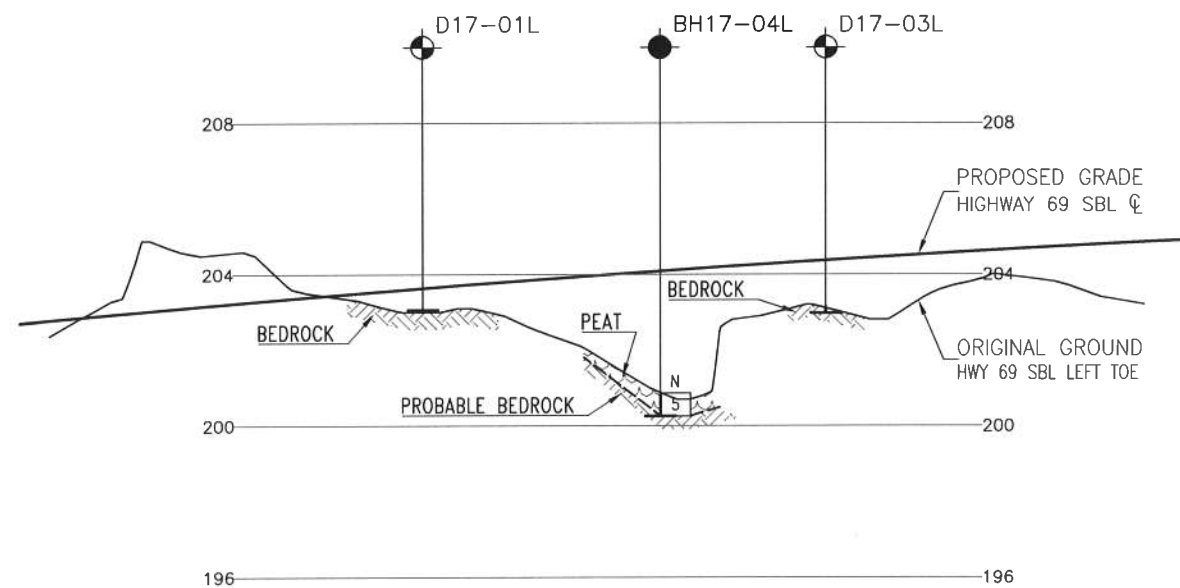
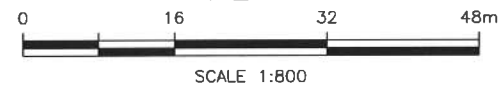
METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+406 O/S 7.6L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2009.10.05 - 2009.10.05 CHECKED BY RPR

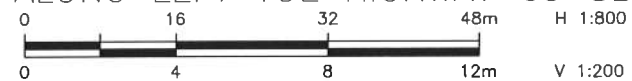
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
							20	40	60	80	100	W _p	W	W _L		
203.1	Ground Surface															
0.0																
0.2	BEDROCK AT 0.2m															



PLAN



PROFILE ALONG LEFT TOE HIGHWAY 69 SBL



METRIC

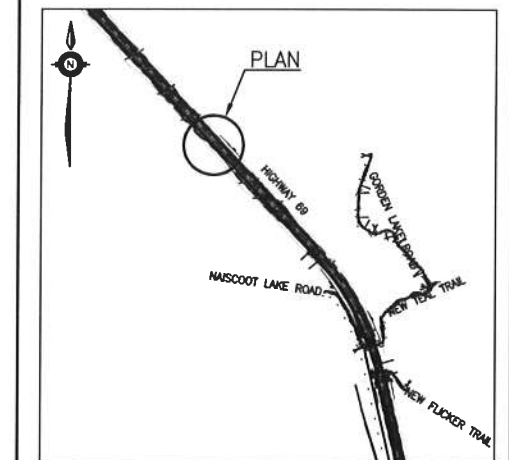
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-LT TOE
(STA 22+350 - 22+410)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.

KEYPLAN
LEGEND

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

NO	ELEVATION	NORTHING	EASTING
BH17-01	203.5	5 057 944.1	233 689.8
BH17-02R	203.9	5 057 957.6	233 686.0
BH17-03	202.6	5 057 962.5	233 672.9
BH17-04L	200.9	5 057 966.3	233 658.6
BH17-05	203.2	5 057 980.8	233 655.9
BH17-06R	203.2	5 057 989.7	233 658.1
BH17-07	203.2	5 057 988.2	233 649.1
D17-01L	203.1	5 057 949.0	233 676.7
D17-02R	201.8	5 057 977.0	233 670.2
D17-03L	203.1	5 057 979.3	233 646.9

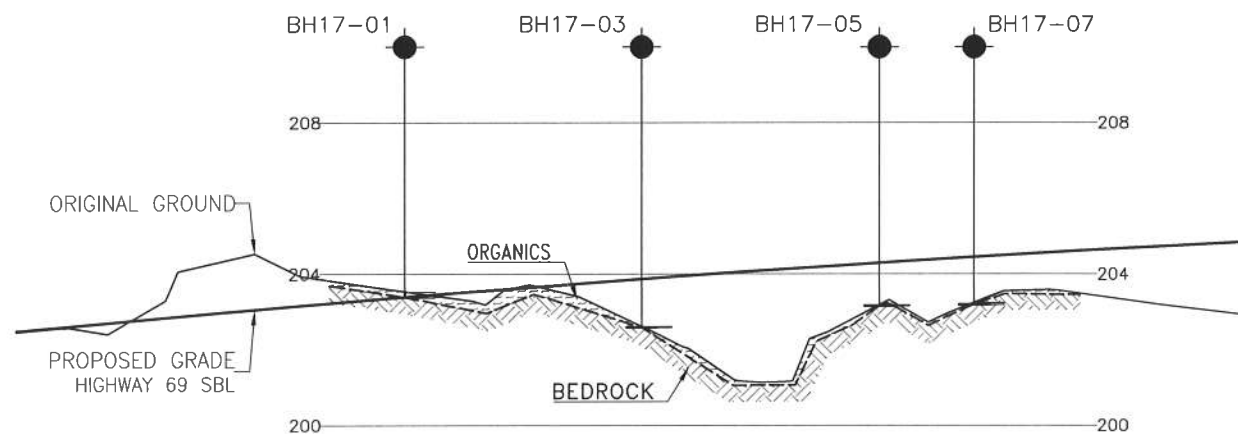
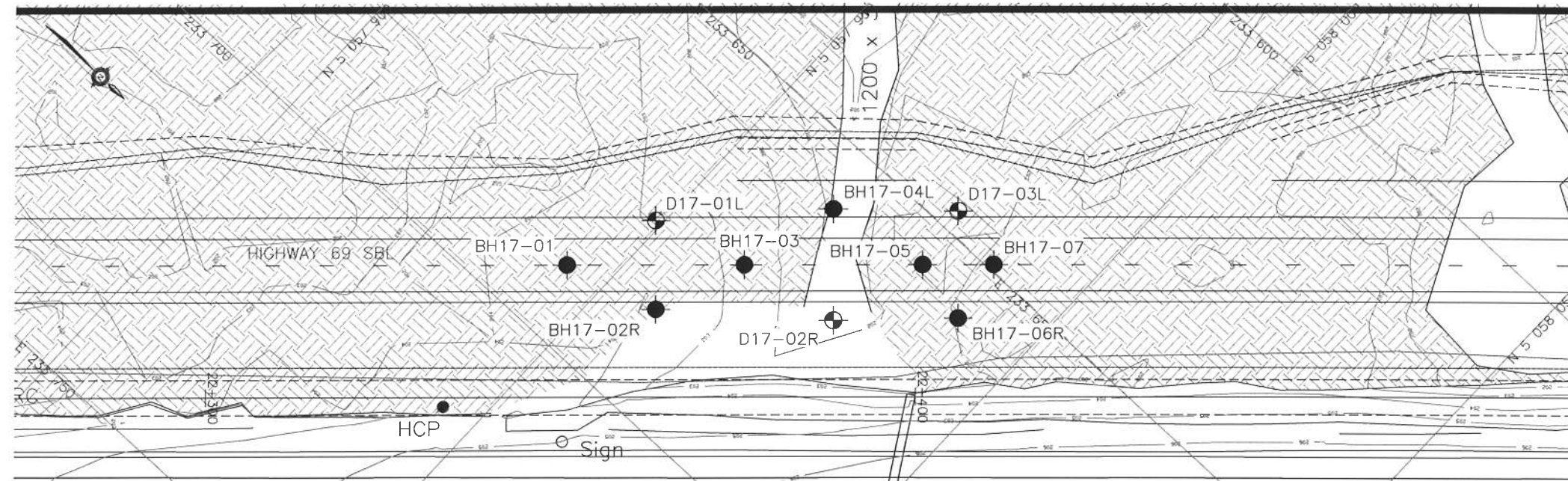
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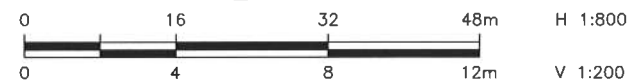
GEOCRES No. 41H-99



REVISIONS	DATE	BY	DESCRIPTION
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DRAWN	MFA	CHK PKC	SITE
LOAD			
STRUCT			
DWG			
DATE	DEC. 2012		

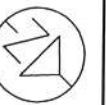


PROFILE ALONG ϕ HIGHWAY 69 SBL

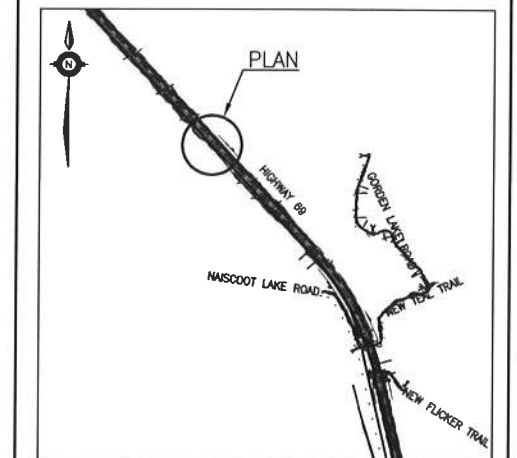


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL- ϕ
(STA 22+350 - 22+410)
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
BH17-01	203.5	5 057 944.1	233 689.8
BH17-02R	203.9	5 057 957.6	233 686.0
BH17-03	202.6	5 057 962.5	233 672.9
BH17-04L	200.9	5 057 966.3	233 658.6
BH17-05	203.2	5 057 980.8	233 655.9
BH17-06R	203.2	5 057 989.7	233 658.1
BH17-07	203.2	5 057 988.2	233 649.1
D17-01L	203.1	5 057 949.0	233 676.7
D17-02R	201.8	5 057 977.0	233 670.2
D17-03L	203.1	5 057 979.3	233 646.9

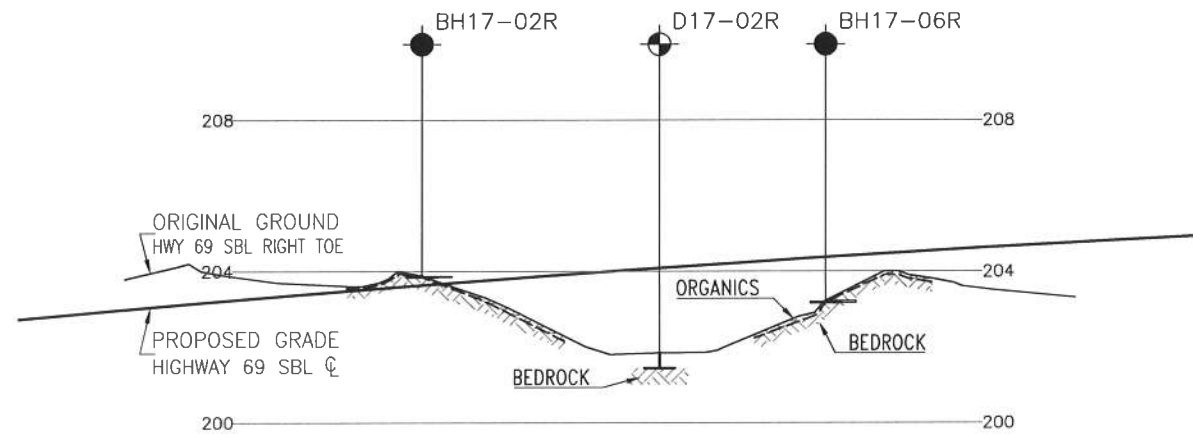
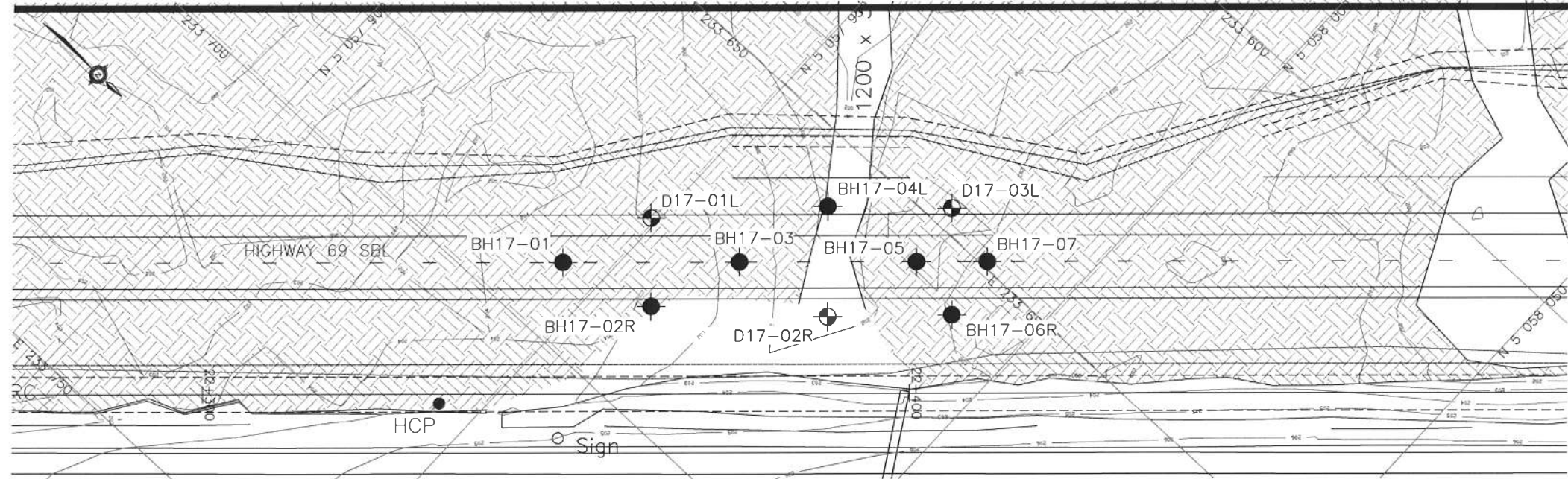
-NOTES-

- 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. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012





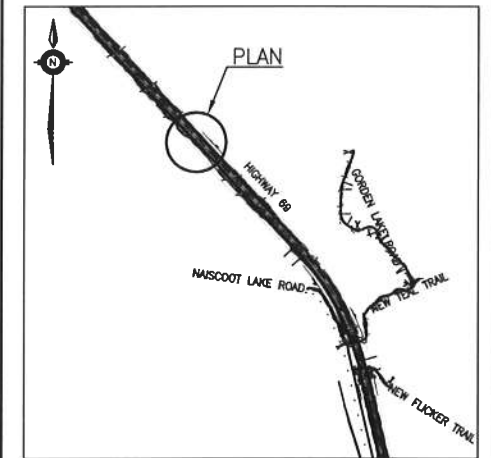
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-RT TOE
(STA 22+350 - 22+410)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN
LEGEND

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

NO	ELEVATION	NORTHING	EASTING
BH17-01	203.5	5 057 944.1	233 689.8
BH17-02R	203.9	5 057 957.6	233 686.0
BH17-03	202.6	5 057 962.5	233 672.9
BH17-04L	200.9	5 057 966.3	233 658.6
BH17-05	203.2	5 057 980.8	233 655.9
BH17-06R	203.2	5 057 989.7	233 658.1
BH17-07	203.2	5 057 988.2	233 649.1
D17-01L	203.1	5 057 949.0	233 676.7
D17-02R	201.8	5 057 977.0	233 670.2
D17-03L	203.1	5 057 979.3	233 646.9

-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. 41H-99

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DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



Appendix D

**Highway 69 SBL
Sta. 22+475 to 22+565 Township of Harrison**

**Boreholes 18-01 to 18-09
DCPTs D18-01R to D18-04L**

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

RECORD OF BOREHOLE No BH18-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+476 C/L, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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							
201.2	Ground Surface							20 40 60 80 100							
0.0	ORGANICS: (25mm)							20 40 60 80 100							
	SAND, trace organics		1	SS	2		201								
	Very Loose														
200.5	Brown														
0.7	Moist		2	SS	3/										
	END OF BOREHOLE AT 0.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.				.050										

RECORD OF BOREHOLE No BH18-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+488.5 O/S 11.3L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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		
201.2	Ground Surface													
0.0	PEAT, fibrous Very Soft to Firm Dark Brown Wet		1	SS	0		201							
200.6														
0.6	SAND, some silt, trace clay, trace gravel Loose Brown Wet		2	SS	8		200							1 88 11 (SI+CL)
199.6														
1.6	END OF BOREHOLE AT 1.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.													

METRIC

[illegible]

RECORD OF BOREHOLE No BH18-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+513.5 O/S 7.7R, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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									
205.0	Ground Surface																
0.0	ORGANICS: (125mm)																
0.1	SAND, trace silt Very Loose		1	SS	4												
204.4	Brown																
0.6	Moist																
	END OF BOREHOLE (SAMPLER BOUNCING) AT 0.6m ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																

METRIC

[illegible]

RECORD OF BOREHOLE No BH18-06L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+538.5 O/S 8.4L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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 (%)	W _p	W	W _L		
204.3	Ground Surface													
8.8	ORGANICS: (25mm) BEDROCK AT 0.025m.													

RECORD OF BOREHOLE No BH18-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+551 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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					WATER CONTENT (%)				
							20	40	60	80	100	W _p	W	W _L			
203.7	Ground Surface																
0.0	PEAT: Very Soft Brown Wet		1	SS	0												
202.9	END OF BOREHOLE AT 0.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																
0.8																	

RECORD OF BOREHOLE No BH18-08R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+556 O/S 8.5R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR





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 (%)				
204.0	Ground Surface							20 40 60 80 100						
0.0	PEAT, trace sand		1	SS	51/	▽	204	○ UNCONFINED + FIELD VANE						
203.7	Brown				225			● QUICK TRIAXIAL × LAB VANE						
0.3	Wet							20 40 60 80 100						
	END OF BOREHOLE AT 0.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 0.2m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.													

RECORD OF BOREHOLE No BH18-09

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+566 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE								WATER CONTENT (%) w _p w w _L	
204.1	Ground Surface							20	40	60	80	100					
0.0	PEAT		1	SS	4		204										
203.6	Soft																
	Brown																
0.5	Wet																
	END OF BOREHOLE AT 0.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																

RECORD OF BOREHOLE No D18-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+488.5 O/S 11.3R, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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 (%)									
201.1	Ground Surface								20	40	60	80	100	w _p	w	w _L		
0.0	DCPT from surface								201									
									200									
199.3																		
1.8	END OF DCPT AT 1.8m UPON REFUSAL ON PROBABLE BEDROCK.																	

METRIC

[illegible]

RECORD OF BOREHOLE No D18-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+538.5 O/S 8.4R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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								WATER CONTENT (%)
204.0	Ground Surface						204	20	40	60	80	100	20	40	60	GR SA SI CL
0.0	DCPT from surface															
203.5																
0.5	END OF DCPT AT 0.5m UPON REFUSAL ON PROBABLE BEDROCK															

RECORD OF BOREHOLE No D18-04L

1 OF 1

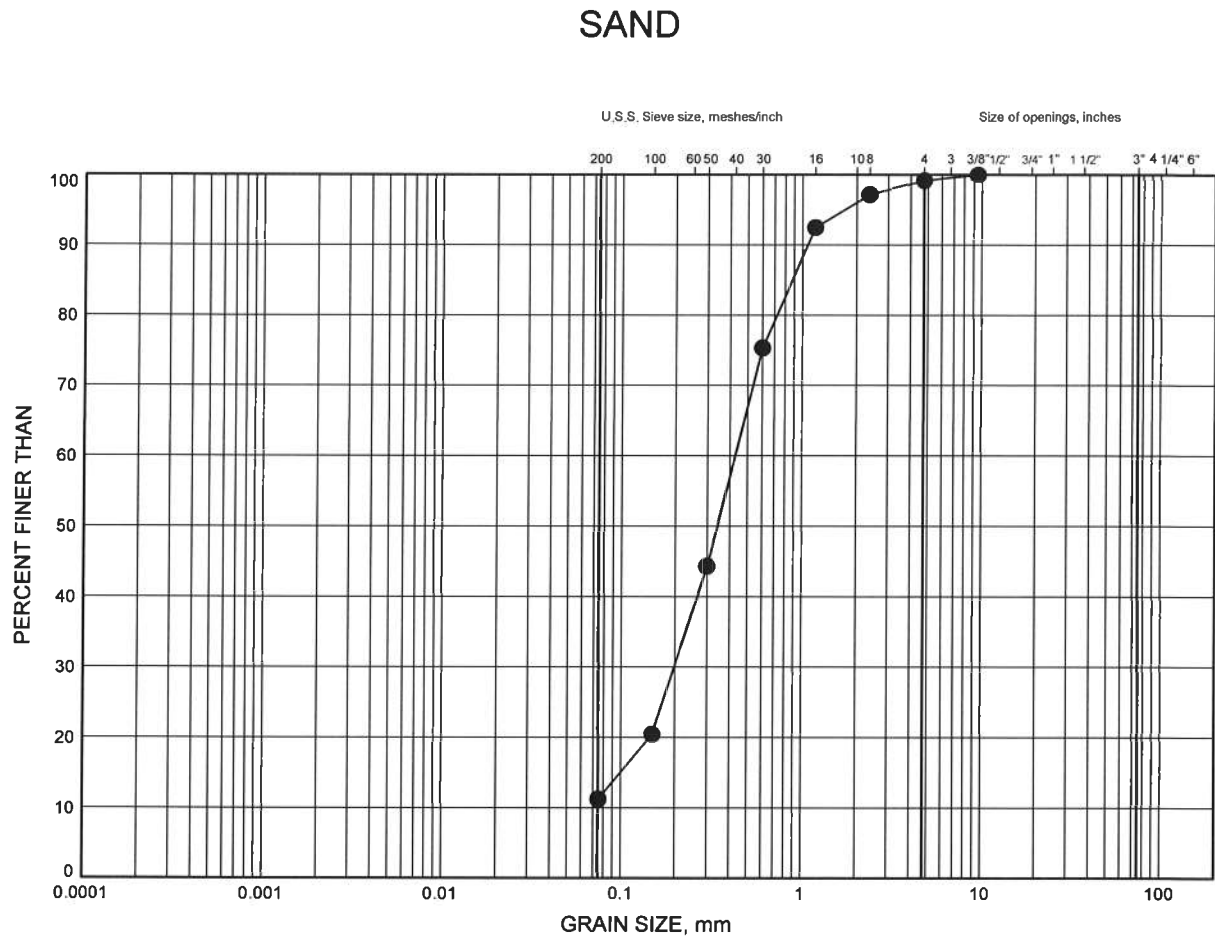
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 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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 Y	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
203.6	Ground Surface													
0.0	DCPT from surface													
203.0														
0.6	END OF DCPT AT 0.6m UPON REFUSAL ON PROBABLE BEDROCK.													

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE D1



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

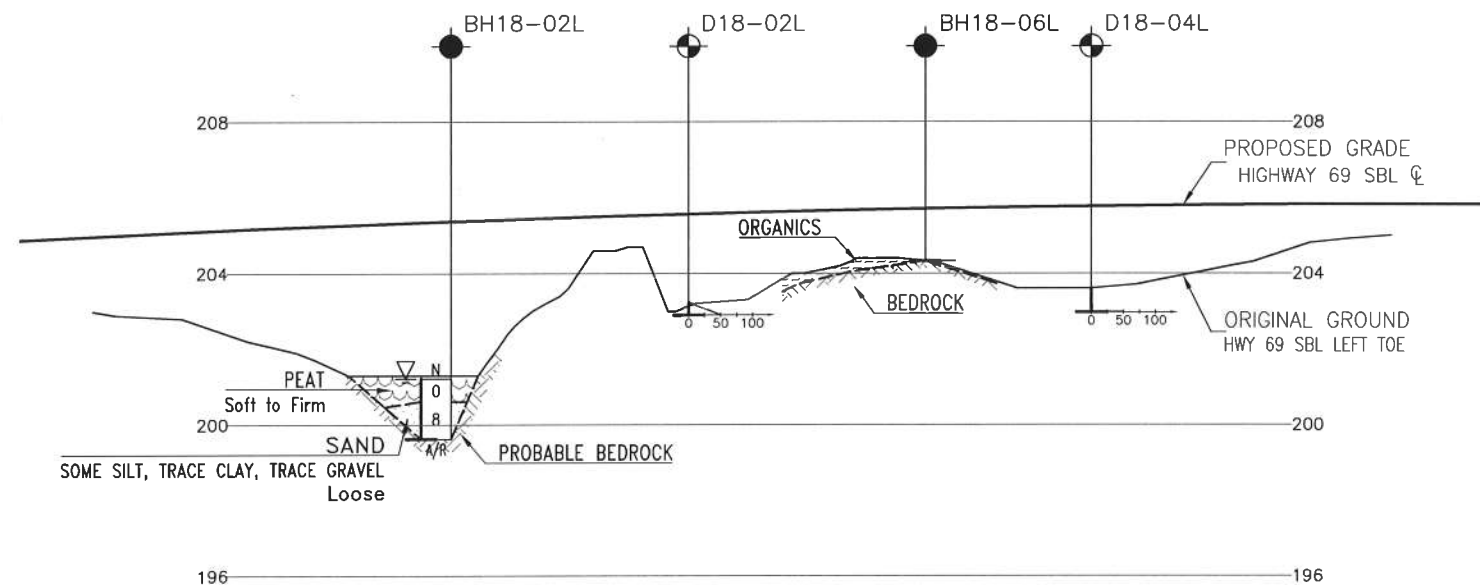
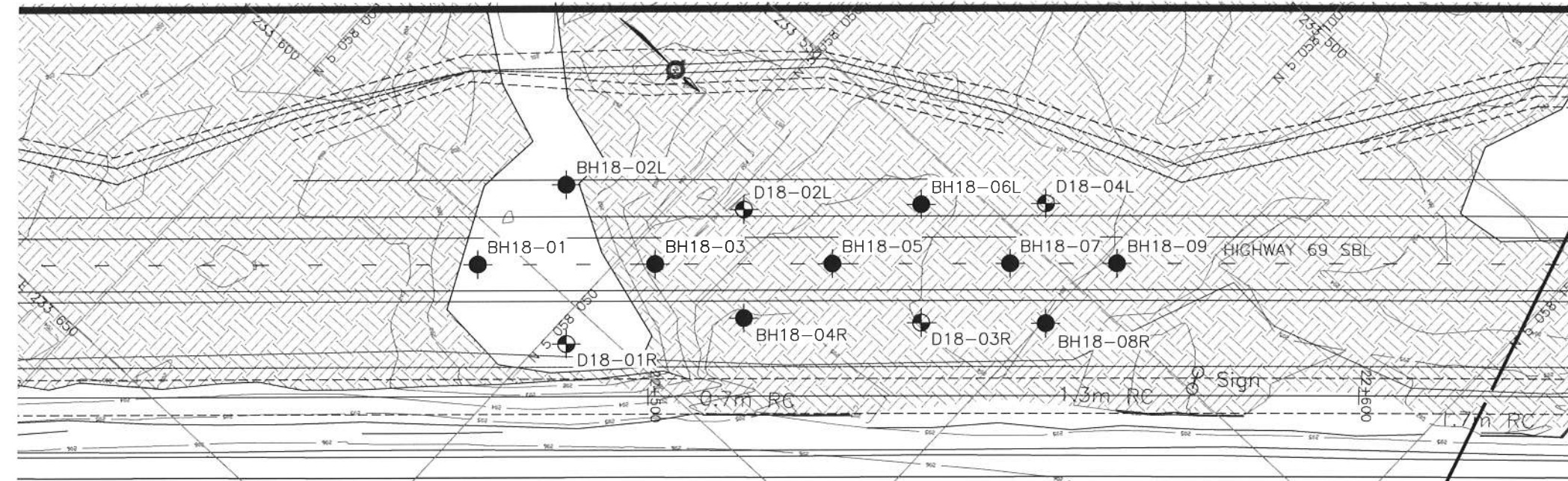
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH18-02L	1.07	200.13

Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA



PROFILE ALONG LEFT TOE HIGHWAY 69 SBL

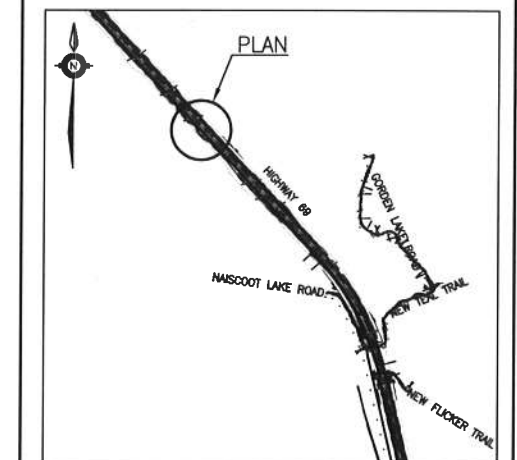


METRIC
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CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-LT TOE
(STA 22+475 - 22+565)
BOREHOLE LOCATIONS AND SOIL STRATA



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

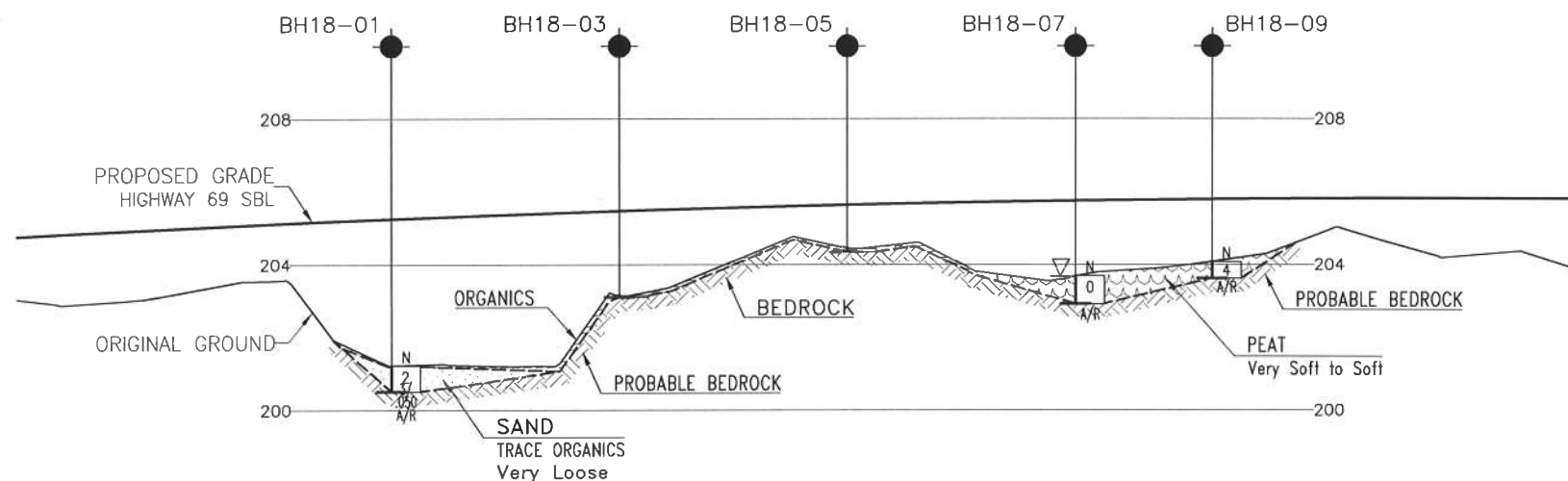
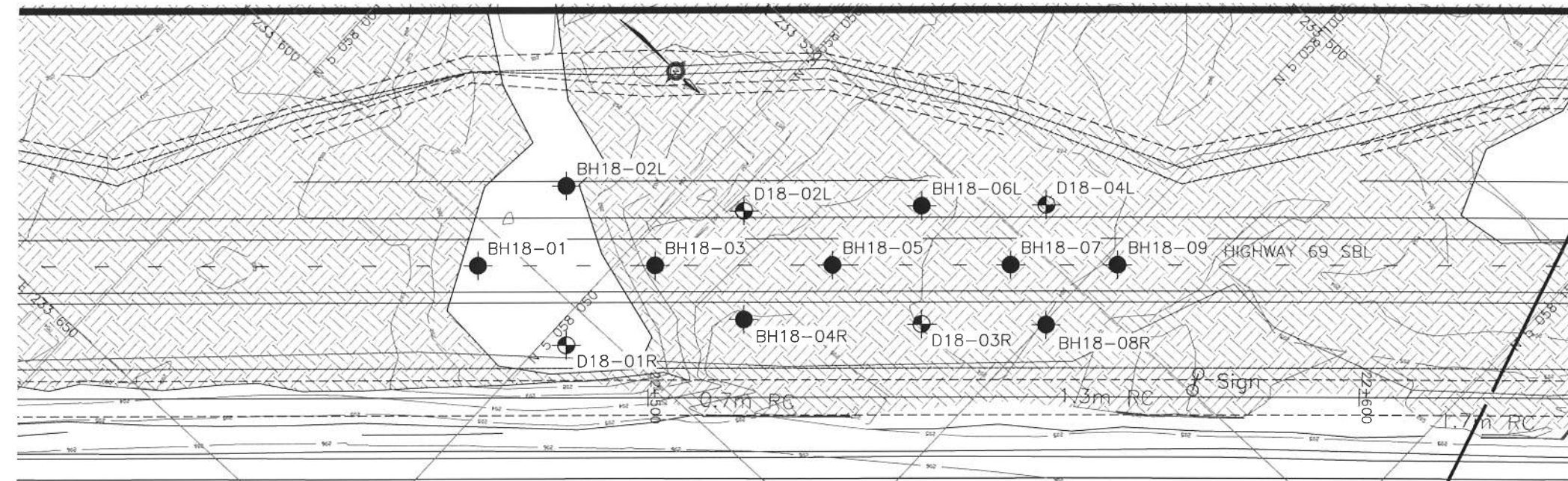
NO	ELEVATION	NORTHING	EASTING
BH18-01	201.2	5 058 035.9	233 605.0
BH18-02L	201.2	5 058 037.4	233 588.2
BH18-03	203.2	5 058 054.2	233 588.0
BH18-04R	205.0	5 058 068.6	233 585.1
BH18-05	204.5	5 058 072.6	233 571.0
BH18-06L	204.3	5 058 076.1	233 556.3
BH18-07	203.7	5 058 090.9	233 554.0
BH18-08R	204.0	5 058 100.4	233 556.9
BH18-09	204.1	5 058 102.0	233 543.8
D18-01R	201.1	5 058 052.7	233 604.8
D18-02L	203.2	5 058 058.2	233 573.8
D18-03R	204.0	5 058 087.5	233 568.7
D18-04L	203.6	5 058 088.8	233 544.4

NOTES-

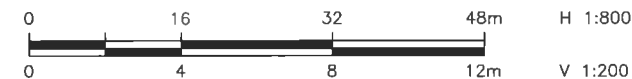
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GEOCRES No. 41H-99

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DRAWN	MFA	CHK PKC	SITE
			LOAD
			DATE DEC. 2012
			STRUCT
			DWG

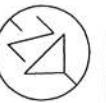


PROFILE ALONG ϕ HIGHWAY 69 SBL

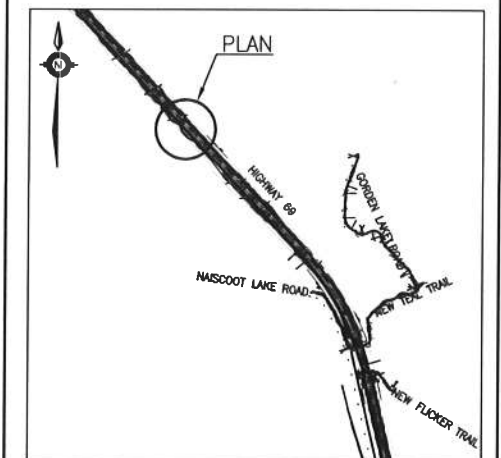


METRIC
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CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL- ϕ
(STA 22+475 - 22+565)
BOREHOLE LOCATIONS AND SOIL STRATA



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
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90%	Rock Quality Designation (RQD)
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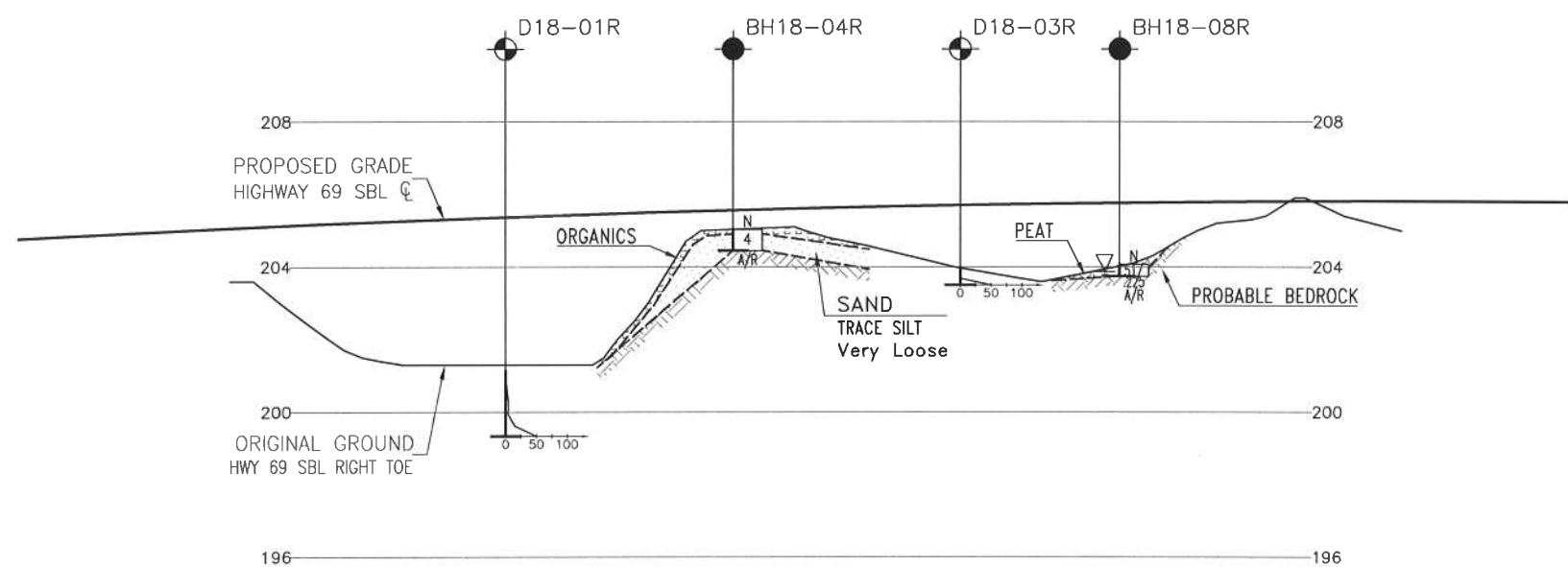
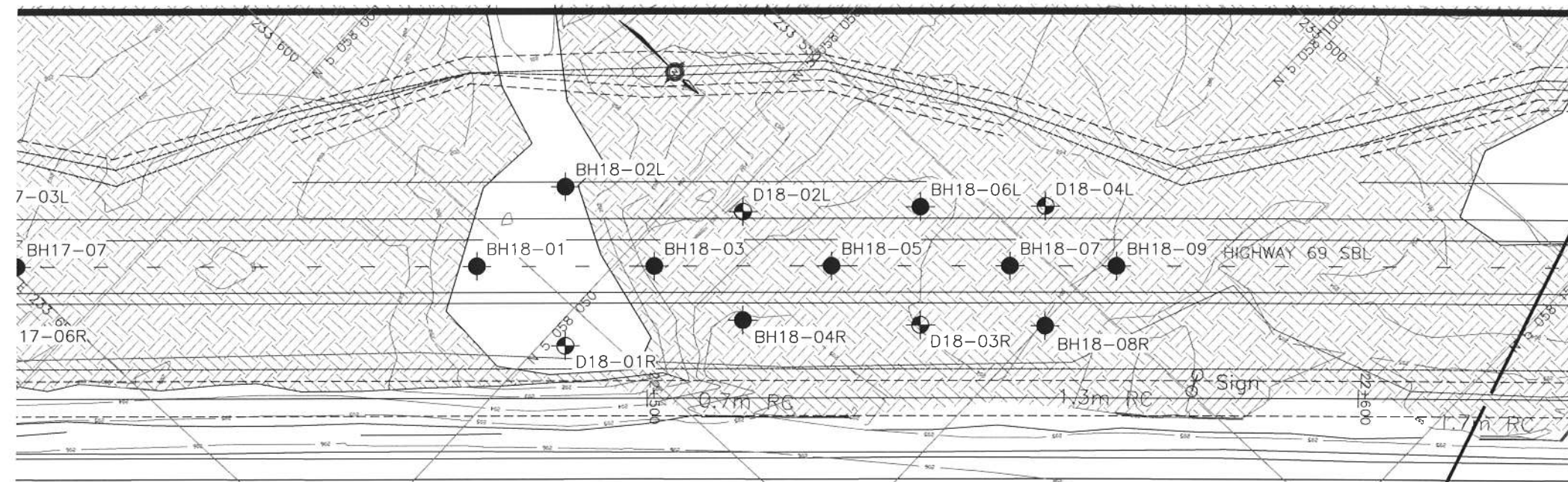
NO	ELEVATION	NORTHING	EASTING
BH18-01	201.2	5 058 035.9	233 605.0
BH18-02L	201.2	5 058 037.4	233 588.2
BH18-03	203.2	5 058 054.2	233 588.0
BH18-04R	205.0	5 058 068.6	233 585.1
BH18-05	204.5	5 058 072.6	233 571.0
BH18-06L	204.3	5 058 076.1	233 556.3
BH18-07	203.7	5 058 090.9	233 554.0
BH18-08R	204.0	5 058 100.4	233 556.9
BH18-09	204.1	5 058 102.0	233 543.8
D18-01R	201.1	5 058 052.7	233 604.8
D18-02L	203.2	5 058 058.2	233 573.8
D18-03R	204.0	5 058 087.5	233 568.7
D18-04L	203.6	5 058 088.8	233 544.4

-NOTES-

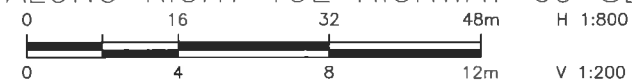
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GEOCREs No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			DATE DEC. 2012
			DWG



PROFILE ALONG RIGHT TOE HIGHWAY 69 SBL



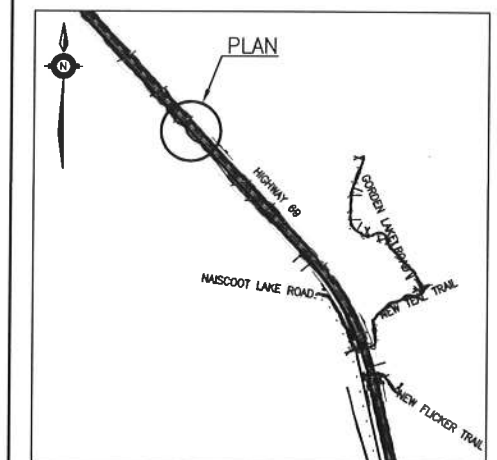
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-RT TOE
(STA 22+475 - 22+565)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN
LEGEND

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

NO	ELEVATION	NORTHING	EASTING
BH18-01	201.2	5 058 035.9	233 605.0
BH18-02L	201.2	5 058 037.4	233 588.2
BH18-03	203.2	5 058 054.2	233 588.0
BH18-04R	205.0	5 058 068.6	233 585.1
BH18-05	204.5	5 058 072.6	233 571.0
BH18-06L	204.3	5 058 076.1	233 556.3
BH18-07	203.7	5 058 090.9	233 554.0
BH18-08R	204.0	5 058 100.4	233 556.9
BH18-09	204.1	5 058 102.0	233 543.8
D18-01R	201.1	5 058 052.7	233 604.8
D18-02L	203.2	5 058 058.2	233 573.8
D18-03R	204.0	5 058 087.5	233 568.7
D18-04L	203.6	5 058 088.8	233 544.4

-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. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



Appendix E

**Highway 69 SBL
Sta. 22+750 to 22+825**

**Boreholes 19-01 to 19-07
DCPTs D19-01R to D19-03R**

**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		<div> <div>PLASTIC LIMIT</div> <div>NATURAL MOISTURE CONTENT</div> <div>LIQUID LIMIT</div> </div>	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			<div> <div>20406080100</div> </div>				
								<div> <div>SHEAR STRENGTH kPa</div> <div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div> </div> </div>	<div> <div>WATER CONTENT (%)</div> <div>204060</div> </div>			
204.8	Ground Surface									<div> <div>W_p</div> <div>W</div> <div>W_L</div> </div>	<div> <div>γ</div> <div>kN/m³</div> </div>	GR SA SI C

[illegible]

ONTMT4S 6121.GPJ 12/11/12

+ 3 × 3: Numbers refer to Sensitivity

METRIC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE			"N" VALUES		w_p ———— w ———— w_L WATER CONTENT (%)		
204.3	Ground Surface						SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100 20 40 60 80 100	20 40 60		kN/m ³	GR SA SI CL



ONTMT4S 6121.GPJ 12/11/12

RECORD OF BOREHOLE No BH19-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+776 C/L, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

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						
203.3	Ground Surface							20 40 60 80 100						
0.0	ORGANICS, trace sand; (200mm) Brown		1	SS	51/			20 40 60 80 100						
0.2	Wet END OF BOREHOLE AT 0.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.				225									

RECORD OF BOREHOLE No BH19-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+788.5 O/S 9.9R, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.10.04 - 2008.10.04 CHECKED BY RPR



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									
201.7	Ground Surface							20	40	60	80	100					
0.0	ORGANICS, some sand: (200mm)		1	SS	51/												
0.2	Brown Wet				200												
	END OF BOREHOLE AT 0.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 0.2m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																

RECORD OF BOREHOLE No BH19-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+801 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008 10 05 - 2008 10 05 CHECKED BY RPR

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					WATER CONTENT (%)						
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					W P W W L						
201.6	Ground Surface							20	40	60	80	100	20	40	60	kN/m ³	GR SA SI CL		
0.0	PEAT, fibrous, some sand Very Soft Brown Wet		1	SS	0		201									114	1 67 23 9		
200.9																			
0.7	Silty SAND, trace gravel, trace clay, some peat Very Loose Grey to Brown Wet		2	SS	2														
199.8			3	SS	54/	200													
1.8	END OF BOREHOLE AT 1.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.				150														

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 (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa		W P W W L				
202.8	Ground Surface						20 40 60 80 100	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE		WATER CONTENT (%)				
8.8	ORGANICS: (25mm)						20 40 60 80 100			20 40 60				
	BEDROCK AT 0.025m													

RECORD OF BOREHOLE No BH19-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+826 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

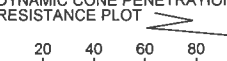
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT w _P w w _L WATER CONTENT (%)		
203.0	Ground Surface							20	40	60	80	100	20	40	60		
0.0	ORGANICS: (300mm)		1	SS	51/		203							o			
202.7	Brown																
0.3	Moist				250												
	END OF BOREHOLE AT 0.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																

RECORD OF BOREHOLE No D19-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+763.5 O/S 7.8R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.05 - 2008.10.05 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT w _p w w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
203.0	Ground Surface										
0.0	DCPT from surface.						203				
202.7											
0.3	END OF DCPT AT 0.3m UPON REFUSAL ON PROBABLE BEDROCK.										

RECORD OF BOREHOLE No D19-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+788.5 O/S 9.9L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.04 - 2008.10.04 CHECKED BY RPR

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			WATER CONTENT (%)			GR	SA		
201.9	Ground Surface														
0.0	DCPT from surface,														
201.4															
0.5	END OF DCPT AT 0.5m UPON REFUSAL ON PROBABLE BEDROCK.														

RECORD OF BOREHOLE No D19-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 22+813.5 O/S 7.1R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008.10.04 - 2008.10.04 CHECKED BY RPR

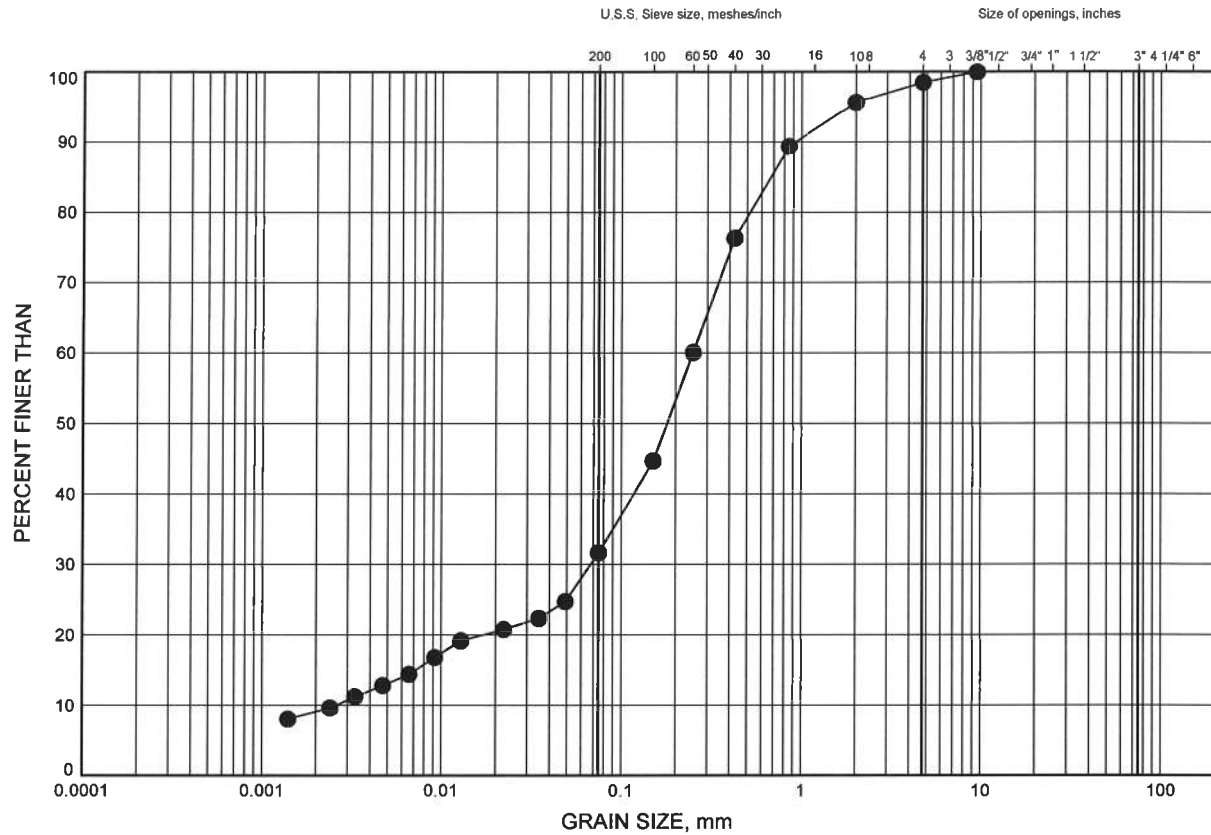
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
							20	40	60	80	100	W _p	W	W _L		
203.2	Ground Surface															
0.0	BEDROCK EXPOSED AT SURFACE.															

ONTWT4S 6121 GPJ 12/12/12

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE E1

Silty SAND



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

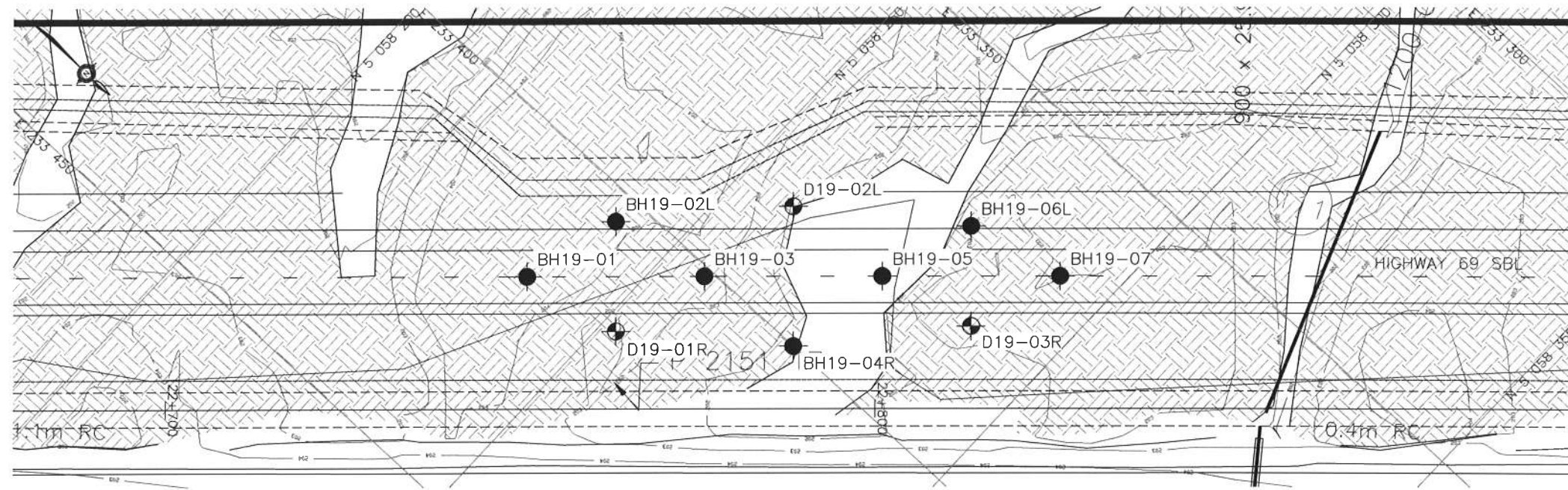
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH19-05	1.52	200.08

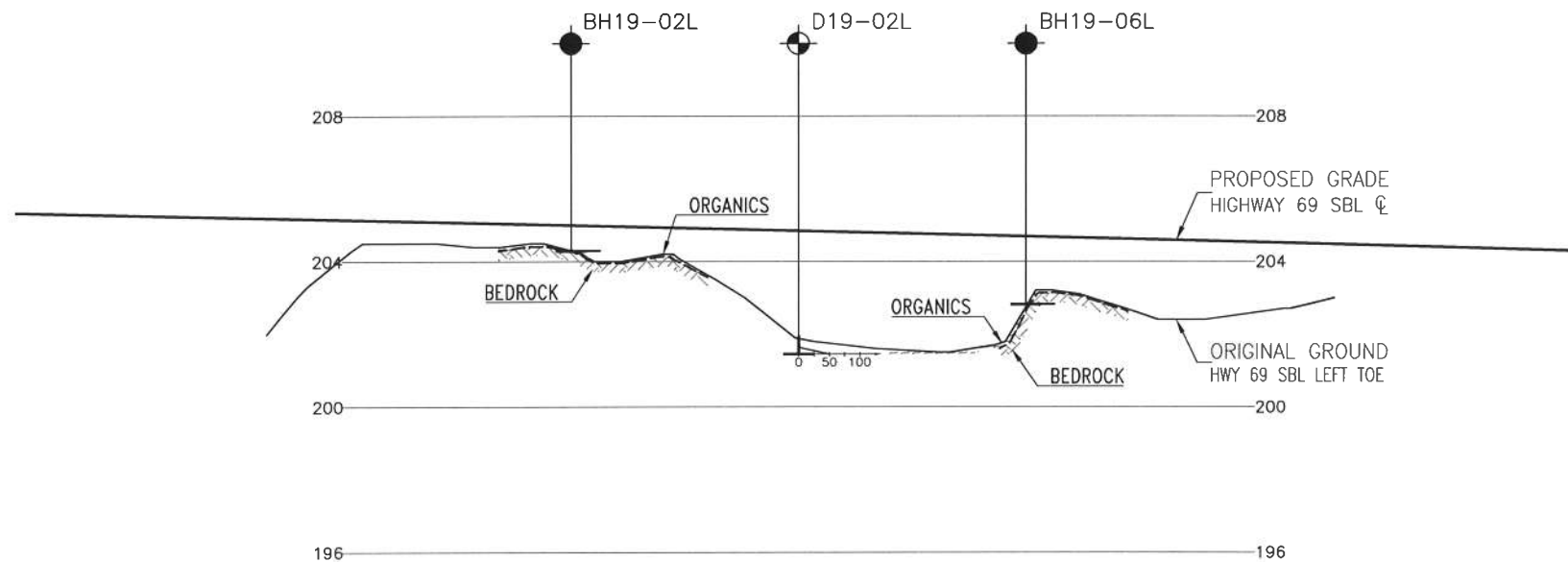
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG LEFT TOE HIGHWAY 69 SBL

0 16 32 48m H 1:800
0 4 8 12m V 1:200

METRIC

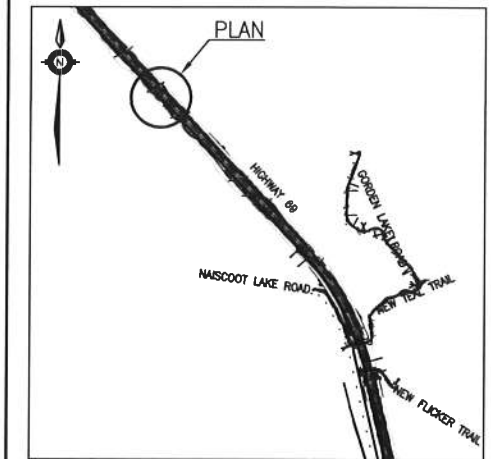
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-LT TOE
(STA 22+750 - 22+825)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING
BH19-01	204.8	5 058 237.7	233 418.2
BH19-02L	204.3	5 058 241.6	233 404.0
BH19-03	203.3	5 058 256.1	233 401.2
BH19-04R	201.7	5 058 272.0	233 400.0
BH19-05	201.6	5 058 274.4	233 384.2
BH19-06L	202.8	5 058 278.8	233 370.5
BH19-07	203.0	5 058 292.8	233 367.3
D19-01R	203.0	5 058 252.2	233 415.4
D19-02L	201.9	5 058 258.5	233 385.5
D19-03R	203.2	5 058 288.4	233 381.0

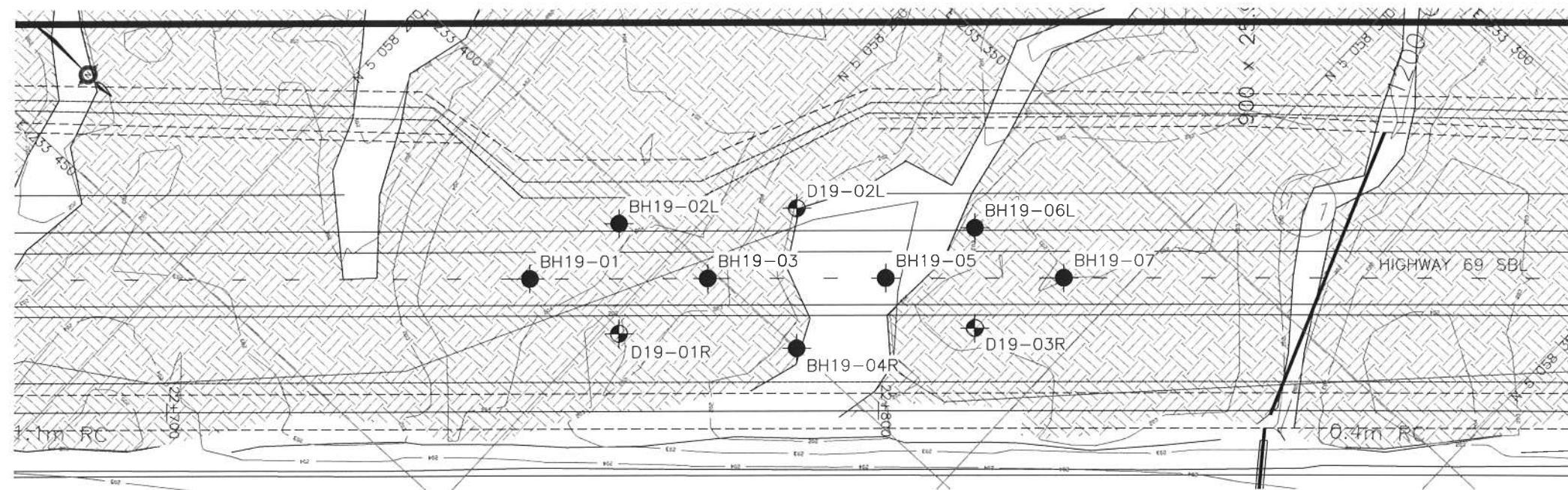
-NOTES-

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

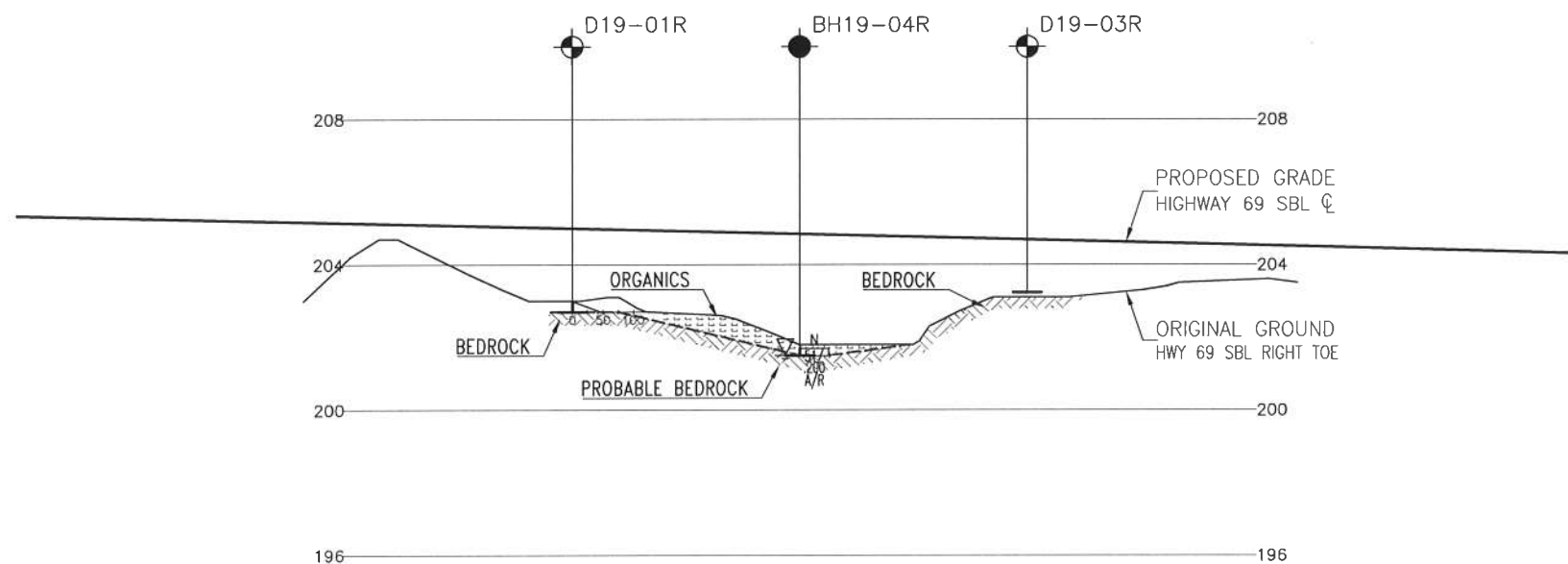
GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			DATE DEC. 2012
			STRUCT
			DWG





PLAN
0 16 32 48m
SCALE 1:800



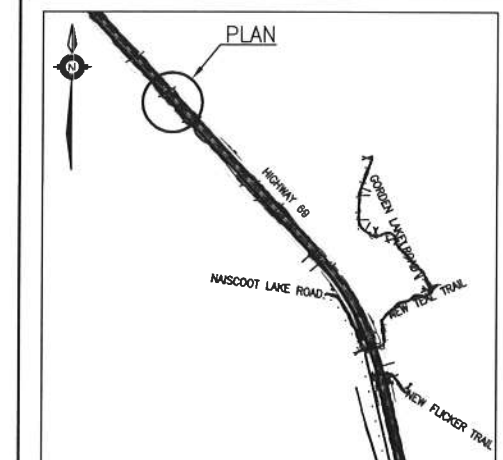
PROFILE ALONG RIGHT TOE HIGHWAY 69 SBL
0 16 32 48m
H 1:800
0 4 8 12m
V 1:200

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

CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-RT TOE
(STA 22+750 - 22+825)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING
BH19-01	204.8	5 058 237.7	233 418.2
BH19-02L	204.3	5 058 241.6	233 404.0
BH19-03	203.3	5 058 256.1	233 401.2
BH19-04R	201.7	5 058 272.0	233 400.0
BH19-05	201.6	5 058 274.4	233 384.2
BH19-06L	202.8	5 058 278.8	233 370.5
BH19-07	203.0	5 058 292.8	233 367.3
D19-01R	203.0	5 058 252.2	233 415.4
D19-02L	201.9	5 058 258.5	233 385.5
D19-03R	203.2	5 058 288.4	233 381.0

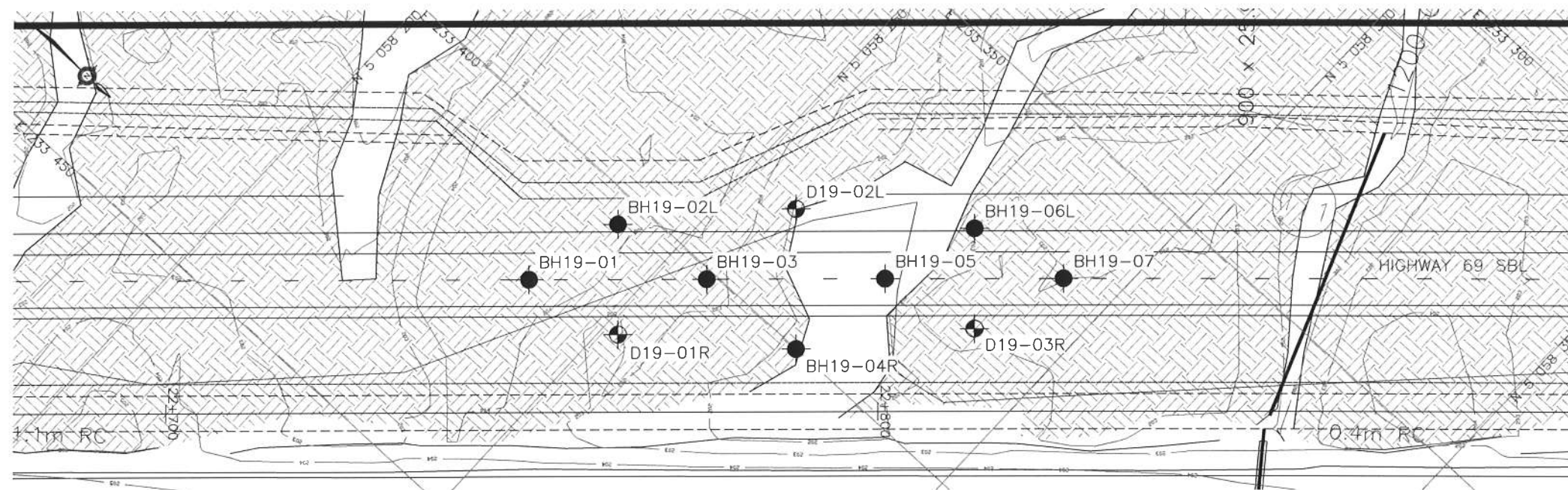
-NOTES-

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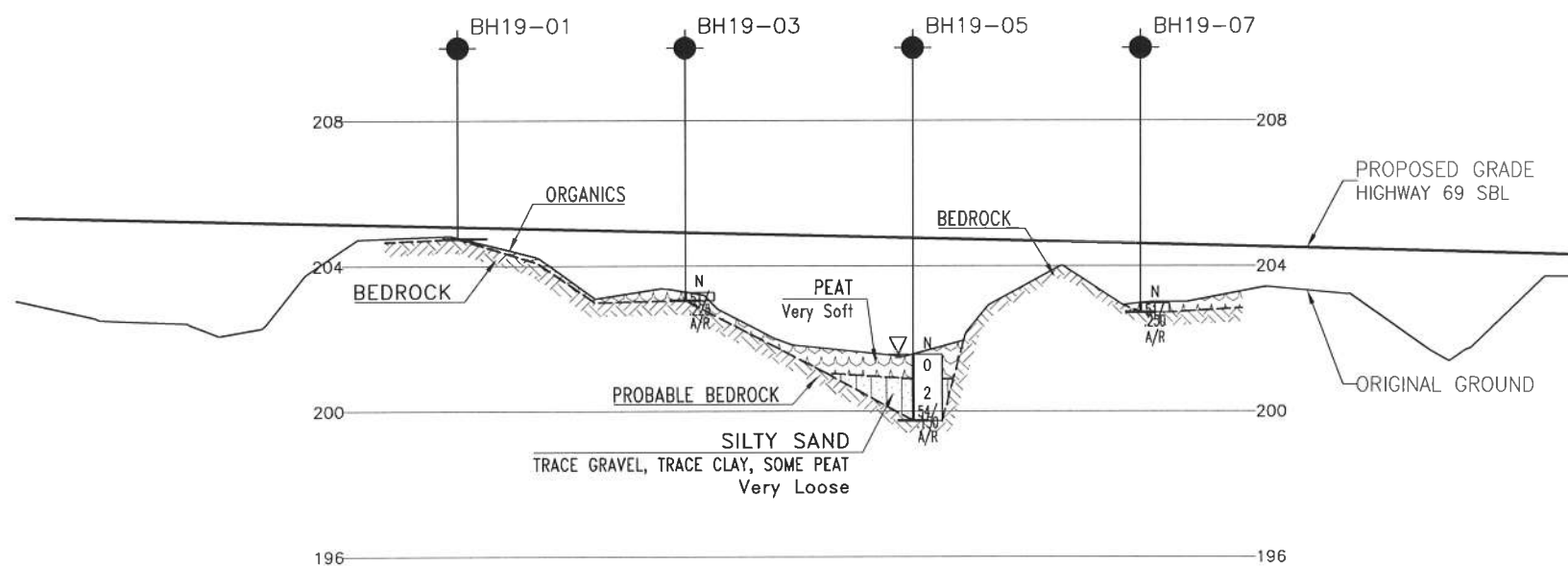
GEOCRES No. 41H-99



REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			STRUCT
			DWG



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG \mathcal{Q} HIGHWAY 69 SBL

0 16 32 48m H 1:800
0 4 8 12m V 1:200

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

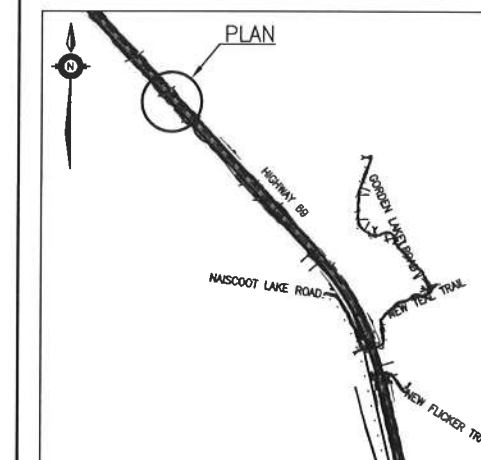
HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL- \mathcal{Q}
(STA 22+750 - 22+825)
BOREHOLE LOCATIONS AND SOIL STRATA



SHEET



THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING
BH19-01	204.8	5 058 237.7	233 418.2
BH19-02L	204.3	5 058 241.6	233 404.0
BH19-03	203.3	5 058 256.1	233 401.2
BH19-04R	201.7	5 058 272.0	233 400.0
BH19-05	201.6	5 058 274.4	233 384.2
BH19-06L	202.8	5 058 278.8	233 370.5
BH19-07	203.0	5 058 292.8	233 367.3
D19-01R	203.0	5 058 252.2	233 415.4
D19-02L	201.9	5 058 258.5	233 385.5
D19-03R	203.2	5 058 288.4	233 381.0

-NOTES-

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

GEOCRES No. 41H-99



REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012

Appendix F

**Highway 69 NBL & SBL
Sta. 23+125 to 23+215 Township of Harrison**

**Boreholes 20-01 to 20-13L, 21-01 to 21-07
DCPTs D20-01L to D20-05L, D21-01L to D21-03L**

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

RECORD OF BOREHOLE No BH20-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+126 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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 (%)				
200.5	Ground Surface							20	40	60	80	100					
0.0	ASPHALT (100mm)																
0.1	SAND and GRAVEL, some silt, trace clay, occasional asphalt and rock fill fragments Brown Moist Very Dense (FILL)		1	AS			200										40 50 10 (SI+CL)
			2	AS													
199.3			1	SS	68/275												
1.2	END OF BOREHOLE AT 1.2m UPON AUGER REFUSAL (SAMPLER BOUNCING) ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.15m, THEN ASPHALT TO SURFACE.																

RECORD OF BOREHOLE No BH20-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+138.5 O/S 6.8R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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 (%)				
200.1	Ground Surface							20 40 60 80 100		w _p w w _L				
0.0	ASPHALT (50mm)		1	AS			200	○ UNCONFINED + FIELD VANE						
	SAND and GRAVEL, some silt, trace clay		2	AS				● QUICK TRIAXIAL × LAB VANE						
	Compact to Dense		1	AS	13		199							40 50 10
	Brown													(Si+CL)
	Moist		2	SS	21									
	(FILL)						198							
	Occasional rock fill fragments		3	SS	41									
							197							
			4	SS	18									
196.3														
3.8	END OF BOREHOLE AT 3.8m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPHALT TO THE SURFACE.													

RECORD OF BOREHOLE No BH20-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+151 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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							
200.3	Ground Surface							<div>20406080100</div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div>							
0.0	ASPHALT (150mm)							<div>204060</div> <div>WATER CONTENT (%)</div> <div>w_p w w_L</div>							
0.2	SAND, some gravel, some silt, trace clay Compact Brown Moist (FILL) Occasional asphalt and rock fragments		1	AS		200								19 70 11 (SI+CL)	
			2	AS											
			1	SS	17										
			2	SS	17										
			3	SS	64/ 275										
198.0															
2.3	SAND and GRAVEL, trace silt, trace clay		3	SS	64/ 275		198							60 34 6 (SI+CL)	
197.6	Very Dense														
2.7	Brown Moist (FILL)														
END OF BOREHOLE AT 2.7m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPHALT TO THE SURFACE.															

RECORD OF BOREHOLE No BH20-04L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+163.5 O/S 7.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE							
200.1	Ground Surface							20	40	60	80	100			
0.0	ASPHALT (50mm)		1	AS			200								
	SAND, some gravel, occasional asphalt and rock fill fragments Very Dense Brown														
199.1	Moist (FILL)		1	SS	50/										
1.0	END OF BOREHOLE AT 1.0m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPHALT TO THE SURFACE.				.125										

RECORD OF BOREHOLE No BH20-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+176 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						PLASTIC LIMIT w _p NATURAL MOISTURE CONTENT w LIQUID LIMIT w _L WATER CONTENT (%)
200.3	Ground Surface													
0.0	ASPHALT (175mm)													
0.2	SAND and GRAVEL, trace silt, trace clay, occasional asphalt and rock fill fragments Dense to Very Dense Brown Moist (FILL)		1	AS			200							
			1	SS	41									
			2	SS	50/		199							
198.5														
1.8	END OF BOREHOLE AT 1.8m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPHALT TO THE SURFACE.				125									

RECORD OF BOREHOLE No BH20-06R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+188.5 O/S 6.9R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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 NATURAL MOISTURE CONTENT W LIQUID LIMIT W _L WATER CONTENT (%)
200.2	Ground Surface							20 40 60 80 100					
0.0	ASPHALT (50mm)		1	AS			200						
	SAND, some gravel, trace silt, occasional rock fill fragments Compact to Dense Brown Moist (FILL)		2	AS									
			1	SS	31		199						
			2	SS	22								
			3	SS	51/ 250		198						
197.5	Very Dense												
2.7	END OF BOREHOLE AT 2.7m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN TO 2.1m AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPHALT TO THE SURFACE.												

RECORD OF BOREHOLE No BH20-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+201 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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 (%)		
200.6	Ground Surface							20	40	60	80	100						
0.0	ASPHALT (150mm)							20	40	60	80	100						
0.2	SAND, some gravel, occasional asphalt and rock fill fragments Compact to Dense Brown Moist (FILL)		1	AS			200											
			2	AS														
			1	SS	42													
			2	SS	13													
198.4																		
2.2	END OF BOREHOLE AT 2.2m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPHALT TO THE SURFACE.																	

RECORD OF BOREHOLE No BH20-08L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+206 O/S 6.6L, NBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE		WATER CONTENT (%) w _P w w _L				
200.6	Ground Surface							20 40 60 80 100						
0.0	ASPHALT (50mm)		1	AS				20 40 60 80 100						
	SAND, some gravel, occasional rock fill fragments Very Dense Brown Moist (FILL)						200							
199.6			1	SS	115									
1.0	END OF BOREHOLE AT 1.0m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPHALT TO THE SURFACE.													

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

RECORD OF BOREHOLE No BH20-09

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+211 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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				
200.8	Ground Surface																	
0.0	ASPHALT (150mm)																	
0.2	SAND and GRAVEL, trace silt, trace clay, occasional rock fill fragments Very Dense Brown Moist (FILL)		1	AS														
			2	AS														
199.5			1	SS	86													34 57 9 (SI+CL)
1.3	END OF BOREHOLE AT 1.3m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.15m, THEN ASPHALT TO THE SURFACE.																	

RECORD OF BOREHOLE No BH20-10R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+125 O/S 18.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.13 - 2010.11.13 CHECKED BY MRA

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 x LAB VANE								
196.5	Ground Surface							20	40	60	80	100				
0.0 196.2	PEAT, fibrous: (250mm)		1	SS	3											
0.3 195.8	SAND, trace silt and rootlets Very Loose Dark Brown Wet		2	SS	10											
0.7 194.9	Silty CLAY, with wet sand seams Stiff Brown Moist		3	SS	43/ 0.250											0 15 48 37
1.6	END OF BOREHOLE AT 1.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 0.2m UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.															

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH20-11R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+150 O/S 18.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.13 - 2010.11.13 CHECKED BY MRA


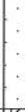

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100		
196.2	Ground Surface												
0.0	Silty CLAY Firm Dark Brown (FILL)		1	SS	6		196						
195.6													
0.6	PEAT, fibrous Soft to Firm Black		2	SS	3		195						
			3	SS	6								
194.4													
1.8	Silty CLAY, with sand seams Stiff Grey		4	SS	11		194						0 16 47 37
193.8													
2.4	SAND, trace to some silt												
193.5	Loose		5	SS	8								
2.7	Grey Wet												
	Silty CLAY, sandy		6	SS	30/		193						0 37 33 30
192.8	Firm												
3.4	Grey				225								
	END OF BOREHOLE AT 3.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 2.2m AND WATER LEVEL AT 1.2m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO SURFACE.												

RECORD OF BOREHOLE No BH20-12R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+175 O/S 18.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.13 - 2010.11.13 CHECKED BY MRA

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 x LAB VANE									
195.9	Ground Surface																
0.0	PEAT, fibrous		1	SS	1	▽											
195.4																	
0.5	SAND, trace silt Very Loose Dark Brown Wet		2	SS	3		195										
194.7																	
1.2	Silty CLAY		3	SS	39/												
194.4	Firm																
1.5	Grey				0.150												
	END OF BOREHOLE AT 1.5m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN TO 1.0m AND WATER LEVEL AT 0.3m UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.																

+³, ×³: Numbers refer to
Sensitivity

20
15
10
5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH20-13L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+177.5 O/S 18.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.13 - 2010.11.13 CHECKED BY MRA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa											
								○ UNCONFINED	+	FIELD VANE									
195.9	Ground Surface						● QUICK TRIAXIAL	×	LAB VANE <td colspan="5"></td> <td colspan="3">WATER CONTENT (%)</td> <td rowspan="2">kN/m³</td> <td rowspan="2">GR SA SI CL</td>						WATER CONTENT (%)			kN/m ³	GR SA SI CL
0.0	PEAT, fibrous: (175mm)						20	40	60	80	100	20	40	60					
0.2	SAND, trace silt, trace clay Loose Dark Brown		1	SS	4								○						
195.3	Moist to Wet																		
0.6																			
195.1																			
0.8	Silty CLAY Very Stiff Brown		2	SS	26								○						
	SAND, some silt Compact Brown Wet		3	SS	28								○				0 77 19 4		
194.1																			
1.8	END OF BOREHOLE AT 1.8m. BOREHOLE SIDEWALLS CAVED TO 0.9m.																		

RECORD OF BOREHOLE No D20-01L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+138.5 O/S 6.8L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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	
200.2	Ground Surface											
0.0	DCPT from 1.5m.						200					
							199					
197.9							198					
2.3	END OF DCPT AT 2.3m UPON REFUSAL ON PROBABLE ROCK FILL.											

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D20-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+163.5 O/S 7.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE		WATER CONTENT (%) w _p w w _L				
200.1	Ground Surface							20 40 60 80 100						
0.0	ASPHALT (50mm)		1	AS			200							
	SAND and GRAVEL Brown Moist (FILL)													
198.8							199							
1.3	AUGER TO 1.3m. AUGER REFUSAL AT 1.3m ON PROBABLE ROCK FILL.													

+ 3 . X 3 : Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D20-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+188.5 O/S 6.9L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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						
200.3	Ground Surface													
0.0	ASPHALT (50mm)		1	AS										
	SAND and GRAVEL Brown Moist (FILL)													
198.8														
1.5	Auger to 1.5m . DCPT from 1.5m.													
196.2														
4.1	END OF DCPT AT 4.1m UPON REFUSAL ON PROBABLE ROCK FILL.													

RECORD OF BOREHOLE No D20-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+206 O/S 6.6R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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									
200.4	Ground Surface							20	40	60	80	100					GR SA SI CL
0.0	Auger to 1.0m.						200										
199.4																	
1.0	AUGER REFUSAL AT 1.0m ON PROBABLE ROCK FILL.																

RECORD OF BOREHOLE No D20-05L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+155 O/S 18.0L, NBL ORIGINATED BY ES
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.11.13 - 2010.11.13 CHECKED BY MRA

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									
196.0 0.0	Ground Surface DCPT from surface.						196	20	40	60	80	100	20	40	60		
194.4 1.6	END OF DCPT AT 1.6m UPON REFUSAL ON PROBABLE BEDROCK OR BOULDER.						195										

METRIC

[illegible]

RECORD OF BOREHOLE No BH21-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+163.5 O/S 13 OR, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.10 - 2009.02.10 CHECKED BY RPR

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 x LAB VANE					WATER CONTENT (%) w _p w w _L PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT					
196.7	Pond Surface							20	40	60	80	100						
0.0	ICE and WATER																	
195.5			1	SS	0		196											
1.2	PEAT, fibrous, some clay Very Soft Dark Brown																	
194.9	Wet (600mm)		2	SS	0		195											
1.8																		
194.5	Silly CLAY, some organics Very Soft Grey																	
2.2	END OF BOREHOLE AT 2.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.																	

RECORD OF BOREHOLE No BH21-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+176 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.10 - 2009.02.10 CHECKED BY RPR

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				WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE	● QUICK TRIAXIAL × LAB VANE							
196.7	Pond Surface															
0.0	ICE and WATER															
195.0																
1.7	Silty CLAY, some sand Very Soft to Stiff Grey		1	SS	14											
			2	SS	1											
			3	SS	0											
192.2																
4.5	END OF BOREHOLE AT 4.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS TO SURFACE.															

+³, x³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH21-04L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+188.5 O/S 13 1L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.13 - 2009.02.13 CHECKED BY RPR

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		
196.7	Pond Surface							20 40 60 80 100						GR SA SI CL
0.0	ICE and WATER							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
195.3								20 40 60 80 100						
1.4	Silty CLAY, trace sand Very Soft Grey		1	SS	3									
	Sand Lense		2	TW										
			2	SS	1									0 8 48 44
192.9	Silty sand layer at 3.5m													
3.8	END OF BOREHOLE AT 3.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Apr 21/09 0.3* 195.6 Jun 05/09 0.3* 195.6 Aug 17/09 Ground Surface Aug 25/09 Ground Surface Oct 27/09 Ground Surface Nov 20/09 Ground Surface *(above ground surface)													

RECORD OF BOREHOLE No BH21-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+201 C/L, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009.02.13 - 2009.02.13 CHECKED BY RPR

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 (%)								
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE											
196.7	Pond Surface						20	40	60	80	100	w _p	w	w _L		GR	SA	SI	CL
0.0	ICE and WATER																		
196.1																			
0.6	SAND, some peat, some clay Very Loose Grey Wet		1	SS	3														
195.5																			
1.2	Silty CLAY, sandy Very Soft Grey		2	SS	2														
			3	TW	PH														
			4	SS	11														
192.8																			
3.9	END OF BOREHOLE AT 3.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS AND HOLEPLUG TO SURFACE.																		

METRIC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES		W _P	W		
200.6	Ground Surface						SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					
							20 40 60 80 100 20 40 60 80 100					

ONTMT4S 6121.GPJ 12/11/12


+ 3 × 3: Numbers refer to Sensitivity

RECORD OF BOREHOLE No BH21-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+216 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY LG
 DATUM Geodetic DATE 2009.02.10 - 2009.02.10 CHECKED BY RPR

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 (%)				
200.4	Ground Surface														
0.0	ORGANICS: (200mm)														
0.2	BEDROCK AT 0.2m.														

RECORD OF BOREHOLE No D21-01L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+163.5 O/S 13.0L, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY LG
DATUM Geodetic DATE 2009.02.10 - 2009.02.10 CHECKED BY RPR

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 (%)						
195.4	Ground Surface														
0.0	DCPT from surface.														

RECORD OF BOREHOLE No D21-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 23+188.5 O/S 13.1R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY LG
 DATUM Geodetic DATE 2009.02.13 - 2009.02.13 CHECKED BY RPR

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 (%)						
196.0	Ground Surface						196	20	40	60	80	100			
0.0	DCPT from surface						195								
							194								
							193								
							192								
190.9							191								
5.1	END OF DCPT AT 5.1m UPON REFUSAL ON PROBABLE BEDROCK.														

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

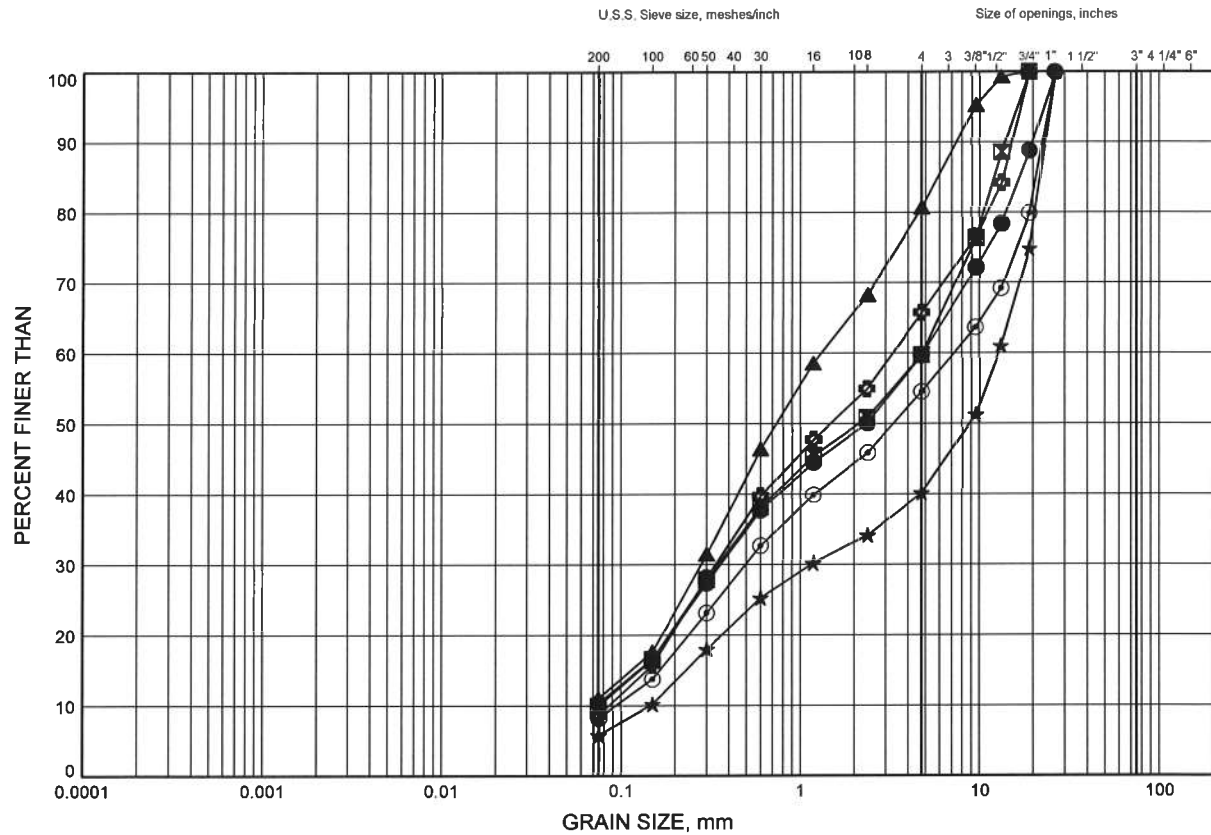
METRIC

[illegible]

Hwy 69 Four-Laning North of Hwy 529
GRAIN SIZE DISTRIBUTION

FIGURE F1

SAND, SAND and GRAVEL FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH20-01	0.98	199.52
⊠	BH20-02R	0.69	199.41
▲	BH20-03	0.69	199.61
★	BH20-03	2.50	197.80
⊙	BH20-05	0.99	199.31
⊕	BH20-09	0.99	199.81

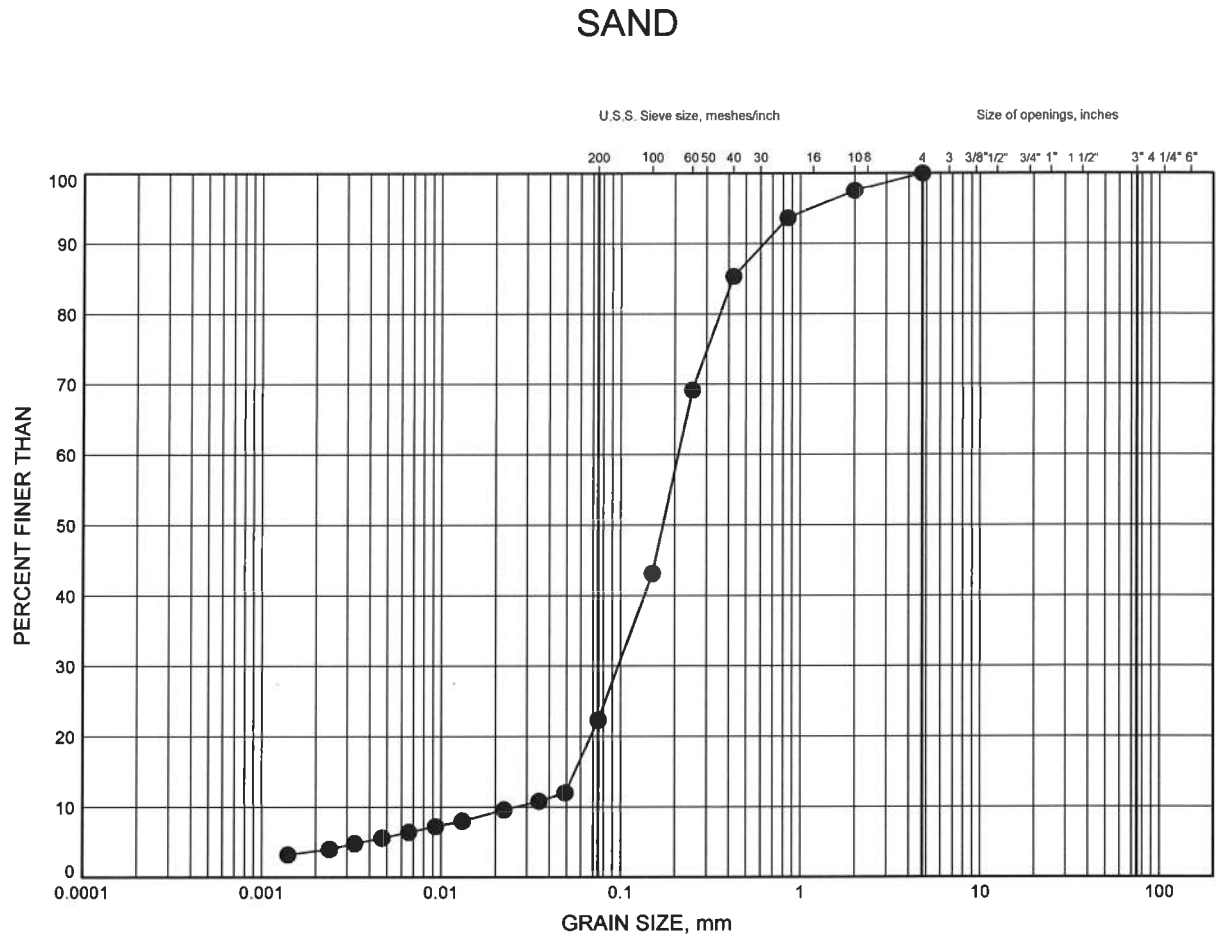
Date December 2012
 GWP# 5294-08-00



Prep'd MFA
 Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE F2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH20-13L	1.52	194.38

Date December 2012
GWP# 5294-08-00

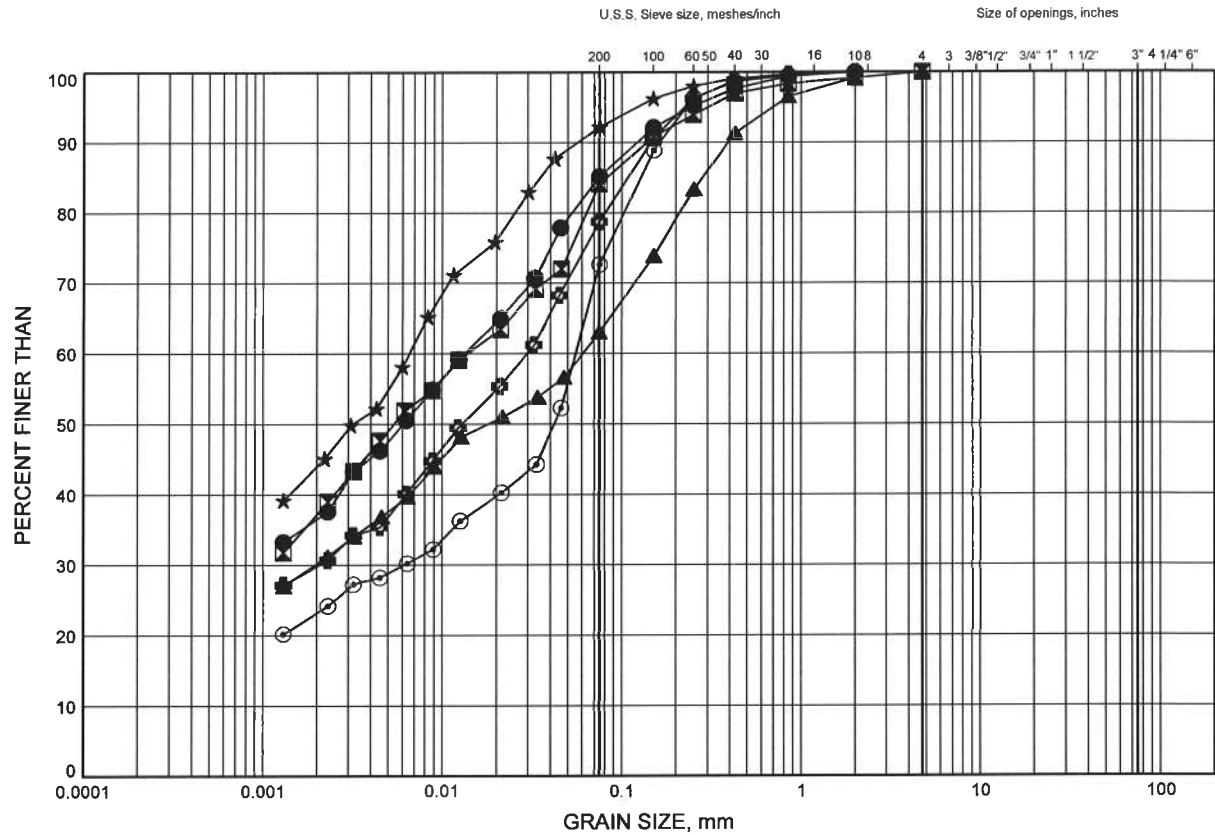


Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE F3

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH20-10R	1.42	195.08
⊠	BH20-11R	2.13	194.07
▲	BH20-11R	3.24	192.96
★	BH21-04L	3.28	193.42
⊙	BH21-05	1.83	194.87
⊕	BH21-05	3.12	193.58

Date December 2012
GWP# 5294-08-00



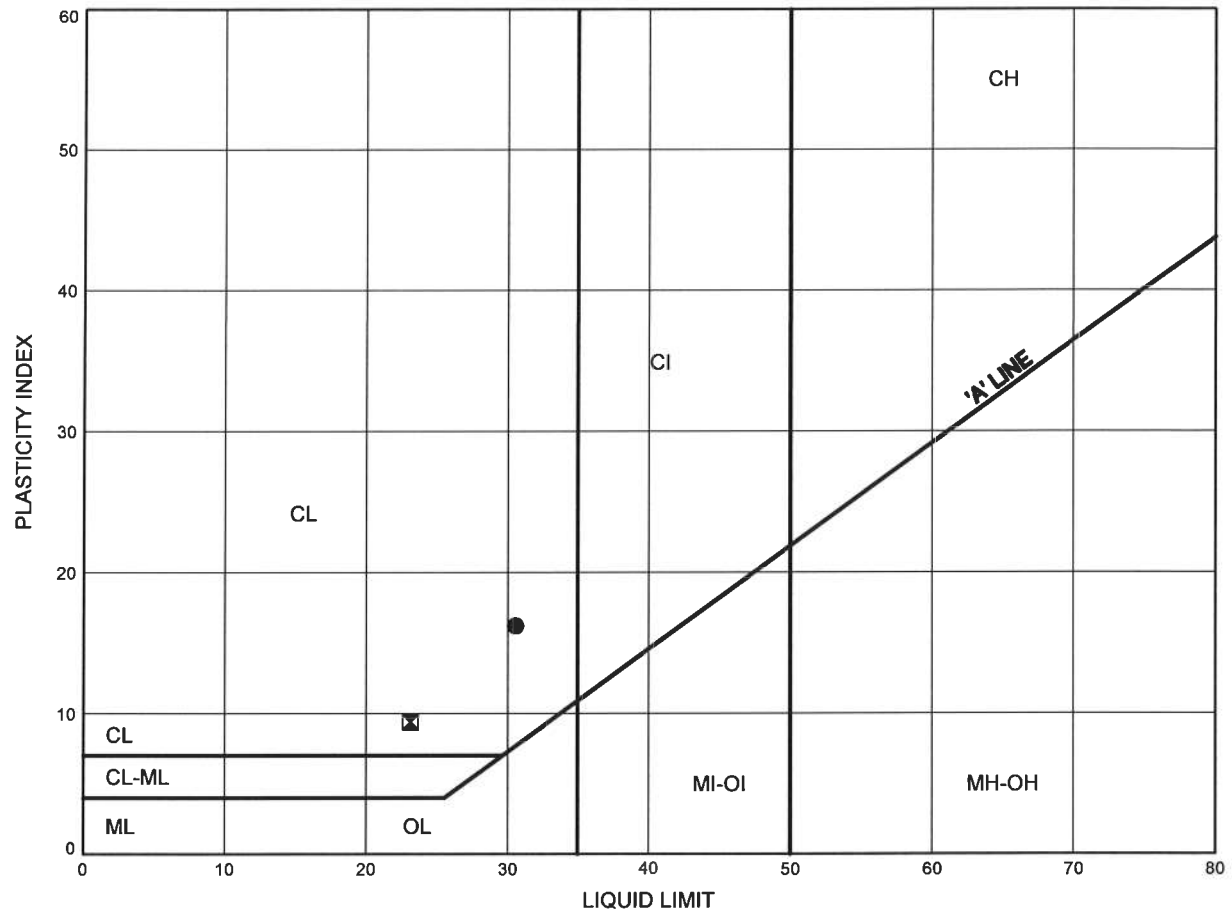
Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529

ATTERBERG LIMITS TEST RESULTS

FIGURE F4

Silty CLAY



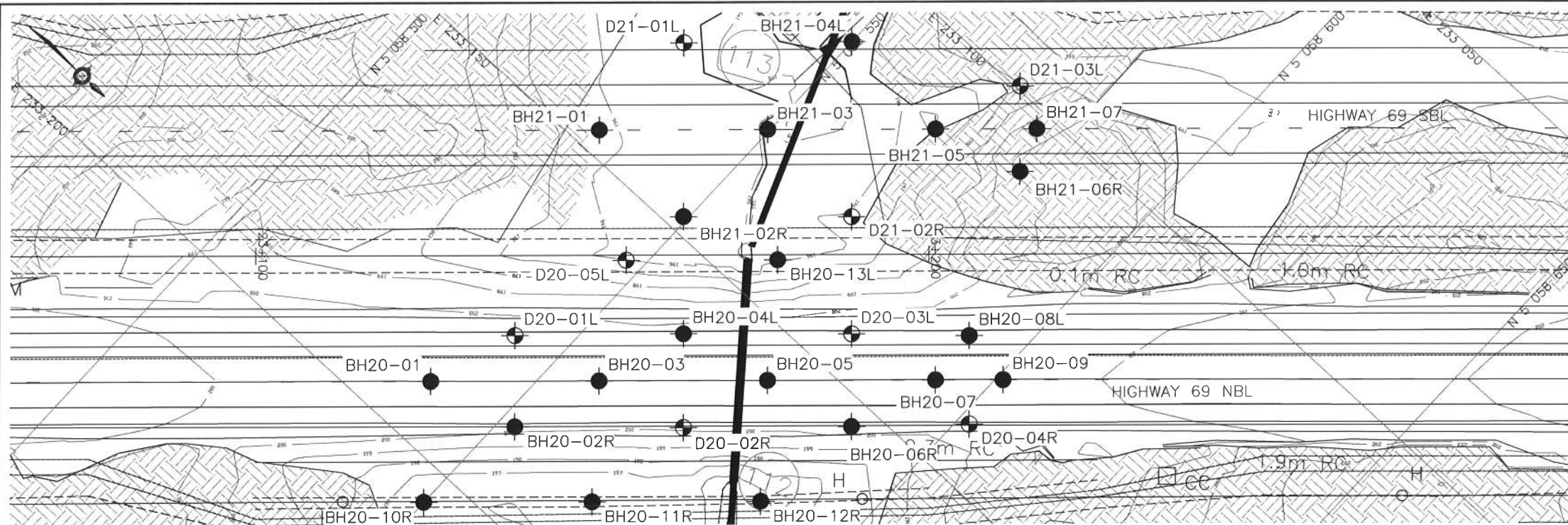
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH20-11R	2.13	194.07
⊗	BH21-05	1.83	194.87

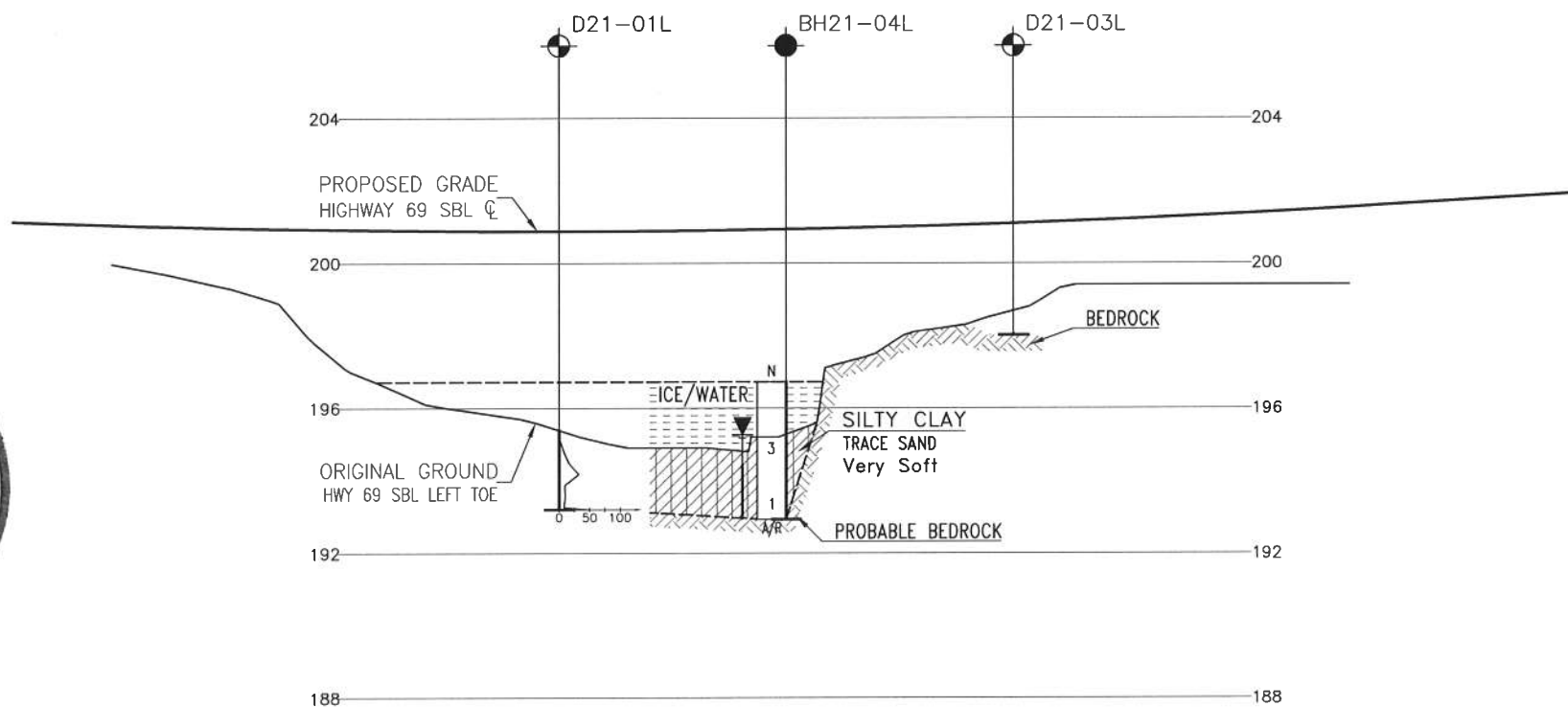
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG LEFT TOE HIGHWAY 69 SBL

0 16 32 48m H 1:800
0 4 8 12m V 1:200

METRIC

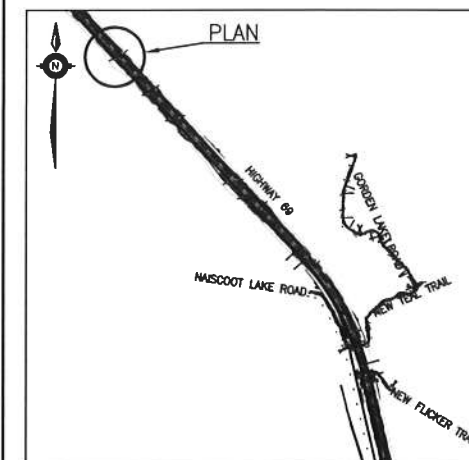
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-LT TOE
(STA 23+125 - 23+215)
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
W	Water Level
HA	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

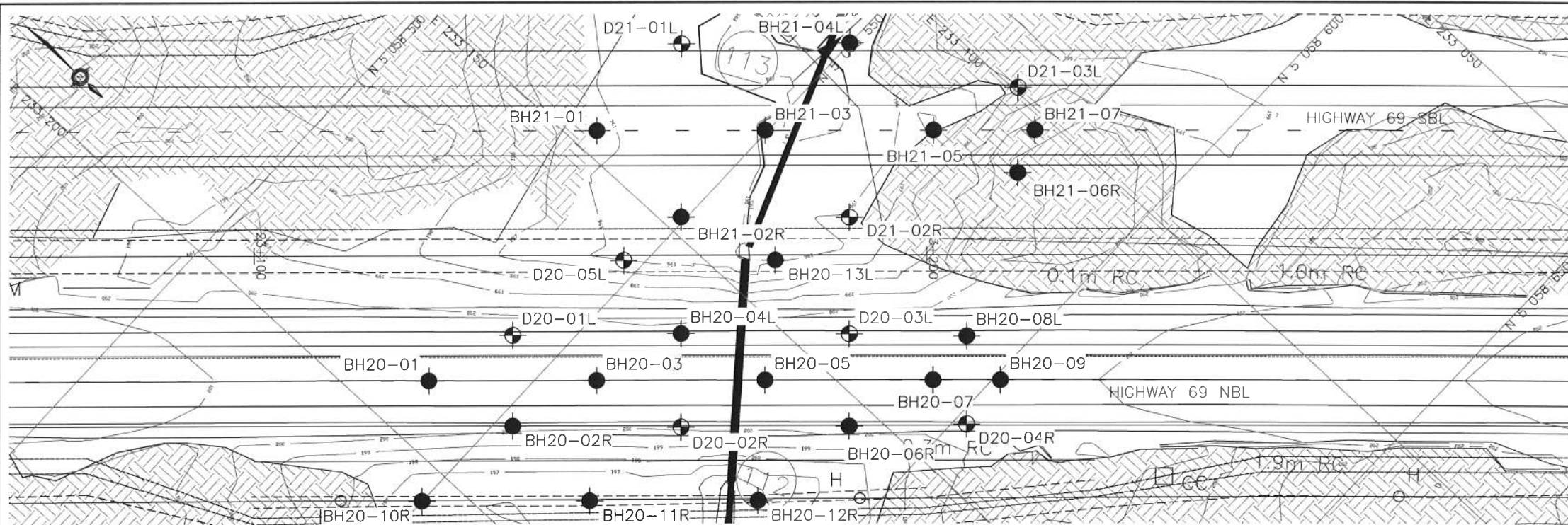
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D20-04R	200.4	5 058 601.7	233 141.6	BH20-01	200.5	5 058 538.5	233 191.0
D20-05L	196.0	5 058 547.5	233 158.1	BH20-02R	200.1	5 058 552.3	233 187.5
BH21-01	196.3	5 058 531.3	233 146.5	BH20-03	200.3	5 058 556.8	233 174.1
BH21-02R	196.7	5 058 549.4	233 147.6	BH20-04L	200.1	5 058 561.2	233 160.4
BH21-03	196.7	5 058 549.7	233 129.6	BH20-05	200.3	5 058 575.2	233 157.1
BH21-04L	196.7	5 058 550.0	233 111.5	BH20-06R	200.2	5 058 589.0	233 153.7
BH21-05	196.7	5 058 568.1	233 112.6	BH20-07	200.6	5 058 593.5	233 140.1
BH21-06R	200.6	5 058 581.6	233 108.8	BH20-08L	200.6	5 058 592.7	233 131.9
BH21-07	200.4	5 058 579.1	233 102.4	BH20-09	200.8	5 058 600.9	233 133.3
D21-01L	195.4	5 058 531.7	233 128.5	BH20-10R	196.5	5 058 550.0	233 204.9
D21-02R	196.0	5 058 567.8	233 130.7	BH20-11R	196.2	5 058 568.3	233 188.0
D21-03L	198.0	5 058 572.9	233 099.4	BH20-12R	195.9	5 058 586.7	233 171.0
				BH20-13L	195.9	5 058 564.0	233 142.9
				D20-01L	200.2	5 058 543.0	233 177.6
				D20-02R	200.1	5 058 570.7	233 170.7
				D20-03L	200.3	5 058 579.7	233 143.5

-NOTES-

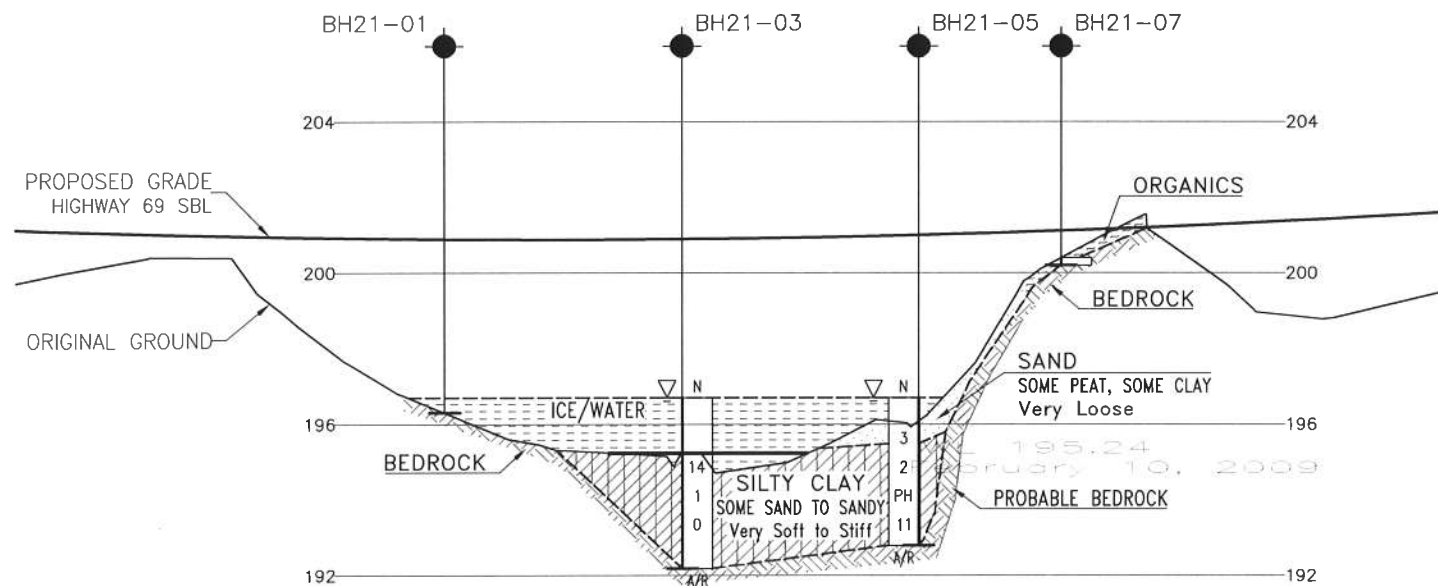
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG \varnothing HIGHWAY 69 SBL

0 16 32 48m H 1:800
0 4 8 12m V 1:200

METRIC

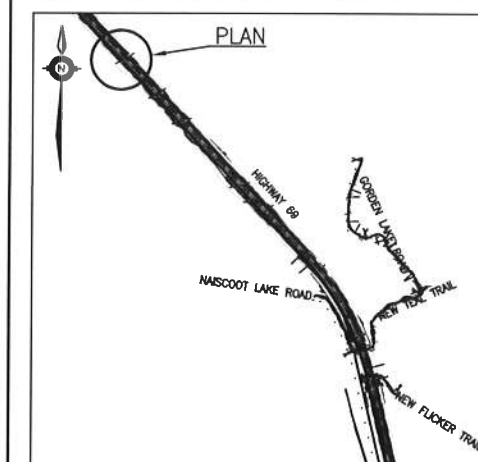
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL- \varnothing
(STA 23+125 - 23+215)
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

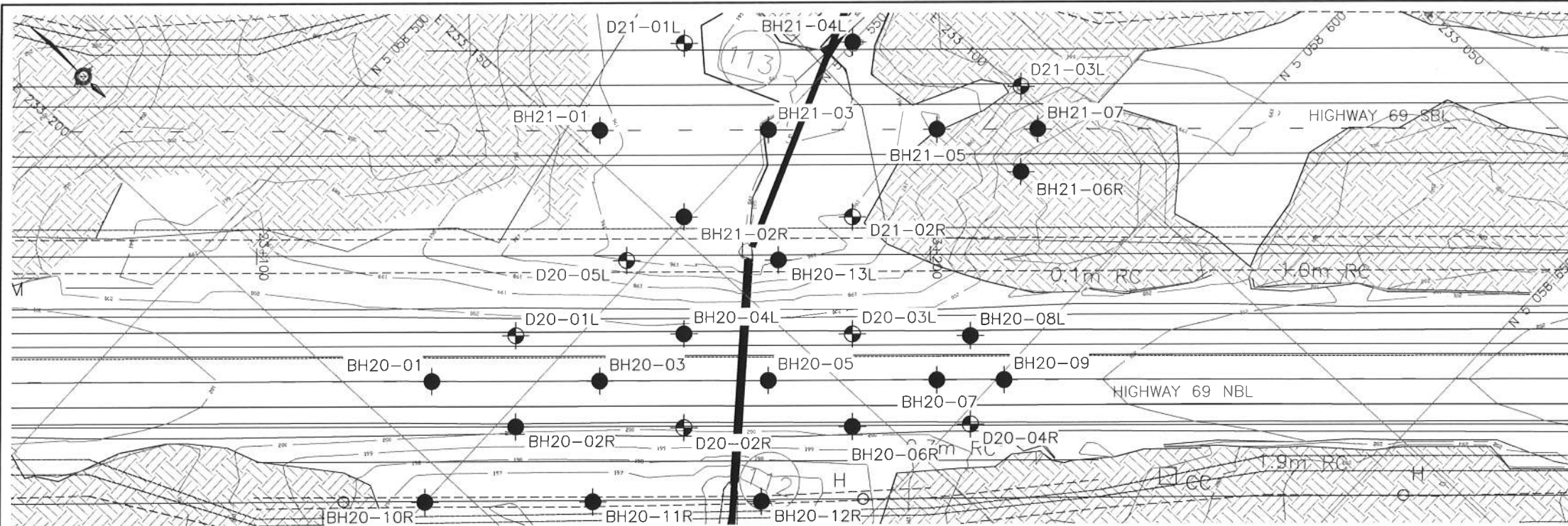
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D20-05L	196.0	5 058 547.5	233 158.1	BH20-02R	200.1	5 058 552.3	233 187.5
BH21-01	196.3	5 058 531.3	233 146.5	BH20-03	200.3	5 058 556.8	233 174.1
BH21-02R	196.7	5 058 549.4	233 147.6	BH20-04L	200.1	5 058 561.2	233 160.4
BH21-03	196.7	5 058 549.7	233 129.6	BH20-05	200.3	5 058 575.2	233 157.1
BH21-04L	196.7	5 058 550.0	233 111.5	BH20-06R	200.2	5 058 589.0	233 153.7
BH21-05	196.7	5 058 568.1	233 112.6	BH20-07	200.6	5 058 593.5	233 140.1
BH21-06R	200.6	5 058 581.6	233 108.8	BH20-08L	200.6	5 058 592.7	233 131.9
BH21-07	200.4	5 058 579.1	233 102.4	BH20-09	200.8	5 058 600.9	233 133.3
D21-01L	195.4	5 058 531.7	233 128.5	BH20-10R	196.5	5 058 550.0	233 204.9
D21-02R	196.0	5 058 567.8	233 130.7	BH20-11R	196.2	5 058 568.3	233 188.0
D21-03L	198.0	5 058 572.9	233 099.4	BH20-12R	195.9	5 058 586.7	233 171.0
				BH20-13L	195.9	5 058 564.0	233 142.9
				D20-01L	200.2	5 058 543.0	233 177.6
				D20-02R	200.1	5 058 570.7	233 170.7
				D20-03L	200.3	5 058 579.7	233 143.5

NOTES

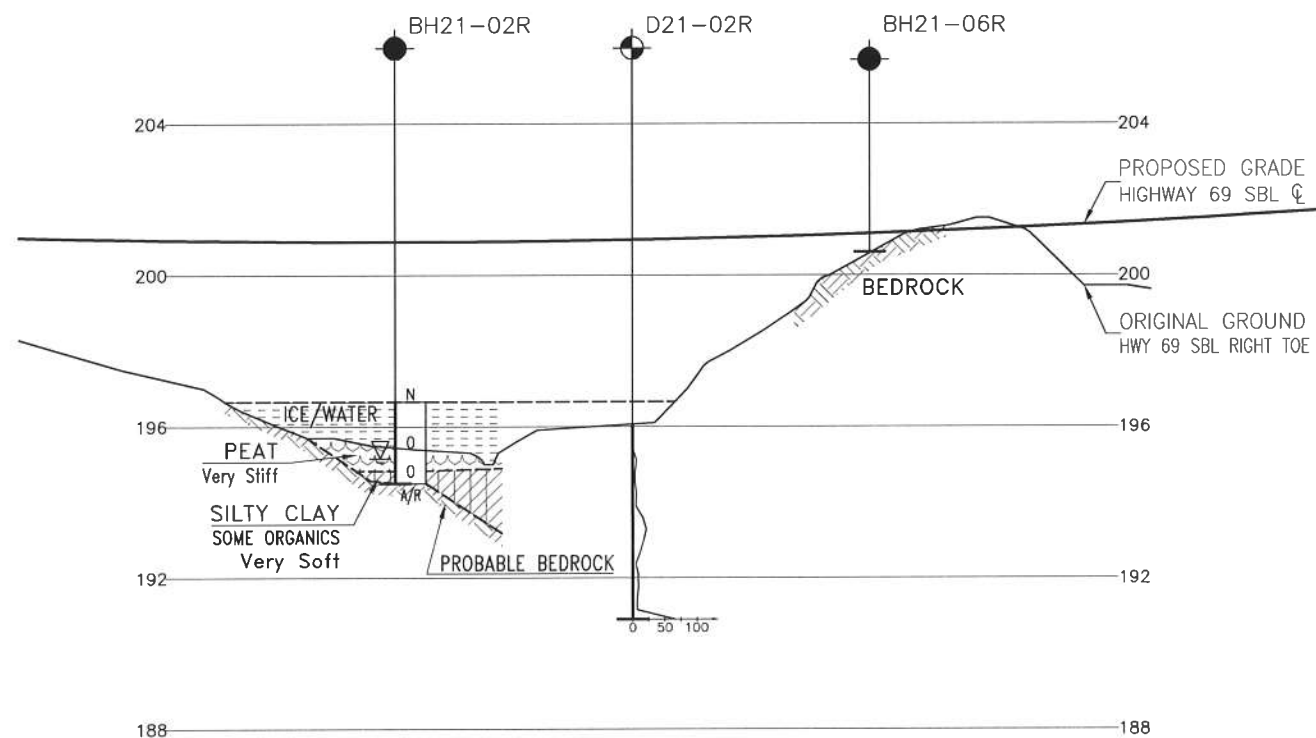
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
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GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG RIGHT TOE HIGHWAY 69 SBL

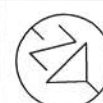
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0 4 8 12m V 1:200

METRIC

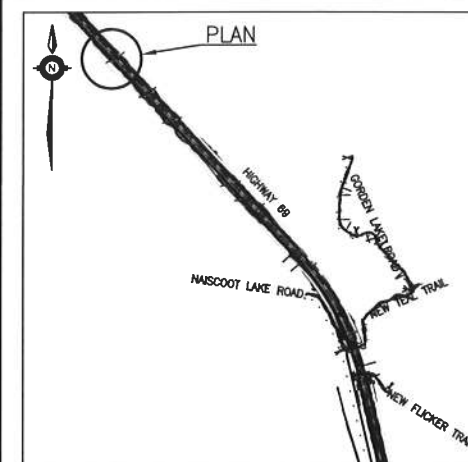
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AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-RT TOE
(STA 23+125 - 23+215)
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

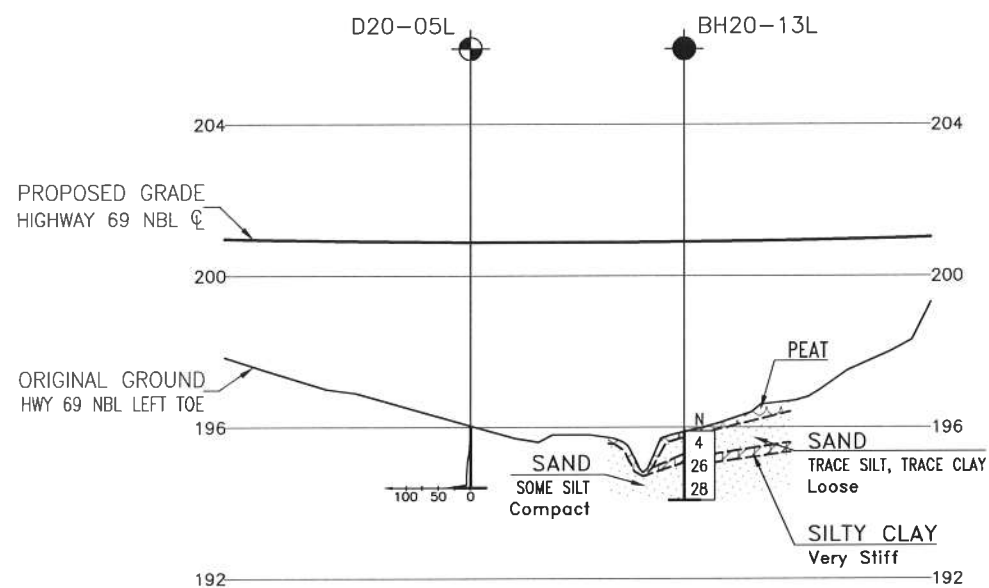
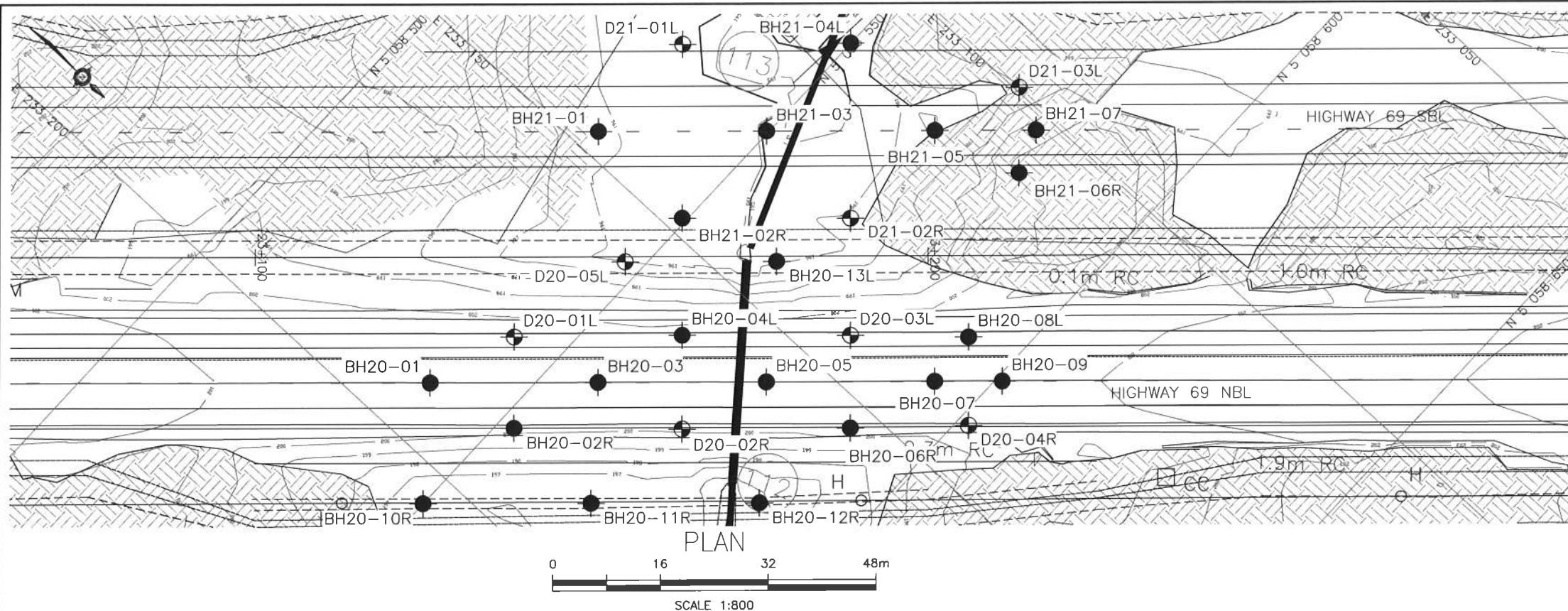
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D20-05L	196.0	5 058 547.5	233 158.1	BH20-02R	200.1	5 058 552.3	233 187.5
BH21-01	196.3	5 058 531.3	233 146.5	BH20-03	200.3	5 058 556.8	233 174.1
BH21-02R	196.7	5 058 549.4	233 147.6	BH20-04L	200.1	5 058 561.2	233 160.4
BH21-03	196.7	5 058 549.7	233 129.6	BH20-05	200.3	5 058 575.2	233 157.1
BH21-04L	196.7	5 058 550.0	233 111.5	BH20-06R	200.2	5 058 589.0	233 153.7
BH21-05	196.7	5 058 568.1	233 112.6	BH20-07	200.6	5 058 593.5	233 140.1
BH21-06R	200.6	5 058 581.6	233 108.8	BH20-08L	200.6	5 058 592.7	233 131.9
BH21-07	200.4	5 058 579.1	233 102.4	BH20-09	200.8	5 058 600.9	233 133.3
D21-01L	195.4	5 058 531.7	233 128.5	BH20-10R	196.5	5 058 550.0	233 204.9
D21-02R	196.0	5 058 567.8	233 130.7	BH20-11R	196.2	5 058 568.3	233 188.0
D21-03L	198.0	5 058 572.9	233 099.4	BH20-12R	195.9	5 058 586.7	233 171.0
				BH20-13L	195.9	5 058 564.0	233 142.9
				D20-01L	200.2	5 058 543.0	233 177.6
				D20-02R	200.1	5 058 570.7	233 170.7
				D20-03L	200.3	5 058 579.7	233 143.5

-NOTES-

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GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
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			LOAD
			STRUCT
			DWG
			DATE DEC. 2012

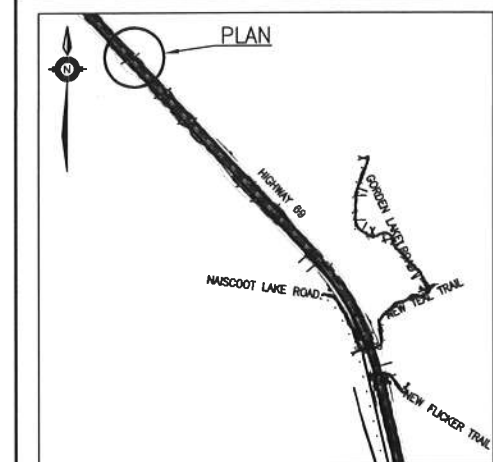


METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-LT TOE
(STA 23+125 - 23+215)
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
W	Water Level
W	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

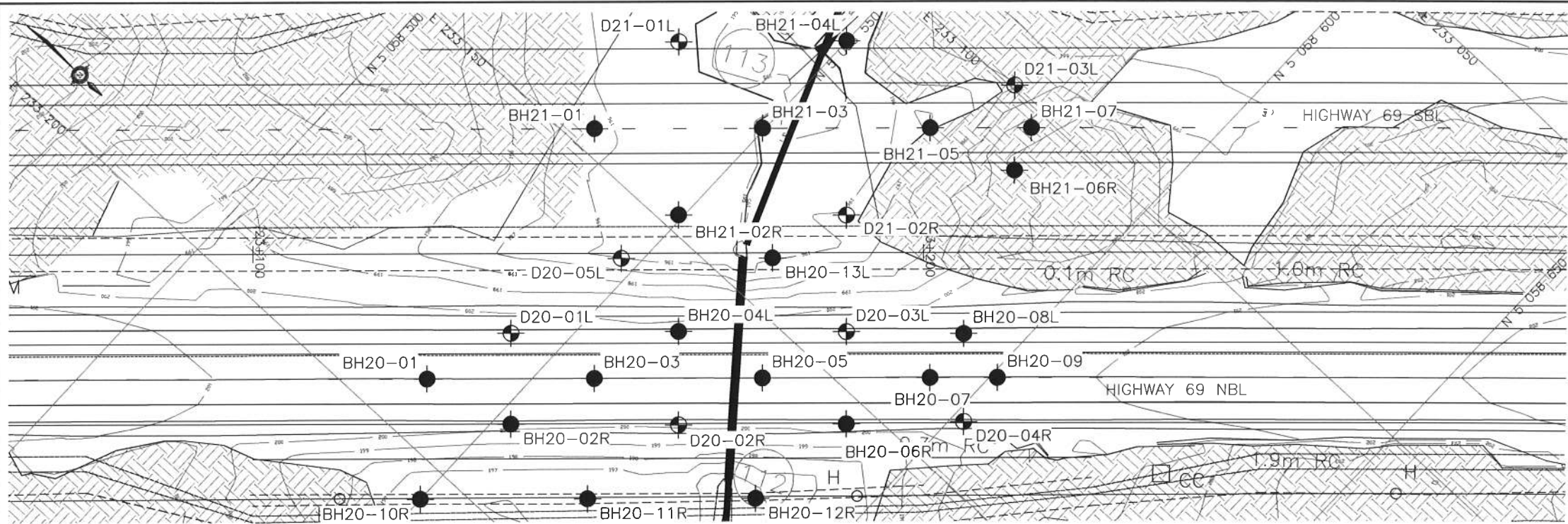
NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D20-04R	200.4	5 058 601.7	233 141.6	BH20-01	200.5	5 058 538.5	233 191.0
D20-05L	196.0	5 058 547.5	233 158.1	BH20-02R	200.1	5 058 552.3	233 187.5
BH21-01	196.3	5 058 531.3	233 146.5	BH20-03	200.3	5 058 556.8	233 174.1
BH21-02R	196.7	5 058 549.4	233 147.6	BH20-04L	200.1	5 058 561.2	233 160.4
BH21-03	196.7	5 058 549.7	233 129.6	BH20-05	200.3	5 058 575.2	233 157.1
BH21-04L	196.7	5 058 550.0	233 111.5	BH20-06R	200.2	5 058 589.0	233 153.7
BH21-05	196.7	5 058 568.1	233 112.6	BH20-07	200.6	5 058 593.5	233 140.1
BH21-06R	200.6	5 058 581.6	233 108.8	BH20-08L	200.6	5 058 592.7	233 131.9
BH21-07	200.4	5 058 579.1	233 102.4	BH20-09	200.8	5 058 600.9	233 133.3
D21-01L	195.4	5 058 531.7	233 128.5	BH20-10R	196.5	5 058 550.0	233 204.9
D21-02R	196.0	5 058 567.8	233 130.7	BH20-11R	196.2	5 058 568.3	233 188.0
D21-03L	198.0	5 058 572.9	233 099.4	BH20-12R	195.9	5 058 586.7	233 171.0
				BH20-13L	195.9	5 058 564.0	233 142.9
				D20-01L	200.2	5 058 543.0	233 177.6
				D20-02R	200.1	5 058 570.7	233 170.7
				D20-03L	200.3	5 058 579.7	233 143.5

-NOTES-

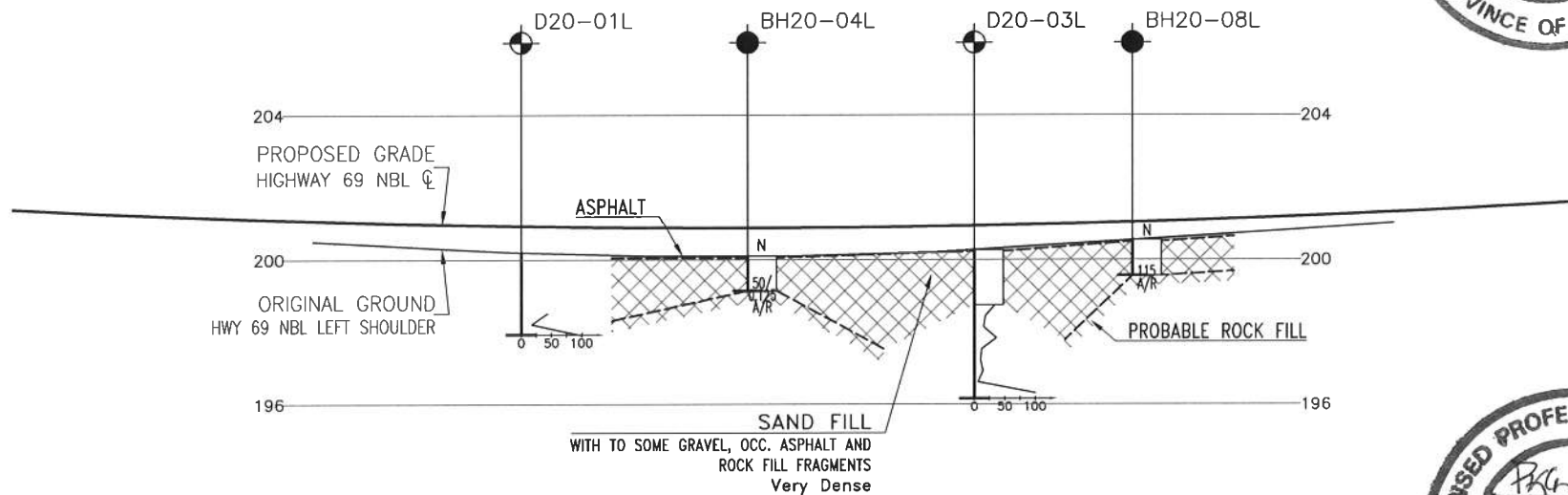
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- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



PLAN
0 16 32 48m
SCALE 1:800



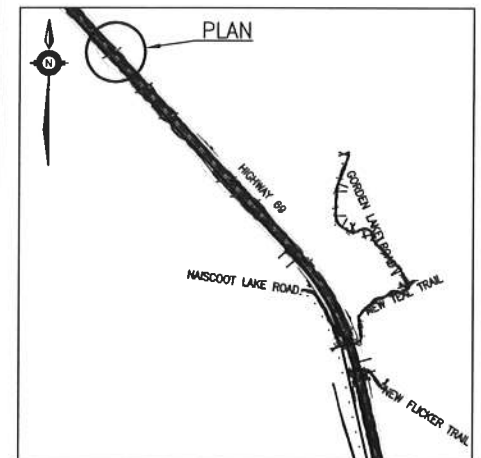
PROFILE ALONG LEFT SHOULDER HIGHWAY 69 NBL

0 16 32 48m H 1:800
0 4 8 12m V 1:200



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

CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-LT SHLDR
(STA 23+125 - 23+215)
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

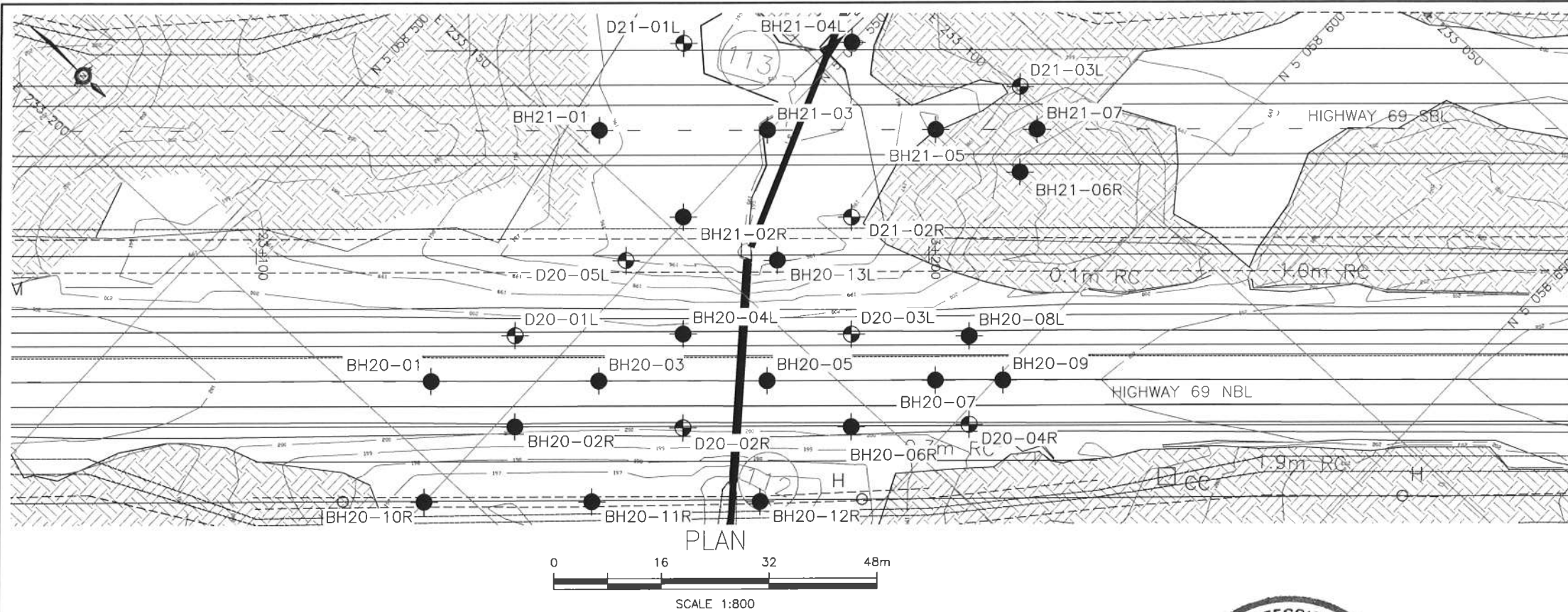
NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D20-04R	200.4	5 058 601.7	233 141.6	BH20-01	200.5	5 058 538.5	233 191.0
D20-05L	196.0	5 058 547.5	233 158.1	BH20-02R	200.1	5 058 552.3	233 187.5
BH21-01	196.3	5 058 531.3	233 146.5	BH20-03	200.3	5 058 556.8	233 174.1
BH21-02R	196.7	5 058 549.4	233 147.6	BH20-04L	200.1	5 058 561.2	233 160.4
BH21-03	196.7	5 058 549.7	233 129.6	BH20-05	200.3	5 058 575.2	233 157.1
BH21-04L	196.7	5 058 550.0	233 111.5	BH20-06R	200.2	5 058 589.0	233 153.7
BH21-05	196.7	5 058 568.1	233 112.6	BH20-07	200.6	5 058 593.5	233 140.1
BH21-06R	200.6	5 058 581.6	233 108.8	BH20-08L	200.6	5 058 592.7	233 131.9
BH21-07	200.4	5 058 579.1	233 102.4	BH20-09	200.8	5 058 600.9	233 133.3
D21-01L	195.4	5 058 531.7	233 128.5	BH20-10R	196.5	5 058 550.0	233 204.9
D21-02R	196.0	5 058 567.8	233 130.7	BH20-11R	196.2	5 058 568.3	233 188.0
D21-03L	198.0	5 058 572.9	233 099.4	BH20-12R	195.9	5 058 586.7	233 171.0
				BH20-13L	195.9	5 058 564.0	233 142.9
				D20-01L	200.2	5 058 543.0	233 177.6
				D20-02R	200.1	5 058 570.7	233 170.7
				D20-03L	200.3	5 058 579.7	233 143.5

-NOTES-

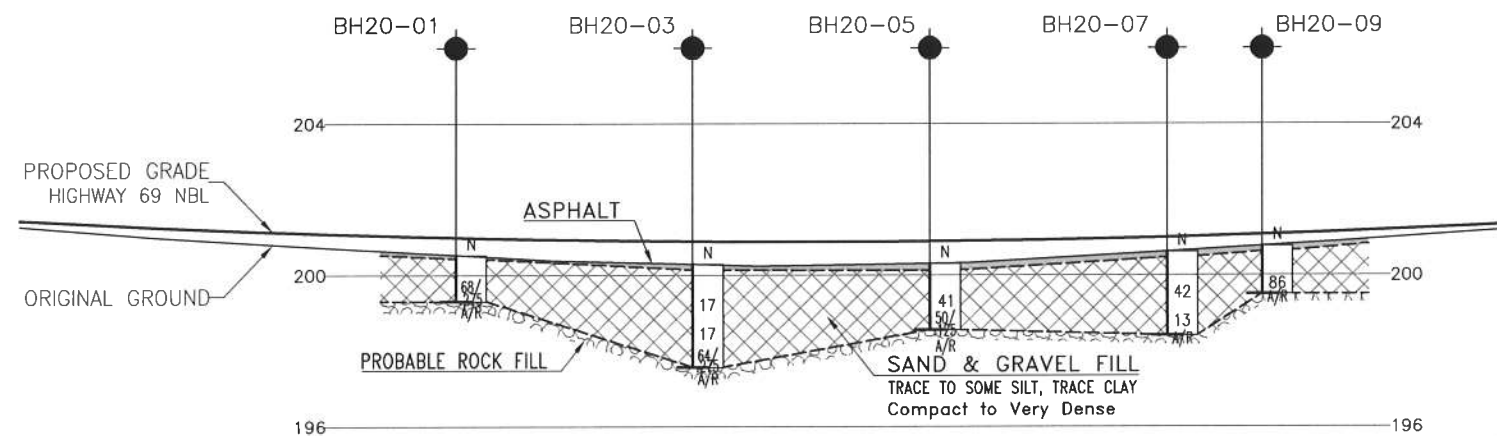
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GEOCREs No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



PLAN

0 16 32 48m
SCALE 1:800

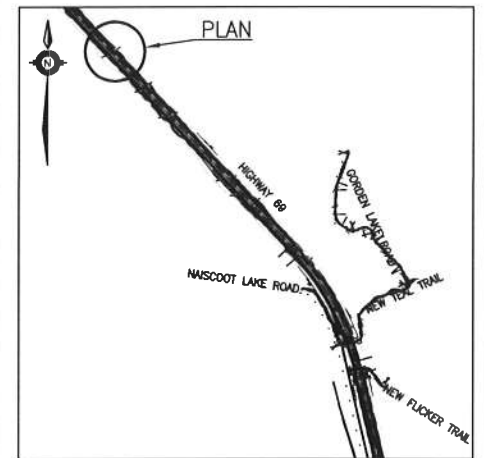
PROFILE ALONG CL HIGHWAY 69 NBL

0 16 32 48m H 1:800
0 4 8 12m V 1:200

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-CL
(STA 23+125 - 23+215)
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
W	Water Level
HA	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

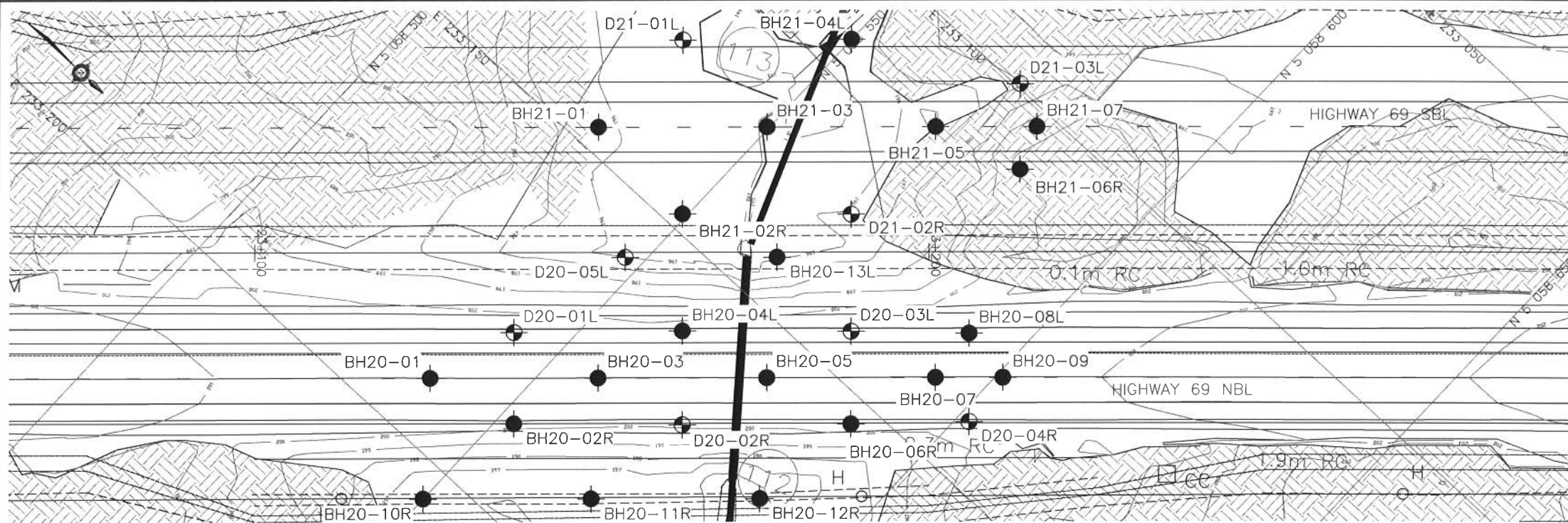
NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D20-04R	200.4	5 058 601.7	233 141.6	BH20-01	200.5	5 058 538.5	233 191.0
D20-05L	196.0	5 058 547.5	233 158.1	BH20-02R	200.1	5 058 552.3	233 187.5
BH21-01	196.3	5 058 531.3	233 146.5	BH20-03	200.3	5 058 556.8	233 174.1
BH21-02R	196.7	5 058 549.4	233 147.6	BH20-04L	200.1	5 058 561.2	233 160.4
BH21-03	196.7	5 058 549.7	233 129.6	BH20-05	200.3	5 058 575.2	233 157.1
BH21-04L	196.7	5 058 550.0	233 111.5	BH20-06R	200.2	5 058 589.0	233 153.7
BH21-05	196.7	5 058 568.1	233 112.6	BH20-07	200.6	5 058 593.5	233 140.1
BH21-06R	200.6	5 058 581.6	233 108.8	BH20-08L	200.6	5 058 592.7	233 131.9
BH21-07	200.4	5 058 579.1	233 102.4	BH20-09	200.8	5 058 600.9	233 133.3
D21-01L	195.4	5 058 531.7	233 128.5	BH20-10R	196.5	5 058 550.0	233 204.9
D21-02R	196.0	5 058 567.8	233 130.7	BH20-11R	196.2	5 058 568.3	233 188.0
D21-03L	198.0	5 058 572.9	233 099.4	BH20-12R	195.9	5 058 586.7	233 171.0
				BH20-13L	195.9	5 058 564.0	233 142.9
				D20-01L	200.2	5 058 543.0	233 177.6
				D20-02R	200.1	5 058 570.7	233 170.7
				D20-03L	200.3	5 058 579.7	233 143.5

-NOTES-

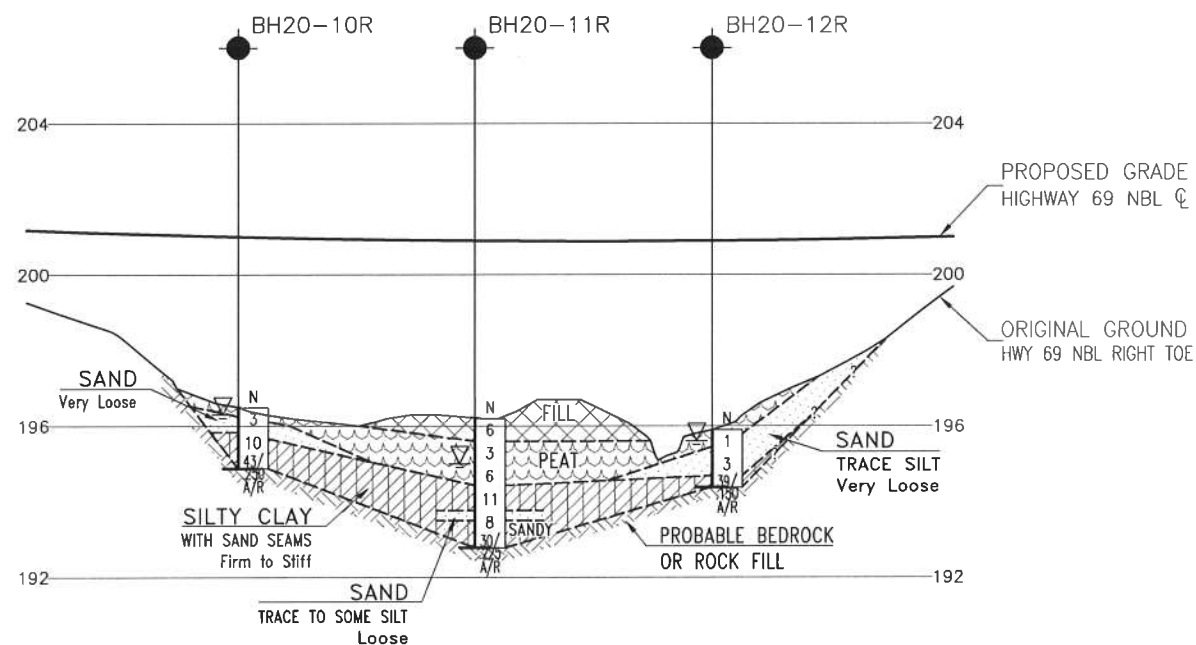
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GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL

0 16 32 48m
0 4 8 12m
H 1:800
V 1:200



METRIC

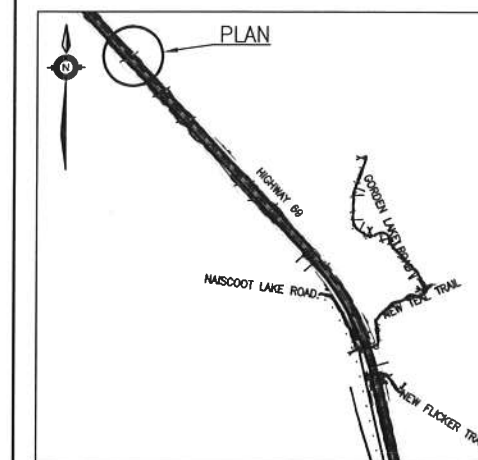
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-RT TOE
(STA 23+125 - 23+215)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN LEGEND

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

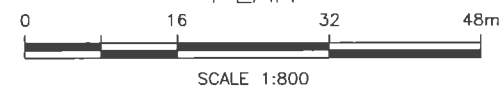
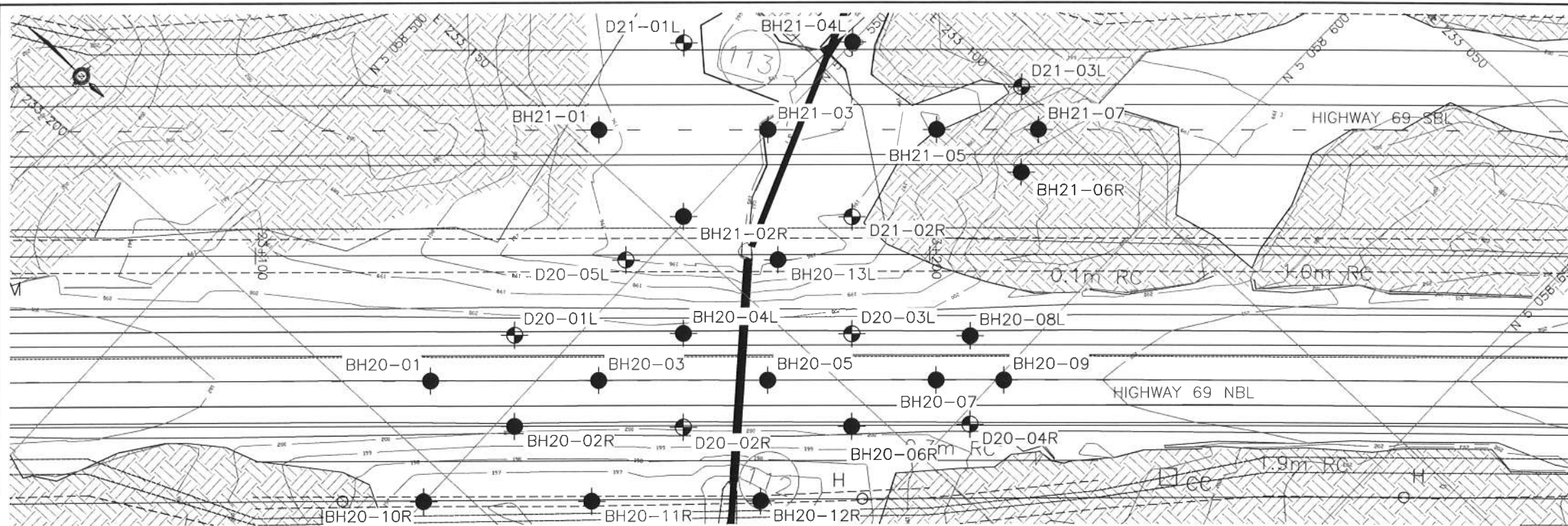
NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D20-04R	200.4	5 058 601.7	233 141.6	BH20-01	200.5	5 058 538.5	233 191.0
D20-05L	196.0	5 058 547.5	233 158.1	BH20-02R	200.1	5 058 552.3	233 187.5
BH21-01	196.3	5 058 531.3	233 146.5	BH20-03	200.3	5 058 556.8	233 174.1
BH21-02R	196.7	5 058 549.4	233 147.6	BH20-04L	200.1	5 058 561.2	233 160.4
BH21-03	196.7	5 058 549.7	233 129.6	BH20-05	200.3	5 058 575.2	233 157.1
BH21-04L	196.7	5 058 550.0	233 111.5	BH20-06R	200.2	5 058 589.0	233 153.7
BH21-05	196.7	5 058 568.1	233 112.6	BH20-07	200.6	5 058 593.5	233 140.1
BH21-06R	200.6	5 058 581.6	233 108.8	BH20-08L	200.6	5 058 592.7	233 131.9
BH21-07	200.4	5 058 579.1	233 102.4	BH20-09	200.8	5 058 600.9	233 133.3
D21-01L	195.4	5 058 531.7	233 128.5	BH20-10R	196.5	5 058 550.0	233 204.9
D21-02R	196.0	5 058 567.8	233 130.7	BH20-11R	196.2	5 058 568.3	233 188.0
D21-03L	198.0	5 058 572.9	233 099.4	BH20-12R	195.9	5 058 586.7	233 171.0
				BH20-13L	195.9	5 058 584.0	233 142.9
				D20-01L	200.2	5 058 543.0	233 177.6
				D20-02R	200.1	5 058 570.7	233 170.7
				D20-03L	200.3	5 058 579.7	233 143.5

NOTES

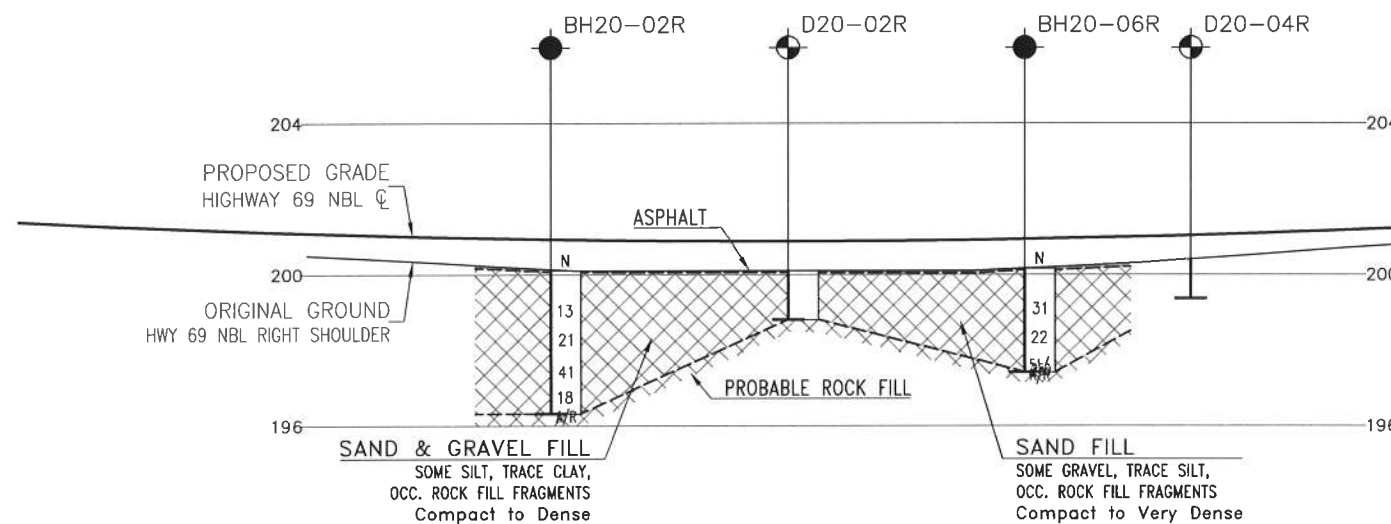
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GEOCRES No. 41H-99

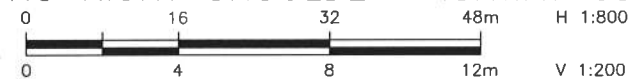
REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



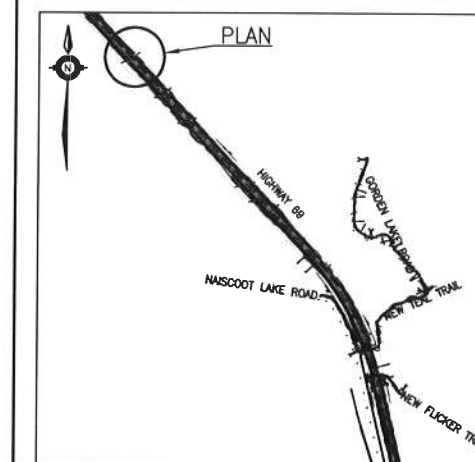
PLAN



PROFILE ALONG RIGHT SHOULDER HIGHWAY 69 NBL



METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-RT SHLDR
(STA 23+125 - 23+215)
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
W	Water Level
H	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D20-04R	200.4	5 058 601.7	233 141.6	BH20-01	200.5	5 058 538.5	233 191.0
D20-05L	196.0	5 058 547.5	233 158.1	BH20-02R	200.1	5 058 552.3	233 187.5
BH21-01	196.3	5 058 531.3	233 146.5	BH20-03	200.3	5 058 556.8	233 174.1
BH21-02R	196.7	5 058 549.4	233 147.6	BH20-04L	200.1	5 058 561.2	233 160.4
BH21-03	196.7	5 058 549.7	233 129.6	BH20-05	200.3	5 058 575.2	233 157.1
BH21-04L	196.7	5 058 550.0	233 111.5	BH20-06R	200.2	5 058 589.0	233 153.7
BH21-05	196.7	5 058 568.1	233 112.6	BH20-07	200.6	5 058 593.5	233 140.1
BH21-06R	200.6	5 058 581.6	233 108.8	BH20-08L	200.6	5 058 592.7	233 131.9
BH21-07	200.4	5 058 579.1	233 102.4	BH20-09	200.8	5 058 600.9	233 133.3
D21-01L	195.4	5 058 531.7	233 128.5	BH20-10R	196.5	5 058 550.0	233 204.9
D21-02R	196.0	5 058 567.8	233 130.7	BH20-11R	196.2	5 058 568.3	233 188.0
D21-03L	198.0	5 058 572.9	233 099.4	BH20-12R	195.9	5 058 586.7	233 171.0
				BH20-13L	195.9	5 058 564.0	233 142.9
				D20-01L	200.2	5 058 543.0	233 177.6
				D20-02R	200.1	5 058 570.7	233 170.7
				D20-03L	200.3	5 058 579.7	233 143.5

-NOTES-

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GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012

Appendix G

**Highway 69 SBL
Sta. 24+000 to 24+040 Township of Harrison**

**Boreholes 22-01 to 22-05
DCPTs D22-01R, D22-02L**

**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		<div> <div>PLASTIC LIMIT</div> <div>NATURAL MOISTURE CONTENT</div> <div>LIQUID LIMIT</div> </div>	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	<div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> <div>100</div> </div>			
198.3	Ground Surface						<div> <div> <div>○ UNCONFINED</div> <div>● QUICK TRIAXIAL</div> </div> <div> <div>+ FIELD VANE</div> <div>× LAB VANE</div> </div> </div>	<div> <div>20</div> <div>40</div> <div>60</div> </div>	<div> <div>γ</div> </div>	<div> <div>kN/m³</div> </div>	GR SA SI CL

[illegible]

ONTMT4S 6121.GPJ 12/11/12

+³ ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No BH22-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+013.5 O/S 13.0L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.07 - 2008.10.07 CHECKED BY RPR

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								
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE				WATER CONTENT (%)				
196.8	Ground Surface															
0.0	PEAT, fibrous Very Soft Brown Wet (700mm)		1	SS	1											
196.1																
0.7	Silty SAND, occasional peaty organics Very Loose to Compact Brown to Grey Moist		2	SS	14											
			3	SS	4											
194.2																
2.6	Silty CLAY, trace sand Soft Grey		4	SS	4											0 3 49 48
193.8																
3.0	Silty SAND, trace clay, trace gravel Loose Grey Wet		5	SS	9											5 70 20 5
193.1																
3.7	END OF BOREHOLE AT 3.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 2.1m UPON COMPLETION OF DRILLING. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Oct 29/08 0.2 196.6 Feb 19/09 0.5 196.3 Apr 21/09 Ground Surface Jun 05/09 0.1 196.7 Aug 17/09 0.5 196.3 Aug 25/09 0.5 196.3 Oct 27/09 0.6 196.2 Nov 20/09 0.9 195.9															

RECORD OF BOREHOLE No BH22-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+026 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.07 - 2008.10.07 CHECKED BY RPR

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 (%)	
197.3	Ground Surface							20	40	60	80	100					
0.0	Silty SAND , some clay, occasional peaty organics Very Loose to Compact Brown Moist to Wet		1	SS	2	▽	197										
			2	SS	16		196										
195.9																	
1.4	Silty CLAY , some sand to sandy Very Soft Grey		3	SS	1											0 25 52 23	
195.0																	
2.3	END OF BOREHOLE AT 2.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 1.15m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.																

METRIC

[illegible]

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No BH22-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+036 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.07 - 2008.10.07 CHECKED BY RPR

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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE								WATER CONTENT (%)	
198.0	Ground Surface							20	40	60	80	100					
0.0	ORGANICS: (75mm)						198										
0.1	Silly SAND , trace clay, occasional peaty organics		1	SS	2												0 63 31 6
197.4	Very Loose																
0.6	Brown																
	Moist																
	END OF BOREHOLE AT 0.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																

METRIC

[illegible]

RECORD OF BOREHOLE No D22-02L

1 OF 1

METRIC

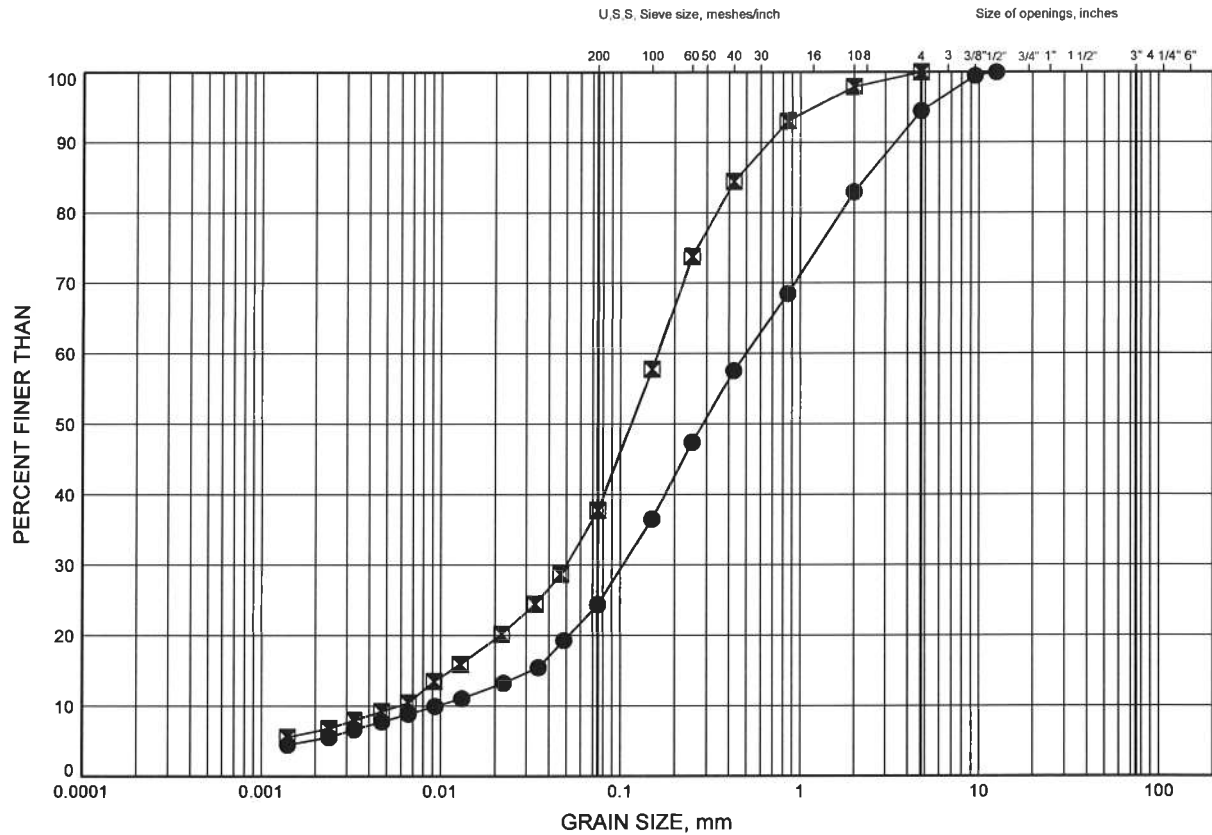
GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+031 O/S 12.8L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.07 - 2008.10.07 CHECKED BY RPR

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 (%)							
197.2 0.0	Ground Surface DCPT from surface.																
	Cone bouncing at 2.4m																
					</												

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE G1.

Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH22-02L	3.35	193.45
■	BH22-05	0.28	197.72

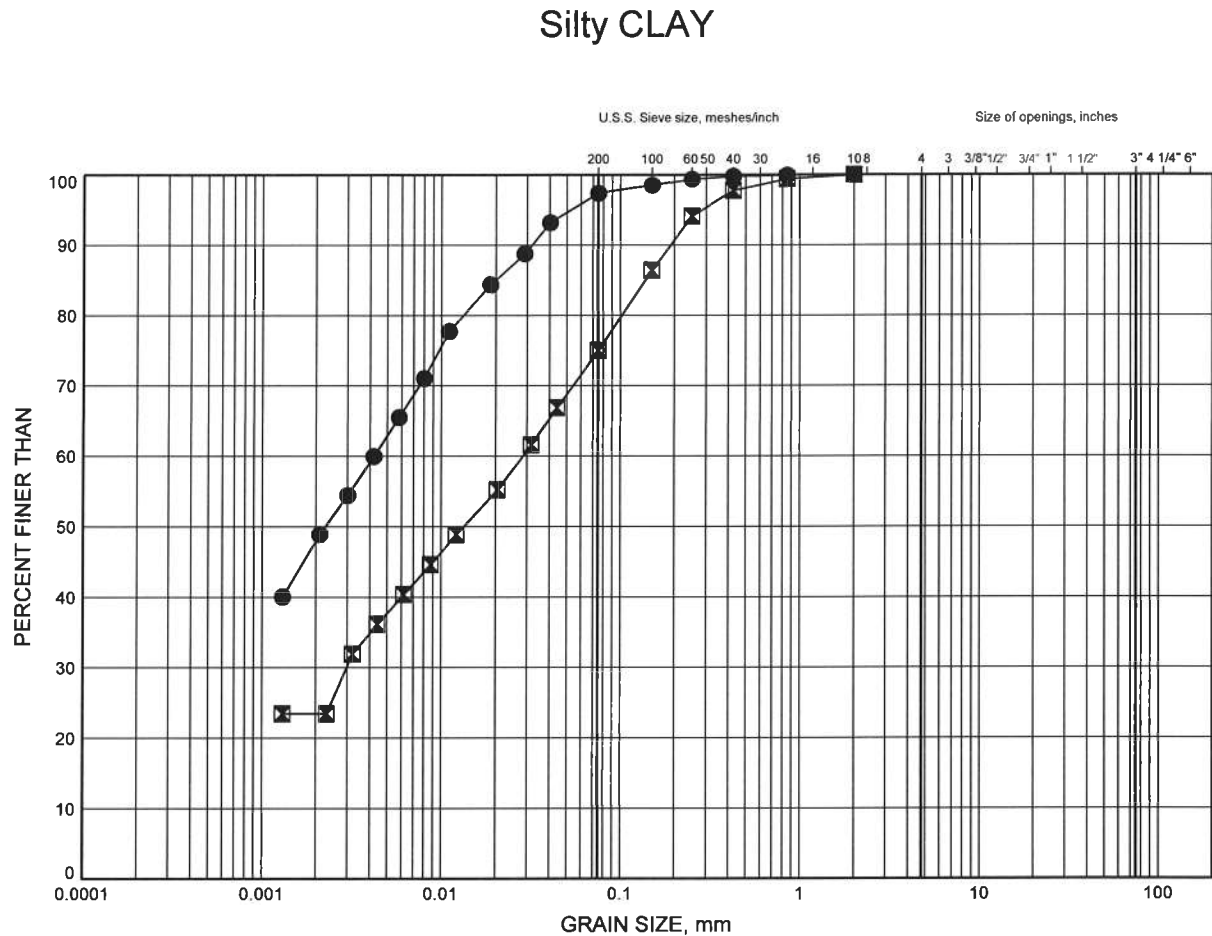
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE G2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH22-02L	2.74	194.06
■	BH22-03	1.83	195.47

Date December 2012
GWP# 5294-08-00



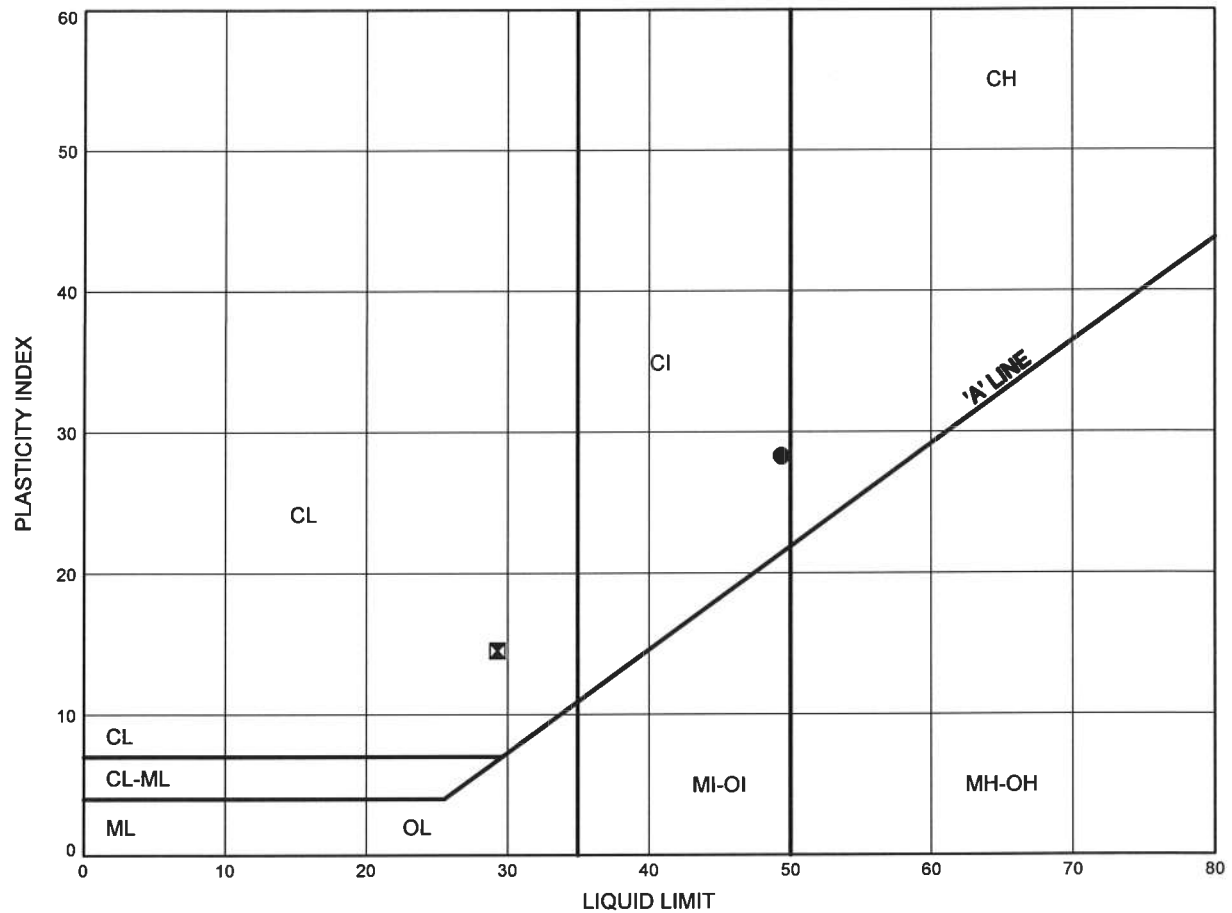
Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529

ATTERBERG LIMITS TEST RESULTS

FIGURE G3

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH22-02L	2.74	194.06
⊠	BH22-03	1.83	195.47

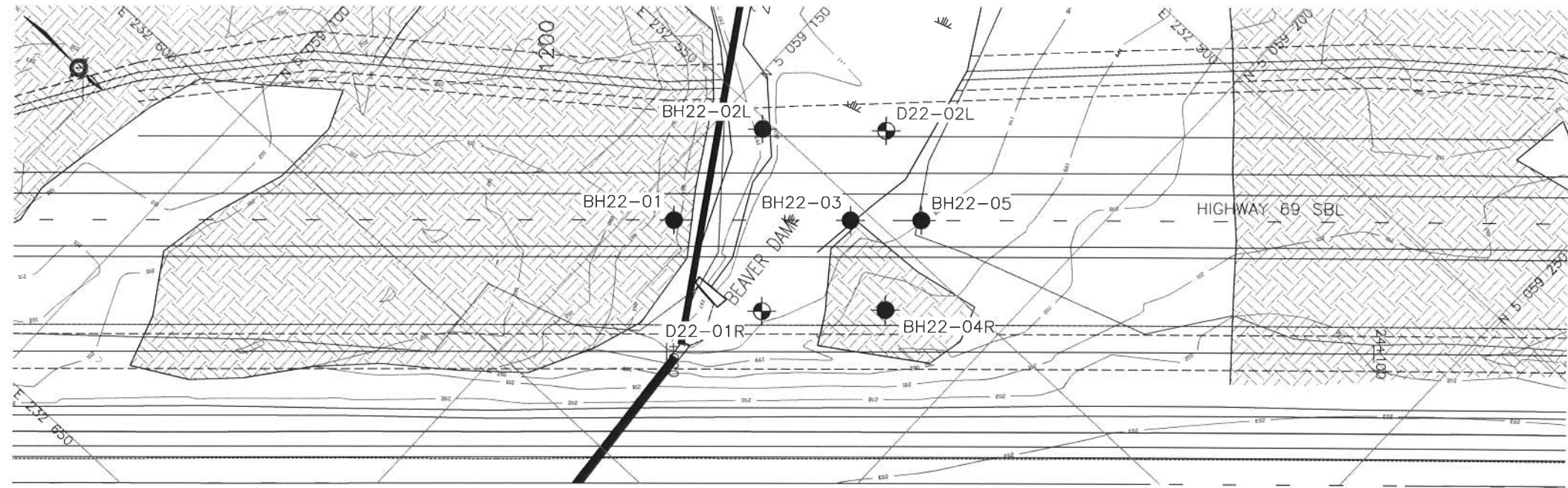
Date December 2012

GWP# 5294-08-00

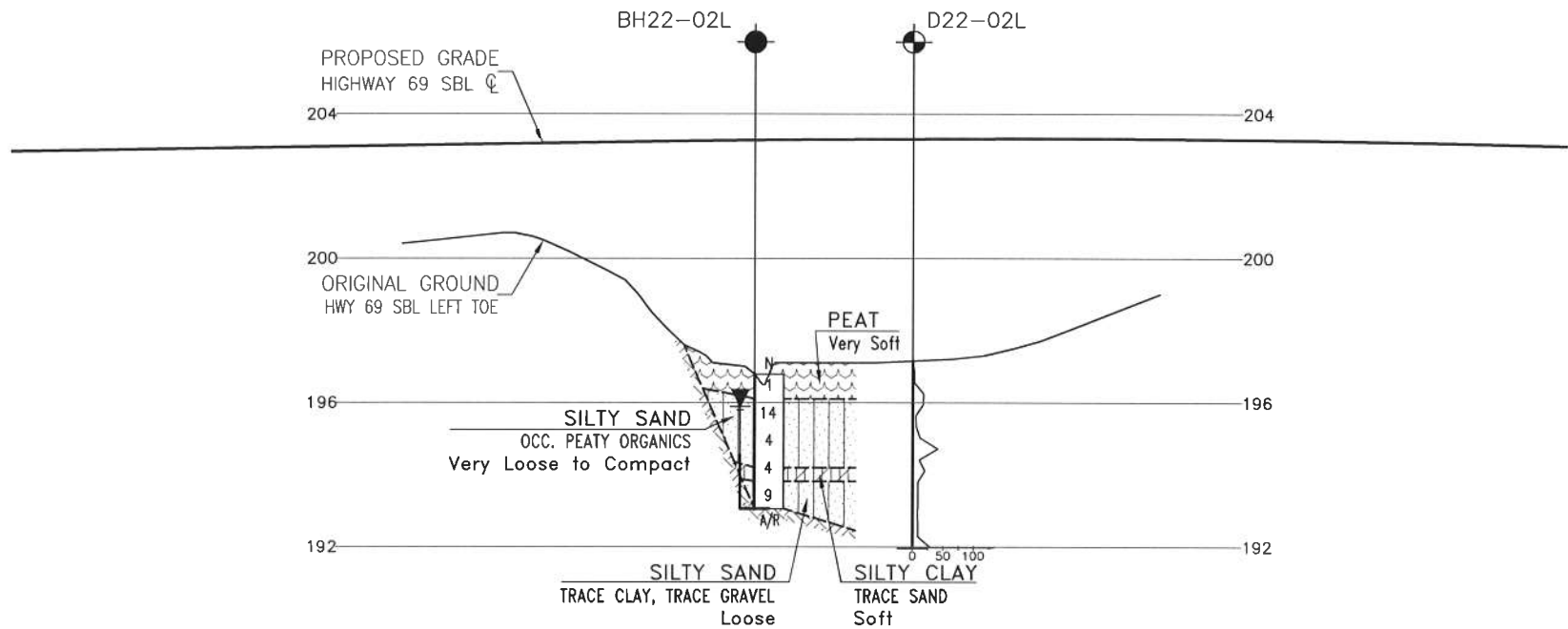


Prep'd MFA

Chkd. MRA



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG LEFT TOE HIGHWAY 69 SBL
0 16 32 48m H 1:800
0 4 8 12m V 1:200

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

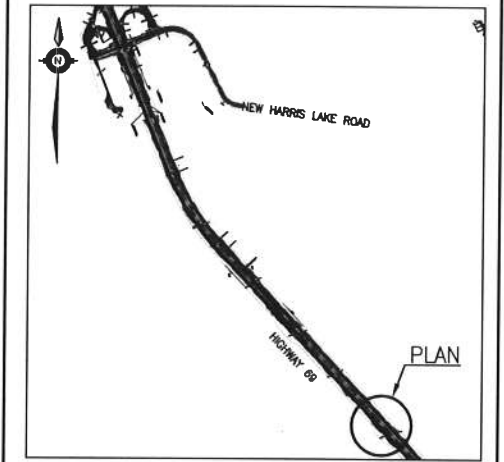
CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-LT TOE
(STA 24+000 - 24+040)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.

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
- W
- Water Level
- HA
- Head Artesian Water
- P
- Piezometer
- 90%
- Rock Quality Designation (RQD)
- A/R
- Auger Refusal

NO	ELEVATION	NORTHING	EASTING
BH22-01	198.3	5 059 155.3	232 569.3
BH22-02L	196.8	5 059 155.6	232 551.2
BH22-03	197.3	5 059 173.6	232 552.3
BH22-04R	199.5	5 059 186.0	232 558.3
BH22-05	198.0	5 059 181.0	232 545.5
D22-01R	197.8	5 059 173.3	232 570.3
D22-02L	197.2	5 059 168.6	232 539.5

-NOTES-

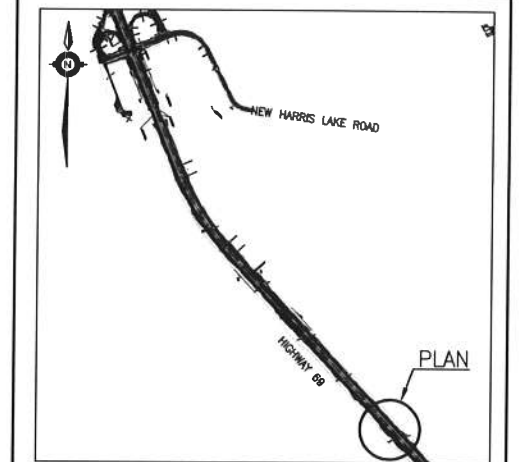
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 41H-99








REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012

SHEET |

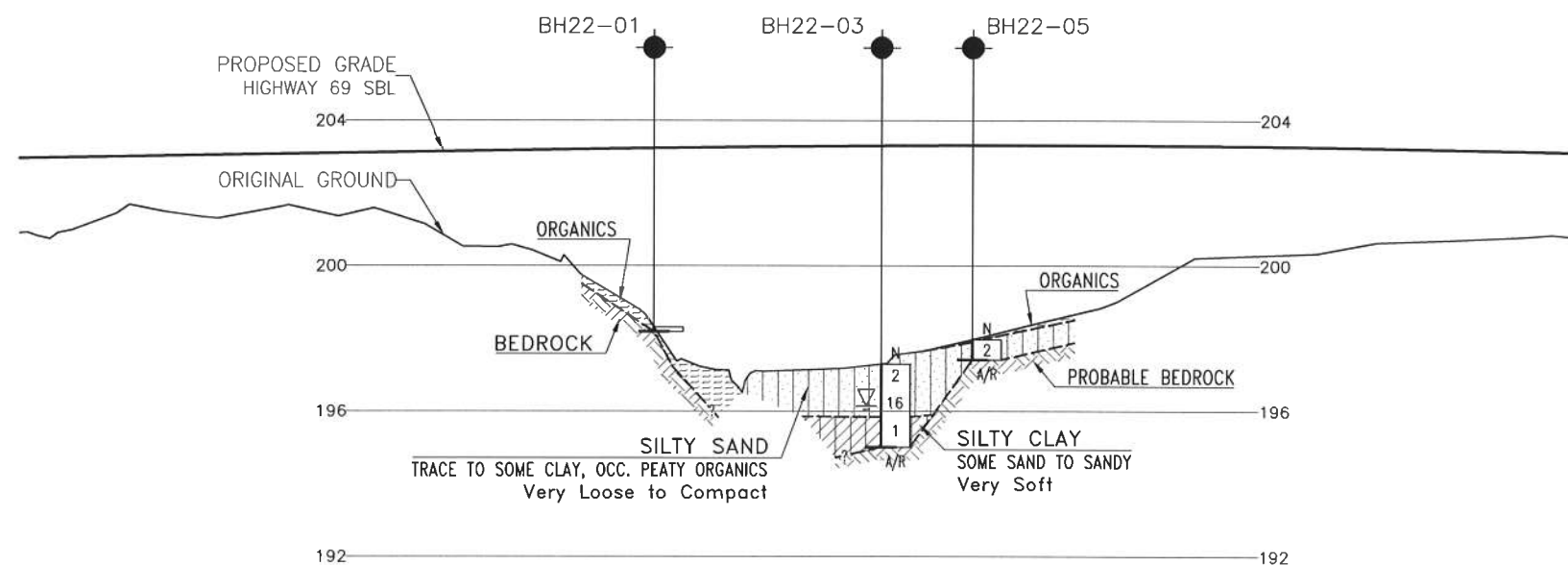


KEYPLAN
LEGEND

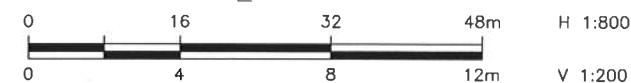
	Borehole
	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60' Cone, 475J/blow)
PH	Pressure, Hydraulic
	Water Level
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

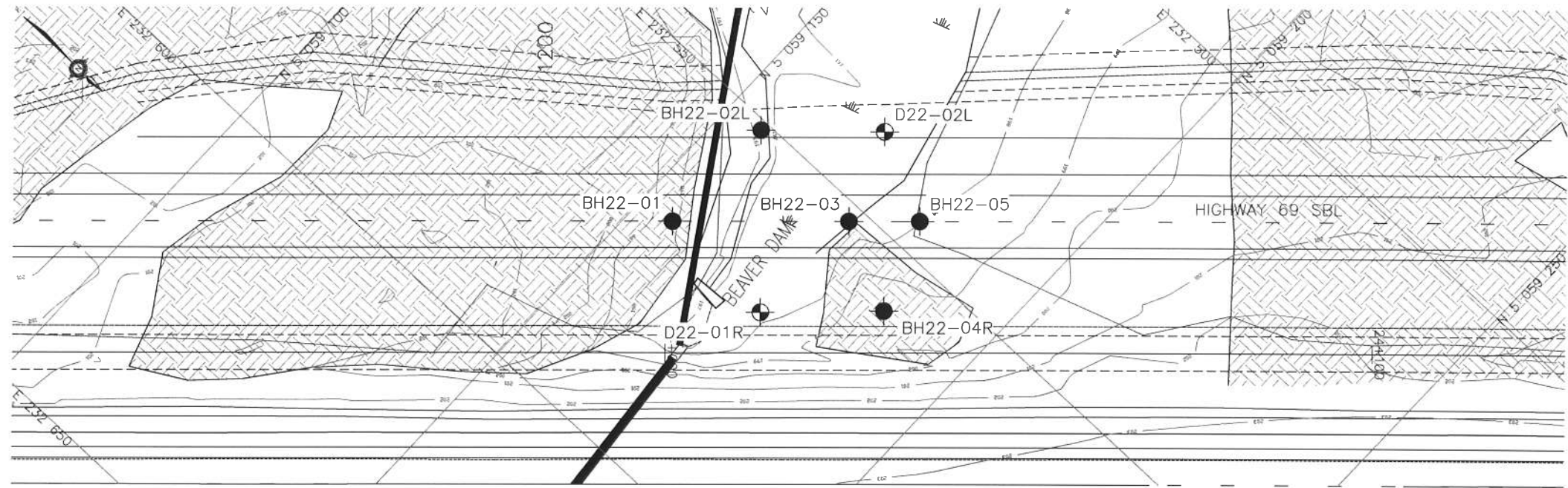
[illegible]

- 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.

[illegible]

PROFILE ALONG C HIGHWAY 69 SBL

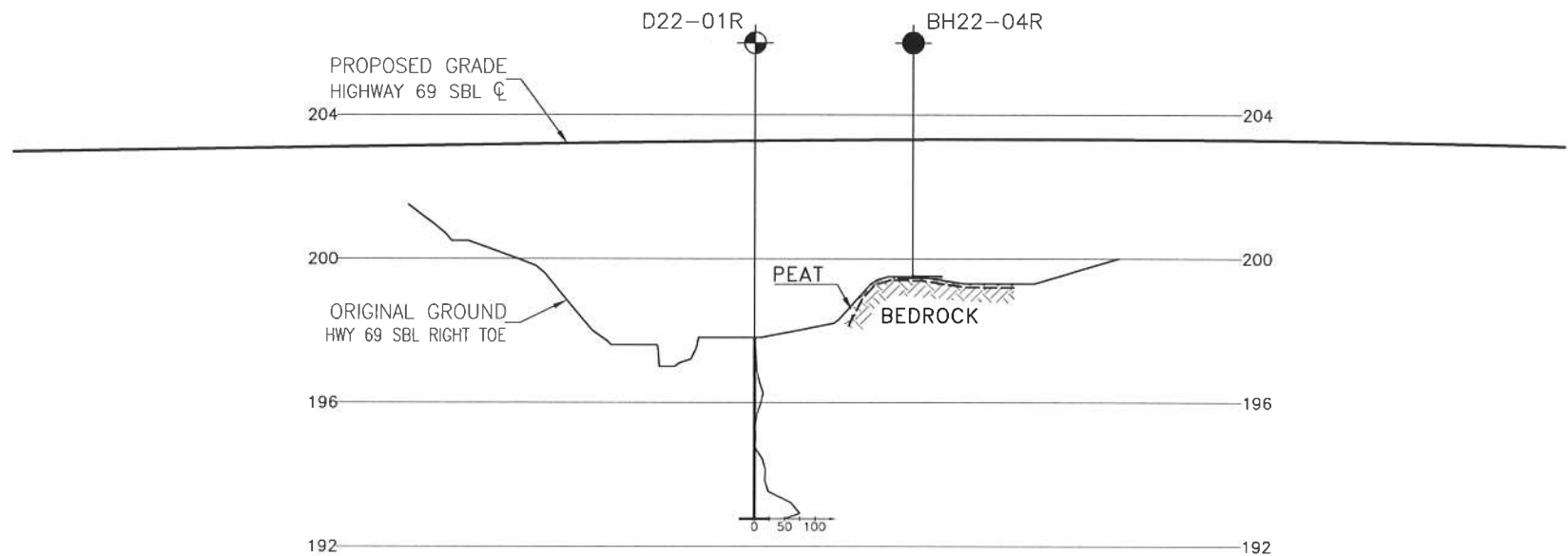




PLAN



SCALE 1:800



PROFILE ALONG RIGHT TOE HIGHWAY 69 SBL



H 1:800

V 1:200

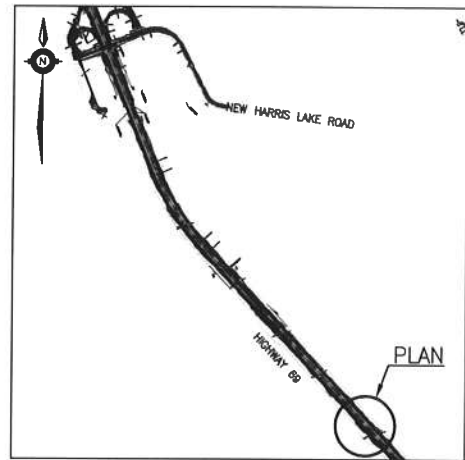
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-RT TOE
(STA 24+000 - 24+040)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING
BH22-01	198.3	5 059 155.3	232 569.3
BH22-02L	196.8	5 059 155.6	232 551.2
BH22-03	197.3	5 059 173.6	232 552.3
BH22-04R	199.5	5 059 186.0	232 558.3
BH22-05	198.0	5 059 181.0	232 545.5
D22-01R	197.8	5 059 173.3	232 570.3
D22-02L	197.2	5 059 168.6	232 539.5

-NOTES-

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

GEOCRES No. 41H-99



REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012

Appendix H

**Highway 69 NBL & SBL
Sta. 24+400 to 24+600 Township of Harrison**

**Boreholes 23-01 to 23-16L, 24-01 to 24-12R, 24-14R to 24-17L
DCPTs D23-01L to D23-07L, D24-01R to D24-05L**

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

RECORD OF BOREHOLE No BH23-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+481 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.29 - 2008.10.29 CHECKED BY RPR

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		
196.1	Ground Surface													
0.0	ASPHALT (200mm)						196							
0.2	SAND and GRAVEL, trace silt, trace clay, occasional asphalt and rock fill fragments Very Dense Brown Moist (FILL)		1	AS										
			2	AS										
			1	SS	50/ 125		195							
			2	SS	63/ 250									
194.1														50 42 8 (SI+CL)
2.0	END OF BOREHOLE AT 2.0m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPHALT TO THE SURFACE.													

ONTMT4S 6121.GPJ 12/11/12

RECORD OF BOREHOLE No BH23-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+488.5 O/S 7.9R, NBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR


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			20	40	60	80	100					
195.6	Ground Surface																
0.0	ASPHALT (75mm)		1	AS													
0.1	SAND and GRAVEL, trace silt, trace clay		2	AS													
195.2	Brown																
0.4	Moist (FILL)																
	END OF BOREHOLE AT 0.4m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m THEN ASPHALT TO SURFACE.																

RECORD OF BOREHOLE No BH23-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+501 C/L, NBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.10.29 - 2008.10.29 CHECKED BY RPR

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 X LAB VANE							
195.9	Ground Surface														
0.0	ASPHALT (200mm)														
0.2	SAND, some gravel, trace silt, occasional rock fill fragments Very Dense Brown Moist (FILL)		1	AS											
			1	SS	98/ 125										
193.9			2	SS	63/ 275										
2.0	END OF BOREHOLE AT 2.0m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN TO 1.5m AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPHALT TO THE SURFACE.														

RECORD OF BOREHOLE No BH23-04L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+513.5 O/S 8.1L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.29 - 2008.10.29 CHECKED BY RPR

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									
195.5	Ground Surface						20	40	60	80	100						
0.0	ASPHALT (50mm)		1	AS													
194.4	SAND and GRAVEL, some silt, trace clay Dense Grey to Brown Moist (FILL)		1	SS	38											33 57 10	
1.1	END OF BOREHOLE AT 1.1m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPHALT TO THE SURFACE.															(SI+CL)	

ONTMT4S 6121.GPJ 12/11/12

RECORD OF BOREHOLE No BH23-05

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+526 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.29 - 2008.10.29 CHECKED BY RPR

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	
195.9	Ground Surface											
0.0	ASPHALT (200mm)											
0.2	SAND, trace to some gravel, occasional rock fill fragments Very Dense to Dense Brown Moist (FILL)		1	AS								
			2	AS								
			1	SS	64							
			2	SS	39							
192.9												
3.0	Silty CLAY, trace to some sand, occasional sand seams, occasional roots and rootlets Soft to Firm Brown to grey		3	SS	2							
			5	SS	PH							
189.3			6	SS	6							
6.6	SAND and SILT, trace gravel, trace clay Loose to Compact Grey Wet											
			7	SS	20							
187.2												
8.7	END OF BOREHOLE AT 8.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 1.6m AFTER COMPLETION OF DRILLING. BOREHOLE CAVED TO 6.2m, THEN BACKFILLED WITH BENTONITE HOLEPLUG TO 0.9m, THEN AUGER CUTTINGS TO 0.15m, THEN											

Continued Next Page

+ 3 . x 3 : Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

METRIC

[illegible]

RECORD OF BOREHOLE No BH23-06R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+538.5 O/S 8.1R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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						
195.5	Ground Surface							20	40	60	80	100		
0.0	ASPHALT (75mm)		1	AS										
0.1	SAND , some gravel, trace silt Brown Moist (FILL)		2	AS			195							
194.6														
0.9	END OF BOREHOLE AT 0.9m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m THEN ASPHALT TO SURFACE.													

+³, ×³: Numbers refer to
Sensitivity

20
15
10
5
0
5
10
15
20
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH23-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+551 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.29 - 2008.10.29 CHECKED BY RPR

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 (%) w _p w w _L
196.0	Ground Surface													
0.0	ASPHALT (225mm)						196							
0.2	SAND, some silt, trace clay, trace gravel Brown Moist (FILL)		1	AS										5 80 15 (SI+CL)
			2	AS										
194.8							195							
1.2	END OF BOREHOLE AT 1.2m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN ASPALT TO THE SURFACE.													

+³, ×³: Numbers refer to
Sensitivity

20
15
10
5
0
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH23-08L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+563.5 O/S 8.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.29 - 2008.10.29 CHECKED BY RPR

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		
195.6	Ground Surface													
0.8	ASPHALT (50mm)		1	AS										
194.8	SAND, some gravel, trace silt Brown Moist (FILL)						195							
0.8	END OF BOREHOLE AT 0.8m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m THEN ASPHALT TO SURFACE.													

RECORD OF BOREHOLE No BH23-09

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+576 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.29 - 2008.10.29 CHECKED BY RPR

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						
196.2	Ground Surface													
0.0	ASPHALT (250mm)													
195.9														
0.3	SAND, some gravel, trace silt		1	AS										
	Brown													
	Moist													
195.3	(FILL)		2	AS										
0.9	END OF BOREHOLE AT 0.9m UPON AUGER REFUSAL ON PROBABLE ROCK FILL OR BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m THEN ASPHALT TO SURFACE.													

ONTMT4S 6121.GPJ 12/11/12

RECORD OF BOREHOLE No BH23-10L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+429 O/S 19.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.15 - 2010.11.15 CHECKED BY MRA

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							WATER CONTENT (%)		
								20 40 60 80 100							20 40 60		
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							w _p w w _L		
194.0	Ground Surface																
0.0	PEAT, fibrous Very Soft Black		1	SS	1		194										
192.9			2	SS	3		193										
1.1	Silty CLAY, with sand seams Soft to Very Stiff Brown to Grey		3	SS	20												
192.2																	
1.8	END OF BOREHOLE AT 1.8m UPON REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.																

RECORD OF BOREHOLE No BH23-11L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+480 O/S 19.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.14 - 2010.11.14 CHECKED BY MRA

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		
194.0	Ground Surface						194							
0.0	PEAT, fibrous Soft Black		1	SS	6									
193.1			2	SS	8		193							
0.9	Silty CLAY, with peaty organics Firm Dark Brown to Brown		3	SS	8									
			4	SS	23		192							
191.6			5	SS	18/									
2.4	Silty SAND													
191.3	Compact Grey													
2.7	Wet													
	END OF BOREHOLE AT 2.7m. BOREHOLE CAVED TO 1.9m. WATER LEVEL AT SURFACE UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.													

+³, X³: Numbers refer to Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH23-12R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+495 O/S 16.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.13 - 2010.11.13 CHECKED BY MRA

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 (%)					
								20 40 60 80 100	w _p w w _L						
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE									
194.0	Ground Surface						194								
0.0	PEAT, fibrous Soft Black		1	SS	1										
193.4															
0.6	Silty CLAY, trace organics Soft to Stiff Brown to Grey		2	SS	2		193								
	With silty sand seams		3	SS	4								0 9 55 36		
			4	SS	11		192								
191.6															
2.4	Silty SAND Compact Grey Wet		5	SS	14		191								
191.2															
2.8	Silty CLAY, with silty sand seams Firm to Soft Grey		6	SS	8								0 11 40 49		
			7	SS	3		190								
189.8															
4.2	Silty SAND, with silty clay layers Very Loose Grey Moist to Wet		8	SS	3		189							0 44 34 22	
			9	SS	0										
188.3			10	SS	36/										
5.7	END OF BOREHOLE AT 5.7m UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND WATER LEVEL AT SURFACE UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.				0.100										

+³, ×³: Numbers refer to
Sensitivity

20
15
10




(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH23-13R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+520 O/S 16.0R, NBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
DATUM Geodetic DATE 2010.11.14 - 2010.11.14 CHECKED BY MRA

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 (%)		
								○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE × LAB VANE				W _P	W	W _L
193.9	Ground Surface														
0.0	PEAT, fibrous Soft Dark Brown		1	SS	2										
			2	SS	12										
192.7	Silty CLAY, some sand Very Soft to Firm Grey		3	SS	4										
1.2			4	SS	8										
			5	SS	6										
			6	SS	1										
190.3			7	SS	27										
3.6	SAND, some silt, trace gravel Compact Grey Wet														
189.6	END OF BOREHOLE AT 4.3m DUE TO CAVE. BOREHOLE OPEN TO 3.6m AND WATER LEVEL AT SURFACE UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.														
4.3															

+³, X³: Numbers refer to Sensitivity
20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH23-14L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+530 O/S 19.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.14 - 2010.11.14 CHECKED BY MRA

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 (%)					
								20 40 60 80 100	w _p w w _L						
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
194.1	Ground Surface														
0.0	PEAT, fibrous Soft Black		1	SS	1		194								
193.3															
0.8	Silty CLAY, some sand Firm to Stiff Brown to Grey Moist		2	SS	4		193								
			3	SS	5										
			4	SS	9		192							0 11 50 39	
191.3			5	SS	27										
2.8	SAND, some silt Compact Grey Wet		6	SS	7		191								
190.8															
3.3	Silty CLAY, occasional sand seams Very Soft to Firm Grey		7	SS	3		190							0 26 34 40	
			8	SS	3										
			9	SS	1		189								
			10	SS	6										
188.0															
6.1	END OF BOREHOLE AT 6.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 4.8m AND WATER LEVEL AT SURFACE UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.														

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH23-15R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+545 O/S 16.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.14 - 2010.11.14 CHECKED BY MRA

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		
194.1	Ground Surface													
0.0	PEAT, fibrous		1	SS	21/ 0.225		194							
193.8	Dark Brown													
0.3	Clayey SILT and SAND Stiff Grey													
193.1			2	SS	29/ 0.225									0 40 44 16
1.0	END OF BOREHOLE AT 1.0m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH AUGER CUTTINGS.													

+³, ×³: Numbers refer to
Sensitivity

20
15
10
5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH23-16L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+555 O/S 19.0L, NBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
DATUM Geodetic DATE 2010.11.14 - 2010.11.14 CHECKED BY MRA

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									
194.1	Ground Surface							20	40	60	80	100					
0.0	PEAT, fibrous: (150mm)		1	SS	11		194										
0.2	Silty CLAY																
193.6	Stiff																
0.5	Brown																
	END OF BOREHOLE AT 0.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH AUGER CUTTINGS.																

RECORD OF BOREHOLE No D23-01L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+488.5 O/S 7.9L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.29 - 2008.10.29 CHECKED BY RPR

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 (%)				
195.8	Ground Surface							20	40	60	80	100	W _P W W _L	
0.0	Auger to 1.3m.							20	40	60	80	100	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	
194.5							195							
1.3	AUGER REFUSAL AT 1.3m ON PROBABLE ROCK FILL.													

+ 3 . X 3 : Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D23-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+513.5 O/S 8.1R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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 (%)	W _P	W	W _L		
195.4	Ground Surface													
0.0	Auger to 0.9m.						195							
194.5	AUGER REFUSAL AT 0.9m ON PROBABLE ROCK FILL.													
0.9														

RECORD OF BOREHOLE No D23-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+538.5 O/S 8.1L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.29 - 2008.10.29 CHECKED BY RPR

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						
195.5	Ground Surface										
0.0	Auger to 1.8m.		1	AS							
	DCPT from 1.8m.										
189.8											
5.7	END OF DCPT AT 5.7m UPON REFUSAL ON PROBABLE BEDROCK.										

RECORD OF BOREHOLE No D23-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+563.5 O/S 8.0R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.30 - 2008.10.30 CHECKED BY RPR

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					WATER CONTENT (%)							GR	SA	SI	CL
195.7	Ground Surface																				
0.0	Auger to 0.6m.																				
195.1																					
0.6	AUGER REFUSAL AT 0.6m ON PROBABLE ROCK FILL.																				

RECORD OF BOREHOLE No D23-05L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+454 O/S 19.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.11.15 - 2010.11.15 CHECKED BY MRA

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				WATER CONTENT (%)							
194.0	Ground Surface						194	20	40	60	80	100	20	40	60	kN/m ³	GR SA SI CL
0.0	DCPT from surface						193										
							192										
191.6																	
2.4	END OF DCPT AT 2.4m UPON REFUSAL ON PROBABLE BEDROCK																

RECORD OF BOREHOLE No D23-06R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+470 O/S 16.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.11.14 - 2010.11.14 CHECKED BY MRA

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 (%)			
194.8	Ground Surface						20 40 60 80 100	20 40 60	w _p w w _L				
0.0	DCPT from surface.						20 40 60 80 100	20 40 60					

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D23-07L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+505 O/S 19.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.11.14 - 2010.11.14 CHECKED BY MRA

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			20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	
194.2	Ground Surface											
0.0	DCPT from surface											
							194					
							193					
							192					
							191					
							190					
189.6												
4.6	END OF DCPT AT 4.6m UPON REFUSAL ON PROBABLE BEDROCK.											

+ 3, X 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH24-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+506 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009 02 08 - 2009 02 08 CHECKED BY RPR

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		
195.5	Pond Surface													
0.0	ICE and WATER						195							
194.6														
0.9	Sandy SILT, trace gravel, occasional roots Loose Grey Moist		1	SS	5		194							
193.8														
1.7	END OF BOREHOLE AT 1.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.													

+³, ×³: Numbers refer to Sensitivity

20
15
10
5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH24-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+513.5 O/S 6.7L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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		
195.5	Pond Surface													
0.0	ICE and WATER													
194.9														
0.6	Silty CLAY, sandy, occasional roots Soft Grey		1	SS	4		195							0 28 42 30
194.1														
1.4	END OF BOREHOLE AT 1.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.													

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH24-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+526 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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					
195.5	Pond Surface						20	40	60	80	100	20	40	60		
0.0	ICE and WATER															
194.1																
1.4	Sandy SILT, clayey, occasional roots Compact Grey Wet		2	SS	16											0 30 49 21
193.3																
2.2	Silty CLAY, trace sand Soft to Firm Grey		3	SS	5											0 2 32 66
			4	SS	2											
191.0																
190.5	Sandy SILT		5	SS	70/											
4.6	Brown Moist				.075											
END OF BOREHOLE (SAMPLER BOUNCING) AT 4.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																

RECORD OF BOREHOLE No BH24-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+538.5 O/S 6.5R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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				
								WATER CONTENT (%)				
195.5	Pond Surface											
0.0	ICE and WATER											
194.1												
1.4	Silty CLAY , trace sand to sandy, occasional roots Very Soft Grey Layer of compact silt (800mm) Stiff to Soft		1	SS	0							
			2	SS	13							0 24 58 18
	Sand lenses		3	SS	4							0 2 37 61
			4	TW								
190.6												
4.9	Sandy SILT , some clay Loose Grey Moist		5	SS	7							
189.1												
6.4	SAND , trace to some clay, trace to some silt, trace gravel Very Loose to Loose Grey Wet		6	SS	4							1 88 11 (SI+CL)
187.2												
8.3	END OF BOREHOLE AT 8.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.											

ONTMT4S 6121.GPJ 12/11/12

RECORD OF BOREHOLE No BH24-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+551 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009 02 08 - 2009 02 08 CHECKED BY RPR

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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					w _P w w _L WATER CONTENT (%)								
								20	40	60	80	100	20	40	60						
195.5	Pond Surface																				
0.0	ICE and WATER																				
194.1																					
1.4	Silty CLAY , trace sand Firm to Very Stiff Grey		1	SS	16										○						
			2	SS	5																
192.5																					
3.0	Sandy SILT Loose Grey Wet		3	SS	4																
191.2																					
4.3	SAND , trace clay, trace silt, trace gravel Loose Grey Wet		4	SS	8										○						
190.2																					
5.3	END OF BOREHOLE AT 5.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																				

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

RECORD OF BOREHOLE No BH24-06L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+561 O/S 6.4L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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						
195.5	Pond Surface							20	40	60	80	100		
0.0	ICE and WATER							20	40	60	80	100		
194.1														
1.4	Sandy SILT, some clay Compact Grey Wet		2	SS	21								0	33 56 11
193.3														
2.2	Silty CLAY, trace sand, trace gravel Grey		3	SS	50/								0	
192.9														
2.6	END OF BOREHOLE AT 2.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Apr 21/09 Ground Surface Jun 05/09 0.1 194.0 Aug 17/09 Ground Surface Aug 25/09 Ground Surface Oct 27/09 Ground Surface Nov 20/09 Ground Surface													

RECORD OF BOREHOLE No BH24-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+566 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009 02 08 - 2009 02 08 CHECKED BY RPR


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		
195.5	Pond Surface													
0.0	ICE and WATER													
194.1														
1.4	Silty CLAY, trace sand, occasional roots Stiff Brown		2	SS	10									
193.3														
2.2	Gravelly SAND, some silt		3	SS	70/									
193.0	Brown to Grey													
2.5	Wet				050									
	END OF BOREHOLE AT 2.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.													

RECORD OF BOREHOLE No BH24-08

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+406 C/L, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.15 - 2011.02.15 CHECKED BY RPR








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 (%)
194.6	Ground Surface															
0.0	PEAT: (175mm)															
0.2	Silty CLAY, some sand Stiff Brown															
193.4			1	SS	54/ 175											
1.2	END OF BOREHOLE AT 1.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.															

RECORD OF BOREHOLE No BH24-09R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+418.5 O/S 6.5R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.15 - 2011.02.15 CHECKED BY RPR

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					
194.1	Ground Surface												GR SA SI CL
0.0	PEAT: (250mm)						○ UNCONFINED + FIELD VANE			w _p w w _L			
193.8							● QUICK TRIAXIAL x LAB VANE			WATER CONTENT (%)			
0.3	Silty CLAY , trace roots and rootlets Firm Brown												
193.2													
0.9	SILT and SAND , some clay Loose to Compact Brown Moist		1	SS	5		194						
			2	SS	10		193						
191.9							192						
2.2	Silty CLAY , some sand Soft Brown		3	SS	2								
			4	SS	0		191						
189.9							190						
4.2	END OF BOREHOLE AT 4.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 2.8m AND WATER LEVEL AT 1.4m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG TO 1.7m THEN AUGER CUTTINGS UPON COMPLETION.												

+ 3, x 3: Numbers refer to
Sensitivity

20
15
10



(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH24-10

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+431 C/L, SBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.02.15 - 2011.02.15 CHECKED BY RPR

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								
194.3	Ground Surface															
0.0	PEAT: (225mm)															
0.2	Silty CLAY, some sand, occasional roots and rootlets Firm Brown		1	SS	4											
			2	SS	7											
192.1	sand seams														0 13 48 39	
2.2	END OF BOREHOLE AT 2.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.															

RECORD OF BOREHOLE No BH24-11

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+456 C/L, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.15 - 2011.02.15 CHECKED BY RPR

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 (%)						
194.5	Ground Surface						20	40	60	80	100	W _P	W	W _L	GR SA SI CL	
0.0	PEAT: (225mm)															
0.2	Silty CLAY, sandy Stiff Brown		1	SS	8											
193.0																
191.5	SAND, trace to some silt		2	SS	50/											
1.7	Very Dense Brown Wet				0.075											
END OF BOREHOLE AT 1.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE UPON COMPLETION.																

RECORD OF BOREHOLE No BH24-12R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+468.5 O/S 6.5R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.15 - 2011.02.15 CHECKED BY RPR




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			20 40 60 80 100	20 40 60	W _P W W _L			
194.1	Ground Surface											kN/m ³	GR SA SI CL
0.0	PEAT, fibrous Dark Brown						194						
193.3													
0.8	Silty CLAY, sandy, roots and rootlets Very Soft to Soft Brown		1	SS	0		193						
			2	SS	4		192	5					0 23 48 29
								5					
			3	SS	3		191	7					
	trace sand		4	SS	0								0 2 59 39
190.2													
3.9	END OF BOREHOLE AT 3.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Feb 22/11 Ground Surface Mar 01/11 Ground Surface Mar 13/11 Ground Surface Apr 27/11 0.1 194.0												

RECORD OF BOREHOLE No BH24-14R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+493.5 O/S 6.5R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.15 - 2011.02.15 CHECKED BY RPR




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								
194.2	Ground Surface							20	40	60	80	100				
0.0	PEAT, fibrous Black						194									
193.3																
0.9	Silty SAND, some clay Very Loose to Compact Brown Moist to Wet		1	SS	0		193									
			2	SS	14											0 48 37 15
192.0																
2.2	Silty CLAY, trace sand Very Soft Brown		3	SS	1		192									0 6 55 39
191.3																
2.9	END OF BOREHOLE AT 2.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 1.7m AND WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.															

RECORD OF BOREHOLE No BH24-15R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+576 O/S 6.5R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.14 - 2011.02.14 CHECKED BY RPR

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 x LAB VANE								
194.4	Ground Surface															
0.0	PEAT Wet						194									
0.6	Silty CLAY, some sand Very Soft to Firm Brown sand seams		1	SS	0		193									0 12 57 31
			2	SS	7											
192.1																
2.3	SAND, some gravel, trace silt Compact Grey Wet		3	SS	11		192									15 77 8 (SI+CL)
	occasional cobbles		4	SS	21		191									
190.6																
3.8	END OF BOREHOLE AT 3.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 1.2m AND WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.															

+ 3 x 3 Numbers refer to
Sensitivity

20
15
10



(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH24-16

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+586 C/L, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.15 - 2011.02.15 CHECKED BY RPR

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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							PLASTIC LIMIT w _p NATURAL MOISTURE CONTENT w LIQUID LIMIT w _L				
194.5	Ground Surface							20	40	60	80	100							
0.0	PEAT: (225mm)																		
0.2	Gravelly SAND, some silt Compact Brown Moist																		
			1	SS	22														
			2	SS	74/ 0-200														
192.6																			
1.9	END OF BOREHOLE AT 1.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 1.1m AND WATER LEVEL AT 0.6m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																		

+ 3 . X 3 : Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH24-17L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+598 O/S 6.4L, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.15 - 2011.02.15 CHECKED BY RPR

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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE							WATER CONTENT (%) w _p w w _L		
194.6	Ground Surface					▽	194									GR SA SI CL	
0.0	PEAT: (225mm)																
0.2	SAND, some silt Very Loose to Compact Brown Moist to Wet		1	SS	4												
	trace gravel		2	SS	25		193										
192.4																	
2.2	END OF BOREHOLE AT 2.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 1.1m AND WATER LEVEL AT 0.4m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																

METRIC

[illegible]

RECORD OF BOREHOLE No D24-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+538.5 O/S 6.5L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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 (%)			
194.1	Ground Surface							20 40 60 80 100		W _P W W _L			
0.0	DCPT from surface. ICE (900mm)							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					
								20 40 60 80 100		20 40 60			
							194						
							193						
							192						
							191						
							190						
							189						
188.2													
5.9	END OF DCPT AT 5.9m UPON REFUSAL ON PROBABLE BEDROCK.												

RECORD OF BOREHOLE No D24-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+561 O/S 6.4R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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	20 40 60	W _P W W _L	WATER CONTENT (%)		
194.2	Ground Surface													
0.0	DCPT from surface													
191.1														
3.1	END OF DCPT AT 3.1m UPON REFUSAL ON PROBABLE BEDROCK.													

RECORD OF BOREHOLE No D24-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+443.5 O/S 6.5R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2011.02.15 - 2011.02.15 CHECKED BY RPR

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								
194.3	Ground Surface												
0.0	DCPT from surface												
192.4	END OF DCPT AT 1.9m UPON REFUSAL ON PROBABLE BEDROCK.												
1.9													

RECORD OF BOREHOLE No D24-05L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+576 O/S 6.4L, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2011.02.14 - 2011.02.14 CHECKED BY RPR

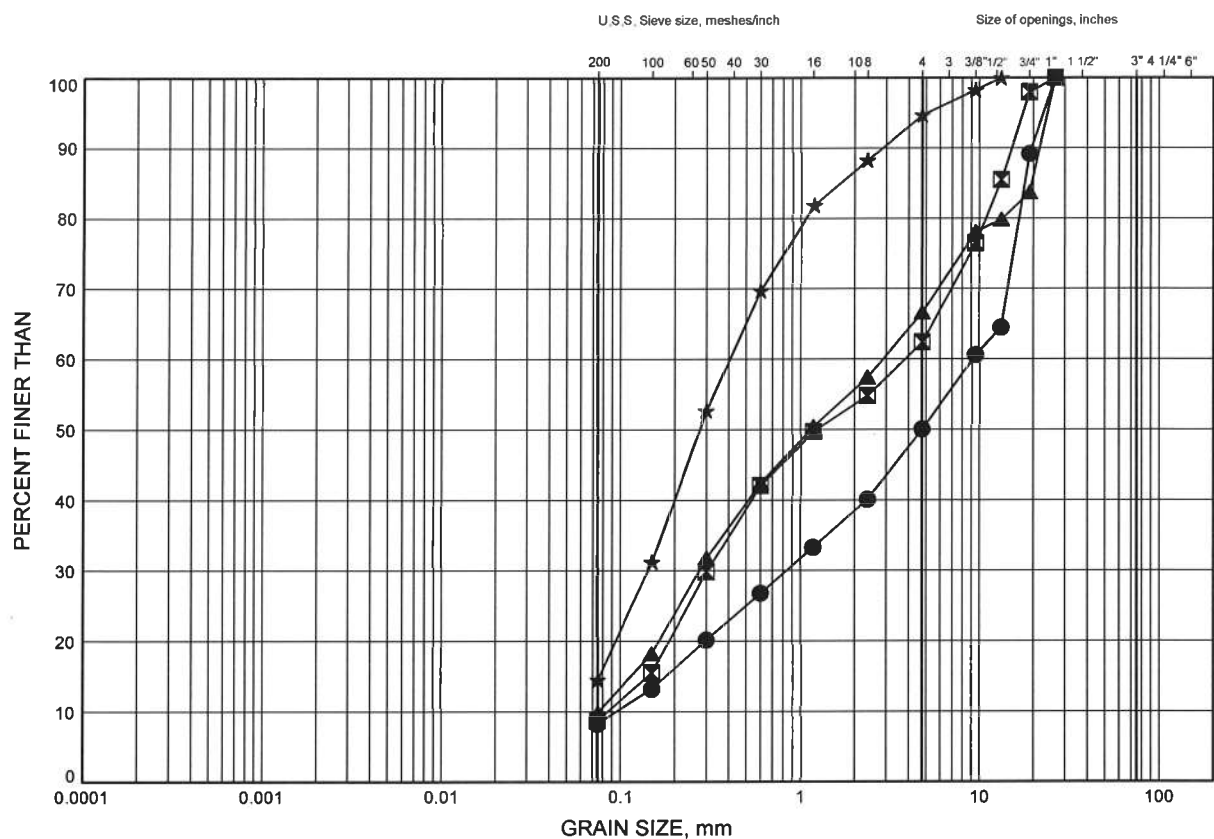
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
194.3	Ground Surface							20 40 60 80 100	○ UNCONFINED + FIELD VANE						
0.0	DCPT from surface							20 40 60 80 100	● QUICK TRIAXIAL × LAB VANE						
							194								
							193								
192.3	END OF DCPT AT 2.0m UPON REFUSAL ON PROBABLE BEDROCK.														
2.0															

ONTMT4S 6121.GPJ 12/12/12

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE H1

SAND to SAND and GRAVEL FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH23-01	1.73	194.37
⊠	BH23-02R	0.53	195.07
▲	BH23-04L	0.91	194.59
★	BH23-07	0.76	195.24

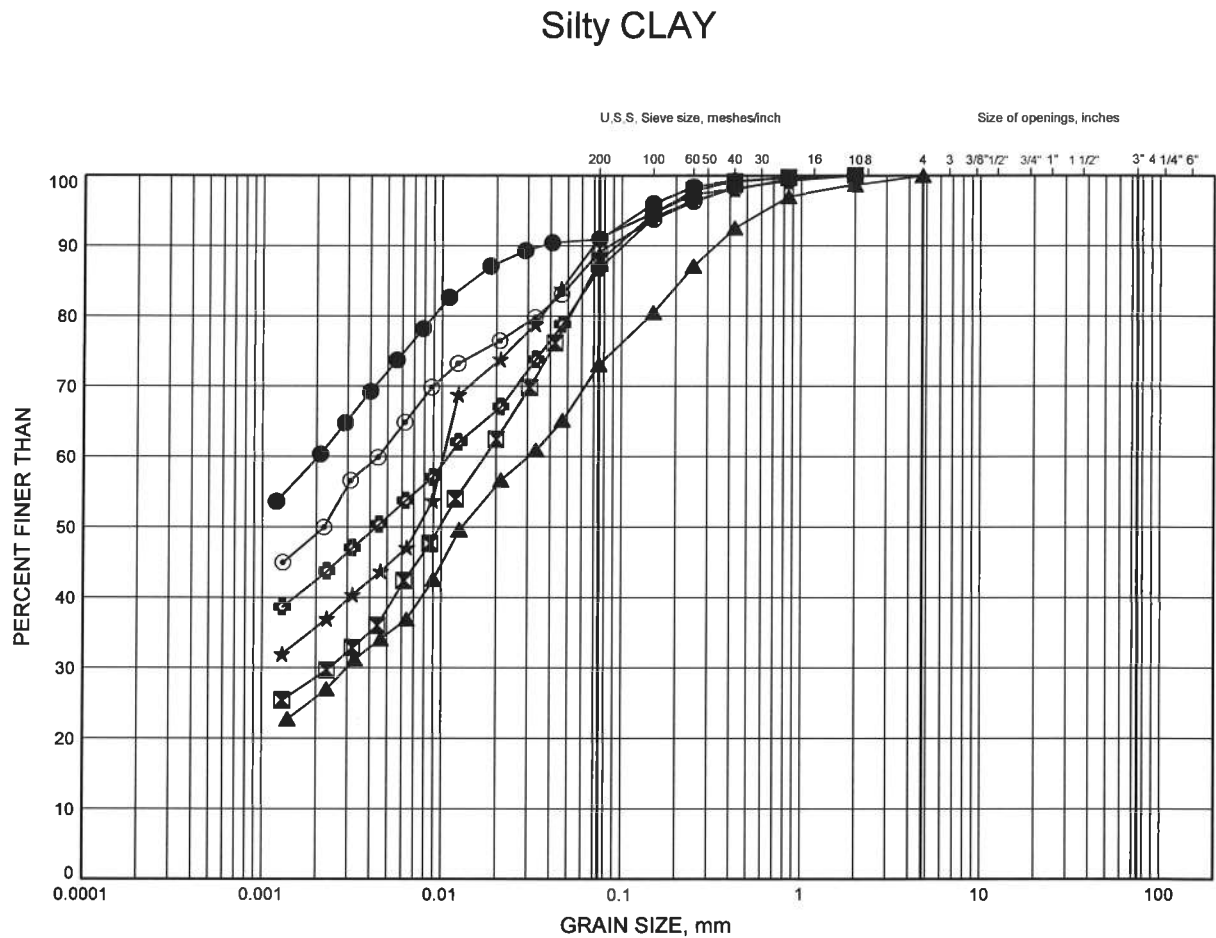
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE H2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH23-05	4.88	191.02
⊠	BH23-05	6.32	189.58
▲	BH23-11L	1.52	192.48
★	BH23-12R	1.52	192.48
⊙	BH23-12R	3.35	190.65
⊕	BH23-13R	2.13	191.77

Date December 2012

GWP# 5294-08-00



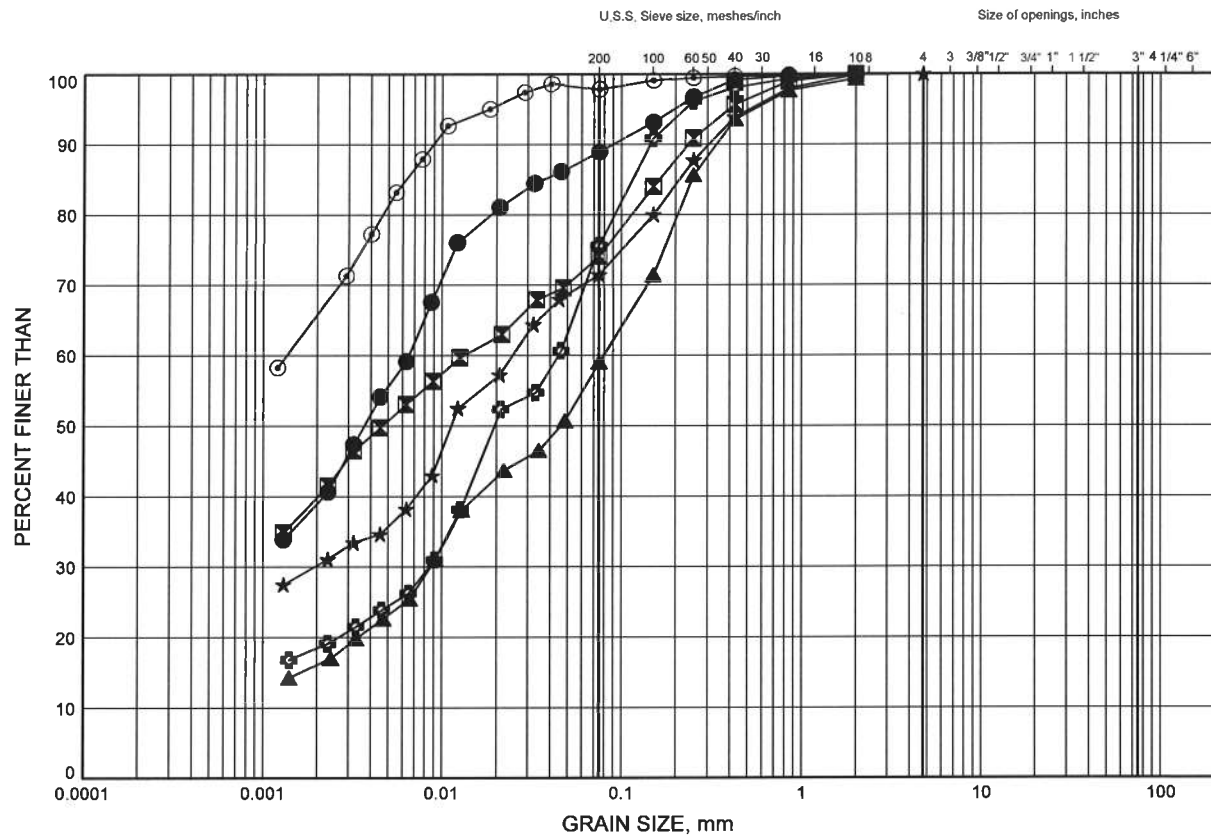
Prep'd MFA

Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE H3

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH23-14L	2.13	191.97
⊠	BH23-14L	3.47	190.63
▲	BH23-15R	0.80	193.30
★	BH24-02L	1.07	194.43
⊙	BH24-03	2.59	192.91
⊞	BH24-04R	2.44	193.06

Date December 2012

GWP# 5294-08-00

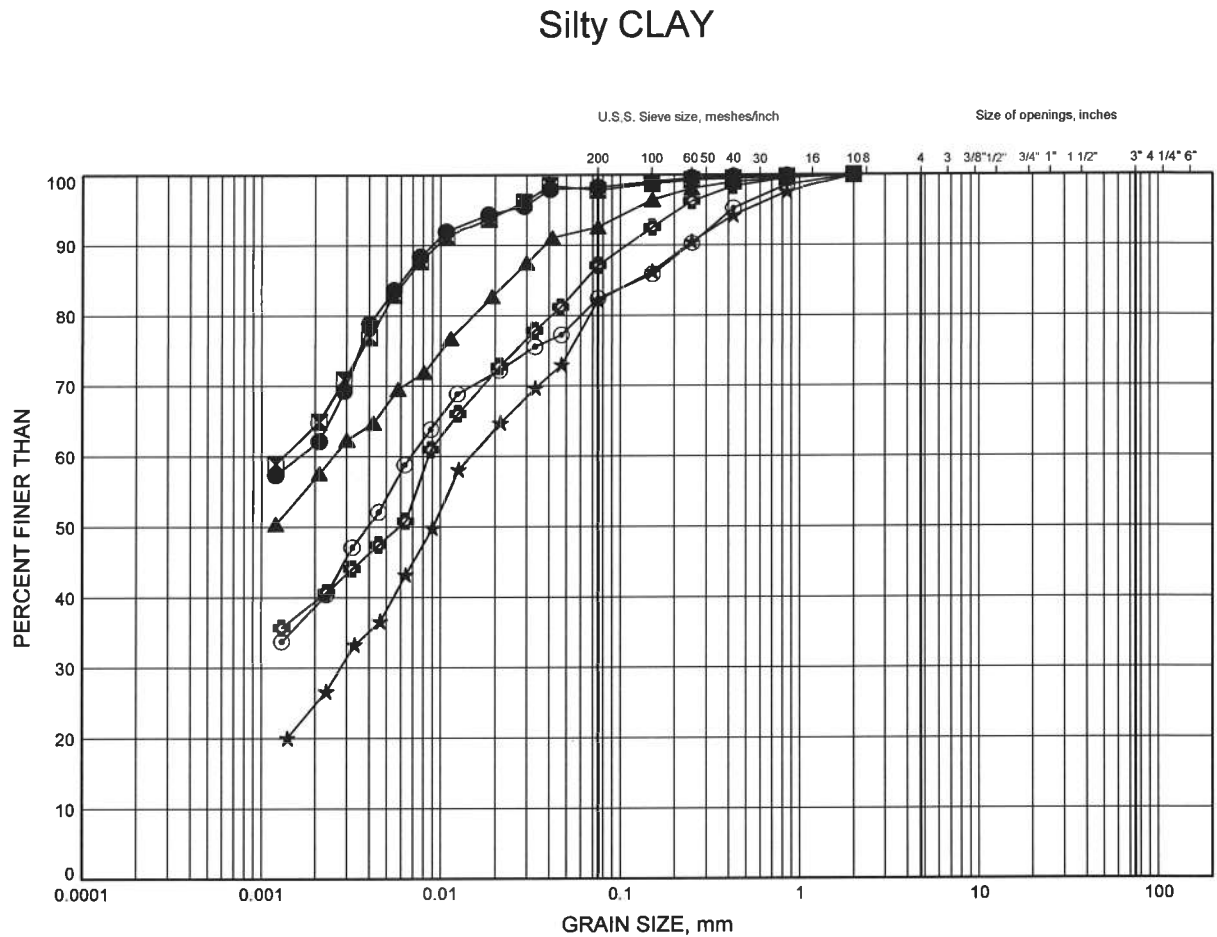


Prep'd MFA

Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE H4



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH24-04R	3.20	192.30
⊠	BH24-05	2.59	192.91
▲	BH24-07	1.83	193.67
★	BH24-08	1.07	193.53
⊙	BH24-09R	3.35	190.75
⊕	BH24-10	1.80	192.50

Date December 2012
GWP# 5294-08-00

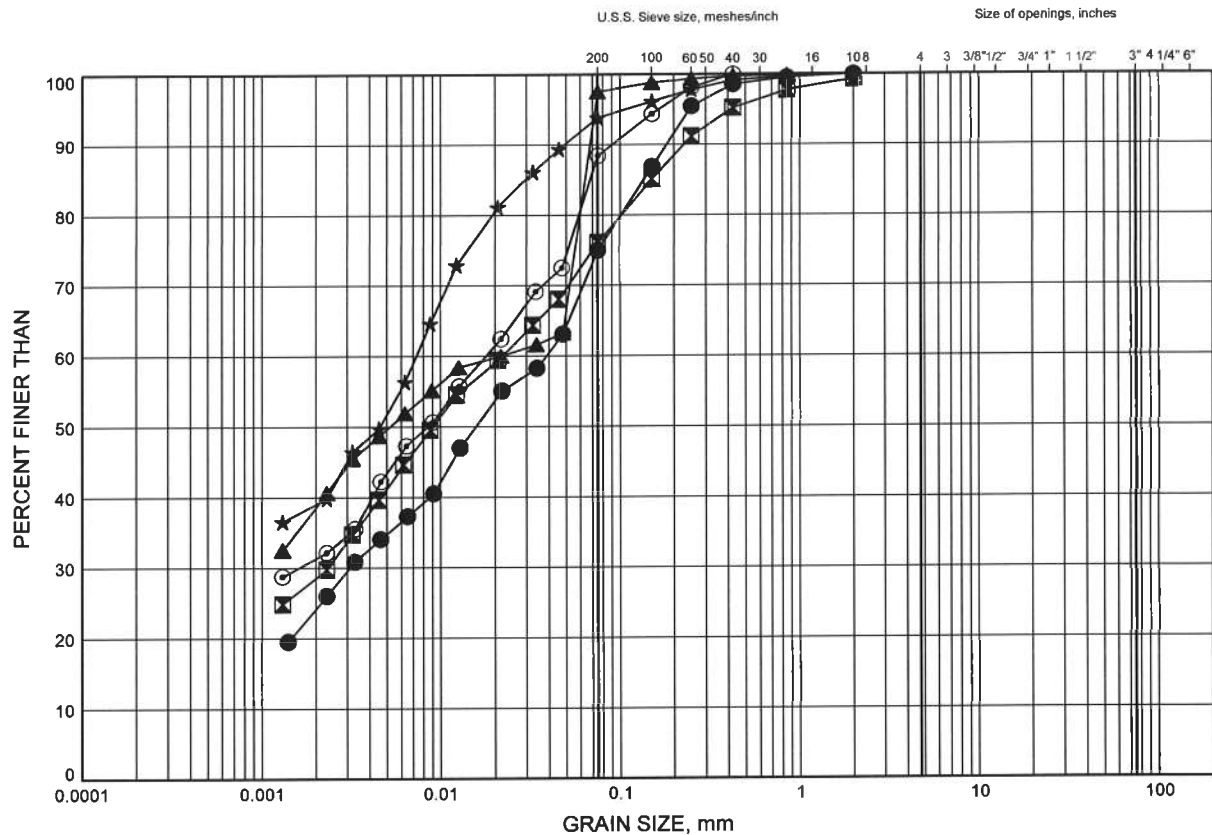


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Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529
GRAIN SIZE DISTRIBUTION

FIGURE H5

Silty CLAY



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

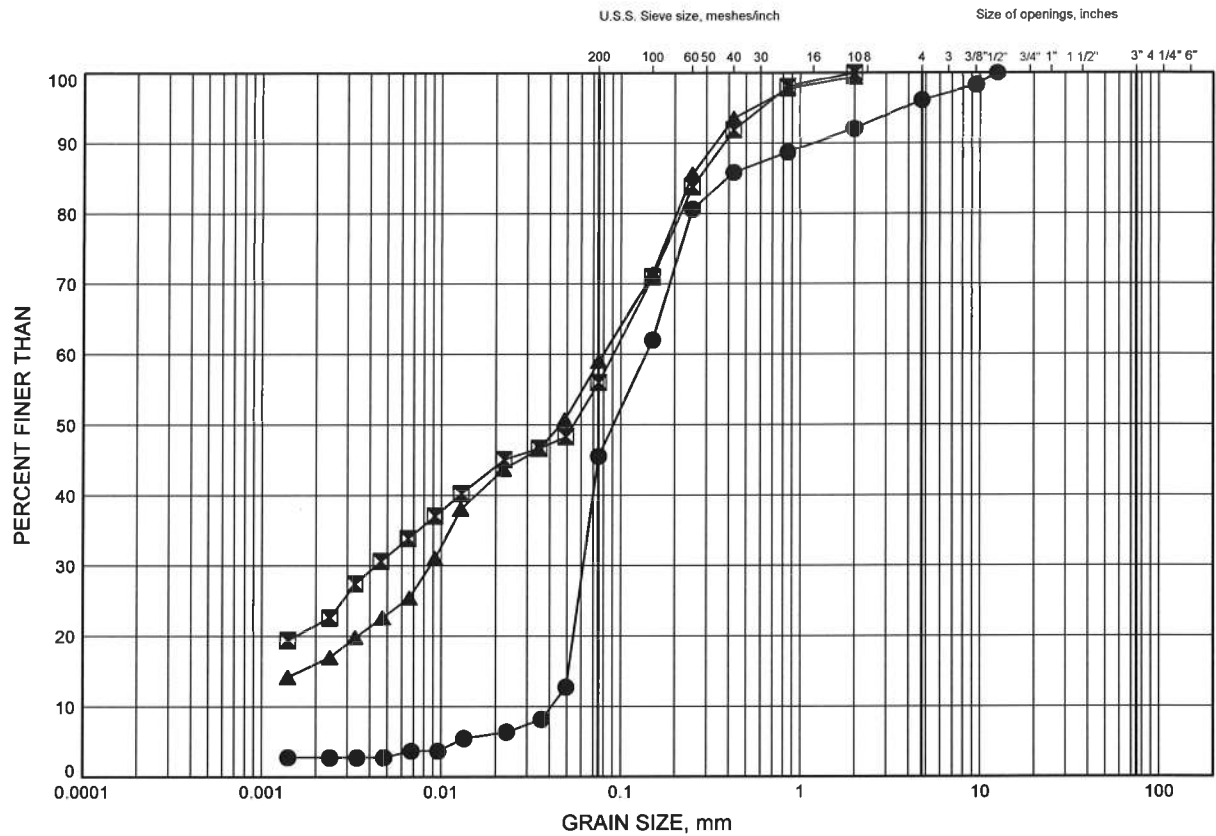
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH24-11	1.07	193.43
⊠	BH24-12R	1.83	192.27
▲	BH24-12R	3.35	190.75
★	BH24-14R	2.59	191.61
⊙	BH24-15R	1.83	192.57

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE H6

Sandy 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)
●	BH23-05	7.92	187.98
⊠	BH23-12R	4.57	189.43
▲	BH23-15R	0.80	193.30

Date December 2012
GWP# 5294-08-00

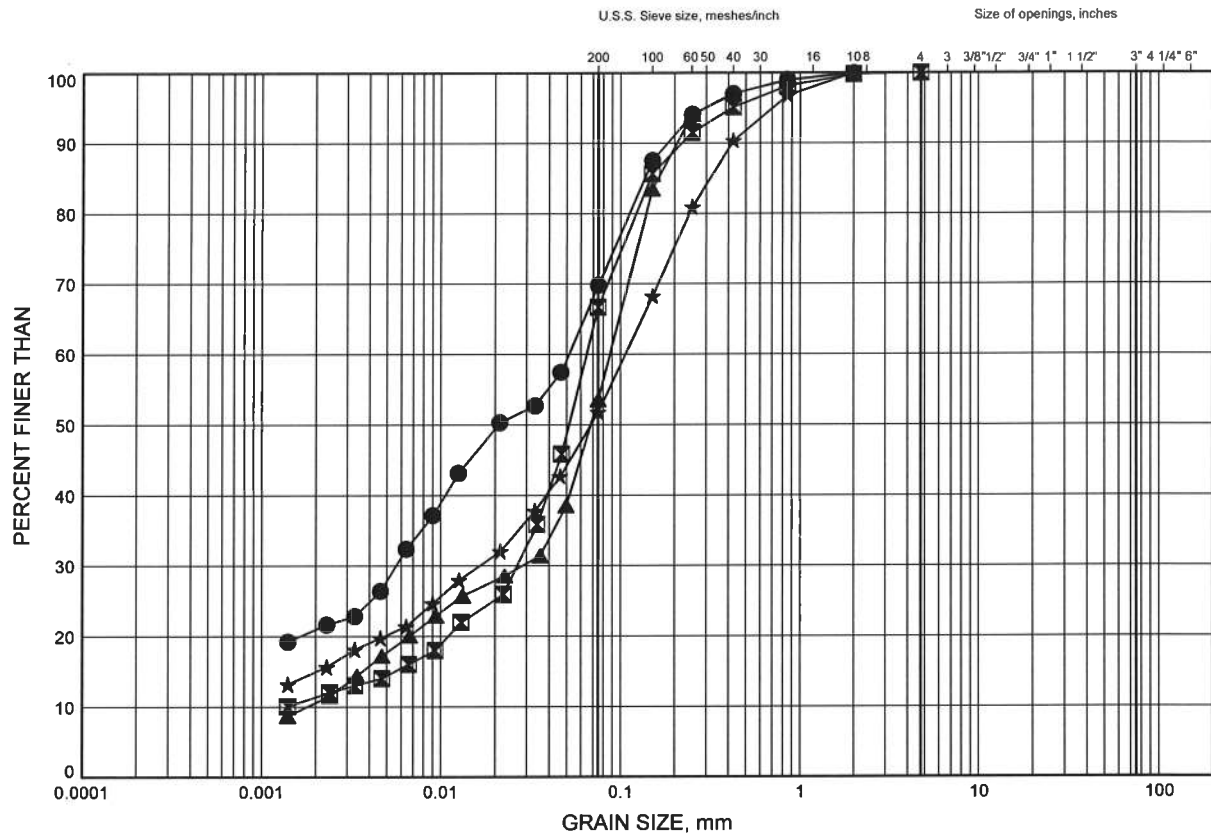


Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE H7

Sandy 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)
●	BH24-03	1.83	193.67
■	BH24-06L	1.83	193.67
▲	BH24-09R	1.83	192.27
★	BH24-14R	1.83	192.37

Date December 2012
GWP# 5294-08-00

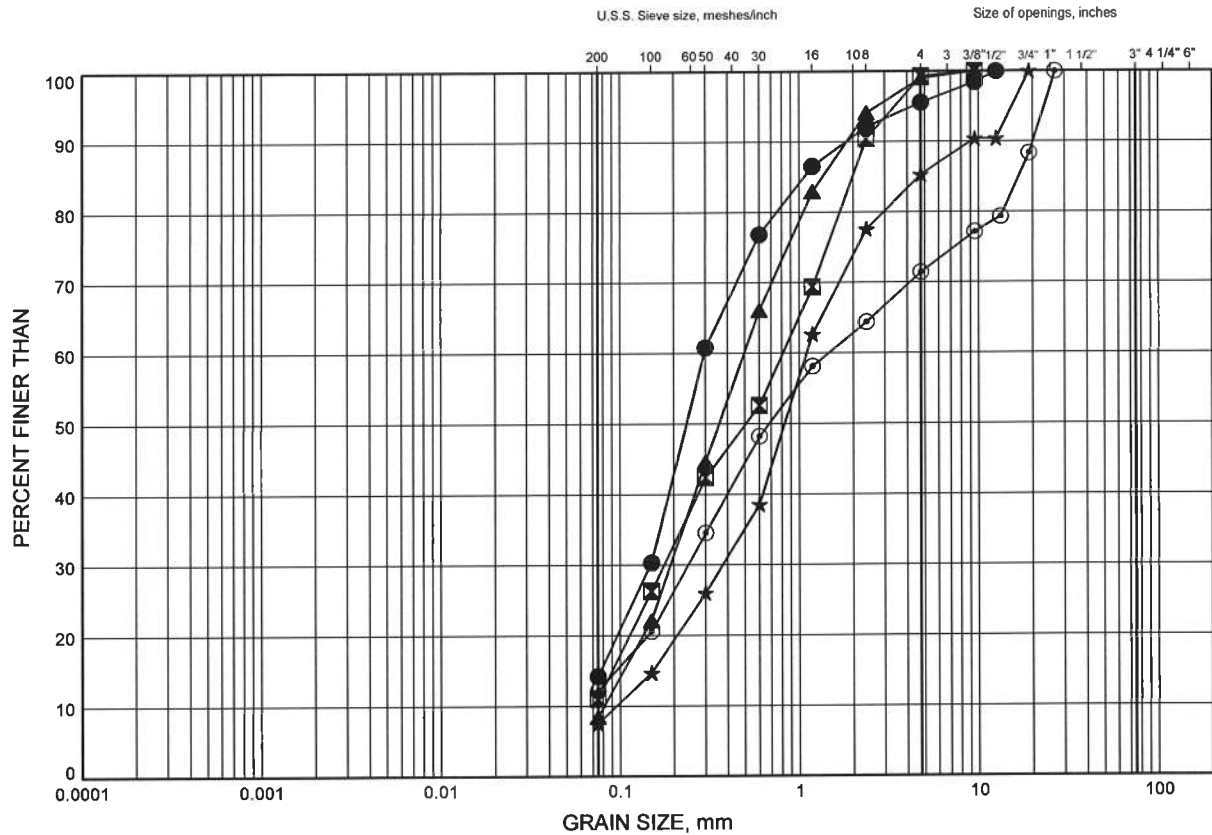


Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529
GRAIN SIZE DISTRIBUTION

FIGURE H8

SAND to Gravelly SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH23-13R	3.96	189.94
■	BH24-04R	7.01	188.49
▲	BH24-05	4.88	190.62
★	BH24-15R	2.59	191.81
⊙	BH24-16	1.83	192.67

GRAIN SIZE DISTRIBUTION - THURBER 6121.GPJ 12/14/12

Date December 2012
 GWP# 5294-08-00

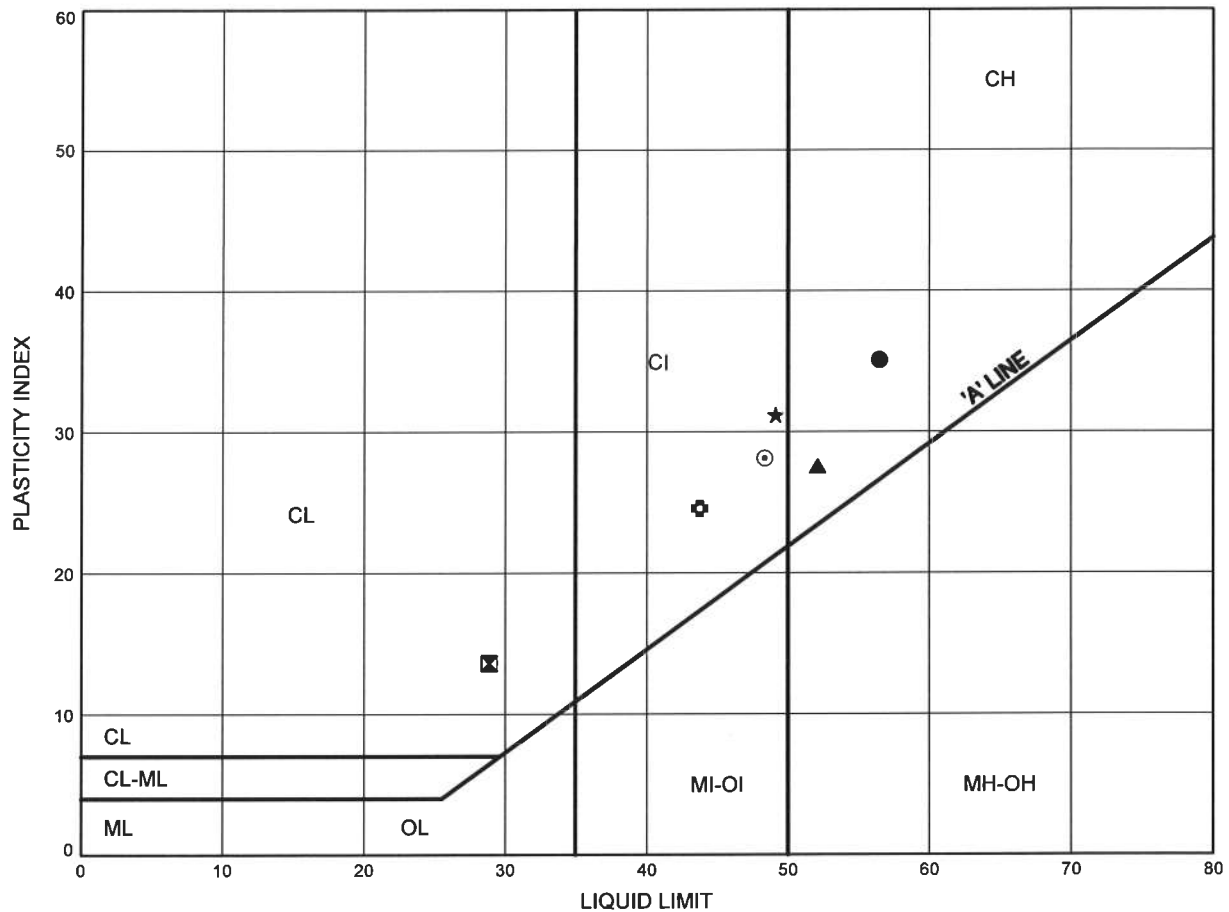


Prep'd MFA
 Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529
ATTERBERG LIMITS TEST RESULTS

FIGURE H9

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH23-05	4.88	191.02
⊠	BH23-05	6.32	189.58
▲	BH23-12R	1.52	192.48
★	BH23-12R	3.35	190.65
⊙	BH23-13R	2.13	191.77
⊕	BH23-14L	2.13	191.97

Date December 2012

GWP# 5294-08-00



Prep'd MFA

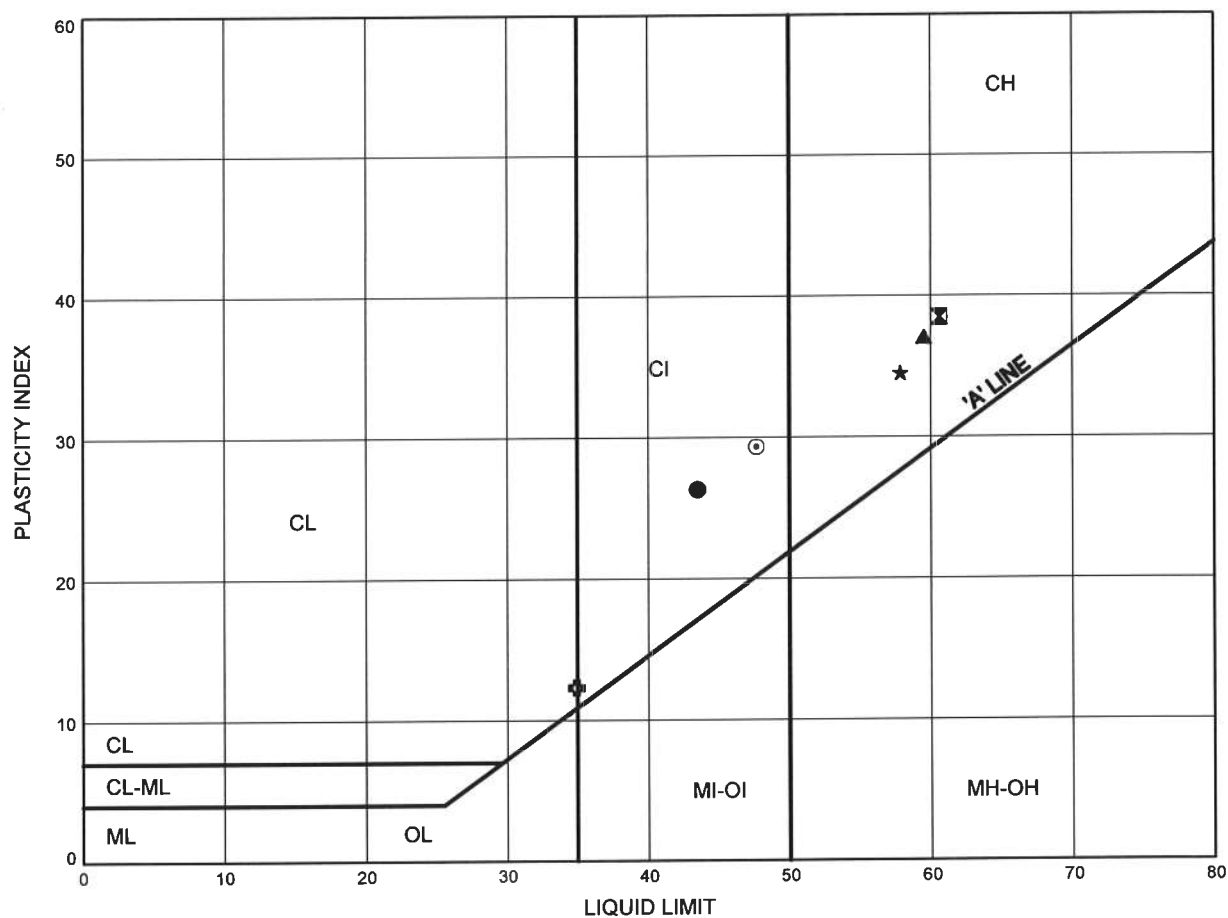
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529

ATTERBERG LIMITS TEST RESULTS

FIGURE H10

Silty CLAY



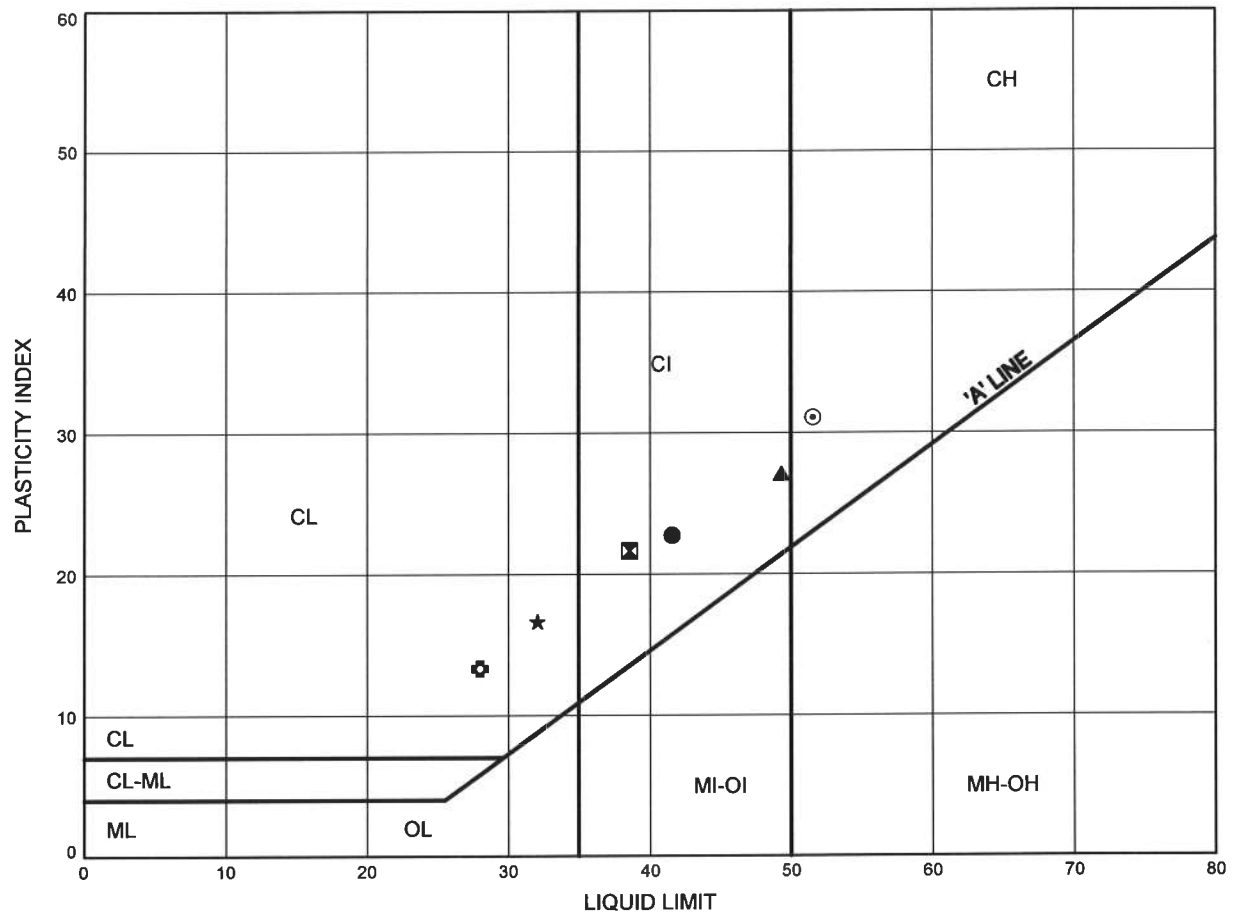
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH23-14L	3.47	190.63
⊠	BH24-03	2.59	192.91
▲	BH24-04R	3.20	192.30
★	BH24-05	2.59	192.91
⊙	BH24-07	1.83	193.67
⊕	BH24-08	1.07	193.53

Hwy 69 Four-Laning North of Hwy 529
ATTERBERG LIMITS TEST RESULTS

FIGURE H11

Silty CLAY



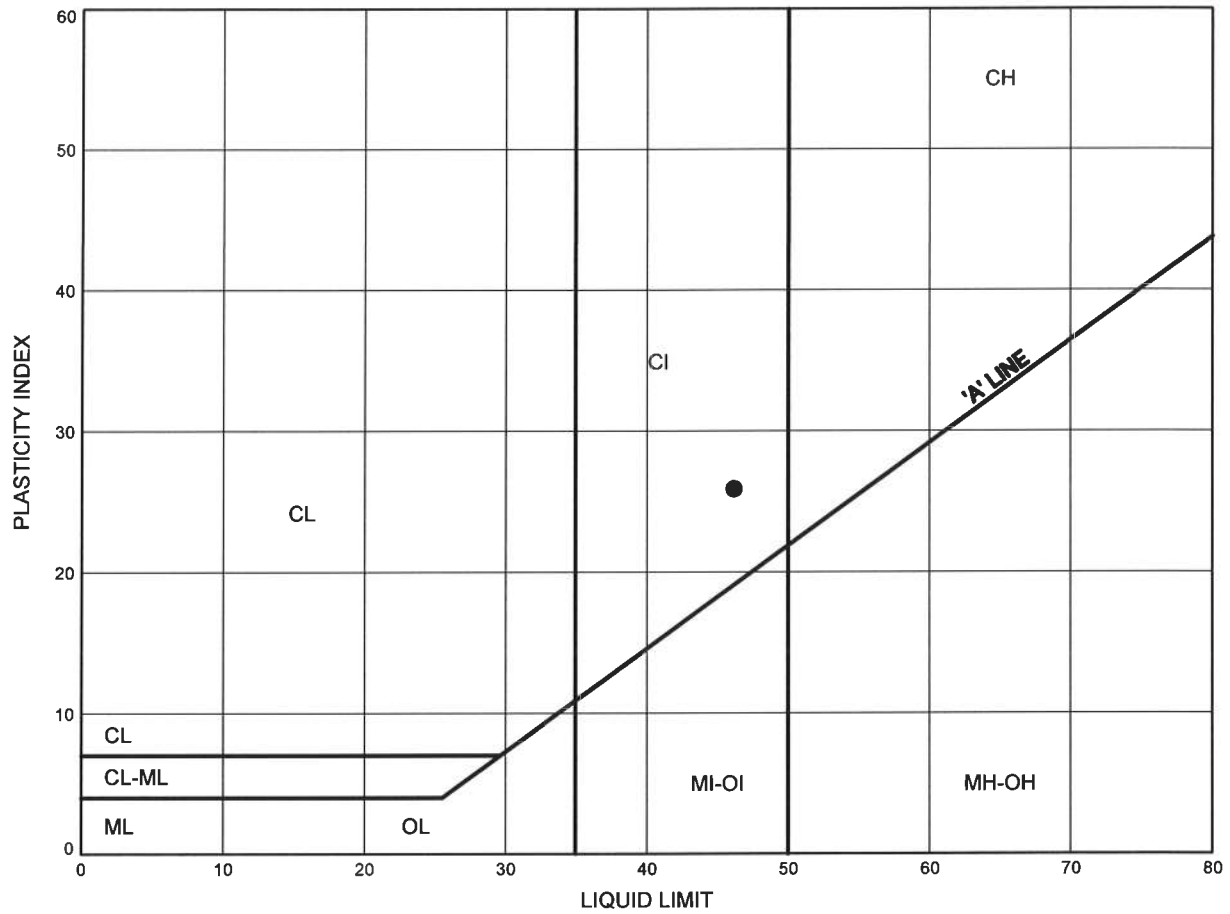
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH24-09R	3.35	190.75
⊠	BH24-10	1.80	192.50
▲	BH24-11	1.07	193.43
★	BH24-12R	1.83	192.27
⊙	BH24-12R	3.35	190.75
⊕	BH24-14R	2.59	191.61

Hwy 69 Four-Laning North of Hwy 529
ATTERBERG LIMITS TEST RESULTS

FIGURE H12

Silty CLAY



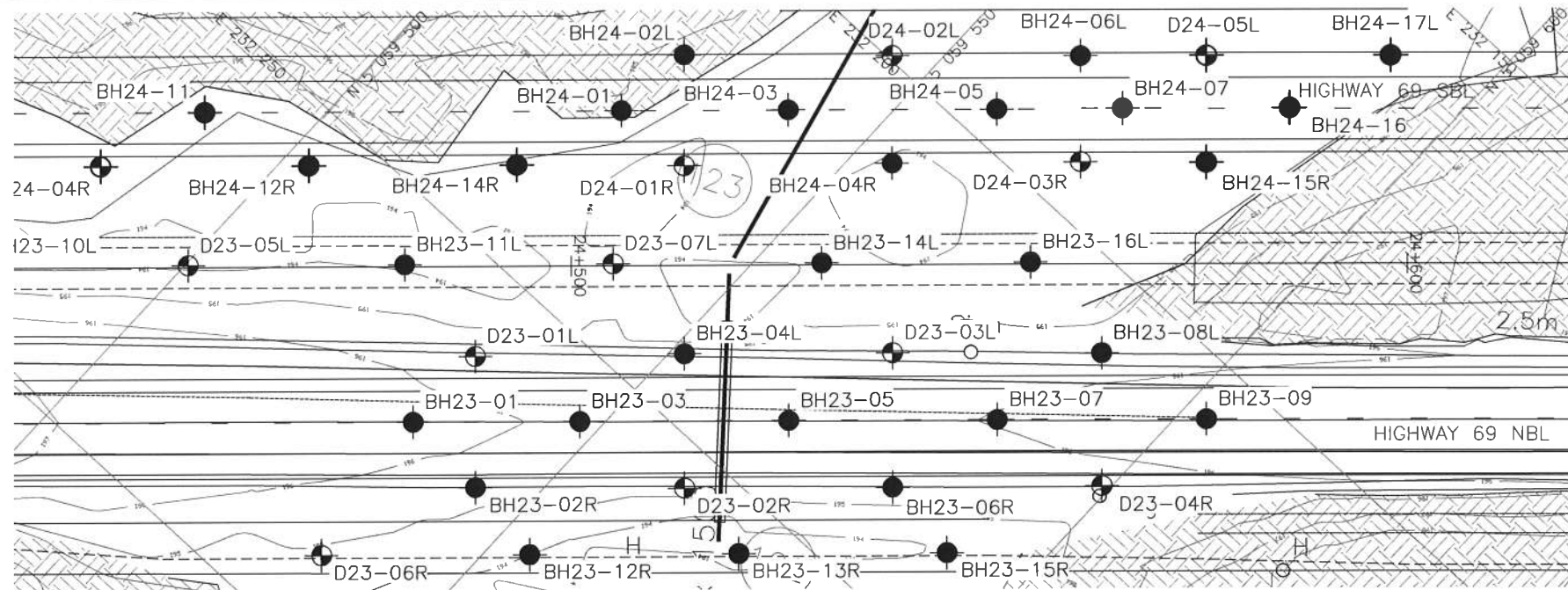
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH24-15R	1.83	192.57

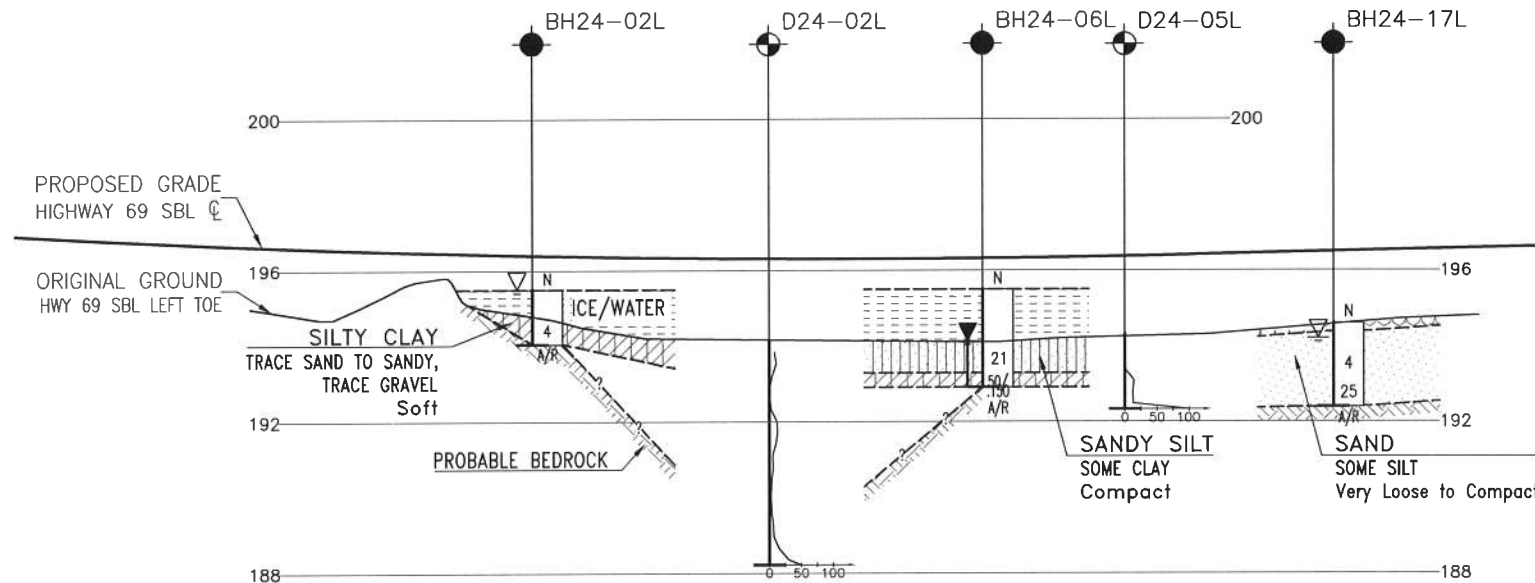
Date December 2012
 GWP# 5294-08-00



Prep'd MFA
 Chkd. MRA



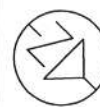
PLAN

0 16 32 48m
SCALE 1:800

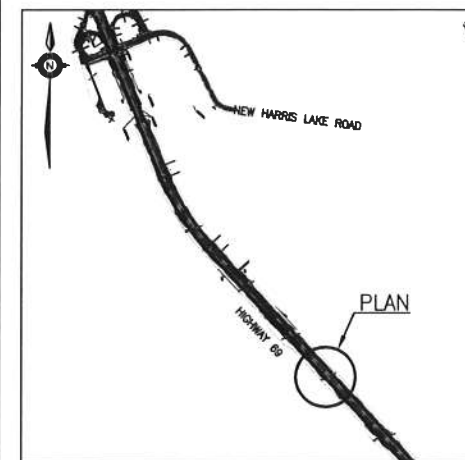
PROFILE ALONG LEFT TOE HIGHWAY 69 SBL

0 16 32 48m H 1:800
0 4 8 12m V 1:200

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-LT TOE
(STA 24+400 - 24+600)
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET

MMM GROUP **THURBER ENGINEERING LTD.**

KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D23-01L	195.8	5 059 533.2	232 259.9	BH23-01	196.1	5 059 533.1	232 270.8
D23-02R	195.4	5 059 562.4	232 254.7	BH23-02R	195.6	5 059 543.9	232 271.5
D23-03L	195.5	5 059 569.8	232 225.8	BH23-03	195.9	5 059 547.7	232 257.2
D23-04R	195.7	5 059 599.1	232 220.7	BH23-04L	195.5	5 059 551.4	232 242.8
D23-05L	194.0	5 059 500.3	232 275.2	BH23-05	195.9	5 059 566.1	232 240.3
D23-06R	194.8	5 059 535.9	232 290.0	BH23-06R	195.5	5 059 580.8	232 237.7
D23-07L	194.2	5 059 537.8	232 240.6	BH23-07	196.0	5 059 584.4	232 223.3
BH24-01	195.5	5 059 525.9	232 226.3	BH23-08L	195.6	5 059 588.2	232 208.9
BH24-02L	195.5	5 059 526.9	232 216.3	BH23-09	196.2	5 059 602.8	232 206.3
BH24-03	195.5	5 059 540.6	232 212.7	BH23-10L	194.0	5 059 482.0	232 292.2
BH24-04R	195.5	5 059 554.2	232 209.0	BH23-11L	194.0	5 059 519.4	232 257.6
BH24-05	195.5	5 059 559.0	232 195.8	BH23-12R	194.0	5 059 554.2	232 273.1
BH24-06L	195.5	5 059 562.0	232 184.3	BH23-13R	193.9	5 059 572.6	232 256.1
BH24-07	195.5	5 059 570.0	232 185.6	BH23-14L	194.1	5 059 556.1	232 223.6
BH24-17L	194.6	5 059 589.1	232 159.1	BH23-15R	194.1	5 059 590.9	232 239.1
D24-01R	193.9	5 059 536.0	232 226.1	BH23-16L	194.1	5 059 574.5	232 206.6
D24-02L	194.1	5 059 545.4	232 199.5				
D24-03R	194.2	5 059 570.7	232 193.7				
D24-04R	194.3	5 059 484.5	232 273.5				
D24-05L	194.3	5 059 573.0	232 174.1				

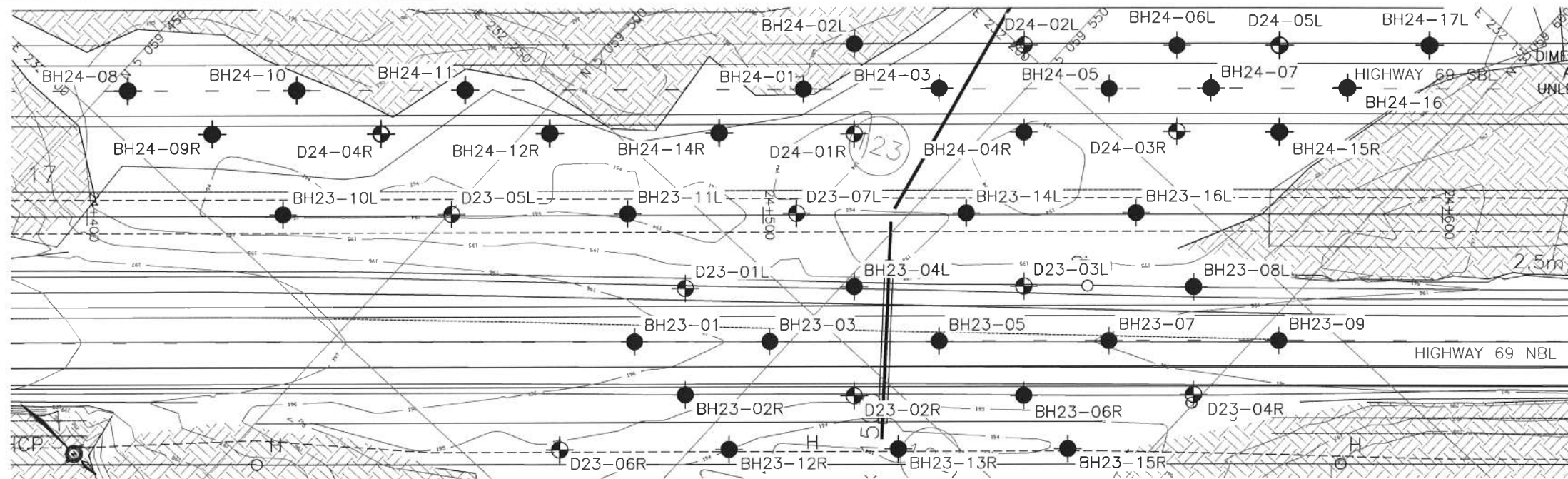
-NOTES-

- 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. 41H-99

REVISIONS

DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG
DRAWN	MFA	CHK PKC



PLAN

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SCALE 1:800

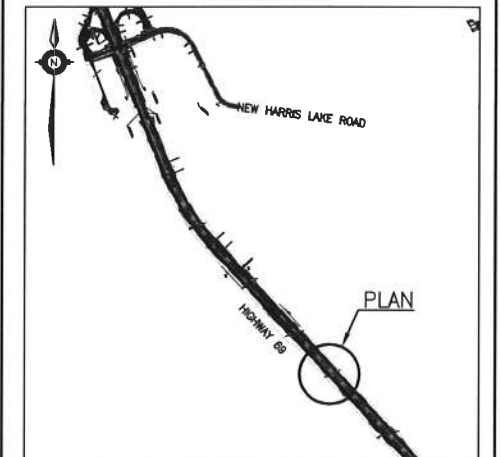
METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-CL
(STA 24+400 - 24+600)
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET



THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

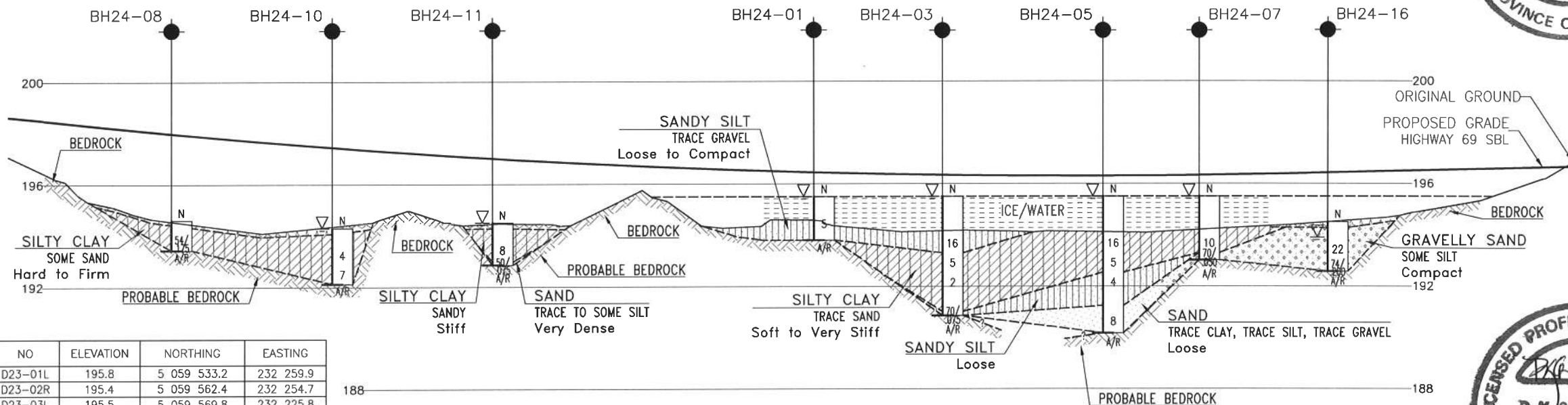
●	Borehole
◆	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60' Cone, 475J/blow)
PH	Pressure, Hydraulic
W	Water Level
HA	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
BH23-01	196.1	5 059 533.1	232 270.8
BH23-02R	195.6	5 059 543.9	232 271.5
BH23-03	195.9	5 059 547.7	232 257.2
BH23-04L	195.5	5 059 551.4	232 242.8
BH23-05	195.9	5 059 566.1	232 240.3
BH23-06R	195.5	5 059 580.8	232 237.7
BH23-07	196.0	5 059 584.4	232 223.3
BH23-08L	195.6	5 059 588.2	232 208.9
BH23-09	196.2	5 059 602.8	232 206.3
BH23-10L	194.0	5 059 482.0	232 292.2
BH23-11L	194.0	5 059 519.4	232 257.6
BH23-12R	194.0	5 059 554.2	232 273.1
BH23-13R	193.9	5 059 572.6	232 256.1
BH23-14L	194.1	5 059 556.1	232 223.6
BH23-15R	194.1	5 059 590.9	232 239.1
BH23-16L	194.1	5 059 574.5	232 206.6

-NOTES-

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

GEOCRES No. 41H-99



PROFILE ALONG CL HIGHWAY 69 SBL

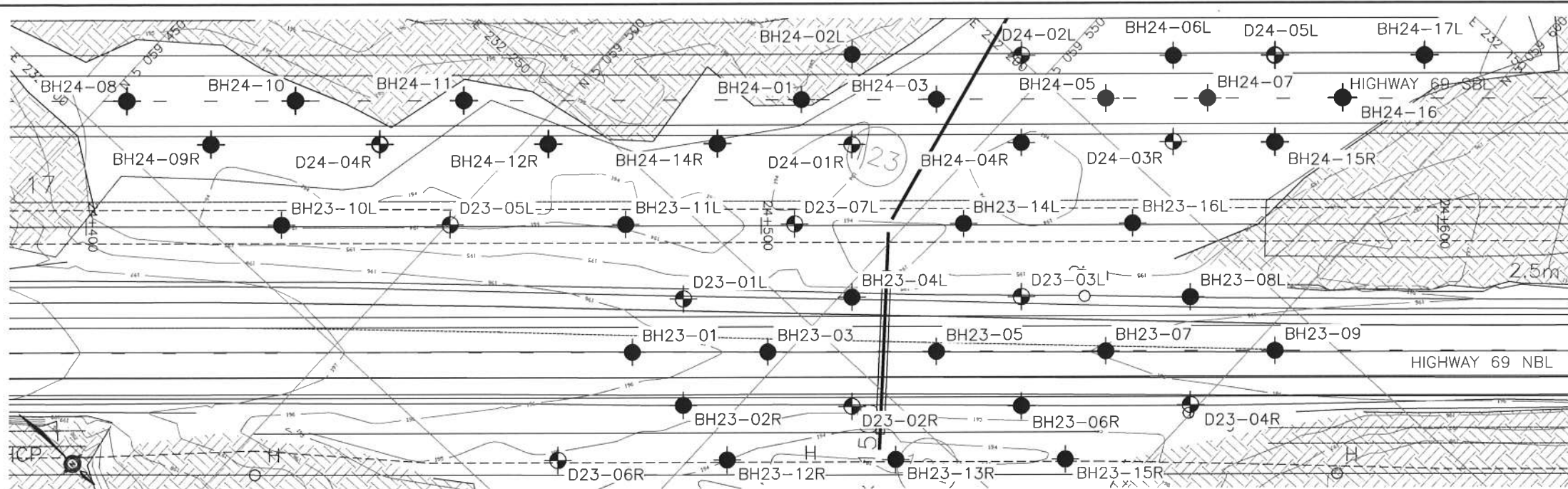
0 16 32 48m
0 4 8 12m

H 1:800

V 1:200

NO	ELEVATION	NORTHING	EASTING
D23-01L	195.8	5 059 533.2	232 259.9
D23-02R	195.4	5 059 562.4	232 254.7
D23-03L	195.5	5 059 569.8	232 225.8
D23-04R	195.7	5 059 599.1	232 220.7
D23-05L	194.0	5 059 500.3	232 275.2
D23-06R	194.8	5 059 535.9	232 290.0
D23-07L	194.2	5 059 537.8	232 240.6
BH24-01	195.5	5 059 525.9	232 226.3
BH24-02L	195.5	5 059 526.9	232 216.3
BH24-03	195.5	5 059 540.6	232 212.7
BH24-04R	195.5	5 059 554.2	232 209.0
BH24-05	195.5	5 059 559.0	232 195.8
BH24-06L	195.5	5 059 562.0	232 184.3
BH24-07	195.5	5 059 570.0	232 185.6
BH24-08	194.6	5 059 452.5	232 294.2
BH24-10	194.3	5 059 470.9	232 277.2
BH24-11	194.5	5 059 489.2	232 260.3
BH24-16	194.5	5 059 584.7	232 172.0
D24-01R	193.9	5 059 536.0	232 226.1
D24-02L	194.1	5 059 545.4	232 199.5
D24-03R	194.2	5 059 570.7	232 193.7

DESIGN	RPR	CHK	AEG	CODE	LOAD	DATE	DEC. 2012
DRAWN	MFA	CHK	PKC	SITE	STRUCT	DWG	



PLAN
0 16 32 48m
SCALE 1:800

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

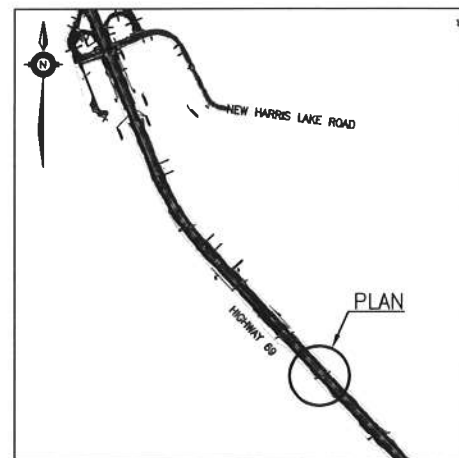


CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-RT TOE
(STA 24+400 - 24+600)
BOREHOLE LOCATIONS AND SOIL STRATA

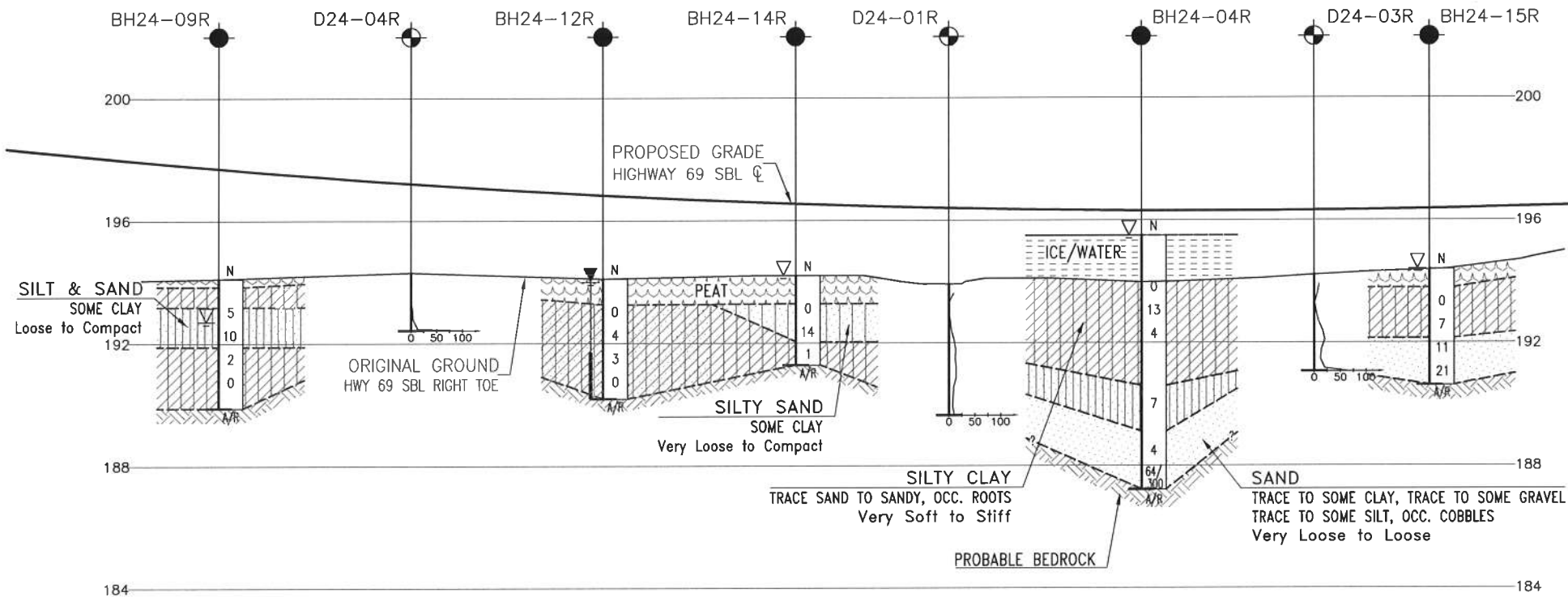
MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN
LEGEND

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



PROFILE ALONG RIGHT TOE HIGHWAY 69 SBL

0 16 32 48m H 1:800
0 4 8 12m V 1:200

NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D23-01L	195.8	5 059 533.2	232 259.9	BH23-01	196.1	5 059 533.1	232 270.8
D23-02R	195.4	5 059 562.4	232 254.7	BH23-02R	195.6	5 059 543.9	232 271.5
D23-03L	195.5	5 059 569.8	232 225.8	BH23-03	195.9	5 059 547.7	232 257.2
D23-04R	195.7	5 059 599.1	232 220.7	BH23-04L	195.5	5 059 551.4	232 242.8
D23-05L	194.0	5 059 500.3	232 275.2	BH23-05	195.9	5 059 566.1	232 240.3
D23-06R	194.8	5 059 535.9	232 290.0	BH23-06R	195.5	5 059 580.8	232 237.7
D23-07L	194.2	5 059 537.8	232 240.6	BH23-07	196.0	5 059 584.4	232 223.3
BH24-01	195.5	5 059 525.9	232 226.3	BH23-08L	195.6	5 059 588.2	232 208.9
BH24-02L	195.5	5 059 526.9	232 216.3	BH23-09	196.2	5 059 602.8	232 206.3
BH24-03	195.5	5 059 540.6	232 212.7	BH23-10L	194.0	5 059 482.0	232 292.2
BH24-04R	195.5	5 059 554.2	232 209.0	BH23-11L	194.0	5 059 519.4	232 257.6
BH24-05	195.5	5 059 559.0	232 195.8	BH23-12R	194.0	5 059 554.2	232 273.1
BH24-06L	195.5	5 059 562.0	232 184.3	BH23-13R	193.9	5 059 572.6	232 256.1
BH24-07	195.5	5 059 570.0	232 185.6	BH23-14L	194.1	5 059 556.1	232 223.6
BH24-09R	194.1	5 059 466.1	232 290.5	BH23-15R	194.1	5 059 590.9	232 239.1
BH24-12R	194.1	5 059 502.8	232 256.6	BH23-16L	194.1	5 059 574.5	232 206.6
BH24-14R	194.2	5 059 521.2	232 239.6				
BH24-15R	194.4	5 059 581.7	232 183.5				
D24-01R	193.9	5 059 536.0	232 226.1				
D24-02L	194.1	5 059 545.4	232 199.5				
D24-03R	194.2	5 059 570.7	232 193.7				
D24-04R	194.3	5 059 484.5	232 273.5				

-NOTES-

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GEOCRES No. 41H-99

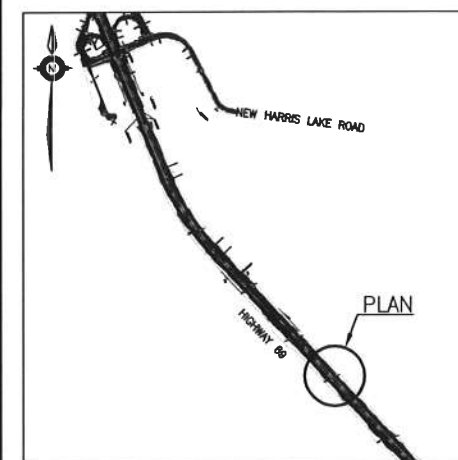
REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK	AEG
DRAWN	MFA	CHK	PKC
LOAD			
STRUCT			
DWG			
DATE	DEC. 2012		

A circular professional seal for a Licensed Professional Engineer in the Province of Ontario. The seal features a signature at the top, the name "M. R. ANDERSON" in the center, and the license number "No. 1312" at the bottom. The words "LICENSED PROFESSIONAL ENGINEER" and "PROVINCE OF ONTARIO" are inscribed around the perimeter.






LICENSED PROFESSIONAL ENGINEER
 P. K. CHATTERJI
 2413/12
 PROVINCE OF ONTARIO



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	NO	ELEVATION	NORTHING	EASTING
D23-01L	195.8	5 059 533.2	232 259.9	BH23-01	196.1	5 059 533.1	232 270.8
D23-02R	195.4	5 059 562.4	232 254.7	BH23-02R	195.6	5 059 543.9	232 271.5
D23-03L	195.5	5 059 569.8	232 225.8	BH23-03	195.9	5 059 547.7	232 257.2
D23-04R	195.7	5 059 599.1	232 220.7	BH23-04L	195.5	5 059 551.4	232 242.8
D23-05L	194.0	5 059 500.3	232 275.2	BH23-05	195.9	5 059 566.1	232 240.3
D23-06R	194.8	5 059 535.9	232 290.0	BH23-06R	195.5	5 059 580.8	232 237.7
D23-07L	194.2	5 059 537.8	232 240.6	BH23-07	196.4	5 059 584.4	232 223.3
BH24-01	195.5	5 059 525.9	232 226.3	BH23-08L	195.6	5 059 588.2	232 208.9
BH24-02L	195.5	5 059 526.9	232 216.3	BH23-09	196.2	5 059 602.8	232 206.3
BH24-03	195.5	5 059 540.6	232 212.7	BH23-10L	194.0	5 059 482.0	232 292.2
BH24-04R	195.5	5 059 554.2	232 209.0	BH23-11L	194.0	5 059 519.4	232 257.6
BH24-05	195.5	5 059 559.0	232 195.8	BH23-12R	194.0	5 059 554.2	232 273.1
BH24-06L	195.5	5 059 562.0	232 184.3	BH23-13R	193.9	5 059 572.6	232 256.1
BH24-07	195.5	5 059 570.0	232 185.6	BH23-14L	194.1	5 059 556.1	232 223.6
D24-01R	193.9	5 059 536.0	232 226.1	BH23-15R	194.1	5 059 590.9	232 239.1
D24-02L	194.1	5 059 545.4	232 199.5	BH23-16L	194.1	5 059 574.5	232 206.6
D24-03R	194.2	5 059 570.7	232 193.7				

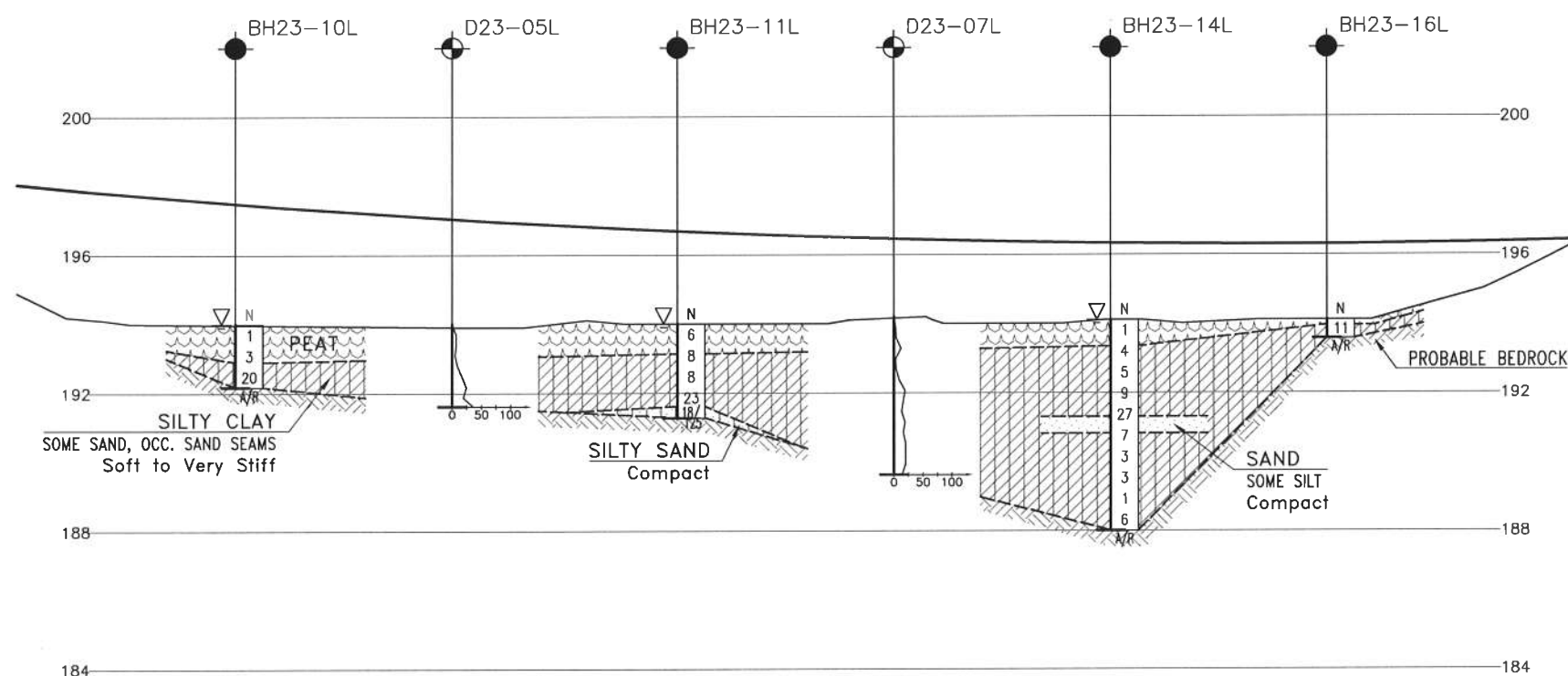
-NOTES-

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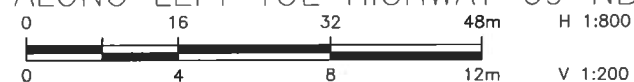
GEOCRES No. 41H-99

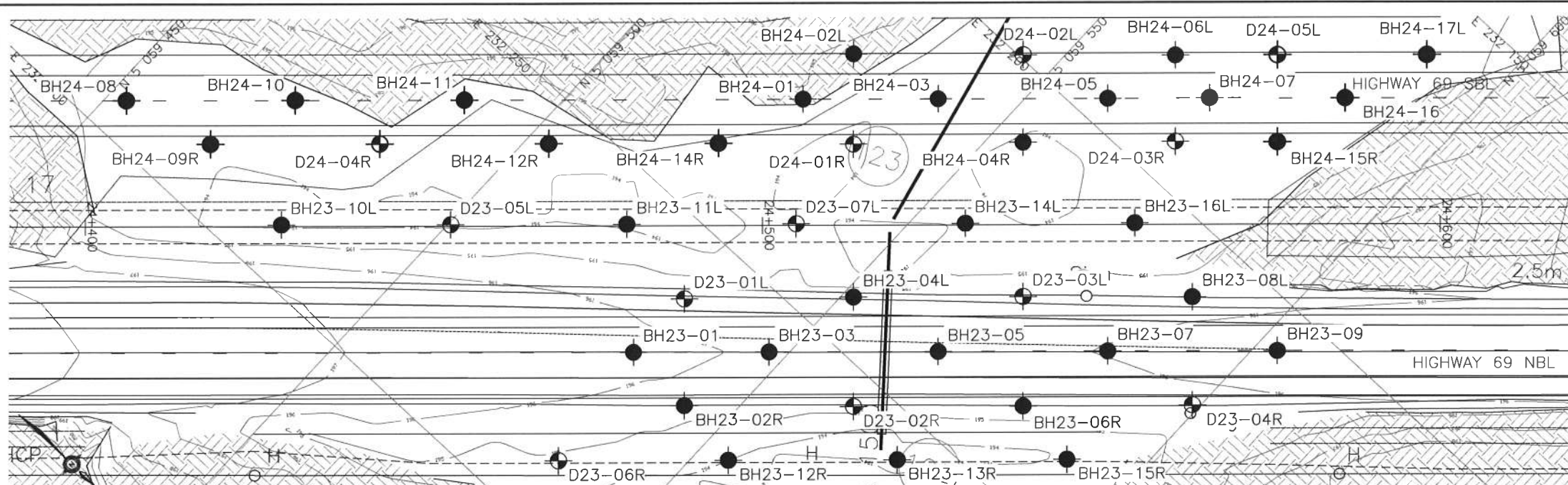
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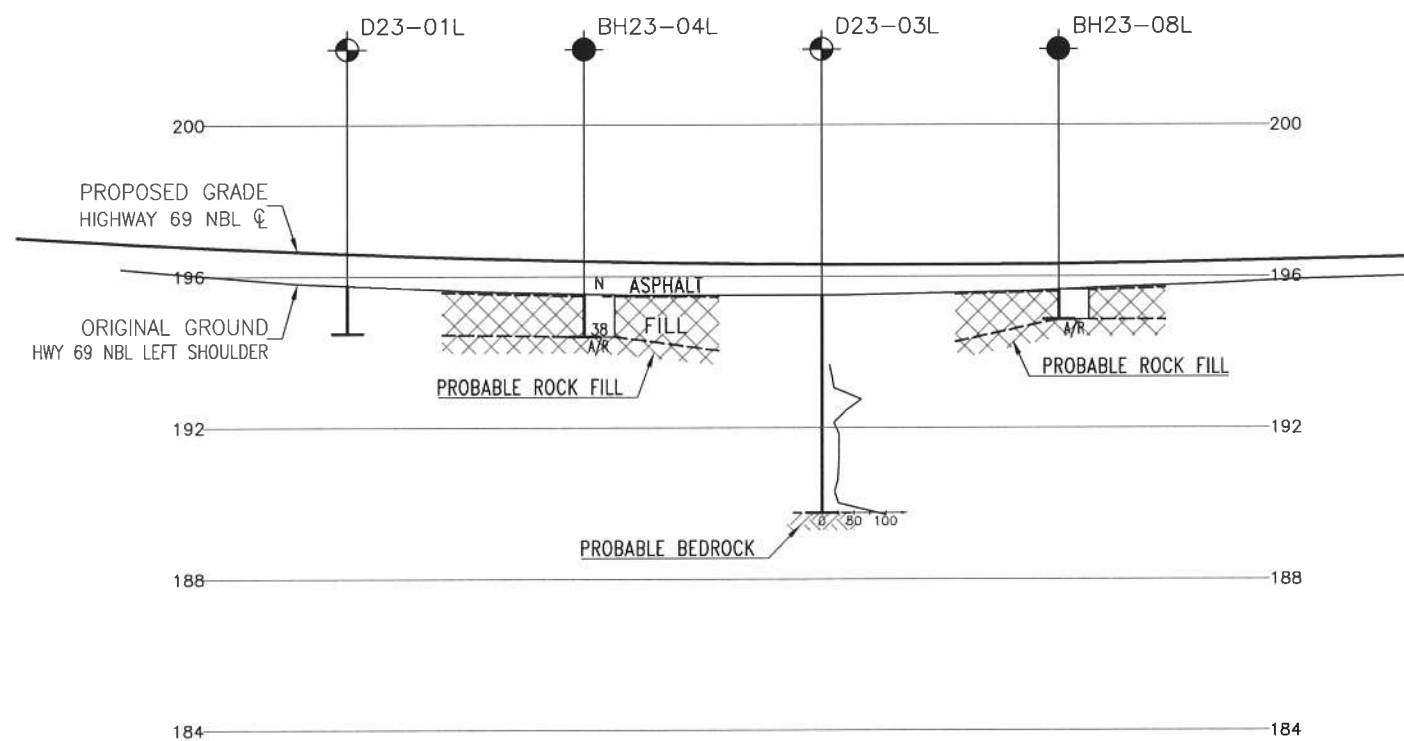
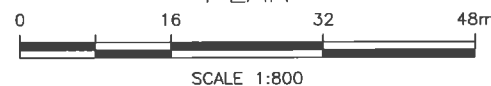


PROFILE ALONG LEFT TOE HIGHWAY 69 NBL

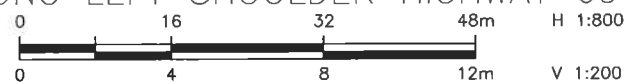




PLAN



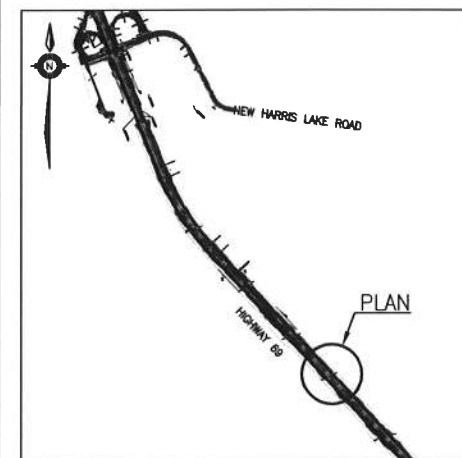
PROFILE ALONG LEFT SHOULDER HIGHWAY 69 NBL



METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-LT SHLDR
(STA 24+400 - 24+600)
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
W	Water Level
HA	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

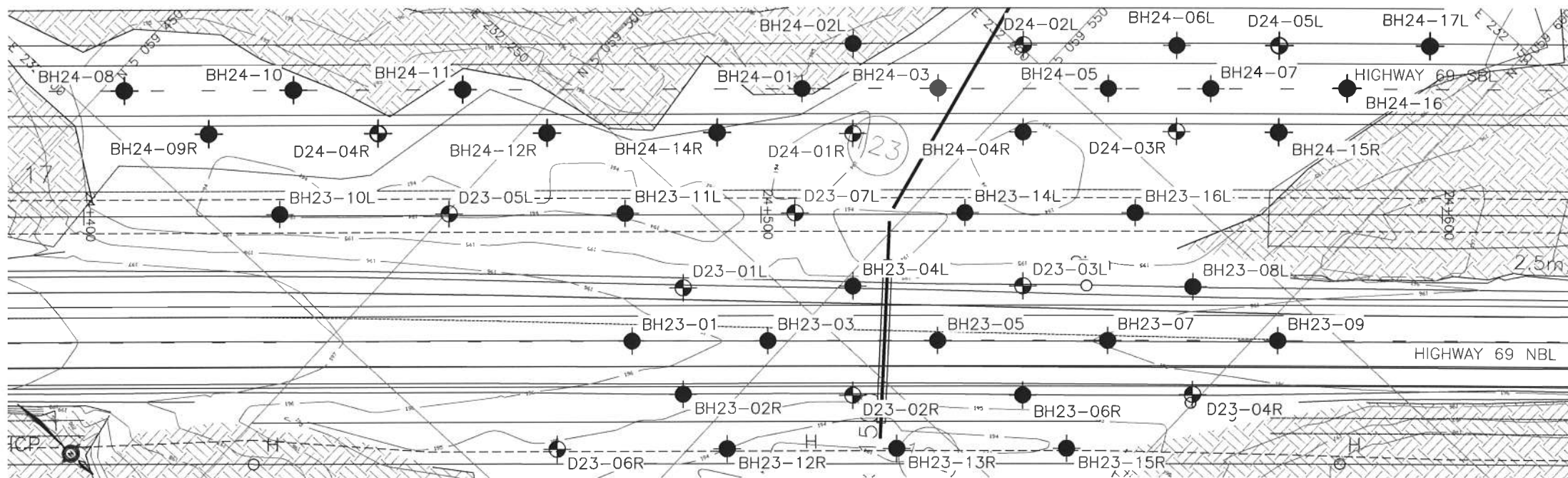
NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D23-01L	195.8	5 059 533.2	232 259.9	BH23-01	196.1	5 059 533.1	232 270.8
D23-02R	195.4	5 059 562.4	232 254.7	BH23-02R	195.6	5 059 543.9	232 271.5
D23-03L	195.5	5 059 569.8	232 225.8	BH23-03	195.9	5 059 547.7	232 257.2
D23-04R	195.7	5 059 599.1	232 220.7	BH23-04L	195.5	5 059 551.4	232 242.8
D23-05L	194.0	5 059 500.3	232 275.2	BH23-05	195.9	5 059 566.1	232 240.3
D23-06R	194.8	5 059 535.9	232 290.0	BH23-06R	195.5	5 059 580.8	232 237.7
D23-07L	194.2	5 059 537.8	232 240.6	BH23-07	196.0	5 059 584.4	232 223.3
BH24-01	195.5	5 059 525.9	232 226.3	BH23-08L	195.6	5 059 588.2	232 208.9
BH24-02L	195.5	5 059 526.9	232 216.3	BH23-09	196.2	5 059 602.8	232 206.3
BH24-03	195.5	5 059 540.6	232 212.7	BH23-10L	194.0	5 059 482.0	232 292.2
BH24-04R	195.5	5 059 554.2	232 209.0	BH23-11L	194.0	5 059 519.4	232 257.6
BH24-05	195.5	5 059 559.0	232 195.8	BH23-12R	194.0	5 059 554.2	232 273.1
BH24-06L	195.5	5 059 562.0	232 184.3	BH23-13R	193.9	5 059 572.6	232 256.1
BH24-07	195.5	5 059 570.0	232 185.6	BH23-14L	194.1	5 059 556.1	232 223.6
D24-01R	193.9	5 059 536.0	232 226.1	BH23-15R	194.1	5 059 590.9	232 239.1
D24-02L	194.1	5 059 545.4	232 199.5	BH23-16L	194.1	5 059 574.5	232 206.6
D24-03R	194.2	5 059 570.7	232 193.7				

NOTES

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

GEOCRES No. 41H-99

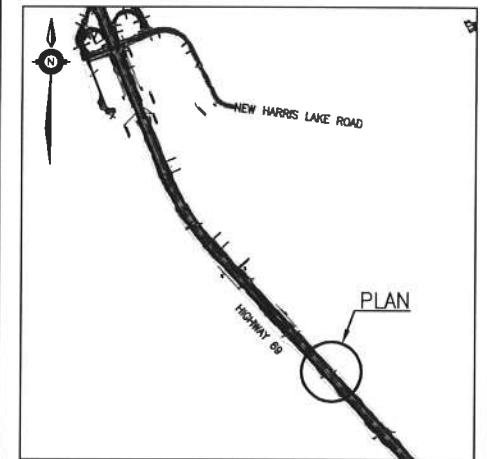
REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



PLAN



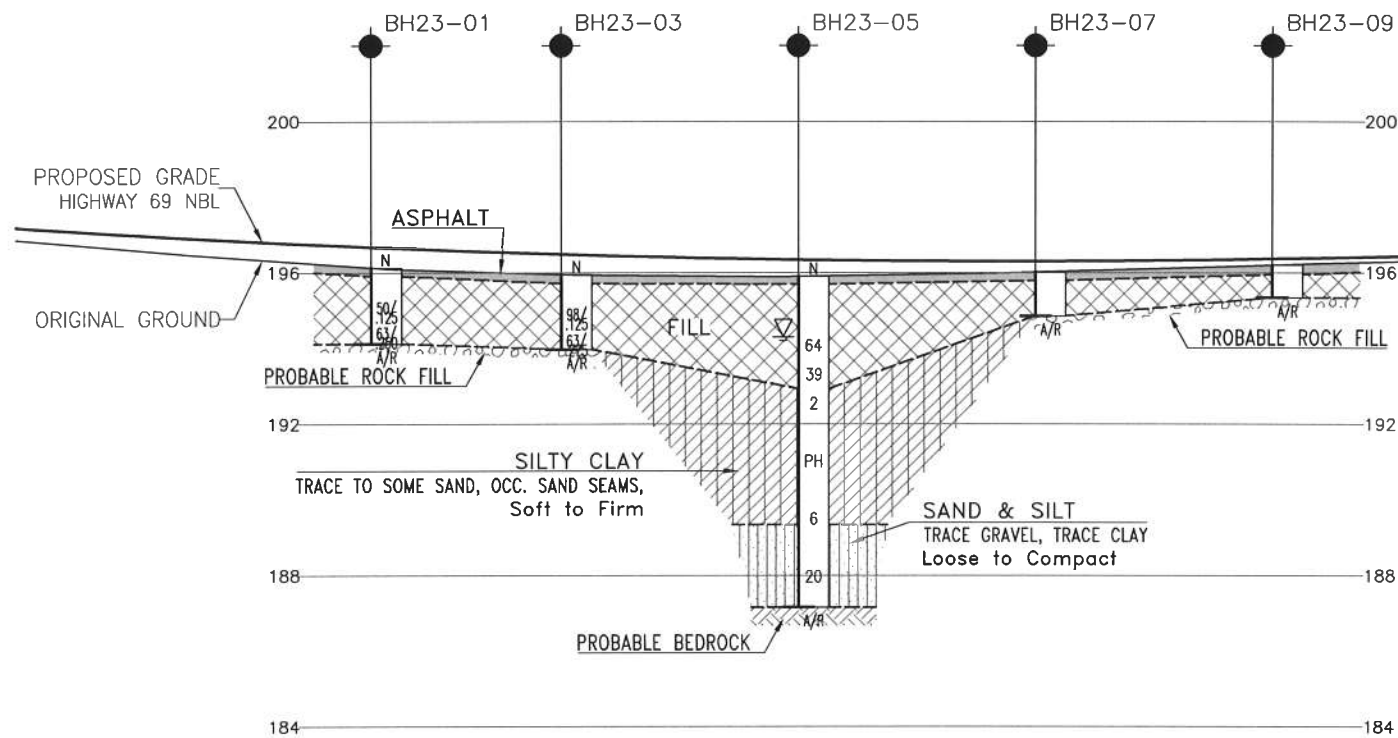
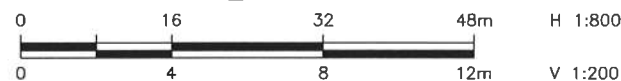
METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL- ϕ
(STA 24+400 - 24+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

PROFILE ALONG ϕ HIGHWAY 69 NBL

NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D23-01L	195.8	5 059 533.2	232 259.9	BH23-01	196.1	5 059 533.1	232 270.8
D23-02R	195.4	5 059 562.4	232 254.7	BH23-02R	195.6	5 059 543.9	232 271.5
D23-03L	195.5	5 059 569.8	232 225.8	BH23-03	195.9	5 059 547.7	232 257.2
D23-04R	195.7	5 059 599.1	232 220.7	BH23-04L	195.5	5 059 551.4	232 242.8
D23-05L	194.0	5 059 500.3	232 275.2	BH23-05	195.9	5 059 566.1	232 240.3
D23-06R	194.8	5 059 535.9	232 290.0	BH23-06R	195.5	5 059 580.8	232 237.7
D23-07L	194.2	5 059 537.8	232 240.6	BH23-07	196.0	5 059 584.4	232 223.3
BH24-01	195.5	5 059 525.9	232 226.3	BH23-08L	195.6	5 059 588.2	232 208.9
BH24-02L	195.5	5 059 526.9	232 216.3	BH23-09	196.2	5 059 602.8	232 206.3
BH24-03	195.5	5 059 540.6	232 212.7	BH23-10L	194.0	5 059 482.0	232 292.2
BH24-04R	195.5	5 059 554.2	232 209.0	BH23-11L	194.0	5 059 519.4	232 257.6
BH24-05	195.5	5 059 559.0	232 195.8	BH23-12R	194.0	5 059 554.2	232 273.1
BH24-06L	195.5	5 059 562.0	232 184.3	BH23-13R	193.9	5 059 572.6	232 256.1
BH24-07	195.5	5 059 570.0	232 185.6	BH23-14L	194.1	5 059 556.1	232 223.6
D24-01R	193.9	5 059 536.0	232 226.1	BH23-15R	194.1	5 059 590.9	232 239.1
D24-02L	194.1	5 059 545.4	232 199.5	BH23-16L	194.1	5 059 574.5	232 206.6
D24-03R	194.2	5 059 570.7	232 193.7				

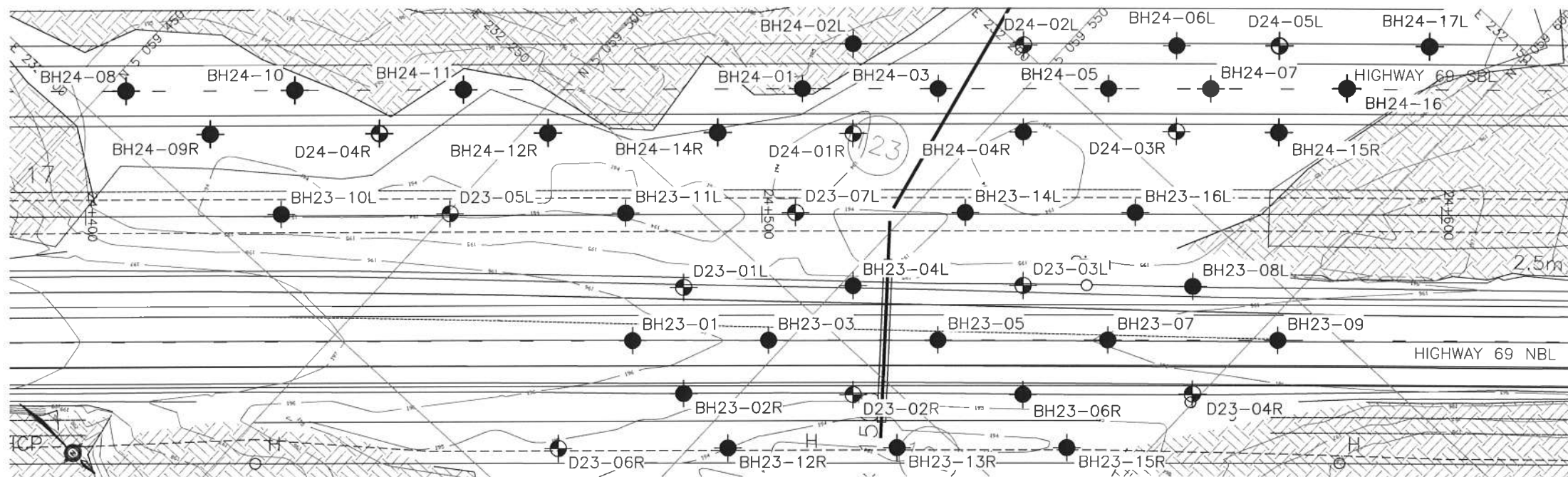
-NOTES-

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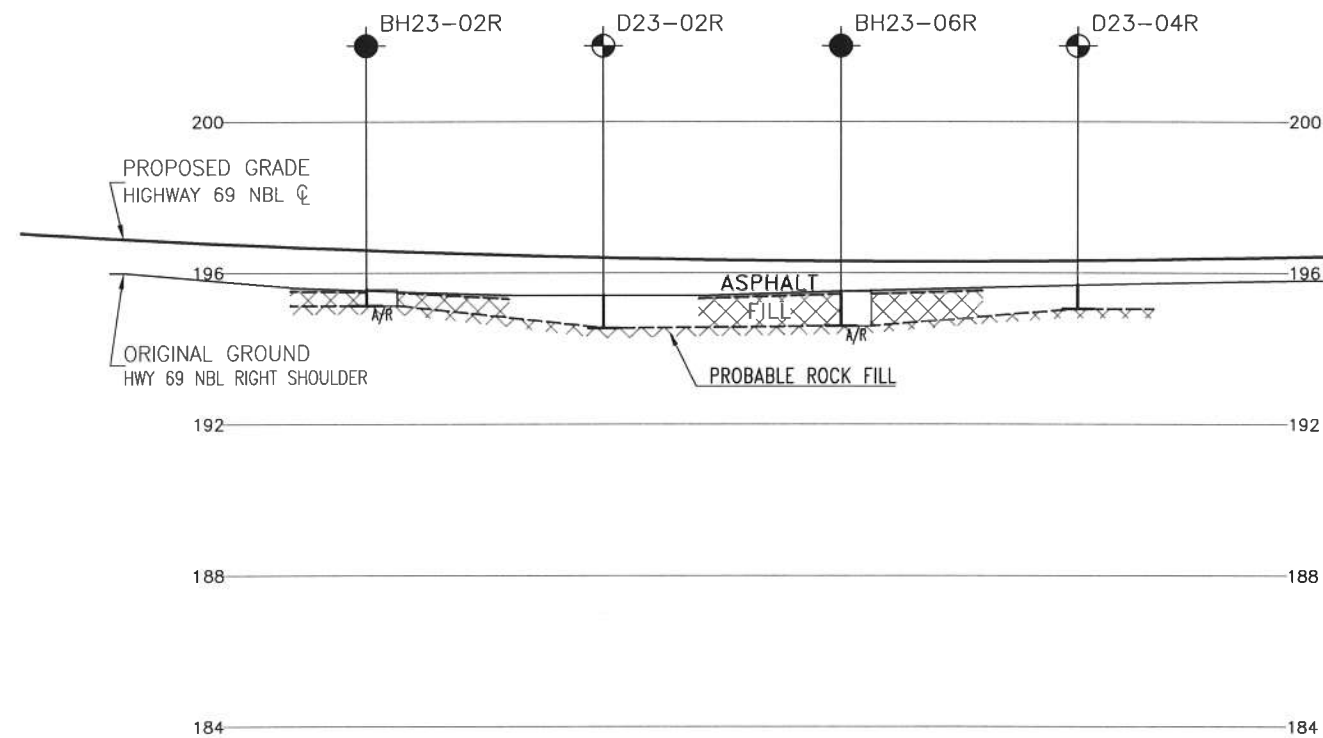
GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			OWG
			DATE DEC. 2012

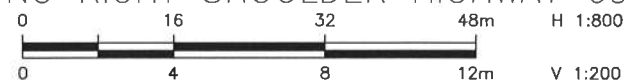




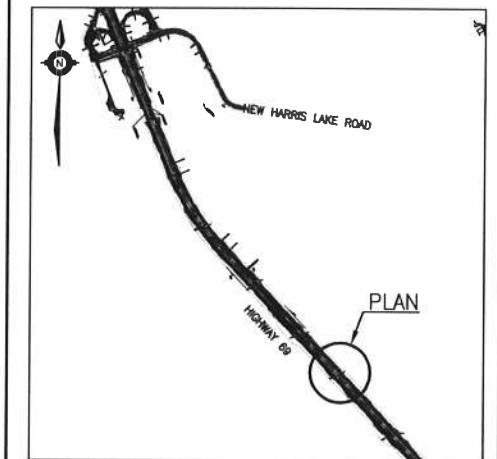
PLAN



PROFILE ALONG RIGHT SHOULDER HIGHWAY 69 NBL



METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-RT SHLDR
(STA 24+400 - 24+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
W	Water Level
HA	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

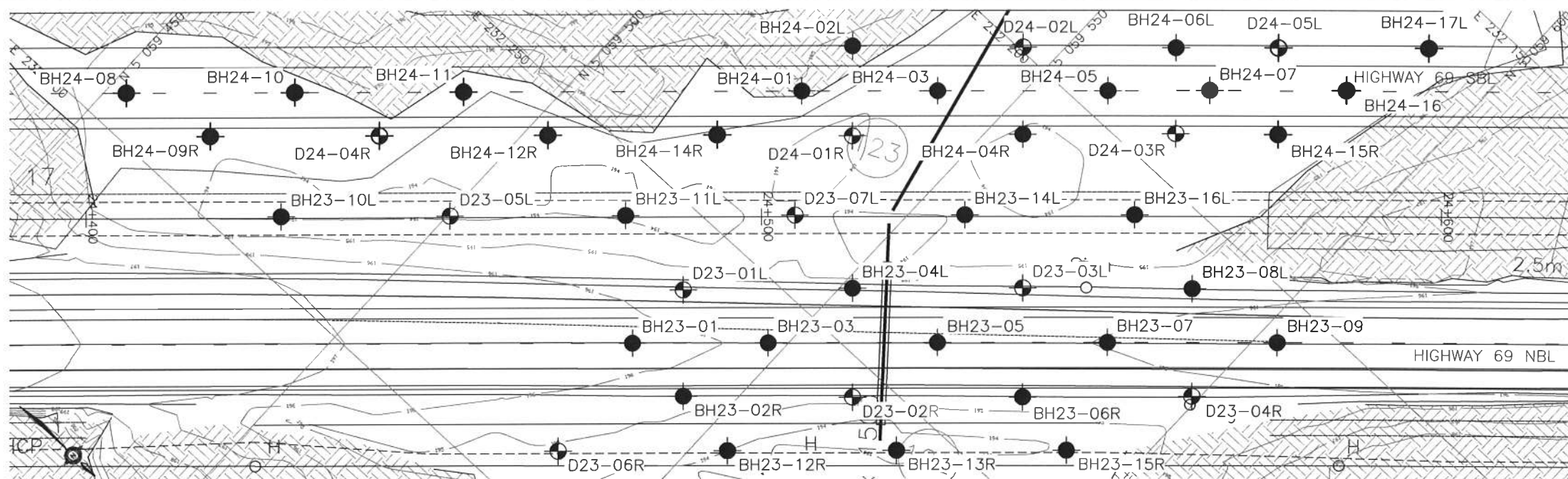
NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D23-01L	195.8	5 059 533.2	232 259.9	BH23-01	196.1	5 059 533.1	232 270.8
D23-02R	195.4	5 059 562.4	232 254.7	BH23-02R	195.6	5 059 543.9	232 271.5
D23-03L	195.5	5 059 569.8	232 225.8	BH23-03	195.9	5 059 547.7	232 257.2
D23-04R	195.7	5 059 599.1	232 220.7	BH23-04L	195.5	5 059 551.4	232 242.8
D23-05L	194.0	5 059 500.3	232 275.2	BH23-05	195.9	5 059 566.1	232 240.3
D23-06R	194.8	5 059 535.9	232 290.0	BH23-06R	195.5	5 059 580.8	232 237.7
D23-07L	194.2	5 059 537.8	232 240.6	BH23-07	196.0	5 059 584.4	232 223.3
BH24-01	195.5	5 059 525.9	232 226.3	BH23-08L	195.6	5 059 588.2	232 208.9
BH24-02L	195.5	5 059 526.9	232 216.3	BH23-09	196.2	5 059 602.8	232 206.3
BH24-03	195.5	5 059 540.6	232 212.7	BH23-10L	194.0	5 059 482.0	232 292.2
BH24-04R	195.5	5 059 554.2	232 209.0	BH23-11L	194.0	5 059 519.4	232 257.6
BH24-05	195.5	5 059 559.0	232 195.8	BH23-12R	194.0	5 059 554.2	232 273.1
BH24-06L	195.5	5 059 562.0	232 184.3	BH23-13R	193.9	5 059 572.6	232 256.1
BH24-07	195.5	5 059 570.0	232 185.6	BH23-14L	194.1	5 059 556.1	232 223.6
D24-01R	193.9	5 059 536.0	232 226.1	BH23-15R	194.1	5 059 590.9	232 239.1
D24-02L	194.1	5 059 545.4	232 199.5	BH23-16L	194.1	5 059 574.5	232 206.6
D24-03R	194.2	5 059 570.7	232 193.7				

-NOTES-

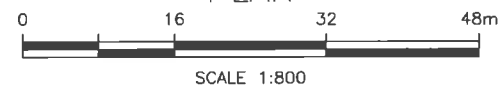
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GEOCRES No. 41H-99

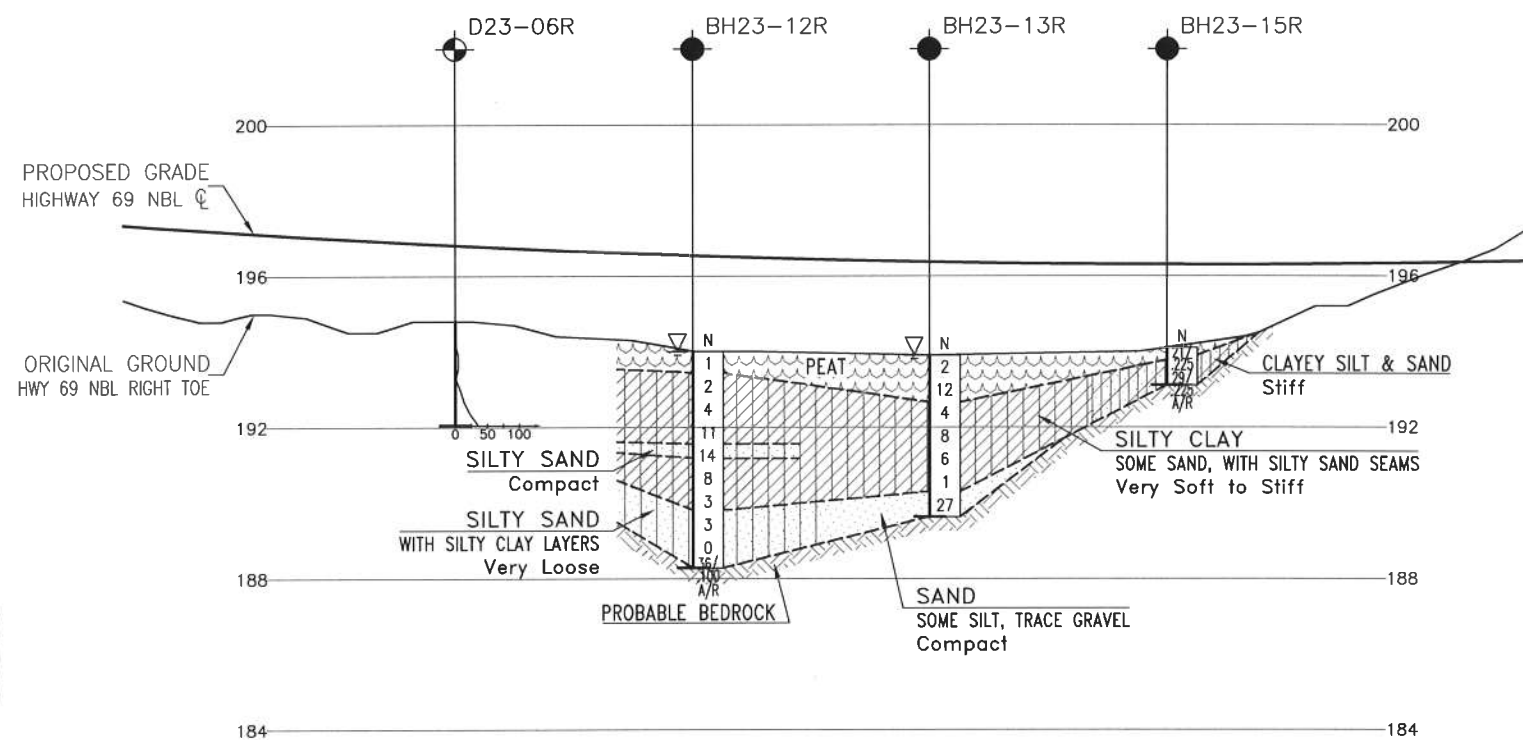
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DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			STRUCT
			DWG
			DATE DEC. 2012



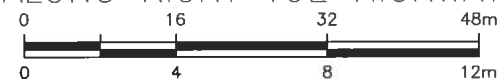
PLAN



SCALE 1:800



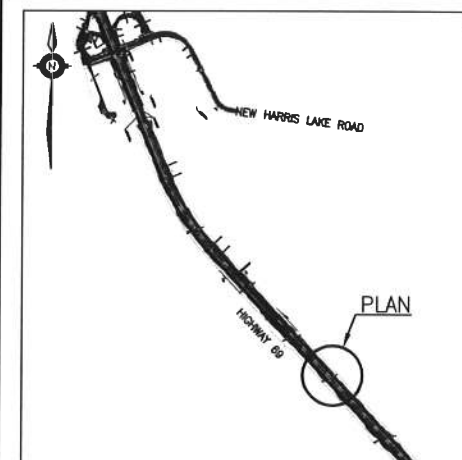
PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL



H 1:800

V 1:200

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-RT TOE
(STA 24+400 - 24+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
W	Water Level
H	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
D23-01L	195.8	5 059 533.2	232 259.9	BH23-01	196.1	5 059 533.1	232 270.8
D23-02R	195.4	5 059 562.4	232 254.7	BH23-02R	195.6	5 059 543.9	232 271.5
D23-03L	195.5	5 059 569.8	232 225.8	BH23-03	195.9	5 059 547.7	232 257.2
D23-04R	195.7	5 059 599.1	232 220.7	BH23-04L	195.5	5 059 551.4	232 242.8
D23-05L	194.0	5 059 500.3	232 275.2	BH23-05	195.9	5 059 566.1	232 240.3
D23-06R	194.8	5 059 535.9	232 290.0	BH23-06R	195.5	5 059 580.8	232 237.7
D23-07L	194.2	5 059 537.8	232 240.6	BH23-07	196.0	5 059 584.4	232 223.3
BH24-01	195.5	5 059 525.9	232 226.3	BH23-08L	195.6	5 059 588.2	232 208.9
BH24-02L	195.5	5 059 526.9	232 216.3	BH23-09	196.2	5 059 602.8	232 206.3
BH24-03	195.5	5 059 540.6	232 212.7	BH23-10L	194.0	5 059 482.0	232 292.2
BH24-04R	195.5	5 059 554.2	232 209.0	BH23-11L	194.0	5 059 519.4	232 257.6
BH24-05	195.5	5 059 559.0	232 195.8	BH23-12R	194.0	5 059 554.2	232 273.1
BH24-06L	195.5	5 059 562.0	232 184.3	BH23-13R	193.9	5 059 572.6	232 256.1
BH24-07	195.5	5 059 570.0	232 185.6	BH23-14L	194.1	5 059 556.1	232 223.6
D24-01R	193.9	5 059 536.0	232 226.1	BH23-15R	194.1	5 059 590.9	232 239.1
D24-02L	194.1	5 059 545.4	232 199.5	BH23-16L	194.1	5 059 574.5	232 206.6
D24-03R	194.2	5 059 570.7	232 193.7				

NOTES

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GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			STRUCT
			DWG
			DATE DEC. 2012

Appendix I

**Highway 69 SBL
Sta. 24+900 to 25+000 Township of Harrison**

**Boreholes 25-01 to 25-04R, 26-01 to 26-08, C124-2, C124-3, C125-1, C125-2
DCPTs D25-01R, D25-02L, D26-01R, D26-02L, C125-D1 to C125-D3**

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

RECORD OF BOREHOLE No BH25-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+901 C/L, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009.02.07 - 2009.02.07 CHECKED BY RPR

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	20 40 60 80 100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L		
194.1	Pond Surface													
0.0	ICE and WATER						194							
192.7							193							
1.4	PEAT Very Soft		1	SS	0		192							
191.9							192							
2.2	Silty CLAY, sandy Very Soft Grey		2	SS	0		191							0 37 29 34
190.6			3	SS	0									
3.5	END OF BOREHOLE AT 3.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS UPON COMPLETION.													

RECORD OF BOREHOLE No BH25-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+913.5 O/S 6.3L, SBL ORIGINATED BY LG
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2009.01.31 - 2009.03.31 CHECKED BY RPR

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	20 40 60 80 100	PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L		
194.1	Pond Surface													
0.0	ICE and WATER						194							
193.0			1	SS	0		193							
1.1	PEAT, fibrous, some clay Black Very Soft Wet		2	SS	0		192							
191.8			3	SS	1		191							
2.3	Silty CLAY Soft Grey													
190.1	END OF BOREHOLE (SAMPLER BOUNCING) AT 4.0m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS TO SURFACE. MOVED 1.5m NORTH AND CONDUCTED DCPT. DCPT TERMINATED AT 4.8m UPON REFUSAL ON PROBABLE BEDROCK.													
4.0														

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH25-03

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+926 C/L, SBL ORIGINATED BY LG
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.01.31 - 2009.01.31 CHECKED BY RPR

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	NATURAL MOISTURE CONTENT	LIQUID LIMIT		
194.1	Pond Surface												
0.0	ICE and WATER						194						
193.1							193						
1.0	PEAT, fibrous, some clay Very Soft Dark Brown Wet		1	SS	0		192						
			2	SS	0		191						
			3	SS	0		190						
			4	SS	0		189						
189.5							188						
4.6	Silty CLAY, trace sand Very Soft Grey		5	SS	0		187						
			6	SS	0		186						
			7	SS	0		185						
			8	SS	0								

Continued Next Page

+³, x³: Numbers refer to Sensitivity
 20
 15 5 10
 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH25-03

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+926 C/L, SBL ORIGINATED BY LG
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.01.31 - 2009.01.31 CHECKED BY RPR

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		20 40 60				
	Continued From Previous Page												
183.4	Silty CLAY , trace sand Grey		9	SS	50/ .000	184							
10.7	END OF BOREHOLE AT 10.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH CUTTINGS AND GROUT UPON COMPLETION.												

RECORD OF BOREHOLE No BH25-04R

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+937.5 O/S 10.0R, SBL ORIGINATED BY ES
 HWY 69 BOREHOLE TYPE Wash Boring COMPILED BY AN
 DATUM Geodetic DATE 2011.02.28 - 2011.02.28 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT		UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)			
								○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE × LAB VANE	w _P w w _L			
194.0	Ground Surface						20 40 60 80 100		20 40 60				
0.0	PEAT, fibrous Soft to Firm Dark Brown		1	SS	7		194					85	
	some clay, trace sand		2	SS	3		193						
			3	SS	3		192					135	
			4	SS	3		191	6				103	
190.1	Silty CLAY Very Soft Grey		5	SS	1		190						0 0 67 33
3.9			1	TW			189						
			2	TW			188						
			6	SS	0		186						0 9 59 32
	trace sand		3	TW			185						

Continued Next Page

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

RECORD OF BOREHOLE No BH25-04R

2 OF 2

METRIC

GWP#	5294-08-00	LOCATION	Harrison Twp., Station 24+937.5 O/S 10.0R, SBL	ORIGINATED BY	ES
HWY	69	BOREHOLE TYPE	Wash Boring	COMPILED BY	AN
DATUM	Geodetic	DATE	2011.02.28 - 2011.02.28	CHECKED BY	RPR

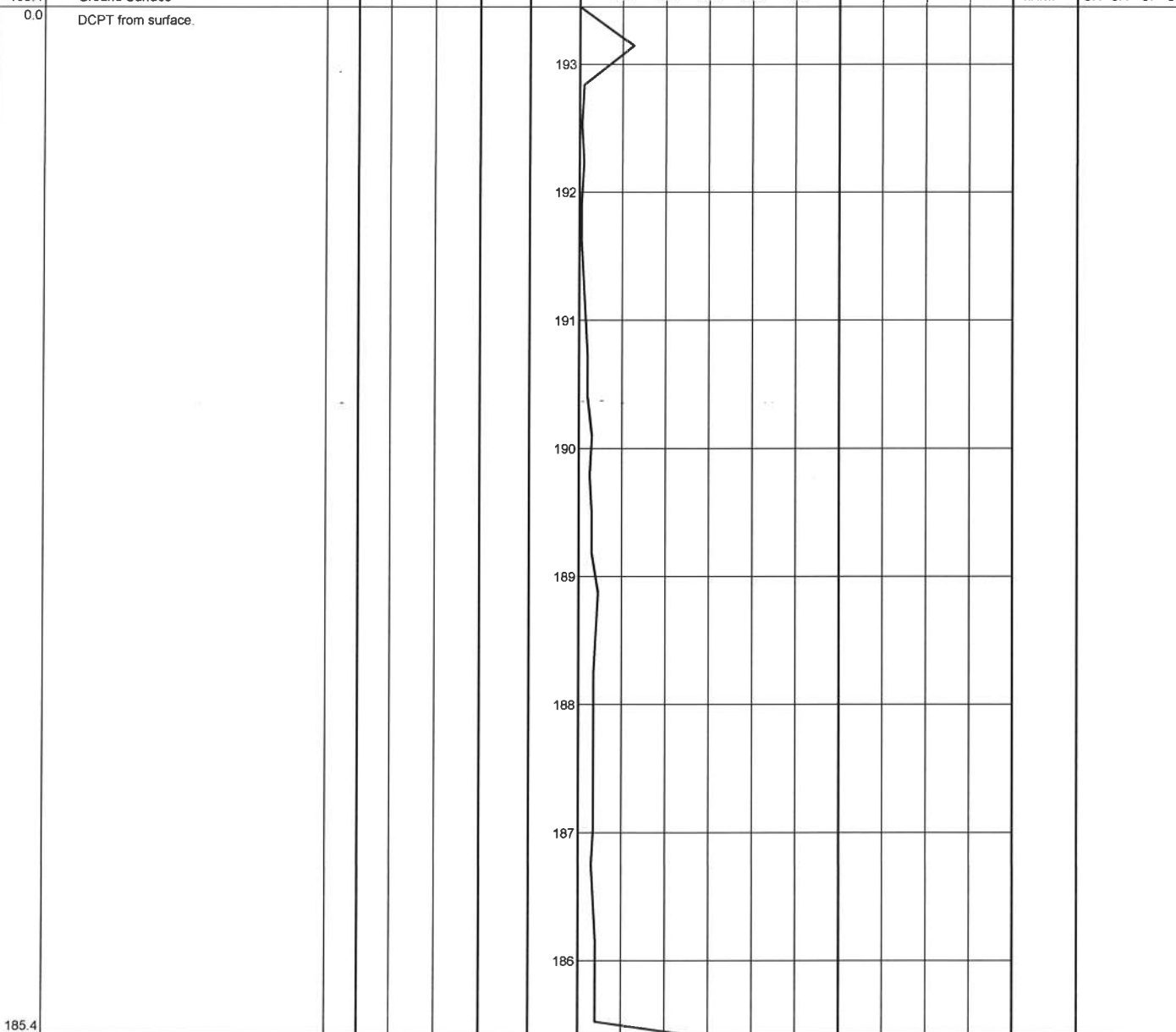
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ONTMT4S 6121.GPJ 12/14/12

+³, ×³: Numbers refer to Sensitivity

METRIC

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)				
193.4	Ground Surface						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						GR SA SI C



END OF DCPT AT 8.0m UPON
REFUSAL ON PROBABLE
BEDROCK.

RECORD OF BOREHOLE No D25-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+937.5 O/S 7.0L, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.11.16 - 2010.11.16 CHECKED BY MRA

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 (%)
193.0	Ground Surface						193						
0.0	DCPT from surface.						192						
							191						
							190						
							189						
							188						
187.2													
5.8	END OF DCPT AT 5.8m UPON REFUSAL ON PROBABLE BEDROCK.												

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

RECORD OF BOREHOLE No BH26-01

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+951 C/L, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009.02.01 - 2009.02.01 CHECKED BY RPR

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	
194.1	Pond Surface						194					
0.0	ICE and WATER											
193.1							193					
1.0	PEAT, some clay Very Soft Dark Brown Wet		1	SS	2							
			2	SS	0							
			3	SS	0							
			4	SS	0							
189.8							190					
4.3	Silty CLAY, trace to some sand Very Soft Grey		5	SS	0							
							189					
			6	TW								
							188					
			7	SS	0							
							187					
							186					
			8	SS	0							
							185					

Continued Next Page

+ 3, x 3: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH26-01

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+951 C/L, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009.02.01 - 2009.02.01 CHECKED BY RPR

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 (%)		
								○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE × LAB VANE	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT w _p — w — w _L					
Continued From Previous Page								20 40 60 80 100	20 40 60						
178.6 15.5 177.7 16.4	Silty CLAY , trace to some sand Very Soft Grey Sandy Auger grinding						184	6 +							
			9	SS	0		183	10 +						0 7 35 58	
							182	7 +							
			10	SS	0		181	6 +							
							180	6 +						0 19 54 27	
			11	SS	0		179	6 +							
							178	4 +							
	Gravelly SAND , trace silt Compact to Very Dense Grey Wet Bedrock fragments		12	SS	11										
			13	SS	59										
	END OF BOREHOLE (SAMPLER BOUNCING) AT 16.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS TO SURFACE.														

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

RECORD OF BOREHOLE No BH26-01R

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+950 O/S 10.0R, SBL ORIGINATED BY ES
 HWY 69 BOREHOLE TYPE Wash Boring COMPILED BY AN
 DATUM Geodetic DATE 2011.03.02 - 2011.03.02 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)					
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	w _p w w _L						
193.8 0.0	Ground Surface						20 40 60 80 100	20 40 60							
	PEAT, fibrous Very Soft to Soft Dark Borwn		1	SS	4										
	clayey, trace sand		2	SS	1										
			3	SS	1										
190.1 3.7	Silty CLAY, trace sand Very Soft Grey														
			4	SS	0										
			1	TW											
			5	SS	0										
			2	TW											
	some sand		6	SS	0										
			3	TW											

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH26-01R

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+950 O/S 10.0R, SBL ORIGINATED BY ES
 HWY 69 BOREHOLE TYPE Wash Boring COMPILED BY AN
 DATUM Geodetic DATE 2011.03.02 - 2011.03.02 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT 7 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 x LAB VANE							
	Continued From Previous Page							20 40 60 80 100							
	Silty CLAY, trace sand Very Soft Grey						183	5 +							
			7	SS	0										
							182	+ 8 +							
			8	SS	0										
							181	+ 5 + 15							
179.9			9	SS	50/		180								
13.9	END OF BOREHOLE AT 13.9m UPON REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS TO SURFACE.				0.150										

+³, X³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH26-02L

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+963.5 O/S 6.4L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.07 - 2009.02.07 CHECKED BY RPR

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	
194.1	Pond Surface											
0.0	ICE and WATER						194					
192.9							193					
1.2	PEAT, some clay Very Soft Dark Brown to Black Wet		1	SS	2		192					
			2	SS	0		191					
			3	SS	0		190					
190.3			4	SS	0		189					
3.8	Silty CLAY, some peat, trace to some sand, some organics Very Soft Grey		5	SS	0		188					
			6	SS	0		187					
			7	SS	0		186					
			8	TW			185					

Continued Next Page

+ 3, X 3: Numbers refer to
Sensitivity

20
15
10



(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH26-02L

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+963.5 O/S 6.4L, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009.02.07 - 2009.02.07 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER • CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT		UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE		WATER CONTENT (%) w _p w w _L			
	Continued From Previous Page							20 40 60 80 100					
181.9	Silty CLAY , trace sand Very Soft Grey		9	SS	0								
12.2	SAND , some gravel, trace clay Very Loose Grey Wet		10	SS	0								
180.7													
13.4	END OF BOREHOLE (SAMPLER BOUNCING) AT 13.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS TO SURFACE. DCPT FROM 13.3 TO 13.4m TO VERIFY PROBABLE BEDROCK.												

+³, X³: Numbers refer to 20
Sensitivity 15-5 10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH26-03

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+976 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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 (%)					
194.1	Pond Surface													
0.0	ICE and WATER													
192.8	PEAT Soft to Very Soft		1	SS	4									
1.3			2	SS	0									
			3	SS	0									
190.4	Silty CLAY, trace sand Very Soft Grey		4	SS	0									0 6 50 44
3.7			5	SS	0									
			6	SS	0									
			7	SS	0									0 7 41 52
185.0	Gravelly SAND Grey Wet		8	SS	50/ .150									
189.8 9.3	END OF BOREHOLE AT 9.3m UPON AUGER REFUSAL ON PROBABLE													

Continued Next Page

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

ONTMT4S 6121.GPJ 12/11/12

RECORD OF BOREHOLE No BH26-03

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+976 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.08 - 2009.02.08 CHECKED BY RPR

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													
	BEDROCK Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Apr 21/09 Ground Surface Jun 04/09 Ground Surface Aug 17/09 Ground Surface Aug 25/09 Ground Surface Oct 27/09 Ground Surface Nov 20/09 Ground Surface													

RECORD OF BOREHOLE No BH26-04R


1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+988.5 O/S 6.3R, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009.02.02 - 2009.02.02 CHECKED BY RPR

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 (%)					
194.1	Pond Surface													
0.0	ICE and WATER													
192.9														
1.2	SAND and SILT, trace clay, some organics Compact Grey Wet		1	SS	19									0 55 40 5
191.6			2	SS	60/									
2.5	END OF BOREHOLE (SAMPLER BOUNCING) AT 2.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.				.050									


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	WATER CONTENT (%)			
193.9	Ground Surface						 <p>SHEAR STRENGTH kPa</p> <p>○ UNCONFINED + FIELD VANE</p> <p>● QUICK TRIAXIAL × LAB VANE</p> <p>20 40 60 80 100</p> <p>20 40 60</p>						

[illegible]

+³, ×³: Numbers refer to Sensitivity

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				
								SHEAR STRENGTH kPa	WATER CONTENT (%)				
197.9	Ground Surface						 <p>○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE</p> <p>20 40 60 80 100 20 40 60</p>						

[illegible]

+³, ×³: Numbers refer to Sensitivity

ONTMT4S 6121.GPJ 12/17/12

RECORD OF BOREHOLE No BH26-06

2 OF 3

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+907.5 O/S 4.5L, NBL ORIGINATED BY ES
HWY 69 BOREHOLE TYPE Hollow Stem Augers/HQ/NW COMPILED BY AN
DATUM Geodetic DATE 2012.06.19 - 2012.06.20 CHECKED BY LRB

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		WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
	Continued From Previous Page						20 40 60 80 100							
	ROCK FILL		6	RUN										
			7	RUN										
184.0														
13.9	Silty CLAY, trace sand Very Soft to Soft Grey		3	SS	0									
			4	SS	0									
			5	SS	2									
179.7														
18.2	Silty SAND, trace gravel Loose Grey Moist													
	No recovery													
178.1			6	SS	100/									
19.8	END OF BOREHOLE AT 19.8m				0.025									

Continued Next Page

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

ONTMT4S 6121.GPJ 12/17/12

RECORD OF BOREHOLE No BH26-06

3 OF 3

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+907.5 O/S 4.5L, NBL ORIGINATED BY ES
 HWY 69 BOREHOLE TYPE Hollow Stem Augers/HQ/NW COMPILED BY AN
 DATUM Geodetic DATE 2012.06.19 - 2012.06.20 CHECKED BY LRB

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			20	40	60	80	100	W _p	W	W _L		
	Continued From Previous Page																
	UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 6.4m, CUTTINGS TO 0.1m, THEN ASPHALT TO SURFACE.																

ONTMT4S 6121.GPJ 12/17/12

RECORD OF BOREHOLE No BH26-07

1 OF 3

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+932.5 O/S 4.5L, NBL ORIGINATED BY ES
HWY 69 BOREHOLE TYPE Hollow Stem Augers/HW/HQ/NW/NQ COMPILED BY AN
DATUM Geodetic DATE 2012.06.21 - 2012.06.22 CHECKED BY LRB

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			
198.1	Ground Surface															
0.0	ASPHALT: (50mm)		1	GS												
	SAND, some gravel Brown Damp (FILL)															
197.0	ROCK FILL		1	RUN												
1.1			2	RUN												
			3	RUN												
			4	RUN												
			5	RUN												
			6	RUN												

Continued Next Page

+ 3, × 3: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH26-07

2 OF 3

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+932.5 O/S 4.5L, NBL ORIGINATED BY ES
HWY 69 BOREHOLE TYPE Hollow Stem Augers/HW/HQ/NW/NQ COMPILED BY AN
DATUM Geodetic DATE 2012.06.21 - 2012.06.22 CHECKED BY LRB

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			20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100		
	Continued From Previous Page													
	ROCK FILL						188							
			7	RUN			187							
			8	RUN			186							
			9	RUN			185							
			10	RUN			184							
			11	RUN			183							
180.7 17.4	Silty CLAY, trace to some sand Very Soft to Soft Grey						182							
			1	SS	0		181							
							180							
							179							

Continued Next Page

+ ³ x 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 LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa			WATER CONTENT (%)						
								UNCONFINED	FIELD VANE	QUICK TRIAXIAL	LAB VANE	W _p	W			W _L	
Continued From Previous Page																	
177.1	Silty CLAY , trace sand Soft Grey	[Hatched]	2	SS	4		178										
21.0	Sandy SILT , trace clay Compact Grey Wet	[Vertical Lines]	3	SS	13		177										
176.4																	
21.7	SILT and SAND , trace clay Compact Grey Wet									176							
174.8	Silt seams		4	SS	115/ 0.275	175									0 36 59 5		
23.3	END OF BOREHOLE AT 23.3m UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.2m, CUTTINGS TO 0.1m, THEN ASPHALT TO SURFACE.																

+ 3, × 3; Numbers refer to Sensitivity

METRIC

[illegible]

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No BH26-08

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+957.5 O/S 4.5L, NBL ORIGINATED BY ES
 HWY 69 BOREHOLE TYPE Hollow Stem Augers/HW/NQ COMPILED BY AN
 DATUM Geodetic DATE 2012.06.22 - 2012.06.23 CHECKED BY LRB

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	20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L		
	Continued From Previous Page							SHEAR STRENGTH kPa						
								○ UNCONFINED + FIELD VANE						
								● QUICK TRIAXIAL × LAB VANE						
								20 40 60 80 100						
								WATER CONTENT (%)						
								20 40 60						
185.5	ROCK FILL		7	RUN			188							
			8	RUN			187							
			9	RUN			186							
12.9	Silty CLAY, trace sand, occasional sand seam Very Soft Grey		1	SS	1		185							0 2 26 72
184.3			2	SS	3									
14.1	Silty SAND, trace clay Very Loose Grey Wet						184							
183.5														
14.9	END OF BOREHOLE AT 14.9m UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 0.6m, CUTTINGS TO 0.1m, THEN ASPHALT TO SURFACE.													

METRIC

SOIL PROFILE						SAMPLES			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	GROUND WATER CONDITIONS	ELEVATION SCALE	SHEAR STRENGTH kPa	WATER CONTENT (%)	GR	SA	SI	CL				
194.1 0.0	Pond Surface ICE and WATER	[Pattern]					194	20 40 60 80 100	20 40 60								
192.9 1.2	DCPT from 1.2m.						193										
							192										
							191										
							190							0 1 54 46			
							189										
							188										
							187										
							186										
							185										

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D26-01R

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+963.5 O/S 6.4R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2009 02 01 - 2009 02 01 CHECKED BY RPR

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								
	Continued From Previous Page							20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE 20 40 60 80 100 WATER CONTENT (%) 20 40 60					0 20 42 38
177.1							184						
							183						
							182						
							181						
							180						
							179						
							178						
17.0	END OF DCPT AT 17.0m UPON REFUSAL ON PROBABLE BEDROCK.												

RECORD OF BOREHOLE No D26-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 24+988.5 O/S 6.3L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY LG
 DATUM Geodetic DATE 2009.02.02 - 2009.02.02 CHECKED BY RPR

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						
192.6	Ground Surface							<div>20406080100</div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div>					<div>PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT</div> <div>w_p w w_L</div> <div>WATER CONTENT (%)</div> <div>204060</div>	
0.0	DCPT from surface.						192							
191.4														
1.2	END OF DCPT AT 1.2m UPON REFUSAL ON PROBABLE BEDROCK.													

RECORD OF BOREHOLE No C124-2

1 OF 1

METRIC

WP# 5134-12-09 LOCATION N 5 059 826.3 E 231 992.7 ORIGINATED BY ES
 HWY 69 BOREHOLE TYPE Hollow Stem Augers/HW/NQ COMPILED BY AN
 DATUM Geodetic DATE 2012.06.20 - 2012.06.20 CHECKED BY LRB

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			20 40 60 80 100	20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L		
197.8	Ground Surface													
196.8	ASPHALT: (50mm) SAND, some gravel Dark Grey to Brown Damp (FILL)		1	GS			197							
1.0	ROCK FILL		1	RUN			196							
			2	RUN			195							
			3	RUN			194							
	Peat (25mm thick) at 5.5m Dark Brown Wet		4	RUN			193							
191.4	PEAT, fibrous Dark Brown Moist						192							
6.4 191.1							191							
6.7	BEDROCK, granitic gneiss, grey													
190.5														
7.3	END OF BOREHOLE AT 7.3m. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.8m, CUTTINGS TO 0.1m, THEN ASPHALT TO SURFACE.													

ONTMT4S 6121(CULVERTS).GPJ 12/14/12

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No C124-3

1 OF 1

METRIC

WP# 5134-12-09 LOCATION N 5 059 822.9 E 231 995.8 ORIGINATED BY ES
 HWY 69 BOREHOLE TYPE Hollow Stem Augers/HQ COMPILED BY AN
 DATUM Geodetic DATE 2012.06.23 - 2012.06.23 CHECKED BY LRB

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		
197.8	Ground Surface													
0.8	ASPHALT: (50mm)													
	SAND, some gravel Brown Damp (FILL)													
196.7														
1.1	ROCK FILL													
			1	RUN										
			2	RUN										
192.9														
4.9	BEDROCK, granitic gneiss, grey		3	RUN										
192.0														
5.8	END OF BOREHOLE AT 5.8m. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 0.1m, THEN ASPHALT TO SURFACE.													

ONTMT4S 6121(CULVERTS).GPJ 12/14/12

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No C125-1

1 OF 1

METRIC

WP# 5134-12-10 LOCATION N 5 059 821.1 E 231 980.0 ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Continuous Split Spoon (50lb Hammer) COMPILED BY AN
DATUM Geodetic DATE 2012.06.19 - 2012.06.19 CHECKED BY LRB

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			
193.5	Ground Surface																
0.0	PEAT, fibrous Very Soft Black Wet		1	SS	1												
192.8						193											
0.7	END OF BOREHOLE AT 0.7m UPON REFUSAL ON PROBABLE BEDROCK																

ONTMT4S 6121(CULVERTS).GPJ 12/14/12

RECORD OF BOREHOLE No C125-2

1 OF 1

METRIC

WP# 5134-12-10 LOCATION N 5 059 808.9 E 231 939.1 ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Continuous Split Spoon (50lb Hammer) COMPILED BY AN
DATUM Geodetic DATE 2012.06.19 - 2012.06.19 CHECKED BY LRB

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE		WATER CONTENT (%) w _P w w _L					
193.3	Pond Surface							20	40	60	80	100			
0.0	WATER														
192.2															
1.1	PEAT , fibrous														
191.9	Black														
1.4	Silty CLAY , trace sand Soft Brown to Grey		1	SS	4										
			2	SS	4										
			3	SS	108/ 0.200										
190.7	Occasional sand seams														
2.6	END OF BOREHOLE AT 2.6m UPON REFUSAL ON PROBABLE BEDROCK.														

+ ³ . X ³ : Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No C125-D1

1 OF 1

METRIC

WP# 5134-12-10 LOCATION N 5 059 817.7 E 231 982.2 ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY AN
DATUM Geodetic DATE 2012.06.19 - 2012.06.19 CHECKED BY LRB

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					WATER CONTENT (%)											
194.2	Ground Surface									20	40	60	80	100	W _P	W	W _L	kN/m ³	GR	SA	SI	CL
0.0							194															
193.6																						
0.6	END OF DCPT AT 0.6m UPON REFUSAL ON PROBABLE BEDROCK.																					

ONTMT4S 6121(CULVERTS).GPJ 12/14/12

+³, X³: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No C125-D2

1 OF 1

METRIC

WP# 5134-12-10 LOCATION N 5 059 806.7 E 231 941.1 ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY AN
DATUM Geodetic DATE 2012.06.19 - 2012.06.19 CHECKED BY LRB

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 (%)				
192.8	Pond Surface													
0.0	WATER							○ UNCONFINED + FIELD VANE						
192.2								● QUICK TRIAXIAL × LAB VANE						
0.6	Start DCPT at 0.6m													
190.4														
2.4	END OF DCPT AT 2.4m UPON REFUSAL ON PROBABLE BEDROCK.													

RECORD OF BOREHOLE No C125-D3

1 OF 1

METRIC

WP# 5134-12-10 LOCATION N 5 059 812.1 E 231 960.6 ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY AN
DATUM Geodetic DATE 2012.06.19 - 2012.06.19 CHECKED BY LRB

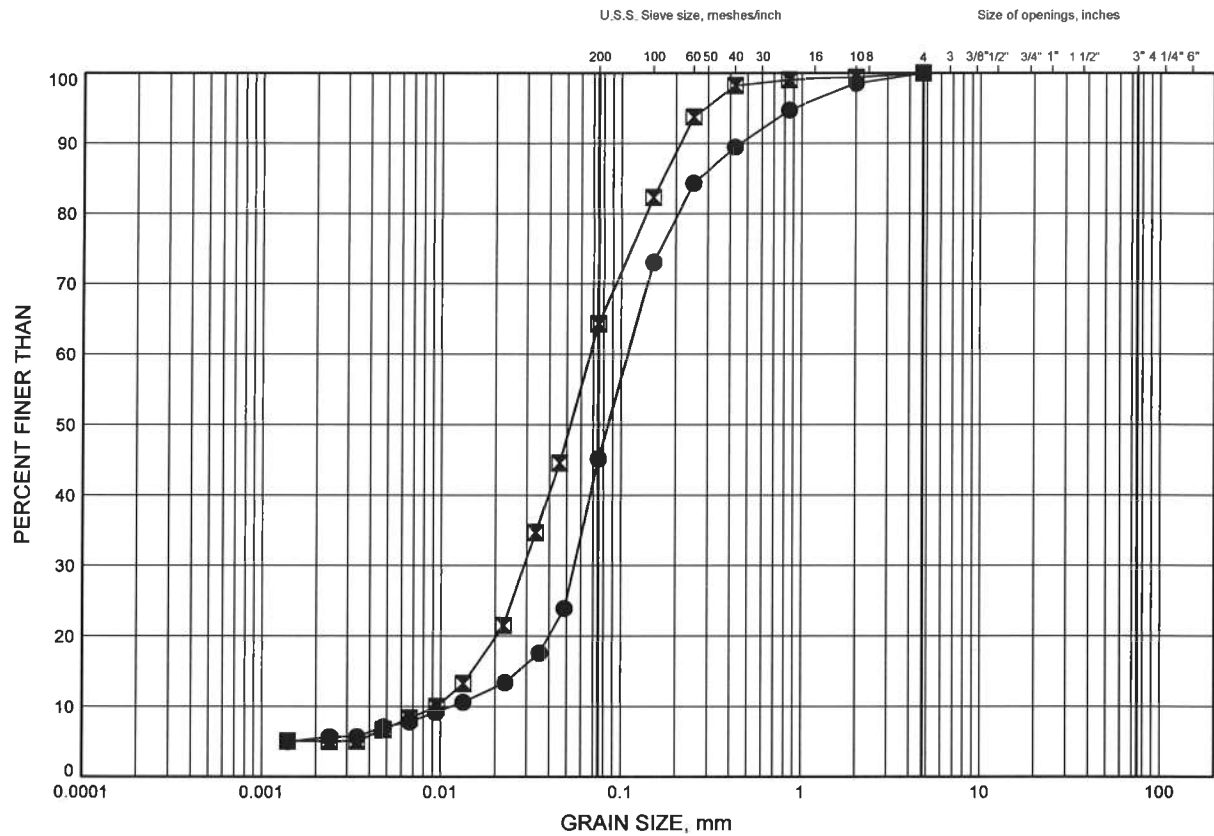
SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE LIQUID CONTENT LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE					WATER CONTENT (%) w _p w w _L							
194.0	Ground Surface						194											
0.0																		
193.5																		
0.5	END OF DCPT AT 0.5m UPON REFUSAL ON PROBABLE BEDROCK																	

ONTMT4S 6121(CULVERTS).GPJ 12/14/12

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE 11

SAND and SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH26-04R	1.83	192.27
⊠	BH26-07	23.08	175.02

GRAIN SIZE DISTRIBUTION - THURBER 6121.GPJ 12/14/12

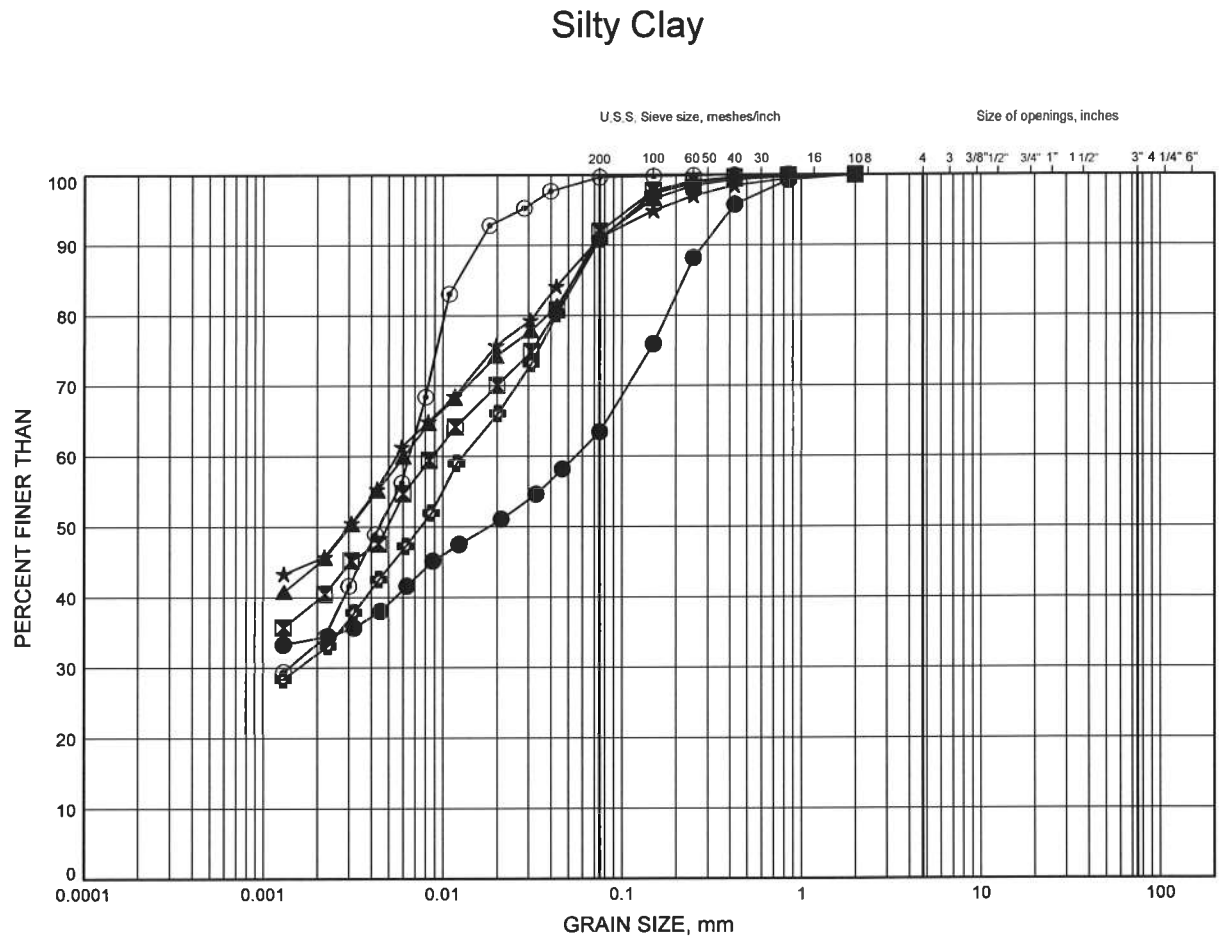
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE 12



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH25-01	2.59	191.51
⊠	BH25-03	4.88	189.22
▲	BH25-03	6.40	187.70
★	BH25-03	9.45	184.65
⊙	BH25-04R	4.11	189.89
⊕	BH25-04R	7.92	186.08

Date December 2012

GWP# 5294-08-00

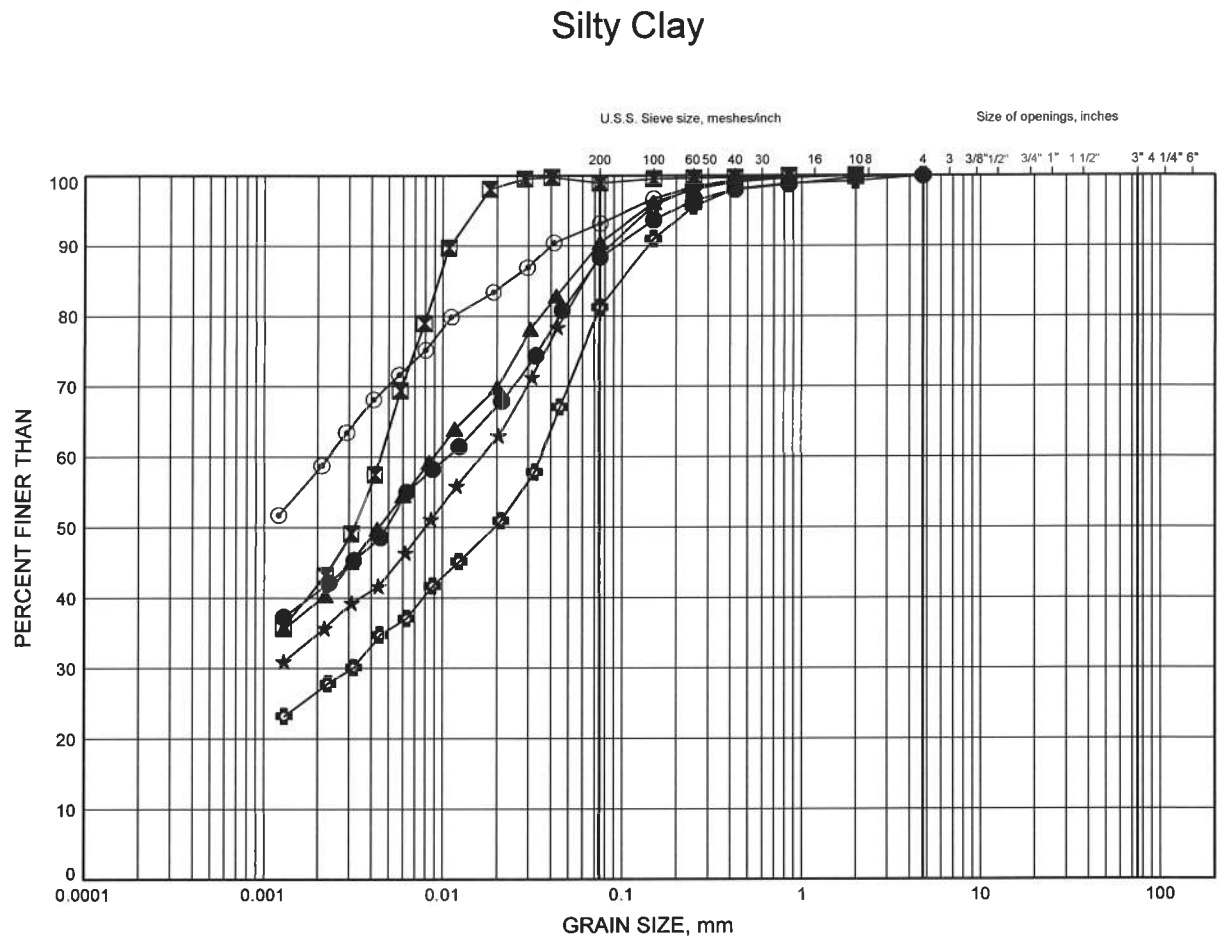


Prep'd MFA

Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE 13



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH25-04R	15.54	178.46
⊠	BH26-01	4.88	189.22
▲	BH26-01	6.40	187.70
★	BH26-01	7.92	186.18
⊙	BH26-01	10.97	183.13
⊕	BH26-01	14.02	180.08

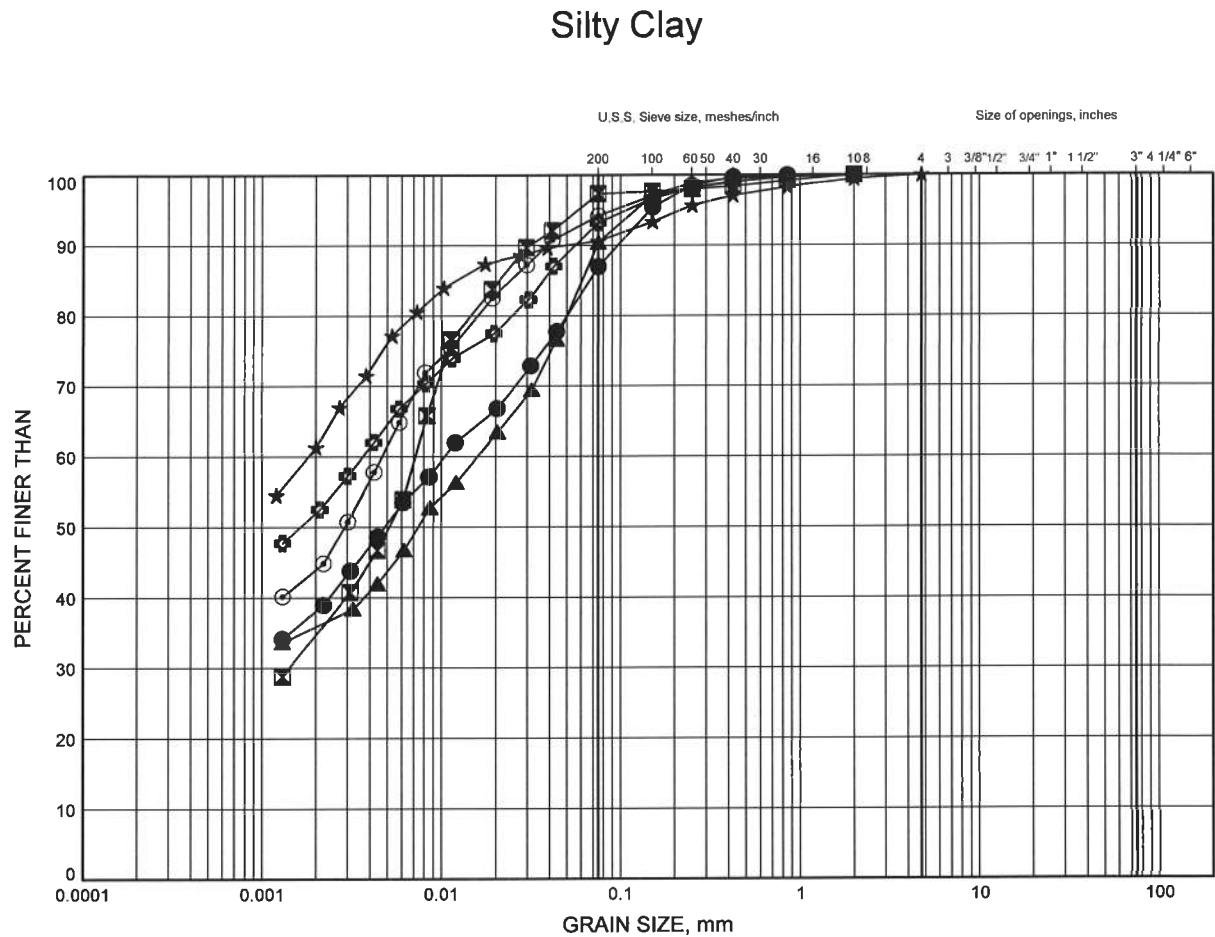
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE 14



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH26-01R	8.69	185.11
⊠	BH26-02L	4.11	189.99
▲	BH26-02L	6.40	187.70
★	BH26-02L	10.97	183.13
⊙	BH26-03	4.11	189.99
⊕	BH26-03	7.92	186.18

Date December 2012

GWP# 5294-08-00

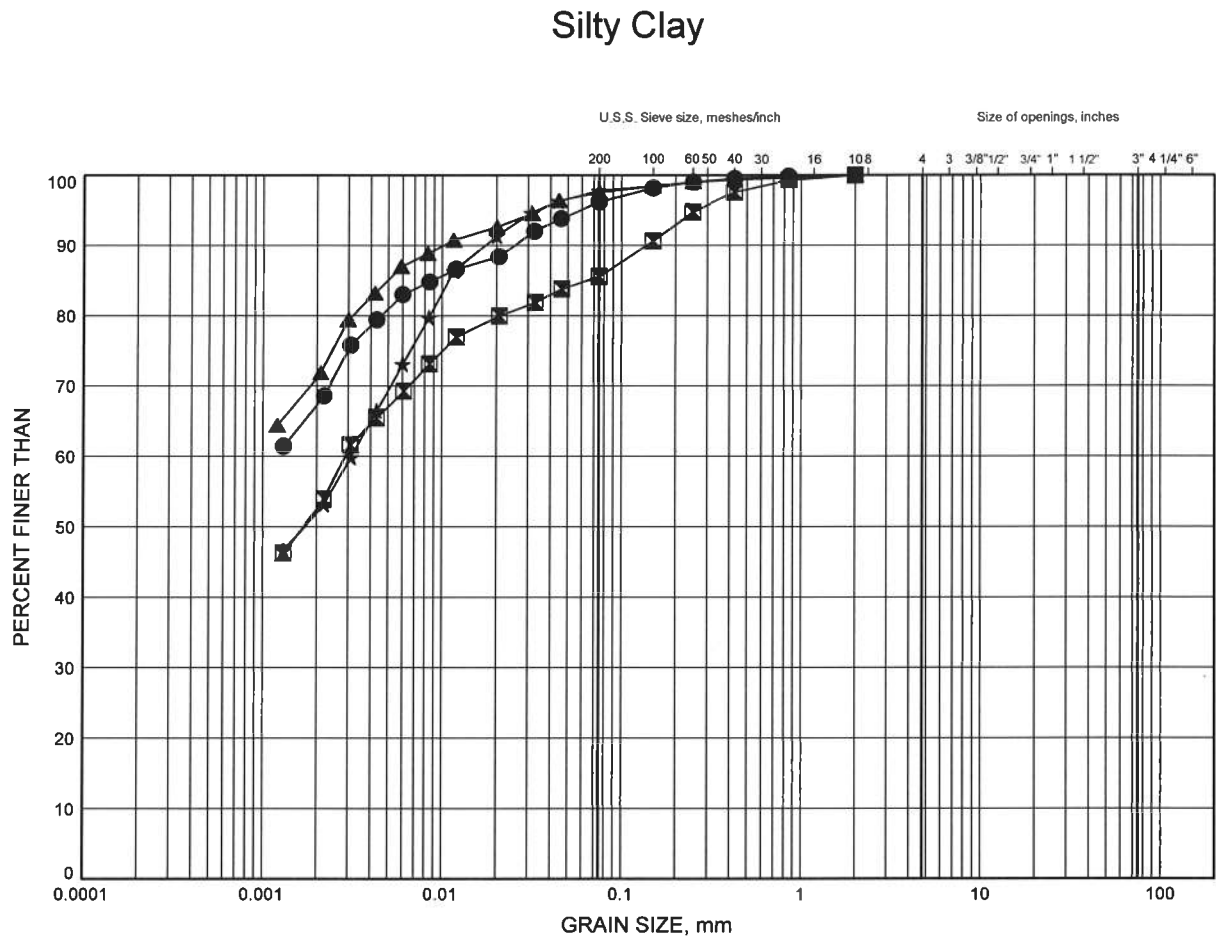


Prep'd MFA

Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE 15



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH26-06	16.46	181.44
■	BH26-07	18.59	179.51
▲	BH26-08	13.41	184.99
★	C125-2	1.98	191.32

Date December 2012
GWP# 5294-08-00

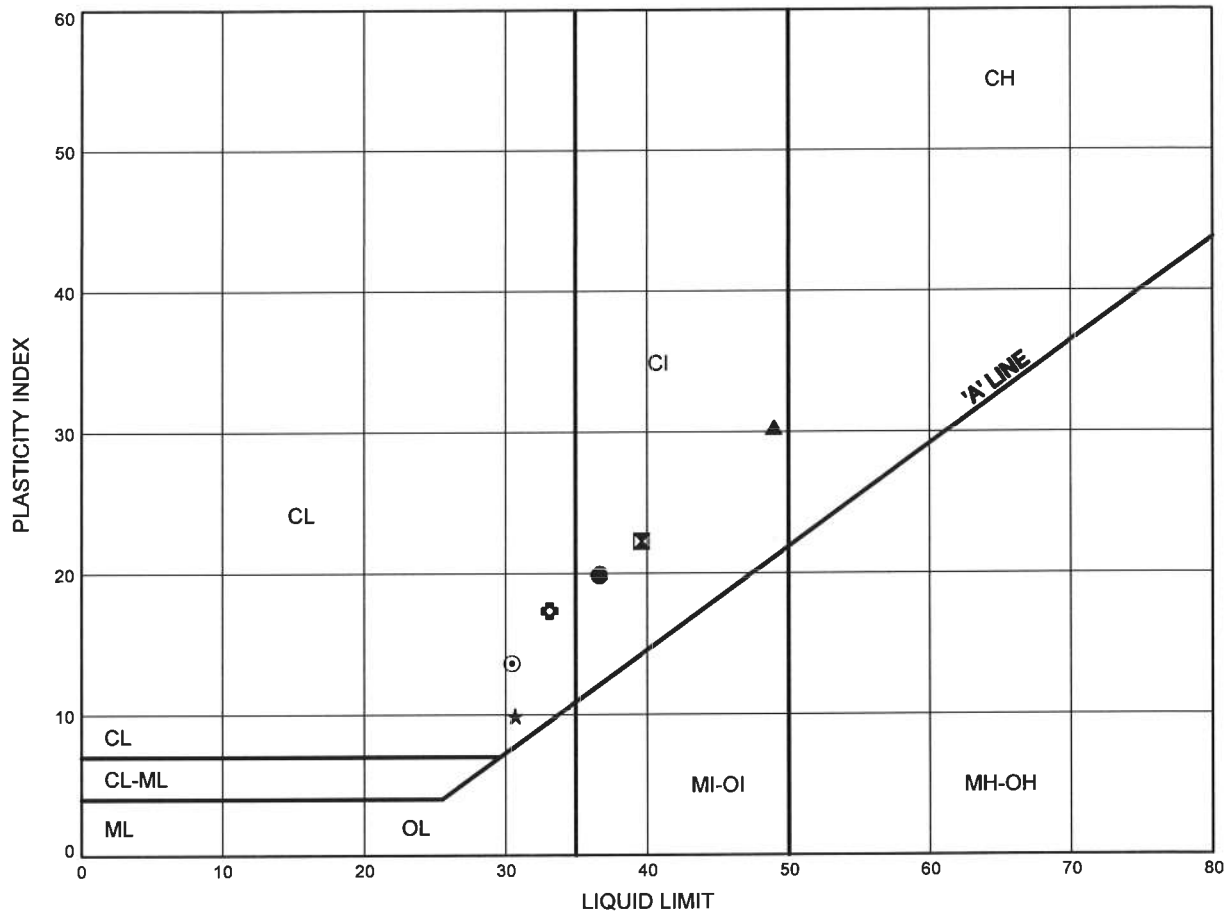


Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529
ATTERBERG LIMITS TEST RESULTS

FIGURE 16

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH25-03	4.88	189.22
⊠	BH25-03	6.40	187.70
▲	BH25-03	9.45	184.65
★	BH25-04R	4.11	189.89
⊙	BH25-04R	7.92	186.08
⊕	BH25-04R	15.54	178.46

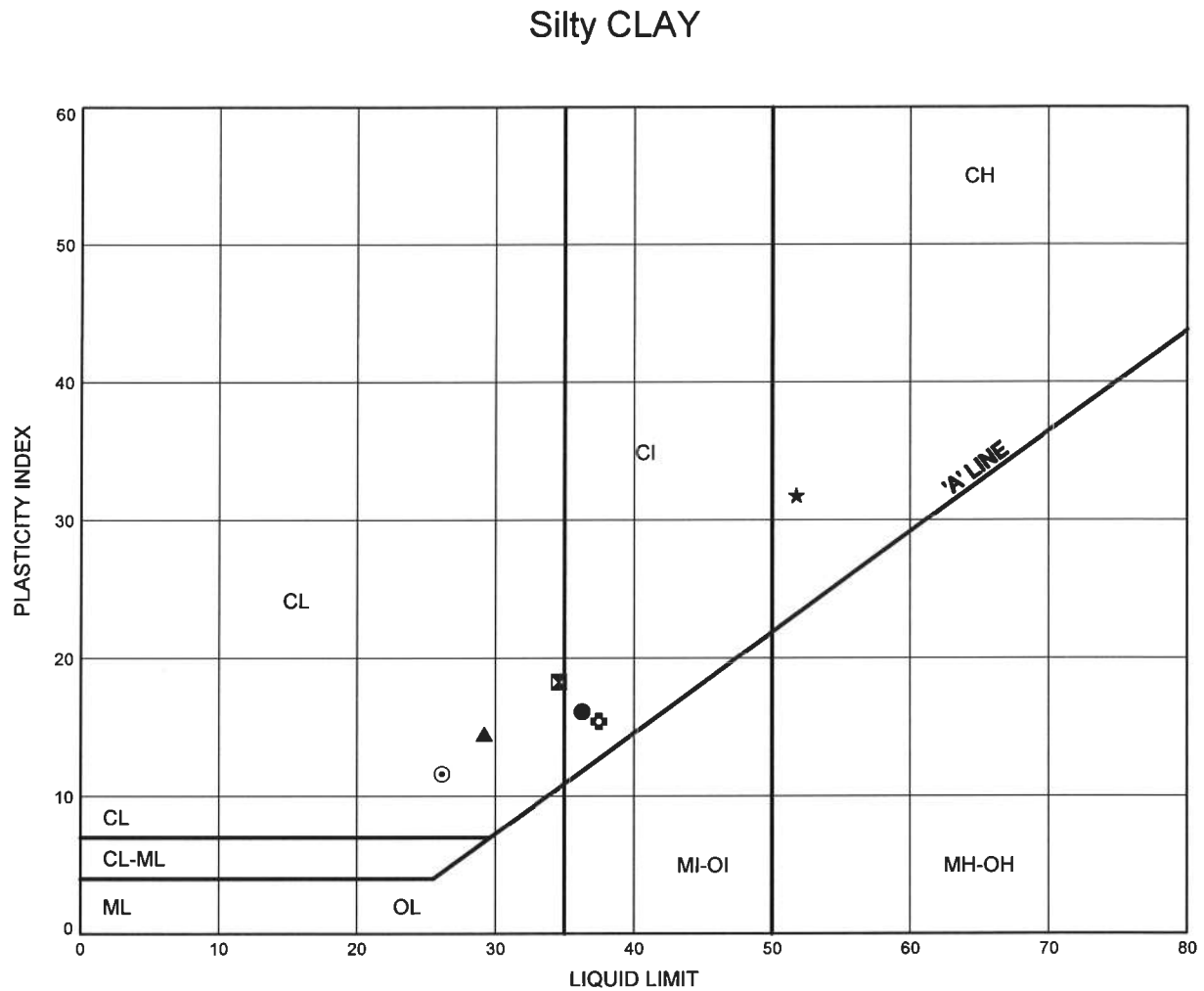
Date December 2012
 GWP# 5294-08-00



Prep'd MFA
 Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529
ATTERBERG LIMITS TEST RESULTS

FIGURE 17



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH26-01	4.88	189.22
⊠	BH26-01	6.40	187.70
▲	BH26-01	7.92	186.18
★	BH26-01	10.97	183.13
⊙	BH26-01	14.02	180.08
⊕	BH26-02L	4.11	189.99

Date December 2012
 GWP# 5294-08-00

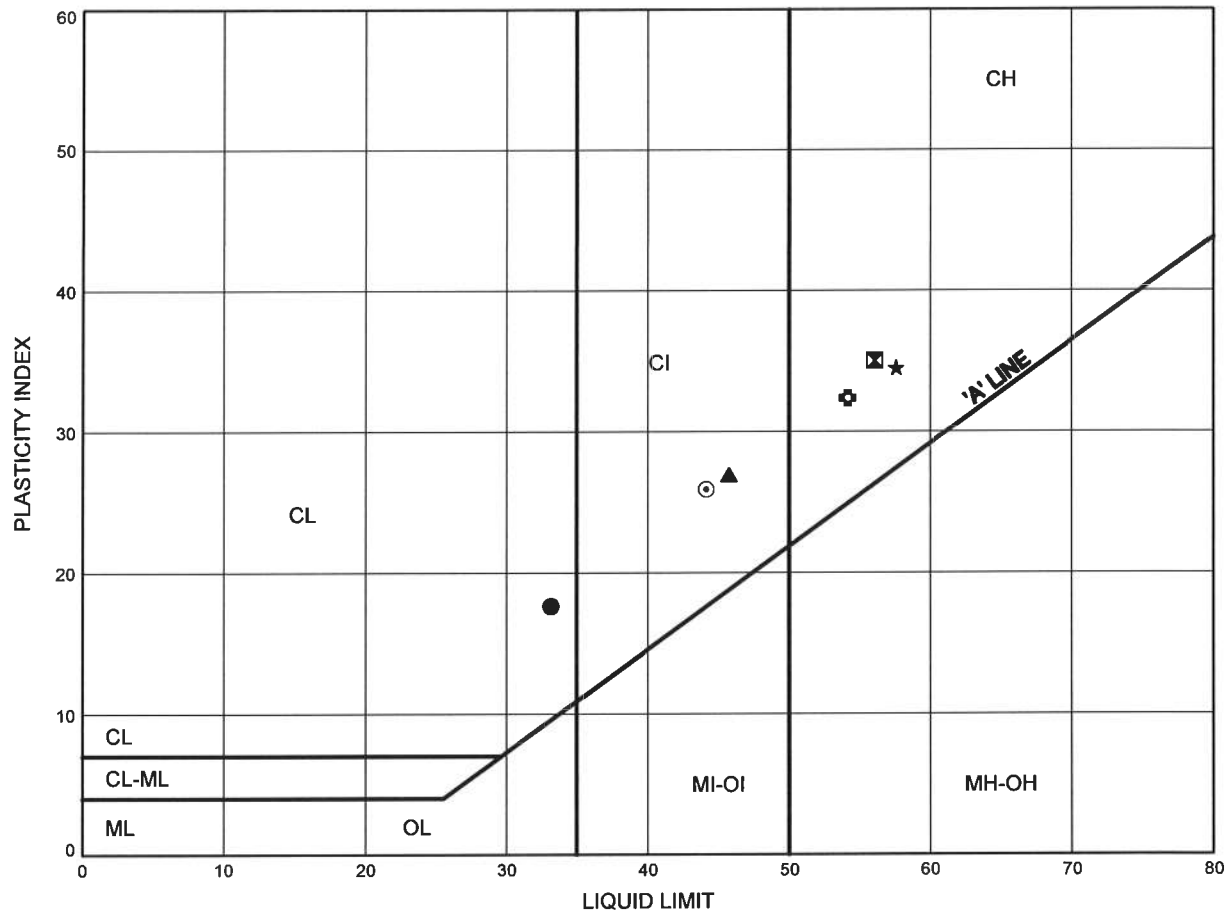


Prep'd MFA
 Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529
ATTERBERG LIMITS TEST RESULTS

FIGURE 18

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH26-02L	6.40	187.70
⊠	BH26-02L	10.97	183.13
▲	BH26-03	7.92	186.18
★	BH26-06	16.46	181.44
⊙	BH26-07	18.59	179.51
⊕	BH26-08	13.41	184.99

Date December 2012
 GWP# 5294-08-00

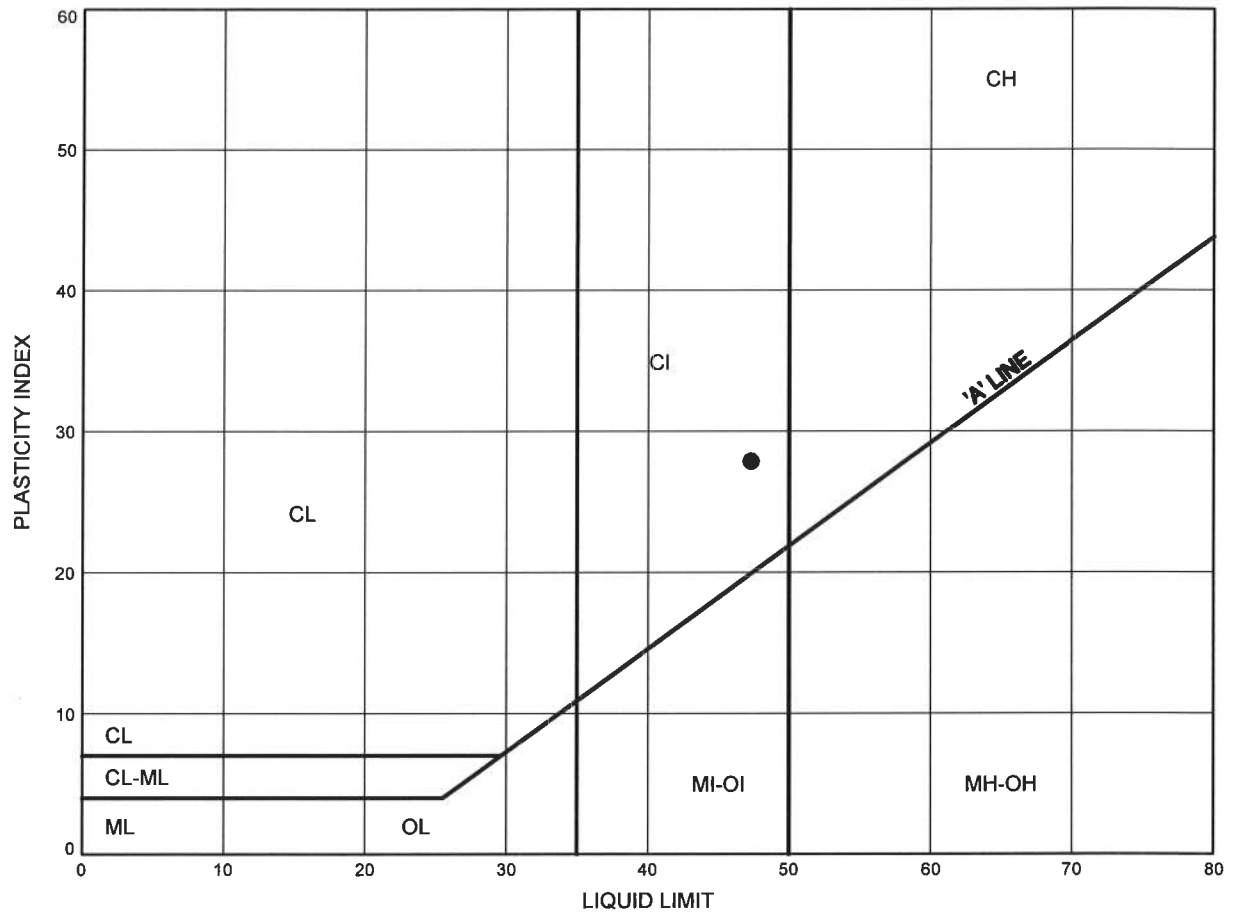


Prep'd MFA
 Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529
ATTERBERG LIMITS TEST RESULTS

FIGURE 19

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	C125-2	1.98	191.32

Date December 2012
 GWP# 5294-08-00



Prep'd MFA
 Chkd. MRA



Consolidation Test Report

CLIENT: **MMM GROUP LIMITED**

FILE NUMBER: **19-5161-21**

PROJECT: **Hwy 69 N. of Hwy 529**

REPORT DATE: **30-Jul-09**

TEST DATES: July 16, 2009 - July 28, 2009

SAMPLE: BH26-01-TW6 (20' - 22')
Silty Clay, trace to some sand, grey, (CL-CI), Grain Size: 39% Clay, 51% Silt, 10% Sand

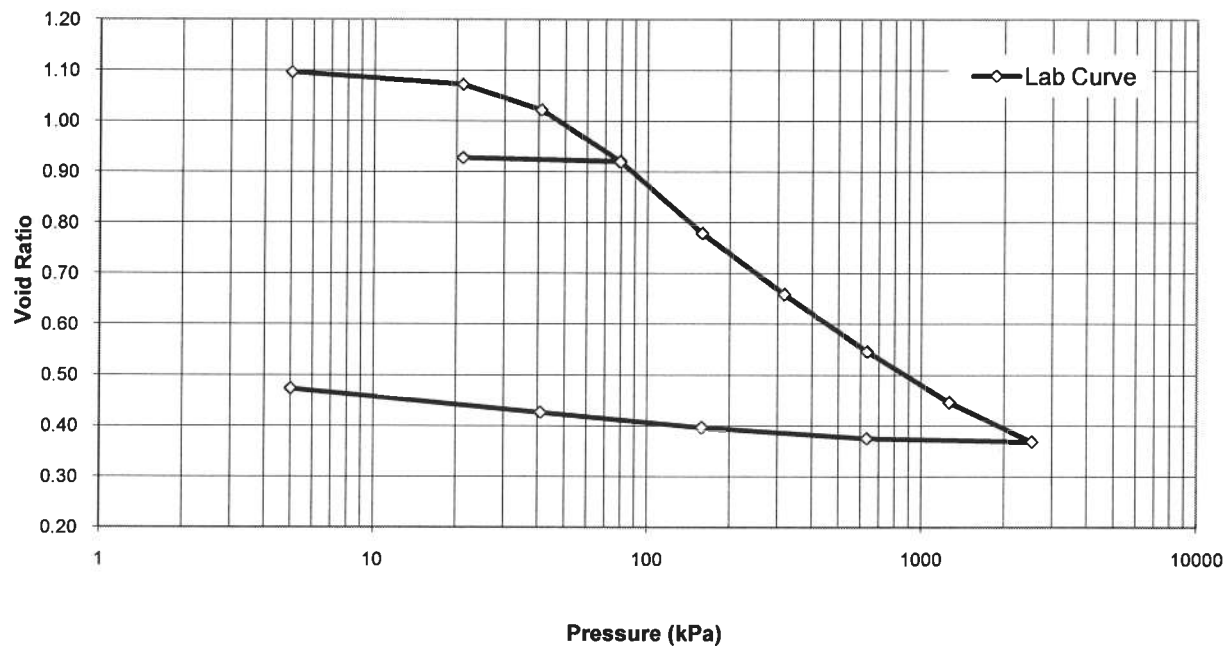
PROCEDURE: Test carried out in accordance with Standard Test Method for One-Dimensional Consolidation Properties of Soils, ASTM D 2435-04, method B

	<u>Start of Test</u>	<u>End of Test</u>
Wet Dens. (kg/m ³)	1804.1	2219.7
Dry Dens. (kg/m ³)	1280.4	1825.2
Moisture Cont. (%)	40.9	21.6
Void Ratio	1.101	0.473
Saturation (%)	99.9	

Note: A Specific Gravity of 2.69 was measured for the void ratio and saturation calculations.

Void Ratio vs Pressure

Project #: 19-5161-21
Client: MMM Group Ltd.
Project Name: Hwy 69 N. of Hwy 529
Sample: BH26-01-TW6 (20' - 22')
Oedometer Consolidation Test



TEST DONE BY: EA
REVIEWED BY: JPL



Consolidation Test Report

Hwy 69 N. of Hwy 529
19-5161-21

BH26-01-TW6 (20' - 22')

TRIMMING: The Specimen was manually trimmed to the size of consolidation ring, then mounted in a fixed ring consolidometer

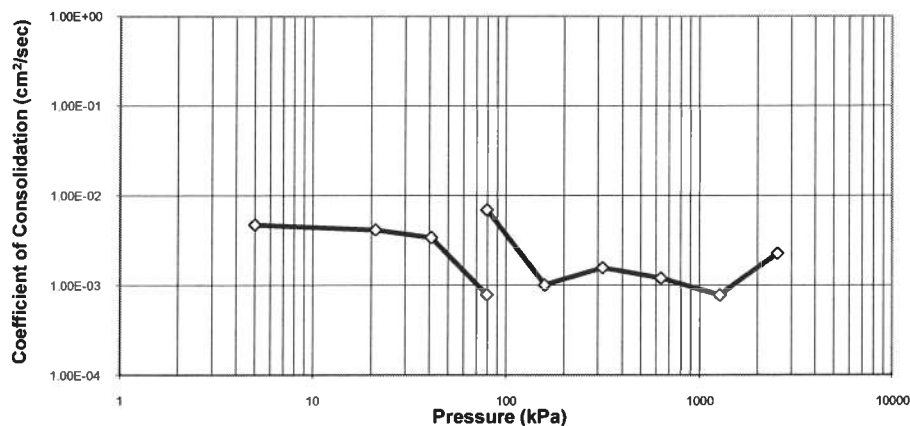
LOADING: A seating load of 5.0 kPa was applied and the consolidometer was flooded with distilled water. Sample was monitored to ensure no swelling effect occurred before the start of the test. Subsequent loads were applied after 100% primary consolidation was reached.

CALCULATIONS: Coefficients of Consolidation were calculated by the square root time method.

Pressure (kPa)	Corr. H. (mm)	Avg. H. (mm)	d ₉₀ (mm)	t ₉₀ (min)	C _v (cm ² /s)	Void Ratio	m _v (m ² /kN)	k (cm/s)
0.0	19.150					1.101		
5.0	19.109	19.130	0.063	2.72	4.75E-03	1.096	4.28E-04	1.99E-07
21.1	18.892	19.001	0.253	3.06	4.17E-03	1.073	7.05E-04	2.88E-07
40.9	18.433	18.663	0.173	3.61	3.41E-03	1.022	1.23E-03	4.12E-07
79.3	17.517	17.975	0.525	14.44	7.90E-04	0.921	1.29E-03	1.00E-07
21.1	17.497	17.507				0.928		
79.3	17.502	17.500	0.167	1.56	6.95E-03	0.920	7.14E-05	4.87E-08
158.5	16.222	16.862	0.712	9.92	1.01E-03	0.779	9.24E-04	9.17E-08
316.4	15.128	15.675	0.670	5.52	1.57E-03	0.659	4.27E-04	6.58E-08
632.1	14.098	14.613	0.692	6.25	1.21E-03	0.546	2.16E-04	2.55E-08
1263.7	13.185	13.642	0.494	8.41	7.82E-04	0.446	1.03E-04	7.86E-09
2527.4	12.477	12.831	0.215	2.56	2.27E-03	0.369	4.25E-05	9.47E-09
632.1	12.478	12.478				0.375		
158.5	12.695	12.587				0.397		
40.9	12.939	12.817				0.426		
5.0	13.293	13.116				0.473		

Coefficient of Consolidation vs. Pressure

Project #: 19-5161-21
Client: MMM Group Ltd.
Project Name: Hwy 69 N. of Hwy 529
Sample: BH26-01-TW6 (20' - 22')
Oedometer Consolidation Test



Notes: C_v and k calculated using t₉₀ values

TEST DONE BY: EA
REVIEWED BY: JPL



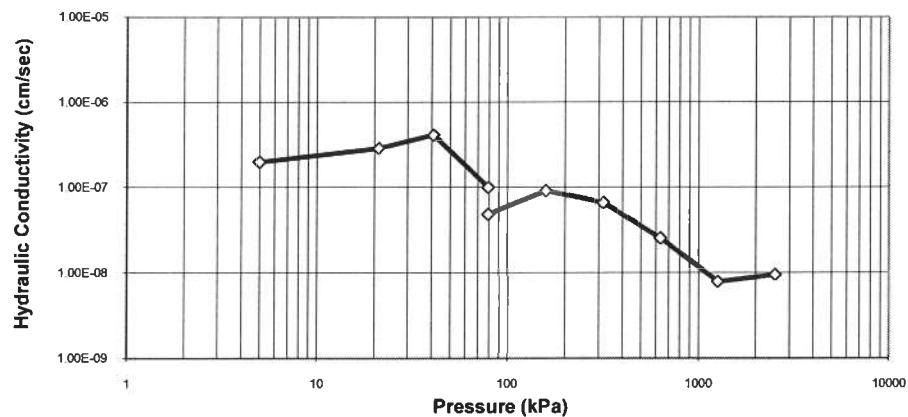
Consolidation Test Report

Hwy 69 N. of Hwy 529
19-5161-21

BH26-01-TW6 (20' - 22')

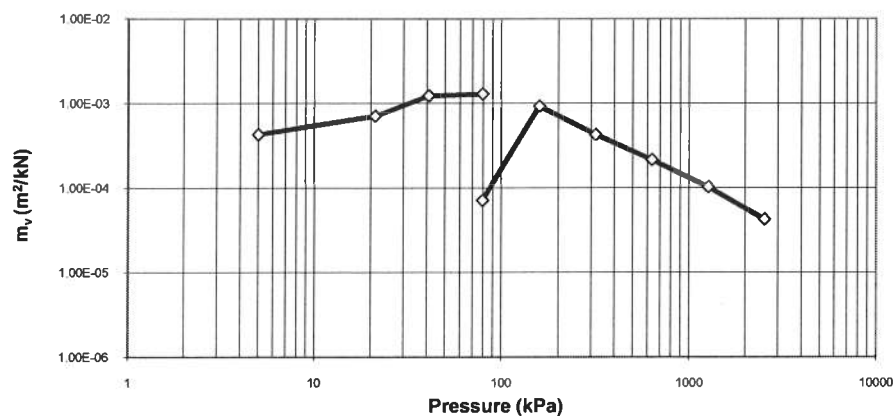
Hydraulic Conductivity vs. Pressure

Project #: 19-5161-21
Client: MMM Group Ltd.
Project Name: Hwy 69 N. of Hwy 529
Sample: BH26-01-TW6 (20' - 22')
Oedometer Consolidation Test

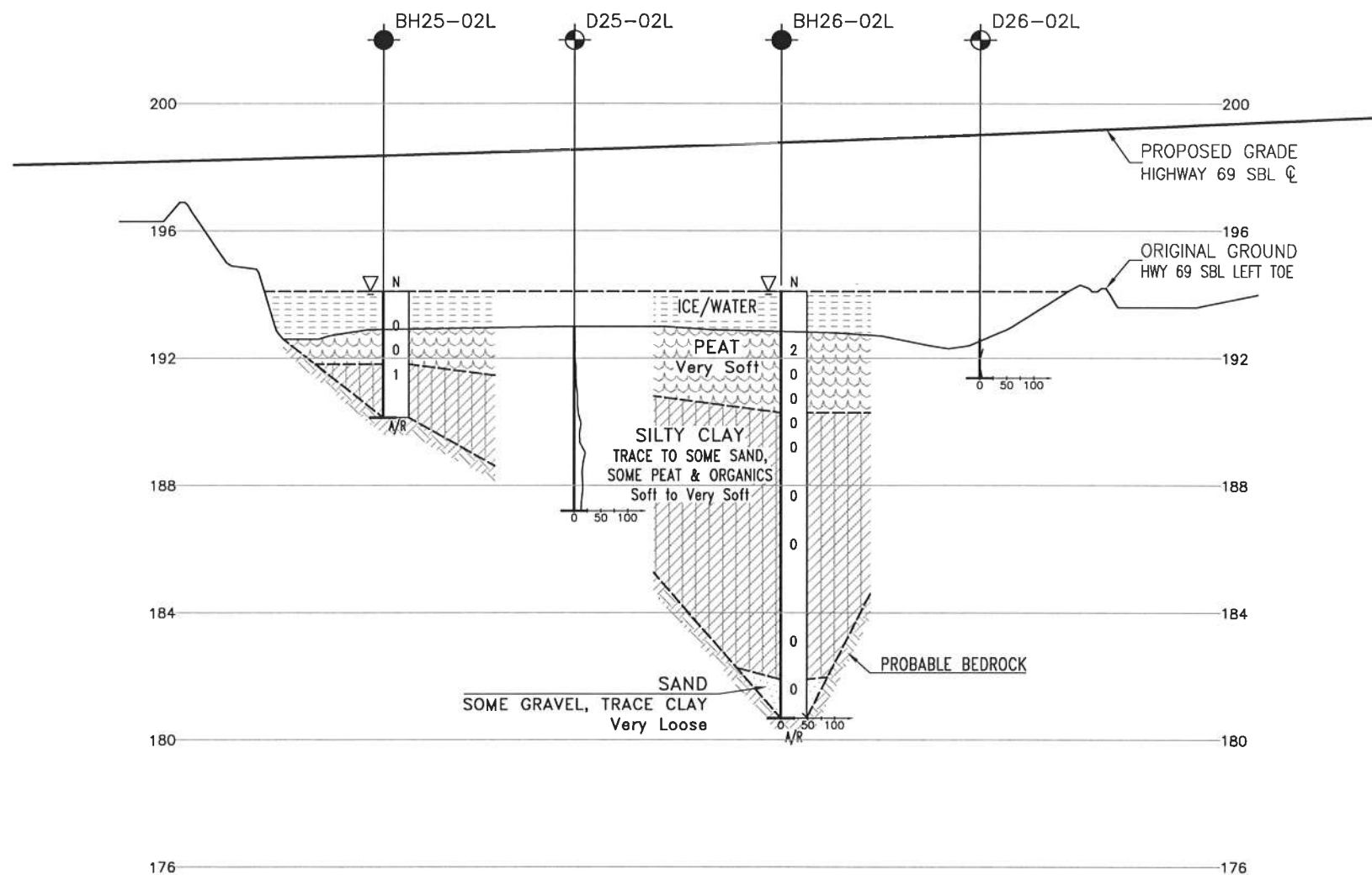
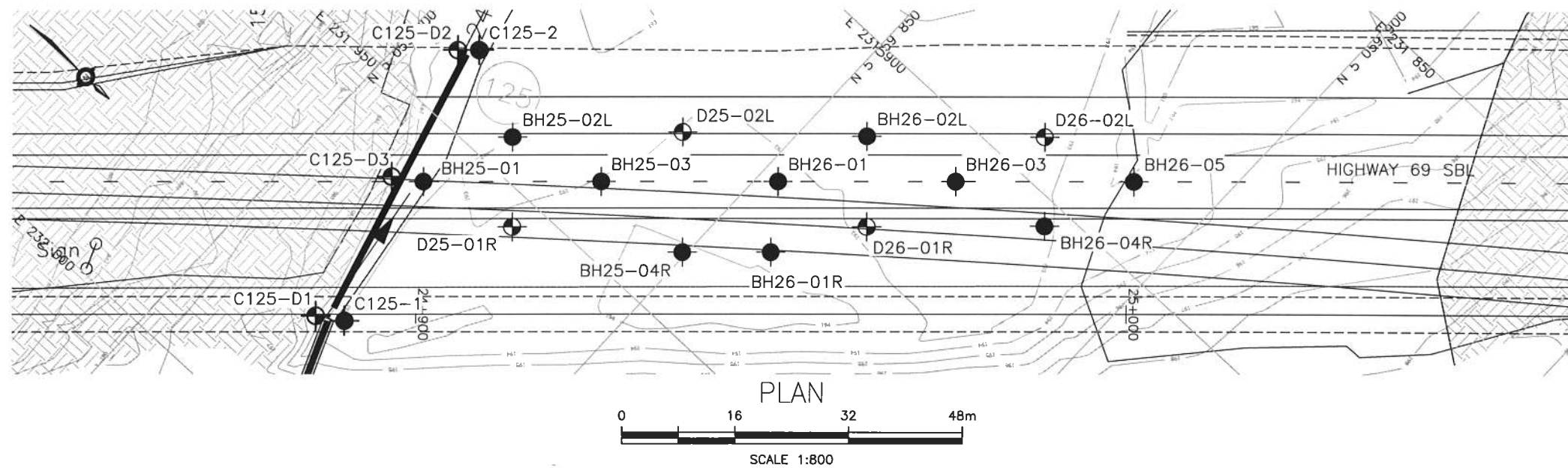


m_v vs. Pressure

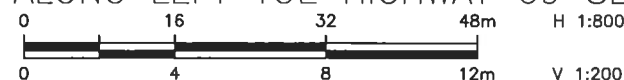
Project #: 19-5161-21
Client: MMM Group Ltd.
Project Name: Hwy 69 N. of Hwy 529
Sample: BH26-01-TW6 (20' - 22')
Oedometer Consolidation Test



TEST DONE BY: EA
REVIEWED BY: JPL



PROFILE ALONG LEFT TOE HIGHWAY 69 SBL



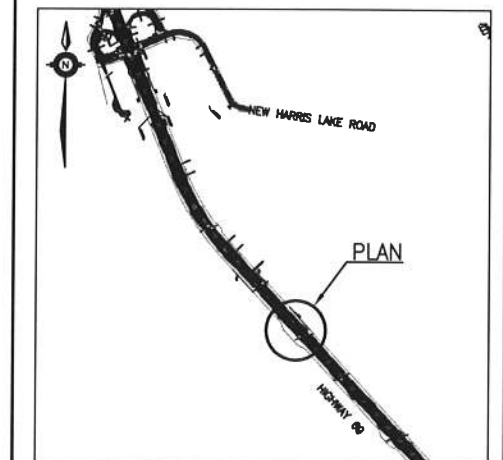
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-LT TOE
(STA 24+900 - 25+000)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN
LEGEND

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

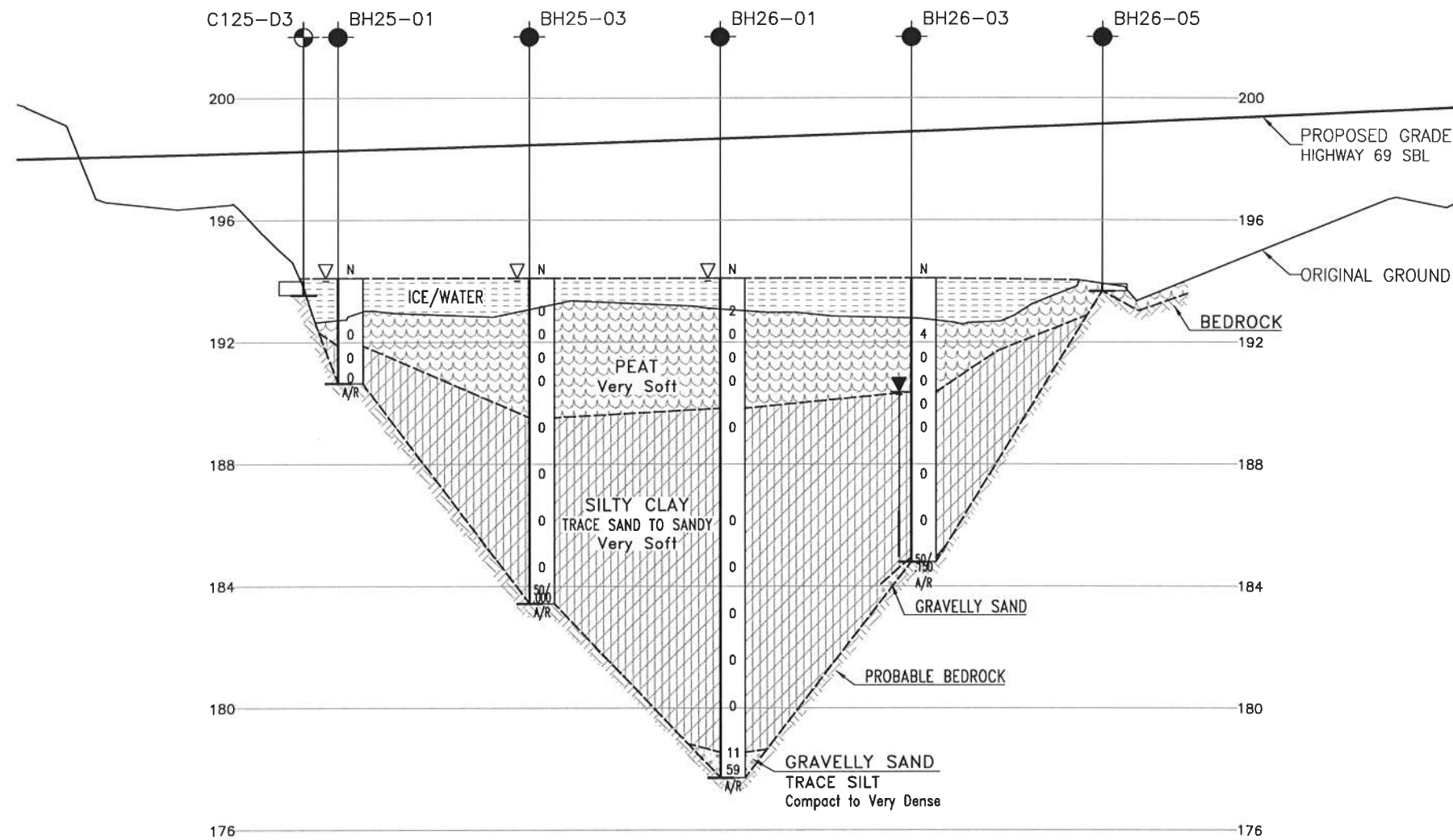
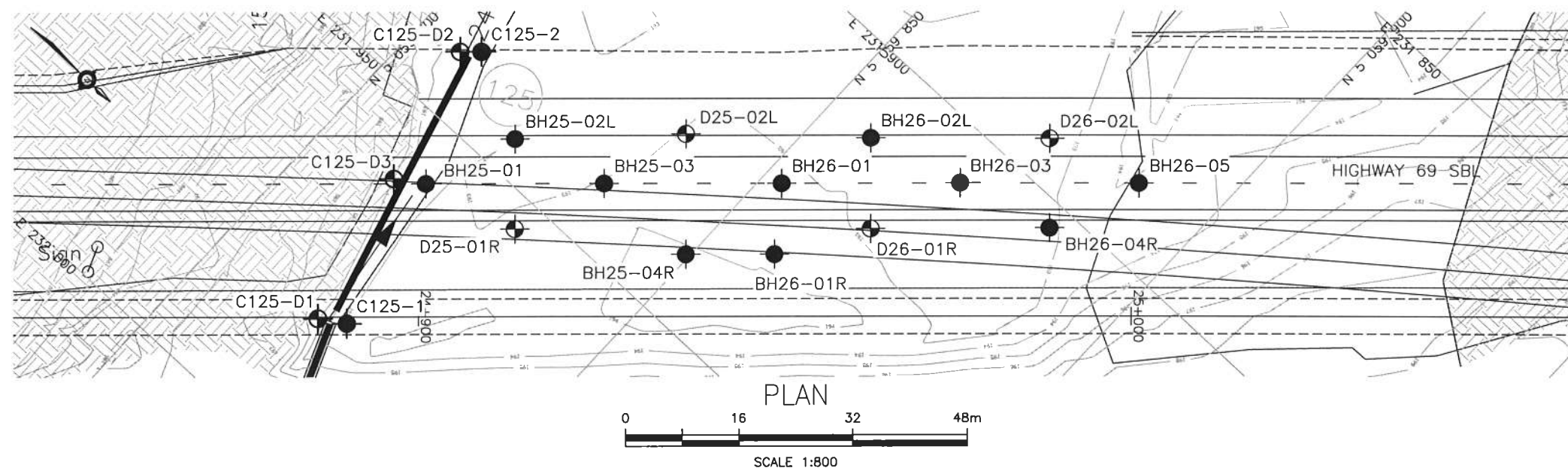
NO	ELEVATION	NORTHING	EASTING
BH25-01	194.1	5 059 815.9	231 958.1
BH25-02L	194.1	5 059 820.8	231 945.0
BH25-03	194.1	5 059 834.2	231 941.1
BH25-04R	194.0	5 059 849.5	231 940.6
D25-01R	193.4	5 059 829.4	231 954.3
D25-02L	193.0	5 059 837.9	231 928.1
BH26-01	194.1	5 059 852.6	231 924.1
BH26-01R	193.8	5 059 858.6	231 932.1
BH26-02L	194.1	5 059 857.4	231 910.9
BH26-03	194.1	5 059 870.9	231 907.1
BH26-04R	194.1	5 059 884.4	231 903.3
BH26-05	193.9	5 059 889.3	231 890.2
D26-01R	194.1	5 059 866.1	231 920.3
D26-02L	192.6	5 059 875.8	231 894.0
C125-2	193.3	5 059 808.9	231 939.1
C125-D2	192.8	5 059 806.7	231 941.1

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.

GEOCRETS No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



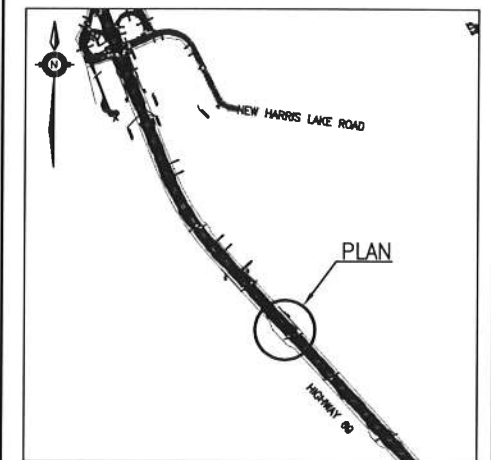
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-CL
(STA 24+900 - 25+000)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



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

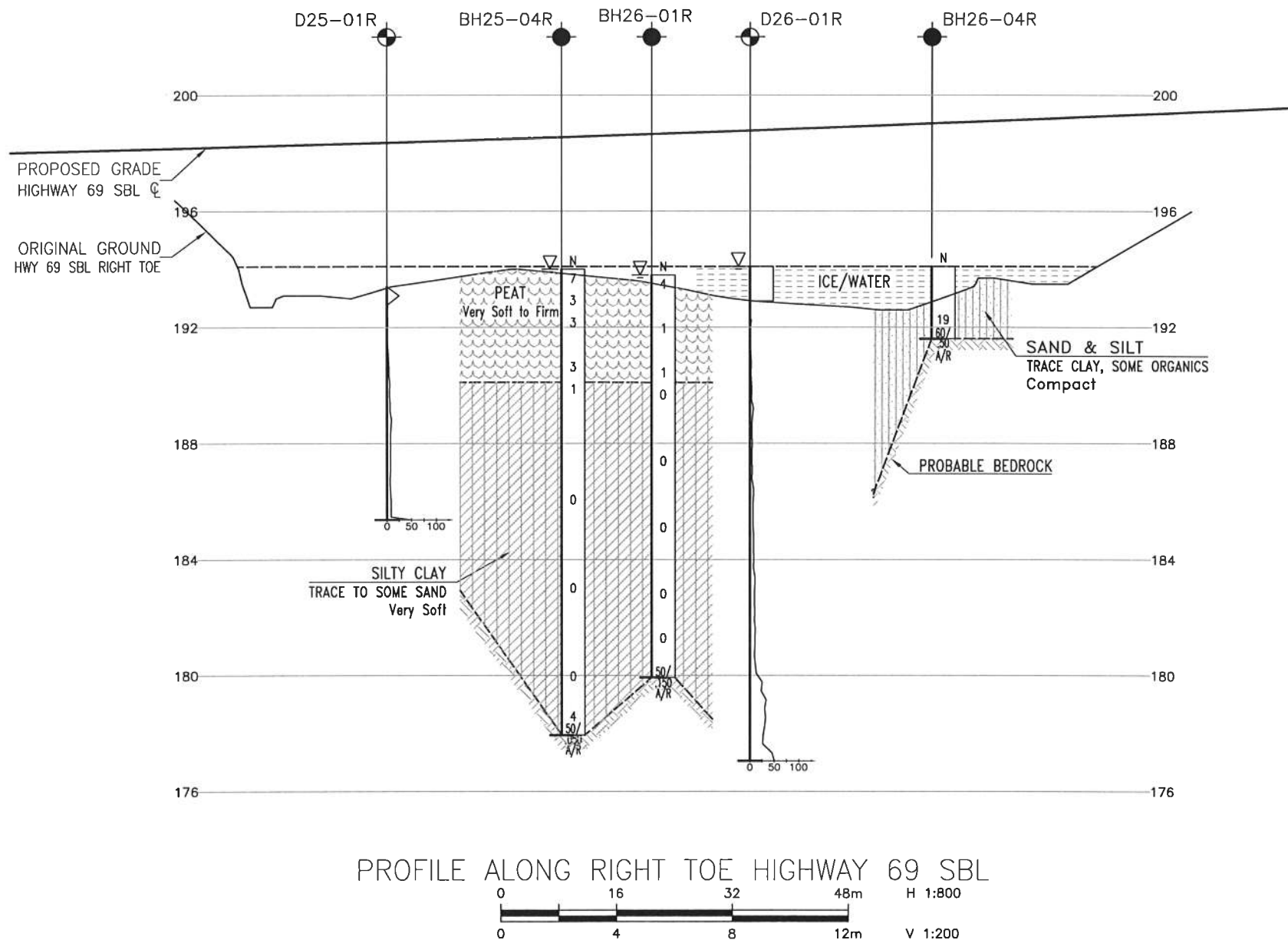
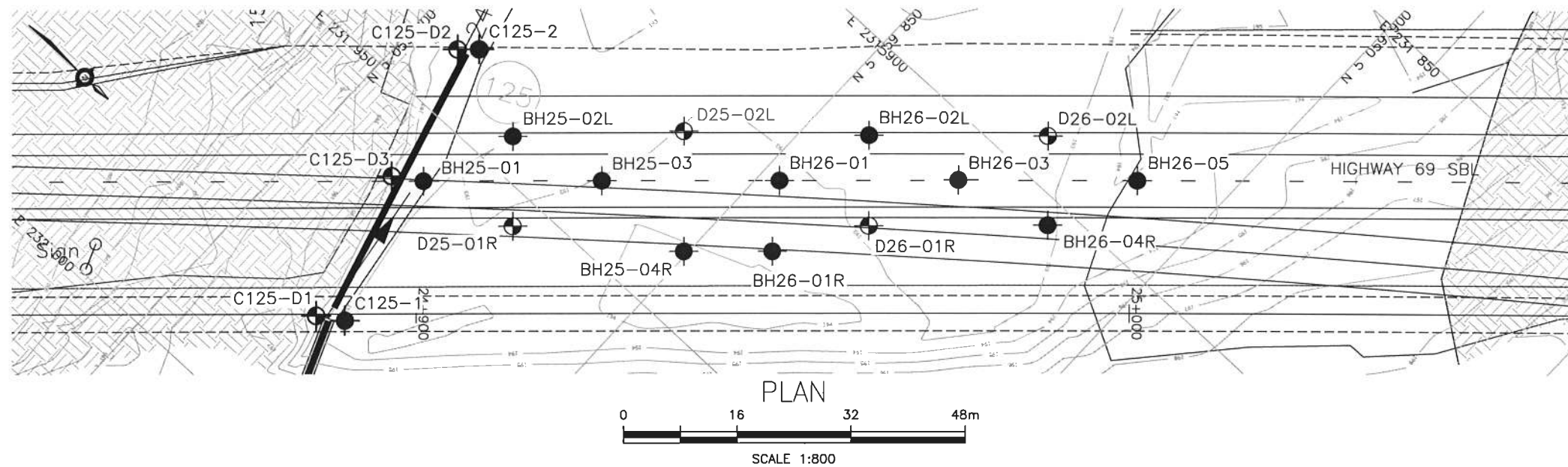
NO	ELEVATION	NORTHING	EASTING
BH25-01	194.1	5 059 815.9	231 958.1
BH25-02L	194.1	5 059 820.8	231 945.0
BH25-03	194.1	5 059 834.2	231 941.1
BH25-04R	194.0	5 059 849.5	231 940.6
D25-01R	193.4	5 059 829.4	231 954.3
D25-02L	193.0	5 059 837.9	231 928.1
BH26-01	194.1	5 059 852.6	231 924.1
BH26-01R	193.8	5 059 858.6	231 932.1
BH26-02L	194.1	5 059 857.4	231 910.9
BH26-03	194.1	5 059 870.9	231 907.1
BH26-04R	194.1	5 059 884.4	231 903.3
BH26-05	193.9	5 059 889.3	231 890.2
D26-01R	194.1	5 059 866.1	231 920.3
D26-02L	192.6	5 059 875.8	231 894.0
C125-D3	194.0	5 059 812.1	231 960.6

NOTES-

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GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



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

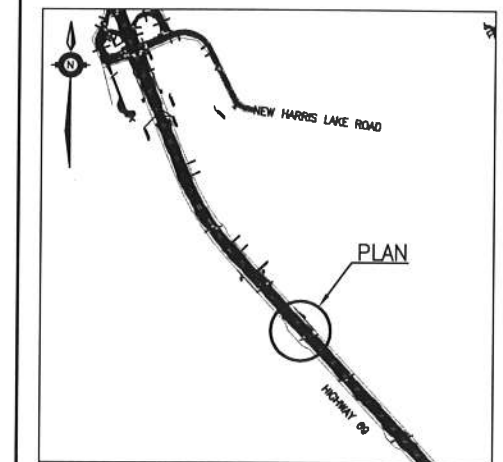


CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 SBL-RT TOE
(STA 24+900 - 25+000)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN LEGEND

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

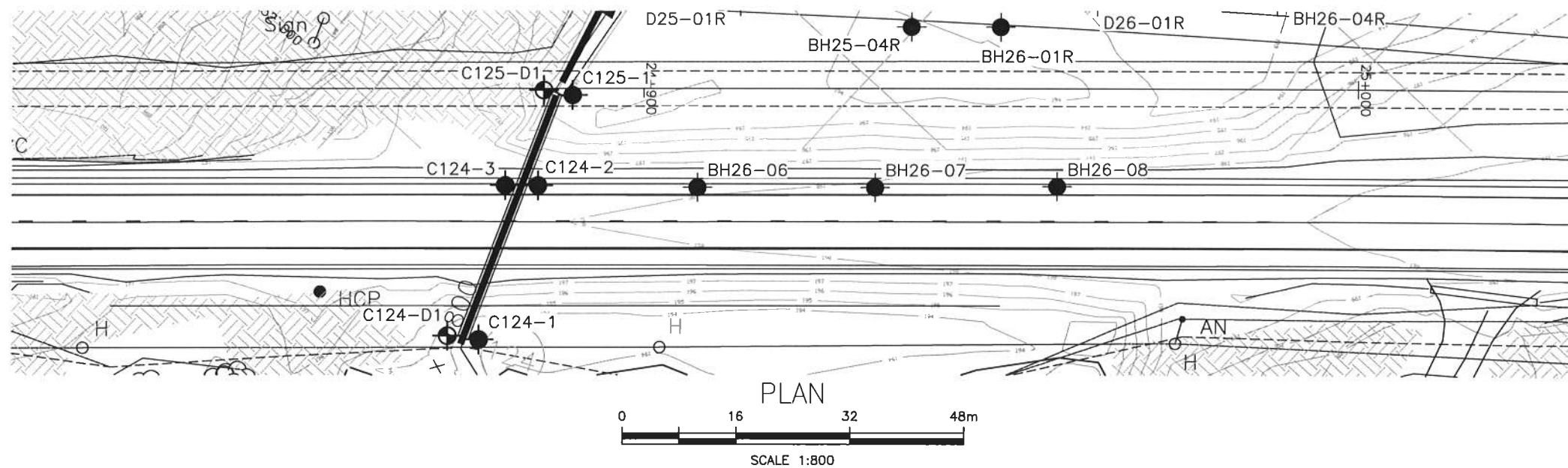
NO	ELEVATION	NORTHING	EASTING
BH25-01	194.1	5 059 815.9	231 958.1
BH25-02L	194.1	5 059 820.8	231 945.0
BH25-03	194.1	5 059 834.2	231 941.1
BH25-04R	194.0	5 059 849.5	231 940.6
D25-01R	193.4	5 059 829.4	231 954.3
D25-02L	193.0	5 059 837.9	231 928.1
BH26-01	194.1	5 059 852.6	231 924.1
BH26-01R	193.8	5 059 858.6	231 932.1
BH26-02L	194.1	5 059 857.4	231 910.9
BH26-03	194.1	5 059 870.9	231 907.1
BH26-04R	194.1	5 059 884.4	231 903.3
BH26-05	193.9	5 059 889.3	231 890.2
D26-01R	194.1	5 059 866.1	231 920.3
D26-02L	192.6	5 059 875.8	231 894.0
C125-1	193.5	5 059 821.1	231 980.0
C125-D1	194.2	5 059 817.7	231 982.2

NOTES

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GEOCRES No. 41H-99

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012

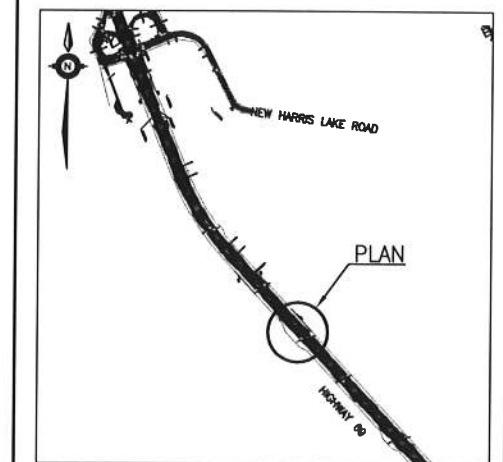


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
HARRISON HWY 69 NBL-LT SHLDR
(STA 24+900 - 25+000)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN LEGEND

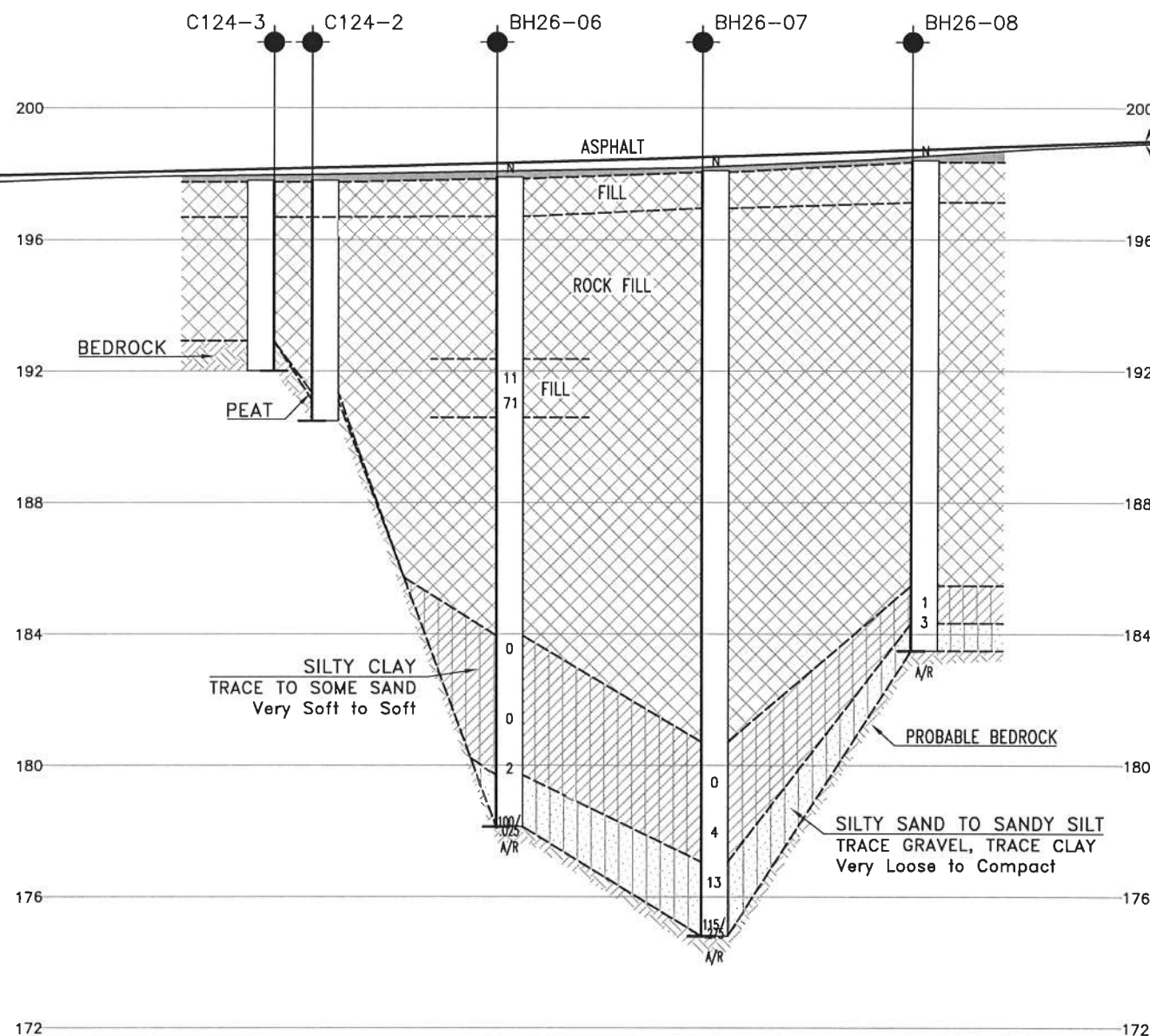
●	Borehole
○	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
W	Water Level
HA	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
C124-1	193.2	5 059 835.0	232 014.2	BH25-01	194.1	5 059 815.9	231 958.1
C124-2	197.8	5 059 826.3	231 992.7	BH25-02L	194.1	5 059 820.8	231 945.0
C124-3	197.8	5 059 822.9	231 995.8	BH25-03	194.1	5 059 834.2	231 941.1
C124-D1	193.5	5 059 831.4	232 016.8	BH25-04R	194.0	5 059 849.5	231 940.6
C125-1	193.5	5 059 821.1	231 980.0	D25-01R	193.4	5 059 829.4	231 954.3
C125-2	193.3	5 059 808.9	231 939.1	D25-02L	193.0	5 059 837.9	231 928.1
C125-D1	194.2	5 059 817.7	231 982.2	BH26-01	194.1	5 059 852.6	231 924.1
C125-D2	192.8	5 059 806.7	231 941.1	BH26-02L	194.1	5 059 857.4	231 910.9
C125-D3	194.0	5 059 812.1	231 960.6	BH26-03	194.1	5 059 870.9	231 907.1
				BH26-04R	194.1	5 059 884.4	231 903.3
				BH26-05	193.9	5 059 889.3	231 890.2
				BH26-06	197.9	5 059 842.9	231 977.6
				BH26-07	198.1	5 059 861.2	231 960.7
				BH26-08	198.4	5 059 879.8	231 943.3
				D26-01R	194.1	5 059 866.1	231 920.3
				D26-02L	192.6	5 059 875.8	231 894.0

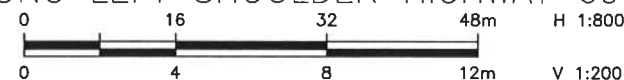
NOTES:

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GEOCRES No. 41H-99



PROFILE ALONG LEFT SHOULDER HIGHWAY 69 NBL



REVISIONS	DATE	BY	DESCRIPTION
DESIGN	RPR	CHK AEG	CODE
DRAWN	MFA	CHK PKC	SITE
			STRUCT
			DWG
			DATE DEC. 2012

Appendix J

**Highway 69 SBL
Sta. 25+300 to 25+355 Township of Harrison**

**Boreholes 27-01 to 27-06
DCPTs D27-01R, D27-02L**

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

RECORD OF BOREHOLE No BH27-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 25+306 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.02 - 2009.02.02 CHECKED BY RPR

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		20 40 60 80 100	20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L		
198.0	Ground Surface												
0.0	Silty SAND , some organics Very Loose Grey Wet		1	SS	2	▽							
197.2			2	SS	507								
0.8	END OF BOREHOLE AT 0.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK WATER AT 0.3m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.				075								

RECORD OF BOREHOLE No BH27-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 25+313.5 O/S 6.9L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.02 - 2009.02.02 CHECKED BY RPR

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 (%)					
197.8	Ground Surface							20 40 60 80 100		20 40 60					
0.0	Silty SAND , some organics Very Loose Grey Moist		1	SS	2		197							0 6 51 43	
197.2															
0.6	Silty CLAY , trace sand, occasional organics Firm to Very Stiff Brown		2	SS	8										
			3	SS	25		196								
195.5															
2.3	END OF BOREHOLE AT 2.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER AT 0.6m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.														

+ 3 X 3 : Numbers refer to
Sensitivity




20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH27-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 25+326 C/L, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009.02.02 - 2009.02.02 CHECKED BY RPR

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 (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)				
197.1	Ground Surface							20 40 60 80 100		w _p	w	w _L		
0.0	PEAT, fibrous, some sand Very Soft Brown Wet		1	SS	2		197							
196.4														
0.7	Silty CLAY, sandy Soft to Firm Grey		2	SS	10		196							0 25 47 28
	Trace sand		3	SS	2									0 3 52 45
194.5			4	SS	50/		195							
2.6	END OF BOREHOLE AT 2.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER AT SURFACE UPON COMPLETION OF DRILLING BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.				.000									

+³, ×³: Numbers refer to
Sensitivity






20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH27-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 25+341.5 O/S 7.0R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
 DATUM Geodetic DATE 2009.02.02 - 2009.02.02 CHECKED BY RPR

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								
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE								
197.1	Ground Surface						20	40	60	80	100	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT		
0.0	PEAT, fibrous, some sand, trace clay Very Soft Brown Wet		1	SS	0										245	
196.3																
0.8	Silty CLAY, some sand, some organics Very Soft to Stiff Grey Layer of sand		2	SS	0											
195.1																
2.0	SAND and SILT, some clay Loose to Compact Grey Wet		3	SS	13										108	
			4	SS	2											
			5	SS	7											
192.1	Auger grinding															
5.0	Gravelly SAND Very Dense Grey Wet		6	SS	80/ 225											
191.0																
6.1	END OF BOREHOLE AT 6.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS UPON COMPLETION.															

+³, X³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH27-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 25+351 C/L, SBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY LG
DATUM Geodetic DATE 2009.02.02 - 2009.02.02 CHECKED BY RPR

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	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100		
197.1	Ground Surface													
0.0	PEAT, fibrous						197							
196.7	Brown													
0.4	Wet													
	Silty CLAY, sandy, occasional organics		1	SS	2									
	Very Soft													
	Grey													
195.9														
1.2	SAND, some gravel		2	SS	11		196							
	Compact													
	Grey													
	Wet													
195.2														
1.9	END OF BOREHOLE AT 1.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Apr 21/09 Ground Surface Jun 04/09 Ground Surface Aug 17/09 Ground Surface Aug 25/09 Ground Surface Oct 27/09 Ground Surface Nov 20/09 Ground Surface													

+³, x³: Numbers refer to
Sensitivity


20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH27-06

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 25+356 C/L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY LG
 DATUM Geodetic DATE 2009.02.02 - 2009.02.02 CHECKED BY RPR

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						
199.6	Ground Surface													
0.0	ORGANICS: (200mm)													
0.2	BEDROCK AT 0.2m													

+ ³ × ³ : Numbers refer to
Sensitivity

20
15
10
5
0
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D27-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harrison Twp., Station 25+313.5 O/S 6.9R, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY LG
 DATUM Geodetic DATE 2009.02.02 - 2009.02.02 CHECKED BY RPR

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL LIMIT MOISTURE LIQUID CONTENT LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa		WATER CONTENT (%)			
197.7	Ground Surface						20 40 60 80 100	○ UNCONFINED + FIELD VANE	W _p W W _L				
0.0	DCPT from surface						20 40 60 80 100	● QUICK TRIAXIAL × LAB VANE				kN/m ³	GR SA SI CL
197.1													
0.6	END OF DCPT AT 0.6m UPON REFUSAL ON PROBABLE BEDROCK												

ONTMT4S 6121.GPJ 12/12/12

RECORD OF BOREHOLE No D27-02L

1 OF 1

METRIC

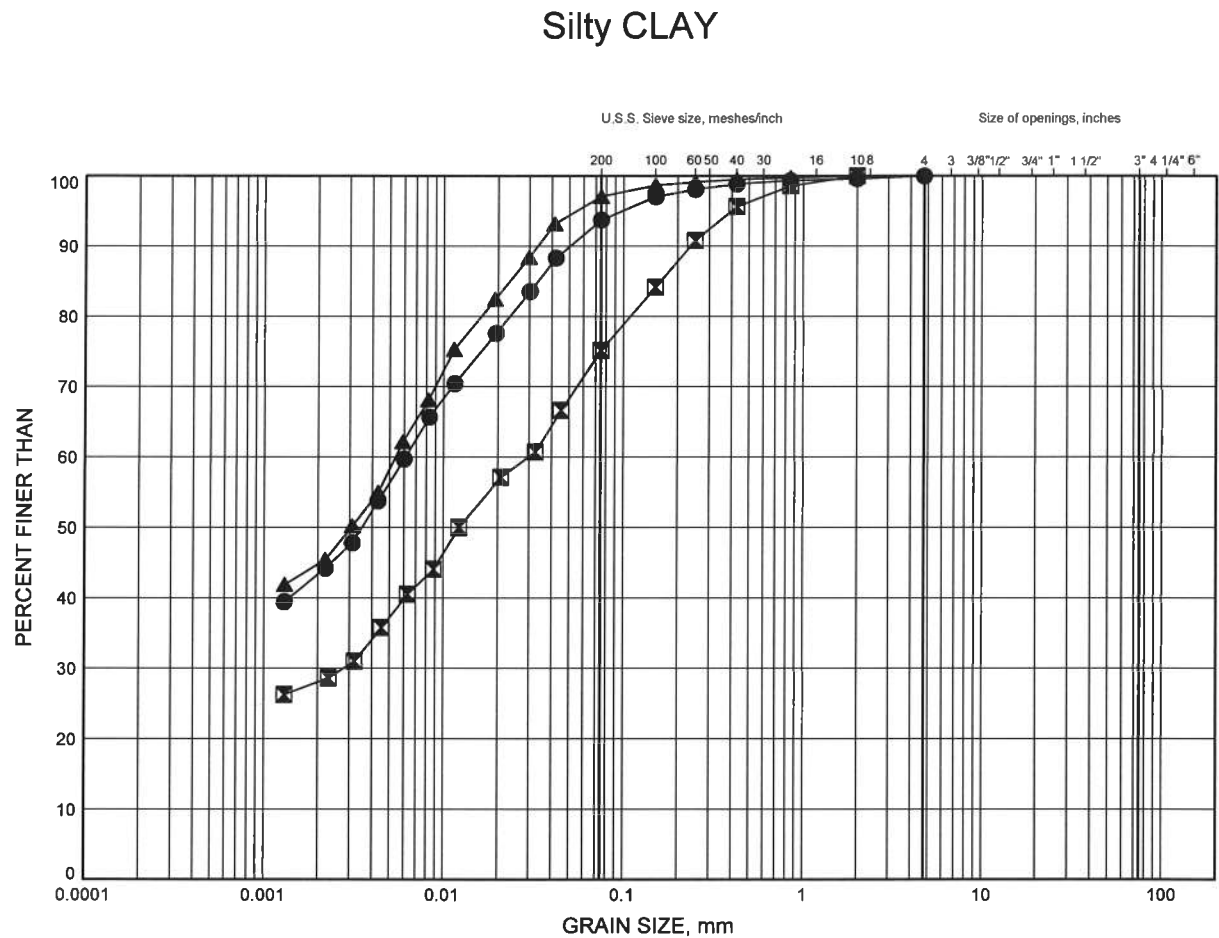
GWP# 5294-08-00 LOCATION Harrison Twp., Station 25+341.5 O/S 7.0L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY LG
 DATUM Geodetic DATE 2009.02.02 - 2009.02.02 CHECKED BY RPR

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				
197.2	Ground Surface							<div>20406080100</div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div>				
0.0	DCPT started at 1.2m							<div>20406080100</div> <div>PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT</div> <div>W_p W W_L</div> <div>WATER CONTENT (%)</div>				
							197					
							196					
							195					
							194					
193.2												
4.0	END OF DCPT AT 4.0m UPON REFUSAL ON PROBABLE BEDROCK.											

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

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE J1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH27-02L	1.07	196.73
■	BH27-03	1.07	196.03
▲	BH27-03	1.83	195.27

Date December 2012
GWP# 5294-08-00

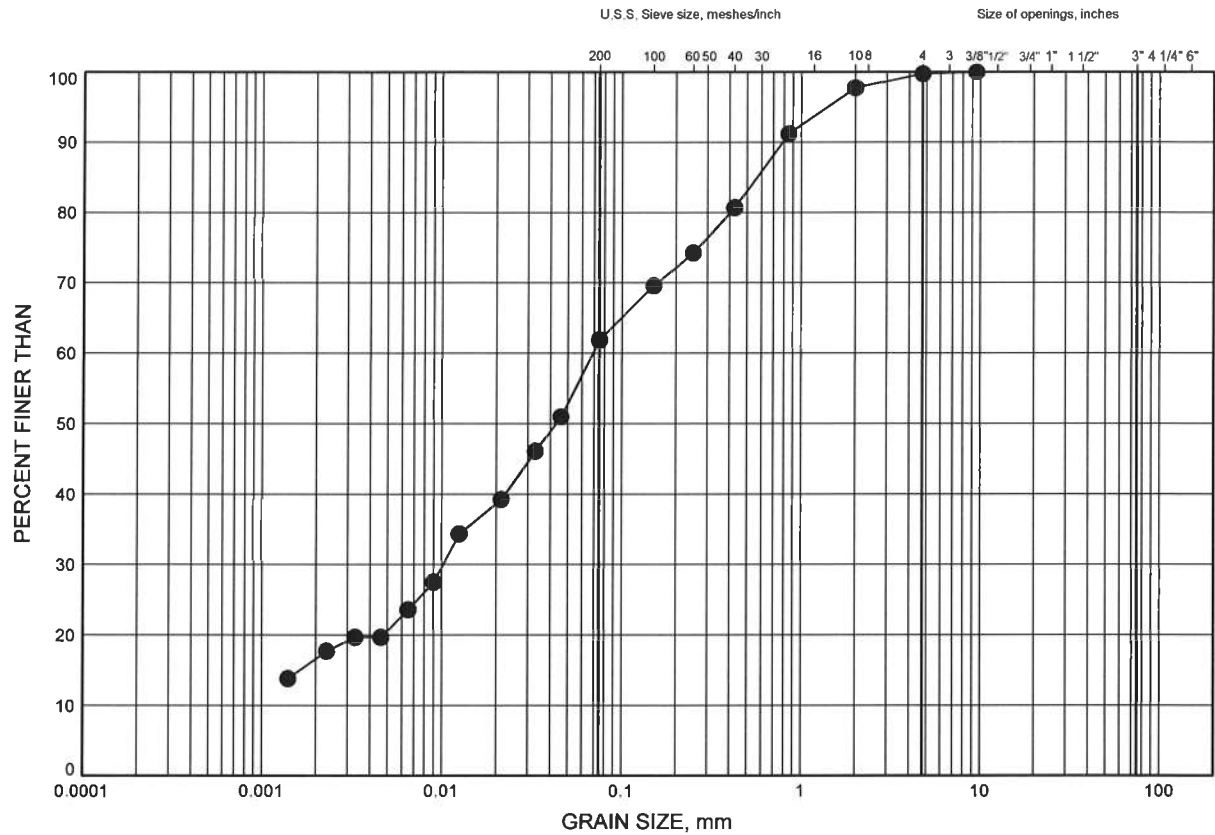


Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529 GRAIN SIZE DISTRIBUTION

FIGURE J2

SAND and SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH27-04R	4.27	192.83

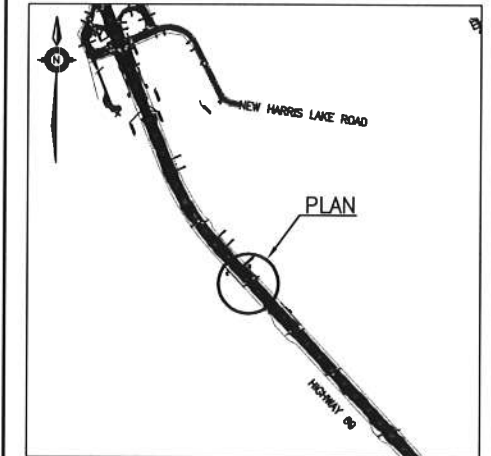
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA








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
BH27-01	198.0	5 060 113.2	231 683.0
BH27-02L	197.8	5 060 114.0	231 672.9
BH27-03	197.1	5 060 127.8	231 669.4
BH27-04R	197.1	5 060 144.0	231 664.0
BH27-05	197.1	5 060 146.2	231 652.5
BH27-06	199.6	5 060 149.9	231 649.1
D27-01R	197.7	5 060 123.4	231 683.0
D27-02L	197.2	5 060 134.5	231 653.8

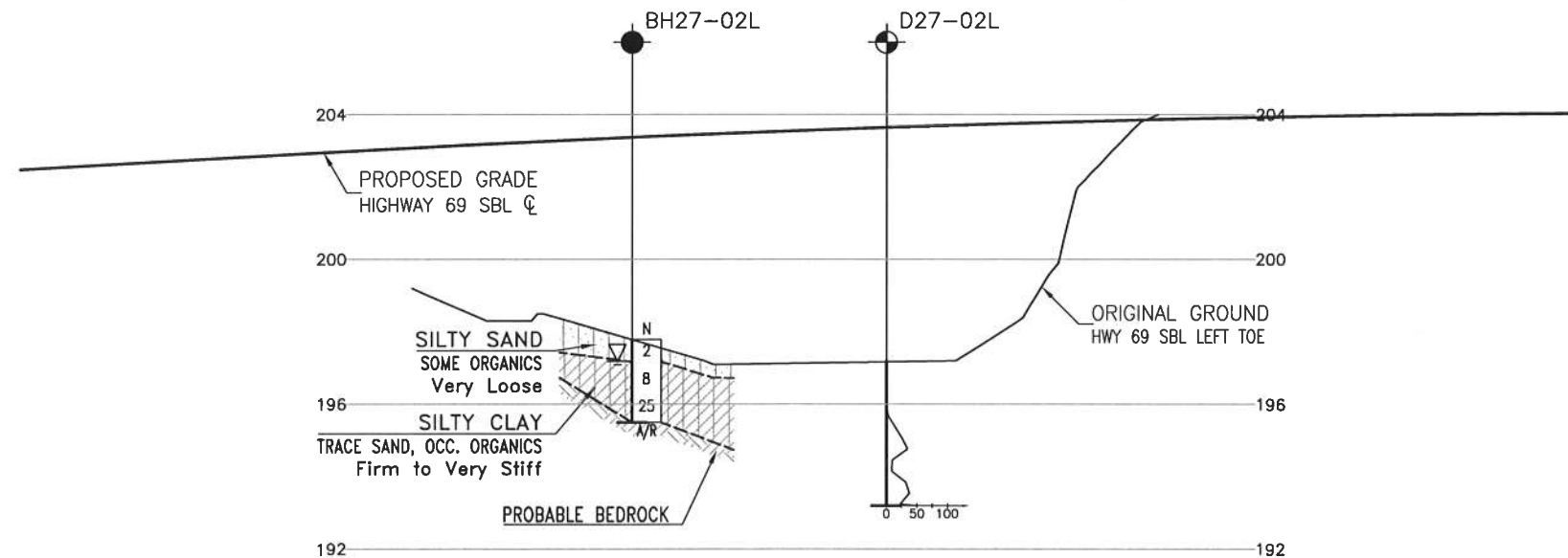
-NOTES-

- 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.

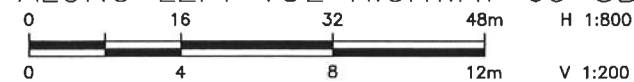
GEOCRES No. 41H-99

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PROFILE ALONG LEFT TOE HIGHWAY 69 SBL





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
BH27-01	198.0	5 060 113.2	231 683.0
BH27-02L	197.8	5 060 114.0	231 672.9
BH27-03	197.1	5 060 127.8	231 669.4
BH27-04R	197.1	5 060 144.0	231 664.0
BH27-05	197.1	5 060 146.2	231 652.5
BH27-06	199.6	5 060 149.9	231 649.1
D27-01R	197.7	5 060 123.4	231 683.0
D27-02L	197.2	5 060 134.5	231 653.8

GEOCRES No. 41H-99

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