

**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 4 of 4**

Geocres Number: 41H-99

Report to

MMM Group Limited

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December 13, 2012
File: 19-5161-21

Appendix S

**Harris Lake Road
N-EW Ramp, Sta. 12+030 to 12+120**

**Boreholes 40-01 to 40-09
DCPTs D40-01R to D40-04L**

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

RECORD OF BOREHOLE No BH40-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., N-E/W Ramp, Station 12+035 C/L ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.10.03 - 2008.10.03 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						
194.8	Ground Surface													
0.0 0.1	ORGANICS: (75mm)													
	SAND and SILT, trace clay, occasional peaty organics Very Loose to Loose Grey Moist		1	SS	2									
			2	SS	9									
	Wet													
			3	SS	2									0 57 34 9
192.6 2.2	Layer of sand and gravel													
	END OF BOREHOLE (SAMPLER BOUNCING) AT 2.2m ON PROBABLE BEDROCK. WATER LEVEL AT 0.9m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE. DCPT CONDUCTED AT 0.9m SOUTH OF THE BOREHOLE. END OF DCPT AT 2.2m UPON REFUSAL ON PROBABLE BEDROCK.													

RECORD OF BOREHOLE No BH40-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., N-E/W Ramp, Station 12+037.5 O/S 6.4L ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.10.03 - 2008.10.03 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									
194.9	Ground Surface																
0.0	ORGANICS: (100mm)		1	SS	1												
0.1	SAND and SILT , some clay, occasional peaty organics Very Loose to Loose Grey Moist		2	SS	6	194											0 29 59 12
193.5																	
1.4	END OF BOREHOLE AT 1.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No BH40-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., N-E/W Ramp, Station 12+050 C/L ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.10.03 - 2008.10.03 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						
195.0	Ground Surface													
0.0	SAND , occasional peaty organics Very Loose Brown Moist		1	SS	3									
194.2														
0.8	END OF BOREHOLE AT 0.77m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION. DCPT CONDUCTED 1.2m EAST OF BOREHOLE. END OF DCPT AT 0.8m UPON REFUSAL ON PROBABLE BEDROCK.													

RECORD OF BOREHOLE No BH40-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., N-E/W Ramp, Station 12+062.5 O/S 8.5R ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.03 - 2008.10.03 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							
195.3	Ground Surface							20 40 60 80 100							
0.0	PEAT, fibrous Very Loose Brown (700mm)		1	SS	1		195								
194.6															
0.7	Silty CLAY, some sand, occasional peaty organics Soft Grey		2	SS	3		194								0 11 55 34
193.5			3	SS	58/										
1.8	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.8m ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.				150										

+³, X³: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH40-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., N-E/W Ramp, Station 12+075 C/L ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008.10.03 - 2008.10.03 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								
196.0	Ground Surface															
0.0																
0.1	ORGANICS: (75mm)															
	BEDROCK AT 0.075m.															

+³, ×³: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH40-06L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., N-E/W Ramp, Station 12+087.5 O/S 6.1L ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.03 - 2008.10.03 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									
195.5	Ground Surface							20	40	60	80	100					
0.0	ORGANICS: (75mm)																
0.1	SAND, some silt, trace clay		1	SS	6												0 84 12 4
	Loose																
194.9	Brown						195										
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.																	

RECORD OF BOREHOLE No BH40-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., N-E/W Ramp, Station 12+100 C/L ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.03 - 2008.10.03 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				
194.9	Ground Surface							20 40 60 80 100		20 40 60				
0.0	SAND and SILT , occasional peaty organics Very Loose Grey Wet		1	SS	2						○			
194.2														
0.7	Silty CLAY , trace sand, occasional peaty organics Very Soft Grey		2	SS	2		194				○			
			3	SS	2		193				○		0 11 45 44	
								5						
191.9							192							
3.0	SAND and SILT , trace to some gravel, trace to some clay Loose to Compact Grey Wet		4	SS	5						○		11 46 33 10	
							191							
			5	SS	21		190				○		1 58 37 4	
189.4														
5.5	END OF BOREHOLE AT 5.5m UPON AUGER REFUSAL (SAMPLER BOUNCING) ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE 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 0.4 194.5 Jan 16/09 Frozen at Surface Feb 19/09 Frozen at Surface Apr 21/09 0.4* 195.3 Jun 04/09 0.3* 195.2 Aug 20/09 0.3 194.6 Aug 25/09 0.3 194.6 Oct 27/09 0.4 194.5 Nov 20/09 0.5 194.4 * (Artesian Condition)													

1 OF 1

METRIC

[illegible]

RECORD OF BOREHOLE No D40-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., N-E/W Ramp, Station 12+037.5 O/S 8.6R ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.03 - 2008.10.03 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								
194.9	Ground Surface												
0.0	DCPT from surface,												
193.4	END OF DCPT AT 1.5m UPON REFUSAL ON PROBABLE BEDROCK												
1.5													

RECORD OF BOREHOLE No D40-02L



1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., N-E/W Ramp, Station 12+062.5 O/S 6.2L ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.03 - 2008.10.03 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			20 40 60 80 100	20 40 60 80 100					
195.7	Ground Surface													
0.0	ORGANICS: (100mm)		1	SS	51/									
0.1	Brown				0.1									
	BEDROCK AT 0.1m.													

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 (%)				
197.0	Ground Surface						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	20 40 60 80 100 20 40 60		kN/m ³	GR SA SI C		

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D40-04L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., N-E/W Ramp, Station 12+112.5 O/S 7.4L ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.03 - 2008.10.03 CHECKED BY RPR

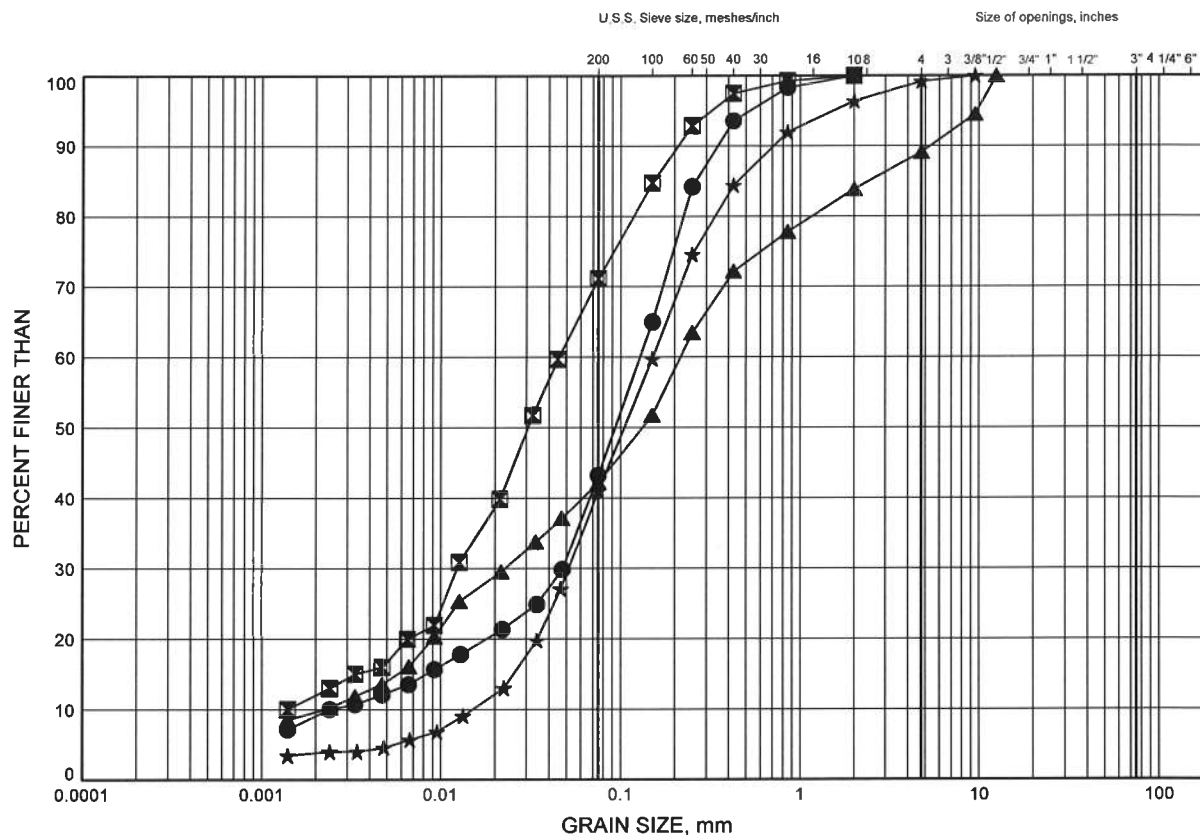
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ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE							
195.9	Ground Surface														
0.0	DCPT from surface.														
194.4															
1.5	END OF DCPT AT 1.5m UPON REFUSAL ON PROBABLE BEDROCK.														

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

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

FIGURE S1

SAND and SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH40-01	1.83	192.97
■	BH40-02L	1.07	193.83
▲	BH40-07	3.35	191.55
★	BH40-07	4.88	190.02

Date December 2012
GWP# 5294-08-00

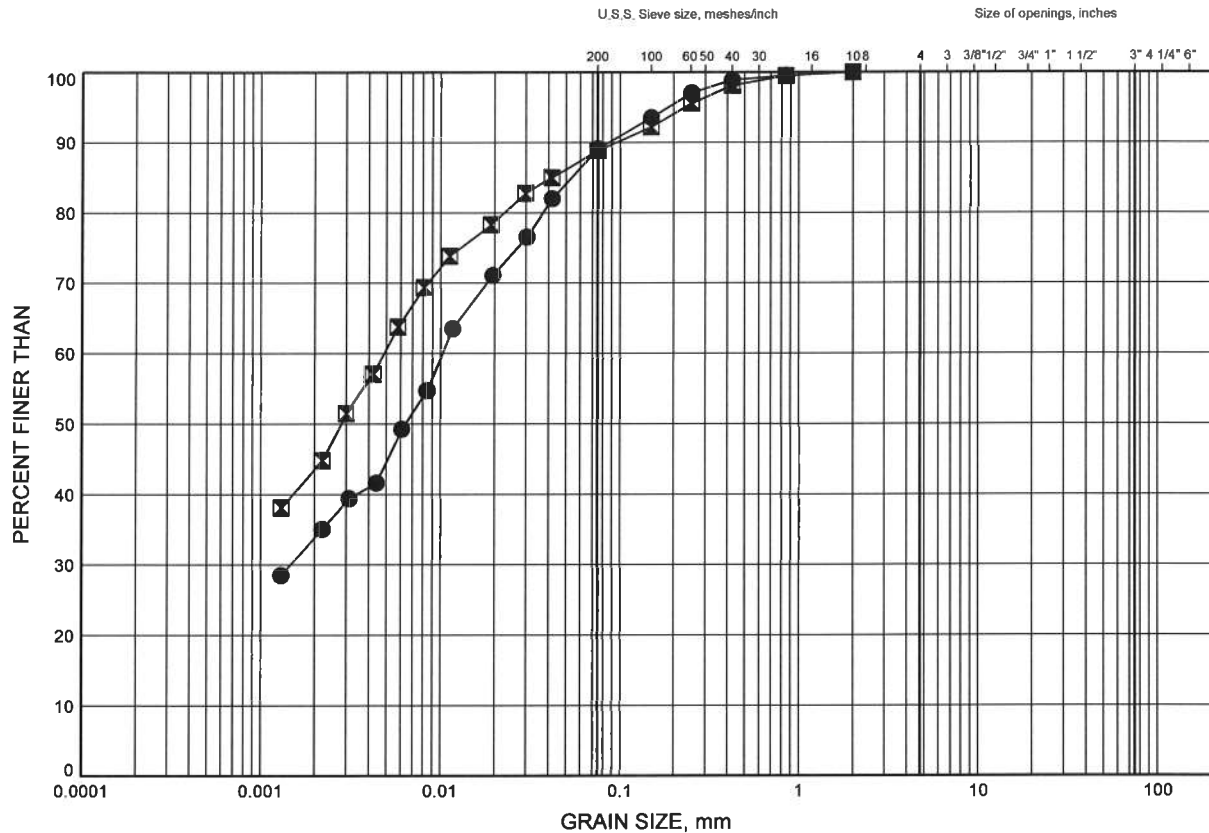


Prep'd MFA
Chkd. MRA

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

FIGURE S2

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH40-04R	1.07	194.23
⊠	BH40-07	1.83	193.07

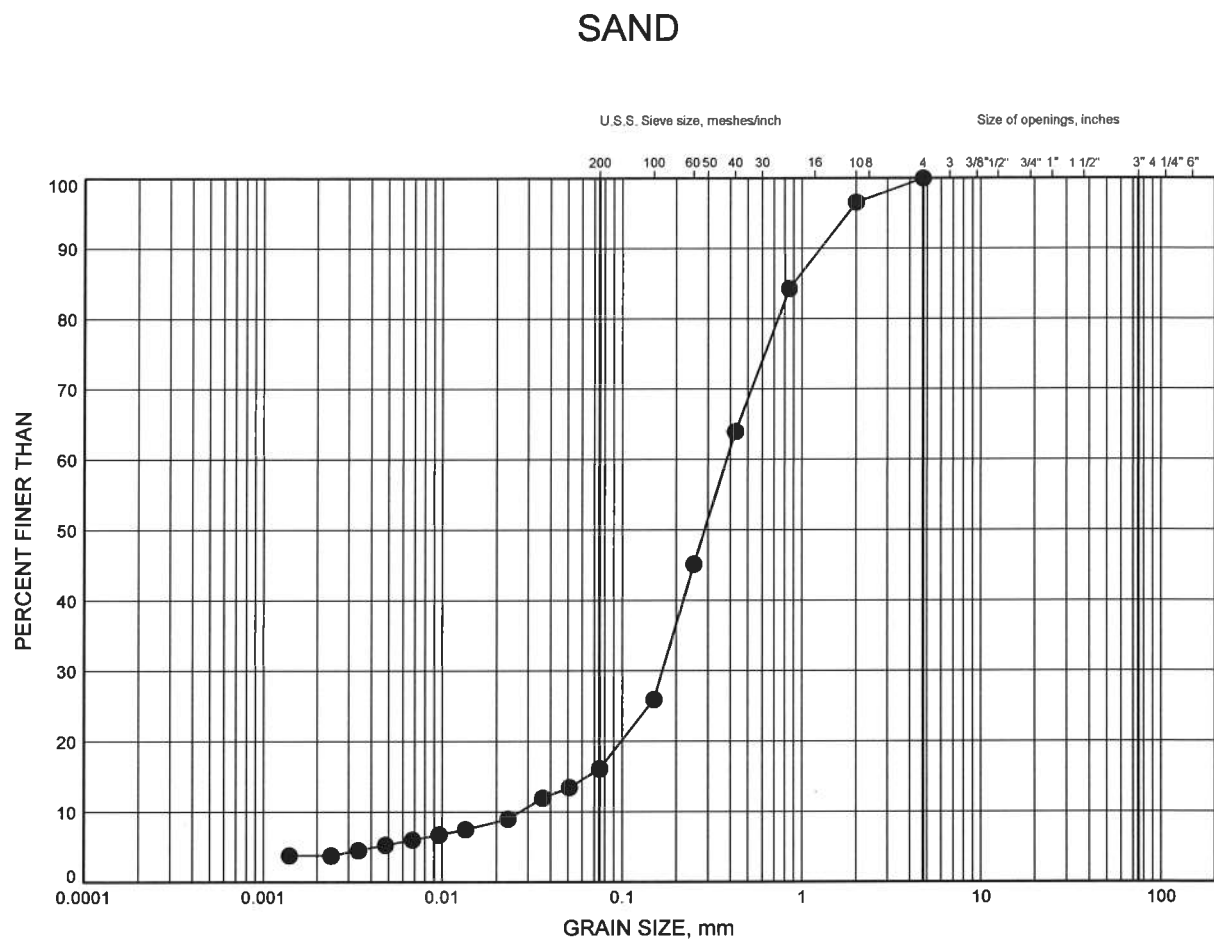
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA

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

FIGURE S3



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH40-06L	0.29	195.21

Date December 2012

GWP# 5294-08-00



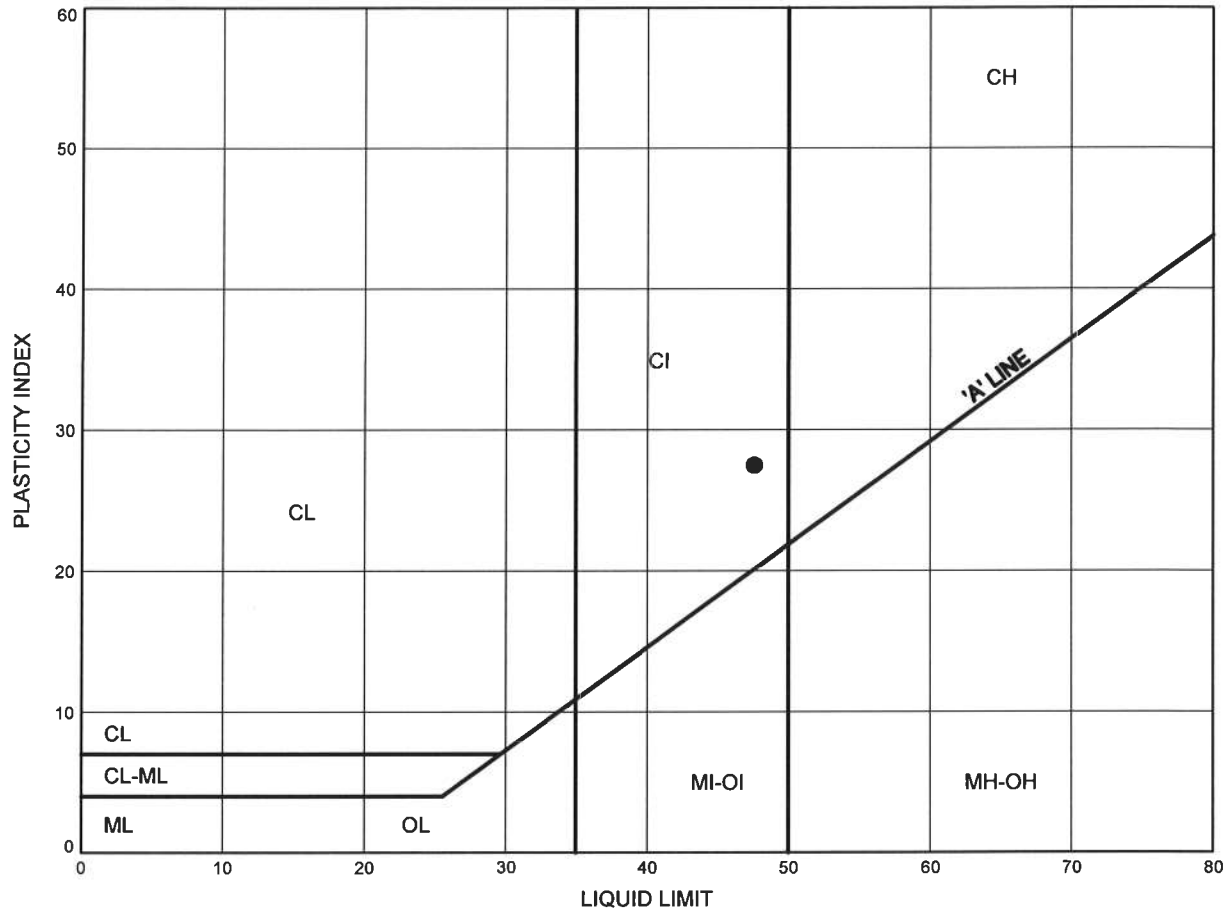
Prep'd MFA

Chkd. MRA

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

FIGURE S4

Silty CLAY



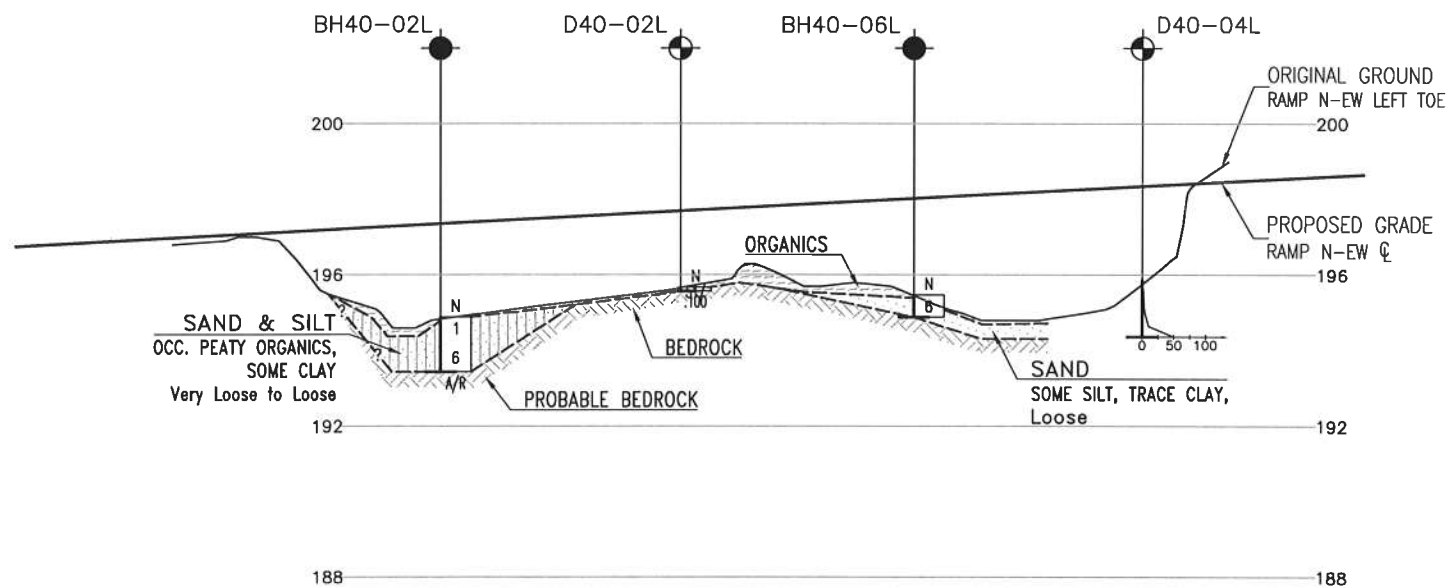
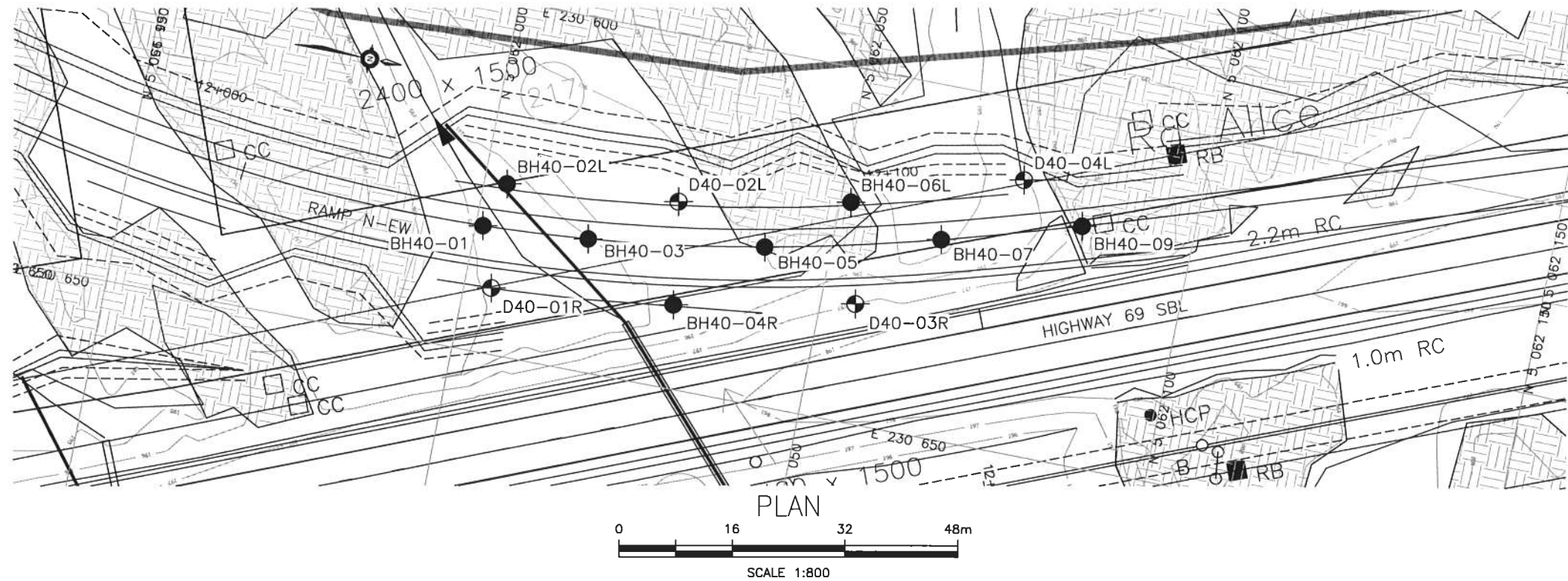
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH40-07	1.83	193.07

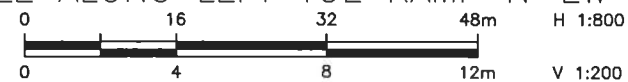
Date December 2012
 GWP# 5294-08-00



Prep'd MFA
 Chkd. MRA



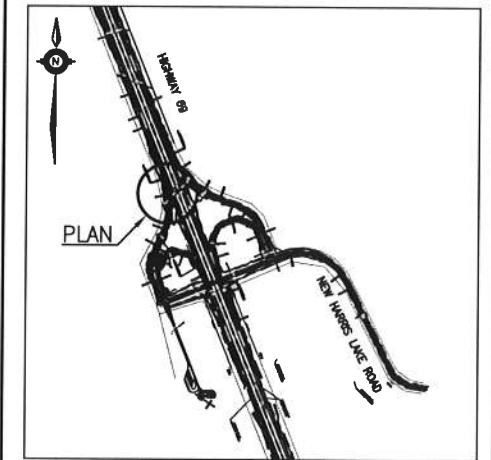
PROFILE ALONG LEFT TOE RAMP N-EW



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

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRIS LAKE RD RAMP N-EW-LT TOE
(STA 12+030 - 12+120)
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
W	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
BH40-01	194.8	5 062 001.0	230 632.2
BH40-02L	194.9	5 062 003.2	230 625.7
BH40-03	195.0	5 062 016.0	230 631.2
BH40-04R	195.3	5 062 029.6	230 638.1
BH40-05	196.0	5 062 040.7	230 627.6
BH40-06L	195.5	5 062 051.5	230 619.0
BH40-07	194.9	5 062 065.0	230 621.8
BH40-09	198.9	5 062 084.2	230 616.1
D40-01R	194.9	5 062 003.9	230 640.7
D40-02L	195.7	5 062 027.5	230 623.6
D40-03R	197.0	5 062 054.9	230 633.1
D40-04L	195.9	5 062 074.9	230 611.2

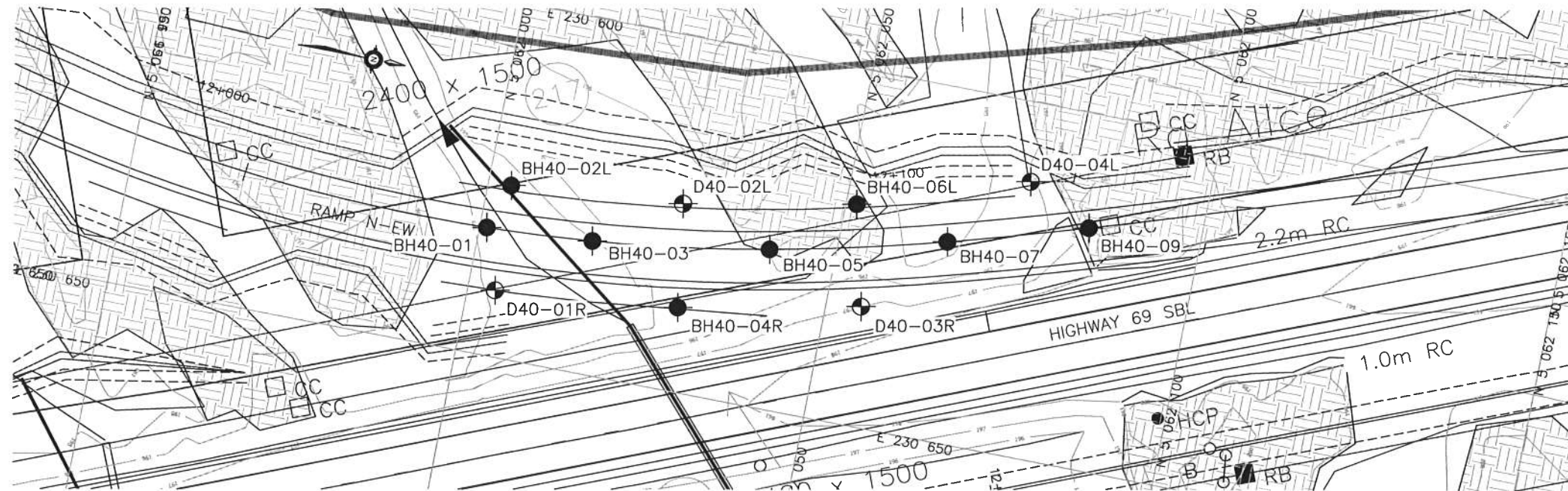
NOTES-

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

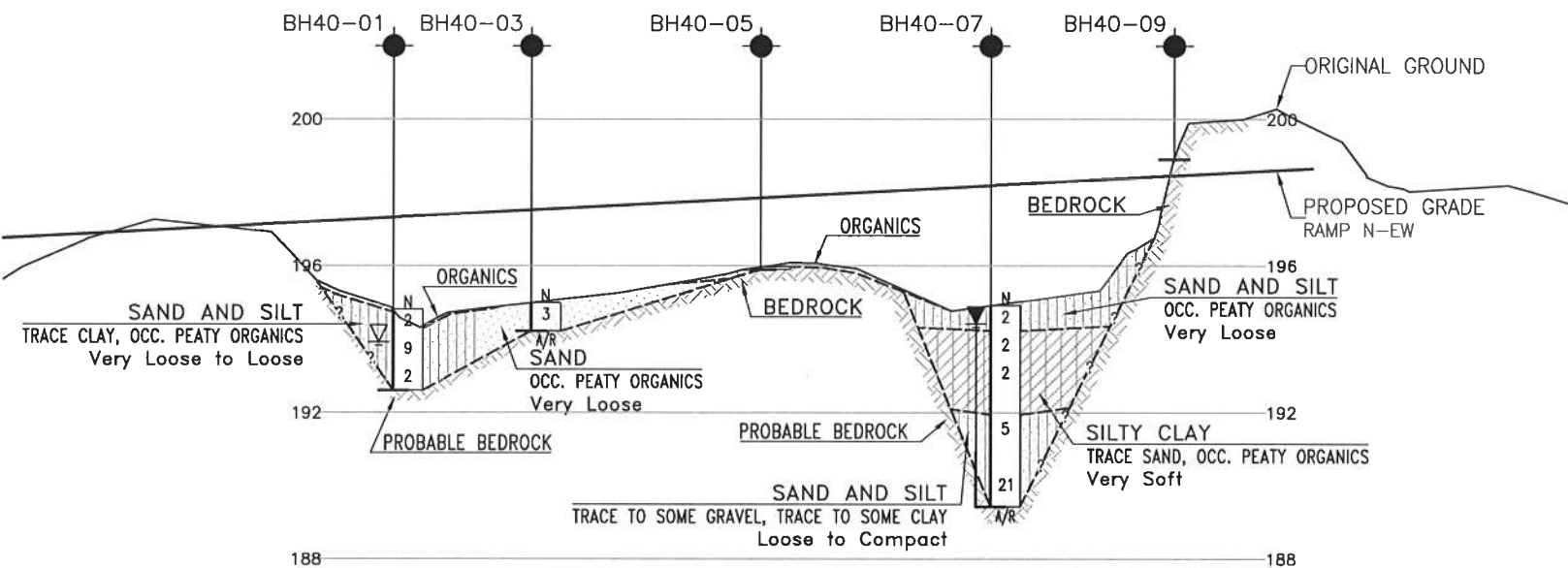
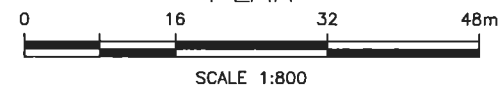
GEOCRES No. 41H-99

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

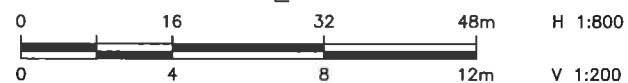




PLAN



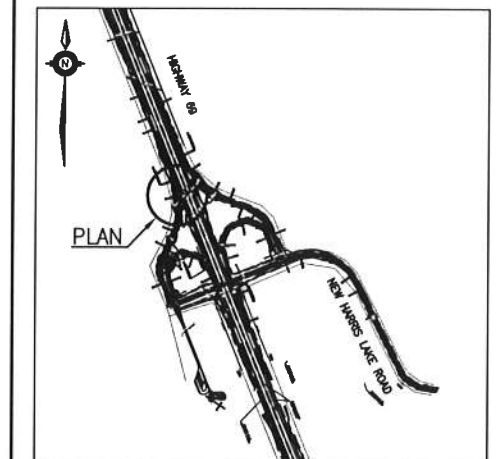
PROFILE ALONG CL RAMP N-EW



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

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRIS LAKE RD RAMP N-EW-
(STA 12+030 - 12+120)
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

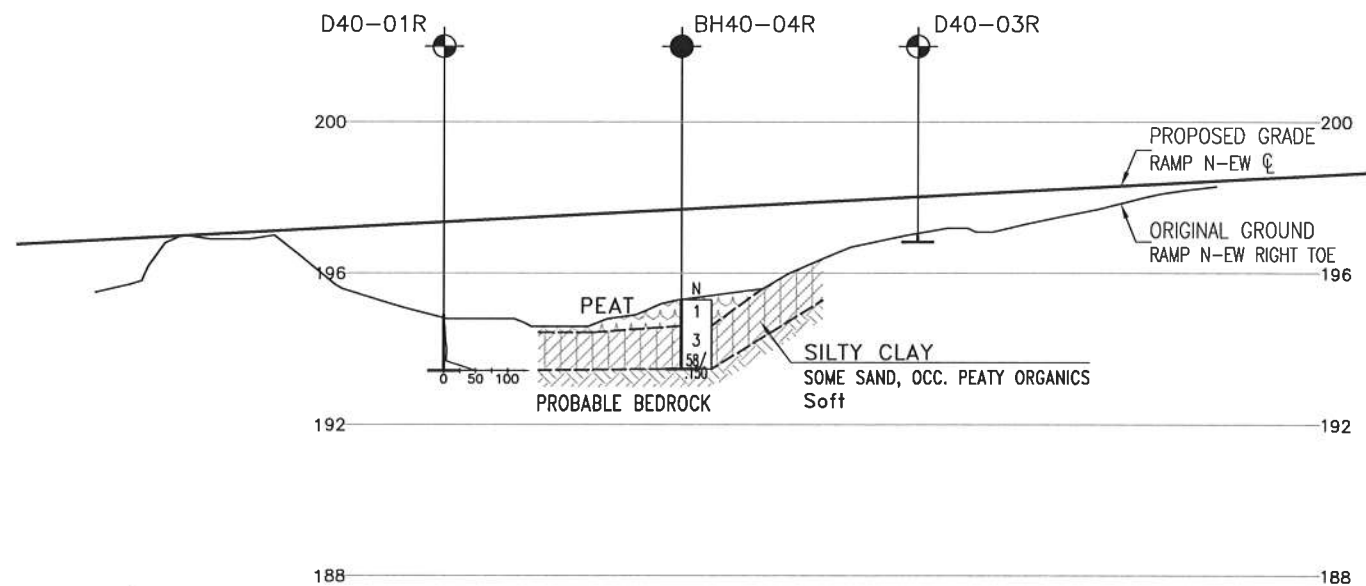
NO	ELEVATION	NORTHING	EASTING
BH40-01	194.8	5 062 001.0	230 632.2
BH40-02L	194.9	5 062 003.2	230 625.7
BH40-03	195.0	5 062 016.0	230 631.2
BH40-04R	195.3	5 062 029.6	230 638.1
BH40-05	196.0	5 062 040.7	230 627.6
BH40-06L	195.5	5 062 051.5	230 619.0
BH40-07	194.9	5 062 065.0	230 621.8
BH40-09	198.9	5 062 084.2	230 616.1
D40-01R	194.9	5 062 003.9	230 640.7
D40-02L	195.7	5 062 027.5	230 623.6
D40-03R	197.0	5 062 054.9	230 633.1
D40-04L	195.9	5 062 074.9	230 611.2

-NOTES-

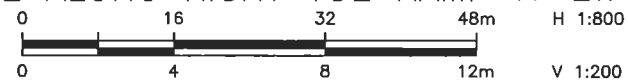
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 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 RAMP N-EW



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
BH40-01	194.8	5 062 001.0	230 632.2
BH40-02L	194.9	5 062 003.2	230 625.7
BH40-03	195.0	5 062 016.0	230 631.2
BH40-04R	195.3	5 062 029.6	230 638.1
BH40-05	196.0	5 062 040.7	230 627.6
BH40-06L	195.5	5 062 051.5	230 619.0
BH40-07	194.9	5 062 065.0	230 621.8
BH40-09	198.9	5 062 084.2	230 616.1
D40-01R	194.9	5 062 003.9	230 640.7
D40-02L	195.7	5 062 027.5	230 623.6
D40-03R	197.0	5 062 054.9	230 633.1
D40-04L	195.9	5 062 074.9	230 611.2

-NOTES-

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

GEOCRES No. 41H-99

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



Appendix T

**Harris Lake Road
Ramp EW-N, Sta. 12+070 to 12+120**

**Boreholes 41-01 to 41-05R
DCPTs D41-01R, D41-02L**

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

RECORD OF BOREHOLE No BH41-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., E/W-N Ramp, Station 12+070 C/L 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 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		
196.0	Ground Surface															
195.8	ORGANICS: (25mm) BEDROCK AT 0.025m.															

RECORD OF BOREHOLE No BH41-02

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., E/W-N Ramp, Station 12+075 C/L 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 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						
195.6	Ground Surface													
0.0	ORGANICS: (125mm)													
0.1	BEDROCK AT 0.125m.													

RECORD OF BOREHOLE No BH41-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., E/W-N Ramp, Station 12+087.5 O/S 5.4L 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE								WATER CONTENT (%) w _p w w _L	
195.3	Ground Surface							20	40	60	80	100	20	40	60		
0.8	ORGANICS: (25mm) Silty CLAY , sandy, occasional peaty organics Very Soft to Stiff Grey to Brown		1	SS	1		195							o			
			2	SS	9									o			0 26 37 37
193.8			3	SS	50/ .000		194										
1.5	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.5m ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No BH41-04

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., E/W-N Ramp, Station 12+100 C/L 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 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE			WATER CONTENT (%) w _P — w — w _L				
195.3	Ground Surface														
195.3	ORGANICS: (25mm)														
	Silty SAND, occasional peaty organics		1	SS	3		195								
	Very Loose to Compact														
	Grey		2	SS	13										
	Moist														
193.9							194								
1.4	Silty CLAY, trace sand														
	Firm		3	SS	5										0 17 48 35
	Grey														
							193								
			1	TW	PH										
							192								
191.6															
3.7	SAND, some silt, trace gravel														
	Compact		4	SS	20										
	Grey														
	Wet						191								
190.7															
4.6	END OF BOREHOLE (SAMPLER BOUNCING) AT 4.6m ON PROBABLE BEDROCK. WATER LEVEL AT 1.17m UPON COMPLETION OF DRILLING. DCPT CONDUCTED 1.5m EAST OF BOREHOLE. END OF DCPT AT 4.6m UPON 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) Oct 29/08 0.2 195.1 Jan 16/09 Frozen at Surface Feb 19/09 Frozen at Surface Apr 21/09 Ground Surface														

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

RECORD OF BOREHOLE No BH41-05R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., E/W-N Ramp, Station 12+110 O/S 8.5R 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					
195.6	Ground Surface						20 40 60 80 100						
0.0	Silty SAND , some peat Very Loose Brown Moist		1	SS	3	▽							
			2	SS	13								
194.2													
1.4	Silty CLAY , trace sand, occasional peaty organics Very Soft to Firm Grey		3	SS	7								0 9 35 56
			4	SS	2								
192.6													
3.0	SAND and GRAVEL , trace silt, trace clay Grey Wet Auger grinding at 3.2m												42 54 4 (SI+CL)
191.1			5	SS	50/ .000								
4.5	END OF BOREHOLE (SAMPLER BOUNCING) AT 4.5m ON PROBABLE BEDROCK. WATER LEVEL AT 1.2m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG AND CUTTINGS TO SURFACE.												

+ 3, X 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D41-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Harris Lake Rd., E/W-N Ramp, Station 12+087.5 O/S 7.6R 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 W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
195.2	Ground Surface													
0.0	DCPT from surface.													
191.4	END OF DCPT AT 3.8m UPON REFUSAL ON PROBABLE BEDROCK.													
3.8														

+³, ×³: Numbers refer to
Sensitivity

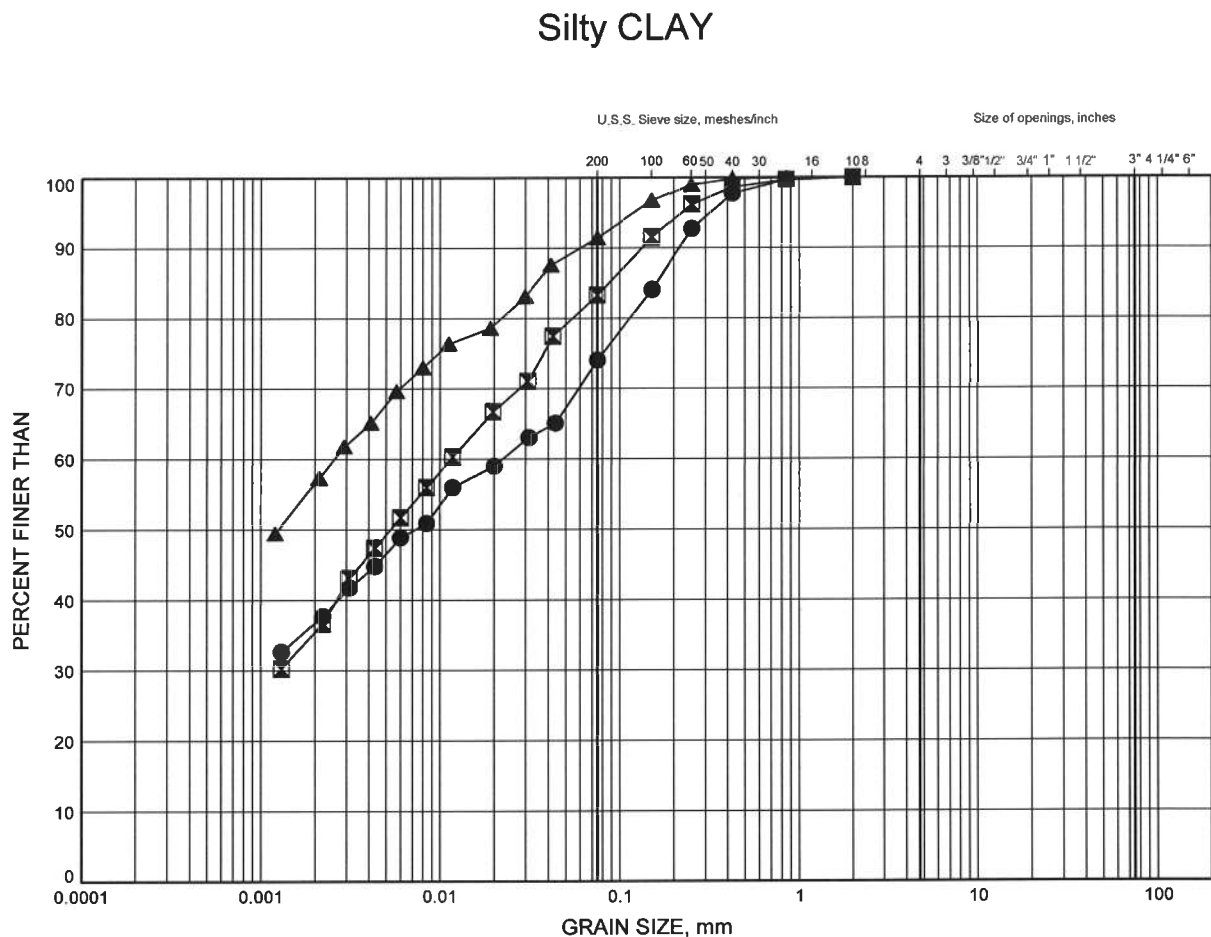
20
15 10 5
(%) STRAIN AT FAILURE

METRIC

[illegible]

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

FIGURE T1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH41-03L	1.07	194.23
■	BH41-04	1.83	193.47
▲	BH41-05R	1.83	193.77

Date December 2012

GWP# 5294-08-00



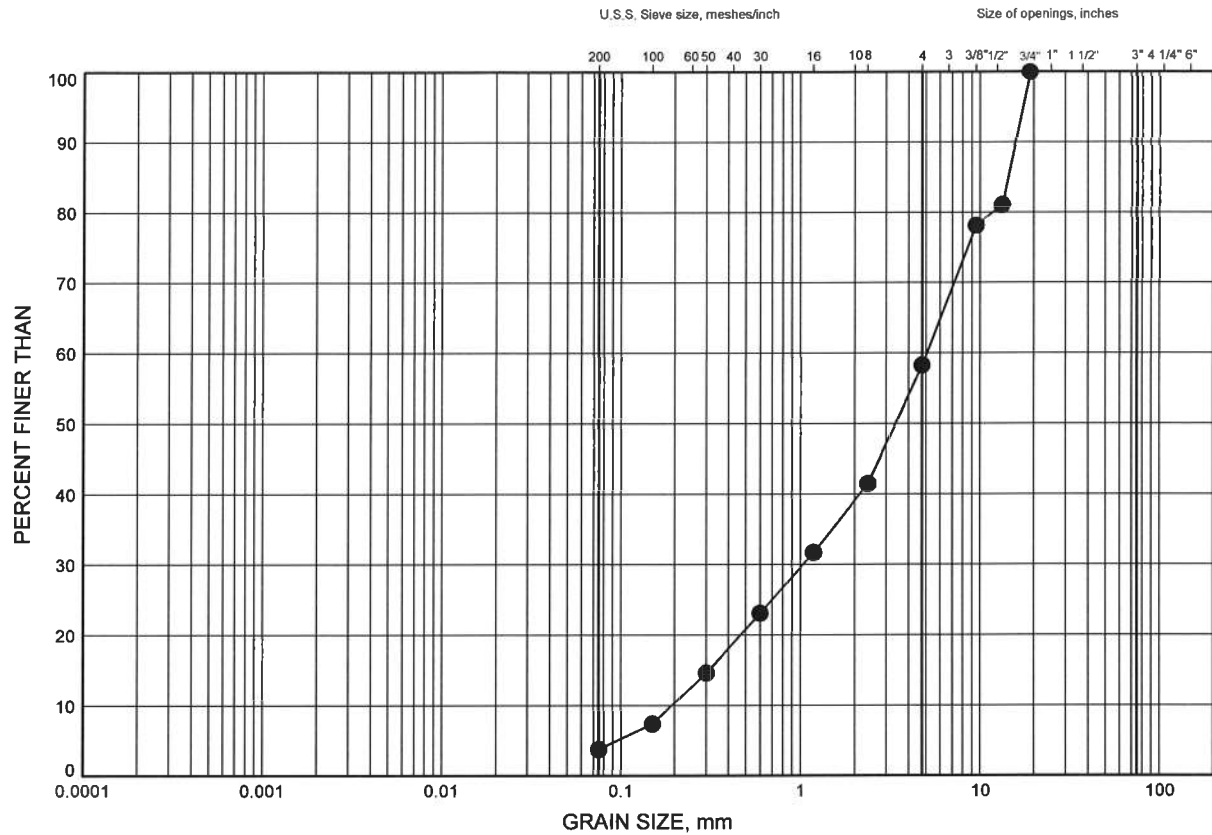
Prep'd MFA

Chkd. MRA

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

FIGURE T2

SAND and GRAVEL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH41-05R	3.35	192.25

Date December 2012
 GWP# 5294-08-00

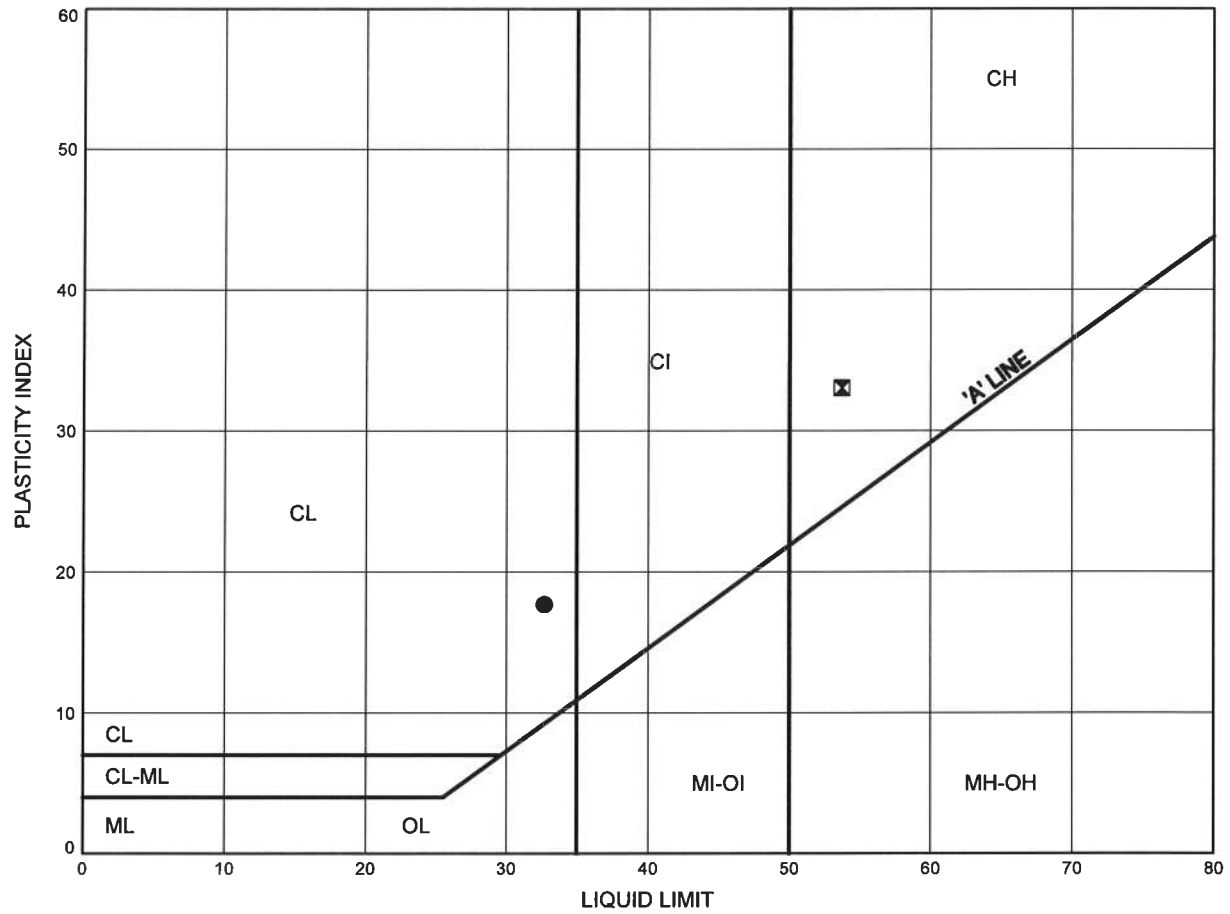


Prep'd MFA
 Chkd. MRA

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

FIGURE T3

Silty CLAY



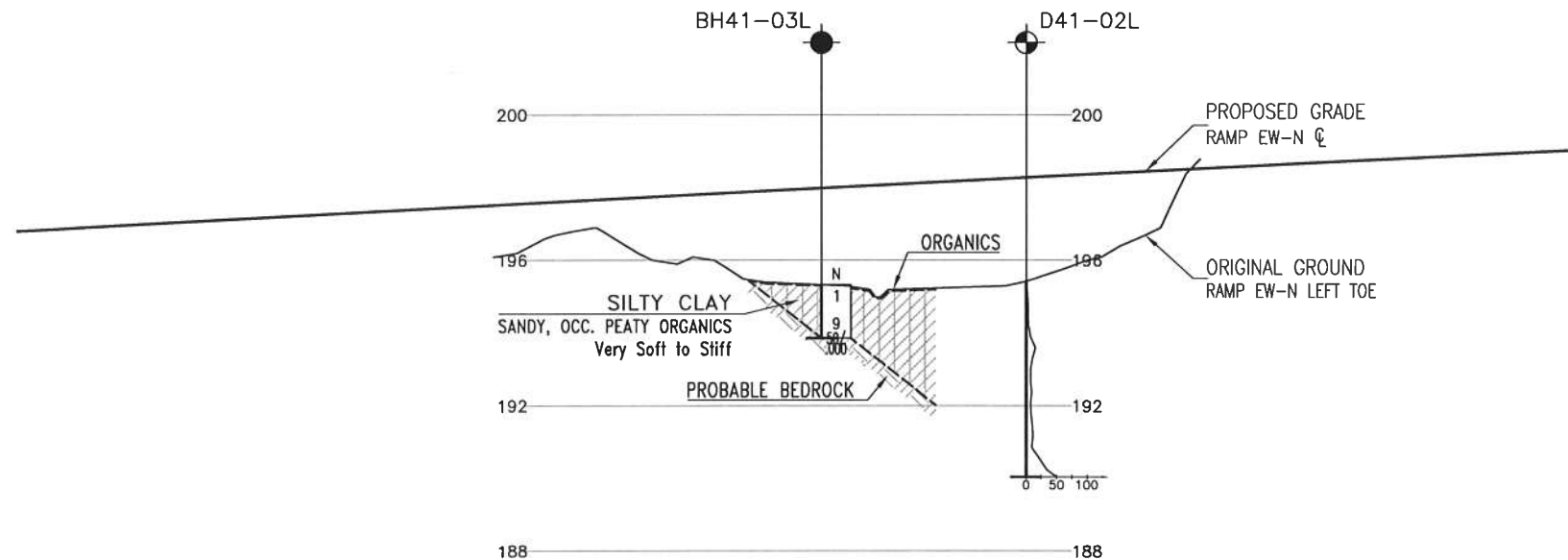
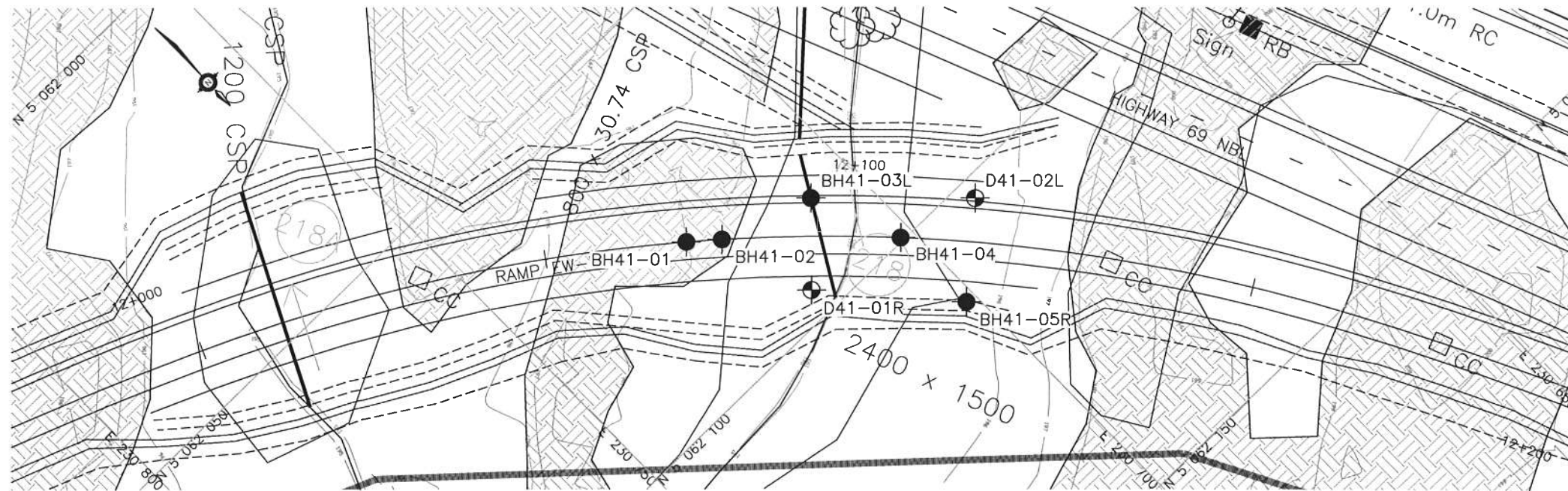
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH41-04	1.83	193.47
☒	BH41-05R	1.83	193.77

Date December 2012
 GWP# 5294-08-00

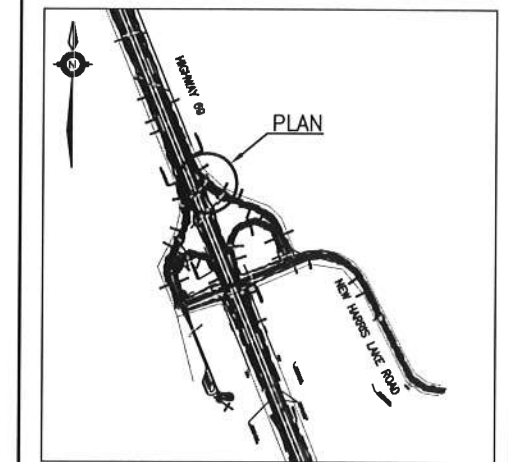


Prep'd MFA
 Chkd. MRA



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

CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
HARRIS LAKE RD RAMP EW-N-LT TOE
(STA 12+070 - 12+120)
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
BH41-01	196.0	5 062 078.9	230 723.6
BH41-02	195.6	5 062 082.2	230 719.8
BH41-03L	195.3	5 062 086.7	230 706.9
BH41-04	195.3	5 062 099.5	230 701.8
BH41-05R	195.6	5 062 112.5	230 701.5
D41-01R	195.2	5 062 096.1	230 715.9
D41-02L	195.4	5 062 102.8	230 690.4

-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.

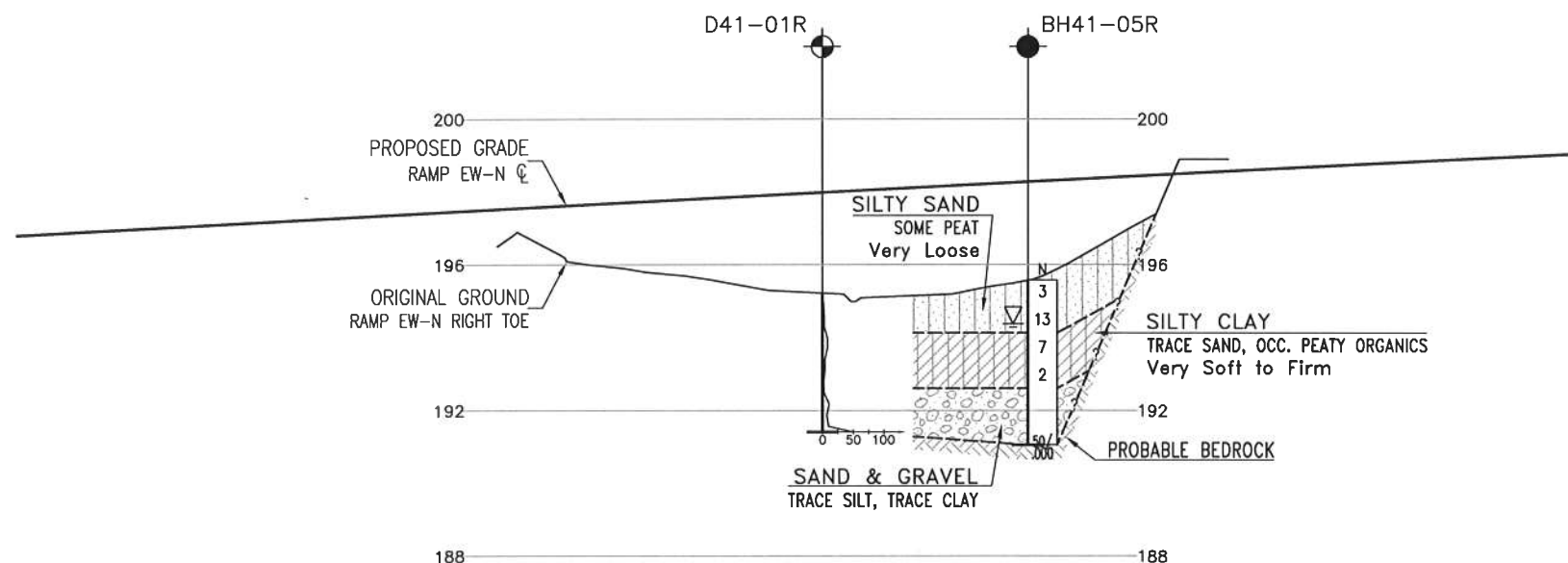
GEOCRES No. 41H-99

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

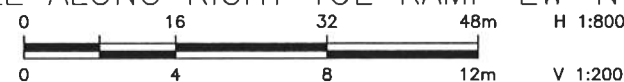
PLAN

0 16 32 48m

SCALE 1:800



PROFILE ALONG RIGHT TOE RAMP EW-N



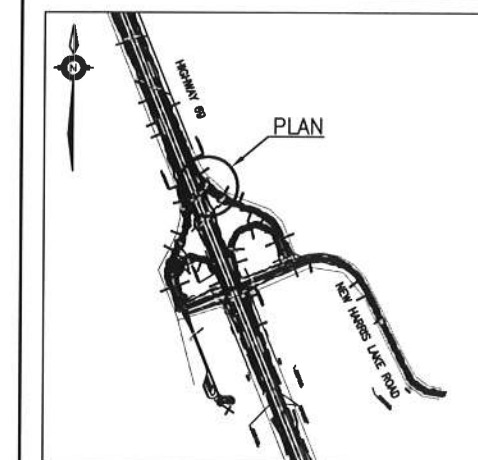
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
HARRIS LAKE RD RAMP EW-N-RT TOE
(STA 12+070 - 12+120)
BOREHOLE LOCATIONS AND SOIL STRATA








THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING
BH41-01	196.0	5 062 078.9	230 723.6
BH41-02	195.6	5 062 082.2	230 719.8
BH41-03L	195.3	5 062 086.7	230 706.9
BH41-04	195.3	5 062 099.5	230 701.8
BH41-05R	195.6	5 062 112.5	230 701.5
D41-01R	195.2	5 062 096.1	230 715.9
D41-02L	195.4	5 062 102.8	230 690.4

-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

[illegible]

Appendix U

**Highway 69 NBL
Sta. 12+470 to 12+540 Township of Wallbridge**

**Boreholes 42-01 to 42-06L
DCPTs D42-01R to D42-03R**

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

RECORD OF BOREHOLE No BH42-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 12+490 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE		WATER CONTENT (%) w _P w w _L				GR	SA	SI	CL	
200.1	Ground Surface							20	40	60	80	100						
0.0	ORGANICS: (50mm) SAND , some silt, trace clay, trace gravel, occasional peaty organics, roots and rootlets Very Loose		1	SS	0		200							○				
199.1	Dark Brown to Grey Moist to Wet		2	SS	54/									○				8 74 14 4
1.0	END OF BOREHOLE AT 1.0m UPON AUGER REFUSAL (SAMPLER BOUNCING) ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS TO SURFACE.				.150													

RECORD OF BOREHOLE No BH42-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 12+500 O/S 8.6L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 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 (%) 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				
199.8	Ground Surface		1	SS	0														
0.0 0.1	ORGANICS: (75mm)																		
	SAND and SILT, some clay, occasional oxidized staining Very Loose to Loose Grey to Brown Moist			2	SS	6													0 31 50 19
			3	SS	9													0 29 56 15	
197.5																			
2.3	END OF BOREHOLE AT 2.3m UPON AUGER REFUSAL (SAMPLER BOUNCING) ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE 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) Sep 24/08 (Ground Surface) Oct 29/08 0.20 199.6 Jan 16/09 Frozen at Surface Feb 19/09 Frozen at Surface Apr 21/09 Ground Surface Jun 05/09 Ground Surface Aug 17/09 Ground Surface Aug 25/09 Ground Surface Oct 27/09 Ground Surface Nov 20/09 Ground Surface																		

METRIC

[illegible]

RECORD OF BOREHOLE No BH42-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 12+525 O/S 8.1R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT <div> <div>20 40 60 80 100</div> <div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div> </div> </div>	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								
202.4	Ground Surface												
8.8	ORGANICS: (50mm)												
	BEDROCK AT 0.05m												

RECORD OF BOREHOLE No BH42-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 12+537.5 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
DATUM Geodetic DATE 2008.09.15 - 2008.09.15 CHECKED BY RPR

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE	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								
201.5	Ground Surface											
0.0	ORGANICS: (50mm)											
	BEDROCK AT 0.05m.											

METRIC

[illegible]

METRIC

[illegible]

METRIC

[illegible]

RECORD OF BOREHOLE No D42-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 12+540 O/S 8.2R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa			WATER CONTENT (%)						
200.7	Ground Surface							<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></di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ONTMT4S 6121.GPJ 12/12/12

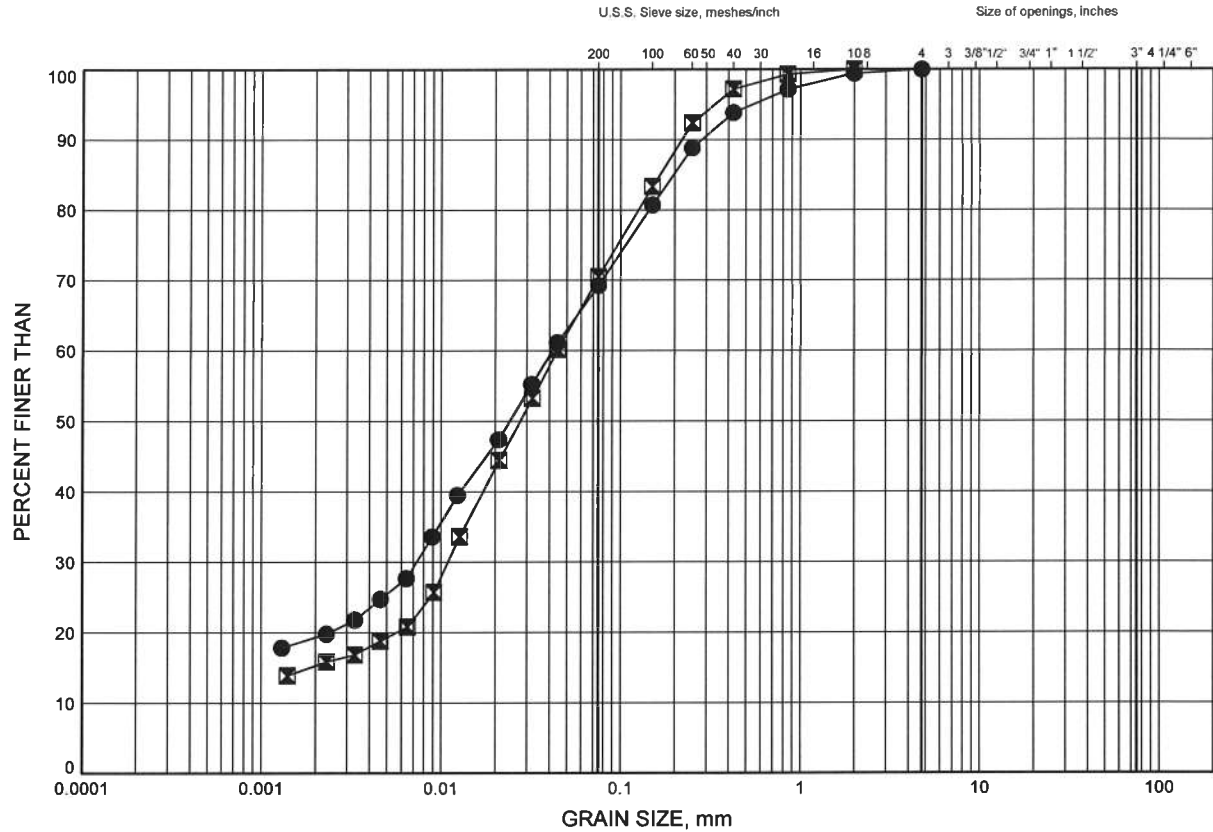
+³ X³ : Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

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

FIGURE U1

SAND and SILT



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

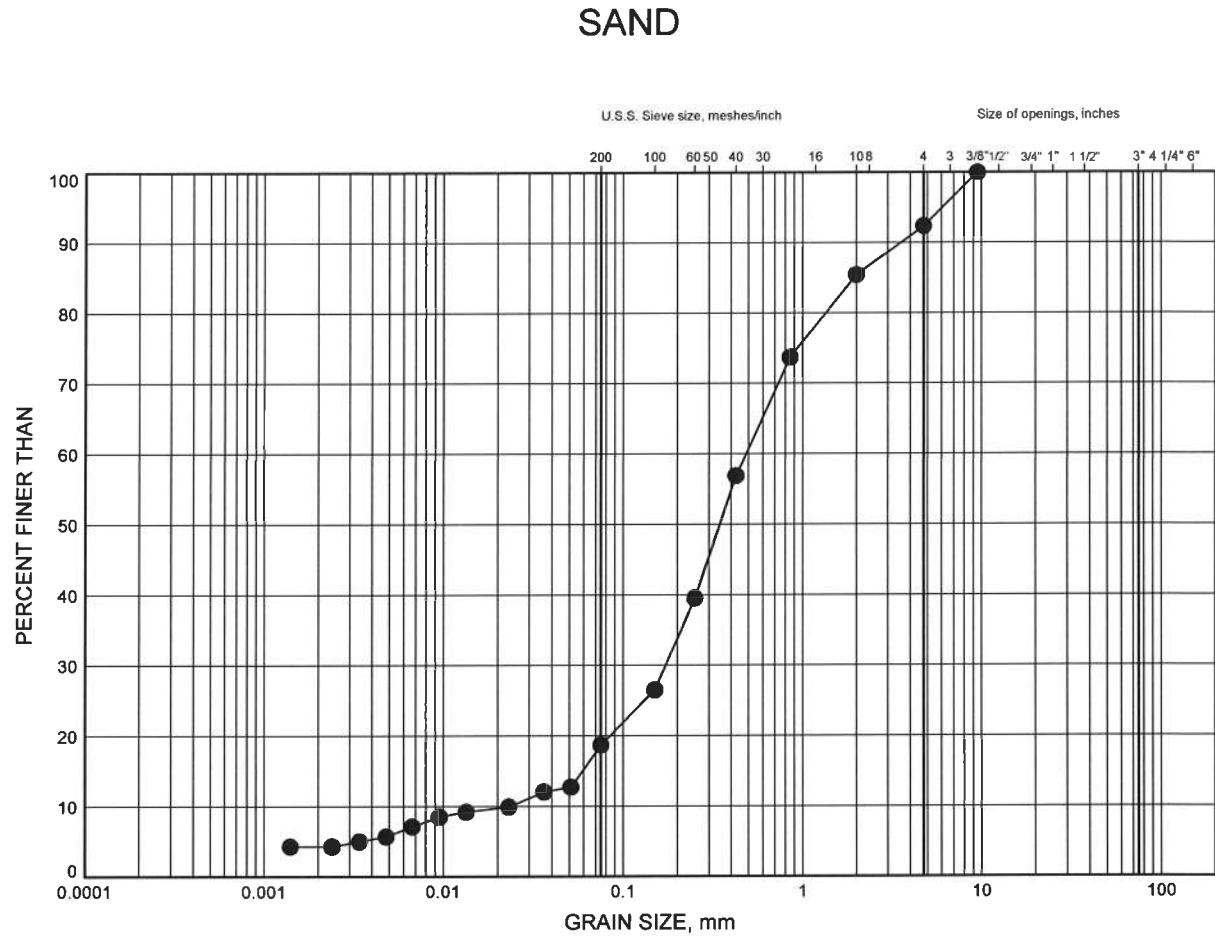
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH42-02L	0.91	198.89
■	BH42-02L	1.83	197.97

Hwy 69 Four-Laning North of Hwy 529

GRAIN SIZE DISTRIBUTION

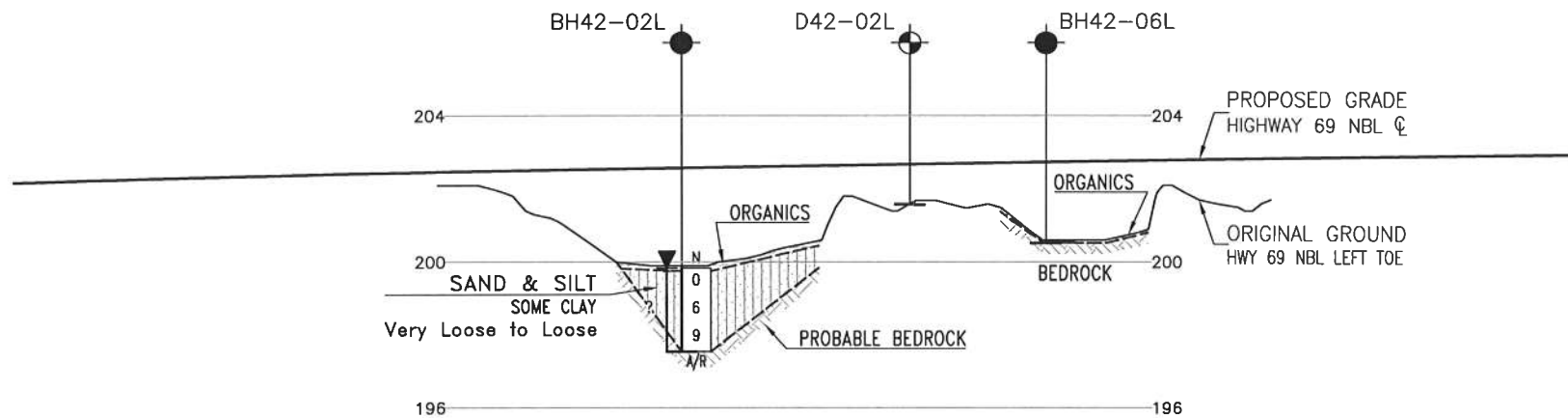
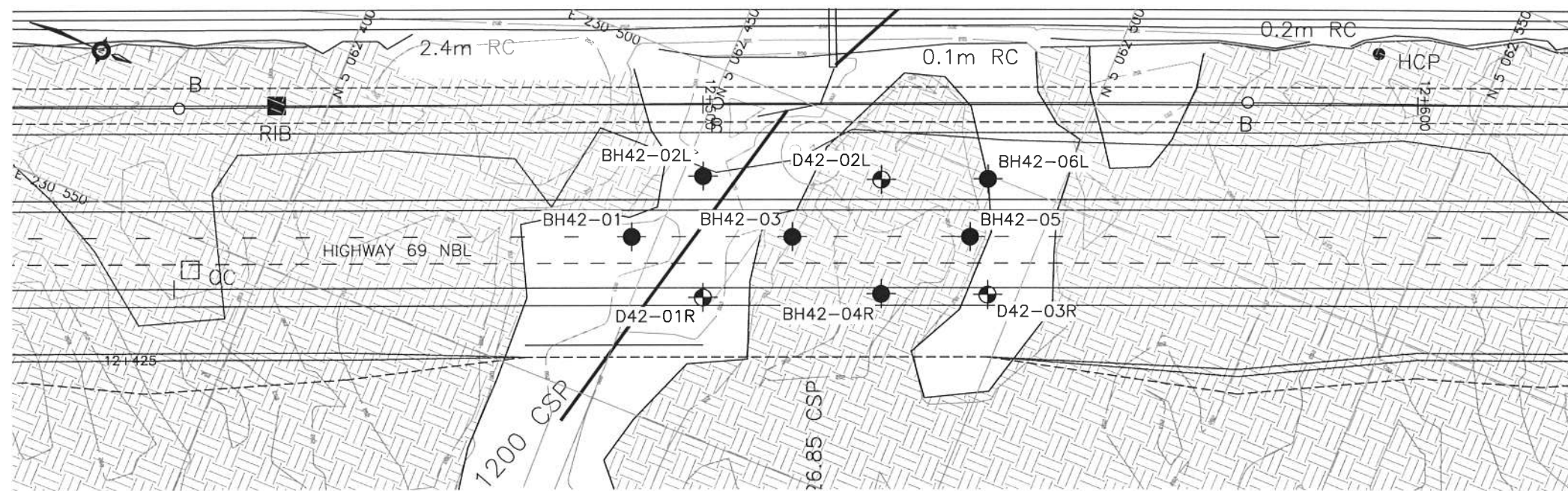
FIGURE U2



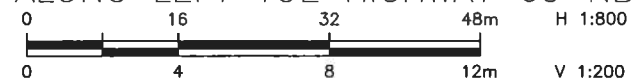
SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH42-01	0.86	199.24



PROFILE ALONG LEFT TOE HIGHWAY 69 NBL



METRIC

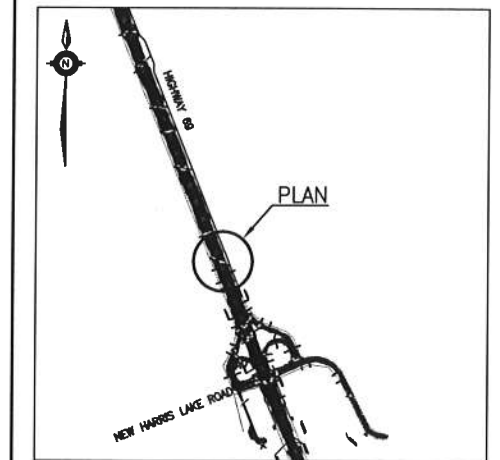
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-LT TOE
(STA 12+470 - 12+540)
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

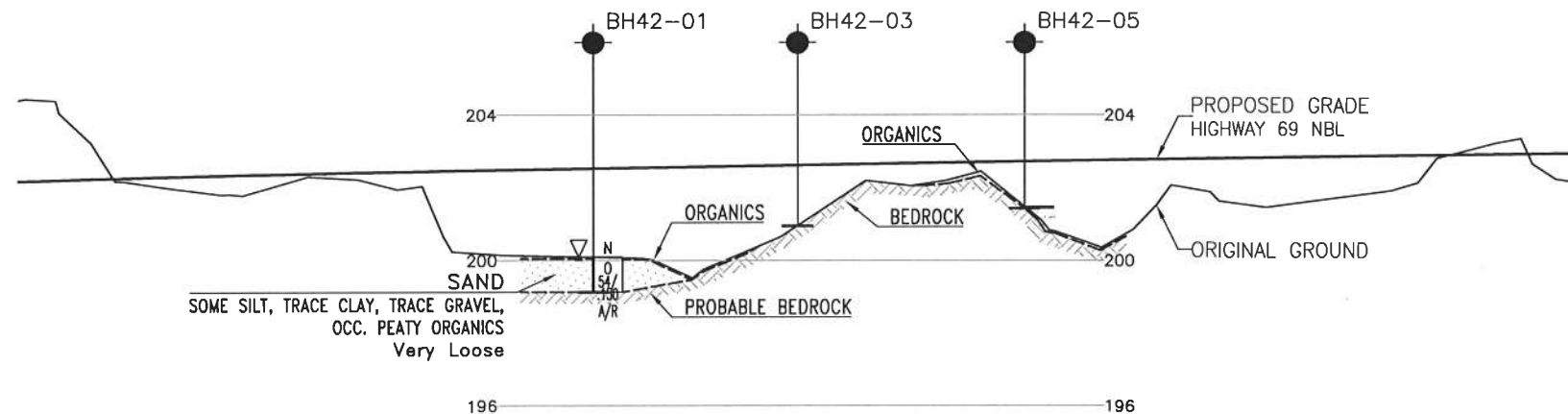
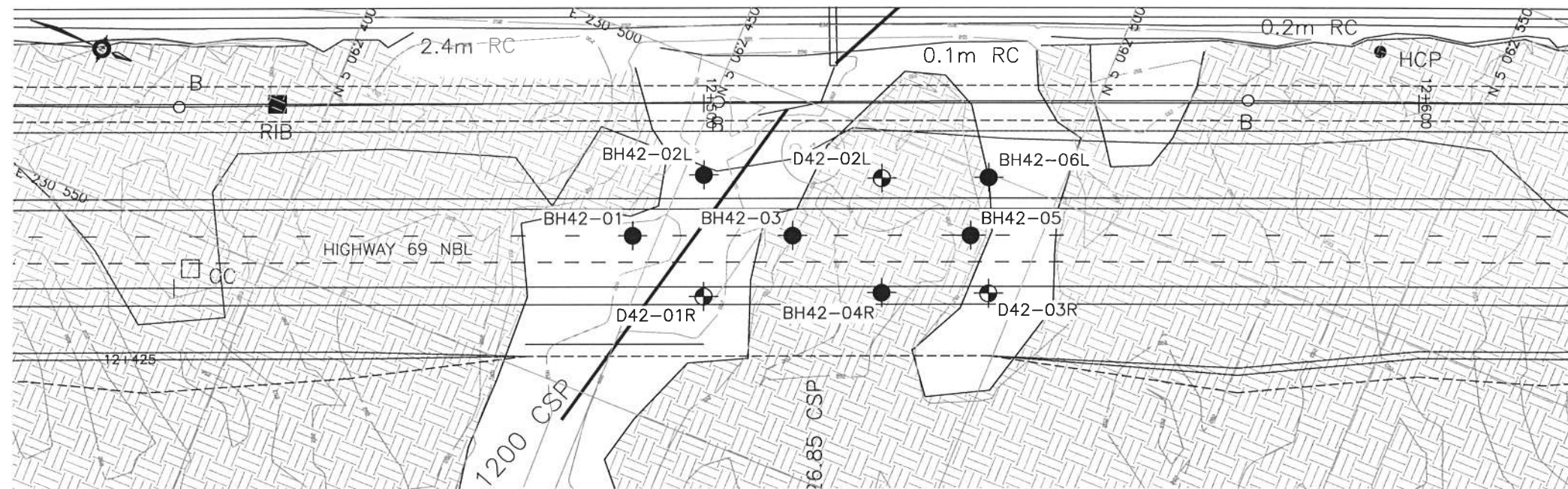
NO	ELEVATION	NORTHING	EASTING
BH42-01	200.1	5 062 446.7	230 526.8
BH42-02L	199.8	5 062 452.7	230 515.1
BH42-03	201.0	5 062 467.6	230 518.4
BH42-04R	202.4	5 062 482.2	230 521.2
BH42-05	201.5	5 062 490.7	230 509.0
BH42-06L	200.5	5 062 490.0	230 500.5
D42-01R	199.7	5 062 459.2	230 531.1
D42-02L	201.6	5 062 476.1	230 506.2
D42-03R	200.7	5 062 496.1	230 515.7

-NOTES-

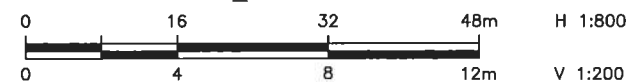
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 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 NBL



METRIC

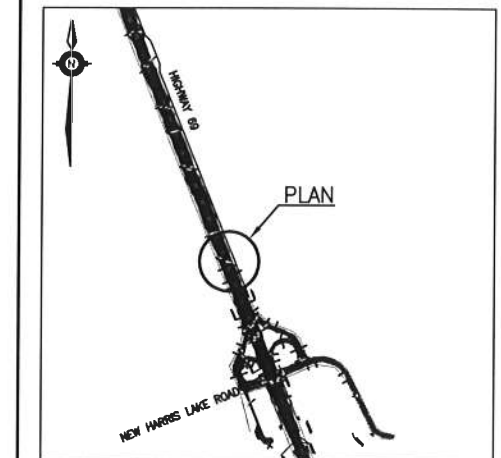
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-CL
(STA 12+470 - 12+540)
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

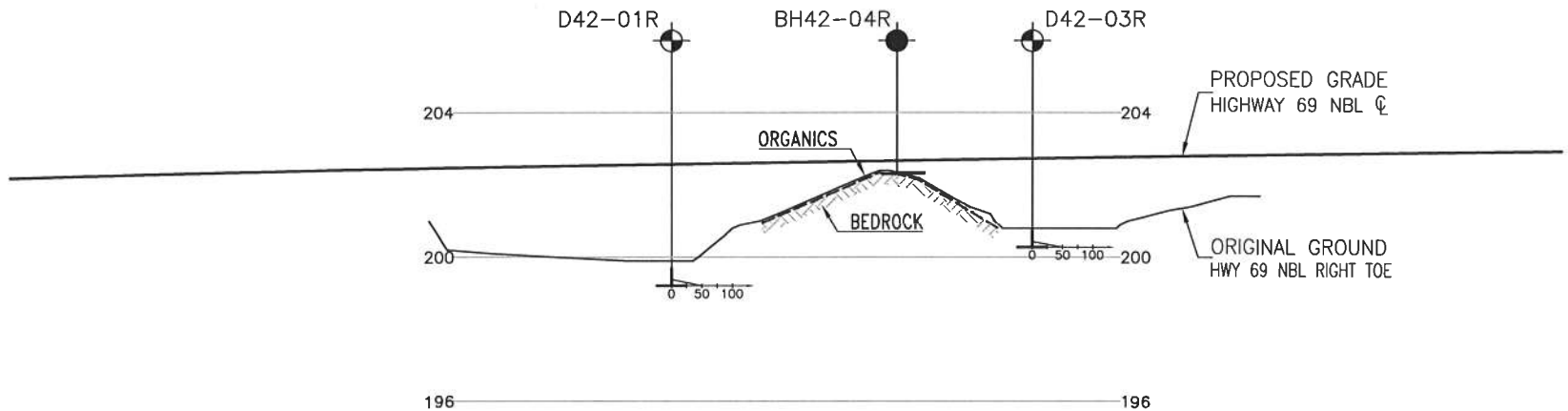
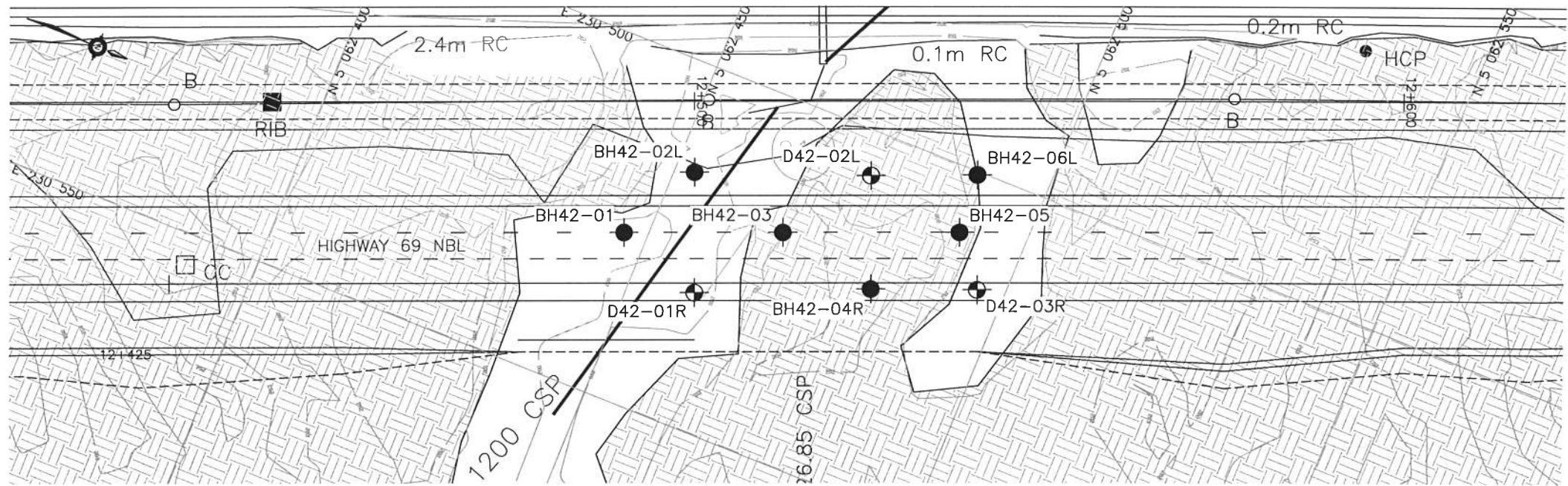
NO	ELEVATION	NORTHING	EASTING
BH42-01	200.1	5 062 446.7	230 526.8
BH42-02L	199.8	5 062 452.7	230 515.1
BH42-03	201.0	5 062 467.6	230 518.4
BH42-04R	202.4	5 062 482.2	230 521.2
BH42-05	201.5	5 062 490.7	230 509.0
BH42-06L	200.5	5 062 490.0	230 500.5
D42-01R	199.7	5 062 459.2	230 531.1
D42-02L	201.6	5 062 476.1	230 506.2
D42-03R	200.7	5 062 496.1	230 515.7

-NOTES-

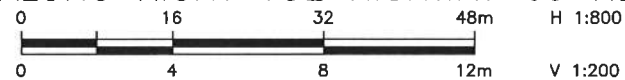
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 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 NBL

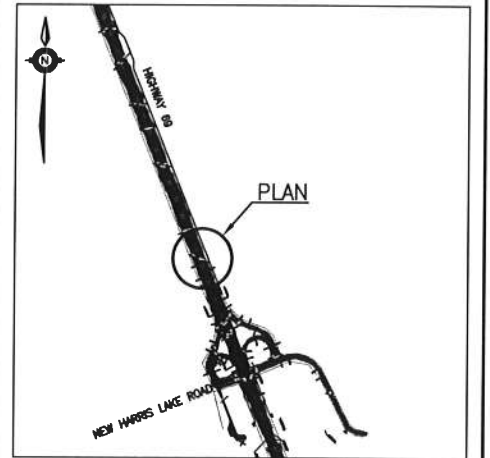


METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-RT TOE
(STA 12+470 - 12+540)
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
W	Water Level
↑	Head Artesian Water
⊥	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
BH42-01	200.1	5 062 446.7	230 526.8
BH42-02L	199.8	5 062 452.7	230 515.1
BH42-03	201.0	5 062 467.6	230 518.4
BH42-04R	202.4	5 062 482.2	230 521.2
BH42-05	201.5	5 062 490.7	230 509.0
BH42-06L	200.5	5 062 490.0	230 500.5
D42-01R	199.7	5 062 459.2	230 531.1
D42-02L	201.6	5 062 476.1	230 506.2
D42-03R	200.7	5 062 496.1	230 515.7

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

Appendix V

**Highway 69 NBL
Sta. 13+130 to 13+190 Township of Wallbridge**

**Boreholes 43-01 to 43-06L
DCPTs D43-01R to D43-03R**

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

RECORD OF BOREHOLE No BH43-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+130 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 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			SHEAR STRENGTH kPa								
200.6	Ground Surface															
0.0	ORGANICS, some sand: (150mm)															
0.2	Silty SAND, trace gravel		1	SS	12											
	Compact															
	Brown															
199.8	Moist						200									
0.8	END OF BOREHOLE AT 0.7m UPON AUGER REFUSAL (SAMPLER BOUNCING) ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.															

RECORD OF BOREHOLE No BH43-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+137.5 O/S 9.7L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 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			SHEAR STRENGTH kPa									
200.2	Ground Surface							20	40	60	80	100					
0.0	ORGANICS, trace sand		1	SS	58/ 175		200	○ UNCONFINED + FIELD VANE					w _p — w — w _L			kN/m ³	GR SA SI CL
199.9	(300mm)							● QUICK TRIAXIAL × LAB VANE									
0.3	END OF BOREHOLE AT 0.3m (SAMPLER BOUNCING) ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																

RECORD OF BOREHOLE No BH43-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+150 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 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			SHEAR STRENGTH kPa		WATER CONTENT (%)					GR
200.7	Ground Surface							20 40 60 80 100	○ UNCONFINED + FIELD VANE	20 40 60					
200.2	ORGANICS: (25mm) Silty SAND, occasional peaty organics Very Loose Brown Moist		1	SS	1			20 40 60 80 100	● QUICK TRIAXIAL × LAB VANE	20 40 60	115				
0.5	END OF BOREHOLE AT 0.5m ON PROBABLE BEDROCK. BOREHOLE DRY 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 BH43-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+162.5 O/S 9.8R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 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 (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%) PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT w _p w w _L	
199.2	Ground Surface													
0.0	ORGANICS: (75mm) Wet Silty CLAY , some sand, decayed wood fragments, occasional rootlets, oxidized staining Firm to Stiff Grey		1	SS	8									
0.1														
197.8			2	SS	9									0 11 56 33
1.4	Silty SAND , some clay Brown Moist to Wet		3	SS	54/ 275									0 68 21 11
197.2														
2.0	END OF BOREHOLE (SAMPLER BOUNCING) AT 2.0m ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE 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) Sep 24/08 0.2 199.0 Oct 29/08 0.3 198.9 Jan 16/09 Frozen at Surface Feb 19/09 Frozen at Surface Apr 21/09 Ground Surface Jun 05/09 0.2 199.0 Aug 17/09 0.4 198.8 Aug 25/09 0.4 198.8 Oct 27/09 0.5 198.7 Nov 20/09 0.8 198.4													

RECORD OF BOREHOLE No BH43-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+175 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008 09 15 - 2008 09 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 (%)				GR	SA	SI	CL
199.8	Ground Surface		1	SS	51/															
0.0	ORGANICS: (200mm)																			
0.2	END OF BOREHOLE AT 0.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.				.150															

RECORD OF BOREHOLE No BH43-06L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+185 O/S 7.5L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
199.1	Ground Surface							20	40	60	80	100			
0.0	ORGANICS: (75mm)		1	SS	1/		199	20	40	60	80	100			
0.1	Wet														
0.2	Silly SAND Grey Wet				.200										
	END OF BOREHOLE AT 0.2m ON PROBABLE BEDROCK. WATER LEVEL AT 0.1m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.														

METRIC

SOIL PROFILE					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES	GROUND WATER CONDITIONS	ELEVATION SCALE
200.6	Ground Surface				
0.0	BEDROCK EXPOSED AT SURFACE.				

RECORD OF BOREHOLE No D43-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+162.5 O/S 9.8L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 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 (%) 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 (%)	
199.0	Ground Surface						199	20	40	60	80	100	20	40	60		
0.0	DCPT from surface																
197.9							198										
1.1	END OF DCPT AT 1.1m UPON REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DCPT.																

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

RECORD OF BOREHOLE No D43-03R

1 OF 1

METRIC

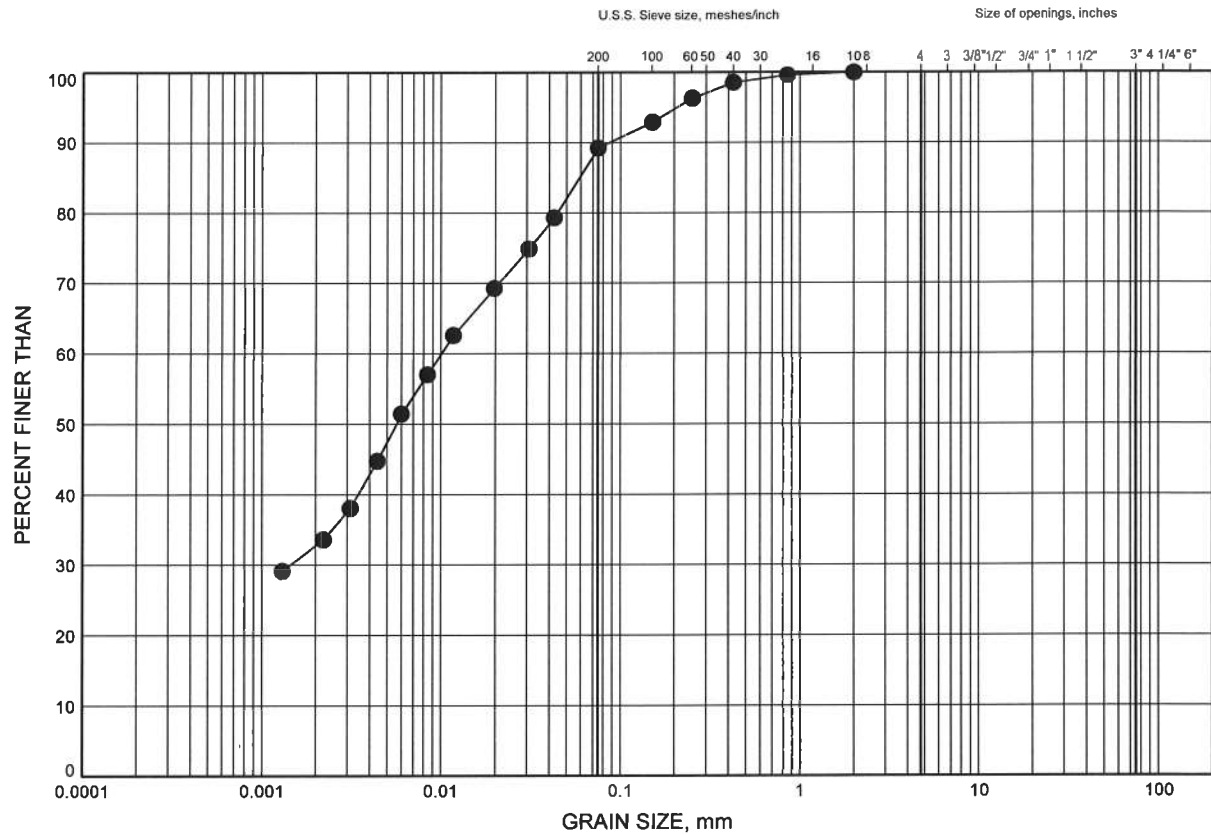
GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+185 O/S 7.5R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008.09.15 - 2008.09.15 CHECKED BY RPR

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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	W _p W W _L				
200.7	Ground Surface													
0.0	BEDROCK EXPOSED AT SURFACE.													

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

FIGURE V1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH43-04R	1.07	198.13

Date December 2012
GWP# 5294-08-00

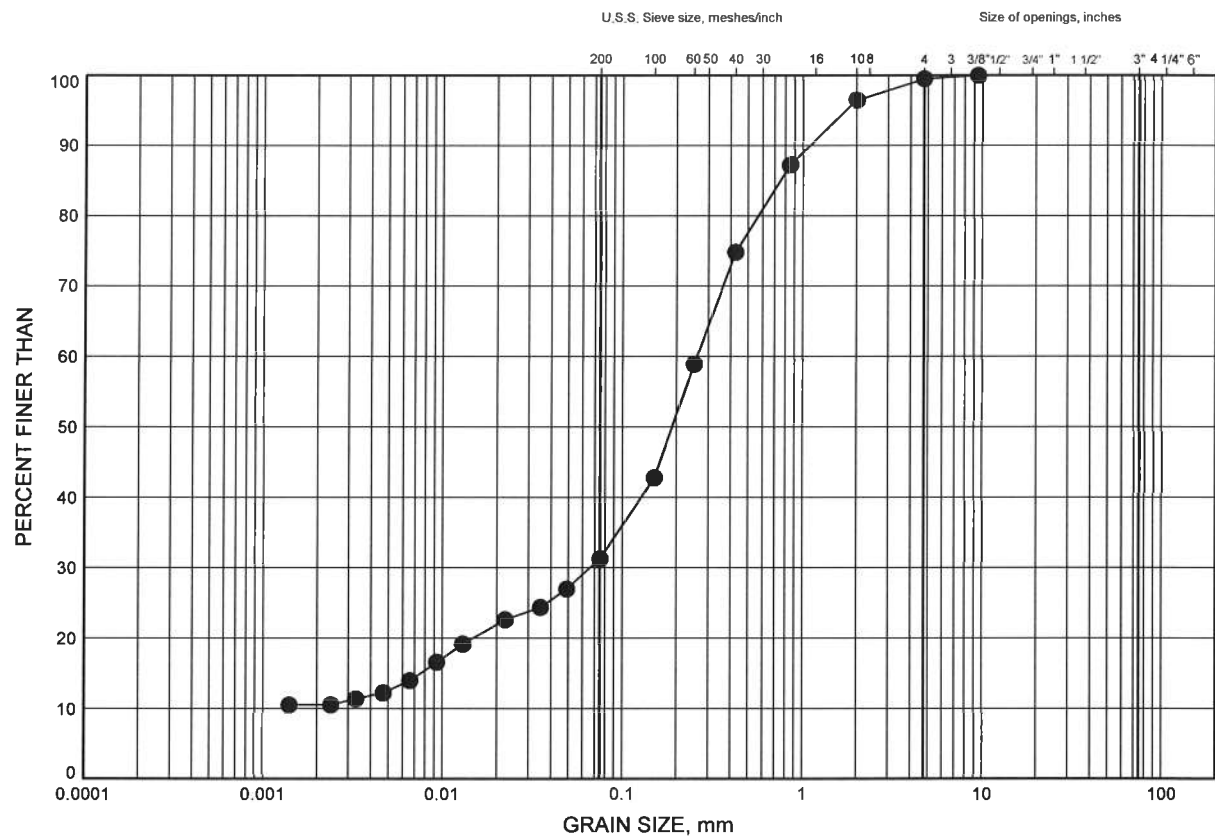


Prep'd MFA
Chkd. MRA

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

FIGURE V2

Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH43-04R	1.74	197.46

Date December 2012
GWP# 5294-08-00

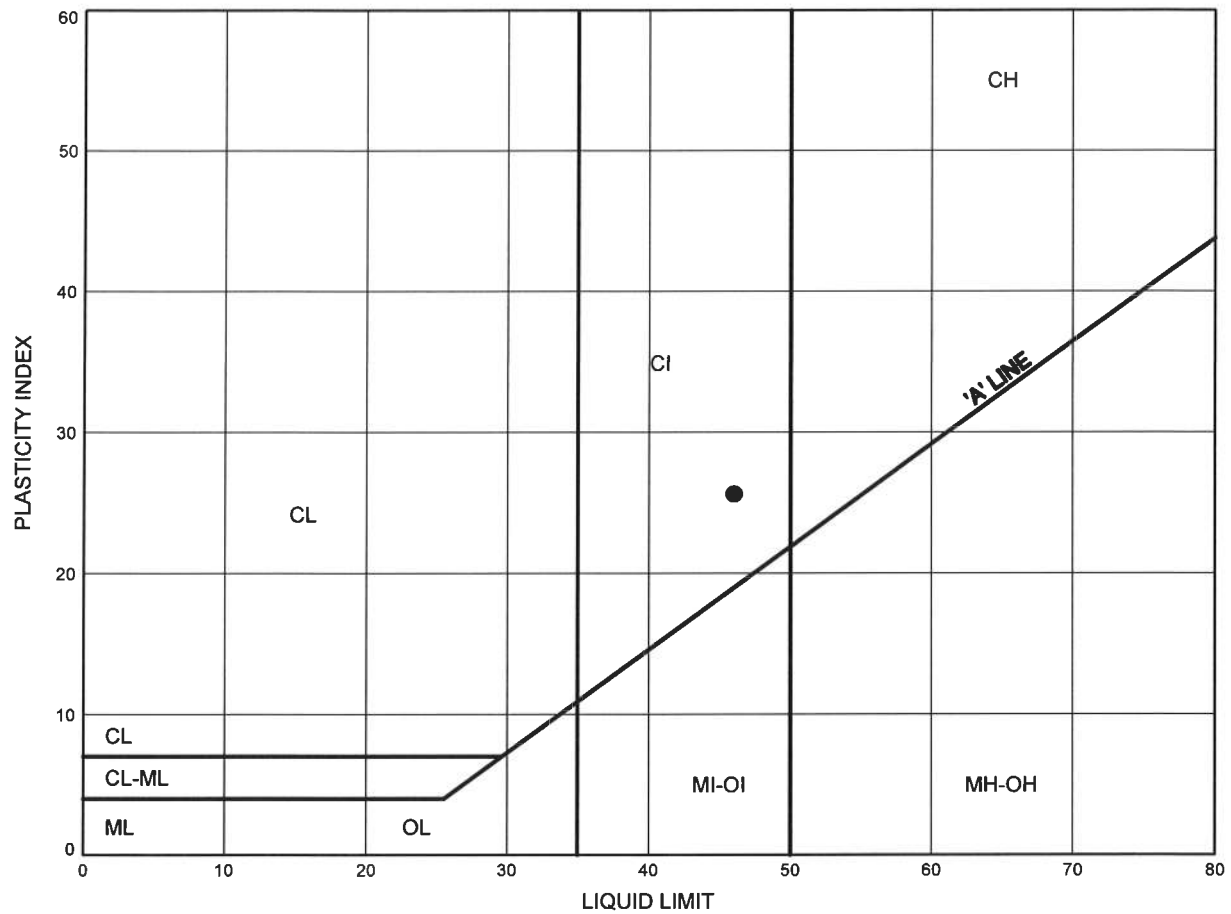


Prep'd MFA
Chkd. MRA

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

FIGURE V3

Silty CLAY



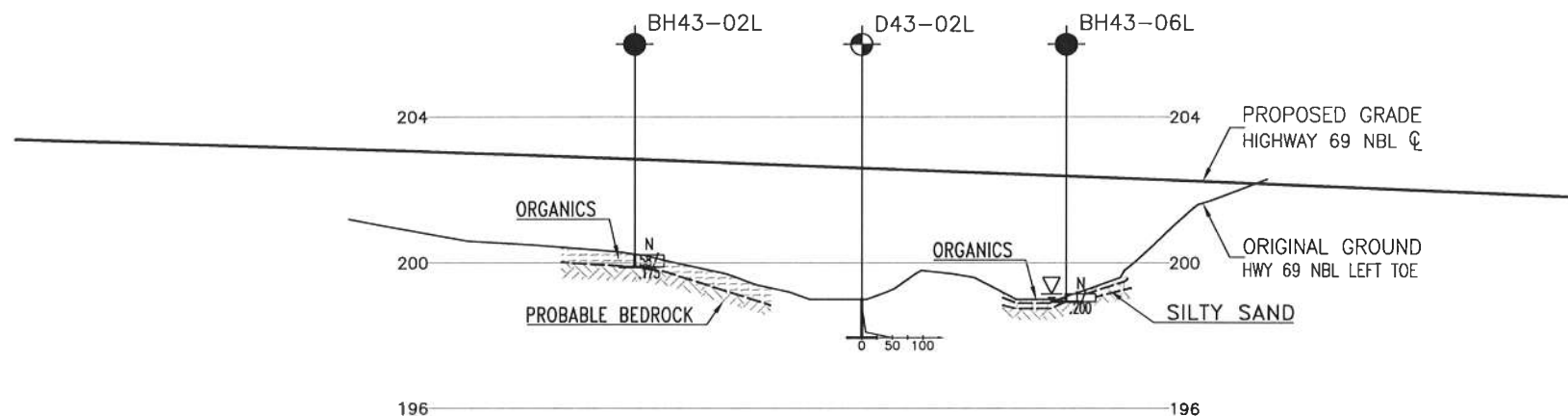
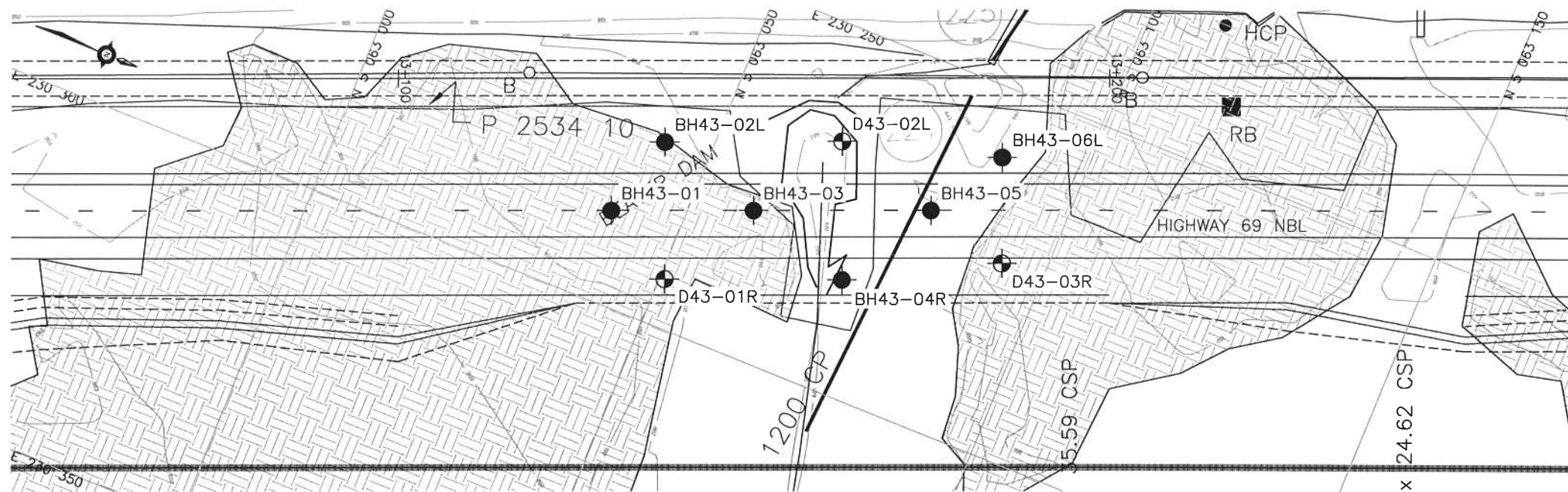
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH43-04R	1.07	198.13

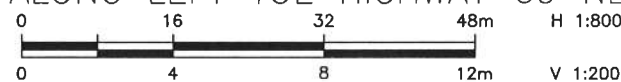
Date December 2012
 GWP# 5294-08-00



Prep'd MFA
 Chkd. MRA

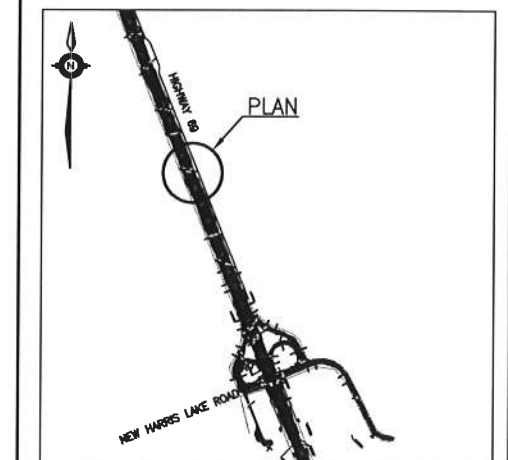


PROFILE ALONG LEFT TOE HIGHWAY 69 NBL



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

CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-LT TOE
(STA 13+130 - 13+190)
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
BH43-01	200.6	5 063 040.1	230 287.1
BH43-02L	200.2	5 063 043.4	230 275.3
BH43-03	200.7	5 063 058.6	230 279.6
BH43-04R	199.2	5 063 073.9	230 284.0
BH43-05	199.8	5 063 081.8	230 270.3
BH43-06L	199.1	5 063 088.3	230 259.6
D43-01R	200.6	5 063 050.7	230 293.3
D43-02L	199.0	5 063 066.6	230 265.8
D43-03R	200.7	5 063 093.9	230 273.5

-NOTES-

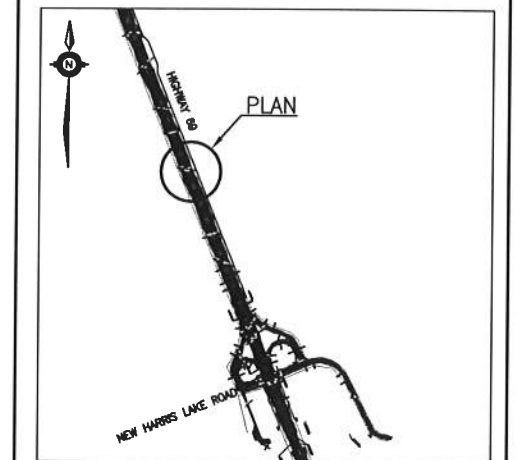
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 41H-99






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



THURBER ENGINEERING LTD.



KEYPLAN
LEGEND

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

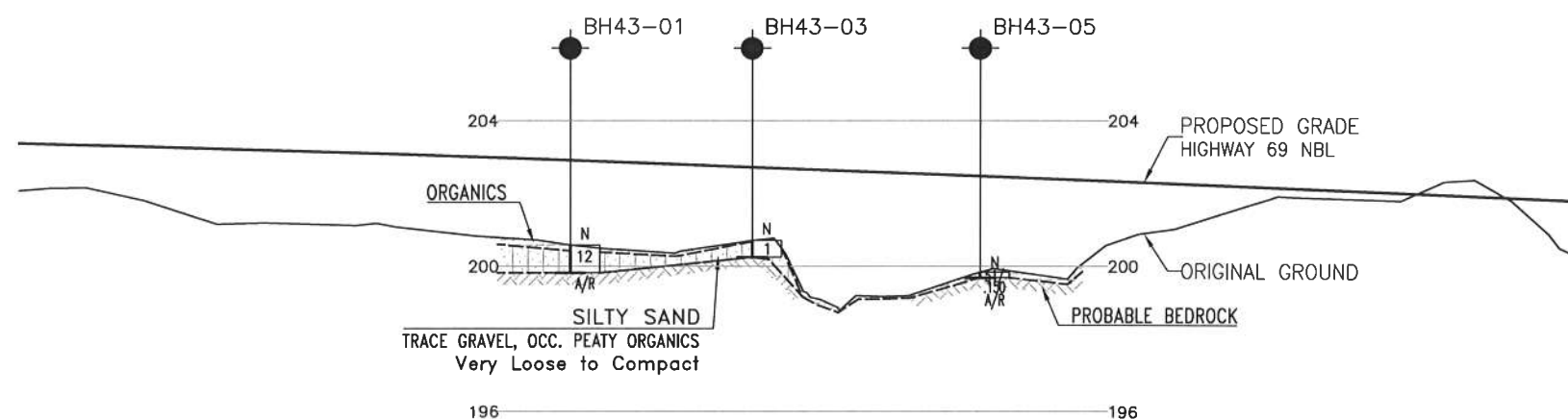
[illegible]

- 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.

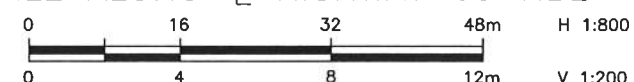
GEOCRES No. 41H-99

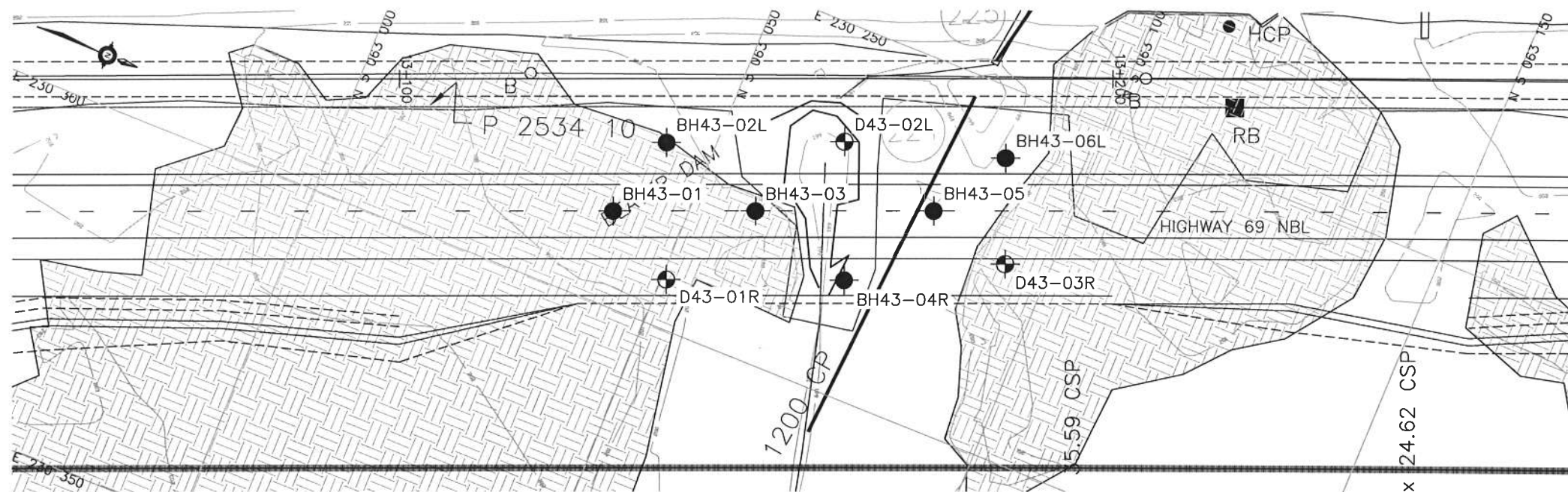
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PLOTDATE: Dec 17, 2012 - 1:21pm



PROFILE ALONG C HIGHWAY 69 NBL





PLAN

0 16 32 48m

SCALE 1:800

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

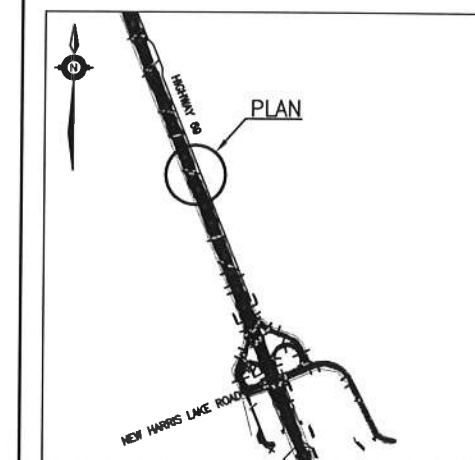
CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-RT TOE
(STA 13+130 - 13+190)
BOREHOLE LOCATIONS AND SOIL STRATA



SHEET








THURBER ENGINEERING LTD



KEYPLAN

L E G E N D

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

NO	ELEVATION	NORTHING	EASTING
BH43-01	200.6	5 063 040.1	230 287.1
BH43-02L	200.2	5 063 043.4	230 275.3
BH43-03	200.7	5 063 058.6	230 279.6
BH43-04R	199.2	5 063 073.9	230 284.0
BH43-05	199.8	5 063 081.8	230 270.3
BH43-06L	199.1	5 063 088.3	230 259.6
D43-01R	200.6	5 063 050.7	230 293.3
D43-02L	199.0	5 063 066.6	230 265.8
D43-03R	200.7	5 063 093.9	230 273.5

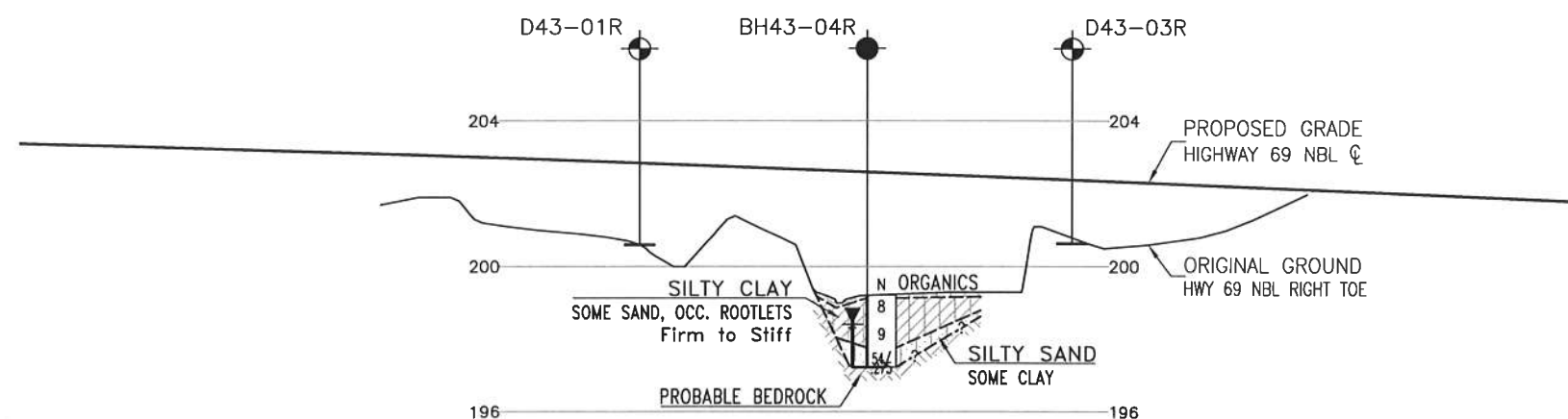
-NOTES-

- 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

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

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PLOTDATE: Dec 17, 2012 - 1:13pm



PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL

Appendix W

**Highway 69 NBL
Sta. 13+580 to 13+650 Township of Wallbridge**

**Boreholes 44-01 to 44-10L
DCPTs D44-01R to D44-04R**

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

METRIC


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RECORD OF BOREHOLE No BH44-02

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+585 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008.09.08 - 2008.09.08 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 (%)				
196.2	Ground Surface														
0.0	ORGANICS: (300mm)														
195.9	Brown														
0.3	Damp						196								
	BEDROCK AT 0.3m.														

ONTMT4S 6121 GPJ 12/12/12

+³.x³: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH44-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+597.5 O/S 9.8L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.08 - 2008.09.08 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	
196.2	Ground Surface											
0.0	SAND and SILT, trace clay, oxidized staining Very Loose to Compact Grey Moist		1	SS	1		196					
			2	SS	11		195					
194.7	Silty CLAY, decayed wood fragments Firm Grey		3	SS	6		194					
193.8												
2.4 193.5	SAND and SILT, some gravel Grey Wet		4	SS	57/ 250							
2.7	END OF BOREHOLE (SAMPLER BOUNCING) AT 2.67m ON PROBABLE BEDROCK. WATER LEVEL AT 0.6m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH GROUT AND HOLEPLUG TO SURFACE.											

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

RECORD OF BOREHOLE No BH44-05R

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+622.5 O/S 10.1R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.08 - 2008.09.08 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 (%)			
								○ UNCONFINED	+ FIELD VANE										
								● QUICK TRIAXIAL	× LAB VANE										
194.9	Ground Surface																		
0.0	SAND and SILT, trace clay Very Loose to Loose Brown to Grey Moist		1	SS	2							○			0 53 43 4				
				2	SS	6							○						
193.5																			
1.4	Silty CLAY, trace sand Very Soft to Soft Grey														0 9 32 59				
			3	SS	4							○							
			4	SS	3							○							
			5	SS	2							○							
			6	SS	0														

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH44-05R

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+622.5 O/S 10.1R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.08 - 2008.09.08 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							
	Continued From Previous Page															
	Oct 29/08	0.3 194.6														
	Jan 16/09	Frozen at Surface														
	Feb 19/09	Frozen at Surface														
	Apr 21/09	Ground Surface														
	Jun 05/09	Ground Surface														
	Aug 17/09	Ground Surface														
	Aug 25/09	0.1 194.8														
	Oct 27/09	0.1 194.8														
	Nov 20/09	0.4 194.5														

RECORD OF BOREHOLE No BH44-06

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+635 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.07 - 2008.09.07 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 (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
								20 40 60 80 100										
195.0	Ground Surface																	
0.0 0.1	ORGANICS: (75mm) SAND and SILT , occasional roots, rootlets and peaty organics Very Loose Dark Brown Moist		1	SS	3	▽	195											
			2	SS	2		194											
193.5																		
1.5	Silty CLAY , some sand, decayed wood fragments Firm Grey		3	SS	6		193											0 12 56 32
192.1																		
2.9	Silty SAND , trace clay Very Loose Grey Wet		4	SS	1		192										0 65 26 9	
191.1			5	SS	53/													
3.9	END OF BOREHOLE (SAMPLER BOUNCING) AT 3.9m ON PROBABLE BEDROCK. WATER LEVEL AT 0.9m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS AND HOLEPLUG TO SURFACE.				275													

+³, X³: Numbers refer to Sensitivity

20
15-5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH44-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+640 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.07 - 2008.09.07 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											
195.1	Ground Surface						20	40	60	80	100								
8.8	ORGANICS: (25mm)		1	SS	1	▽							○			0 3 38 59			
	SAND and SILT Very Loose Brown to Grey Moist		2	SS	3									○					
														○					
193.6														○					
	Silty CLAY, trace sand Soft Grey		3	SS	3									┌───┐ e └───┘					
1.5																41 52 7 (SI+CL)			
			4	SS	3								○						
192.2																			
2.9	SAND and GRAVEL, trace silt, trace clay Loose Grey Wet		5	SS	8								○						
191.4																			
3.7	END OF BOREHOLE AT 3.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 1.5m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS TO SURFACE.																		

+ 3, x 3: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH44-08R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+605 O/S 10.0R, NBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
DATUM Geodetic DATE 2010.11.30 - 2010.11.30 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 + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						w _P w w _L		
195.1	Ground Surface					20 40 60 80 100	20 40 60									
0.0	ORGANICS: (150mm)															
0.2	SAND, some silt Loose Brown Moist to Wet		1	SS	3	▽	195									
			2	SS	7		194								0 84 13 3	
193.6			3	SS	2											
1.5	Silty CLAY, trace to some sand Soft to Stiff Grey		4	SS	10		193								0 18 60 22	
			5	SS	7											
			6	SS	8		192									
			7	SS	4										0 3 31 66	
			8	SS	2		191									
190.3																
4.8	END OF BOREHOLE AT 4.8m UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND WATER LEVEL AT 0.9m UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.															

+³, X³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

METRIC

[illegible]

RECORD OF BOREHOLE No BH44-10L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+645 O/S 10.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.12.02 - 2010.12.02 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	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	
195.4	Ground Surface											
0.0	ORGANICS, fibrous, with some clay		1	SS	1		195					
194.7												
0.7	SAND, trace silt, trace rootlets Loose		2	SS	4							
194.1	Brown Wet											
1.3	Silty SAND, trace clay Compact		3	SS	10		194					
193.4	Brown to Grey Moist to Wet											
2.0	Silty CLAY, some sand Stiff		4	SS	8		193					
	Grey											
			5	SS	14							
192.4												
3.0	END OF BOREHOLE AT 3.0m DUE TO CAVE. BOREHOLE OPEN TO 2.7m AND WATER LEVEL AT 0.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.											

+ 3, X 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D44-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+587.5 O/S 9.8R, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2008.09.08 - 2008.09.08 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 (%)				
195.8	Ground Surface							20 40 60 80 100	○ UNCONFINED + FIELD VANE	20 40 60				
0.0	Auger to 1.5m. DCPT starts from 1.5m.							● QUICK TRIAXIAL × LAB VANE						
									</					

RECORD OF BOREHOLE No D44-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+612.5 O/S 10.1L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2008.09.08 - 2008.09.08 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE								
195.0	Ground Surface						195									
0.0	Auger to 1.5m, DCPT starts from 1.5m.						194									
							193									
							192									
191.0	END OF DCPT AT 4.0m UPON REFUSAL ON PROBABLE BEDROCK.															
4.0																

RECORD OF BOREHOLE No D44-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+622.5 O/S 10.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.12.02 - 2010.12.02 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 (%)				
195.1	Ground Surface							20 40 60 80 100		20 40 60				
0.0	DCPT from surface.						195							
194.1														
1.0	END OF DCPT AT 1.0m UPON REFUSAL ON PROBABLE BEDROCK.													

ONTMT4S 6121.GPJ 12/12/12

+ 3 . X 3 : Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D44-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+645 O/S 10.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.12.02 - 2010.12.02 CHECKED BY MRA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL LIMIT MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE			WATER CONTENT (%) w _p w w _L				
195.2	Ground Surface														
0.0	DCPT from surface						195								
194.1	END OF DCPT AT 1.1m UPON REFUSAL ON PROBABLE BEDROCK														
1.1															

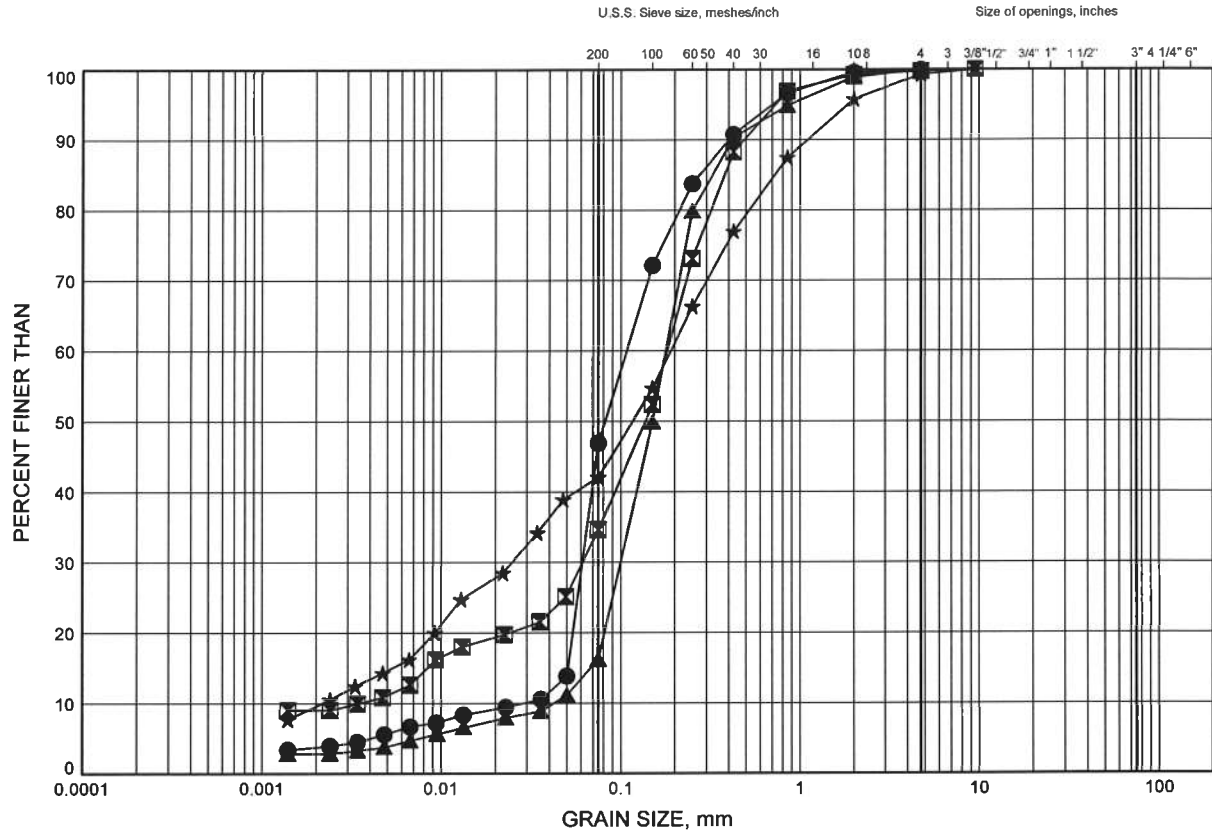
+³, ×³: Numbers refer to
Sensitivity

20
15
10
5
(%) STRAIN AT FAILURE

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

FIGURE W1

SAND and SILT to SAND



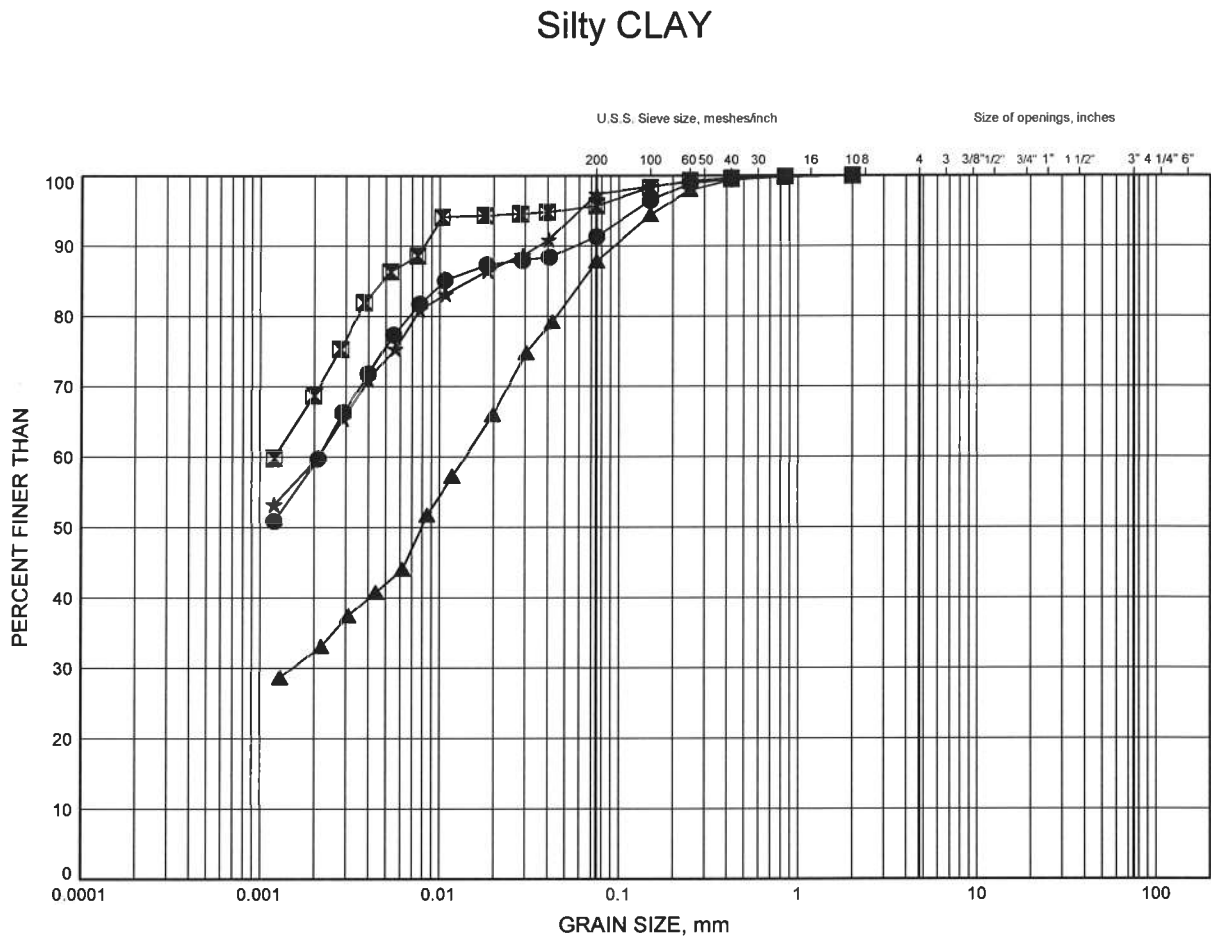
SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH44-05R	1.07	193.83
⊠	BH44-06	3.35	191.65
▲	BH44-08R	0.91	194.19
★	BH44-10L	1.52	193.88

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

FIGURE W2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH44-05R	4.11	190.79
■	BH44-05R	6.40	188.50
▲	BH44-06	1.83	193.17
★	BH44-07	1.83	193.27

GRAIN SIZE DISTRIBUTION - THURBER 6121.GPJ 12/13/12

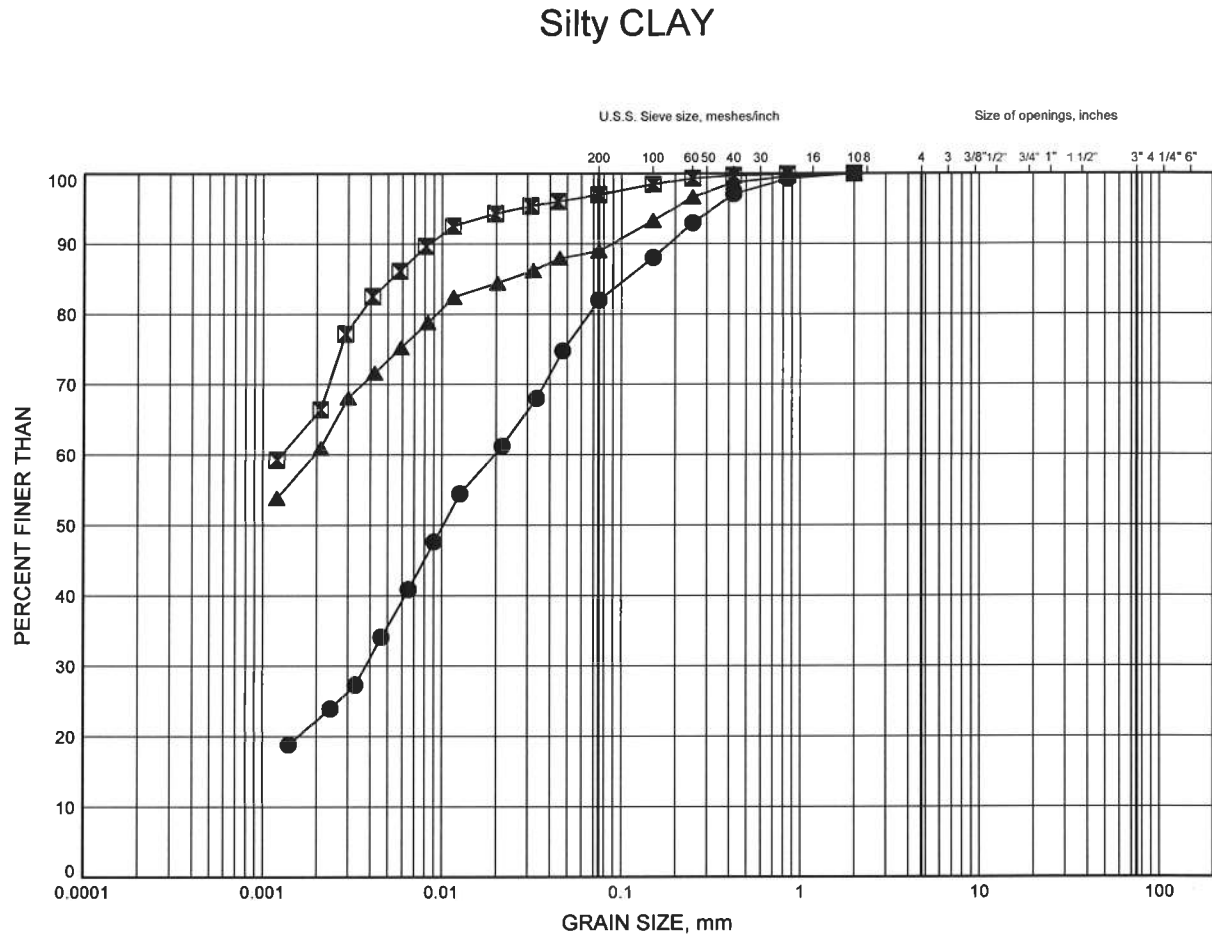
Date December 2012
 GWP# 5294-08-00



Prep'd MFA
 Chkd. MRA

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

FIGURE W3



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH44-08R	2.13	192.97
■	BH44-08R	3.96	191.14
▲	BH44-10L	2.74	192.66

Date December 2012
GWP# 5294-08-00

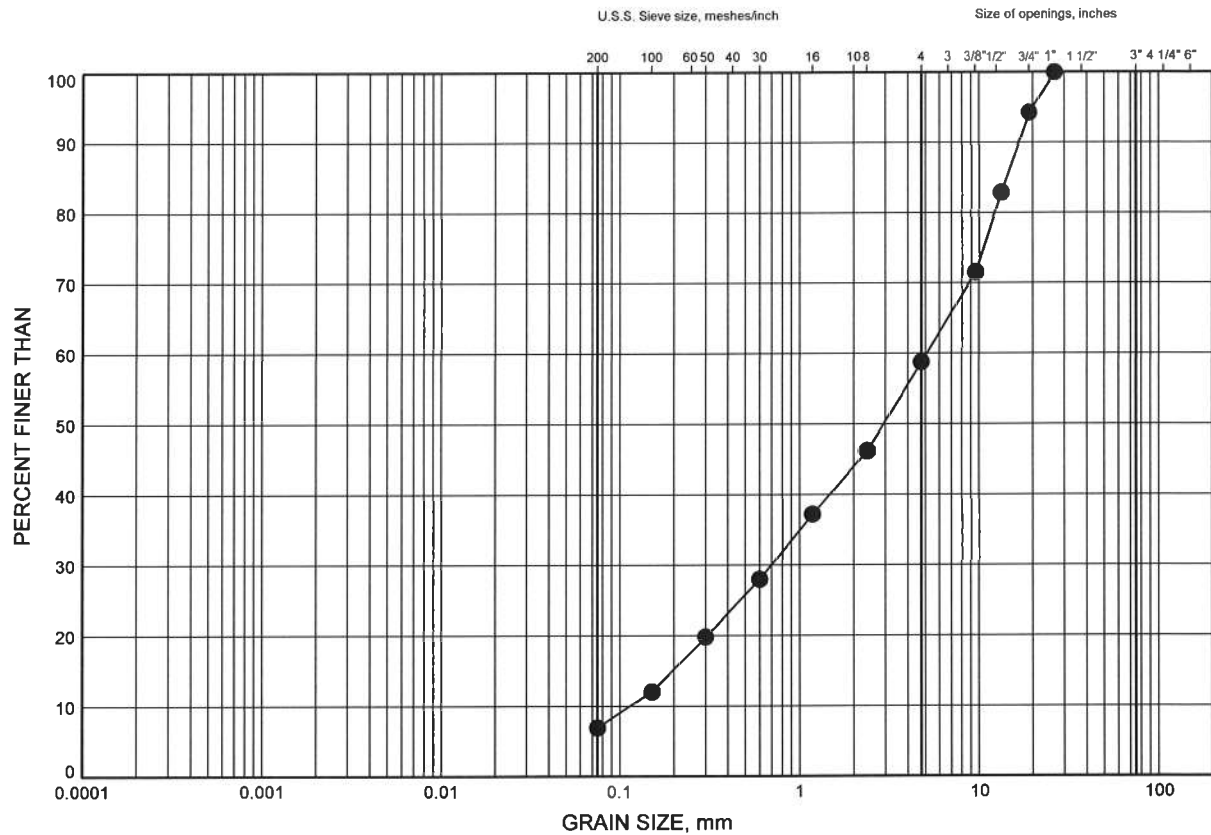


Prep'd MFA
Chkd. MRA

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

FIGURE W4

SAND and GRAVEL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH44-07	3.35	191.75

Date December 2012
GWP# 5294-08-00

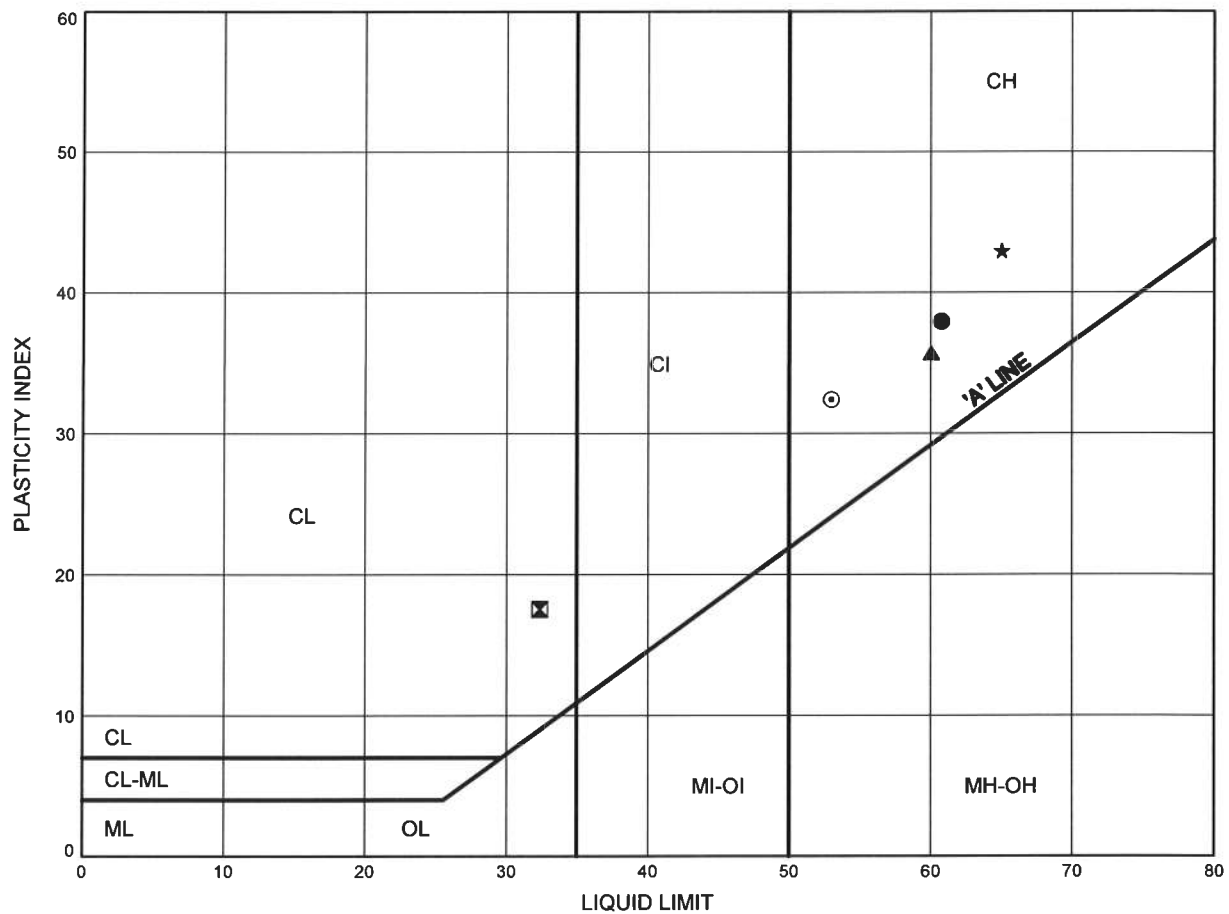


Prep'd MFA
Chkd. MRA

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

FIGURE W5

Silty CLAY



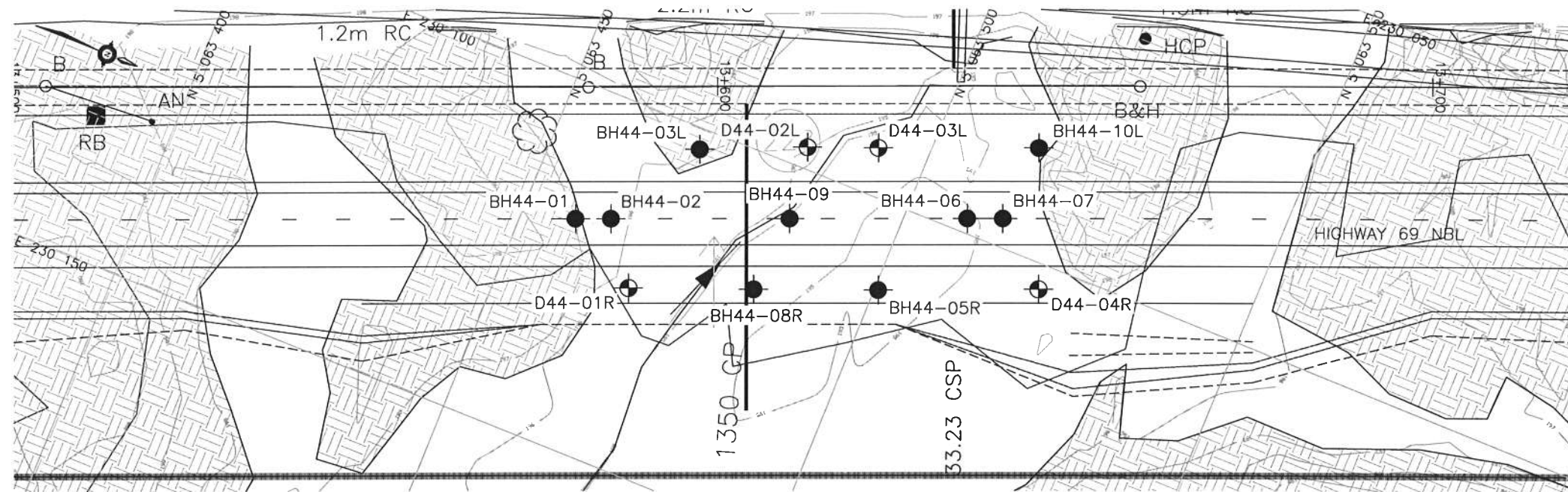
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH44-05R	4.11	190.79
⊠	BH44-06	1.83	193.17
▲	BH44-07	1.83	193.27
★	BH44-08R	3.96	191.14
⊙	BH44-10L	2.74	192.66

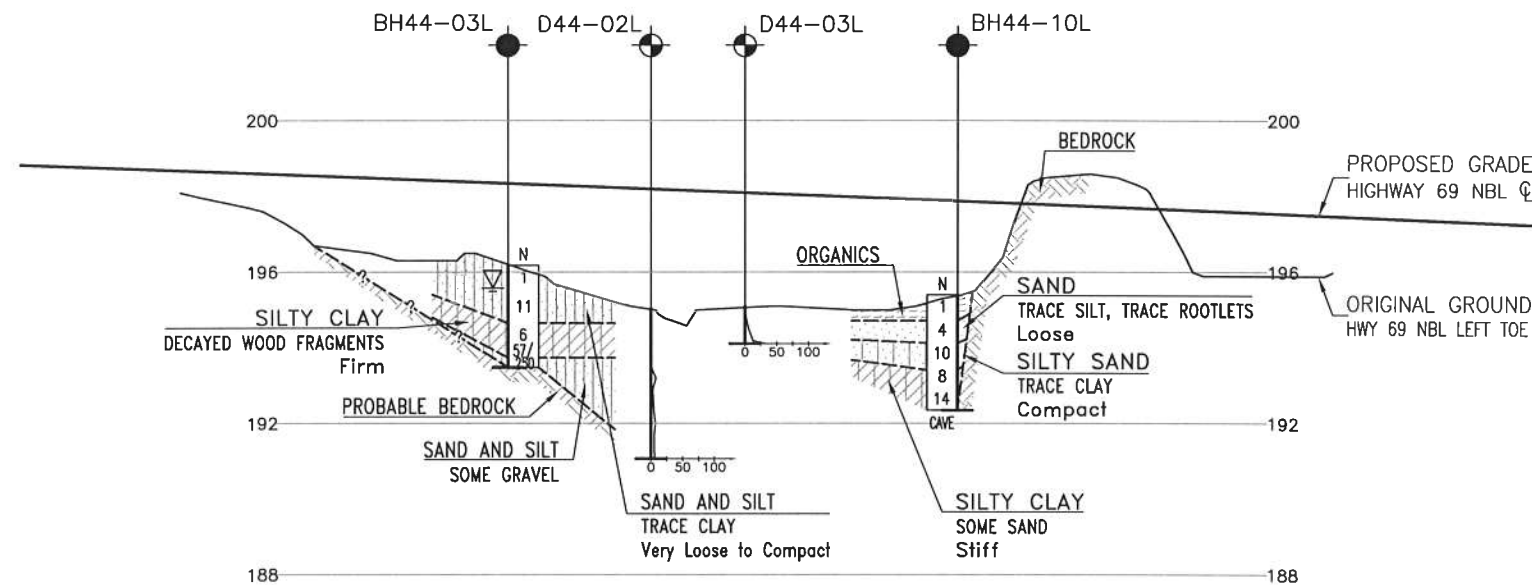
Date December 2012
 GWP# 5294-08-00



Prep'd MFA
 Chkd. MRA



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG LEFT TOE HIGHWAY 69 NBL

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

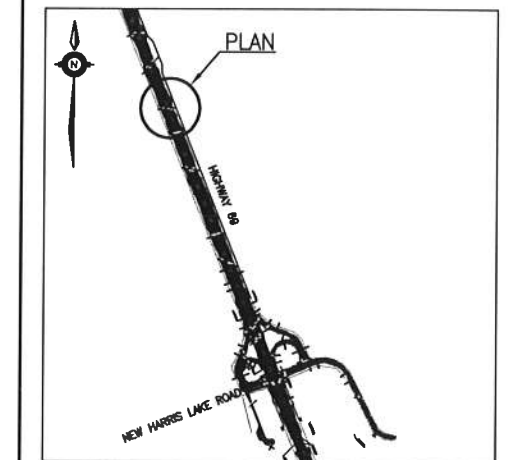
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-LT TOE
(STA 13+580 - 13+650)
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
BH44-01	196.9	5 063 457.3	230 118.6
BH44-02	196.2	5 063 462.0	230 116.7
BH44-03L	196.2	5 063 469.9	230 102.9
BH44-05R	194.9	5 063 500.5	230 112.0
BH44-06	195.0	5 063 508.3	230 098.0
BH44-07	195.1	5 063 513.0	230 096.1
BH44-08R	195.1	5 063 484.3	230 118.5
BH44-09	195.1	5 063 485.2	230 107.3
BH44-10L	195.4	5 063 513.9	230 084.9
D44-01R	195.8	5 063 468.0	230 124.8
D44-02L	195.0	5 063 483.7	230 097.0
D44-03L	195.1	5 063 493.0	230 093.4
D44-04R	195.2	5 063 521.4	230 103.5

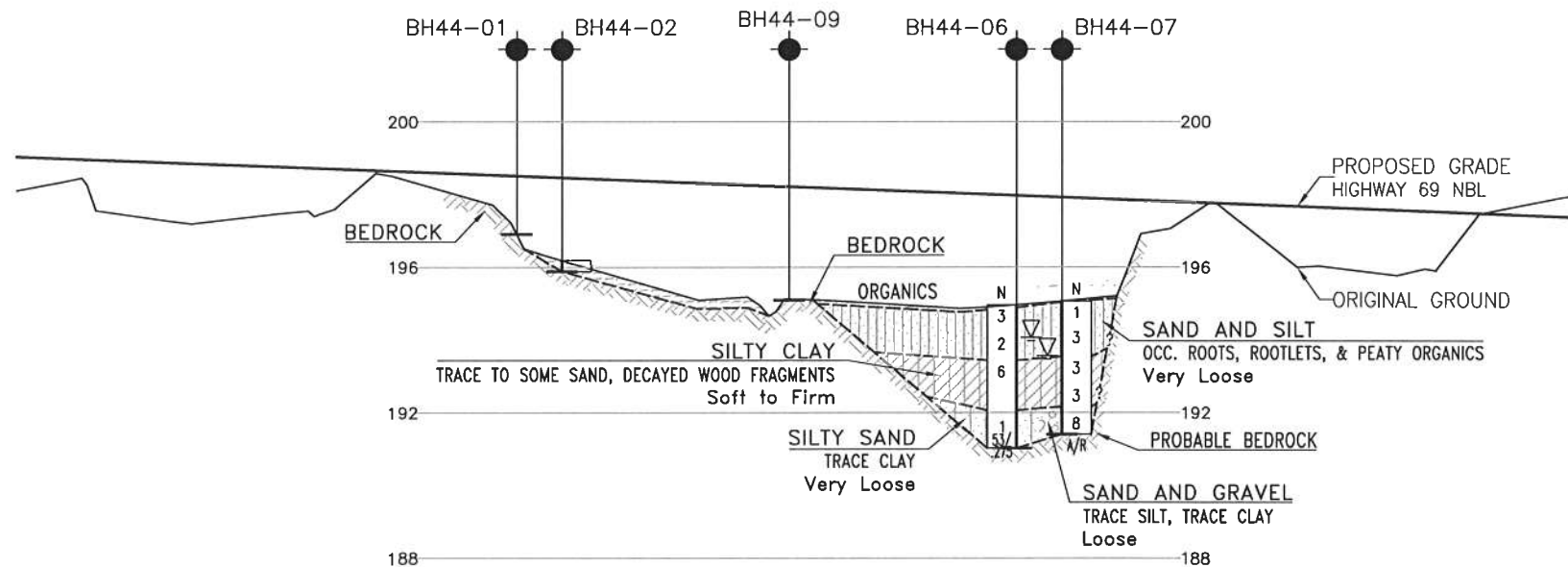
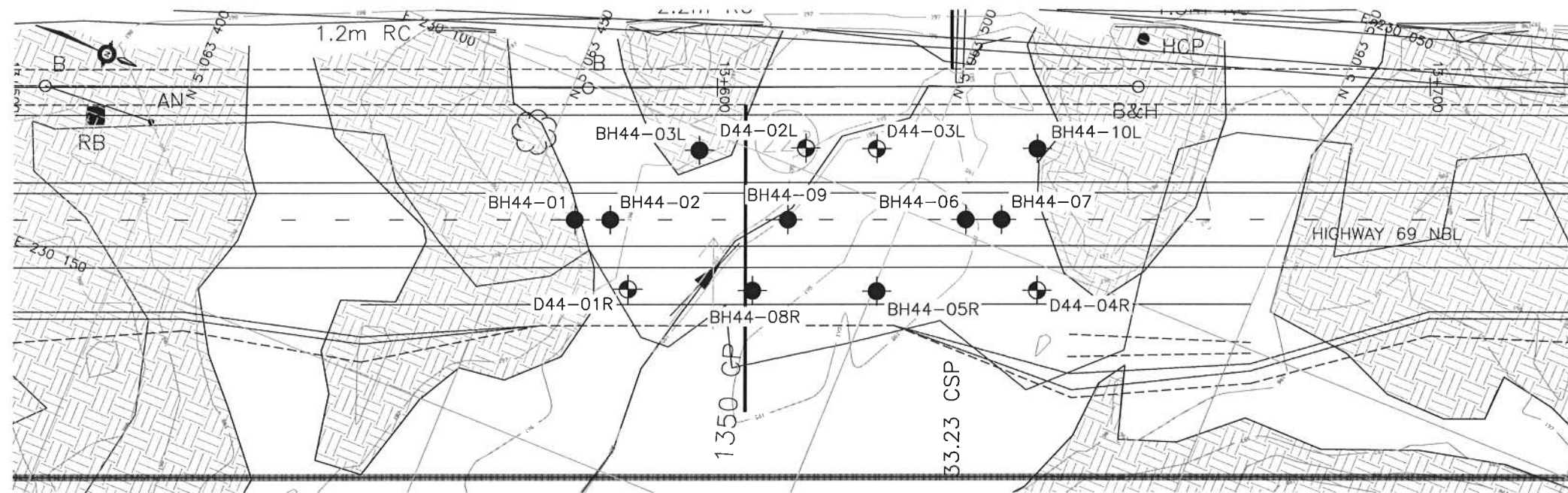
-NOTES-

- 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.

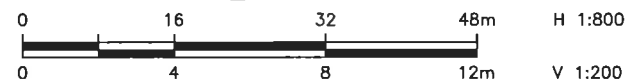
GEOCRES No. 41H-99

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





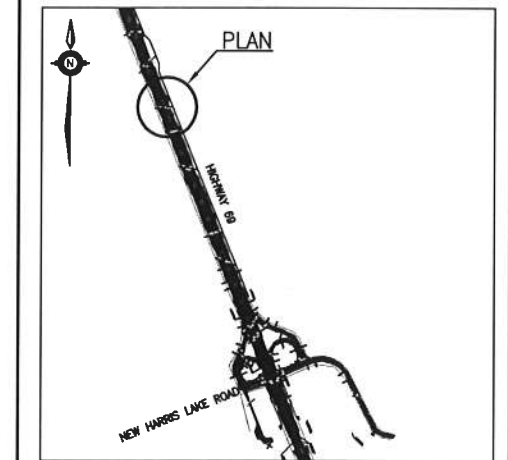
PROFILE ALONG CL HIGHWAY 69 NBL



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

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-CL
(STA 13+580 - 13+650)
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
↑	Head Artesian Water
⊥	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
BH44-01	196.9	5 063 457.3	230 118.6
BH44-02	196.2	5 063 462.0	230 116.7
BH44-03L	196.2	5 063 469.9	230 102.9
BH44-05R	194.9	5 063 500.5	230 112.0
BH44-06	195.0	5 063 508.3	230 098.0
BH44-07	195.1	5 063 513.0	230 096.1
BH44-08R	195.1	5 063 484.3	230 118.5
BH44-09	195.1	5 063 485.2	230 107.3
BH44-10L	195.4	5 063 513.9	230 084.9
D44-01R	195.8	5 063 468.0	230 124.8
D44-02L	195.0	5 063 483.7	230 097.0
D44-03L	195.1	5 063 493.0	230 093.4
D44-04R	195.2	5 063 521.4	230 103.5

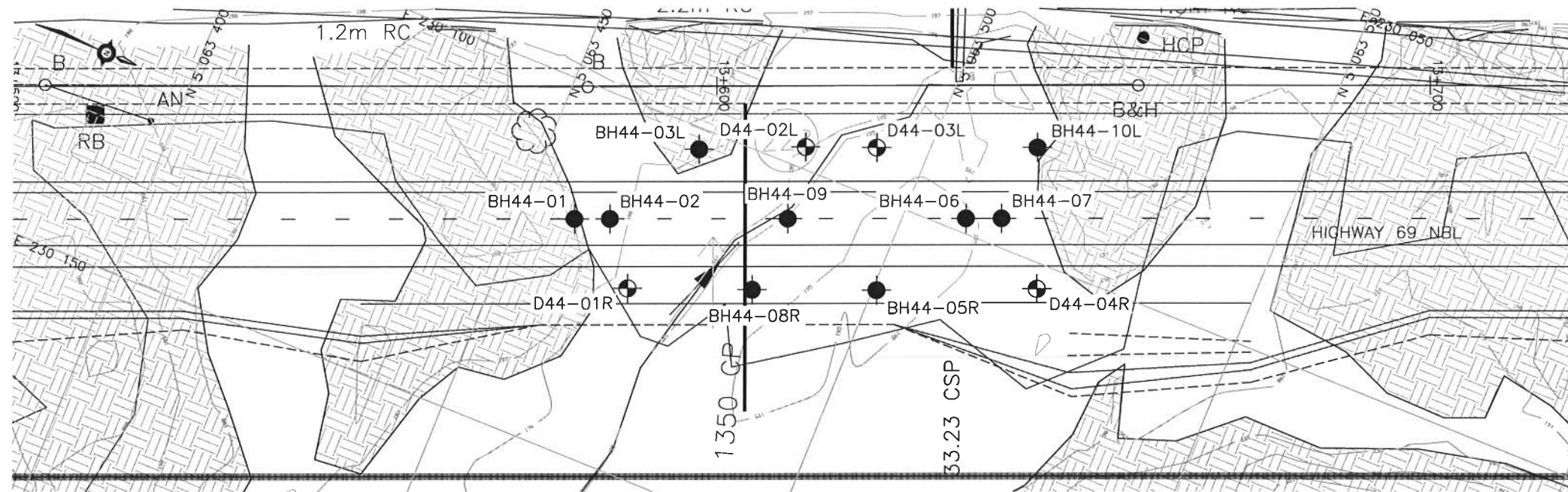
-NOTES-

- 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

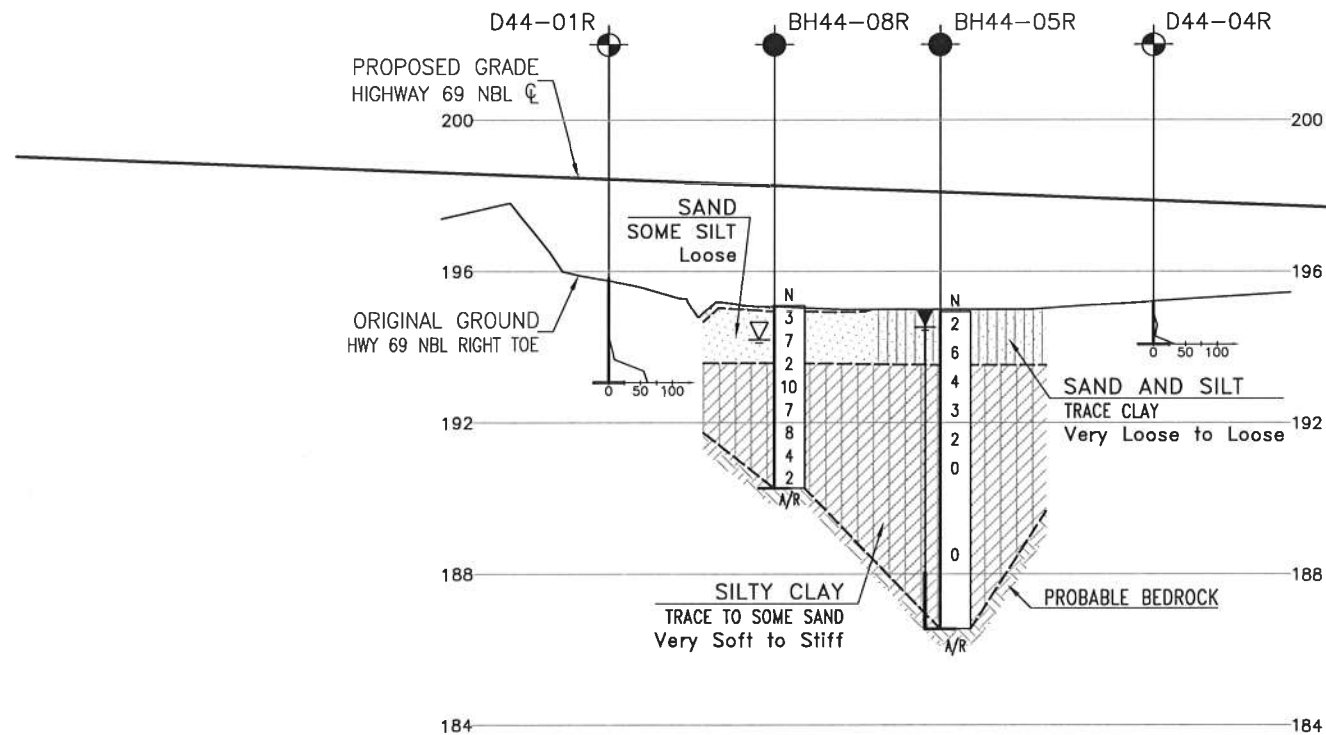




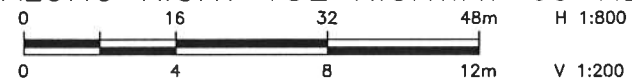
PLAN



SCALE 1:800



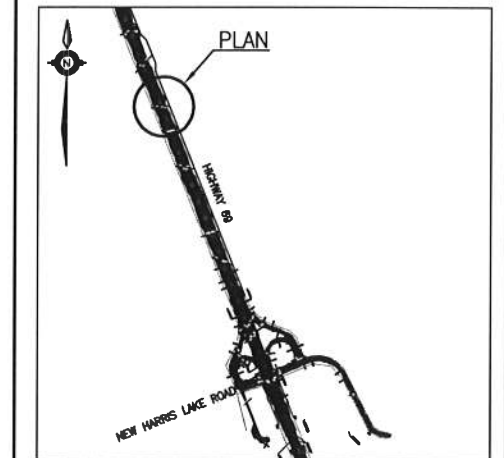
PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL



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

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-RT TOE
(STA 13+580 - 13+650)
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
BH44-01	196.9	5 063 457.3	230 118.6
BH44-02	196.2	5 063 462.0	230 116.7
BH44-03L	196.2	5 063 469.9	230 102.9
BH44-05R	194.9	5 063 500.5	230 112.0
BH44-06	195.0	5 063 508.3	230 098.0
BH44-07	195.1	5 063 513.0	230 096.1
BH44-08R	195.1	5 063 484.3	230 118.5
BH44-09	195.1	5 063 485.2	230 107.3
BH44-10L	195.4	5 063 513.9	230 084.9
D44-01R	195.8	5 063 468.0	230 124.8
D44-02L	195.0	5 063 483.7	230 097.0
D44-03L	195.1	5 063 493.0	230 093.4
D44-04R	195.2	5 063 521.4	230 103.5

-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 PKG	SITE
			LOAD
			STRUCT
			DWG
			DATE DEC. 2012

Appendix X

**Highway 69 NBL
Sta. 13+890 to 13+990 Township of Wallbridge**

**Boreholes 45-01 to 45-10
DCPTs D45-01R to D45-04L**


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

RECORD OF BOREHOLE No BH45-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+895 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.09 - 2008.09.09 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 (%)			
193.1 0.0	Ground Surface ORGANICS: (800mm)		1	SS	2		193	20	40	60	80	100	20	40	60		
192.3 0.8	END OF BOREHOLE AT 0.8m UPON AUGER REFUSAL 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
5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH45-02

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+900 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.09 - 2008.09.09 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 (%)				
192.8	Ground Surface							20 40 60 80 100		w _p w w _L				
192.8	ORGANICS: (25mm)							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE						
192.2	Silty SAND Very Loose Brown Moist		1	SS	1			20 40 60 80 100		20 40 60				
191.3	Silty CLAY, trace sand, decayed wood fragments Soft Grey		2	SS	4		192			20 40 60				0 8 45 47
191.5	Silty SAND Grey Wet		3	SS	1/					20 40 60				
1.7	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.7m UPON PROBABLE BEDROCK. WATER LEVEL AT 0.9m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.				.125									

RECORD OF BOREHOLE No BH45-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+912.5 O/S 9.0L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008 09 09 - 2008 09 09 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 NATURAL MOISTURE CONTENT LIQUID LIMIT w _P w w _L WATER CONTENT (%)	
192.7	Ground Surface													
0.0	ORGANICS, peaty, fibrous: (50mm)		1	SS	3									
192.1	Silty SAND, some clay Very Loose Grey Moist		2	SS	3									
0.6	Silty CLAY, trace sand, decayed wood fragments, occasional rootlets Very Soft to Soft Grey		3	SS	2									

+³ x³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH45-04

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+925 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.09 - 2008.09.09 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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE								
192.6	Ground Surface															
0.0	ORGANICS: peaty: (800mm)		1	SS	0											
191.8							192									
0.8	Silty CLAY, trace to some sand Very Soft Grey		2	SS	2											0 5 68 27
			3	SS	1		191									
							190									
189.2			4	SS	50/											0 18 39 43
3.4	END OF BOREHOLE (SAMPLER BOUNCING) AT 3.4m ON PROBABLE BEDROCK. WATER LEVEL AT 0.3m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH GROUT AND HOLEPLUG TO SURFACE.															

+³, X³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH45-05R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+937.5 O/S 8.8R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.08 - 2008.09.08 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 (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		W _p	W	W _L		
192.8	Ground Surface							20 40 60 80 100						
0.0	ORGANICS, peaty: (300mm)							20 40 60 80 100						
192.5	Dark Brown		1	SS	6									
0.3	Silty SAND													
192.0	Loose													
0.8	Grey													
	Moist													
	Silty CLAY, trace to some sand, oxidized stains Very Soft Grey		2	SS	2		192							0 11 57 32
			3	SS	2		191							
			1	TW	PH		190							
			4	SS	0									
							189							
			5	SS	0		188							0 7 58 35
187.3														
5.5	END OF BOREHOLE AT 5.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 0.3m UPON COMPLETION OF DRILLING. DCPT CONDUCTED NEAR THE BOREHOLE. END OF DCPT AT 5.5m UPON REFUSAL. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Sep 24/08 0.2* 193.0 Oct 29/08 0.0 192.8 Feb 19/09 Frozen at Surface Apr 21/09 0.7* 193.5 Jun 04/09 0.5* 193.3 Aug 17/09 0.6 192.2 Oct 27/09 0.6 192.2 Nov 20/09 1.0 191.8 * (Artesian Condition) Aug 25/09 0.5 192.3													

+ 3, x 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH45-06

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+950 C/L, NBL ORIGINATED BY LG
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2009.01.27 - 2009.01.27 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		<div>PLASTIC LIMIT w_P</div> <div>NATURAL MOISTURE CONTENT w</div> <div>LIQUID LIMIT w_L</div>	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				
192.5	Ground Surface							<div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div>				GR SA SI CL
0.0	ORGANICS, peaty: (800mm)											
191.7							192					
0.8	Silty CLAY, trace sand Very Soft to Soft Brown		1	SS	3							
			2	SS	2		191	6 +				0 3 51 46
			3	SS	0		190	10				
							189	6 +				
187.9							188	10				
4.6	SAND, trace gravel, trace sill, medium to coarse grained Compact Dark Brown Wet		4	SS	26							3 94 3 (SI+CL)
186.5							187					
6.0	END OF BOREHOLE (SAMPLER BOUNCING) AT 6.0m ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS TO SURFACE.											

+ 3, x 3: Numbers refer to
Sensitivity

20
15
10


(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH45-07L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+962.5 O/S 8.1 L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.09 - 2008.09.09 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			20 40 60 80 100	W _P W W _L	20 40 60				
193.0	Ground Surface		1	SS	25		193	SHEAR STRENGTH kPa		WATER CONTENT (%)				
0.0	ORGANICS, peaty: (400mm) Brown							○ UNCONFINED + FIELD VANE						
192.5								● QUICK TRIAXIAL × LAB VANE						
0.5	Silty SAND, occasional rootlets Compact													
192.0	Grey Moist													
1.0	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.0m ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE. DCPT CONDUCTED NEAR THE BOREHOLE. END OF DCPT AT 1.0m UPON REFUSAL ON PROBABLE BEDROCK.													

+³, x³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH45-08

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+975 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.09 - 2008.09.09 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 NATURAL MOISTURE CONTENT LIQUID LIMIT w _p w w _L WATER CONTENT (%)				
192.9	Ground Surface					▽												
0.0	ORGANICS, peaty, fibrous, some sand (900mm)		1	SS	1													
192.0																		
0.9	Silty SAND, some clay, occasional pealy organics		2	SS	4													
191.5	Very Loose																	
1.4	Grey Moist to Wet																	
	Silty CLAY, trace sand		3	SS	1													
	Very Soft																	
	Grey																	
189.9																		
3.0	SAND, trace silt, trace clay, trace gravel		4	SS	51/													
	Very Dense				175													
	Grey																	
	Wet																	
189.1																		
3.8	END OF BOREHOLE (SAMPLER BOUNCING) AT 3.8m ON PROBABLE BEDROCK. WATER LEVEL AT 0.4m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH GROUT TO SURFACE. DCPT CONDUCTED NEAR THE BOREHOLE. END OF DCPT AT 3.8m UPON REFUSAL ON PROBABLE BEDROCK.																	

RECORD OF BOREHOLE No BH45-09R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+987.5 O/S 7.1R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.09 - 2008.09.09 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE		WATER CONTENT (%) w _p w w _L				
193.2	Ground Surface							20 40 60 80 100		20 40 60				
193.2	ORGANICS: (25mm)													
	Silty SAND, occasional peaty organics		1	SS	1									
	Very Loose to Loose													
	Brown to Grey													
	Moist													
	Occasional topsoil, fibrous peat, roots and rootlets		2	SS	6							137		
			3	SS	1									
190.8														
2.4	Silty CLAY, trace sand		4	SS	0								0 10 49 41	
	Very Soft													
	Grey													
190.2														
3.0	SAND, trace clay, trace silt													
189.9	Grey		5	SS	52/								0 96 4	
3.3	Wet													
	END OF BOREHOLE (SAMPLER BOUNCING) AT 3.3m ON PROBABLE BEDROCK.													
	WATER LEVEL AT 1.0m UPON COMPLETION OF DRILLING.													
	BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.													
	Piezometer installation consists of 19mm diameter schedule 40 PVC pipe with 1.52m slotted screen.													
	WATER LEVEL READINGS:													
	DATE DEPTH (m) ELEV. (m)													
	Sep 24/08 3.0 190.2													
	Oct 29/08 0.2 193.0													
	Feb 19/09 Frozen at Surface													
	Apr 21/09 0.1 193.1													
	Jun 05/09 Ground Surface													
	Aug 17/09 0.2 193.0													
	Aug 25/09 0.1 193.1													
	Oct 27/09 0.2 193.0													
	Nov 20/09 0.6 192.6													

RECORD OF BOREHOLE No BH45-10

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+990 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.09 - 2008.09.09 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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
193.5	Ground Surface							20	40	60	80	100					
0.0	ORGANICS: (50mm)		1	SS	9												
193.0	Silty SAND																
0.5	Loose Brown Moist																
	END OF BOREHOLE AT 0.45m UPON AUGER REFUSAL 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

RECORD OF BOREHOLE No D45-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+912.5 O/S 9.0R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008 09 09 - 2008 09 09 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				
192.6 0.0	Ground Surface DCPT from surface.							20 40 60 80 100		20 40 60		
							192					
							191					
							190					
189.3 3.3	END OF DCPT AT 3.25m UPON REFUSAL ON PROBABLE BEDROCK.											

METRIC

[illegible][illegible]

ONTMT4S 6121.GPJ 12/12/12

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No D45-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+962.5 O/S 8.1R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.09 - 2008.09.09 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				
192.5 0.0	Ground Surface DCPT from surface.							20 40 60 80 100	20 40 60			GR SA SI CL
189.7 2.8	END OF DCPT AT 2.8m UPON REFUSAL ON PROBABLE BEDROCK.											

RECORD OF BOREHOLE No D45-04L

1 OF 1

METRIC

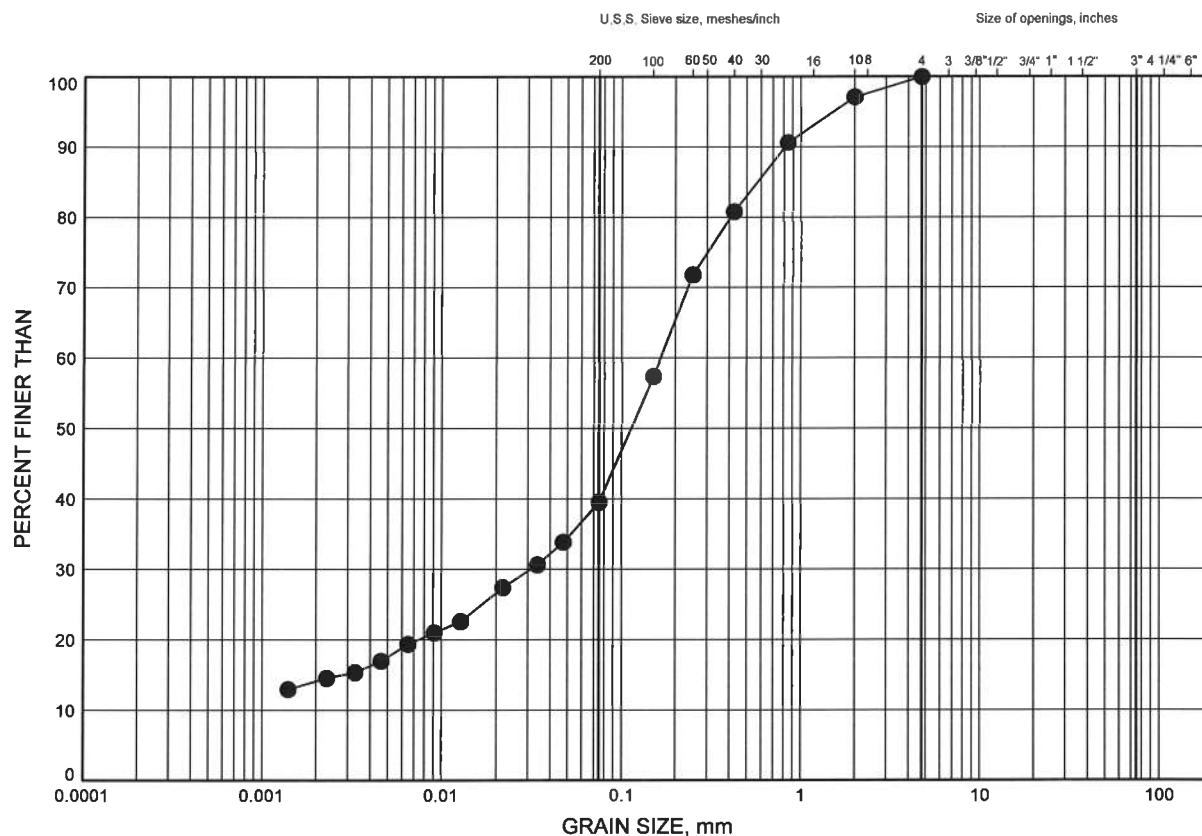
GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 13+987.5 O/S 7.1L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.09 - 2008.09.09 CHECKED BY RPR

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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					
194.2	Ground Surface												
0.0	BEDROCK EXPOSED AT SURFACE.												

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

FIGURE X1

Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH45-08	1.07	191.83

Date December 2012

GWP# 5294-08-00

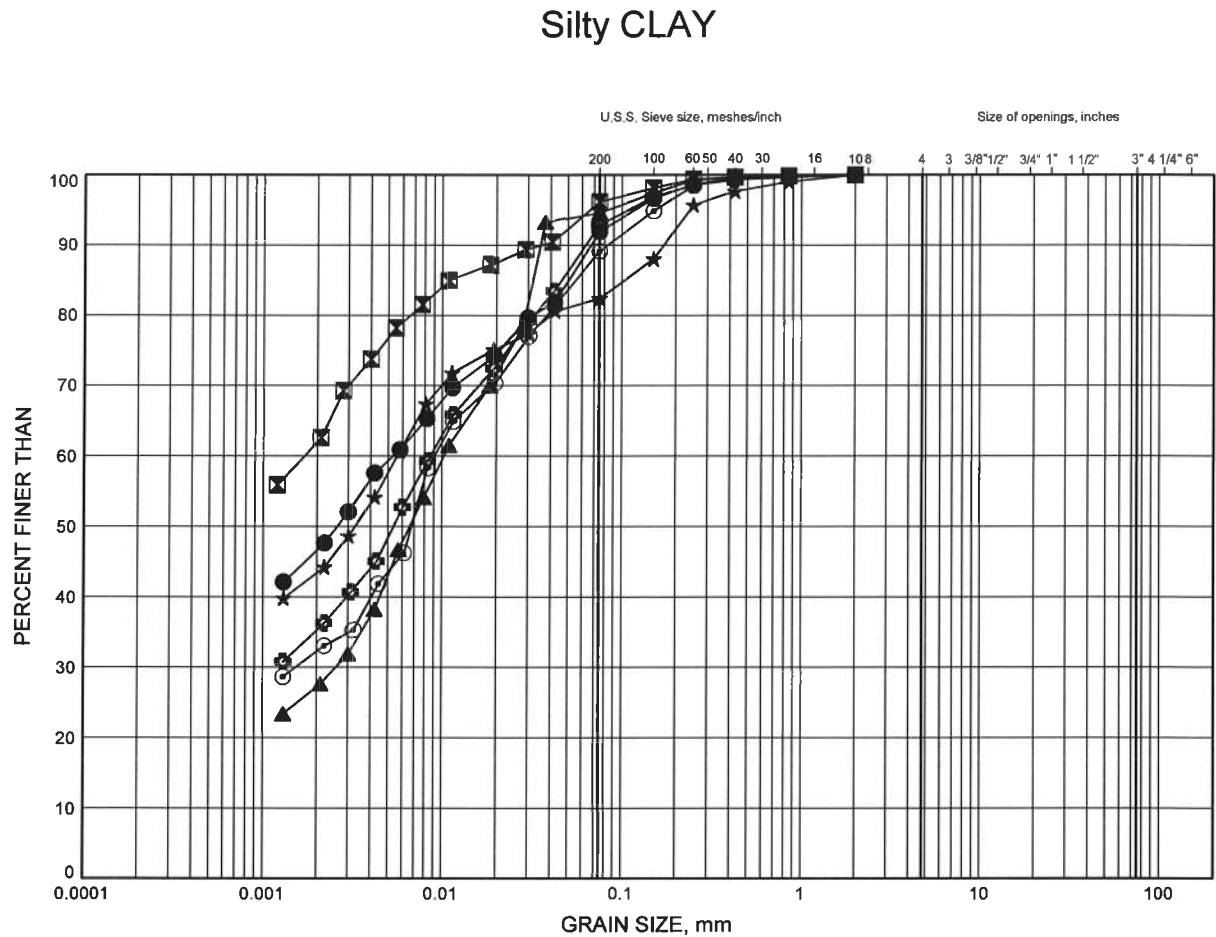


Prep'd MFA

Chkd. MRA

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

FIGURE X2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH45-02	1.07	191.73
⊠	BH45-03L	1.83	190.87
▲	BH45-04	1.07	191.53
★	BH45-04	3.20	189.40
⊙	BH45-05R	1.07	191.73
⊕	BH45-05R	4.88	187.92

Date December 2012

GWP# 5294-08-00

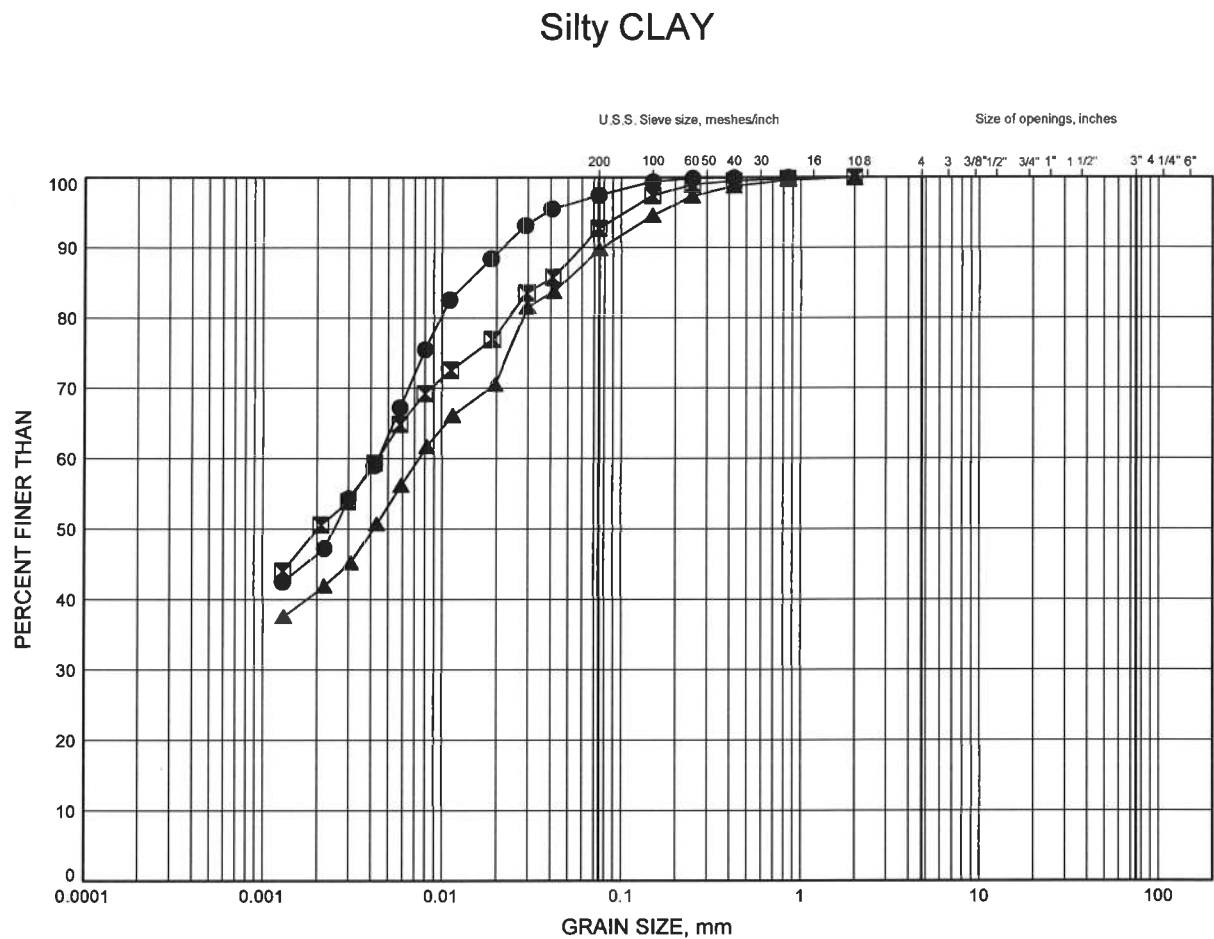


Prep'd MFA

Chkd. MRA

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

FIGURE X3



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH45-06	1.83	190.67
⊠	BH45-08	1.83	191.07
▲	BH45-09R	2.59	190.61

Date December 2012

GWP# 5294-08-00

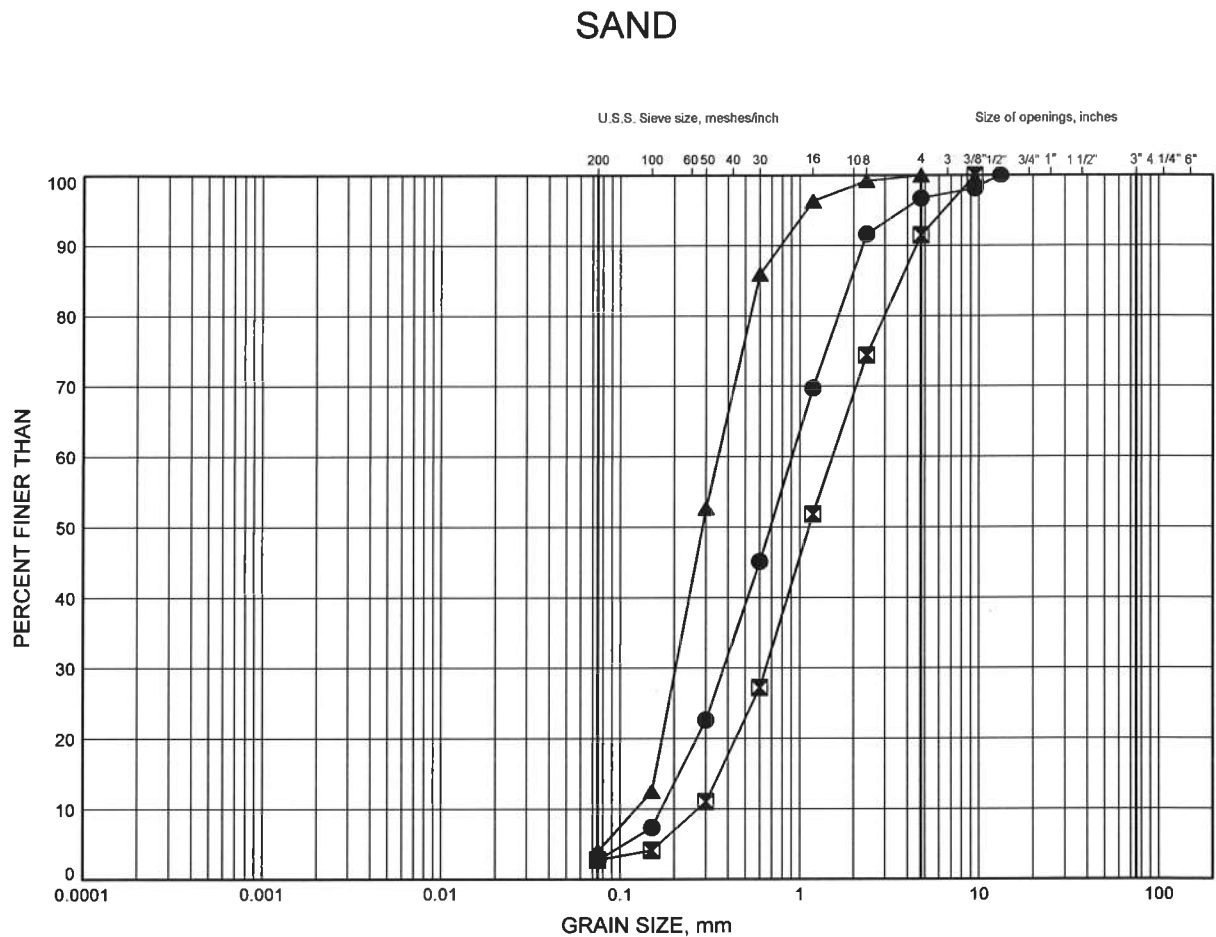


Prep'd MFA

Chkd. MRA

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

FIGURE X4



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH45-06	4.88	187.62
⊠	BH45-08	3.14	189.76
▲	BH45-09R	3.19	190.01

Date December 2012

GWP# 5294-08-00



Prep'd MFA

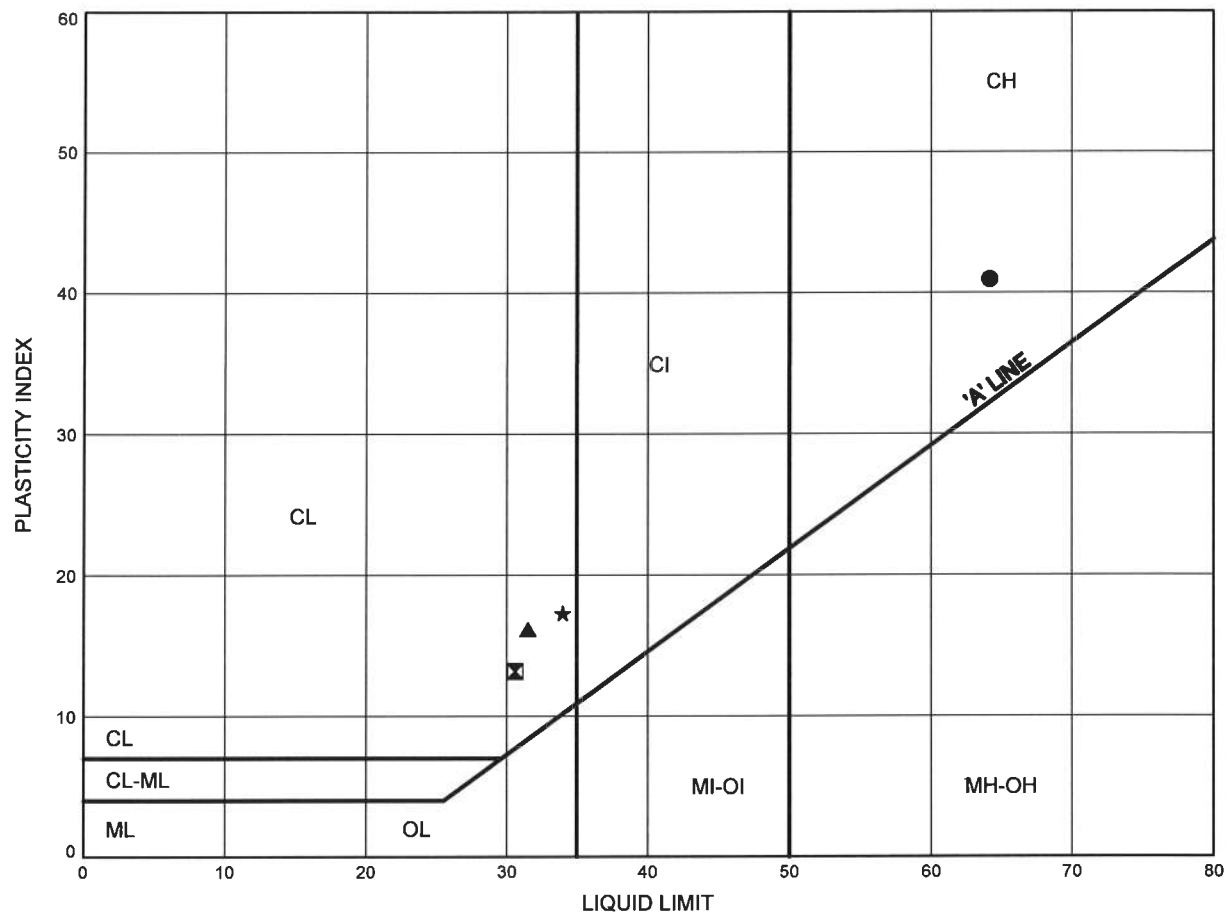
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529

ATTERBERG LIMITS TEST RESULTS

FIGURE X5

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH45-03L	1.83	190.87
⊠	BH45-04	1.07	191.53
▲	BH45-04	3.20	189.40
★	BH45-05R	4.88	187.92

Date December 2012
GWP# 5294-08-00

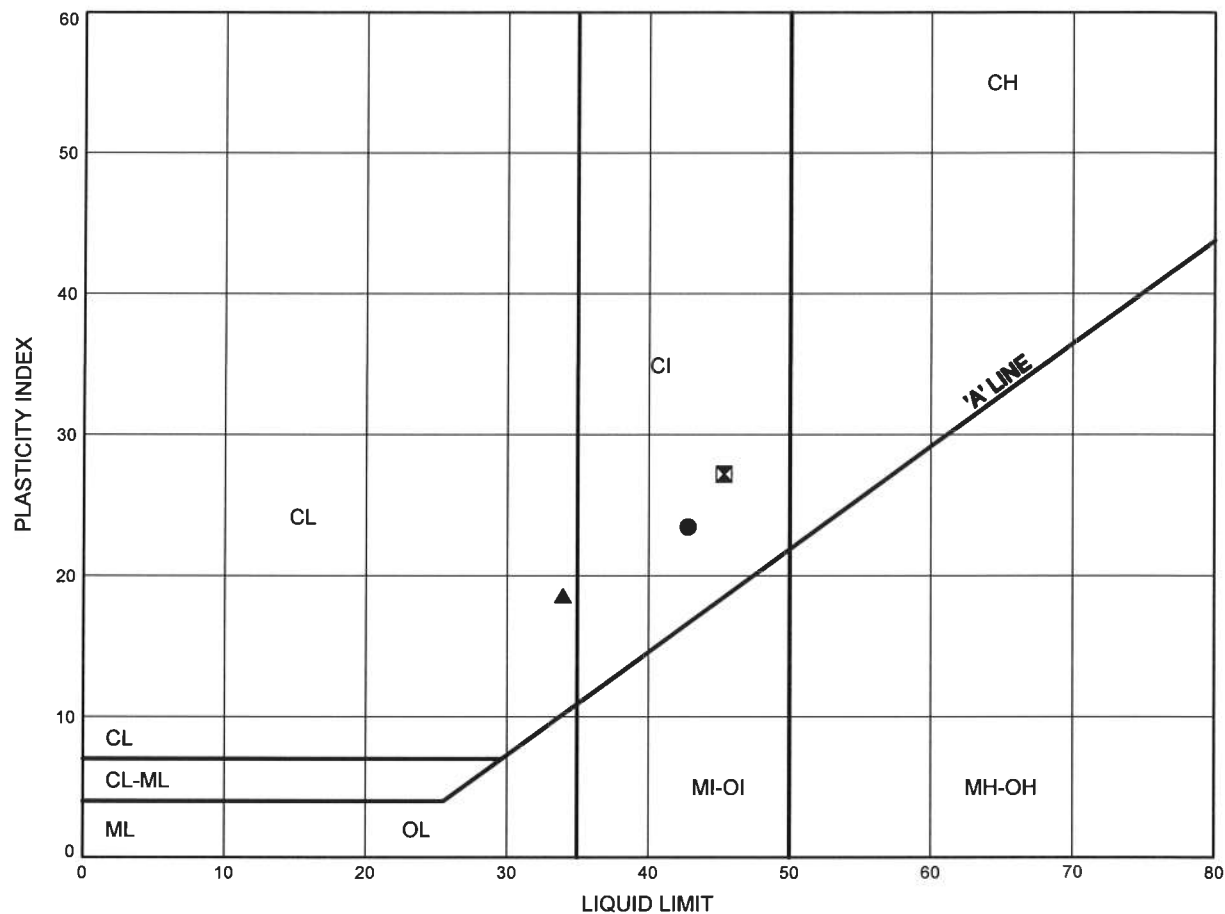


Prep'd MFA
Chkd. MRA

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

FIGURE X6

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH45-06	1.83	190.67
⊠	BH45-08	1.83	191.07
▲	BH45-09R	2.59	190.61

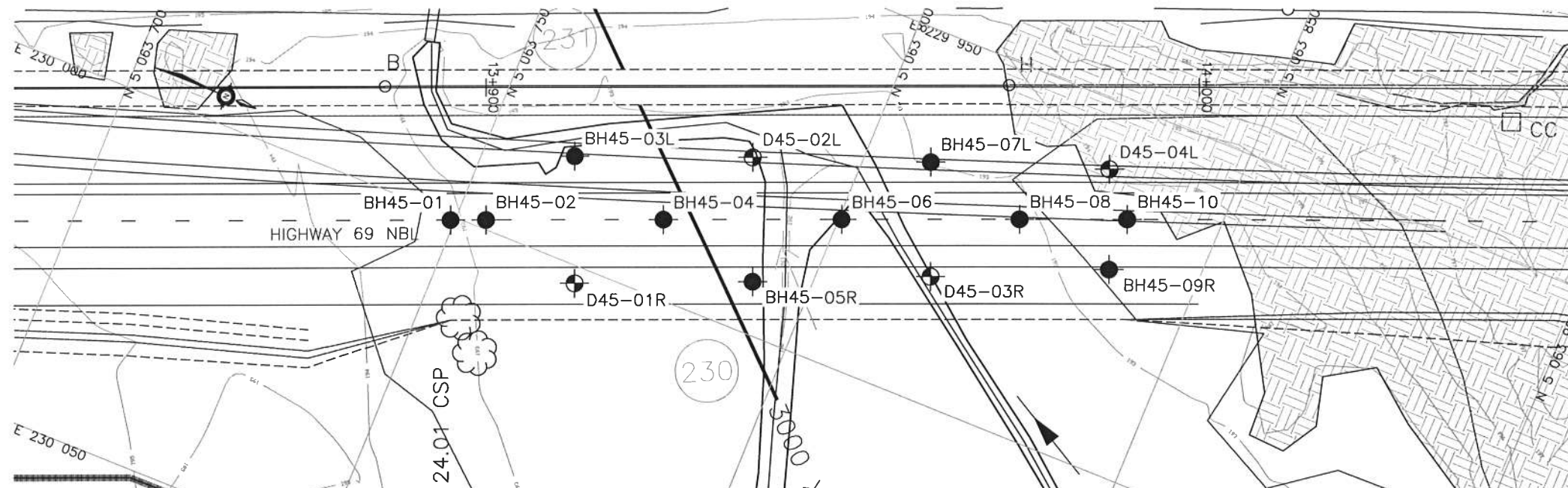
Date December 2012

GWP# 5294-08-00

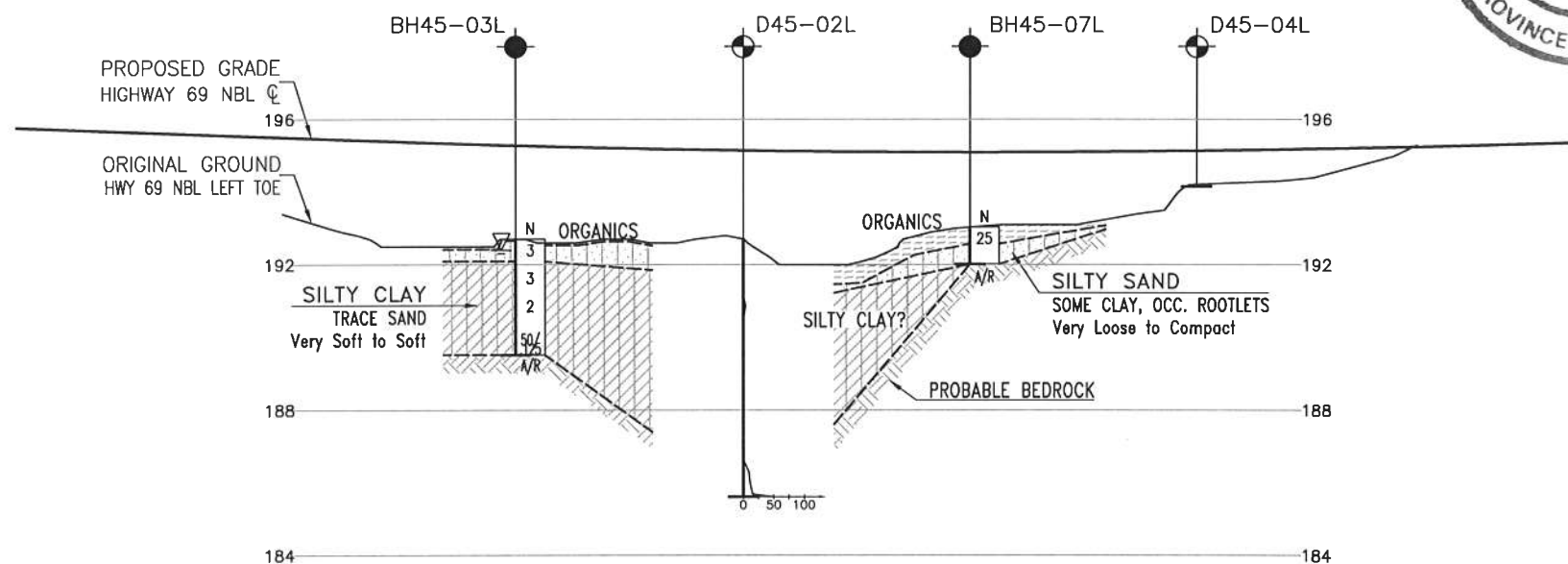


Prep'd MFA

Chkd. MRA



0 16 32 48m
SCALE 1:800



PROFILE ALONG LEFT TOE HIGHWAY 69 NBL

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

METRIC

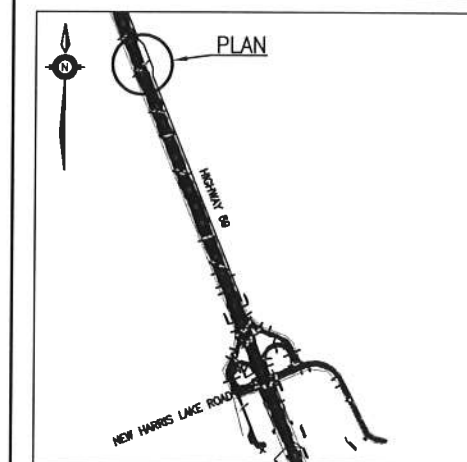
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-LT TOE
(STA 13+890 - 13+990)
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

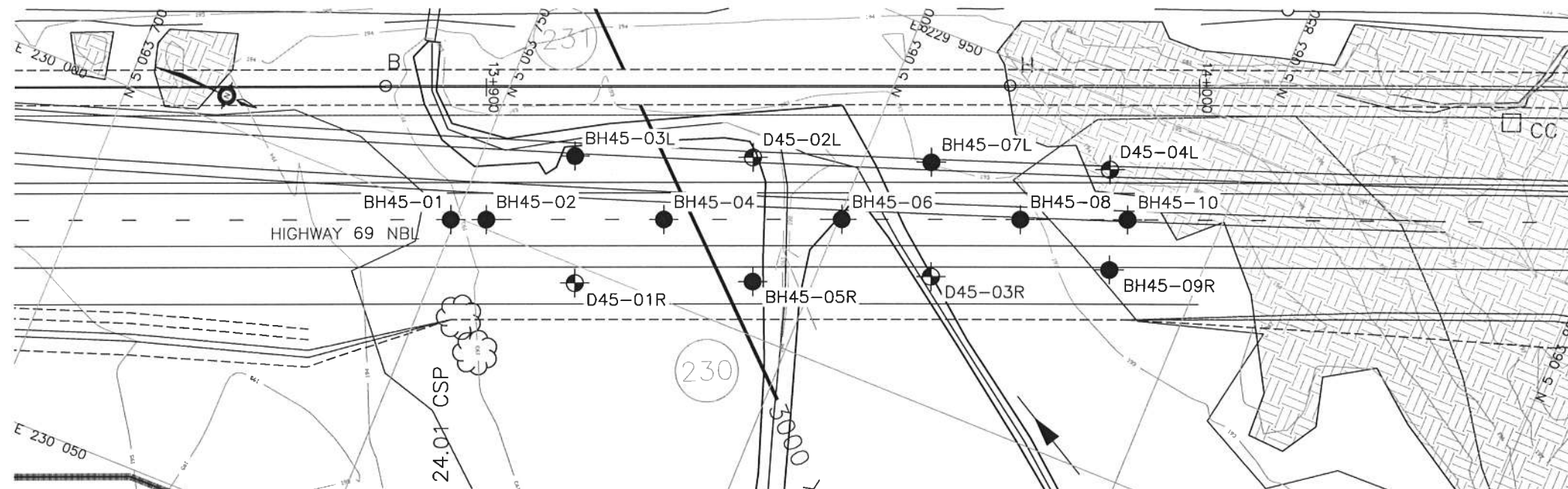
NO	ELEVATION	NORTHING	EASTING
BH45-01	193.1	5 063 749.4	230 000.6
BH45-02	192.8	5 063 754.0	229 998.7
BH45-03L	192.7	5 063 762.3	229 985.7
BH45-04	192.6	5 063 777.2	229 989.3
BH45-05R	192.8	5 063 792.1	229 992.8
BH45-06	192.5	5 063 800.4	229 980.0
BH45-07L	193.0	5 063 809.0	229 967.8
BH45-08	192.9	5 063 823.6	229 970.6
BH45-09R	193.2	5 063 837.8	229 972.5
BH45-10	193.5	5 063 837.5	229 965.0
D45-01R	192.6	5 063 769.0	230 002.4
D45-02L	192.7	5 063 785.5	229 976.5
D45-03R	192.5	5 063 815.0	229 982.8
D45-04L	194.2	5 063 832.5	229 959.3

NOTES

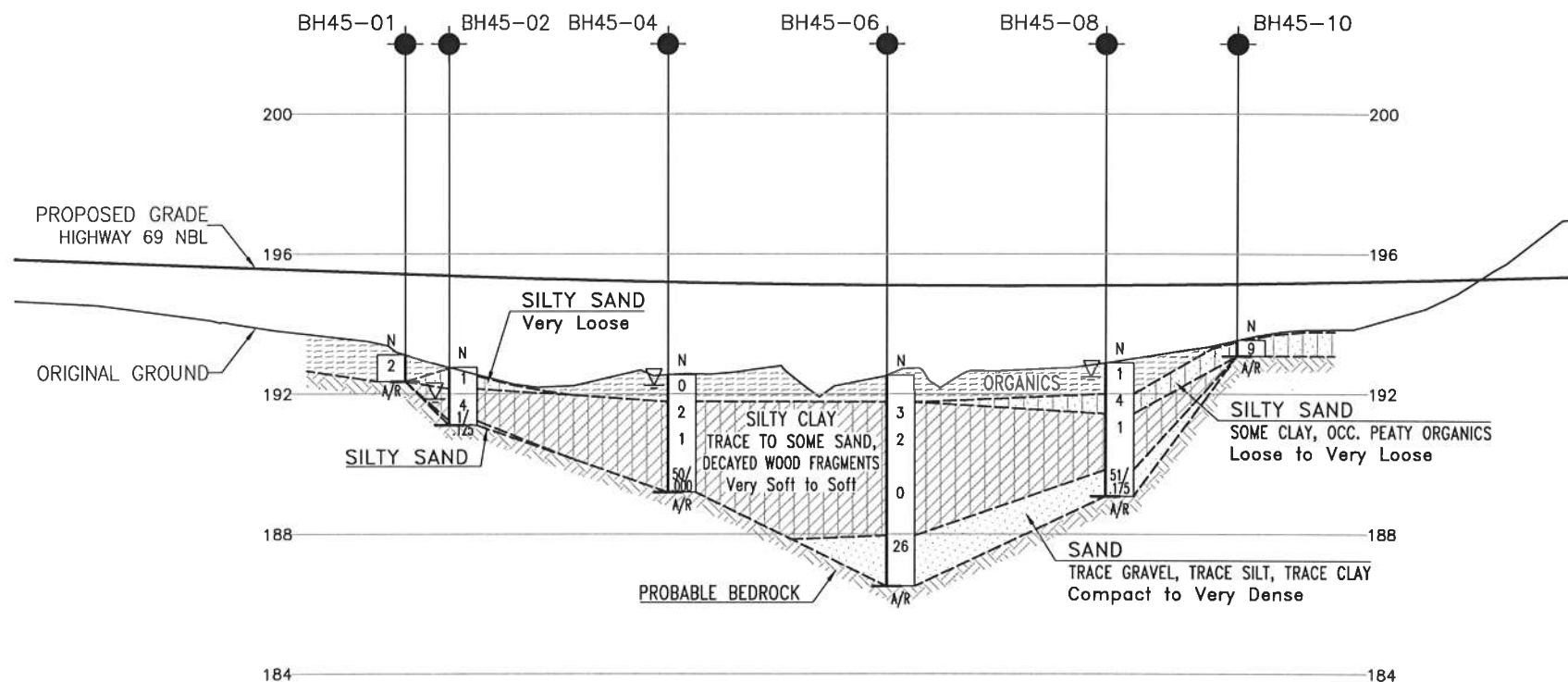
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 41H-99

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



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

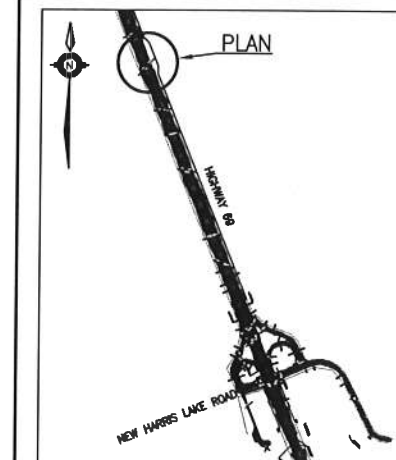
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-CL
(STA 13+890 - 13+990)
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

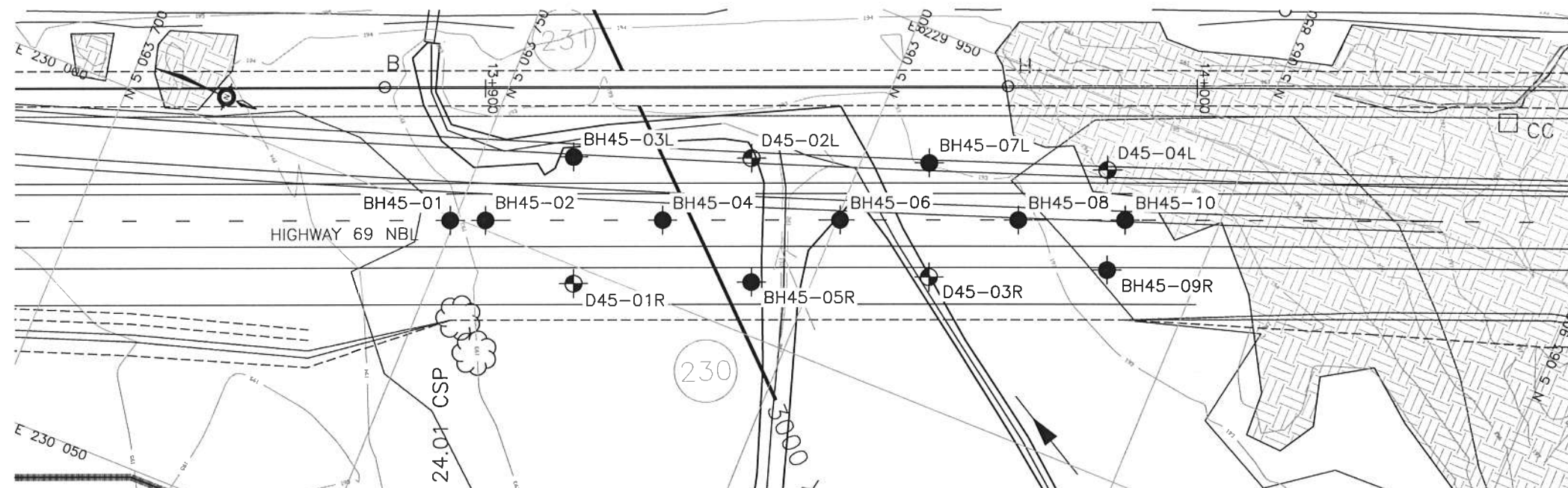
NO	ELEVATION	NORTHING	EASTING
BH45-01	193.1	5 063 749.4	230 000.6
BH45-02	192.8	5 063 754.0	229 998.7
BH45-03L	192.7	5 063 762.3	229 985.7
BH45-04	192.6	5 063 777.2	229 989.3
BH45-05R	192.8	5 063 792.1	229 992.8
BH45-06	192.5	5 063 800.4	229 980.0
BH45-07L	193.0	5 063 809.0	229 967.8
BH45-08	192.9	5 063 823.6	229 970.6
BH45-09R	193.2	5 063 837.8	229 972.5
BH45-10	193.5	5 063 837.5	229 965.0
D45-01R	192.6	5 063 769.0	230 002.4
D45-02L	192.7	5 063 785.5	229 976.5
D45-03R	192.5	5 063 815.0	229 982.8
D45-04L	194.2	5 063 832.5	229 959.3

-NOTES-

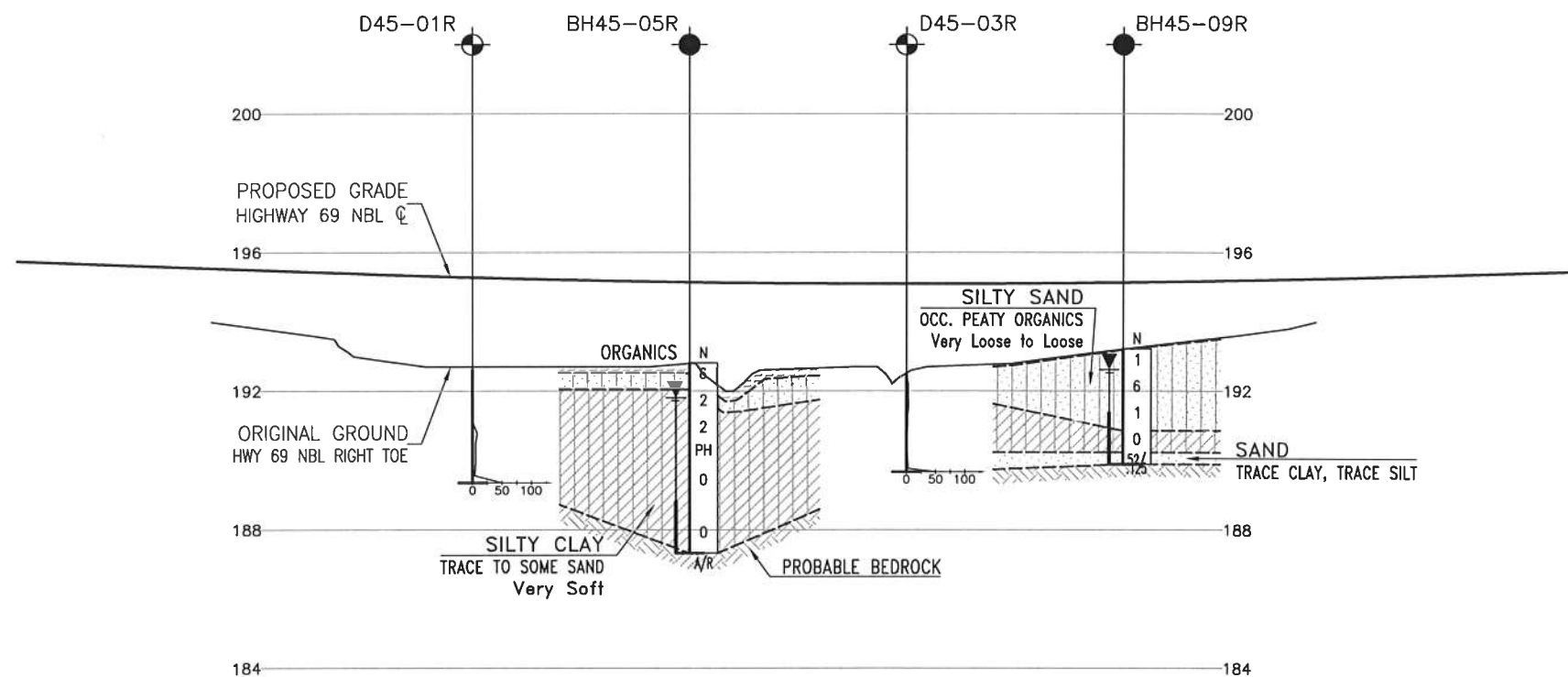
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

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
SCALE 1:800



PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL

SCALE 1:800
SCALE 1:200

METRIC

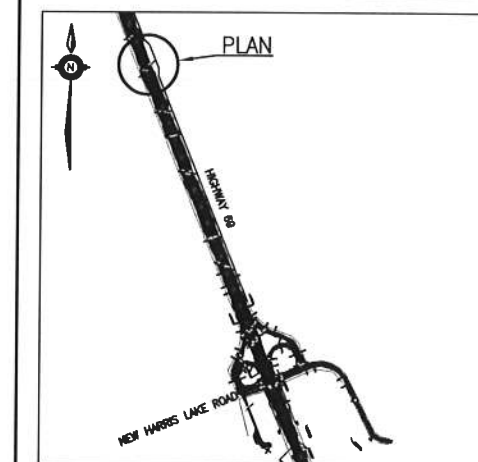
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-RT TOE
(STA 13+890 - 13+990)
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
BH45-01	193.1	5 063 749.4	230 000.6
BH45-02	192.8	5 063 754.0	229 998.7
BH45-03L	192.7	5 063 762.3	229 985.7
BH45-04	192.6	5 063 777.2	229 989.3
BH45-05R	192.8	5 063 792.1	229 992.8
BH45-06	192.5	5 063 800.4	229 980.0
BH45-07L	193.0	5 063 809.0	229 967.8
BH45-08	192.9	5 063 823.6	229 970.6
BH45-09R	193.2	5 063 837.8	229 972.5
BH45-10	193.5	5 063 837.5	229 965.0
D45-01R	192.6	5 063 769.0	230 002.4
D45-02L	192.7	5 063 785.5	229 976.5
D45-03R	192.5	5 063 815.0	229 982.8
D45-04L	194.2	5 063 832.5	229 959.3

-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



Appendix Y

**Highway 69 NBL
Sta. 14+110 to 14+280 Township of Wallbridge**

**Boreholes 46-01 to 46-11
DCPTs D46-01R to D46-05R**

**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		UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
195.9	Ground Surface						SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60 100		GR SA SI	

ONTMT4S 6121.GPJ 12/12/12

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No BH46-02

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+235 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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			SHEAR STRENGTH kPa				
								WATER CONTENT (%)				
195.1	Ground Surface						20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L		
0.0	PEAT, fibrous, mixed with topsoil Very Soft Brown Moist (700mm)		1	SS	0		195				45	
194.4												
0.7	Silty CLAY, sandy, oxidized staining Firm Grey		2	SS	8		194					0 32 47 21
193.3												
1.8	Occasional cobbles		3	SS	54/ 200							
	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG AND AUGER CUTTINGS TO SURFACE.											

+ ³ . x ³ : Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH46-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+247.5 O/S 6.7L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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							
195.2	Ground Surface		1	SS	55/ 150	▽	195							kN/m ³	GR SA SI CL
0.0	ORGANICS: (50mm)							○ UNCONFINED + FIELD VANE			w _p w w _L				
194.7	Silty SAND, trace clay, occasional peaty organics							● QUICK TRIAXIAL × LAB VANE							
0.5	Very Dense Brown Wet														
	END OF BOREHOLE (SAMPLER BOUNCING) AT 0.4m 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 BH46-04

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+255 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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 (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE						
195.2	Ground Surface							● QUICK TRIAXIAL × LAB VANE					GR SA SI CL	
0.0	PEAT , fibrous, some sand, some silt Very Soft Brown (700mm)		1	SS	0		195							
194.5														
0.7	Silty CLAY , trace sand, occasional rootlets, oxidized staining Firm Brown to Grey		2	SS	8		194							0 6 39 55
193.5														
1.7	Silty SAND , trace sand, trace gravel Compact Grey Moist		3	SS	12		193							
192.3			4	SS	12									5 61 27 7
2.9	END OF BOREHOLE AT 2.9m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE 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) Sep 24/08 0.1 195.1 Oct 29/08 0.2 195.0 Jan 16/09 Frozen at Surface Feb 19/09 Frozen at Surface Apr 21/09 Ground Surface Jun 05/09 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 BH46-05R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+269 O/S 8.2R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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											
195.6	Ground Surface		1	SS	2			20 40 60 80 100					20 40 60					528	GR SA SI CL
0.0	ORGANICS: (500mm) Soft Brown							SHEAR STRENGTH kPa					WATER CONTENT (%)						
195.1	Wet							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE											
0.5	END OF BOREHOLE AT 0.4m UPON REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 0.2m 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 BH46-06

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+273 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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			20 40 60 80 100	20 40 60 80 100					
195.4	Ground Surface													
0.0	ORGANICS: (150mm)		1	SS	50/									GR SA SI CL
0.2	Brown Wet				.000									
	END OF BOREHOLE (SAMPLER BOUNCING) AT 0.5m ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.													

RECORD OF BOREHOLE No BH46-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+122.5 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.12.02 - 2010.12.02 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						
								20 40 60 80 100						
193.9	Ground Surface													
0.0	ORGANICS, fibrous													
0.2	Silty CLAY, trace sand Soft to Stiff Grey		1	SS	2		193							0 9 44 47
			2	SS	13									
			3	SS	14									
192.1														
1.8	SAND, some silt, trace gravel Compact Grey Wet		4	SS	13	192							4 84 12 (SI+CL)	
			5	SS	30									
190.9							191							
3.0	END OF BOREHOLE (SAMPLER BOUNCING) AT 3.0m ON PROBABLE BEDROCK. BOREHOLE OPEN AND WATER LEVEL AT 1.5m UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.													

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH46-08R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+135 O/S 8.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 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		
193.8	Ground Surface													
0.0	ORGANICS, fibrous Black		1	SS	2									
193.4														
0.4	Silty CLAY, with wet sand seams Firm Brown to Grey		2	SS	6		193							
			3	SS	8									
			4	SS	35/ 300		192							0 9 44 47
191.5														
2.3	END OF BOREHOLE (SAMPLER BOUNCING) AT 2.3m ON PROBABLE BEDROCK. BOREHOLE OPEN TO 2.3m AND WATER LEVEL AT 0.2m UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.													

RECORD OF BOREHOLE No BH46-09

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+147.5 C/L, NBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Visual Examination COMPILED BY MFA
DATUM Geodetic DATE 2010.11.30 - 2010.11.30 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 (%)			
							20	40	60	80	100	W _p	W	W _L		
193.5	Ground Surface															
0.0	BEDROCK AT SURFACE.															

+ ³ × 3 : Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH46-10L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+160 O/S 8.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.11.30 - 2010.11.30 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									
								20 40 60 80 100									
194.0	Ground Surface																
0.0	ORGANICS , fibrous, with rock fragments		1	SS	2		194										
0.2	Silty CLAY , some sand Soft to Stiff Brown		2	SS	10		193										
192.8	SAND , trace silt, trace gravel Compact Brown Moist to Wet	3	SS	30													8 86 6 (SI+CL)
191.6		4	SS	15	192												
2.4	END OF BOREHOLE AT 2.4m DUE TO CAVE. BOREHOLE OPEN TO 1.8m AND WATER LEVEL AT 1.8m UPON COMPLETION. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No BH46-11

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wellbridge Twp., Station 14+172.5 C/L, NBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
DATUM Geodetic DATE 2010.11.30 - 2010.11.30 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		
194.7	Ground Surface													
0.0	ORGANICS, fibrous: (175mm)													
0.2	Silty SAND, with clay seams Very Loose to Loose Brown Moist to Wet		1	SS	3									
193.7			2	SS	40/ 250		194							0 50 34 16
1.0	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.0m ON PROBABLE BEDROCK. WATER LEVEL AT 0.3m UPON COMPLETION. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.													

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D46-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+247.5 O/S 6.7R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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						
195.0	Ground Surface						195	20 40 60 80 100	20 40 60					
0.0	DCPT from surface.						194	20 40 60 80 100	20 40 60					
193.7	END OF DCPT AT 1.3m UPON REFUSAL ON PROBABLE BEDROCK. WATER AT SURFACE UPON COMPLETION OF DCPT.							20 40 60 80 100	20 40 60					
1.3								20 40 60 80 100	20 40 60					

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D46-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wellbridge Twp., Station 14+263.8 O/S 8.2L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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								
195.5	Ground Surface											
0.0	DCPT from surface.											
194.6	END OF DCPT AT 0.9m UPON REFUSAL ON PROBABLE BEDROCK.											
0.9												

RECORD OF BOREHOLE No D46-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+110 O/S 8.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 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								
194.3	Ground Surface												
0.0	DCPT from surface						194						
193.1	END OF DCPT AT 1.2m UPON REFUSAL ON PROBABLE BEDROCK.												
1.2													

RECORD OF BOREHOLE No D46-04L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+135 O/S 8.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 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 (%)				
							20	40	60	80	100	W _p	W	W _L			
195.1	Ground Surface																
0.0	BEDROCK AT SURFACE.																

RECORD OF BOREHOLE No D46-05R

1 OF 1

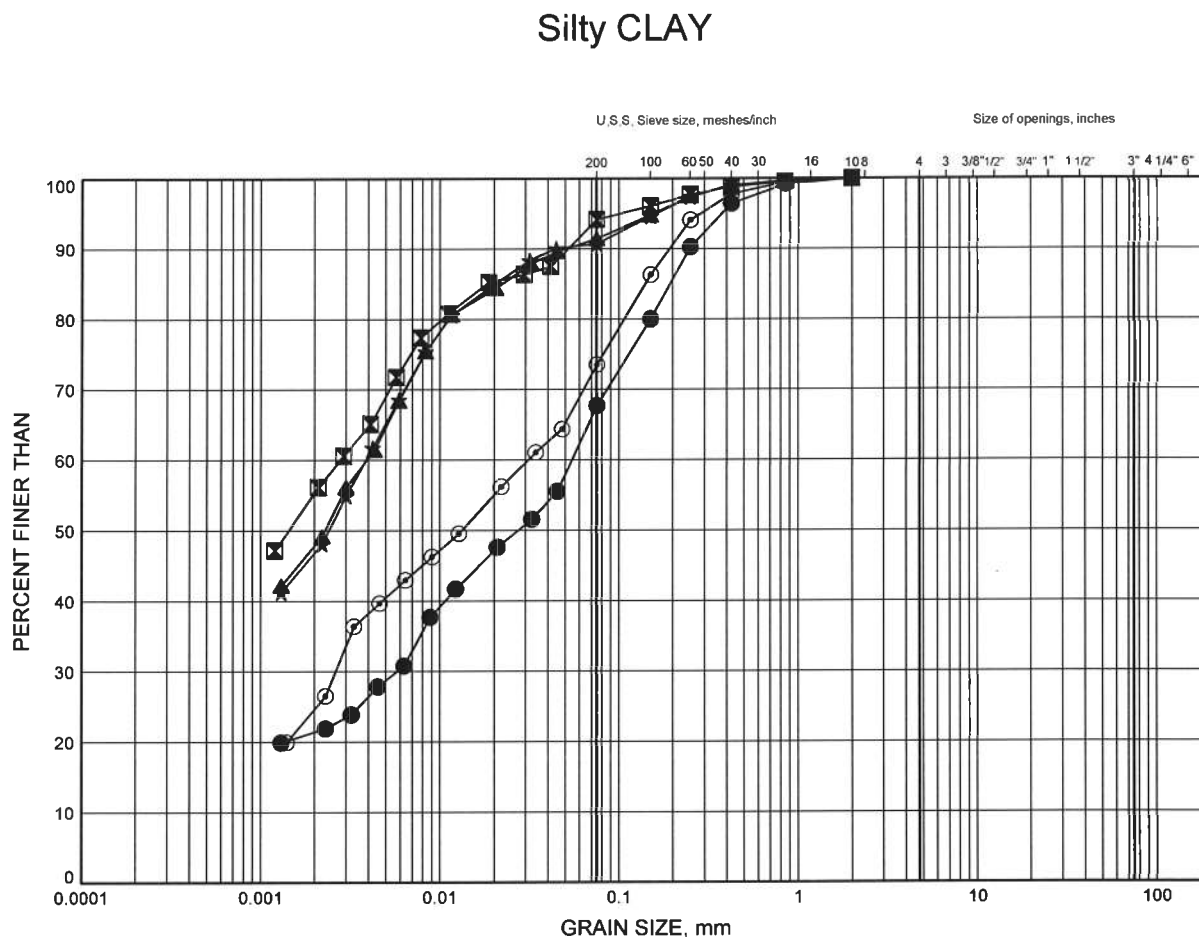
METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+160 O/S 8.0R, N8L
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) ORIGINATED BY SLL
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 COMPILED BY AN
 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						
193.7 0.0	Ground Surface DCPT from surface.							○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE x LAB VANE					
191.3 2.4	END OF DCPT AT 2.4m UPON REFUSAL ON PROBABLE BEDROCK.													

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

FIGURE Y1



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH46-02	1.07	194.03
■	BH46-04	1.07	194.13
▲	BH46-07	1.52	192.38
★	BH46-08R	1.52	192.28
○	BH46-10L	0.91	193.09

Date December 2012

GWP# 5294-08-00



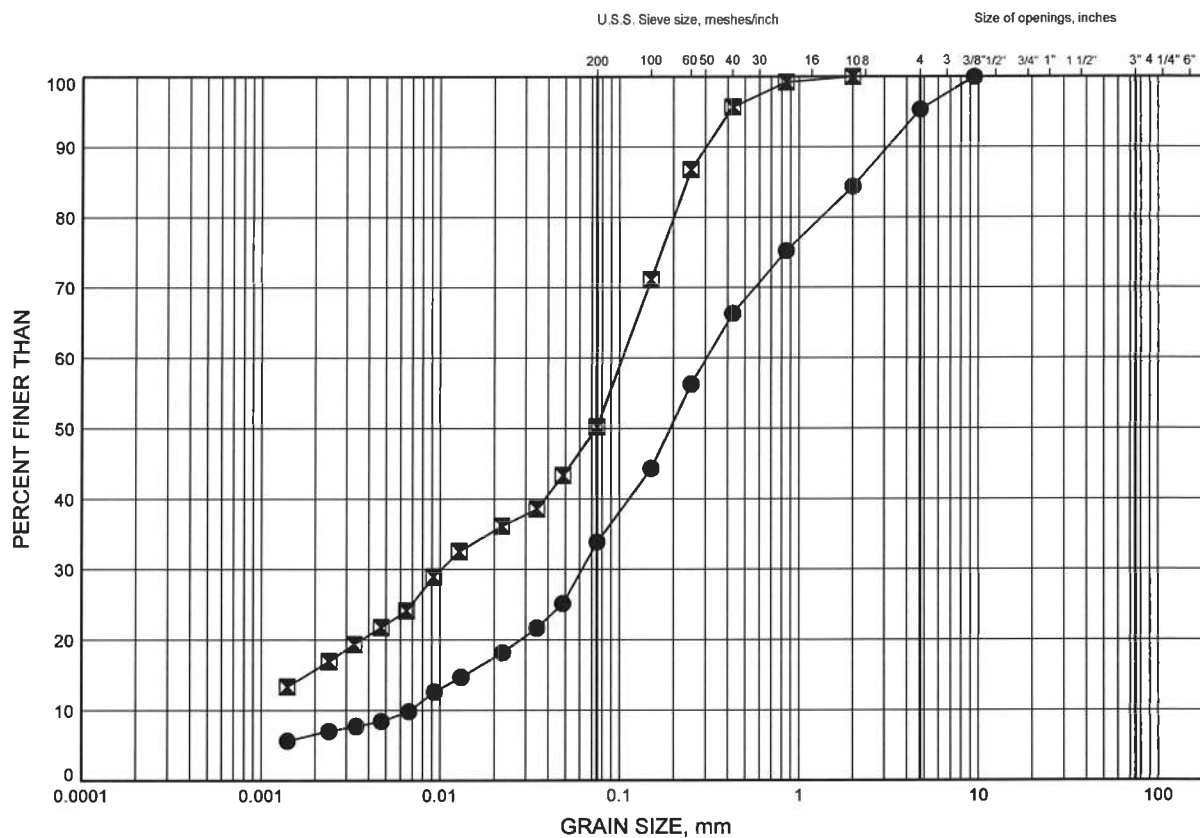
Prep'd MFA

Chkd. MRA

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

FIGURE Y2

Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH46-04	2.59	192.61
■	BH46-11	0.81	193.89

Date December 2012

GWP# 5294-08-00

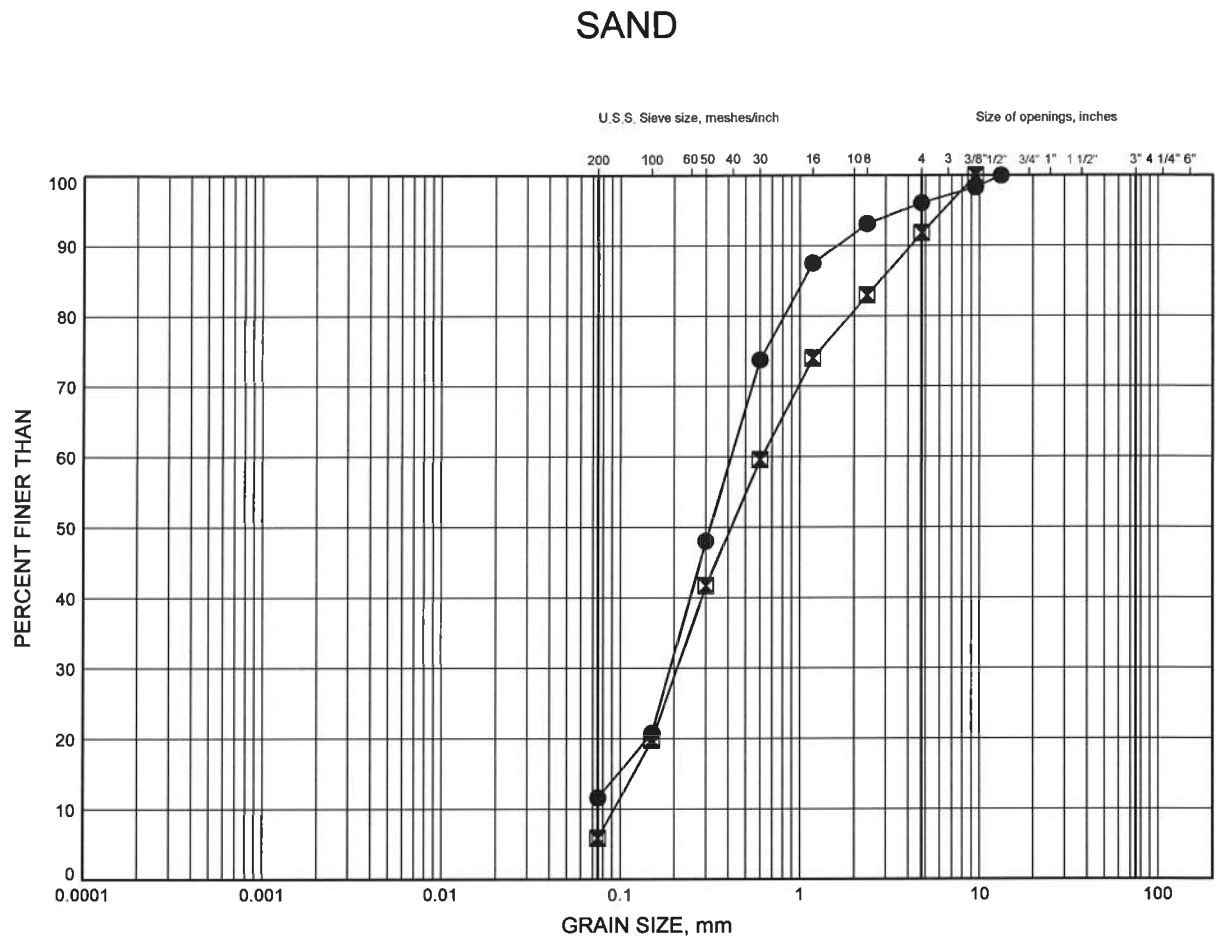


Prep'd MFA

Chkd. MRA

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

FIGURE Y3



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH46-07	2.13	191.77
◻	BH46-10L	1.52	192.48

Date December 2012
GWP# 5294-08-00



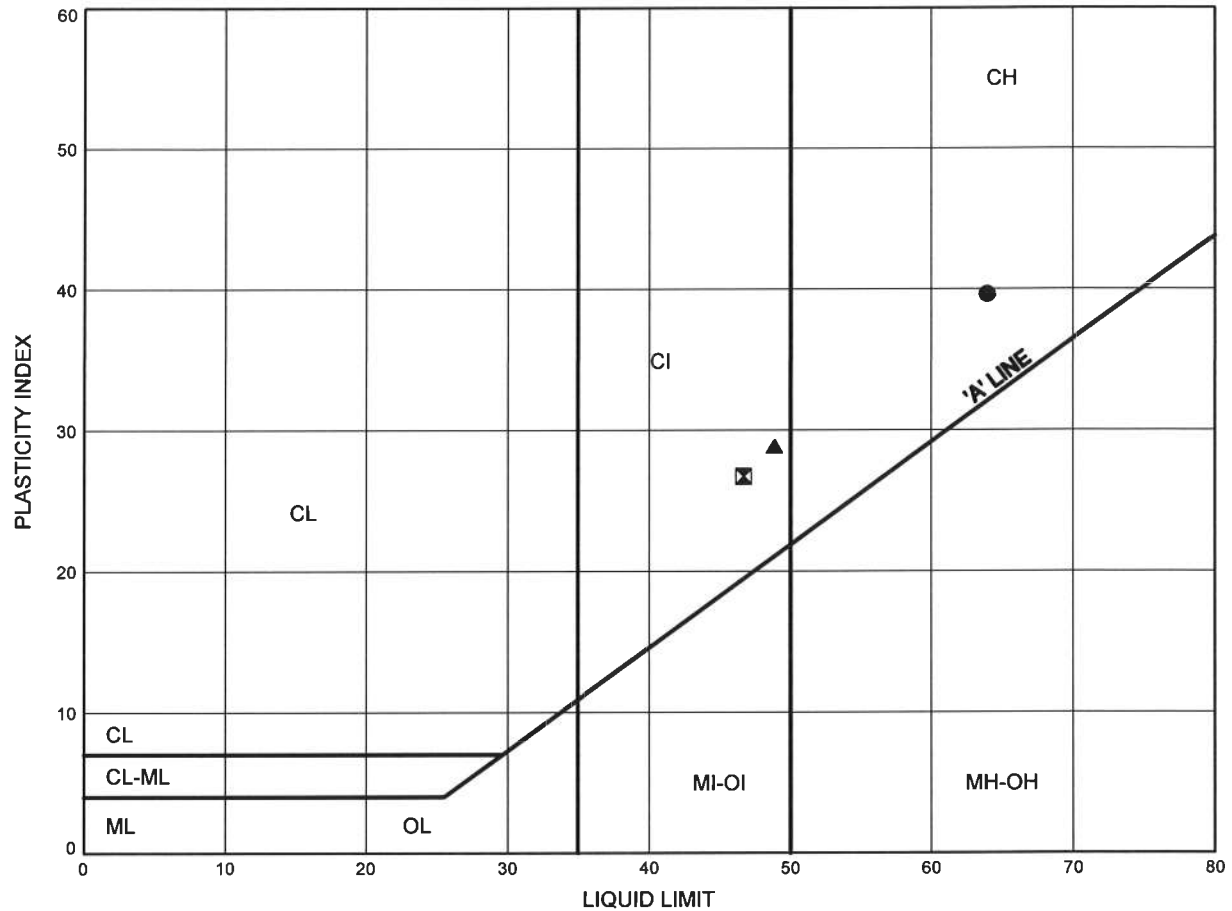
Prep'd MFA
Chkd. MRA

Hwy 69 Four-Laning North of Hwy 529

ATTERBERG LIMITS TEST RESULTS

FIGURE Y4

Silty CLAY



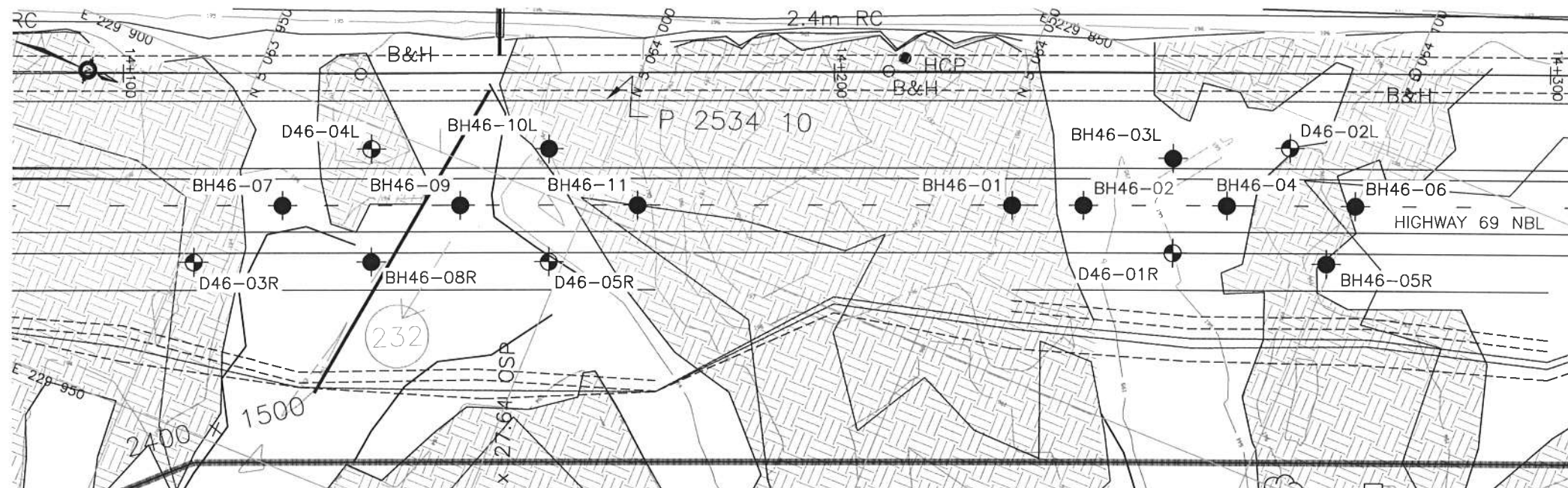
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH46-04	1.07	194.13
⊠	BH46-07	1.52	192.38
▲	BH46-08R	1.52	192.28

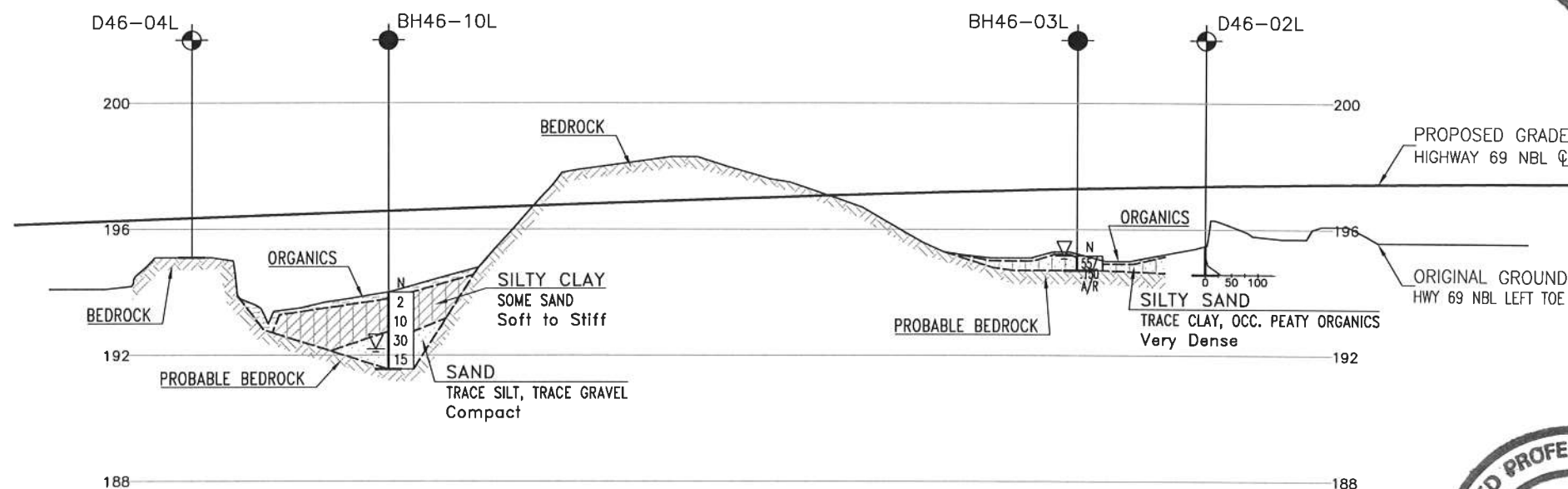
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG LEFT TOE HIGHWAY 69 NBL

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

METRIC

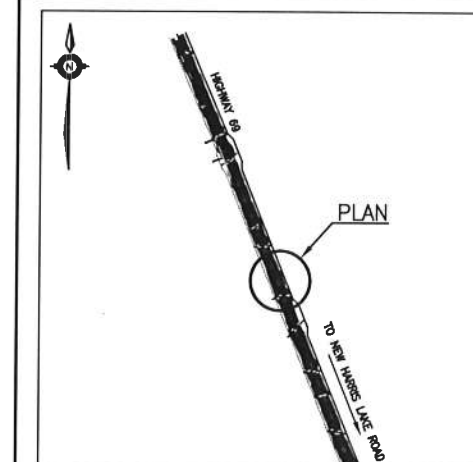
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-LT TOE
(STA 14+110 - 14+280)
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
BH46-01	195.9	5 064 055.4	229 877.0
BH46-02	195.1	5 064 064.7	229 873.2
BH46-03L	195.2	5 064 073.7	229 862.3
BH46-04	195.2	5 064 083.2	229 865.7
BH46-05R	195.6	5 064 099.2	229 868.1
BH46-06	195.4	5 064 099.9	229 859.0
BH46-07	193.9	5 063 960.3	229 915.4
BH46-08R	193.8	5 063 974.9	229 918.1
BH46-09	193.5	5 063 983.5	229 906.0
BH46-10L	194.0	5 063 992.1	229 893.9
BH46-11	194.7	5 064 006.7	229 896.6
D46-01R	195.0	5 064 078.8	229 874.7
D46-02L	195.5	5 064 088.3	229 854.8
D46-03R	194.3	5 063 951.8	229 927.5
D46-04L	195.1	5 063 968.9	229 903.3
D46-05R	193.7	5 063 998.1	229 908.7

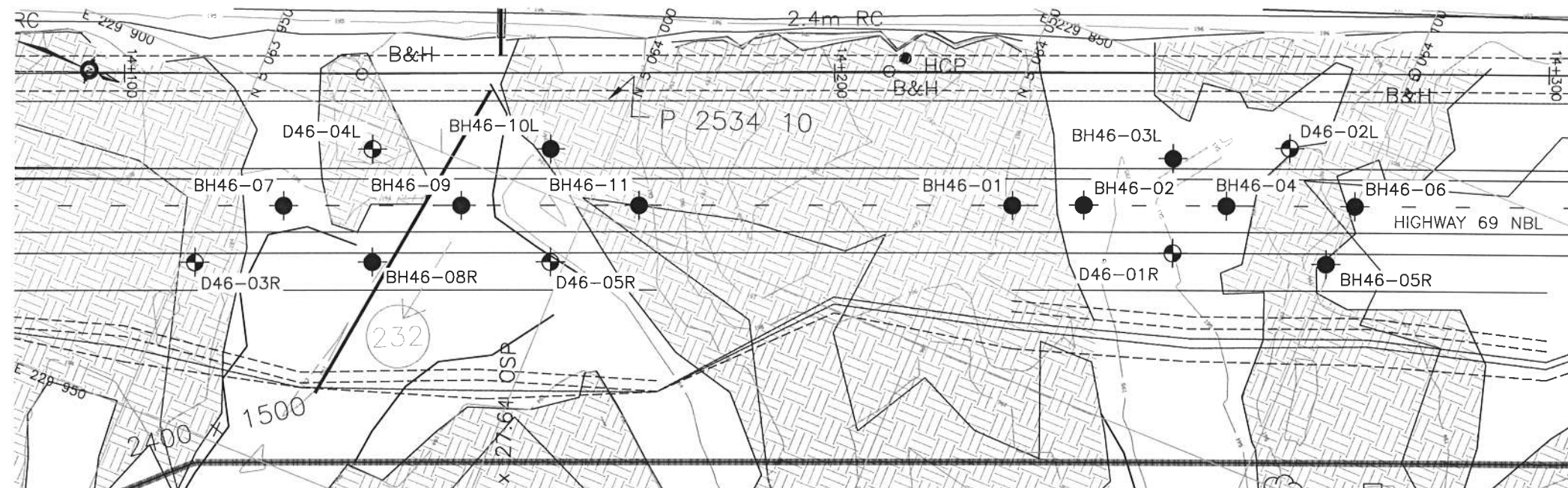
NOTES

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

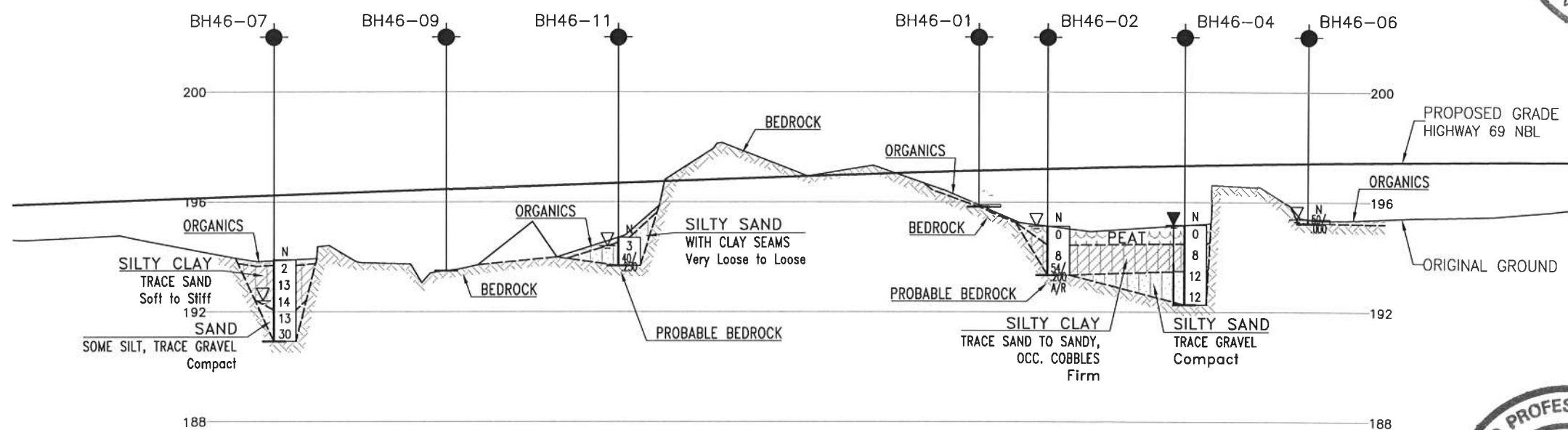
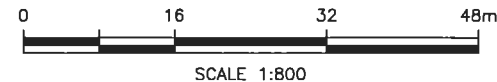
GEOCRES No. 41H-99

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

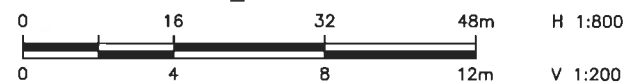




PLAN



PROFILE ALONG CL HIGHWAY 69 NBL



METRIC

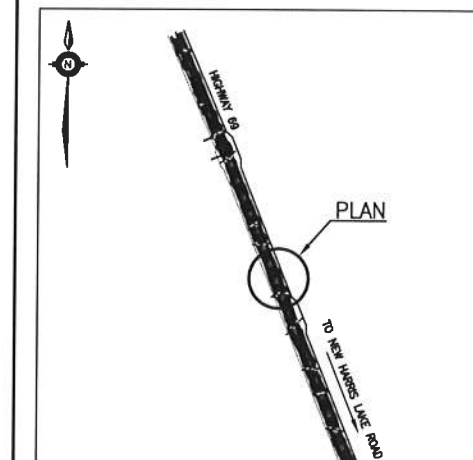
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-CL
(STA 14+110 - 14+280)
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
BH46-01	195.9	5 064 055.4	229 877.0
BH46-02	195.1	5 064 064.7	229 873.2
BH46-03L	195.2	5 064 073.7	229 862.3
BH46-04	195.2	5 064 083.2	229 865.7
BH46-05R	195.6	5 064 099.2	229 868.1
BH46-06	195.4	5 064 099.9	229 859.0
BH46-07	193.9	5 063 960.3	229 915.4
BH46-08R	193.8	5 063 974.9	229 918.1
BH46-09	193.5	5 063 983.5	229 906.0
BH46-10L	194.0	5 063 992.1	229 893.9
BH46-11	194.7	5 064 006.7	229 896.6
D46-01R	195.0	5 064 078.8	229 874.7
D46-02L	195.5	5 064 088.3	229 854.8
D46-03R	194.3	5 063 951.8	229 927.5
D46-04L	195.1	5 063 968.9	229 903.3
D46-05R	193.7	5 063 998.1	229 908.7

-NOTES-

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

GEOCRES No. 41H-99

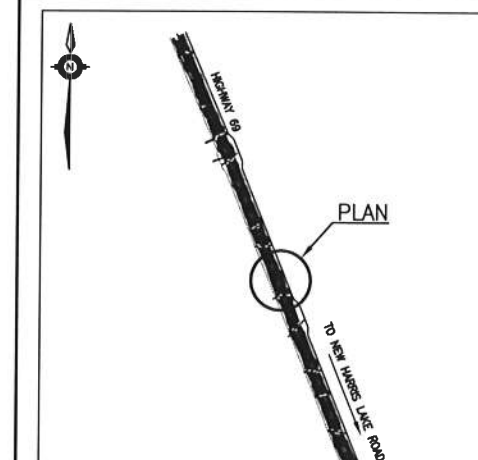
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			LOAD
			STRUCT
			DWG
			DATE DEC. 2012



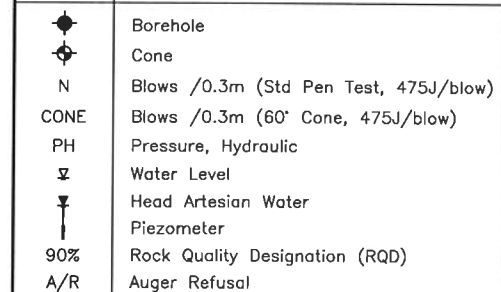
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-RT TOE
(STA 14+110 - 14+280)
BOREHOLE LOCATIONS AND SOIL STRATA



KEYPLAN
LEGEND



NO	ELEVATION	NORTHING	EASTING
BH46-01	195.9	5 064 055.4	229 877.0
BH46-02	195.1	5 064 064.7	229 873.2
BH46-03L	195.2	5 064 073.7	229 862.3
BH46-04	195.2	5 064 083.2	229 865.7
BH46-05R	195.6	5 064 099.2	229 868.1
BH46-06	195.4	5 064 099.9	229 859.0
BH46-07	193.9	5 063 960.3	229 915.4
BH46-08R	193.8	5 063 974.9	229 918.1
BH46-09	193.5	5 063 983.5	229 906.0
BH46-10L	194.0	5 063 992.1	229 893.9
BH46-11	194.7	5 064 006.7	229 896.6
D46-01R	195.0	5 064 078.8	229 874.7
D46-02L	195.5	5 064 088.3	229 854.8
D46-03R	194.3	5 063 951.8	229 927.5
D46-04L	194.1	5 063 968.9	229 903.3
D46-05R	193.7	5 063 998.1	229 908.7

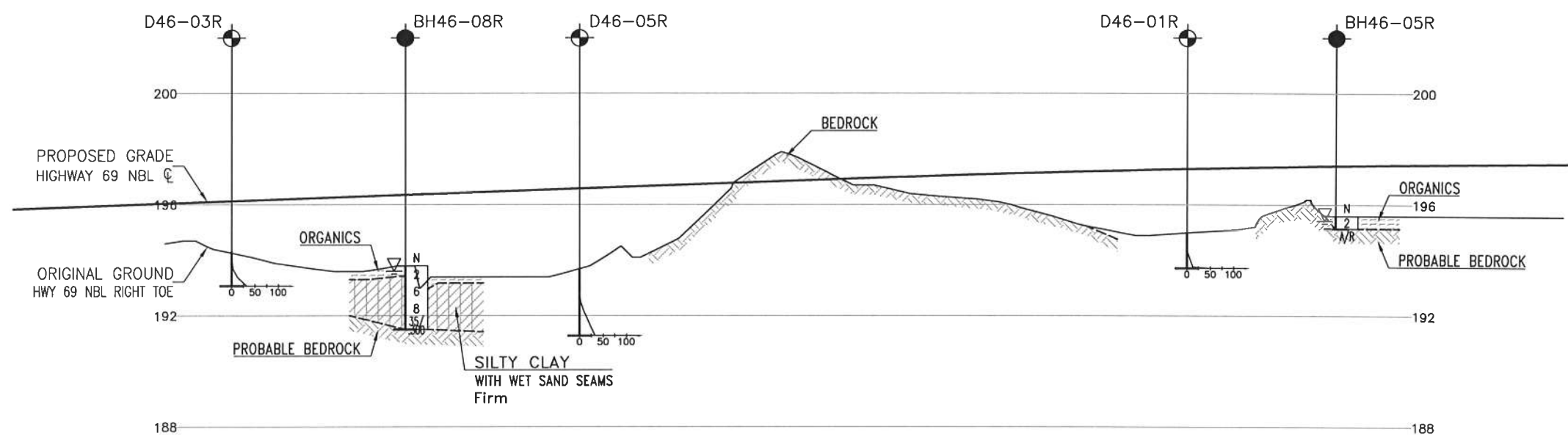
-NOTES-

- 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]

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PLOTDATE: Dec 17, 2012 - 1:15pm



PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL

0 16 32 48m H 1:800

0 4 8 12m V 1:200



Appendix Z

**Highway 69 NBL
Sta. 14+460 to 14+690 Township of Wallbridge**

**Boreholes 47-01 to 47-10, 47A-01 to 47A-06L
DCPTs D47-01R to D47-04L, D47A-01L to D47A-04R, C236-D1**

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

RECORD OF BOREHOLE No BH47-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+460 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008 09 11 - 2008 09 11 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						
195.4	Ground Surface													
0.0	ORGANICS: (300mm)													
195.1	Brown		1	SS	12									
0.3	SAND, with peaty organics													
194.7	Compact													
0.7	Brown													
194.3	Moist		2	SS	61/									
1.1	Silty CLAY, trace sand				150									
	Very Stiff													
	Brown to Grey													
	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.1m ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.													

+ 3, x 3: Numbers refer to
Sensitivity

20
15
10
5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH47-02

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+465 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE			w _p	w	w _L			WATER CONTENT (%)	
195.4	Ground Surface		1	SS	50/			20	40	60	80	100	20	40	60	80	GR SA SI CL
0.0	ORGANICS: (75mm)																
0.1	Brown				.000												
	BEDROCK AT 0.075m.																

RECORD OF BOREHOLE No BH47-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+477.5 O/S 6.3L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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 (%)				
195.1	Ground Surface							20 40 60 80 100						
0.0	Silty CLAY Very Soft Grey		1	SS	0		195							
194.3														
0.8	SAND , some silt, trace clay, trace gravel Brown		2	SS	57/ 150		194							4 81 15 (S+Cl)
1.2	Wet END OF BOREHOLE (SAMPLER BOUNCING) AT 1.2m ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.													

RECORD OF BOREHOLE No BH47-04

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+490 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						WATER CONTENT (%) w _p w w _L
194.8	Ground Surface													
0.0	ORGANICS: (50mm) Brown Wet Silty CLAY , trace sand, occasional peaty organics Very Stiff Brown		1	SS	1								57	
			2	SS	24		194							0 4 28 68
			3	SS	29		193							
			4	SS	8									
192.2														
2.6	SAND , trace silt, trace clay Loose Grey Moist						192							0 88 12 (SI+CL)
							191							
190.5														
4.3	SAND and GRAVEL													
190.2	Grey		5	SS	50/									
4.6	END OF BOREHOLE AT 4.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH GROUT AND HOLEPLUG TO SURFACE.				150									

RECORD OF BOREHOLE No BH47-05R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+502.5 O/S 7.2R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.11 - 2008.09.11 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		WATER CONTENT (%) w _p w w _L			
194.7	Ground Surface												
0.0	ORGANICS, peaty Very Soft to Soft Brown Wet		1	SS	2							87.5	
193.8	A layer of grey sandy silt (200mm)						194						
0.9	Silty CLAY, trace sand Very Soft to Soft Grey		2	SS	3								
							193						
			3	SS	1								
							192						0 1 47 52
191.5													
3.2	END OF BOREHOLE AT 3.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE 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) Sep 24/08 Ground Surface Oct 29/08 0.3 194.4 Jan 16/09 Frozen at Surface Feb 19/09 0.2 194.5 Apr 21/09 Ground Surface Jun 05/09 Ground Surface Aug 17/09 Ground Surface Aug 25/09 Ground Surface Oct 27/09 Ground Surface Nov 20/09 Ground Surface												


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

RECORD OF BOREHOLE No BH47-06

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+515 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.11 - 2008.09.11 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							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT				
194.9	Ground Surface							20	40	60	80	100	W _P	W	W _L				
0.0	Silty CLAY , trace sand, oxidized staining Soft to Firm Grey Occasional peaty organics		1	SS	1	194									○				
			2	SS	6												○		0 7 54 39
193.2			3	SS	52/										○				
1.7	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS AND HOLEPLUG TO SURFACE.				200														

+³, X³: Numbers refer to Sensitivity




20
15
10
5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH47-07L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+527.5 O/S 8.4L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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									
195.1	Ground Surface							20	40	60	80	100					
0.0	ORGANICS , peaty: (500mm) Very Soft		1	SS	5		195										
194.6	Brown																
0.5	Wet																
	END OF BOREHOLE (SAMPLER BOUNCING) AT 0.4m ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE 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 BH47-08

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+540 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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					
195.4	Ground Surface																
0.8	ORGANICS: (50mm)																
	Silty CLAY, sandy, oxidized staining Very Soft Grey		1	SS	3		195										
194.2			2	SS	50/ 000												0 30 50 20
1.2	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.																

+ 3, x 3: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH47-09R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+547.5 O/S 8.3R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.11 - 2008.09.11 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									
195.3	Ground Surface							20	40	60	80	100					
0.0	SILT , some sand, trace clay Loose to Compact Brown to Grey Moist		1	SS	5		195										0 16 81 3
194.0			2	SS	19												
1.3	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.																

1 OF 1

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								
196.2	Ground Surface						SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	W _P — W — W _L 20 40 60	WATER CONTENT (%) 20 40 60	γ kN/m ³	GR SA SI		

ONTMT4S 6121.GPJ 12/12/12

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No D47-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+477.5 O/S 6.3R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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			20	40					
194.8	Ground Surface													
0.0	DCPT from surface.													
192.6	END OF DCPT AT 2.2m UPON REFUSAL ON PROBABLE BEDROCK.													
2.2														

RECORD OF BOREHOLE No D47-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+502.5 O/S 7.2L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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									
194.7	Ground Surface																
0.0	Auger to 1.5m, DCPT starts from 1.5m.																
193.0																	
1.7	END OF DCPT AT 1.7m UPON REFUSAL ON PROBABLE BEDROCK.																

RECORD OF BOREHOLE No D47-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+527.5 O/S 8.5R, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2008.09.11 - 2008.09.11 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								WATER CONTENT (%) w _p w w _L
195.1	Ground Surface							20	40	60	80	100	20	40	60	
0.0	DCPT from surface						195									
0.2	END OF DCPT AT 0.2m UPON REFUSAL ON PROBABLE BEDROCK															

ONTMT4S 6121.GPJ 12/12/12

+³, X³: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D47-04L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+547.5 O/S 8.3L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.10 - 2008.09.10 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		w _p w w _L				
196.0	Ground Surface							20 40 60 80 100	○ UNCONFINED + FIELD VANE					
0.0	DCPT from surface.						196	● QUICK TRIAXIAL x LAB VANE	WATER CONTENT (%)					
195.2									20 40 60					
0.8	END OF DCPT AT 0.8m UPON REFUSAL ON PROBABLE BEDROCK.													

RECORD OF BOREHOLE No BH47A-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+625 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 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 (%)	
								20 40 60 80 100	20 40 60 80 100							
195.4	Ground Surface															
0.0	ORGANICS, fibrous															
0.2	Silty SAND, trace clay		1	SS	5											
194.8	Loose															
0.6	Brown															
	Moist															
	Silty CLAY, trace sand															
	Very Stiff to Hard															
	Brown															
193.6			3	SS	33											
1.8	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.															

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

RECORD OF BOREHOLE No BH47A-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+637.5 O/S 11.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 CHECKED BY MRA

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 (%)				
195.1	Ground Surface							20 40 60 80 100		W _p	W	W _L		
0.0	ORGANICS , fibrous, with sand Soft		1	SS	2		195	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE						
194.5														
0.6	SAND , some silt to silty, some clay		2	SS	7									0 60 28 12
194.0														
1.1	Silty CLAY , trace sand seams Very Stiff Brown		3	SS	19		194							0 10 42 48
193.3														
1.8	SAND , some silt to silty		4	SS	17									
193.0														
2.1	Silty CLAY , trace sand seams Very Stiff						193							
192.7														
2.4	Brown END OF BOREHOLE AT 2.4m DUE TO CAVE. BOREHOLE OPEN TO 1.8m AND WATER LEVEL AT 0.4m UPON COMPLETION. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.													

RECORD OF BOREHOLE No BH47A-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+650 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 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 (%)								
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							w _p w w _L								
195.1	Ground Surface							20	40	60	80	100	20	40	60	GR	SA	SI	CL				
0.0	ORGANICS , fibrous: (100mm)						195																
0.1	SAND , trace silt Very Loose Brown		1	SS	1	▽								○									
194.5	Wet																						
0.6	Silty CLAY , with some wet sand seams Firm Brown		2	SS	6														0	18	47	35	
193.9								194							○								
1.2																							
193.6	SAND , some silt Compact Brown Wet		3	SS	16										○					4	78	14	4
1.5															○								
	Silty CLAY , with sand seams Very Stiff to Firm Brown		4	SS	7		193									○							
192.7																							
2.4	END OF BOREHOLE AT 2.4m DUE TO CAVE. BOREHOLE OPEN TO 1.3m AND WATER LEVEL AT 1.2m 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 BH47A-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+662.5 O/S 11.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 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		
195.1	Ground Surface													
0.0	ORGANICS, fibrous: (200mm) Black		1	SS	1		195							
0.2	SAND, trace gravel, trace silt Very Loose													
194.3	Brown		2	SS	33/									
0.8	Wet				150									
END OF BOREHOLE (SAMPLER BOUNCING) AT 0.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND WATER LEVEL AT 0.2m UPON COMPLETION. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.														

RECORD OF BOREHOLE No BH47A-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wellbridge Twp., Station 14+675 C/L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 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 (%)				
195.1	Ground Surface							20 40 60 80 100		w _P w w _L				
0.0	ORGANICS , fibrous: (100mm)							○ UNCONFINED + FIELD VANE						
0.1	Black		1	SS	3		195							
194.5	Silty CLAY , with rootlets													
0.6	Soft													
	Brown													
	SAND , trace silt, trace gravel		2	SS	10									3 90 7
193.9	Compact						194							(SI+CL)
	Brown													
1.2	Wet													
	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.2m UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND WATER LEVEL AT 0.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.													

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH47A-06L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+687.5 O/S 11.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 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 (%)
								20 40 60 80 100							
195.7	Ground Surface														
0.0	ORGANICS, fibrous: (150mm)														
0.2	SAND, some silt Very Loose to Compact Brown Moist		1	SS	2										
			2	SS	9										
			3	SS	15										
			4	SS	33/										
193.6					150										
2.1	END OF BOREHOLE (SAMPLER BOUNCING) AT 2.1m UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.														

METRIC

[illegible]

RECORD OF BOREHOLE No D47A-02R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+637.5 O/S 11.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 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					
195.1	Ground Surface							20	40	60	80	100	20	40	60	
0.0	DCPT from surface						195									
							194									
							193									
192.4																
2.7	END OF DCPT AT 2.7m UPON REFUSAL ON PROBABLE BEDROCK															

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

RECORD OF BOREHOLE No D47A-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+662.5 O/S 11.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 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 (%)					
195.1	Ground Surface						195	20 40 60 80 100	20 40 60					
0.0	DCPT from surface													
194.2	END OF DCPT AT 0.9m UPON REFUSAL ON PROBABLE BEDROCK													
0.9														

RECORD OF BOREHOLE No D47A-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 14+687.5 O/S 11.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2010.12.01 - 2010.12.01 CHECKED BY MRA

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		w _p w w _L				
195.5	Ground Surface							20 40 60 80 100						
0.0	DCPT from surface							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	WATER CONTENT (%)					
195.0								20 40 60 80 100						
0.5	END OF DCPT AT 0.5m UPON REFUSAL ON PROBABLE BEDROCK													

RECORD OF BOREHOLE No C236-D1

1 OF 1

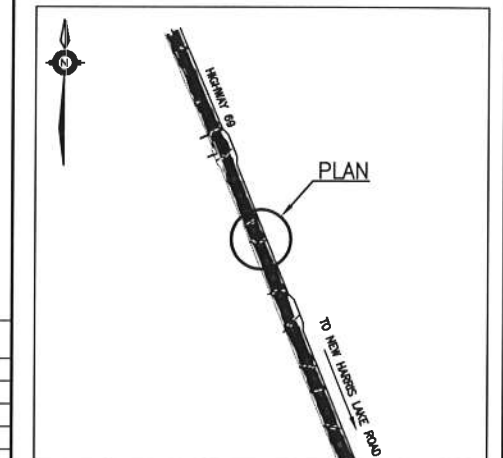
METRIC

WP# 5134-12-22 LOCATION N 5 064 451.2 E 229 731.8 ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY AN
DATUM Geodetic DATE 2012.05.23 - 2012.05.23 CHECKED BY LRB

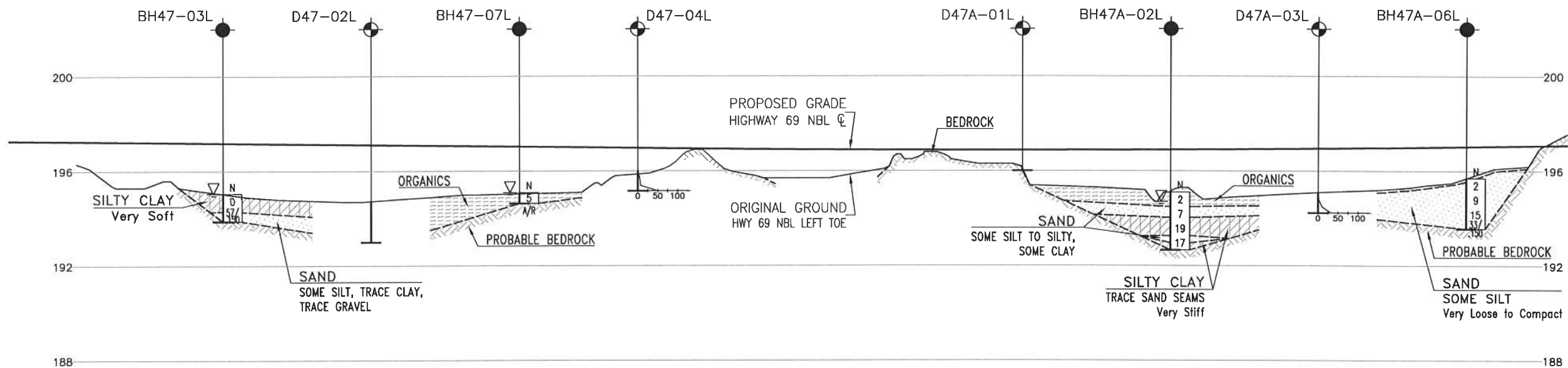
SOIL PROFILE		SAMPLES				GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT		UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		W _p	W		
195.1	Ground Surface							20 40 60 80 100					
0.0	Start DCPT from surface							20 40 60 80 100					
							195						
							194						
							193						
							192						
							191						
190.0													
5.1	END OF DCPT AT 5.1m UPON REFUSAL ON PROBABLE BEDROCK. HOLE BACKFILLED WITH BENTONITE HOLEPLUG TO SURFACE.												






DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

HIGHWAY 69 FOUR-LANING WALLBRIDGE HWY 69 NBL-LT TOE (STA 14+460 - 14+690) BOREHOLE LOCATIONS AND SOIL STRATA	
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NQ	ELEVATION	NORTHING	EASTING
D47-01R	194.8	5 064 291.9	229 788.3
D47-02L	194.7	5 064 310.0	229 766.3
D47-03R	195.1	5 064 339.1	229 771.1
D47-04L	196.0	5 064 351.3	229 748.1
D47A-01L	196.1	5 064 410.6	229 721.1
D47A-02R	195.1	5 064 442.0	229 732.2
D47A-03L	195.1	5 064 456.9	229 702.2
D47A-04R	195.5	5 064 488.3	229 713.3



	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

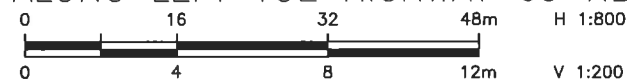
NO	ELEVATION	NORTHING	EASTING
BH47-01	195.4	5 064 273.3	229 788.9
BH47-02	195.4	5 064 277.9	229 787.1
BH47-03L	195.1	5 064 287.1	229 776.5
BH47-04	194.8	5 064 301.1	229 777.7
BH47-05R	194.7	5 064 315.4	229 779.7
BH47-06	194.9	5 064 324.3	229 768.3
BH47-07L	195.1	5 064 332.7	229 755.9
BH47-08	195.4	5 064 347.5	229 759.0
BH47-09R	195.3	5 064 357.5	229 763.9
BH47-10	196.2	5 064 366.0	229 751.5
BH47A-01	195.4	5 064 426.3	229 727.1
BH47A-02L	195.1	5 064 433.7	229 712.3
BH47A-03	195.1	5 064 449.4	229 717.8
BH47A-04R	195.1	5 064 465.2	229 723.3
BH47A-05	195.1	5 064 472.6	229 708.4
BH47A-06L	195.7	5 064 480.1	229 693.5

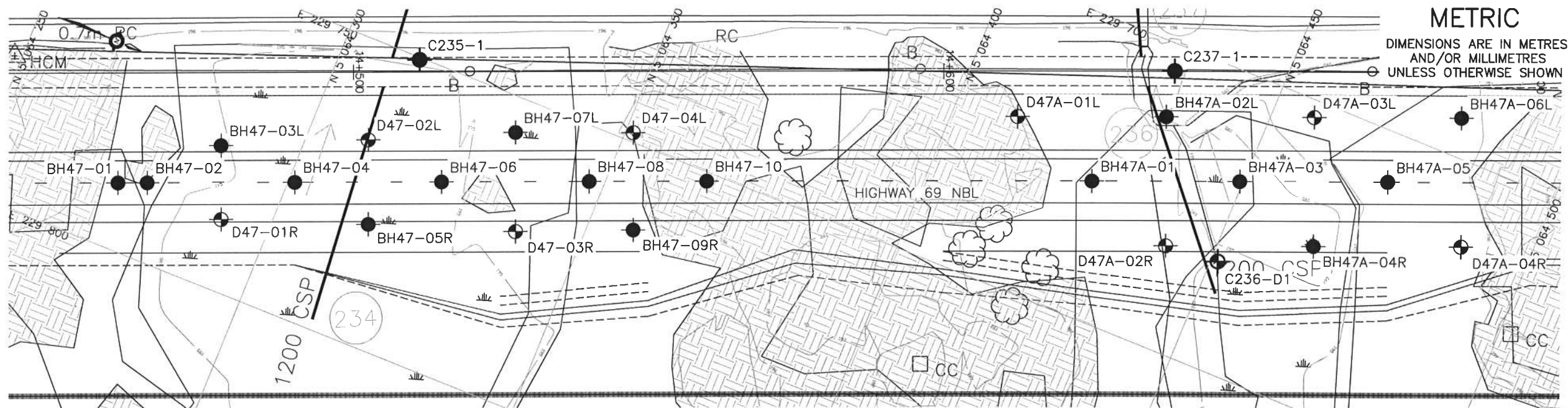
- 1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- 2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 41H-99



PROFILE ALONG LEFT TOE HIGHWAY 69 NBL

[illegible]



PLAN

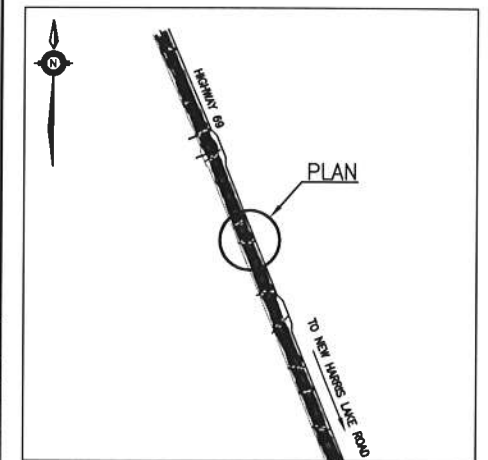


NO	ELEVATION	NORTHING	EASTING
D47-01R	194.8	5 064 291.9	229 788.2
D47-02L	194.7	5 064 310.0	229 766.3
D47-03R	195.1	5 064 339.1	229 771.5
D47-04L	196.0	5 064 351.3	229 748.5
D47A-01L	196.1	5 064 410.6	229 721.6
D47A-02R	195.1	5 064 442.0	229 732.7
D47A-03L	195.1	5 064 456.9	229 702.9
D47A-04R	195.5	5 064 488.3	229 713.9
C236-D1	195.1	5 064 451.2	229 731.8

CONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-RT TOE
(STA 14+460 - 14+690)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.

KEYPLAN
LEGEND

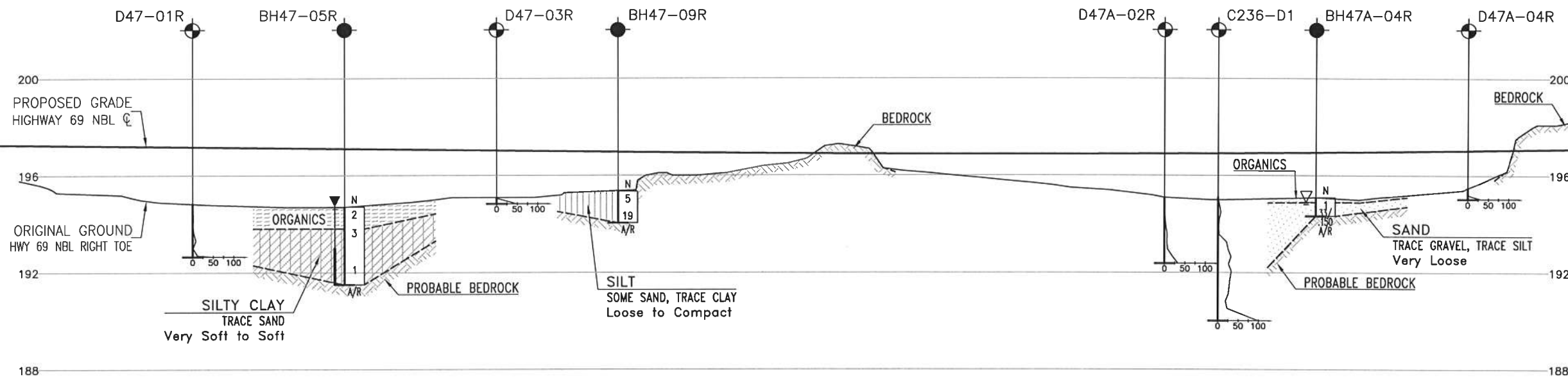
●	Borehole
○	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60' Cone, 475J/blow)
PH	Pressure, Hydraulic
W	Water Level
HA	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
BH47-01	195.4	5 064 273.3	229 788.9
BH47-02	195.4	5 064 277.9	229 787.1
BH47-03L	195.1	5 064 287.1	229 776.5
BH47-04	194.8	5 064 301.1	229 777.7
BH47-05R	194.7	5 064 315.4	229 779.7
BH47-06	194.9	5 064 324.3	229 768.3
BH47-07L	195.1	5 064 332.7	229 755.9
BH47-08	195.4	5 064 347.5	229 759.0
BH47-09R	195.3	5 064 357.5	229 763.9
BH47-10	196.2	5 064 366.0	229 751.5
BH47A-01	195.4	5 064 426.3	229 727.1
BH47A-02L	195.1	5 064 433.7	229 712.3
BH47A-03	195.1	5 064 449.4	229 717.8
BH47A-04R	195.1	5 064 465.2	229 723.3
BH47A-05	195.1	5 064 472.6	229 708.4
BH47A-06L	195.7	5 064 480.1	229 693.5

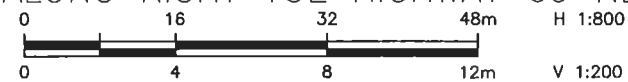
-NOTES-

- 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



PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL



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

Appendix AA

**Highway 69 NBL & SBL
Sta. 15+050 to 15+190**

**Boreholes 48-01 to 48-06, 48-08R to 48-11R, 49-01 to 49-06R, 49-08R to 49-10R,
C238-1, C239-1, C239-2
DCPTs D48-01R to D48-05L, D49-01R to D49-05R, D49-07R, D49-08L**

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

RECORD OF BOREHOLE No BH48-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+095 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.12 - 2008.09.12 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 x LAB VANE					
192.5	Ground Surface												
0.0	Silty SAND Very Loose Brown Moist		1	SS	0								
191.8													
0.7	Silty CLAY , trace sand Firm to Stiff Grey		2	SS	6								
			3	SS	8								0 3 37 60
190.3													
2.2	END OF BOREHOLE (SAMPLER BOUNCING) AT 2.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 1.9m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE. DCPT CONDUCTED NEAR THE BOREHOLE. END OF DCPT AT 2.2m UPON REFUSAL ON PROBABLE BEDROCK.												

+³, x³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH48-02

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+100 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.12 - 2008.09.12 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						WATER CONTENT (%)	
192.2	Ground Surface														
0.0	Silty SAND , with organics Very Loose Brown Moist		1	SS	1	▽	192								
191.5															
0.7	Silty CLAY , some sand Firm Grey		2	SS	6		191								
			3	SS	7		190								
	Very soft														
			4	SS	1										
			1	TW	PH		189								
	trace sand						188								
			5	SS	1										
							187								
			6	SS	1		186								
185.0															
7.2	END OF BOREHOLE AT 7.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 1.5m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH GROUT AND HOLEPLUG TO SURFACE. DCPT CONDUCTED NEAR THE BOREHOLE. END OF DCPT AT 7.2m UPON REFUSAL ON PROBABLE BEDROCK.														

+ 3, X 3 : Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH48-03L

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+112.5 O/S 9.4L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.12 - 2008.09.12 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					
191.9	Ground Surface							20 40 60 80 100					
0.0	Silty SAND , with peaty organics Very Loose Brown Moist		1	SS	0		191						GR SA SI CL
190.8													
1.1	Silty CLAY , trace to some sand, oxidized staining Very Soft to Soft Grey		2	SS	4								
			3	SS	4								
			4	SS	1								
							189					0 2 50 48	
							188						
			5	SS	0		187						
							186						
			6	SS	1							0 11 57 32	
							185						
184.7													
7.2	SAND , trace clay, trace silt, trace gravel Very Loose Grey Moist		7	SS	4		184					9 87 4 (SI+CL)	
182.8							183						
9.1	END OF BOREHOLE (SAMPLER BOUNCING) AT 9.1m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 0.9m UPON COMPLETION OF DRILLING.												

Continued Next Page

+ 3, × 3: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH48-03L

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+112.5 O/S 9.4L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.12 - 2008.09.12 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		
	Continued From Previous Page															
	BOREHOLE BACKFILLED WITH HOLEPLUG AND GROUT TO SURFACE. DCPT CONDUCTED NEAR THE BOREHOLE. END OF DCPT AT 9.1m UPON REFUSAL ON PROBABLE BEDROCK.															

RECORD OF BOREHOLE No BH48-04

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+125 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.12 - 2008.09.12 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			20 40 60 80 100	PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	
191.8	Ground Surface											
0.0	PEAT, fibrous (700mm) Dark Brown		1	SS	2							
191.1												
0.7	Silty SAND with peaty organics Very Loose Brown Wet		2	SS	2							
			3	SS	1							
189.4												
2.4	Silty CLAY, trace sand Very Soft Grey		4	SS	2							
			5	SS	0							
185.9			6	SS	3							
5.9	SAND, trace silt, trace clay Very Loose Grey Wet											
			7	SS	2							
184.1			8	SS	52							
7.7	END OF BOREHOLE (SAMPLER BOUNCING) AT 7.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 0.15m 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 0.1 191.7 Jan 16/09 Frozen at Surface Feb 19/09 Frozen at Surface Apr 21/09 0.2 191.6				0.050							

Continued Next Page

+ 3, X 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH48-04

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+125 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.12 - 2008.09.12 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			20 40 60 80 100	20 40 60 80 100	w _p w w _L	WATER CONTENT (%)			
Continued From Previous Page														
	Jun 05/09 Ground Surface Oct 27/09 0.3 191.5													

RECORD OF BOREHOLE No BH48-05R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+130 O/S 9.2R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.13 - 2008.09.13 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 (%)				
192.1	Ground Surface							20 40 60 80 100		w _p	w	w _L		
0.0	Silty SAND , occasional peaty organics Very Loose to Loose Brown Wet		1	SS	0	▽	192							
			2	SS	5		191							
190.7														
1.4	Silty CLAY , trace sand Soft to Firm Grey		3	SS	5		190							
			4	SS	3									
189.1														
3.0	SAND , trace gravel, trace silt, trace clay Loose Grey Wet		5	SS	9		189							
187.0							188							
5.1	END OF BOREHOLE UPON AUGER REFUSAL AT 5.1m ON PROBABLE BEDROCK. WATER LEVEL AT 0.3m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH GROUT AND HOLEPLUG TO SURFACE.													

RECORD OF BOREHOLE No BH48-06

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+135 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.13 - 2008.09.13 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				
192.1	Ground Surface							20 40 60 80 100				
0.0	PEAT: (700mm) Very Soft Brown Wet		1	SS	1		192					
191.4												
0.7	Silly SAND, some clay Loose Grey Wet		2	SS	7		191					
			3	SS	4		190					0 60 29 11
189.7												
2.4	Silly CLAY, trace sand Very Soft Grey		4	SS	2		189					0 6 30 64
188.3												
3.8	END OF BOREHOLE AT 3.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH GROUT AND HOLEPLUG TO SURFACE. DCPT CONDUCTED NEAR THE BOREHOLE. END OF DCPT AT 3.8m UPON REFUSAL ON PROBABLE BEDROCK.											

RECORD OF BOREHOLE No BH48-08R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+087.5 O/S 11.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.13 - 2011.02.13 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 (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
192.9	Pond Surface							20	40	60	80	100					
0.0	ICE: (100mm)																
0.1																	
192.5	PEAT: (300mm)																
0.4	Black																
	SAND, trace silt																
191.9	Loose																
1.0	Brown		1	SS	5		192										
	Wet																
	Silty CLAY, trace sand																
	Firm																
	Brown		2	SS	50/												
191.1																	
1.8	END OF BOREHOLE AT 1.8m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.																

RECORD OF BOREHOLE No BH48-09L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+147.5 O/S 9.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.13 - 2011.02.13 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				
191.9	Ground Surface							20 40 60 80 100				
0.0	PEAT, fibrous							20 40 60 80 100				
191.2												
0.7	SAND, trace silt and gravel, occasional organics Very Loose Brown Wet		1	SS	0		191					
190.2												
1.7	Silty CLAY, sandy Firm to Stiff Brown to Grey		2	SS	6		190					0 26 26 48
			3	SS	8							0 3 35 62
188.9							189					
3.0	END OF BOREHOLE AT 3.0m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 1.9m AND WATER LEVEL AT 0.3m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH CUTTINGS TO SURFACE.											

+ 3, X 3: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH48-10

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+160 C/L, NBL 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 × LAB VANE							
192.0	Ground Surface						192								
0.0	PEAT: (400mm) Black														
191.6															
0.4	Silty SAND, trace clay, occasional rootlets Loose Brown Wet		1	SS	5		191								0 69 26 5
190.6															
1.4	Silty CLAY, trace sand, occasional roots and rootlets Very Soft Dark Brown Sand and silt seams		2	SS	3		190								
			3	SS	8										
			4	SS	1		189								0 4 48 48
187.6							188								
4.4	SAND, some silt, trace gravel Compact Grey Wet		5	SS	24		187								
186.6															
5.4	END OF BOREHOLE AT 5.4m 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) Feb 22/11 0.4 191.6 Mar 01/11 0.4 191.6 Mar 13/11 Ground Surface 192.0 Apr 27/11 0.4 191.6														

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH48-11R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+172.5 O/S 11.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.13 - 2011.02.13 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				
								20 40 60 80 100	PLASTIC LIMIT	NATURAL MOISTURE CONTENT		
192.2	Ground Surface											
0.0 191.9	PEAT: (300mm)											
0.3	SILT, trace sand to sandy, occasional clayey silt seams Compact Brown to Grey Moist to Wet		1	SS	15							
			2	SS	7							
			3	SS	6							
189.3	Layer of silty clay (500mm)											
2.9	Silty CLAY, trace sand Very Soft Grey		4	SS	1							
			1	TW								
186.1												
6.1	SILT and SAND, some clay Very Loose to Loose Grey		5	SS	0							
			6	SS	8							
183.5												
8.7	END OF BOREHOLE AT 8.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 2.2m AND WATER LEVEL AT 0.9m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.8m, THEN CUTTINGS TO SURFACE											

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

RECORD OF BOREHOLE No D48-01R

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+112.5 O/S 9.4R, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2008.09.12 - 2008.09.12 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			20 40 60 80 100	20 40 60 80 100					
192.1	Ground Surface													
0.0	Auger to 0.15m. DCPT starts from 0.15m.													
							192							
							191							
							190							
							189							
							188							
							187							
							186							
							185							
							184							
							183							

Continued Next Page

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

RECORD OF BOREHOLE No D48-01R

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+112.5 O/S 9.4R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.12 - 2008.09.12 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 (%)						
	Continued From Previous Page								20 40 60 80 100		w _p w w _L				
								182							
								181							
180.4															
11.7	END OF DCPT AT 11.7m UPON REFUSAL ON PROBABLE BEDROCK.														

RECORD OF BOREHOLE No D48-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+130 O/S 9.2L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2008.09.12 - 2008.09.12 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					
192.0	Ground Surface						20	40	60	80	100	20	40	60		
0.0	Auger to 0.15m. DCPT starts from 0.15m.															
					</											

RECORD OF BOREHOLE No D48-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+087.5 O/S 9.0L, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2011 02 13 - 2011 02 13 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				
192.4	Ground Surface							<div><div>20406080100</div><div>○ UNCONFINED + FIELD VANE</div><div>● QUICK TRIAXIAL × LAB VANE</div></div>				
0.0	DCPT from surface							<div><div>20406080100</div><div>PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT</div><div>w_p w w_L</div><div>WATER CONTENT (%)</div></div>				
							192					
							191					
							190					
							189					
							188					
187.0												
5.4	END OF DCPT AT 5.4m UPON REFUSAL ON PROBABLE BEDROCK.											

RECORD OF BOREHOLE No D48-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+147.5 O/S 11.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2011.02.13 - 2011.02.13 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				
								20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w		
192.0	Ground Surface							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE				
0.0	DCPT from surface						192	20 40 60 80 100			20 40 60	
							191					
							190					
							189					
							188					
187.0												
5.0	END OF DCPT AT 5.0m UPON REFUSAL ON PROBABLE BEDROCK.											

METRIC

[illegible]

RECORD OF BOREHOLE No BH49-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+080 O/S 4.0L, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.28 - 2008.10.28 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		
194.5	Ground Surface													
0.0	ASPHALT (50mm)													
	SAND, some gravel		1	AS										
193.9	Brown						194							
0.6	Moist (FILL)													
	END OF BOREHOLE AT 0.6m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN COLD PATCH TO THE SURFACE.													

RECORD OF BOREHOLE No BH49-02L

1 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+087.5 O/S 12.5L, SBL ORIGINATED BY WB
 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 NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)					
								20 40 60 80 100	w _P w w _L						
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
192.1	Ground Surface							20 40 60 80 100	20 40 60						
0.0	Sandy SILT , some clay, trace gravel, occasional roots Compact to Loose Grey Moist to Wet		1	SS	21		192					41%			
			2	SS	5		191			○				0 36 52 12	
190.5															
1.6	Silty CLAY , trace sand Very Soft Grey		3	SS	0		190			○					
			4	SS	0					┌─┐ ○				0 5 76 19	
							189	+4							
								+6							
			5	SS	0		188				○				
								+4							
187.1															
5.0	Sandy SILT , trace clay Very Loose Grey Wet		6	SS	2		187				○			0 38 54 8	
							186								
185.5															
6.6	Silty CLAY , trace sand Very Soft Grey		7	SS	0		185			○					
			8	SS	0		184			┌─┐ ○				0 31 48 21	
							183								

Continued Next Page

+ 3, × 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH49-02L

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+087.5 O/S 12.5L, SBL ORIGINATED BY WB
 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	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 (%)
	Continued From Previous Page							20 40 60 80 100		20 40 60						
								○ UNCONFINED + FIELD VANE								
								● QUICK TRIAXIAL × LAB VANE								
181.6	Silty CLAY , sandy, occasional organics		9	SS	0		182									
10.5	Very Soft															
	Grey															
180.8	Silty SAND , trace to some clay, trace gravel						181									
11.3	Very Loose															
	Grey															
	Moist															
	Gravelly SAND , trace silt		10	SS	26		180									
	Compact															
	Grey															
179.8	Wet															
12.3	END OF BOREHOLE AT 12.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH GROUT, HOLEPLUG AND AUGER CUTTINGS TO SURFACE.															

+³, x³: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH49-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+100 O/S 4.0L, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.28 - 2008.10.28 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				
194.2	Ground Surface							20 40 60 80 100						
0.0	ASPHALT (50mm)		1	AS		194								
193.5	SAND, some gravel Brown Moist (FILL)													
0.7	END OF BOREHOLE AT 0.7m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN COLD PATCH TO THE SURFACE.													

RECORD OF BOREHOLE No BH49-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+112.5 O/S 3.0R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.10.28 - 2008.10.28 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		
194.1	Ground Surface													
0.0	ASPHALT (50mm)		1	AS			194							
	SAND, some gravel, occasional rock fill fragments Brown Moist (FILL)		1	SS	115/ .225									
192.9							193							
1.2	END OF BOREHOLE AT 1.2m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN COLD PATCH TO THE SURFACE.													

+³, X³: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH49-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+125 O/S 3.0R, SBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.10.28 - 2008.10.28 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	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100		
194.0	Ground Surface													
0.0	ASPHALT (50mm)		1	AS			194							
	SAND, some gravel, occasional rock fill fragments Brown Moist (FILL)													
192.9							193							
1.1	END OF BOREHOLE AT 1.1m UPON AUGER REFUSAL ON PROBABLE ROCK FILL. BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO 0.2m, THEN COLD PATCH TO THE SURFACE.													

+³, ×³: Numbers refer to
Sensitivity




20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH49-06R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+075 O/S 16.0R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.13 - 2011.02.13 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							
192.8	Ground Surface							20	40	60	80	100			
0.0	PEAT, fibrous: (600mm)														
192.2															
0.6	SAND, trace silt Loose Brown		1	SS	7		192								
191.6	Wet														
1.2	Silty CLAY, trace sand Firm Brown		2	SS	8		191								
190.6															
2.2	END OF BOREHOLE AT 2.2m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 0.6m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.														

RECORD OF BOREHOLE No BH49-08R

1 OF 2

METRIC

GWP#	5294-08-00	LOCATION	Wallbridge Twp., Station 15+125 O/S 16.0R, SBL	ORIGINATED BY	SLL
HWY	69	BOREHOLE TYPE	Hollow Stem Augers	COMPILED BY	AN
DATUM	Geodetic	DATE	2011.02.13 - 2011.02.13	CHECKED BY	RPR

[illegible]

Continued Next Page

+ 3, x 3: Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH49-08R

2 OF 2

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+125 O/S 16.0R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2011.02.13 - 2011.02.13 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						
	Continued From Previous Page							20 40 60 80 100						
	BOREHOLE OPEN TO 3.8m AND WATER LEVEL AT 0.7m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG TO 2.0m, THEN AUGER CUTTINGS TO SURFACE.							20 40 60 80 100						

+³, ×³: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH49-09L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+150 O/S 13.0L, 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 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						
191.9	Ground Surface						20 40 60 80 100								
0.0	PEAT Black														
191.0															
0.9	Sandy SILT, some clay, occasional roots and rootlets Very Loose Brown Moist		1	SS	1										
			2	SS	9										
189.6															
2.3	Silty CLAY, trace sand, occasional rootlets Stiff to Firm Brown		3	SS	8										
	Very Soft		4	SS	1										
			5	SS	0										
			1	TW											
185.2															
6.7	END OF BOREHOLE AT 6.7m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH HOLEPLUG TO 2.2m, THEN AUGER CUTTINGS TO SURFACE.														

+ 3, × 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH49-10R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+175 O/S 18.0R, SBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.02.13 - 2011.02.13 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 (%)				
192.0	Ground Surface							20 40 60 80 100		20 40 60			GR SA SI CL	
0.0	PEAT: (300mm)						192							
191.7														
0.3	Silty CLAY, trace sand Stiff Brown		1	SS	13	▽	191							
			2	SS	9		190							
			3	SS	2		189							
	Very Soft		4	SS	0		188							
187.7														
4.3	END OF BOREHOLE AT 4.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 2.0m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG TO 2.3m, THEN AUGER CUTTINGS TO SURFACE.													

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D49-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+087.5 O/S 4.0R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.10.28 - 2008.10.28 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 (%)			
194.3	Ground Surface						20 40 60 80 100	○ UNCONFINED + FIELD VANE	W _P W W _L				
0.0	Auger to 0.8m. DCPT starts from 0.8m.					194	20 40 60 80 100	● QUICK TRIAXIAL × LAB VANE					
193.5													
0.8	END OF DCPT AT 0.8m UPON REFUSAL ON PROBABLE ROCK FILL.												

+³ ×³ : Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D49-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+112.5 O/S 12.5L, SBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) 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			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			
192.2	Ground Surface						<div>20 40 60 80 100</div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL X LAB VANE</div>				
0.0	DCPT from surface.						<div>20 40 60 80 100</div> <div>PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT</div> <div>W_p W W_L</div> <div>WATER CONTENT (%)</div>				
						192					
						191					
						190					
	Probable boulder or bedrock					189					
						188					
187.3											
4.9	END OF DCPT AT 4.9m UPON REFUSAL ON PROBABLE BEDROCK.										

RECORD OF BOREHOLE No D49-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+050 O/S 16.0R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2011.02.13 - 2011.02.13 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					
193.8	Ground Surface												
0.0	DCPT from surface												
191.2													
2.6	END OF DCPT AT 2.6m UPON REFUSAL ON PROBABLE BEDROCK												

+³, ×³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D49-04L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+067.5 O/S 13.0L, 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 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				
192.4	Ground Surface														
0.0	DCPT from surface														
191.1															
1.3	END OF DCPT AT 1.3m UPON REFUSAL ON PROBABLE BEDROCK.														

RECORD OF BOREHOLE No D49-05R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+100 O/S 16.0R, SBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2011.02.13 - 2011.02.13 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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)				
192.0	Ground Surface						192	20 40 60 80 100		w _P w w _L				
0.0	DCPT from surface						192	20 40 60 80 100		20 40 60				
							191							
							190							
							189							
							188							
							187							
							186							
							185							
184.5														
7.5	END OF DCPT AT 7.5m UPON REFUSAL ON PROBABLE BEDROCK.													

+³, X³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D49-07R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+150 O/S 16.0R, SBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2011.02.13 - 2011.02.13 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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	W _P W W _L				
192.5	Ground Surface													
0.0	DCPT from surface													
190.4	END OF DCPT AT 2.1m UPON REFUSAL ON PROBABLE BEDROCK													
2.1														

METRIC

[illegible]

+³, ×³ Numbers refer to Sensitivity

RECORD OF BOREHOLE No C238-1

1 OF 1

METRIC

WP# 5134-12-24 LOCATION N 5 064 890.8 E 229 553.3 ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2012.05.23 - 2012.05.23 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 (%)
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			
191.8	Ground Surface												
0.0	PEAT: (200mm)												
0.2	SAND, trace roots and rootlets Very Loose Dark Brown Moist to Wet		1	SS	4								
			2	SS	2								
190.4													
1.4	Silty CLAY Very Soft to Soft Brown to Grey		3	SS	2								
			4	SS	3								
			5	SS	0								
187.9													
3.9	SAND, trace gravel, trace silt Very Loose to Compact Grey Wet		6	SS	0								
			7	SS	18								
184.5													
7.3	END OF BOREHOLE AT 7.3m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 2.9m AND WATER LEVEL AT 0.8m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 0.9m, THEN CUTTINGS TO SURFACE.												

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

RECORD OF BOREHOLE No C239-1

1 OF 2

METRIC

WP# 5134-12-25 LOCATION N 5 064 870.4 E 229 525.3 ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2012.05.23 - 2012.05.23 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			SHEAR STRENGTH kPa					WATER CONTENT (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
								○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE × LAB VANE				w _p	w	w _L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
192.2	Ground Surface						20	40	60	80	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

Continued Next Page

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

RECORD OF BOREHOLE No C239-1

2 OF 2

METRIC

WP# 5134-12-25 LOCATION N 5 064 870.4 E 229 525.3 ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2012.05.23 - 2012.05.23 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 (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
	Continued From Previous Page							20 40 60 80 100	PLASTIC LIMIT W P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W L		
								20 40 60 80 100	WATER CONTENT (%)				
									○ UNCONFINED + FIELD VANE				
									● QUICK TRIAXIAL × LAB VANE				
								20 40 60 80 100	20 40 60				

RECORD OF BOREHOLE No C239-2

1 OF 2

METRIC

WP# 5134-12-25 LOCATION N 5 064 861.9 E 229 519.7 ORIGINATED BY ES
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2012.06.25 - 2012.06.25 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	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	
194.0	Ground Surface											
193.8	ASPHALT: (40mm)		1	GS			194					
	SAND, some gravel, some silt, occasional cobbles Compact Brown (FILL)		1	SS	15		193					
192.6	ROCK FILL		1	RUN			192					
191.8	SAND, some silt, trace gravel Compact Brown Wet		2	SS	14		191					
190.9	Silty CLAY, some sand to sandy Soft to Very Soft Grey		3	SS	4		190					
	Occasional sand layers		4	SS	1		189					
			5	SS	0		188					
			6	SS	0		187					
			7	SS	0		186					
							185					

Continued Next Page

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

RECORD OF BOREHOLE No C239-2

2 OF 2

METRIC

WP# 5134-12-25 LOCATION N 5 064 861.9 E 229 519.7 ORIGINATED BY ES
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2012.06.25 - 2012.06.25 CHECKED BY LRB

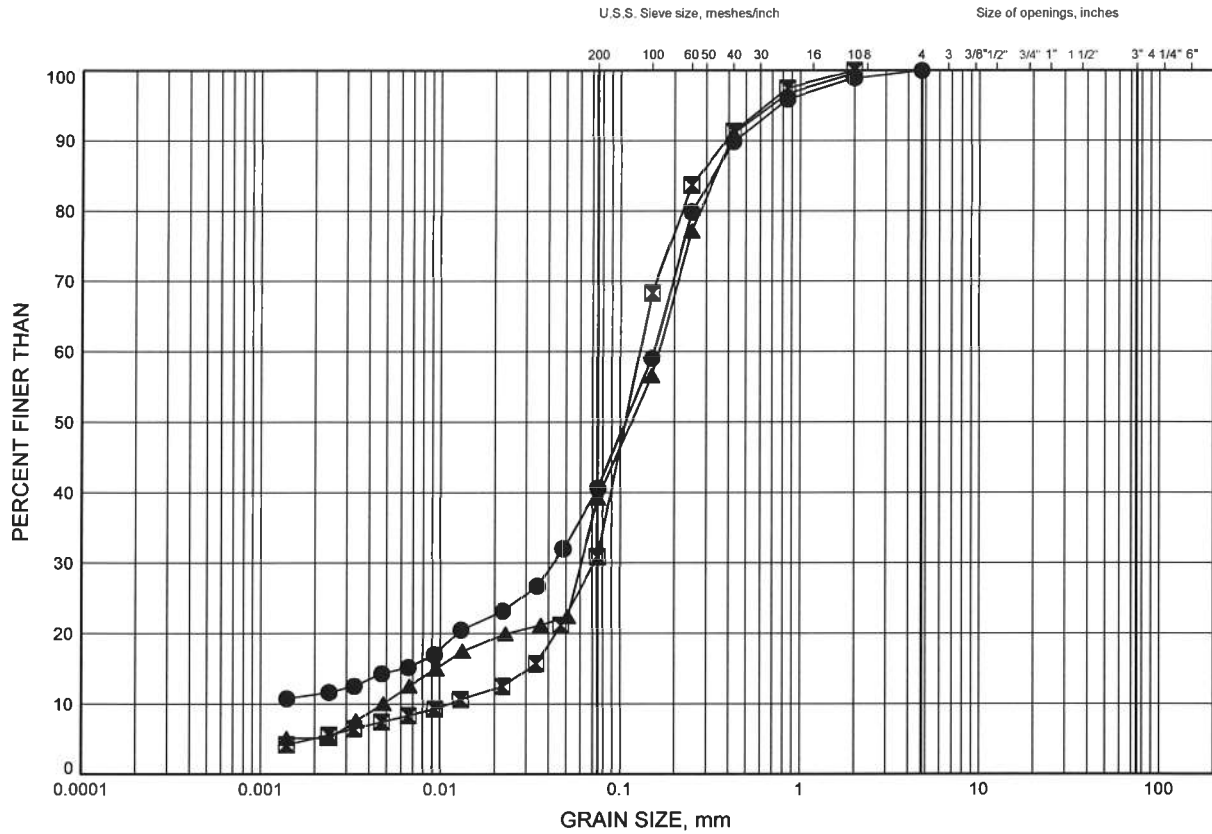
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100		
	Continued From Previous Page							SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE						
								WATER CONTENT (%)						
								PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT						
								w _p w w _L						
183.3							184							
10.7	SAND, some gravel Compact Grey Wet		8	SS	13		183							
182.2														
11.8	END OF BOREHOLE AT 11.8m UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 0.9m, CUTTINGS TO 0.1m, THEN ASPHALT TO SURFACE.													

ONTMT4S 6121(CULVERTS) GPJ 12/14/12

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

FIGURE AA1

SAND to Silty SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH48-06	1.83	190.27
⊠	BH48-10	1.07	190.93
▲	BH49-08R	1.83	190.57

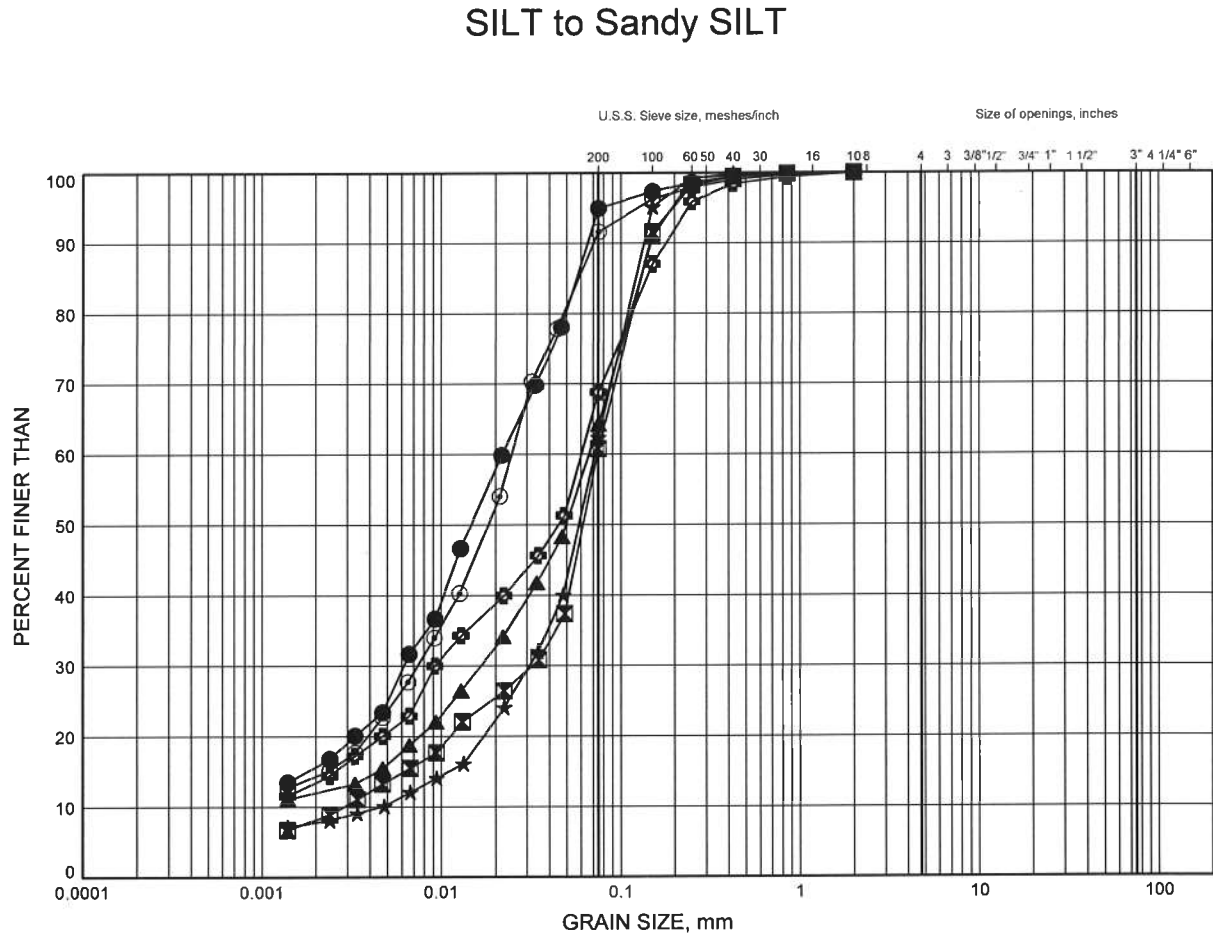
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA

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

FIGURE AA2



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH48-11R	1.83	190.37
⊠	BH48-11R	2.74	189.46
▲	BH49-02L	1.22	190.88
★	BH49-02L	5.79	186.31
⊙	BH49-08R	3.35	189.05
⊕	BH49-09L	1.83	190.07

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

Date December 2012
GWP# 5294-08-00

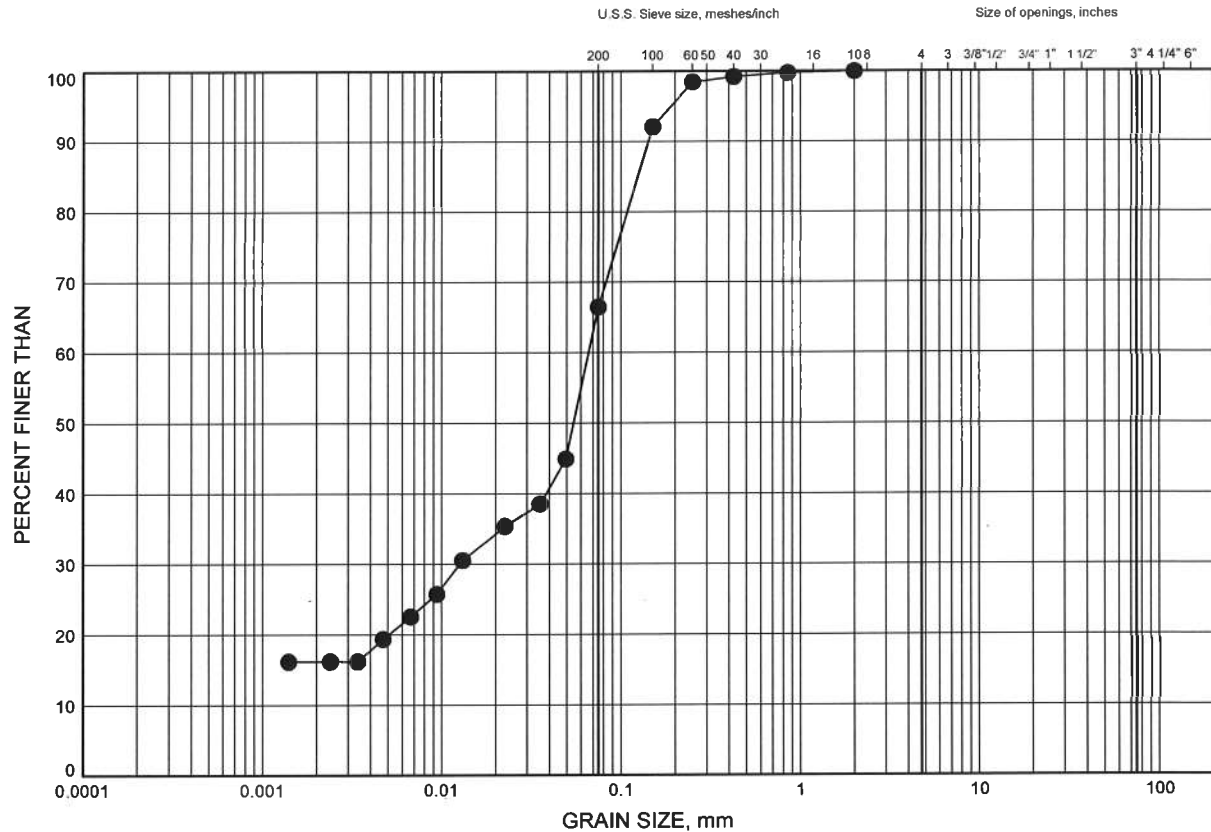


Prep'd MFA
Chkd. MRA

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

FIGURE AA3

SILT to Sandy SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	C239-1	2.59	189.61

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

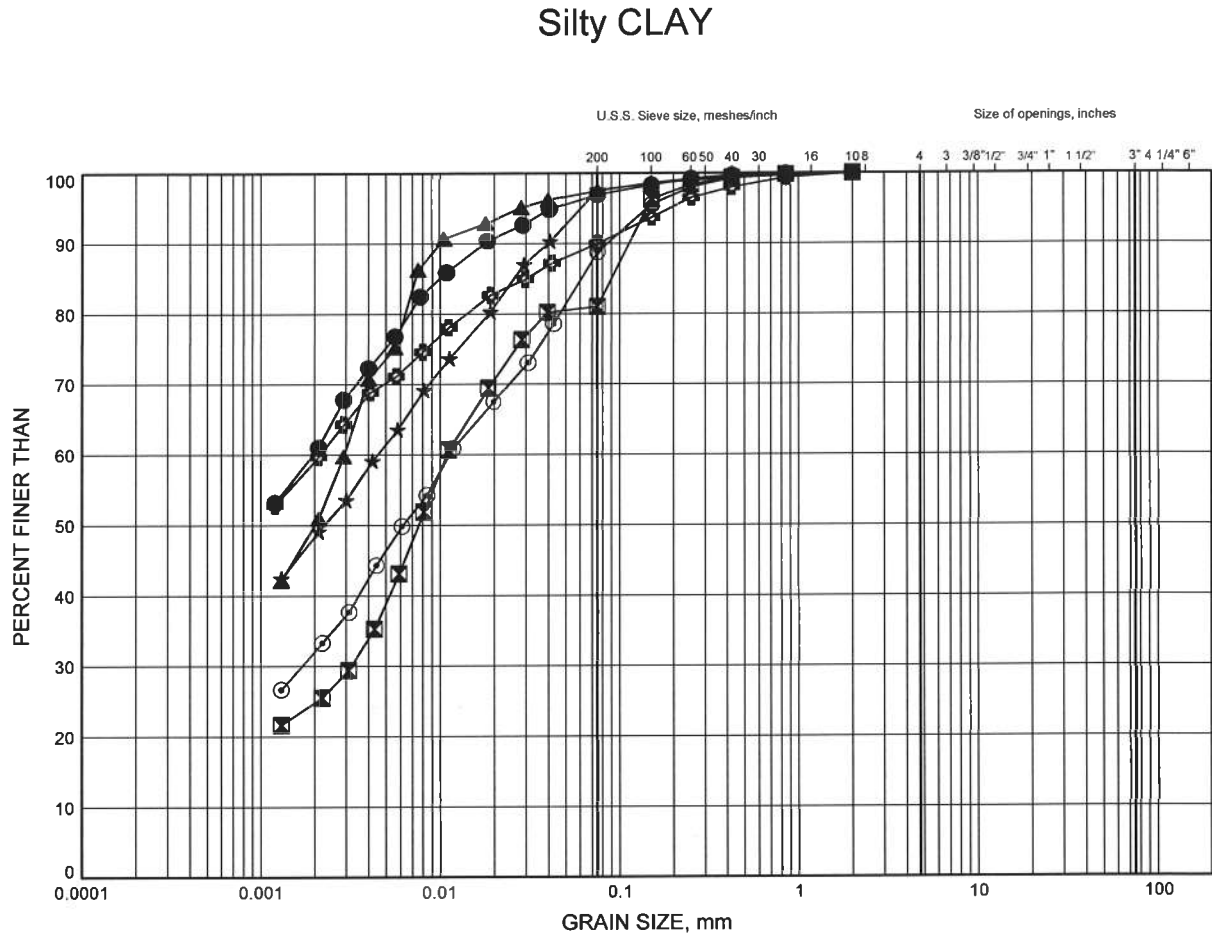
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA

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

FIGURE AA4



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH48-01	1.83	190.67
⊠	BH48-02	1.07	191.13
▲	BH48-02	4.88	187.32
★	BH48-03L	2.59	189.31
⊙	BH48-03L	6.40	185.50
⊕	BH48-05R	1.83	190.27

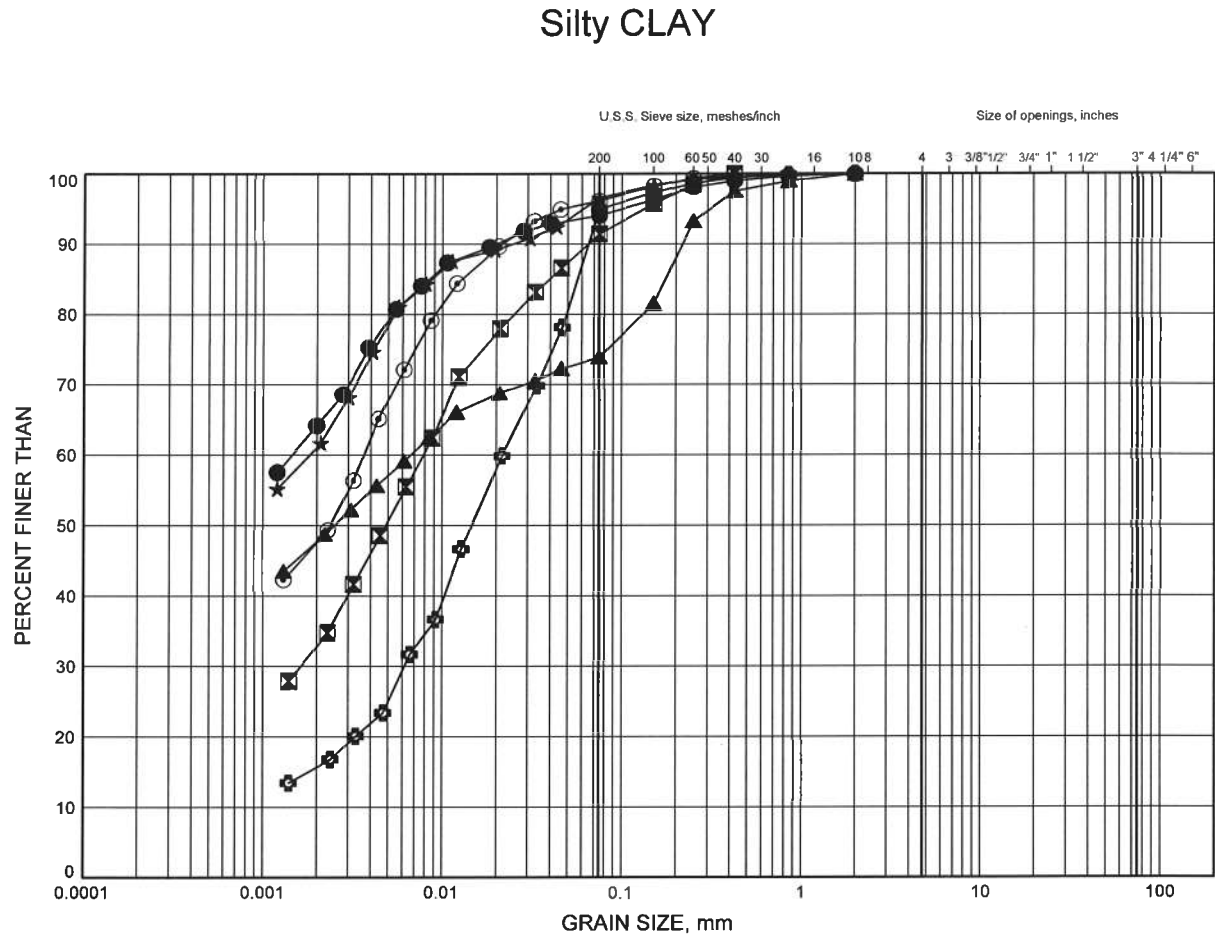
Date December 2012
GWP# 5294-08-00



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Chkd. MRA

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

FIGURE AA5



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH48-06	2.59	189.51
⊠	BH48-08R	1.18	191.72
▲	BH48-09L	1.89	190.01
★	BH48-09L	2.59	189.31
⊙	BH48-10	3.35	188.65
⊕	BH48-11R	1.83	190.37

Date December 2012

GWP# 5294-08-00

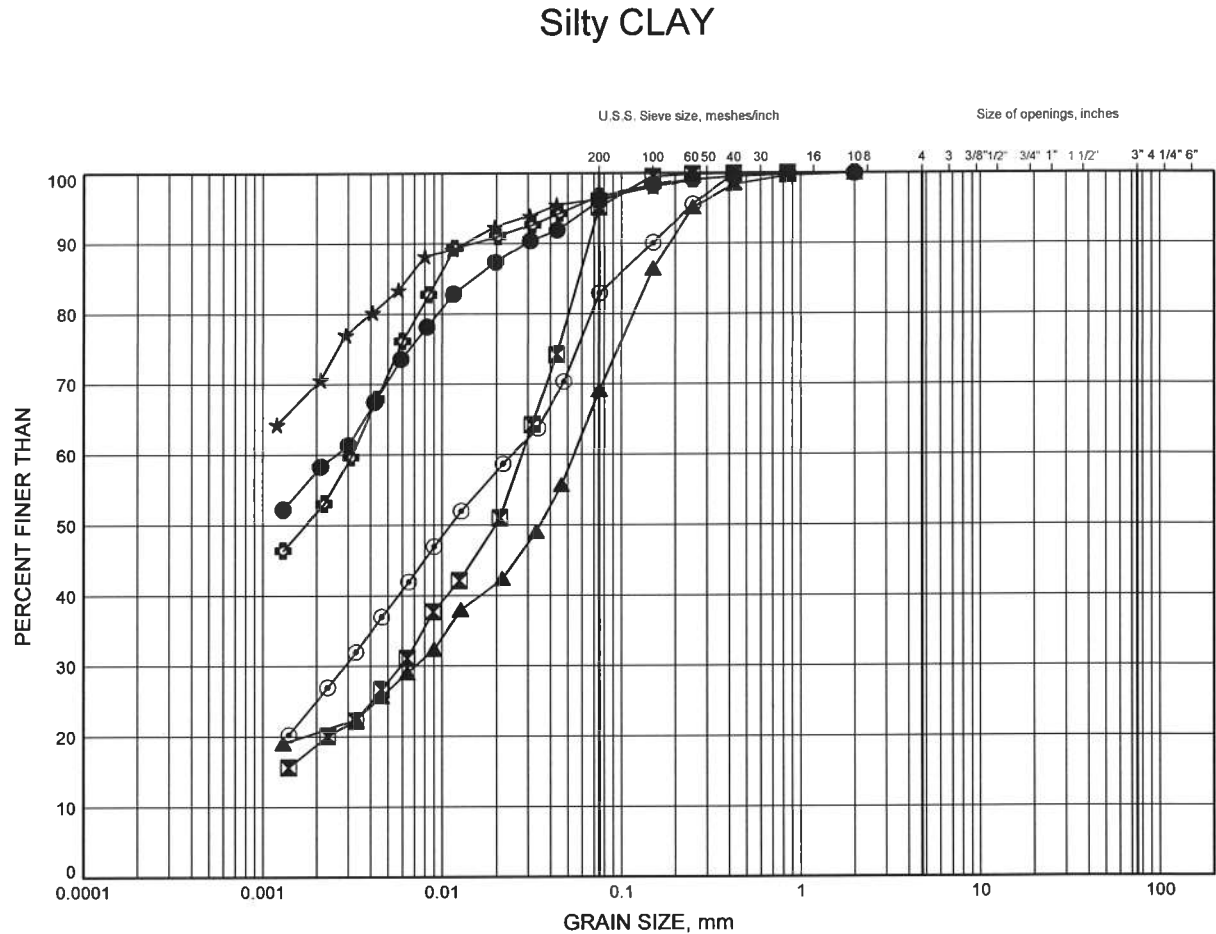


Prep'd MFA

Chkd. MRA

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

FIGURE AA6



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH48-11R	3.35	188.85
⊠	BH49-02L	2.74	189.36
▲	BH49-02L	8.84	183.26
★	BH49-06R	1.83	190.97
⊙	BH49-08R	6.40	186.00
⊕	BH49-09L	4.88	187.02

Date December 2012
GWP# 5294-08-00

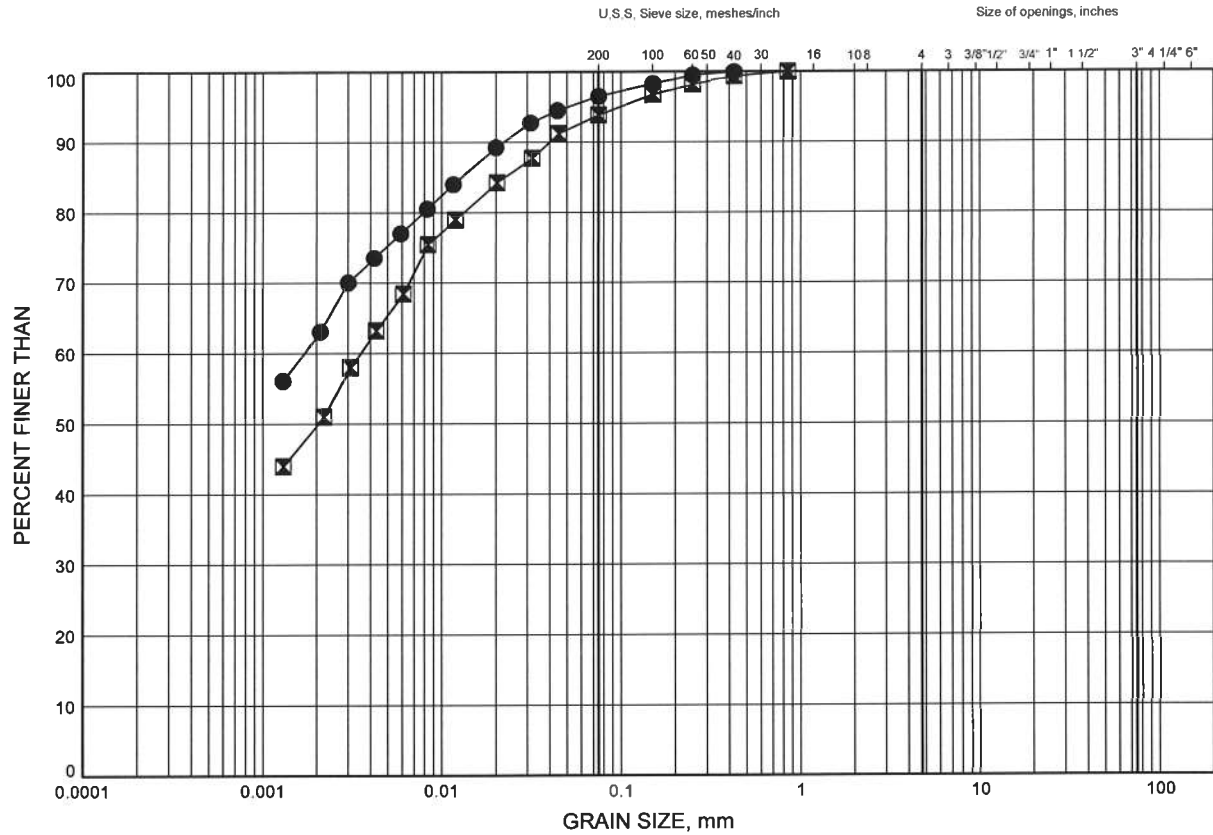


Prep'd MFA
Chkd. MRA

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

FIGURE AA7

Silty CLAY



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

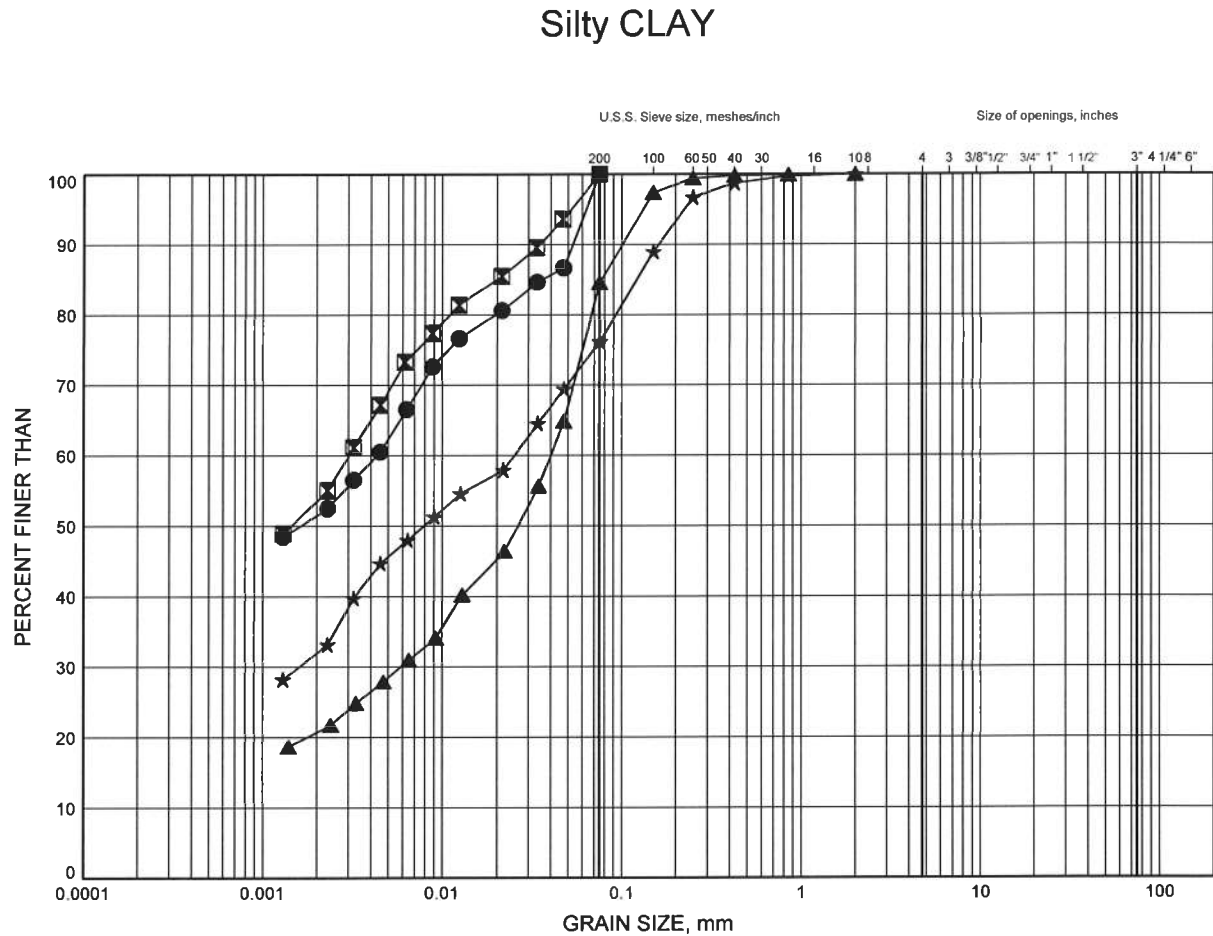
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH49-10R	1.83	190.17
■	BH49-10R	3.35	188.65

Hwy 69 Four-Laning North of Hwy 529

GRAIN SIZE DISTRIBUTION

FIGURE AA8



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	C238-1	2.59	189.21
⊠	C239-1	4.88	187.32
▲	C239-2	3.35	190.65
★	C239-2	9.45	184.55

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

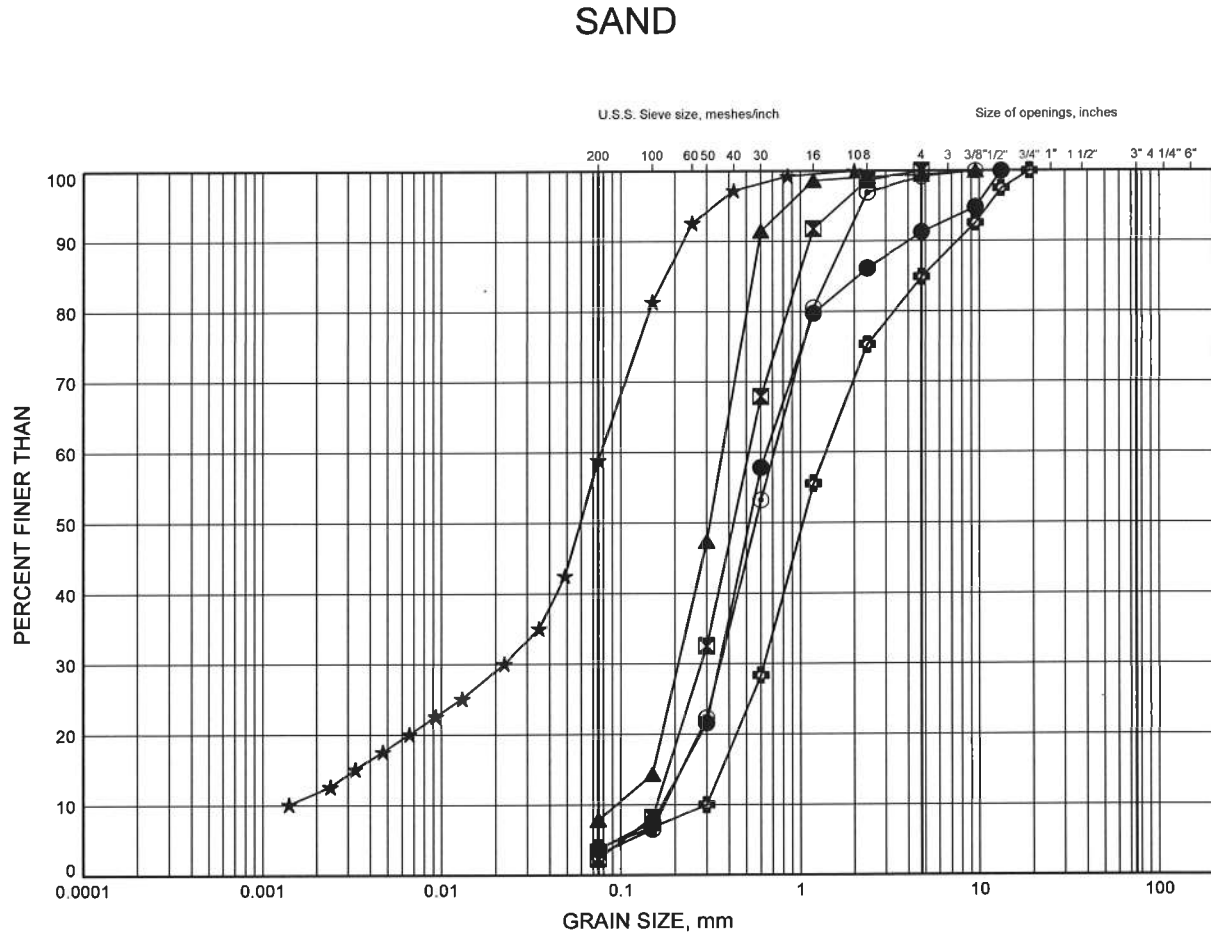
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA

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

FIGURE AA9



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH48-03L	7.92	183.98
⊠	BH48-04	6.71	185.09
▲	BH48-05R	3.35	188.75
★	BH48-11R	6.40	185.80
⊙	C238-1	4.88	186.92
⊕	C239-1	9.45	182.75

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

Date December 2012
GWP# 5294-08-00

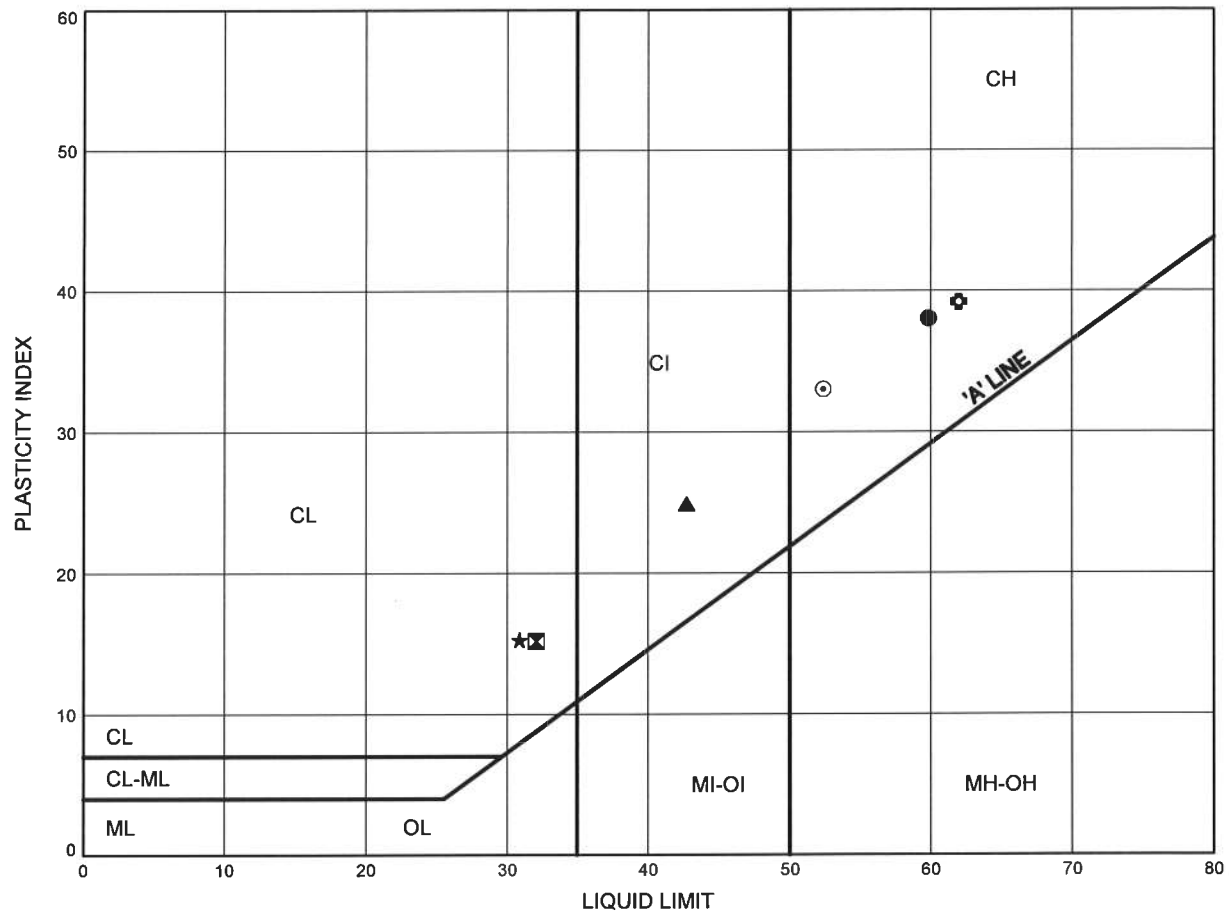


Prep'd MFA
Chkd. MRA

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

FIGURE AA10

Silty CLAY



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH48-01	1.83	190.67
⊠	BH48-02	1.07	191.13
▲	BH48-03L	2.59	189.31
★	BH48-03L	6.40	185.50
⊙	BH48-05R	1.83	190.27
⊕	BH48-06	2.59	189.51

Date December 2012

GWP# 5294-08-00



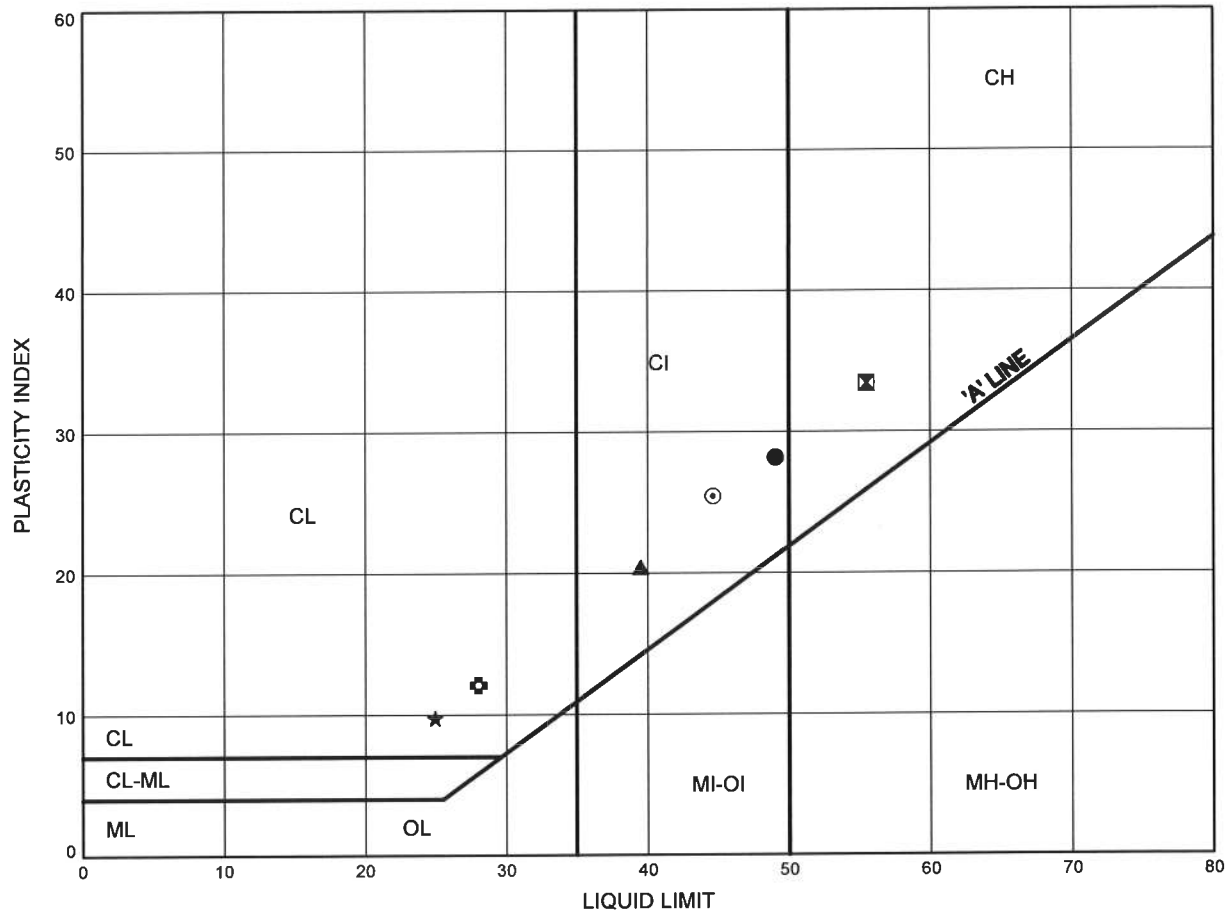
Prep'd MFA

Chkd. MRA

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

FIGURE AA11

Silty CLAY



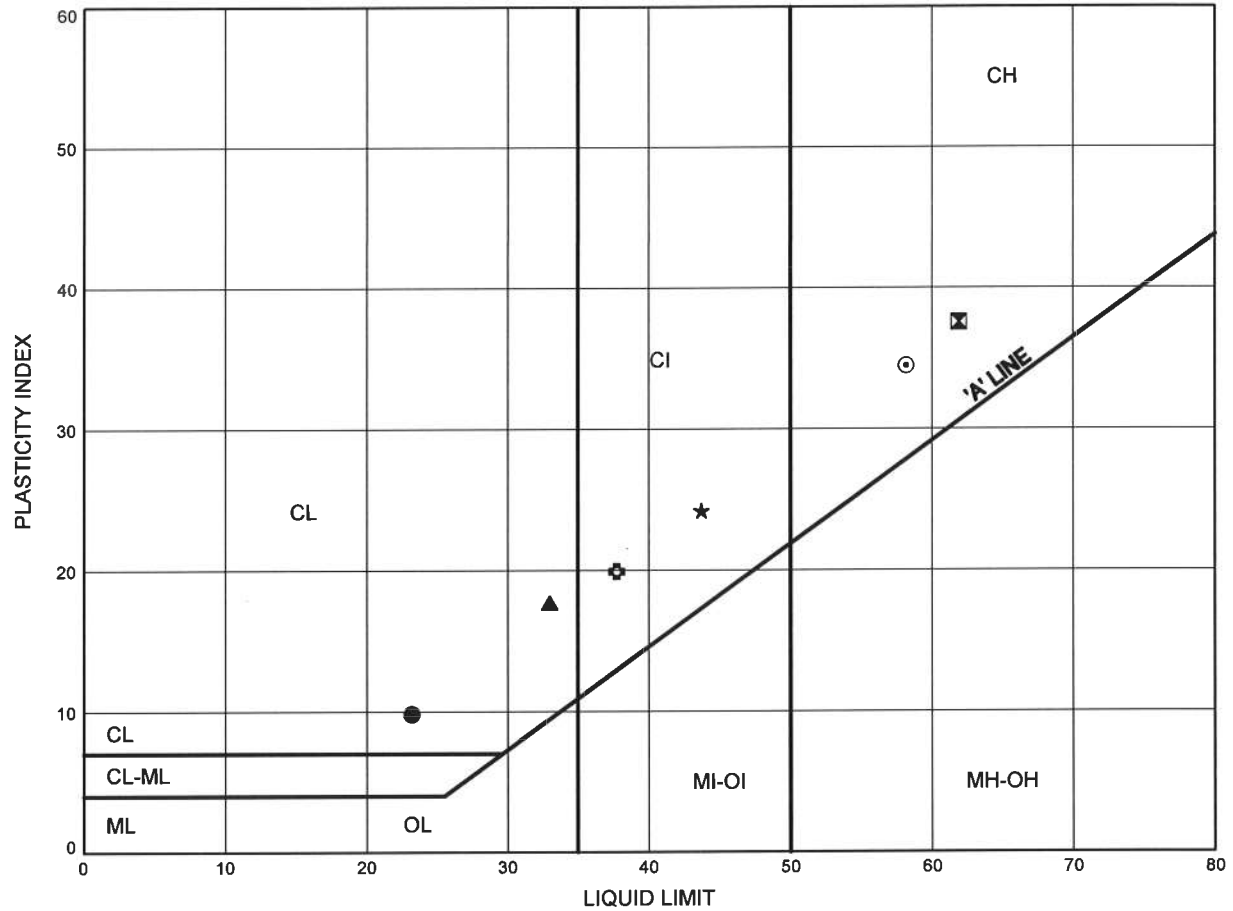
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH48-09L	1.89	190.01
⊠	BH48-09L	2.59	189.31
▲	BH48-10	3.35	188.65
★	BH48-11R	1.83	190.37
⊙	BH48-11R	3.35	188.85
⊕	BH49-02L	2.74	189.36

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

FIGURE AA12

Silty CLAY



LEGEND

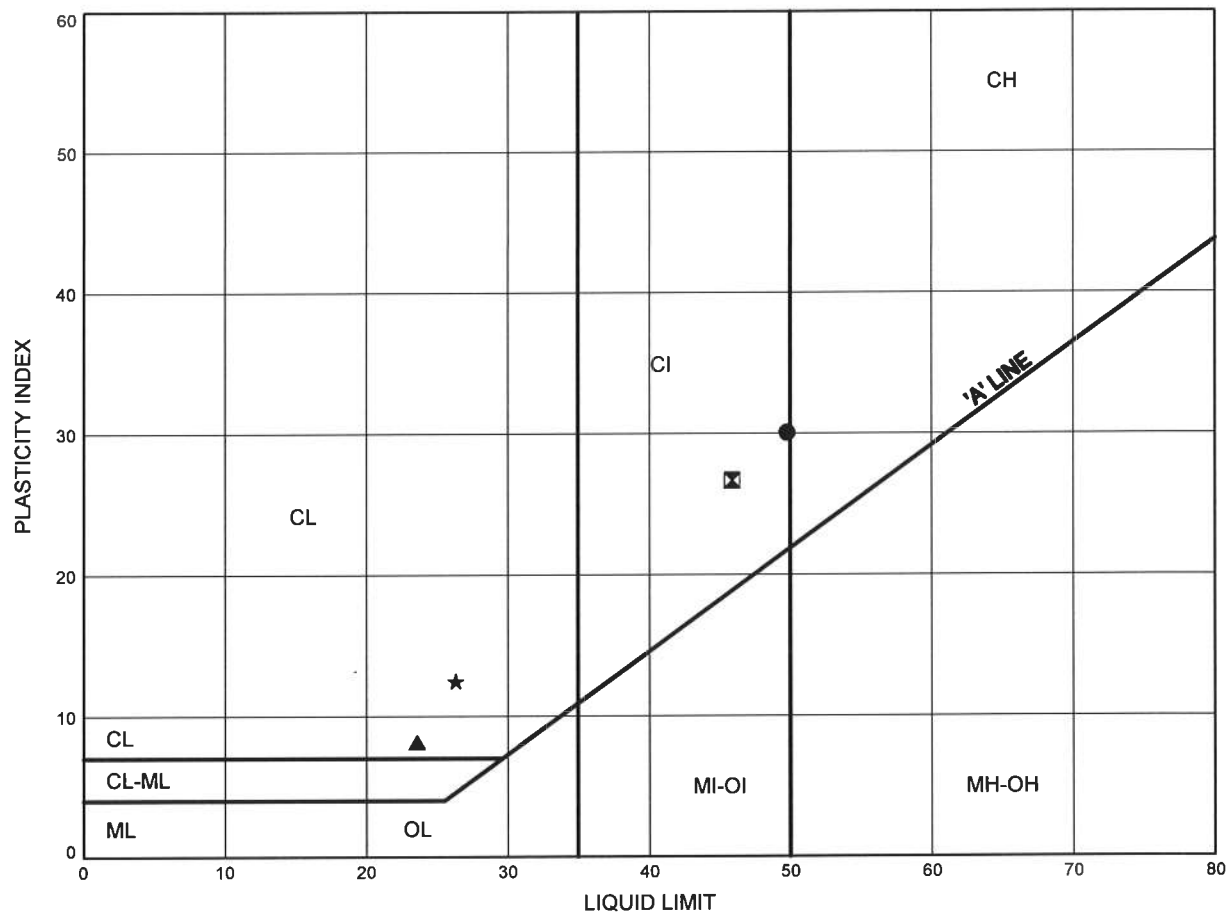
SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH49-02L	8.84	183.26
⊠	BH49-06R	1.83	190.97
▲	BH49-08R	6.40	186.00
★	BH49-09L	4.88	187.02
⊙	BH49-10R	1.83	190.17
⊕	BH49-10R	3.35	188.65

Hwy 69 Four-Laning North of Hwy 529

ATTERBERG LIMITS TEST RESULTS

FIGURE AA13

Silty CLAY



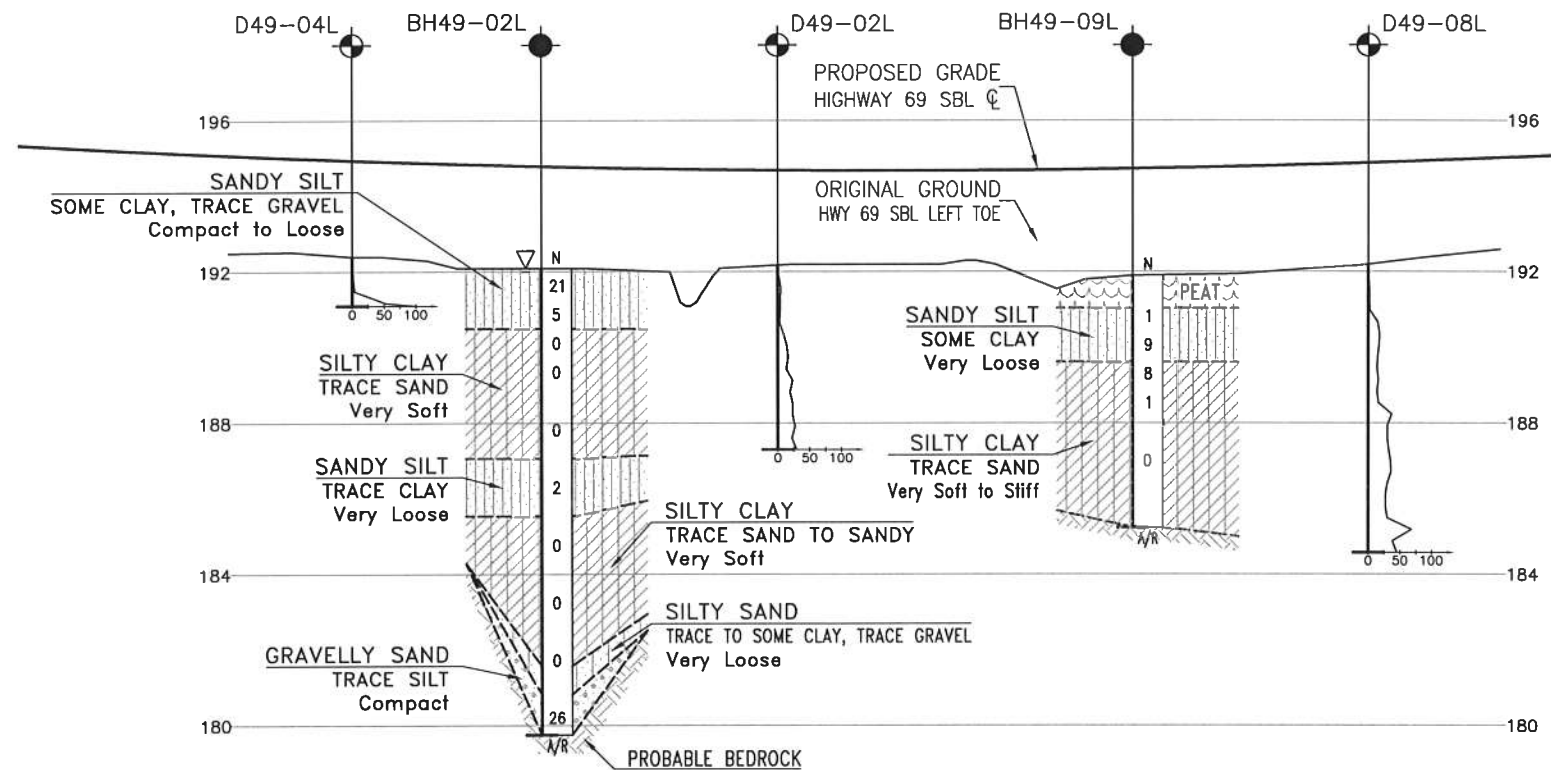
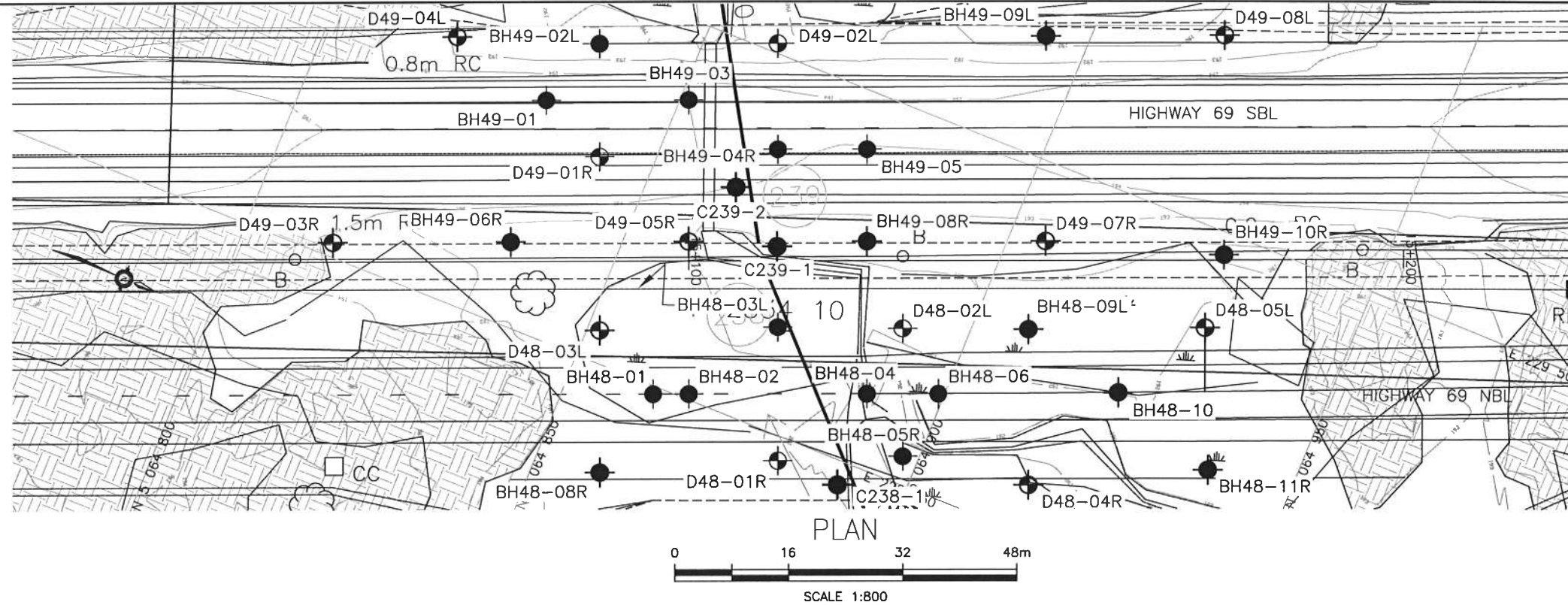
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	C238-1	2.59	189.21
⊠	C239-1	4.88	187.32
▲	C239-2	3.35	190.65
★	C239-2	9.45	184.55

Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA



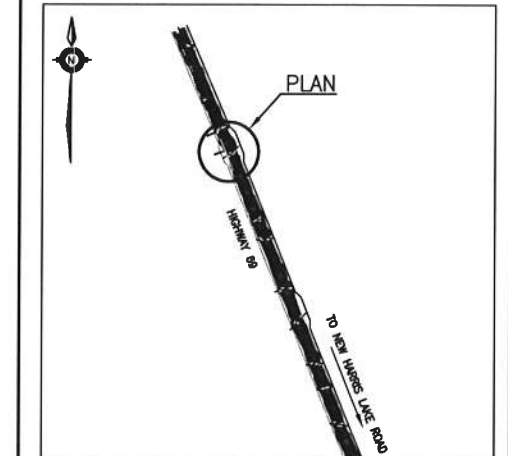
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 SBL-LT TOE
(STA 15+050 - 15+190)
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
W	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
C238-1	191.8	5 064 890.8	229 553.3	BH49-01	194.5	5 064 832.6	229 518.2
C239-1	192.2	5 064 870.4	229 525.3	BH49-02L	192.1	5 064 836.6	229 508.0
C239-2	194.0	5 064 861.9	229 519.7	BH49-03	194.2	5 064 851.1	229 510.7
				BH49-04R	194.1	5 064 865.4	229 512.6
				BH49-05	194.0	5 064 876.9	229 507.9
				BH49-06R	192.8	5 064 835.5	229 538.6
				BH49-08R	192.4	5 064 881.8	229 519.9
				BH49-09L	191.9	5 064 894.1	229 483.7
				BH49-10R	192.0	5 064 928.8	229 503.0
				D49-01R	194.3	5 064 842.6	229 522.8
				D49-02L	192.2	5 064 859.7	229 498.7
				D49-03R	193.8	5 064 812.3	229 548.0
				D49-04L	192.4	5 064 817.6	229 514.6
				D49-05R	192.0	5 064 858.6	229 529.3
				D49-07R	192.5	5 064 905.0	229 510.6
				D49-08L	192.2	5 064 917.2	229 474.3

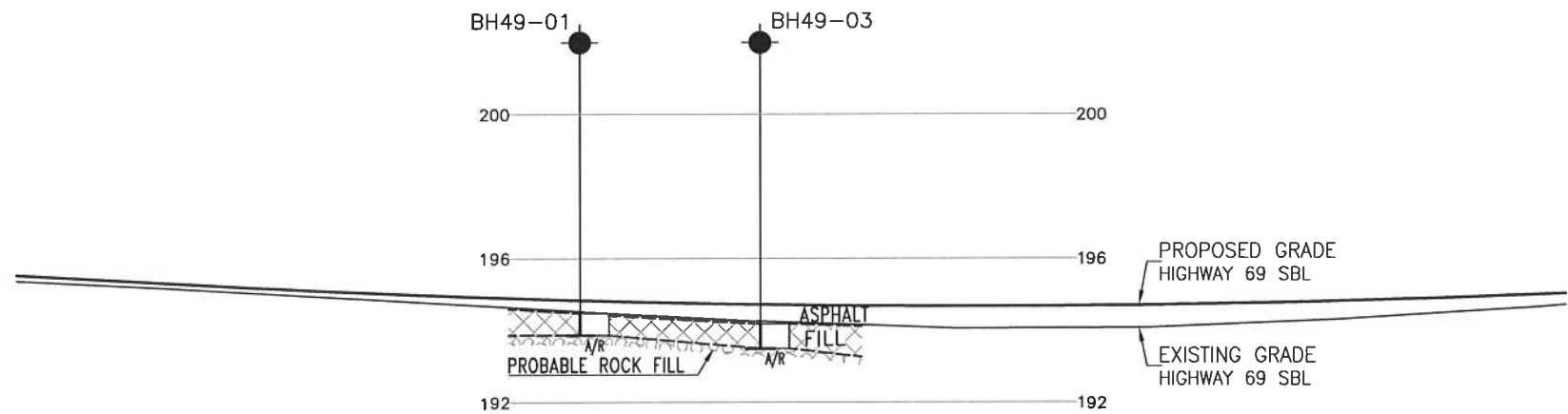
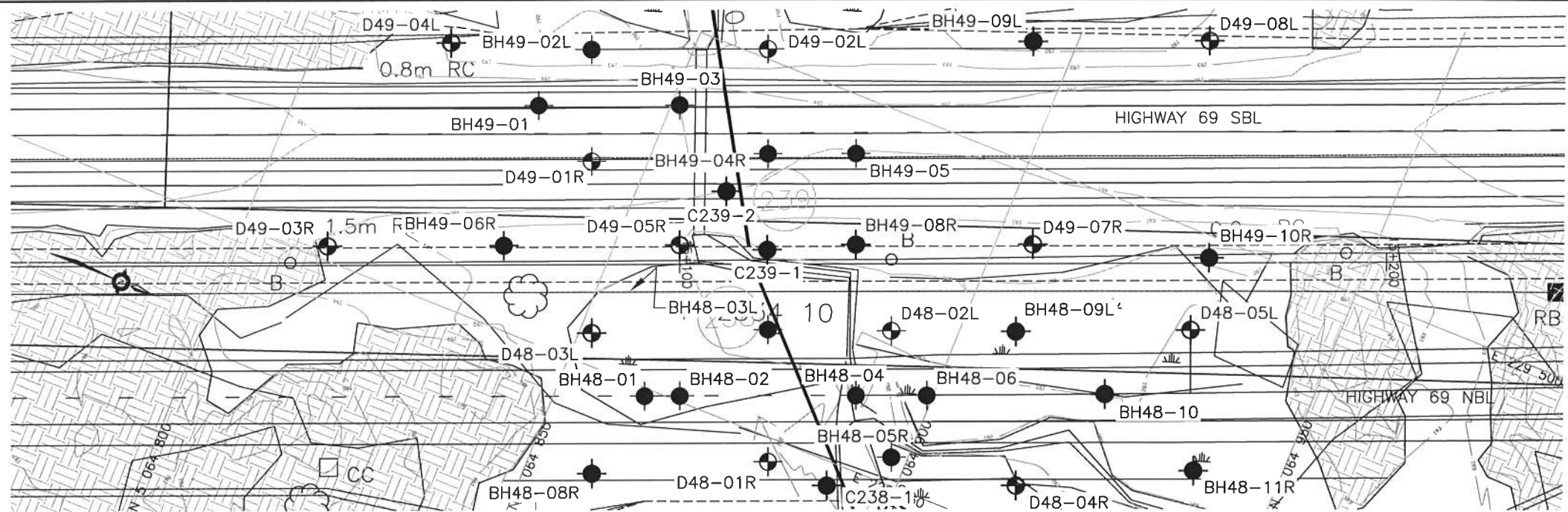
NOTES-

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

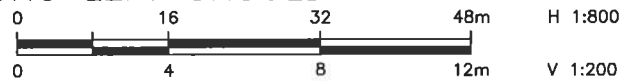
GEOCRES No. 41H-99

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





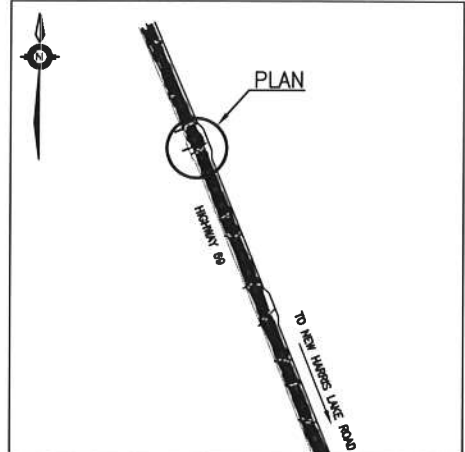
PROFILE ALONG LEFT SHOULDER HIGHWAY 69 SBL



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

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 SBL-LT SHLDR
(STA 15+050 - 15+190)
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
C239-1	192.2	5 064 870.4	229 525.3	BH49-01	194.5	5 064 832.6	229 518.2
C239-2	194.0	5 064 861.9	229 519.7	BH49-02L	192.1	5 064 836.6	229 508.0
				BH49-03	194.2	5 064 851.1	229 510.7
				BH49-04R	194.1	5 064 865.4	229 512.6
				BH49-05	194.0	5 064 876.9	229 507.9
				BH49-06R	192.8	5 064 835.5	229 538.6
				BH49-08R	192.4	5 064 881.8	229 519.9
				BH49-09L	191.9	5 064 894.1	229 483.7
				BH49-10R	192.0	5 064 928.8	229 503.0
				D49-01R	194.3	5 064 842.6	229 522.8
				D49-02L	192.2	5 064 859.7	229 498.7
				D49-03R	193.8	5 064 812.3	229 548.0
				D49-04L	192.4	5 064 817.6	229 514.6
				D49-05R	192.0	5 064 858.6	229 529.3
				D49-07R	192.5	5 064 905.0	229 510.6
				D49-08L	192.2	5 064 917.2	229 474.3

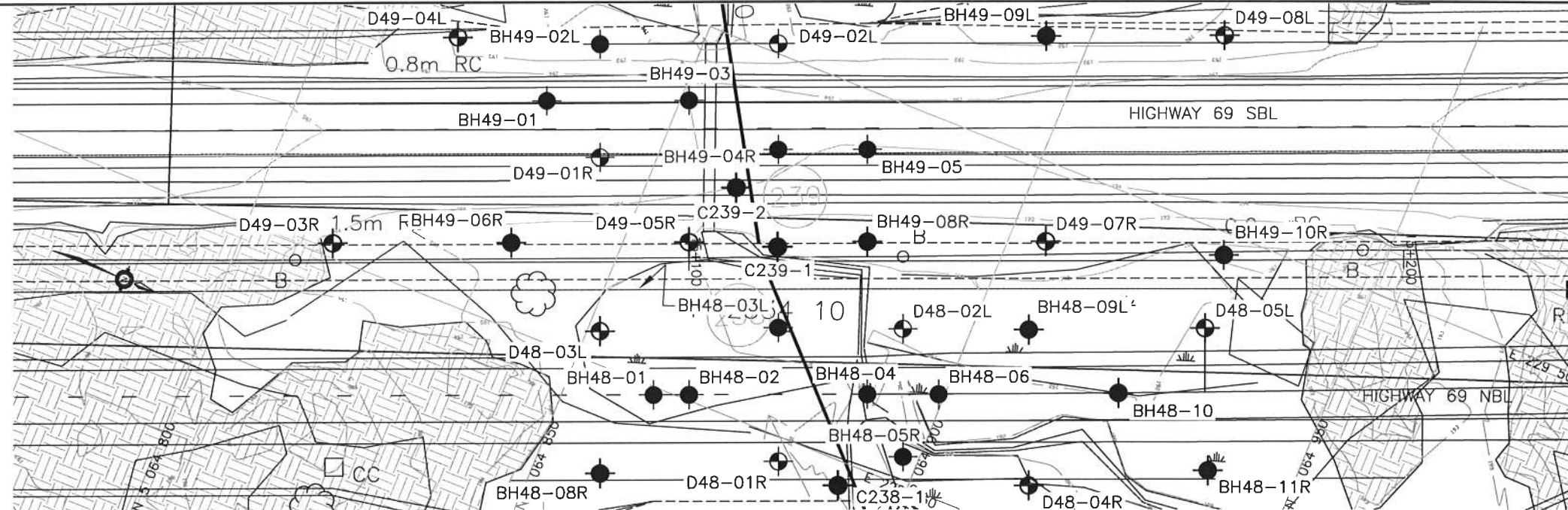
NOTES

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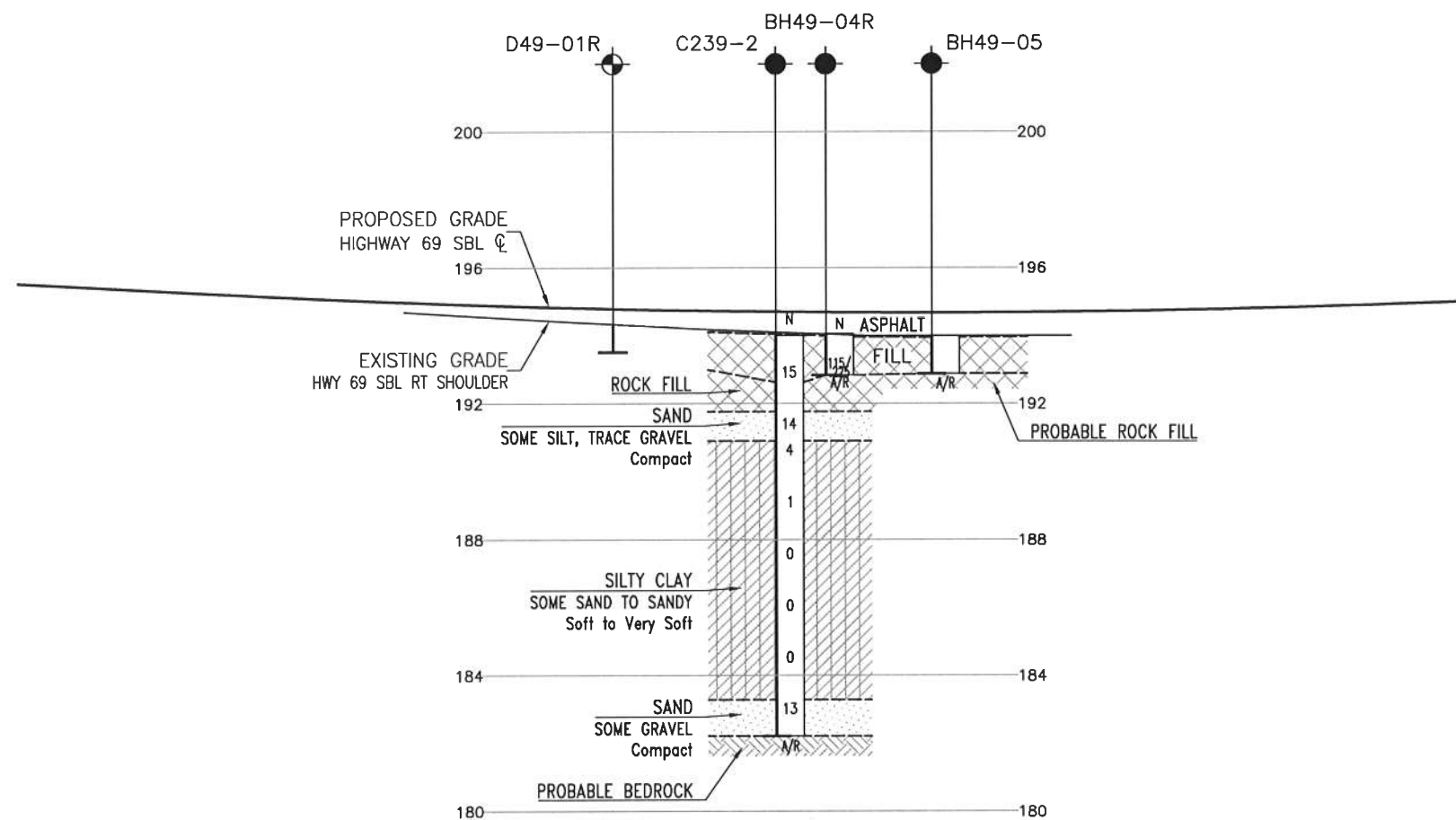
GEOCRES No. 41H-99

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





PLAN
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SCALE 1:800



PROFILE ALONG RIGHT SHOULDER HIGHWAY 69 SBL

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0 4 8 12m V 1:200

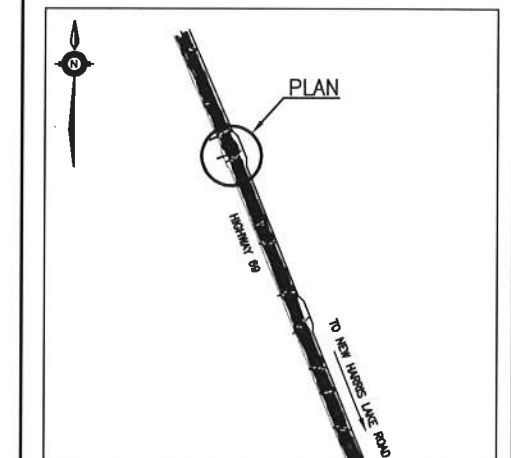
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 SBL-RT SHLDR
(STA 15+050 - 15+190)
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
W	Head Artesian Water
P	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING	NO	ELEVATION	NORTHING	EASTING
C239-1	192.2	5 064 870.4	229 525.3	BH49-01	194.5	5 064 832.6	229 518.2
C239-2	194.0	5 064 861.9	229 519.7	BH49-02L	192.1	5 064 836.6	229 508.0
				BH49-03	194.2	5 064 851.1	229 510.7
				BH49-04R	194.1	5 064 865.4	229 512.6
				BH49-05	194.0	5 064 876.9	229 507.9
				BH49-06R	192.8	5 064 835.5	229 538.6
				BH49-08R	192.4	5 064 881.8	229 519.9
				BH49-09L	191.9	5 064 894.1	229 483.7
				BH49-10R	192.0	5 064 928.8	229 503.0
				D49-01R	194.3	5 064 842.6	229 522.8
				D49-02L	192.2	5 064 859.7	229 498.7
				D49-03R	193.8	5 064 812.3	229 548.0
				D49-04L	192.4	5 064 817.6	229 514.6
				D49-05R	192.0	5 064 858.6	229 529.3
				D49-07R	192.5	5 064 905.0	229 510.6
				D49-08L	192.2	5 064 917.2	229 474.3

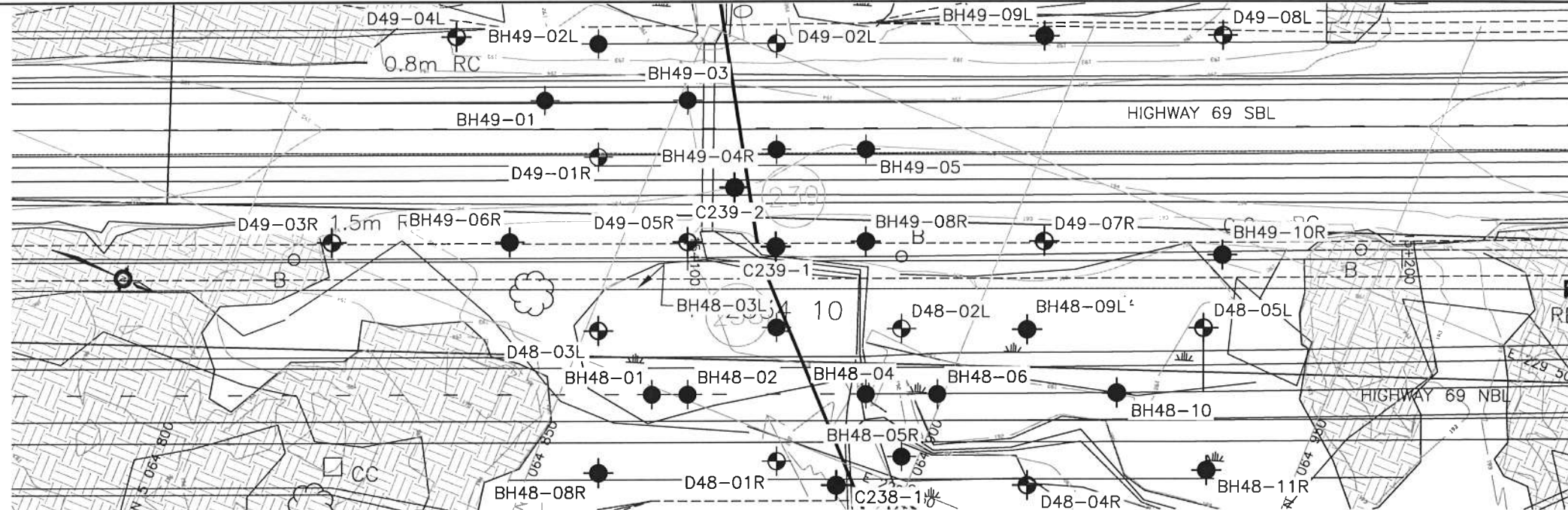
NOTES-

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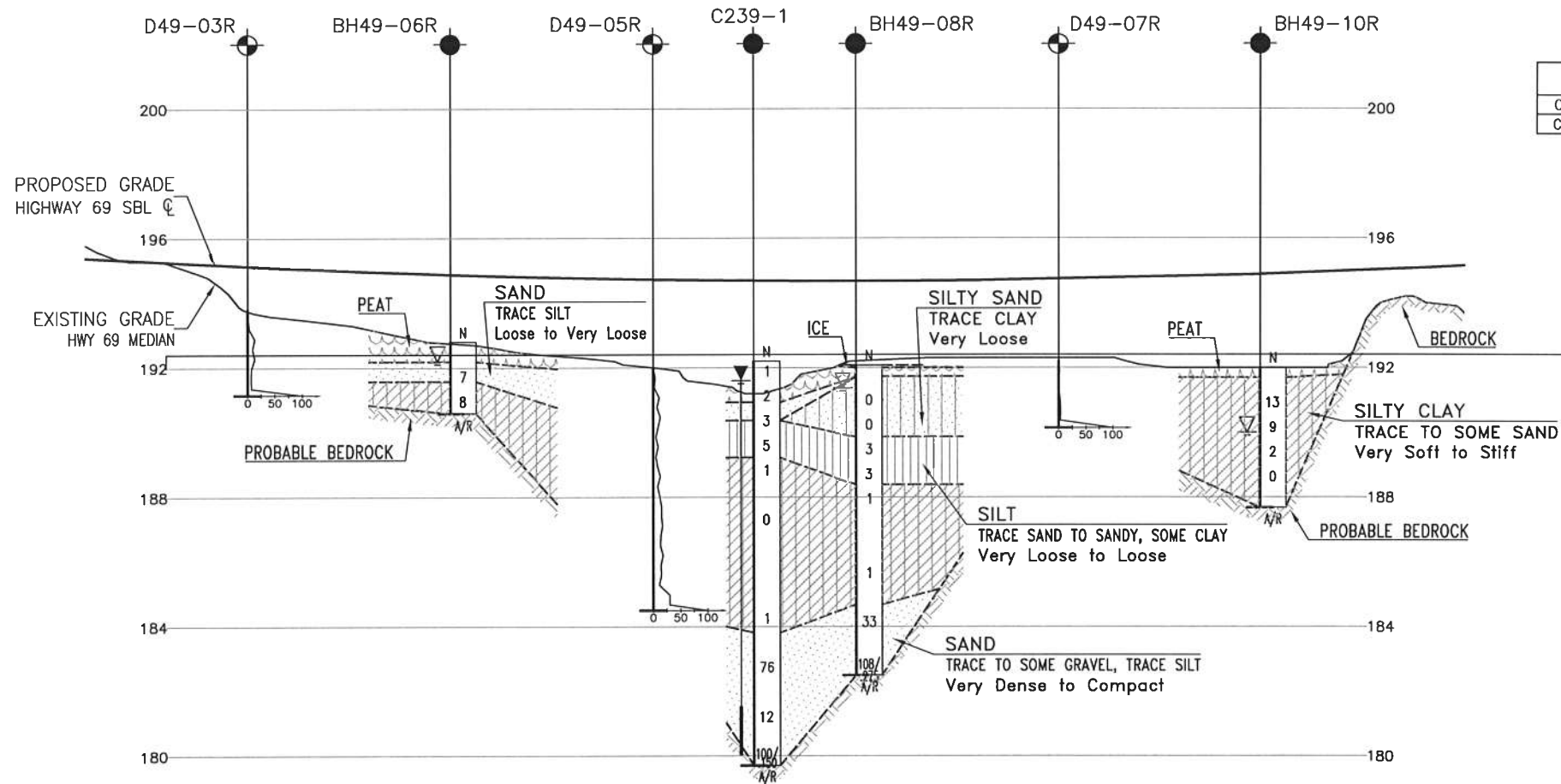
GEOCREs No. 41H-99

REVISIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															</
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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

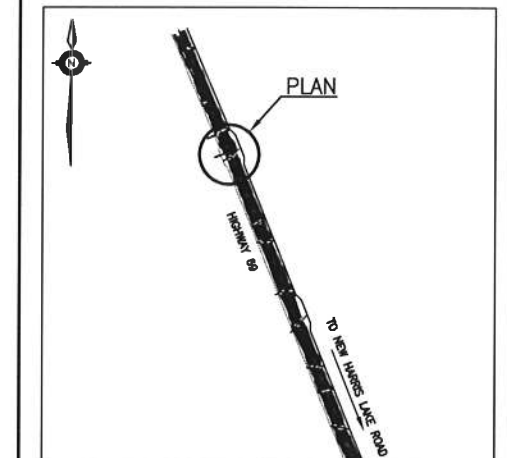
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 SBL-RT TOE
(STA 15+050 - 15+190)
BOREHOLE LOCATIONS AND SOIL STRATA

MMM GROUP

THURBER ENGINEERING LTD.

**KEYPLAN****LEGEND**

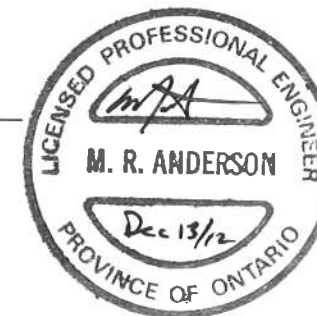
●	Borehole
⊕	Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60' Cone, 475J/blow)
PH	Pressure, Hydraulic
▽	Water Level
⬇	Head Artesian Water
⬇	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
BH49-01	194.5	5 064 832.6	229 518.2
BH49-02L	192.1	5 064 836.6	229 508.0
BH49-03	194.2	5 064 851.1	229 510.7
BH49-04R	194.1	5 064 865.4	229 512.6
BH49-05	194.0	5 064 876.9	229 507.9
BH49-06R	192.8	5 064 835.5	229 538.6
BH49-08R	192.4	5 064 881.8	229 519.9
BH49-09L	191.9	5 064 894.1	229 483.7
BH49-10R	192.0	5 064 928.8	229 503.0
D49-01R	194.3	5 064 842.6	229 522.8
D49-02L	192.2	5 064 859.7	229 498.7
D49-03R	193.8	5 064 812.3	229 548.0
D49-04L	192.4	5 064 817.6	229 514.6
D49-05R	192.0	5 064 858.6	229 529.3
D49-07R	192.5	5 064 905.0	229 510.6
D49-08L	192.2	5 064 917.2	229 474.3

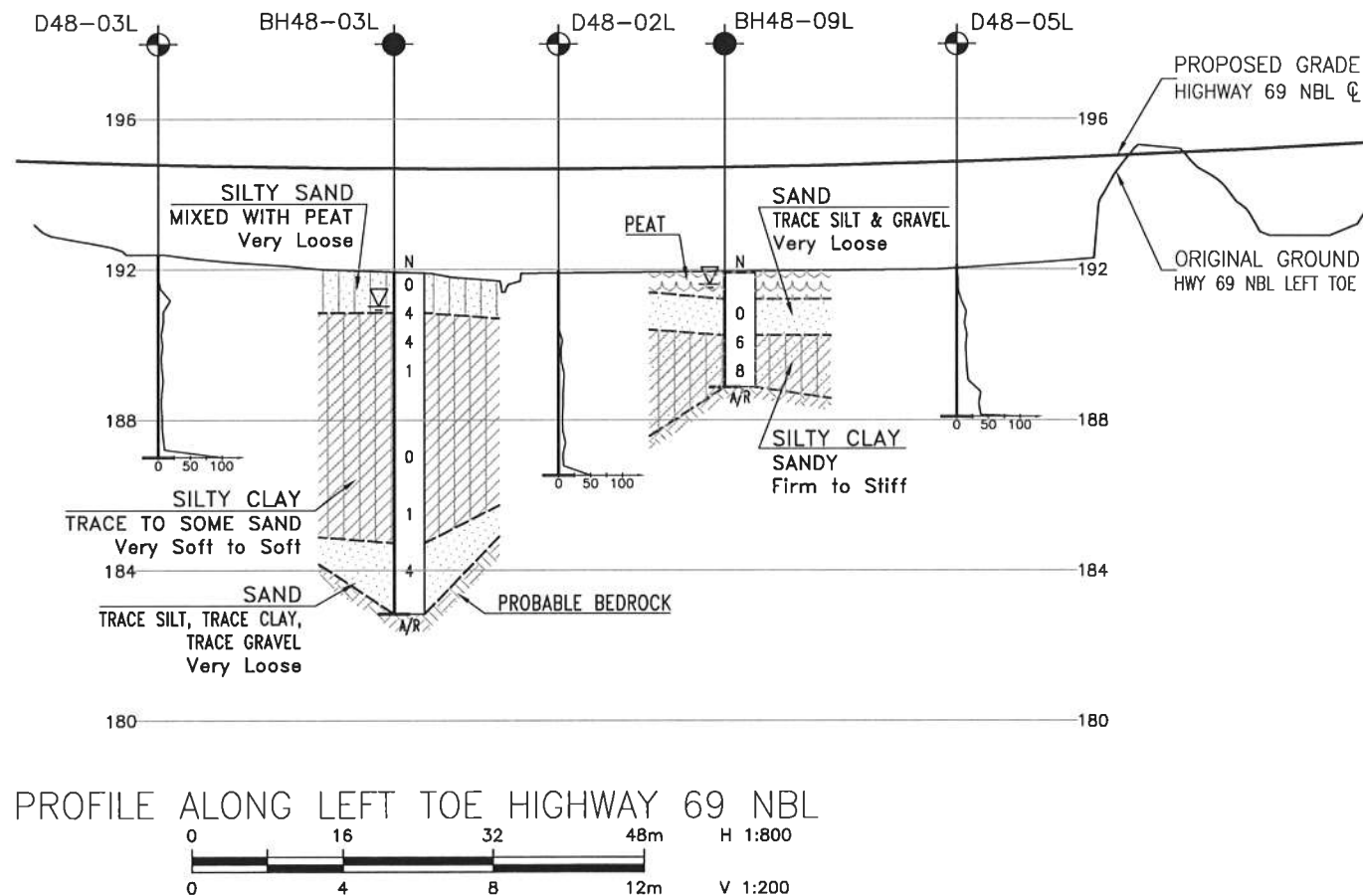
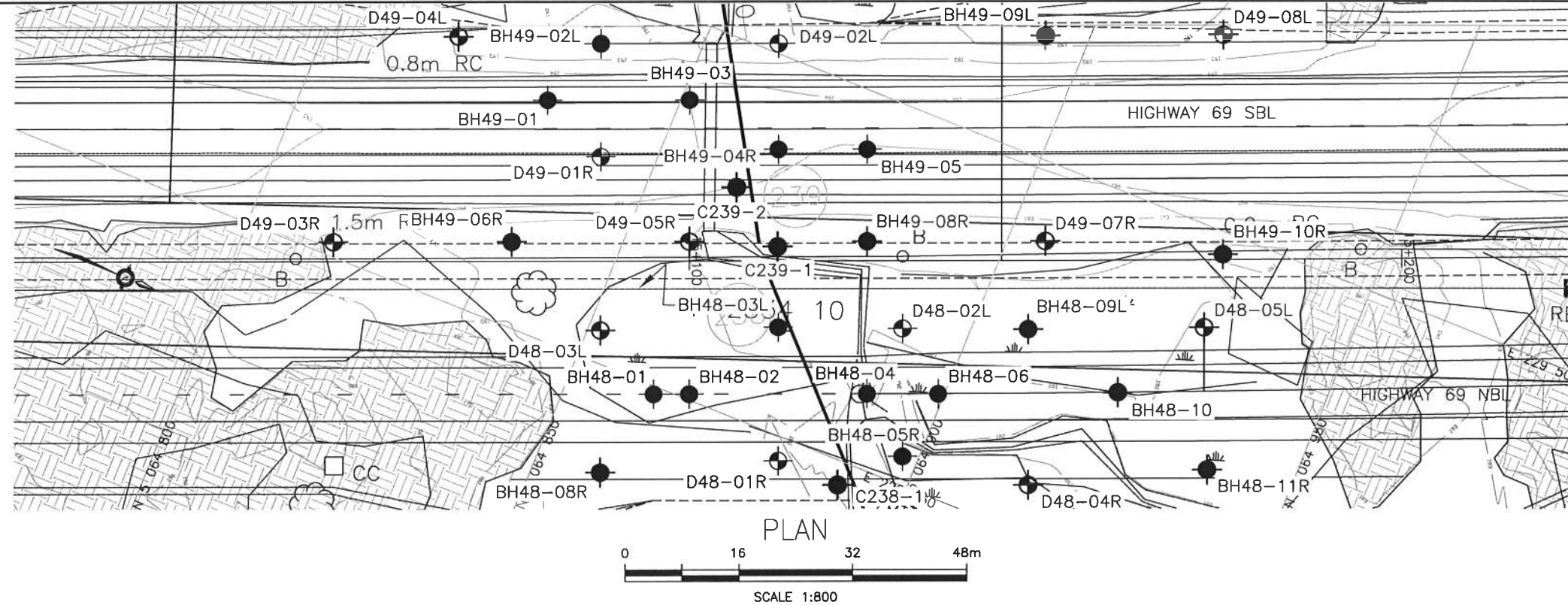
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GEOCREs No. 41H-99



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



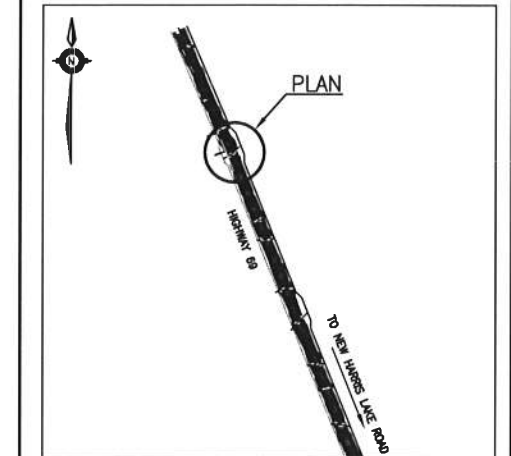
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-LT TOE
(STA 15+050 - 15+190)
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
BH48-01	192.5	5 064 862.1	229 551.1
BH48-02	192.2	5 064 866.7	229 549.2
BH48-03L	191.9	5 064 874.8	229 535.8
BH48-04	191.8	5 064 889.9	229 539.9
BH48-05R	192.1	5 064 897.8	229 546.1
BH48-06	192.1	5 064 899.1	229 536.1
BH48-08R	192.9	5 064 859.2	229 564.1
BH48-09L	191.9	5 064 907.4	229 523.0
BH48-10	192.0	5 064 922.4	229 526.5
BH48-11R	192.2	5 064 938.1	229 531.9
D48-01R	192.1	5 064 881.8	229 553.3
D48-02L	192.0	5 064 891.1	229 529.5
D48-03L	192.4	5 064 851.7	229 545.6
D48-04R	192.0	5 064 915.6	229 543.3
D48-05L	192.0	5 064 930.2	229 513.5

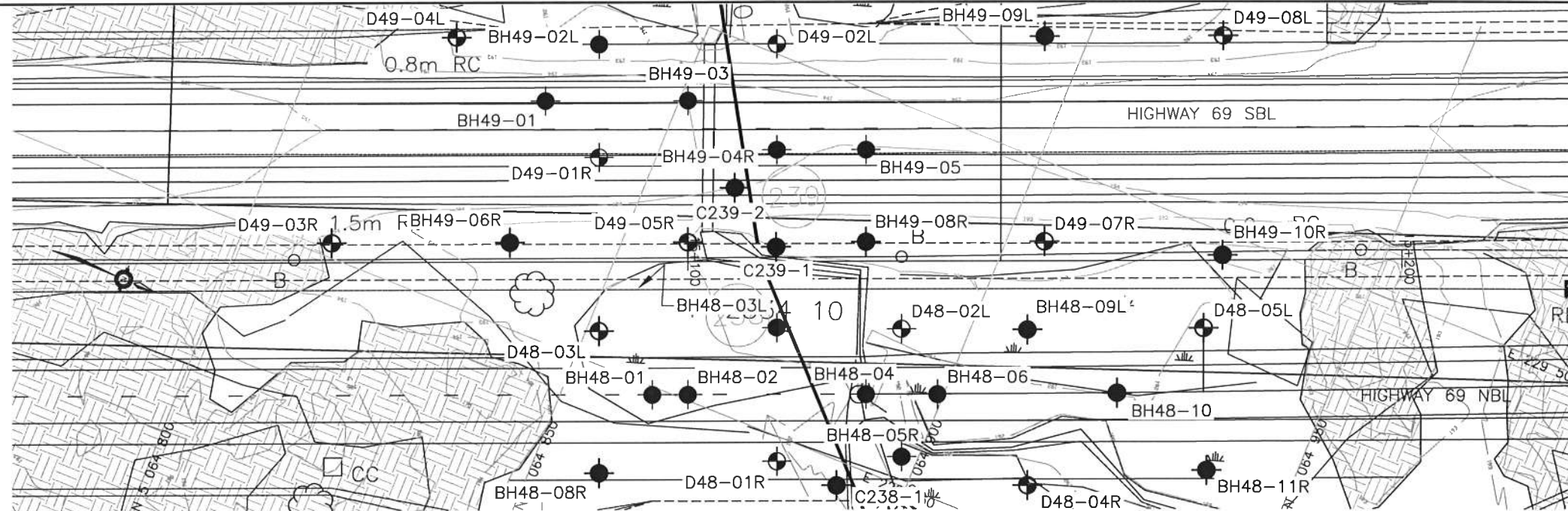
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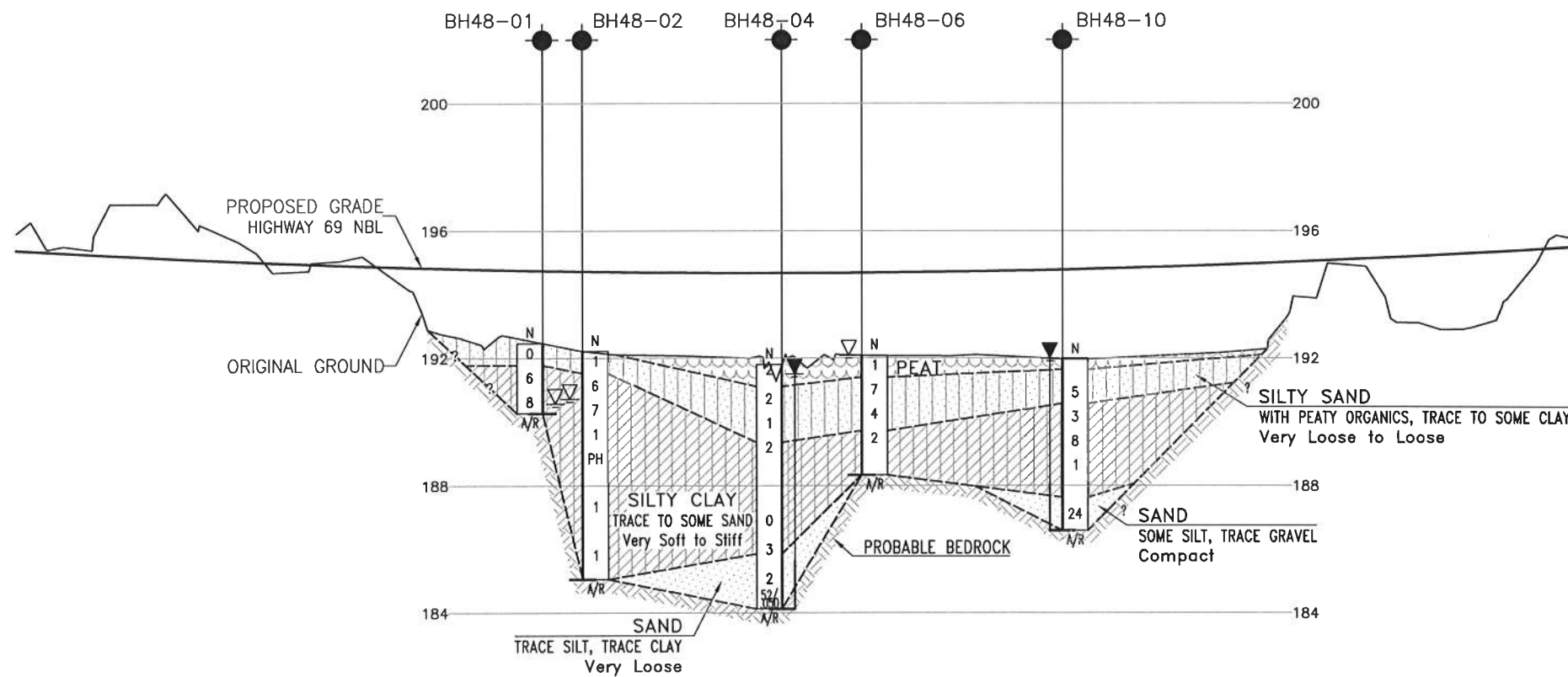
GEOCREs No. 41H-99

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

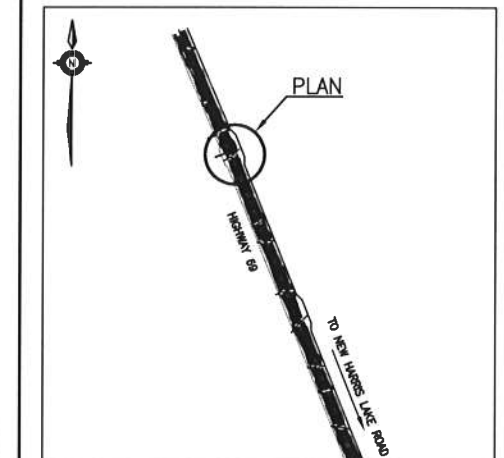
0 16 32 48m H 1:800
0 4 8 12m V 1:200

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



CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-CL
(STA 15+050 - 15+190)
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

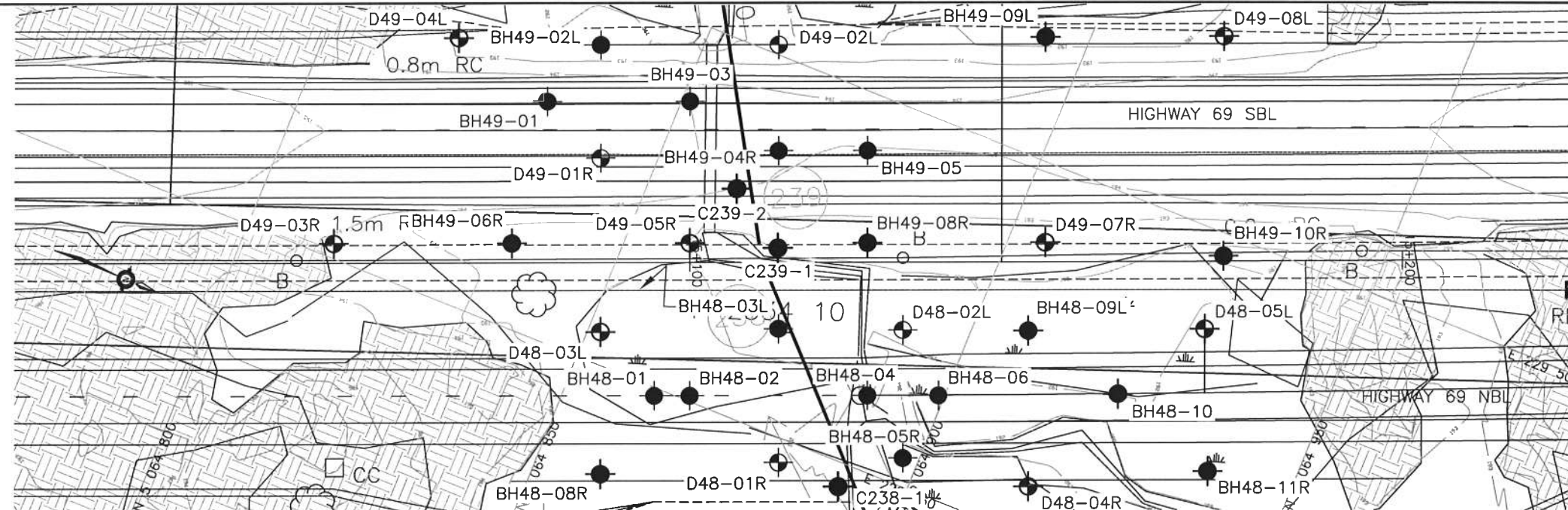
NO	ELEVATION	NORTHING	EASTING
BH48-01	192.5	5 064 862.1	229 551.1
BH48-02	192.2	5 064 866.7	229 549.2
BH48-03L	191.9	5 064 874.8	229 535.8
BH48-04	191.8	5 064 889.9	229 539.9
BH48-05R	192.1	5 064 897.8	229 546.1
BH48-06	192.1	5 064 899.1	229 536.1
BH48-08R	192.9	5 064 859.2	229 564.1
BH48-09L	191.9	5 064 907.4	229 523.0
BH48-10	192.0	5 064 922.4	229 526.5
BH48-11R	192.2	5 064 938.1	229 531.9
D48-01R	192.1	5 064 881.8	229 553.3
D48-02L	192.0	5 064 891.1	229 529.5
D48-03L	192.4	5 064 851.7	229 545.6
D48-04R	192.0	5 064 915.6	229 543.3
D48-05L	192.0	5 064 930.2	229 513.5
C238-1	191.8	5 064 890.8	229 553.3

-NOTES-

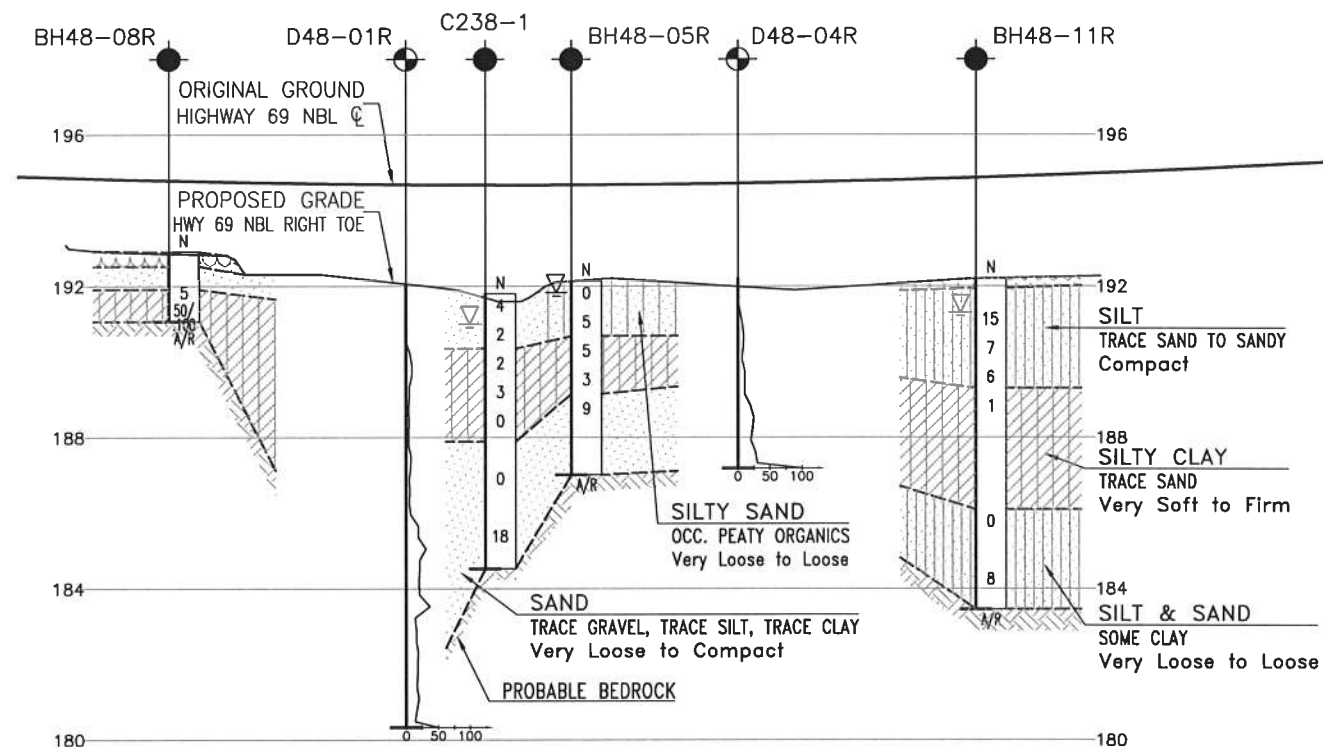
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GEOCREs No. 41H-99

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



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL

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

METRIC

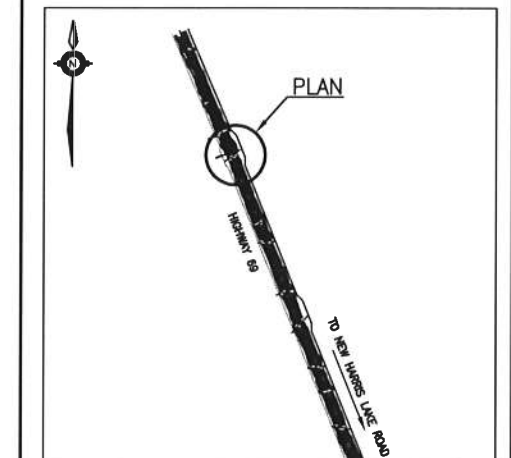
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-RT TOE
(STA 15+050 - 15+190)
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
BH48-01	192.5	5 064 862.1	229 551.1
BH48-02	192.2	5 064 866.7	229 549.2
BH48-03L	191.9	5 064 874.8	229 535.8
BH48-04	191.8	5 064 889.9	229 539.9
BH48-05R	192.1	5 064 897.8	229 546.1
BH48-06	192.1	5 064 899.1	229 536.1
BH48-08R	192.9	5 064 859.2	229 564.1
BH48-09L	191.9	5 064 907.4	229 523.0
BH48-10	192.0	5 064 922.4	229 526.5
BH48-11R	192.2	5 064 938.1	229 531.9
D48-01R	192.1	5 064 881.8	229 553.3
D48-02L	192.0	5 064 891.1	229 529.5
D48-03L	192.4	5 064 851.7	229 545.6
D48-04R	192.0	5 064 915.6	229 543.3
D48-05L	192.0	5 064 930.2	229 513.5
C238-1	191.8	5 064 890.8	229 553.3

-NOTES-

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

GEOCREs No. 41H-99

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



Appendix BB

**Highway 69 NBL
Sta. 15+450 to 15+560**

**Boreholes 50-01 to 50-10
DCPTs D50-01R to D50-04L**

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

RECORD OF BOREHOLE No BH50-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+450 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.13 - 2008.09.13 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							PLASTIC LIMIT w _p NATURAL MOISTURE CONTENT w LIQUID LIMIT w _L WATER CONTENT (%)			
196.3	Ground Surface							20	40	60	80	100						
0.0	SAND , with peaty organics, trace silt Very Loose		1	SS	1													
195.8	Brown						196											
0.5	Wet																	
	END OF BOREHOLE AT 0.4m (SAMPLER BOUNCING) ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																	

RECORD OF BOREHOLE No BH50-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+462.5 O/S 7.2L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
DATUM Geodetic DATE 2008.09.13 - 2008.09.13 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	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								
197.4	Ground Surface												
0.0	BEDROCK AT SURFACE.												

ONTMT4S 6121.GPJ 12/12/12

+³, ×³: Numbers refer to
Sensitivity

20
15-20
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH50-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+475 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008.09.13 - 2008.09.13 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 (%) 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			
197.3	Ground Surface																
0.0	BEDROCK AT SURFACE.																

RECORD OF BOREHOLE No BH50-04R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Walbridge Twp., Station 15+487.5 O/S 8.8R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008.09.13 - 2008.09.13 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 (%) 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 80 100	Wp	W	WL			
197.1	Ground Surface													
0.0	ORGANICS: (25mm) BEDROCK AT 0.025m.													

RECORD OF BOREHOLE No BH50-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+500 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.13 - 2008.09.13 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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100					
196.2	Ground Surface													
0.0	SAND, with peaty organics, some silt		1	SS	1		196							
195.7	Loose Brown Wet													
0.5	Silty CLAY, some sand, oxidized stains		2	SS	4		195							0 10 52 38
194.8	Soft Grey													
1.4	Silty SAND													
194.4	Brown Wet		3	SS	53/									
1.8	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.8m ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.				150									

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

RECORD OF BOREHOLE No BH50-06L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+512.5 O/S 8.7L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.13 - 2008.09.13 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						
196.2	Ground Surface													
0.0	SAND , with peaty organics													
195.9	Loose													
0.3	Brown		1	SS	1									
	Wet													
	Silty CLAY , trace sand													
	Very Soft to Soft		2	SS	3									
	Grey													
194.8														
1.4	END OF BOREHOLE (SAMPLER BOUNCING) AT 1.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.													

+³, X³: Numbers refer to
Sensitivity



20
15-⁵
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH50-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+525 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.13 - 2008.09.13 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 (%) 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		
196.1	Ground Surface																
0.0 0.1	ORGANICS: (75mm) Silty CLAY , some sand to sandy Very Soft to Firm Grey		1	SS	1								○				
			2	SS	6							○				0 25 51 24	
194.6																	
1.5	SAND and GRAVEL , trace silt Grey Wet		3	SS	53/ .150							○					
194.1																	
2.0	END OF BOREHOLE (SAMPLER BOUNCING) AT 2.0m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG TO SURFACE.																

METRIC

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	20					
196.8	Ground Surface												
							SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
							WATER CONTENT (%) 20 40 60					kN/m ³	GR SA SI CL

ONTMT4S 6121.GPJ 12/12/12

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH50-09

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+550 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
DATUM Geodetic DATE 2008.09.13 - 2008.09.13 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 (%)					
197.7	Ground Surface													
0.0	BEDROCK AT SURFACE.													

ONTMT4S 6121.GPJ 12/12/12

+³, ×³: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

METRIC

[illegible]

METRIC

[illegible]

METRIC

[illegible]

RECORD OF BOREHOLE No D50-03R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+512.5 O/S 8.7R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008.09.13 - 2008.09.13 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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	W _P W W _L				
196.1	Ground Surface													
0.0	BEDROCK EXPOSED AT SURFACE.													

METRIC

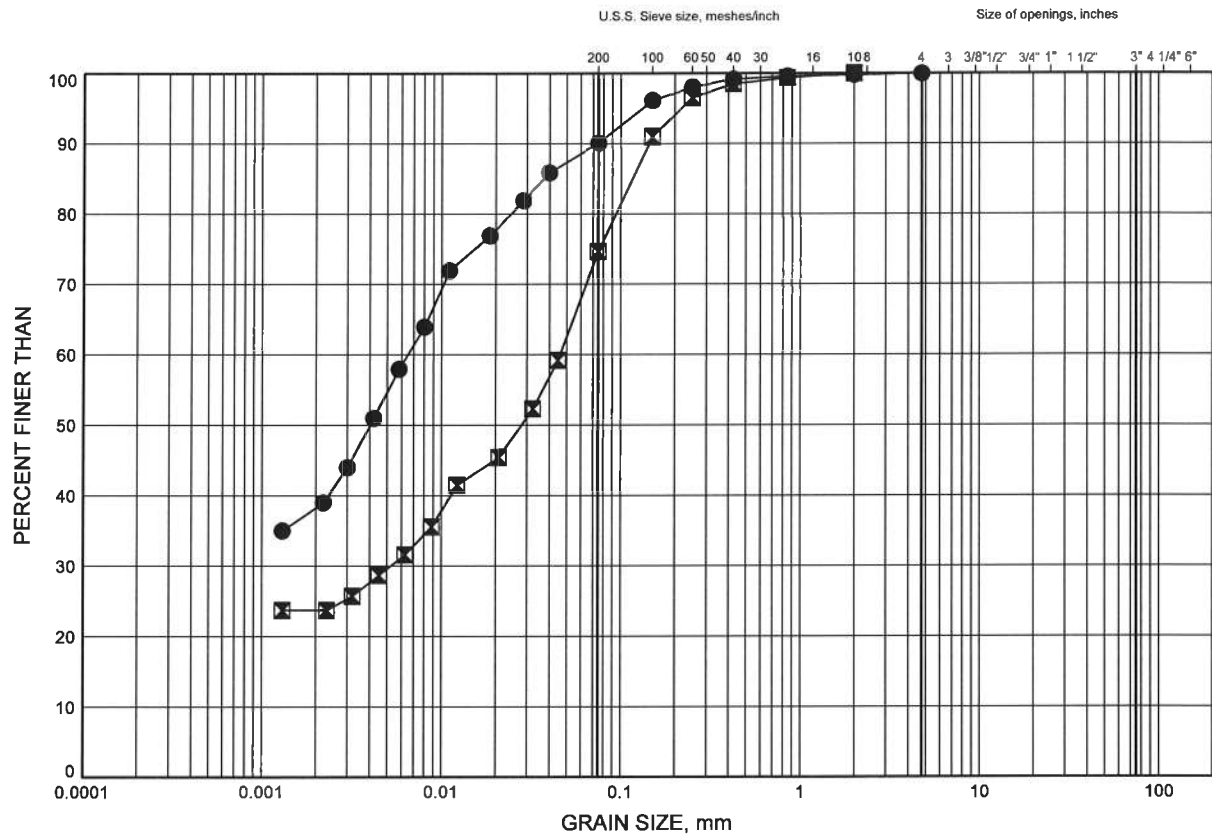
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(%) STRAIN AT FAILURE

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

FIGURE BB1

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH50-05	1.07	195.13
■	BH50-07	0.91	195.19

Date December 2012

GWP# 5294-08-00



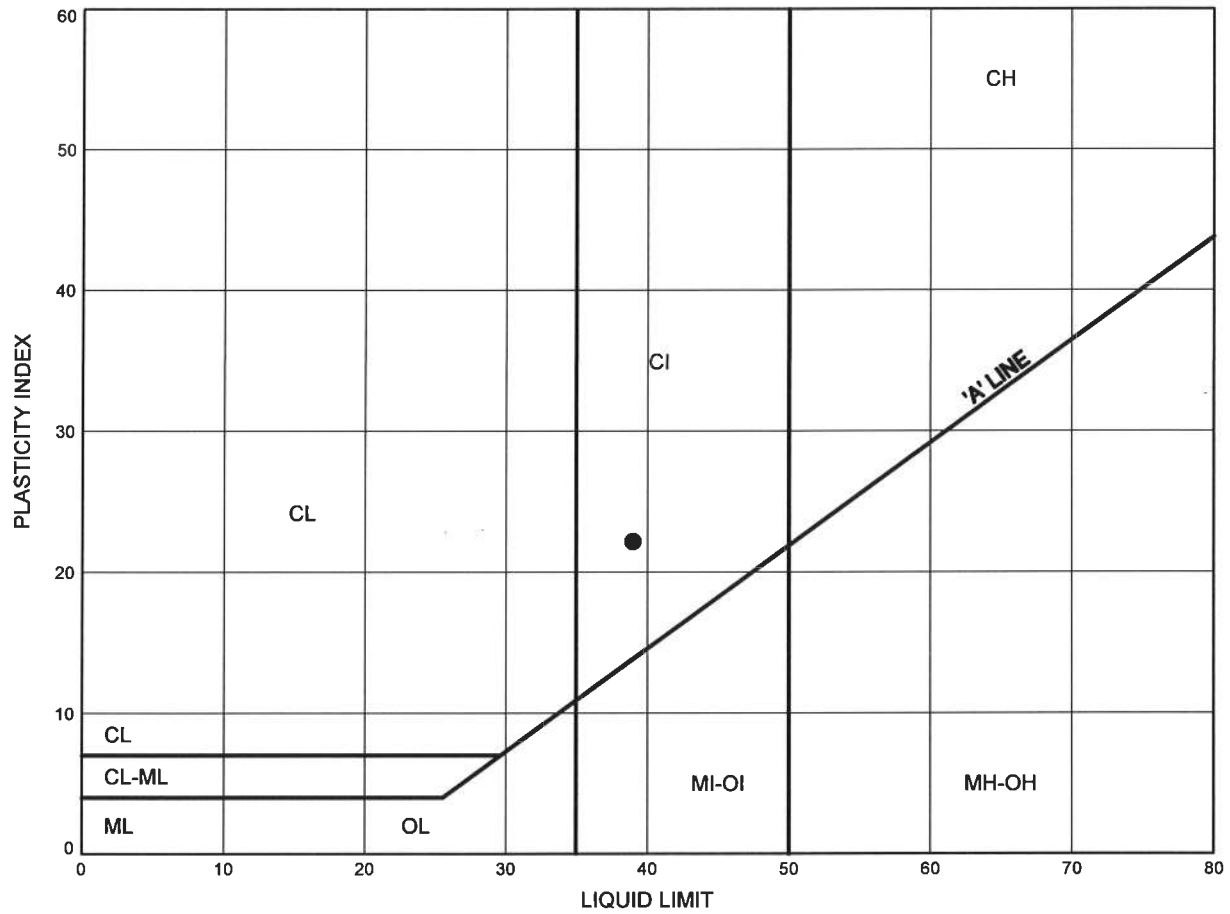
Prep'd MFA

Chkd. MRA

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

FIGURE BB2

Silty CLAY



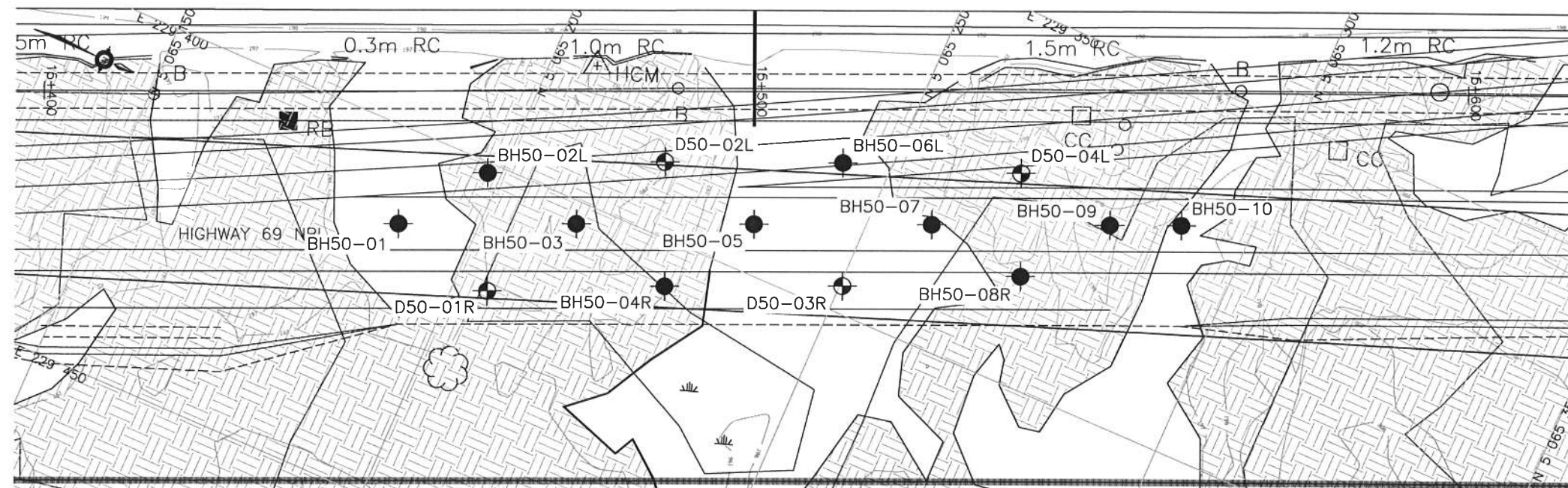
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH50-05	1.07	195.13

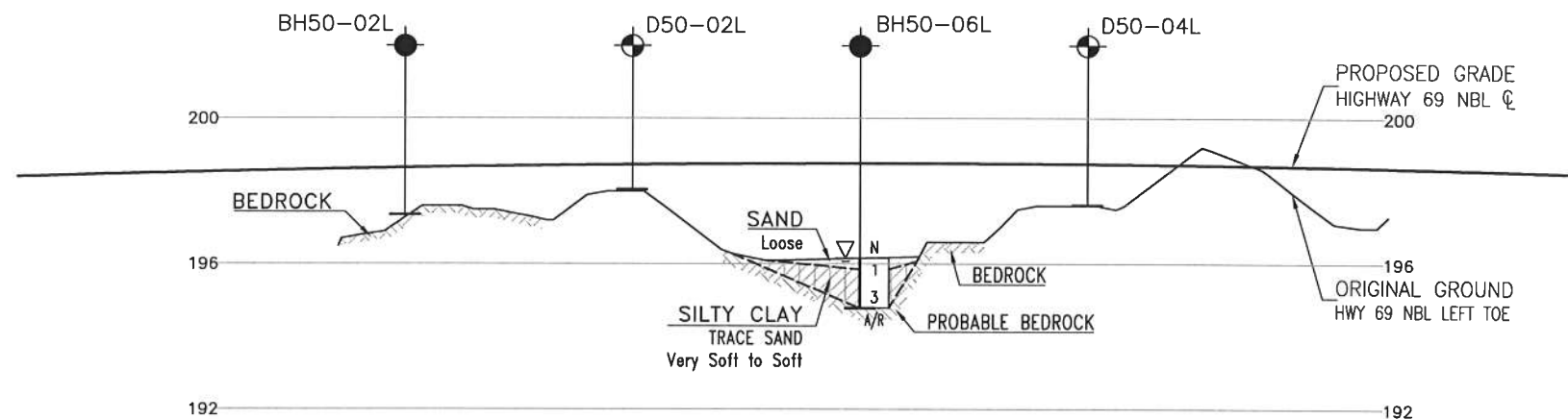
Date December 2012
 GWP# 5294-08-00



Prep'd MFA
 Chkd. MRA



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG LEFT TOE HIGHWAY 69 NBL

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

METRIC

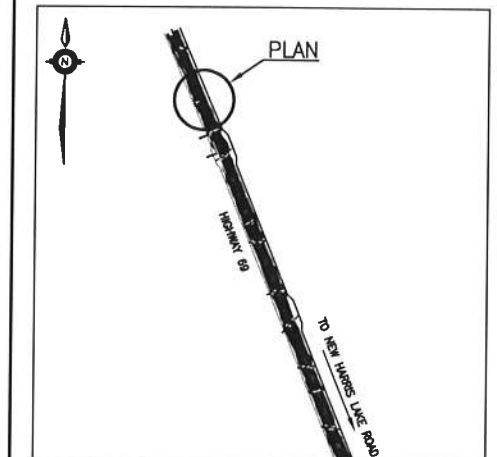
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-LT TOE
(STA 15+450 - 15+560)
BOREHOLE LOCATIONS AND SOIL STRATA



THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

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

NO	ELEVATION	NORTHING	EASTING
BH50-01	196.3	5 065 189.5	229 413.0
BH50-02L	197.4	5 065 198.2	229 401.4
BH50-03	197.3	5 065 212.5	229 403.1
BH50-04R	197.1	5 065 227.4	229 406.2
BH50-05	196.2	5 065 235.4	229 393.2
BH50-06L	196.2	5 065 243.5	229 380.3
BH50-07	196.1	5 065 258.4	229 383.3
BH50-08R	196.8	5 065 272.8	229 385.1
BH50-09	197.7	5 065 281.4	229 373.4
BH50-10	196.9	5 065 290.6	229 369.5
D50-01R	196.9	5 065 204.8	229 416.7
D50-02L	198.1	5 065 220.5	229 390.1
D50-03R	196.1	5 065 250.4	229 396.2
D50-04L	197.6	5 065 267.0	229 371.7

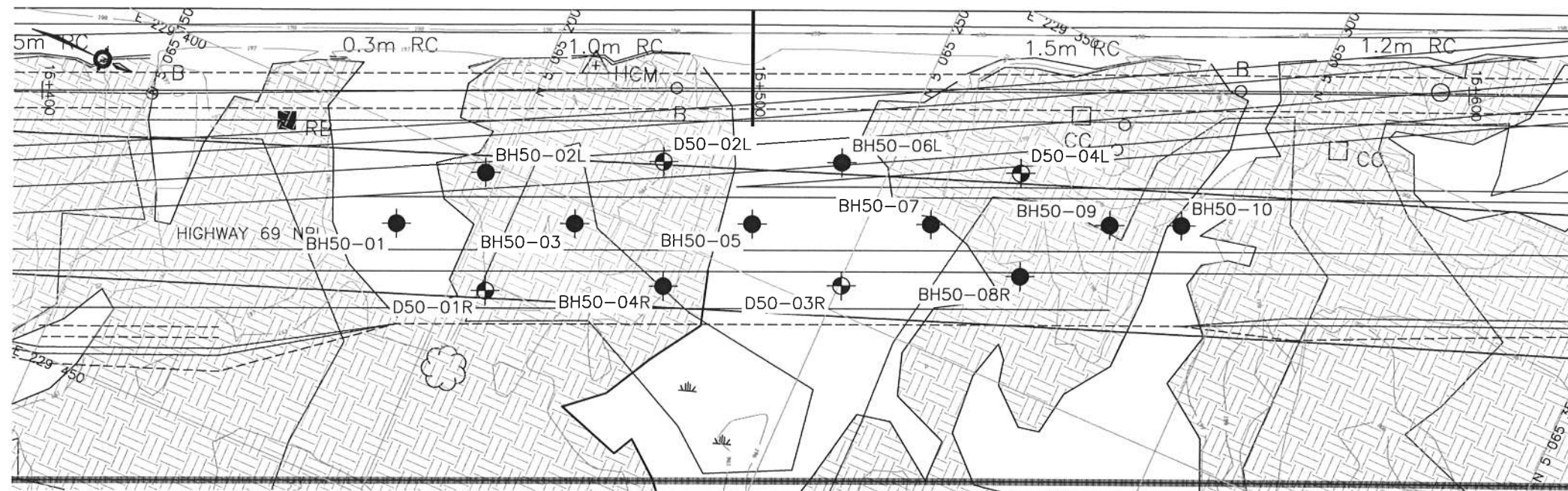
-NOTES-

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

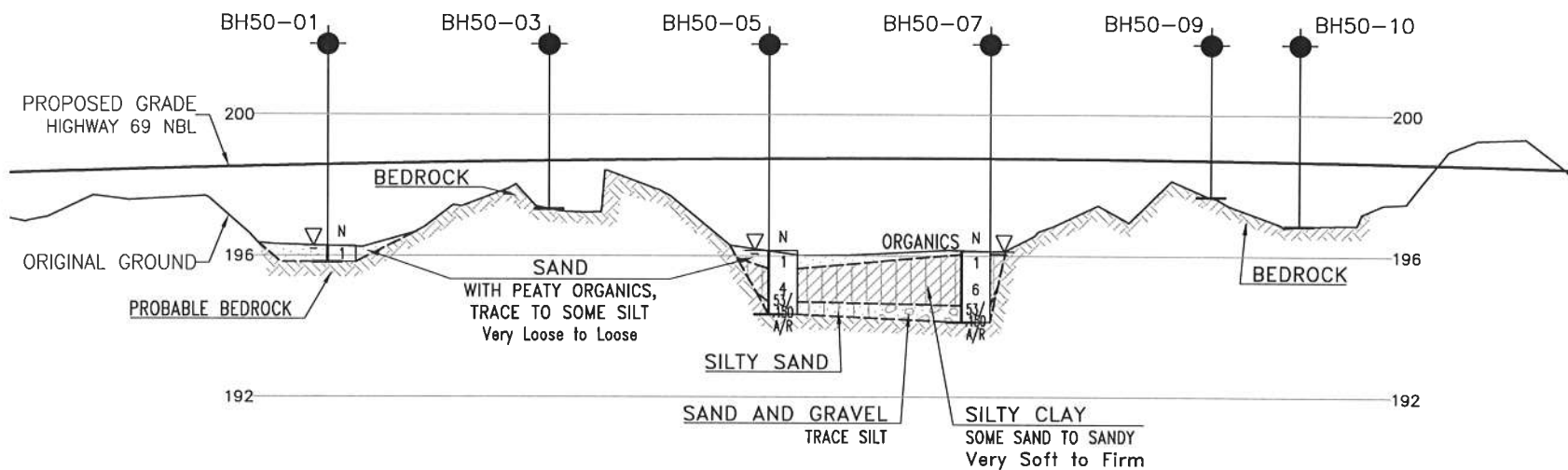
GEOCRES No. 41H-99

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





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

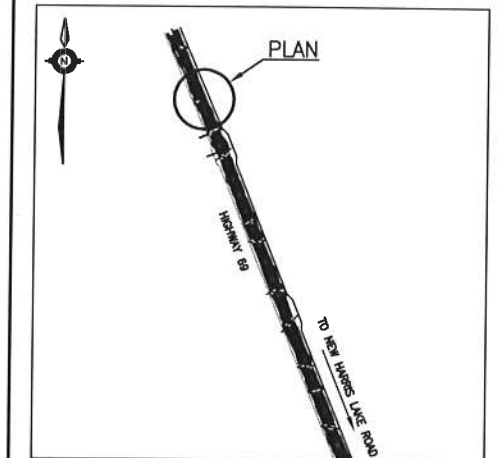
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-CL
(STA 15+450 - 15+560)
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
BH50-01	196.3	5 065 189.5	229 413.0
BH50-02L	197.4	5 065 198.2	229 401.4
BH50-03	197.3	5 065 212.5	229 403.1
BH50-04R	197.1	5 065 227.4	229 406.2
BH50-05	196.2	5 065 235.4	229 393.2
BH50-06L	196.2	5 065 243.5	229 380.3
BH50-07	196.1	5 065 258.4	229 383.3
BH50-08R	196.8	5 065 272.8	229 385.1
BH50-09	197.7	5 065 281.4	229 373.4
BH50-10	196.9	5 065 290.6	229 369.5
D50-01R	196.9	5 065 204.8	229 416.7
D50-02L	198.1	5 065 220.5	229 390.1
D50-03R	196.1	5 065 250.4	229 396.2
D50-04L	197.6	5 065 267.0	229 371.7

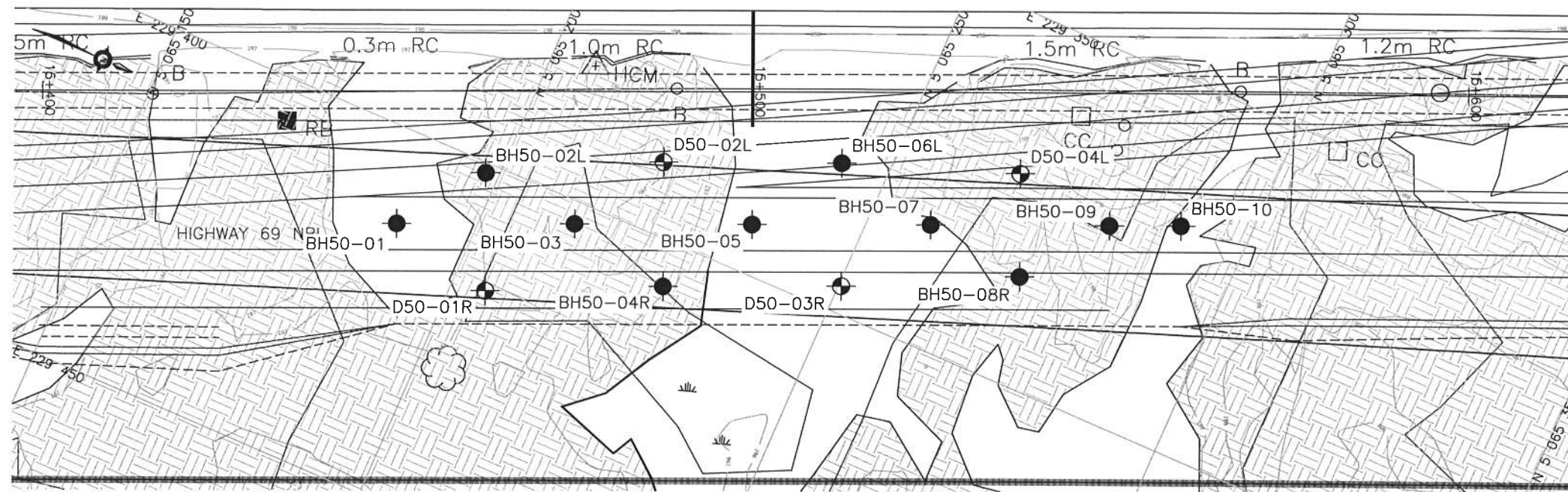
-NOTES-

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GEOCRES No. 41H-99

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

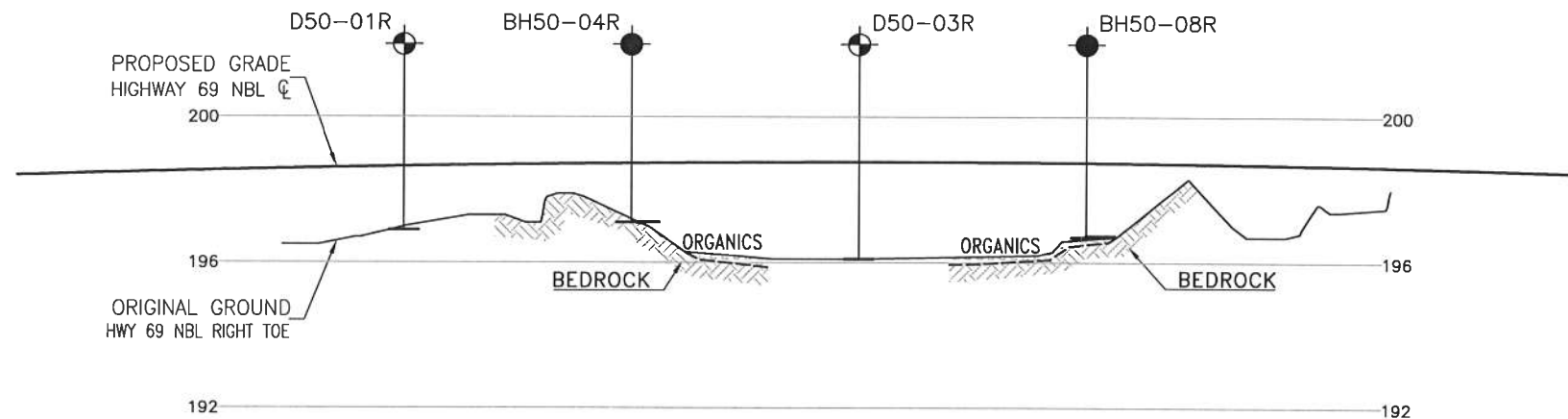




PLAN



SCALE 1:800



PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL



H 1:800

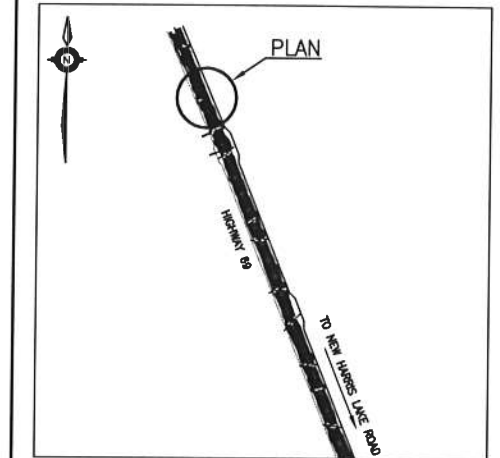
V 1:200

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-RT TOE
(STA 15+450 - 15+560)
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
BH50-01	196.3	5 065 189.5	229 413.0
BH50-02L	197.4	5 065 198.2	229 401.4
BH50-03	197.3	5 065 212.5	229 403.1
BH50-04R	197.1	5 065 227.4	229 406.2
BH50-05	196.2	5 065 235.4	229 393.2
BH50-06L	196.2	5 065 243.5	229 380.3
BH50-07	196.1	5 065 258.4	229 383.3
BH50-08R	196.8	5 065 272.8	229 385.1
BH50-09	197.7	5 065 281.4	229 373.4
BH50-10	196.9	5 065 290.6	229 369.5
D50-01R	196.9	5 065 204.8	229 416.7
D50-02L	198.1	5 065 220.5	229 390.1
D50-03R	196.1	5 065 250.4	229 396.2
D50-04L	197.6	5 065 267.0	229 371.7

-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
			STRUCT
			DWG
			DATE DEC. 2012

Appendix CC

**Highway 69 NBL
Sta. 15+710 to 15+800**

**Boreholes 51-01 to 51-08R
DCPTs D51-01R to D51-04L**

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

RECORD OF BOREHOLE No BH51-01

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+725 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.14 - 2008.09.14 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					
195.3	Ground Surface							20 40 60 80 100					
0.0	Silty SAND , trace silt, occasional rootlets Very Loose to Loose Brown to Grey Moist to Wet		1	SS	3	▽	195						
	Layer of dark brown peat from 0.9m to 1.6m		2	SS	6		194						
193.5			3	SS	1		193						
1.8	Silty CLAY , trace sand Very Soft Grey												
193.1			4	SS	2								
2.2	SAND and SILT , trace clay Very Loose Grey Wet		5	SS	21/ 225		192						
191.9													
3.4	END OF BOREHOLE (SAMPLER BOUNCING) AT 3.4m UPON AUGER REFUSAL ON PROBABLE PROBABLE BEDROCK. WATER LEVEL AT 1.1m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH GROUT TO SURFACE.												

RECORD OF BOREHOLE No BH51-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+737.5 O/S 9.5L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.14 - 2008.09.14 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		
195.3	Ground Surface											
0.0	Silty SAND , some silt Very Loose Brown Moist		1	SS	4							
	Brown to Grey		2	SS	5							
	Layer of dark brown peat and decayed wood pieces		3	SS	2							
193.5												
1.8	Silty CLAY , trace sand											
193.1	Very Soft											
2.2	Grey											
	SAND and SILT , trace clay Very Loose Grey Moist		4	SS	2							
	Layer of dark brown organics, rootlets and decayed wood pieces		5	SS	18/ 250							
191.8												
3.5	END OF BOREHOLE AT 3.5m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT 2.2m 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 0.3 195.0 Jan 16/09 Frozen at Surface Feb 19/09 Frozen at Surface Apr 21/09 Ground Surface Jun 05/09 0.1 195.2 Aug 17/09 0.2 195.1 Aug 25/09 0.2 195.1 Oct 27/09 0.3 195.0 Nov 20/09 0.7 194.6											

+ 3 × 3

Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH51-03

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+750 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008.09.14 - 2008.09.14 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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
194.9	Ground Surface							20	40	60	80	100					
0.0	ORGANICS: (300mm)		1	SS	50/			20	40	60	80	100				147	GR SA SI CL
194.6	Soft																
0.3	Dark Brown Wet				.000												
	BEDROCK AT 0.3m. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																

+ 3 , x 3 : Numbers refer to
Sensitivity

20
15
10


(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH51-04R

1 of 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+762.5 O/S 9.7R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.14 - 2008.09.14 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 × LAB VANE									
195.6	Ground Surface							20	40	60	80	100					
0.0	ORGANICS: (200mm)		1	SS	50/			20	40	60	80	100			o		
0.2	END OF BOREHOLE AT 0.2m UPON AUGER REFUSAL ON BEDROCK. BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.				.000												

RECORD OF BOREHOLE No BH51-05

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+775 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.14 - 2008.09.14 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									
194.8	Ground Surface							20	40	60	80	100					
0.0	ORGANICS, peaty: (600mm) Brown Wet		1	SS	50/ .000												
194.2	END OF BOREHOLE (SAMPLER BOUNCING) AT 0.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH AUGER CUTTINGS UPON COMPLETION.																
0.6																	

METRIC[illegible]

RECORD OF BOREHOLE No BH51-07

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+795 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.14 - 2008.09.14 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				
196.5	Ground Surface							20 40 60 80 100	○ UNCONFINED + FIELD VANE					
0.0	ORGANICS: (200mm)		1.5	SS	51/			20 40 60 80 100	● QUICK TRIAXIAL × LAB VANE				o	
0.2	BEDROCK AT 0.2m.				.150									

+³ ×³ : Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No BH51-08R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+712.5 O/S 10.0R, NBL ORIGINATED BY SLL
 HWY 69 BOREHOLE TYPE Portable Split Spoon Sampling Equipment COMPILED BY AN
 DATUM Geodetic DATE 2010.12.02 - 2010.12.02 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 (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
195.3	Ground Surface							20 40 60 80 100					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
0.0	ORGANICS, fibrous: (150mm)							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE					w _p w w _L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
0.2	SAND, trace to some silt Very Loose to Loose Brown Wet		1	SS	2	▽	195																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

+³, x³: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D51-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+737.5 O/S 9.5R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.14 - 2008.09.14 CHECKED BY RPR

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			WATER CONTENT (%)						
195.3	Ground Surface														
0.0	DCPT from surface.														
194.5															
0.8	END OF DCPT AT 0.8m UPON REFUSAL ON PROBABLE BEDROCK.														

ONTMT4S 6121.GPJ 12/12/12

+³ X³: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D51-02L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+762.5 O/S 9.7L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2008.09.14 - 2008.09.14 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						
194.7	Ground Surface							20 40 60 80 100						
0.0	DCPT from surface						194	20 40 60 80 100						
193.5	END OF DCPT AT 1.2m UPON REFUSAL ON PROBABLE BEDROCK.													
1.2														

METRIC

[illegible]

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D51-04L

1 OF 1

METRIC

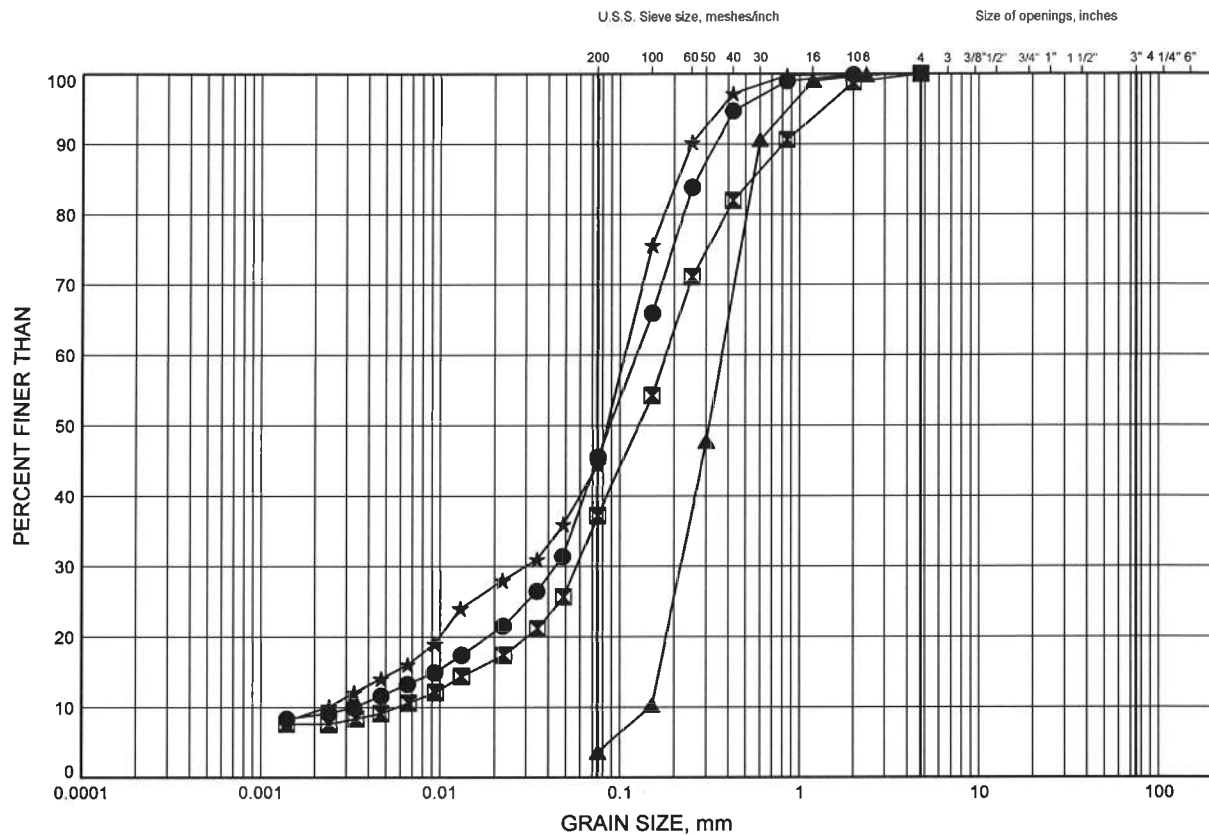
GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+712.5 O/S 10.0L, NBL ORIGINATED BY SLL
HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
DATUM Geodetic DATE 2010.12.02 - 2010.12.02 CHECKED BY MRA

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			20 40 60 80 100	20 40 60 80 100	W _P W W _L				
195.6	Ground Surface													
0.0	DCPT from surface													
194.8	END OF DCPT AT 0.8m UPON REFUSAL ON PROBABLE BEDROCK						195							
0.8														

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

FIGURE CC1

SAND and SILT to SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH51-01	2.59	192.71
■	BH51-02L	3.25	192.05
▲	BH51-08R	0.91	194.39
★	BH51-08R	1.68	193.62

Date December 2012

GWP# 5294-08-00



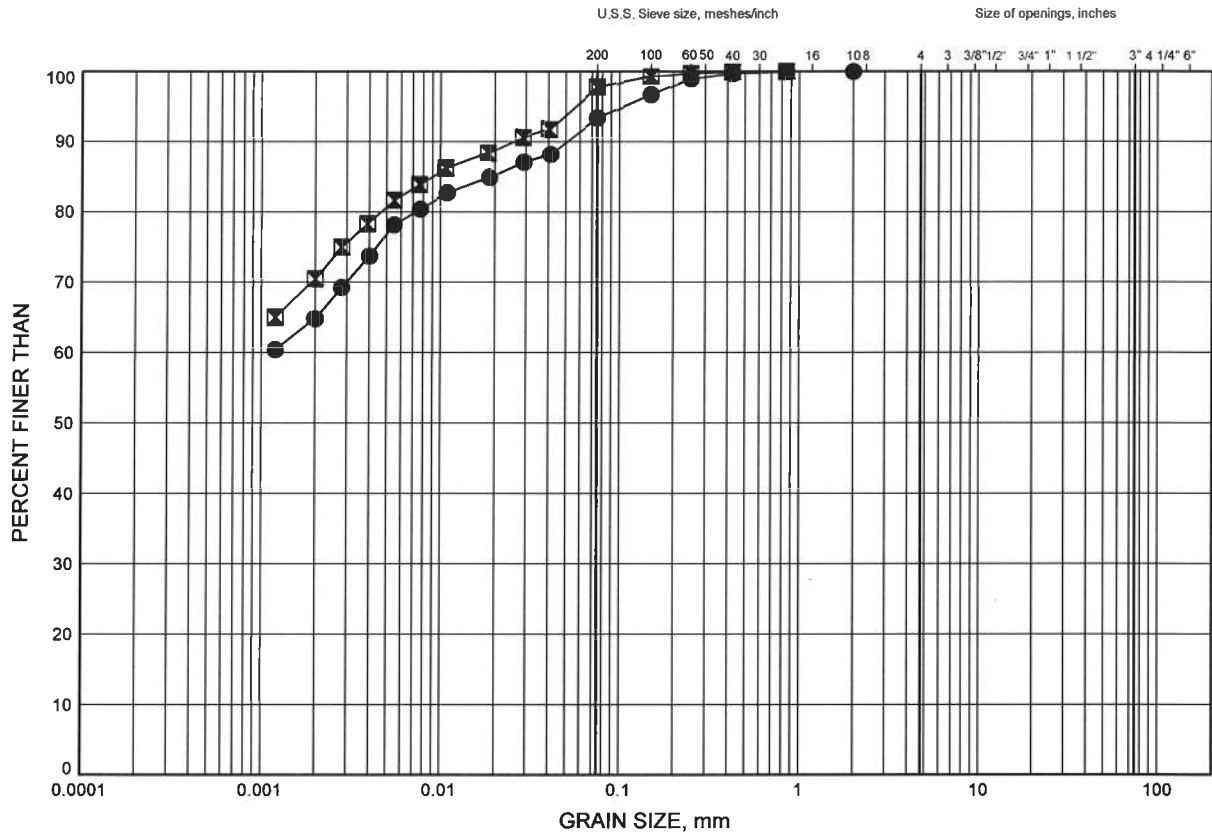
Prep'd MFA

Chkd. MRA

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

FIGURE CC2

Silty CLAY



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH51-01	1.98	193.32
⊠	BH51-02L	1.98	193.32

Date December 2012

GWP# 5294-08-00



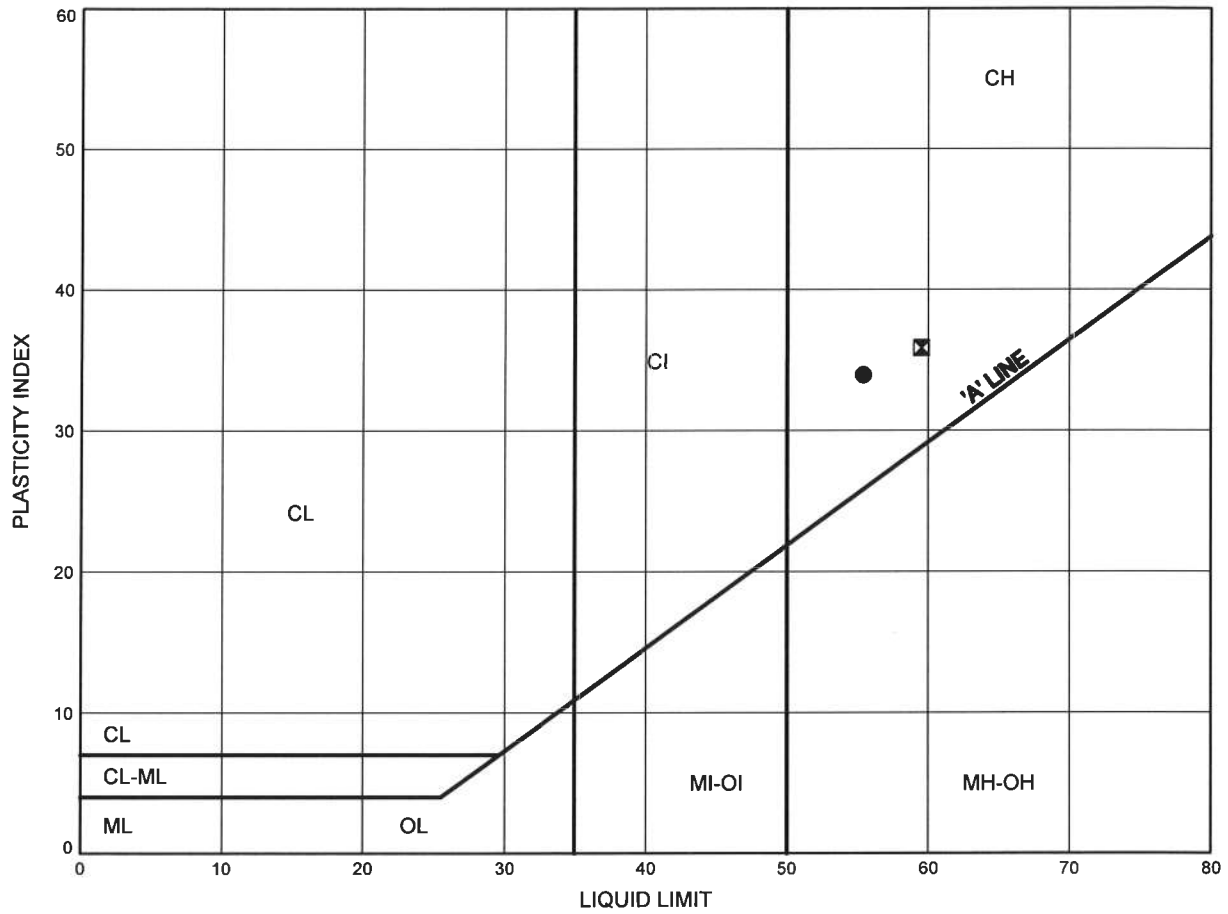
Prep'd MFA

Chkd. MRA

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

FIGURE CC3

Silty CLAY



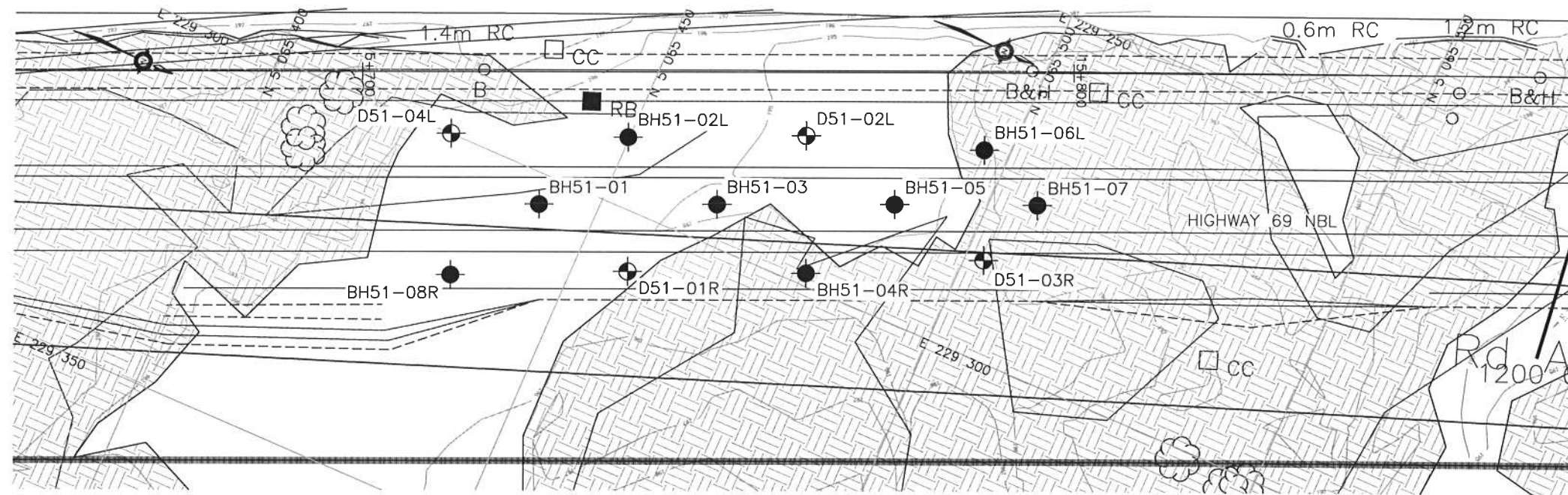
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH51-01	1.98	193.32
⊠	BH51-02L	1.98	193.32

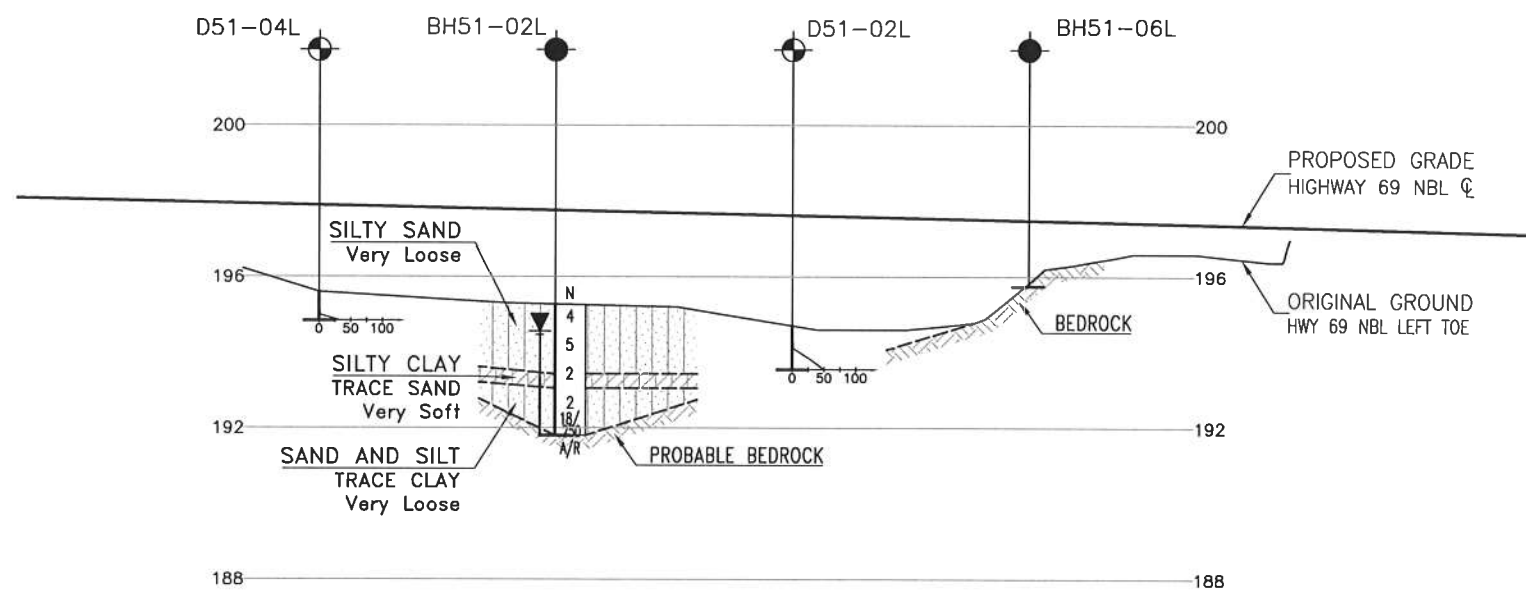
Date December 2012
 GWP# 5294-08-00



Prep'd MFA
 Chkd. MRA



PLAN
0 16 32 48m
SCALE 1:800



PROFILE ALONG LEFT TOE HIGHWAY 69 NBL

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

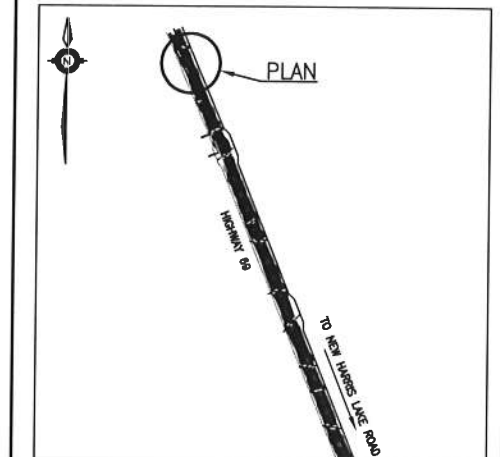
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-LT TOE
(STA 15+710 - 15+800)
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
BH51-01	195.3	5 065 442.1	229 304.2
BH51-02L	195.3	5 065 449.8	229 290.5
BH51-03	194.9	5 065 465.1	229 294.3
BH51-04R	195.6	5 065 480.4	229 298.3
BH51-05	194.8	5 065 488.0	229 284.4
BH51-06L	195.8	5 065 496.4	229 272.3
BH51-07	196.5	5 065 506.4	229 276.5
BH51-08R	195.3	5 065 434.6	229 318.3
D51-01R	195.3	5 065 457.3	229 308.0
D51-02L	194.7	5 065 472.7	229 280.5
D51-03R	195.6	5 065 502.6	229 286.6
D51-04L	195.6	5 065 426.7	229 299.9

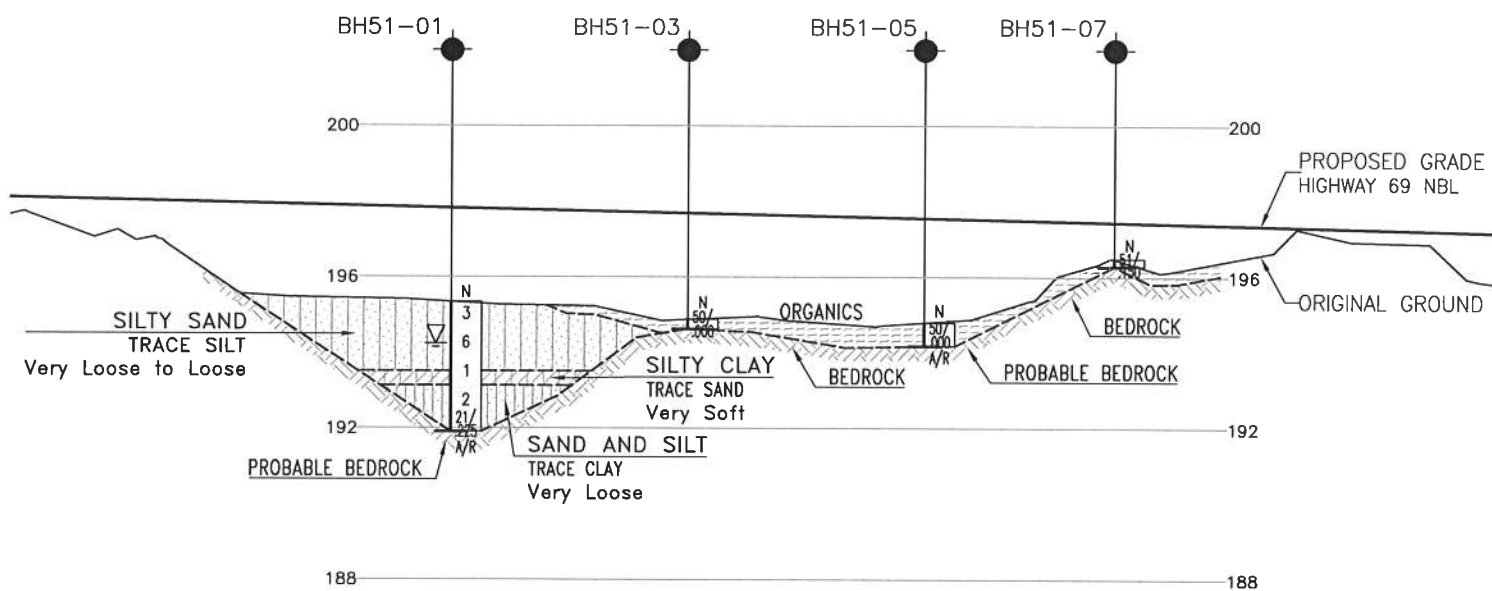
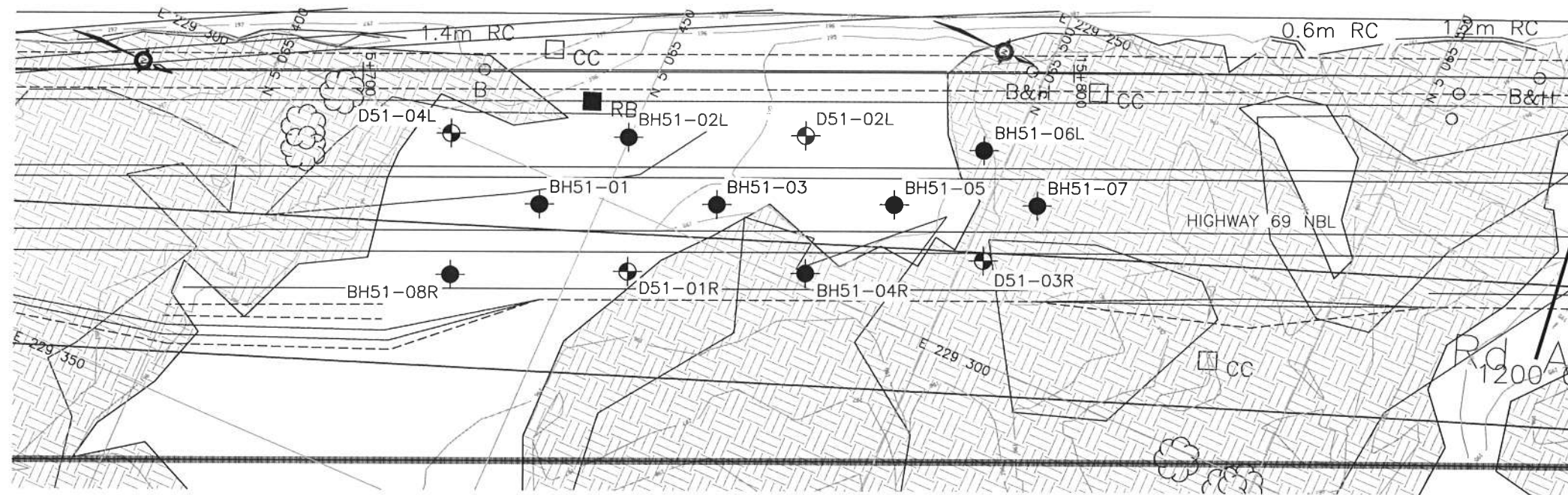
-NOTES-

- 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.

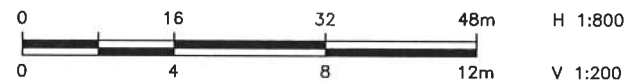
GEOCRES No. 41H-99

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





PROFILE ALONG CL HIGHWAY 69 NBL

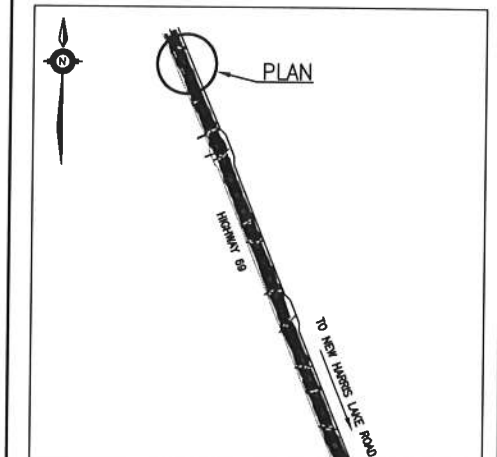


METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWNCONT No
GWP No 5294-08-00HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-CL
(STA 15+710 - 15+800)
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

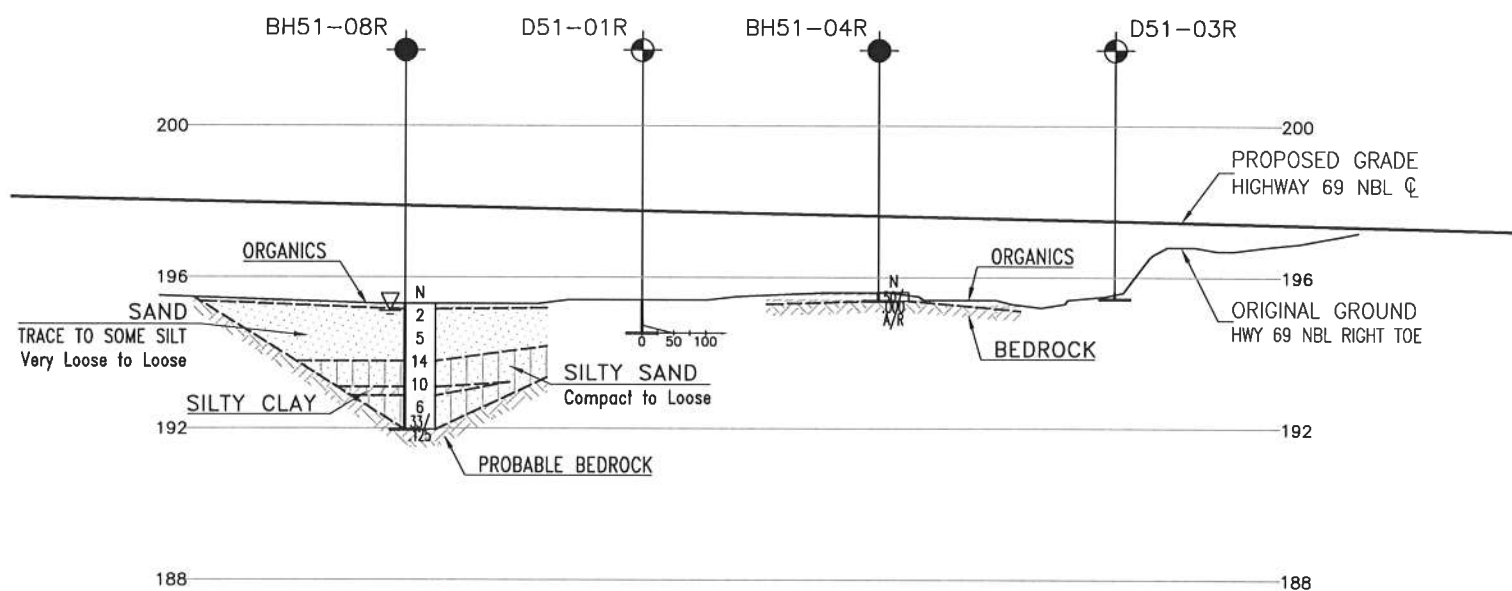
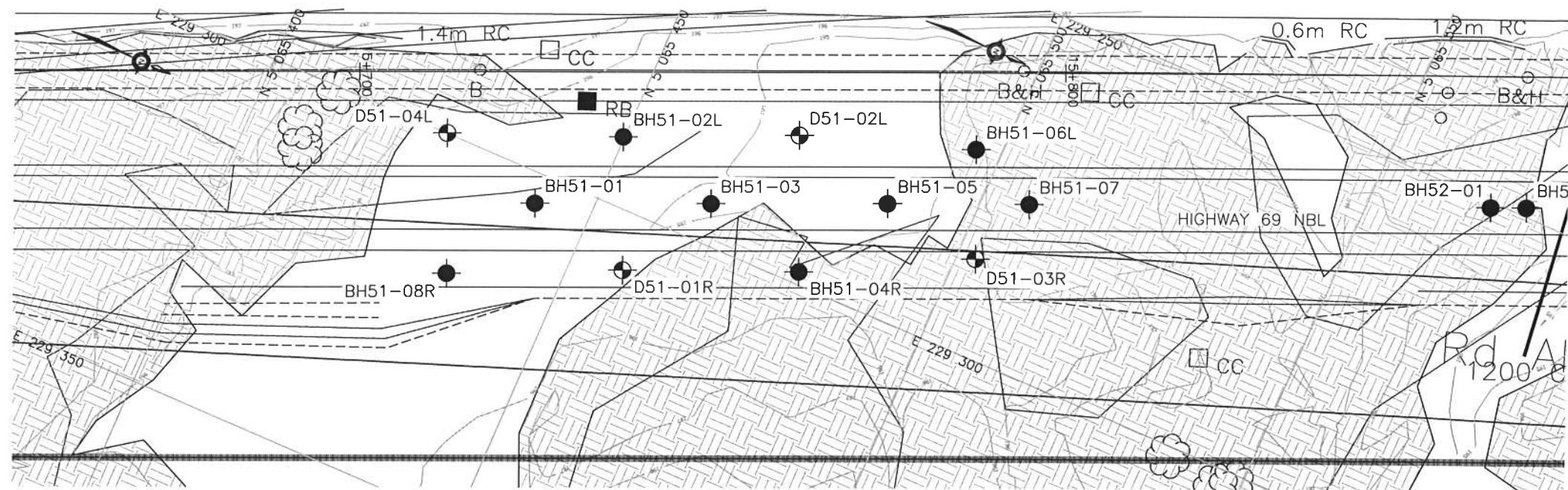
NO	ELEVATION	NORTHING	EASTING
BH51-01	195.3	5 065 442.1	229 304.2
BH51-02L	195.3	5 065 449.8	229 290.5
BH51-03	194.9	5 065 465.1	229 294.3
BH51-04R	195.6	5 065 480.4	229 298.3
BH51-05	194.8	5 065 488.0	229 284.4
BH51-06L	195.8	5 065 496.4	229 272.3
BH51-07	196.5	5 065 506.4	229 276.5
BH51-08R	195.3	5 065 434.6	229 318.3
D51-01R	195.3	5 065 457.3	229 308.0
D51-02L	194.7	5 065 472.7	229 280.5
D51-03R	195.6	5 065 502.6	229 286.6
D51-04L	195.6	5 065 426.7	229 299.9

-NOTES-

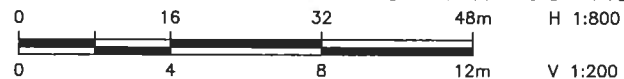
- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 41H-99

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



PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL



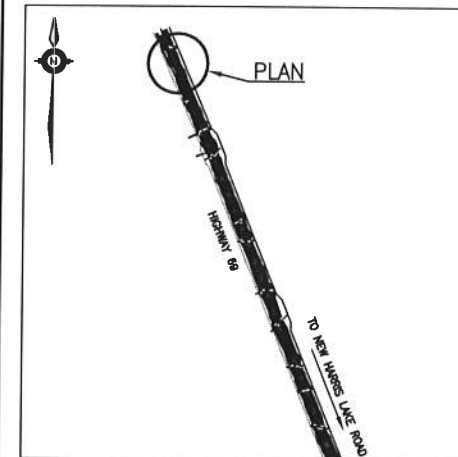
METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-RT TOE
(STA 15+710 ~ 15+800)
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
BH51-01	195.3	5 065 442.1	229 304.2
BH51-02L	195.3	5 065 449.8	229 290.5
BH51-03	194.9	5 065 465.1	229 294.3
BH51-04R	195.6	5 065 480.4	229 298.3
BH51-05	194.8	5 065 488.0	229 284.4
BH51-06L	195.8	5 065 496.4	229 272.3
BH51-07	196.5	5 065 506.4	229 276.5
BH51-08R	195.3	5 065 434.6	229 318.3
D51-01R	195.3	5 065 457.3	229 308.0
D51-02L	194.7	5 065 472.7	229 280.5
D51-03R	195.6	5 065 502.6	229 286.6
D51-04L	195.6	5 065 426.7	229 299.9

-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
DRAWN	MFA	CHK	PKC
LOAD	DATE	DEC. 2012	DWG



Appendix DD

**Highway 69 NBL
Sta. 15+860 to 15+915**

**Boreholes 52-01 to 52-06
DCPTs D52-01R, D52-02L**

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

METRIC

[illegible]

METRIC

GWP#	5294-08-00	LOCATION	Wallbridge Twp., Station 15+865 C/L NBL	ORIGINATED BY	WB
HWY	69	BOREHOLE TYPE	Visual Assessment and Manual Excavation	COMPILED BY	AN
DATUM	Geodetic	DATE	2008.09.14 - 2008.09.14	CHECKED BY	RPR

[illegible]

RECORD OF BOREHOLE No BH52-03L

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+877.5 O/S 8.0L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2008.09.14 - 2008.09.14 CHECKED BY RPR

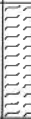

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20 40 60 80 100	W _P W W _L	WATER CONTENT (%)			
194.4	Ground Surface												
0.0	ORGANICS: (50mm)												
	SAND, trace clay, trace silt Very Loose to Loose Brown Wet		1	SS	1								
			2	SS	7								
			3	SS	6								
	Occasional cobbles Grey		4	SS	12/								
191.8													
2.6	END OF BOREHOLE (SAMPLER BOUNCING) AT 2.6m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE 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 0.4 194.0 Jan 16/09 Frozen at Surface Feb 19/09 Frozen at Surface Apr 21/09 Ground Surface Jun 05/09 0.1 194.3 Aug 17/09 Ground Surface Aug 25/09 Ground Surface Oct 27/09 Ground Surface Nov 20/09 Ground Surface												

RECORD OF BOREHOLE No BH52-04

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+890 C/L, NBL ORIGINATED BY WB
HWY 69 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2008.09.14 - 2008.09.14 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				
194.8	Ground Surface							20	40	60	80	100							
0.0	ORGANICS , peaty: (800mm) Dark Brown		1	SS	1														
194.0																			
0.8	SAND , trace silt, trace gravel, trace clay Loose Brown		2	SS	6		194												
193.4	Wet																		
1.4	END OF BOREHOLE AT 1.4m UPON AUGER REFUSAL ON PROBABLE BEDROCK. WATER LEVEL AT SURFACE UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH AUGER CUTTINGS TO SURFACE.																		

METRIC

[illegible]

RECORD OF BOREHOLE No BH52-06

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+915 C/L, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Visual Assessment and Manual Excavation COMPILED BY AN
 DATUM Geodetic DATE 2008 09 14 - 2008 09 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	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
198.2	Ground Surface						20	40	60	80	100						
0.0	ORGANICS: (350mm)							20	40	60	80	100					
197.8							198										
0.4	BEDROCK AT 0.35m.																

+³, X³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No D52-01R

1 OF 1

METRIC

GWP# 5294-08-00 LOCATION Wallbridge Twp., Station 15+877.5 O/S 8.0R, NBL ORIGINATED BY WB
 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY AN
 DATUM Geodetic DATE 2008.09.14 - 2008.09.14 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		
194.7	Ground Surface													
0.0	DCPT from surface													
193.2														
1.5	END OF DCPT AT 1.5m UPON REFUSAL ON PROBABLE BEDROCK													

+³ . X³ : Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

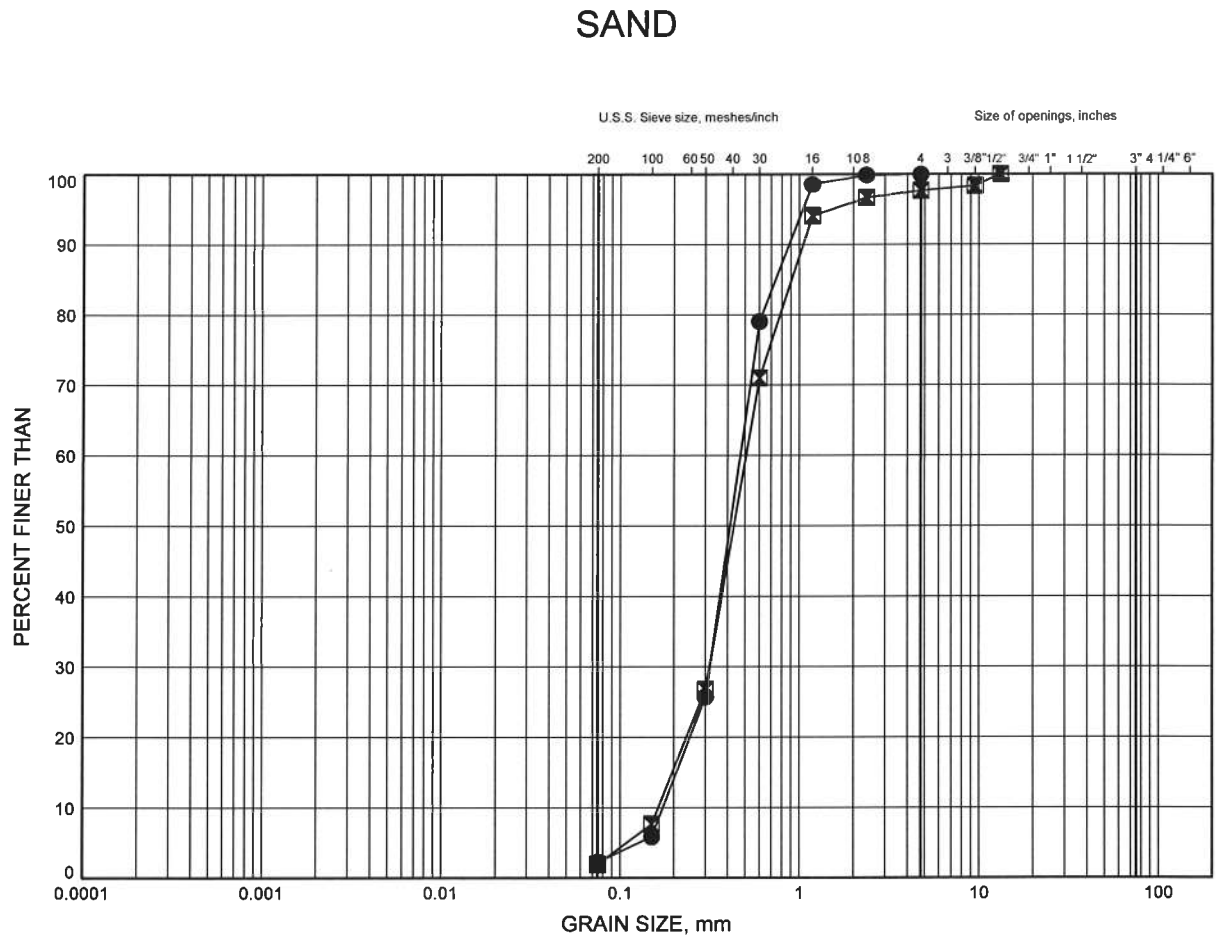
1 OF 1

METRIC

[illegible]

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

FIGURE DD1



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

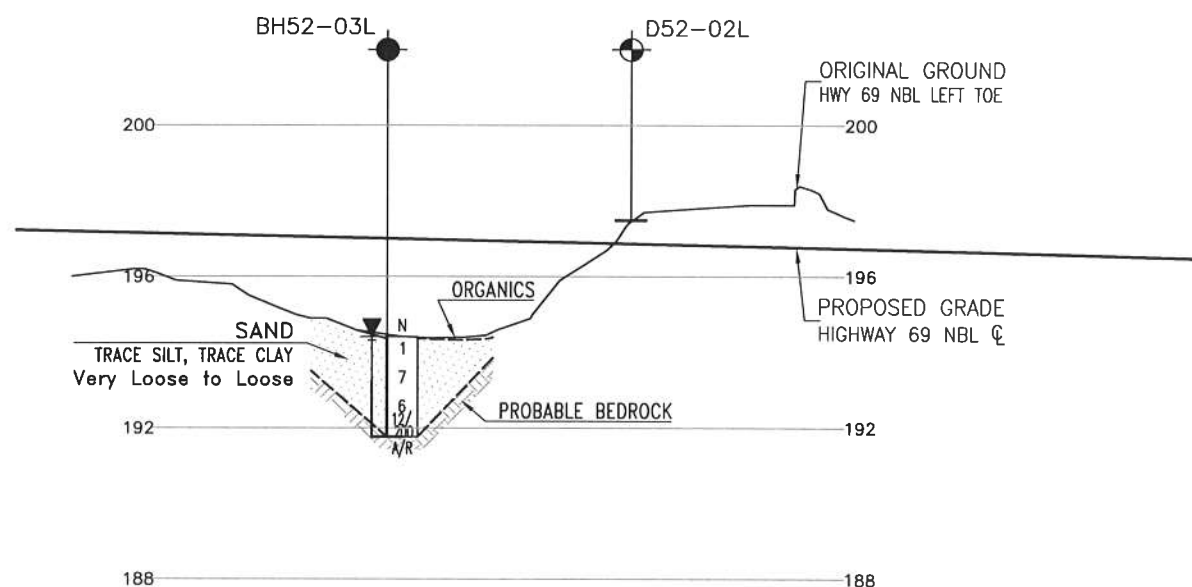
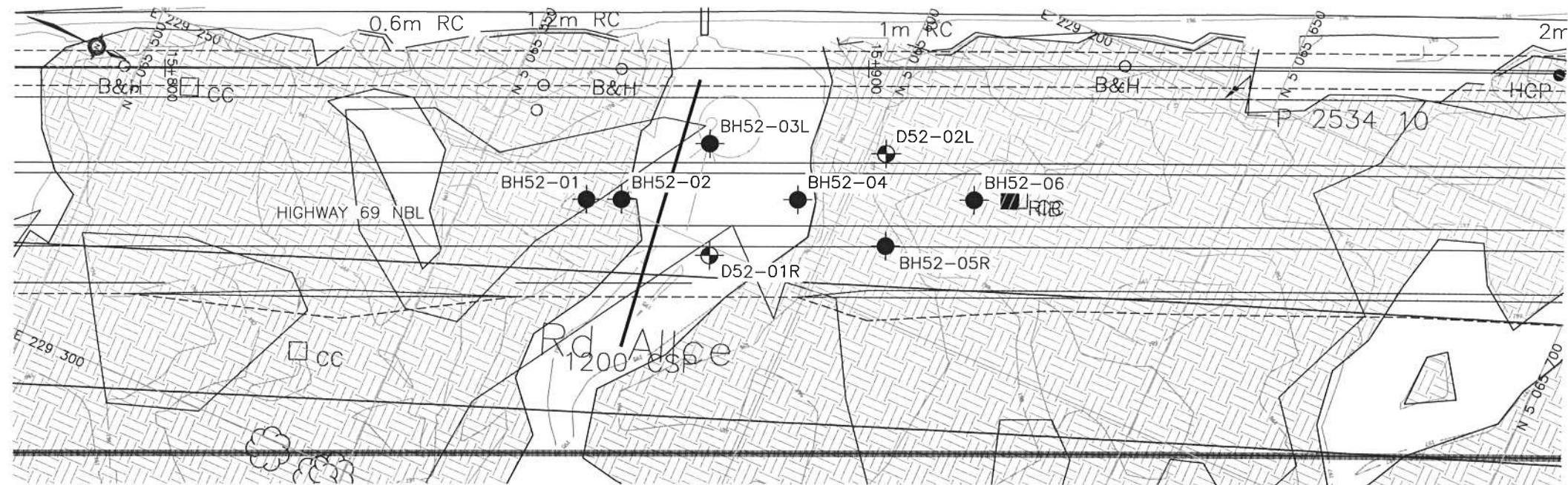
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	BH52-03L	1.83	192.57
⊠	BH52-04	1.07	193.73

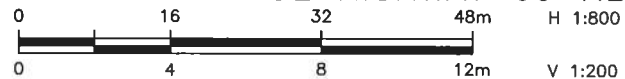
Date December 2012
GWP# 5294-08-00



Prep'd MFA
Chkd. MRA



PROFILE ALONG LEFT TOE HIGHWAY 69 NBL

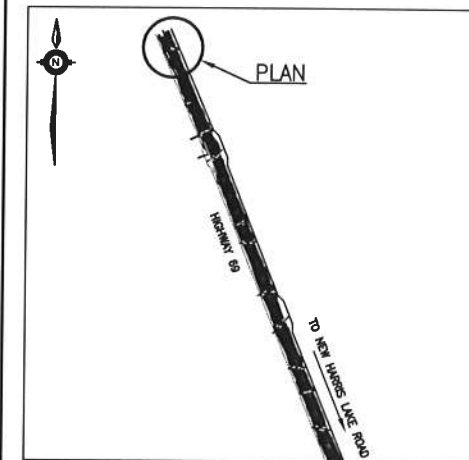


METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-LT TOE
(STA 15+860 - 15+915)
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
BH52-01	196.0	5 065 566.1	229 250.8
BH52-02	195.2	5 065 570.7	229 248.8
BH52-03L	194.4	5 065 579.0	229 236.5
BH52-04	194.8	5 065 593.6	229 238.9
BH52-05R	196.6	5 065 607.7	229 240.0
BH52-06	198.2	5 065 616.6	229 229.0
D52-01R	194.7	5 065 585.3	229 251.2
D52-02L	197.5	5 065 602.5	229 227.9

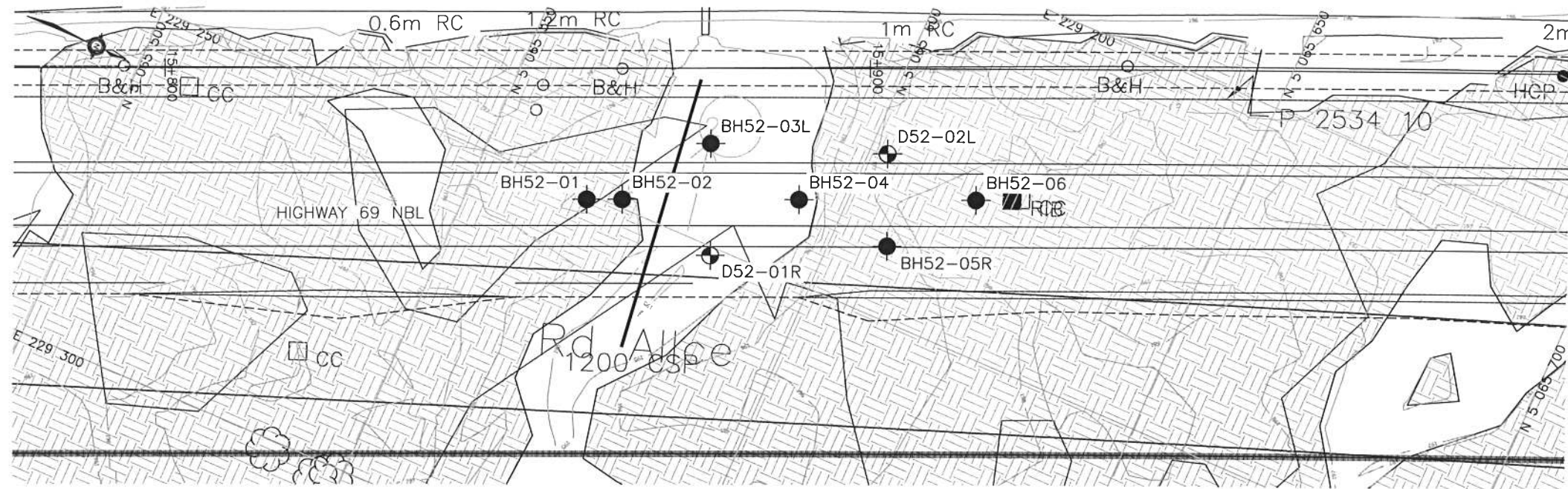
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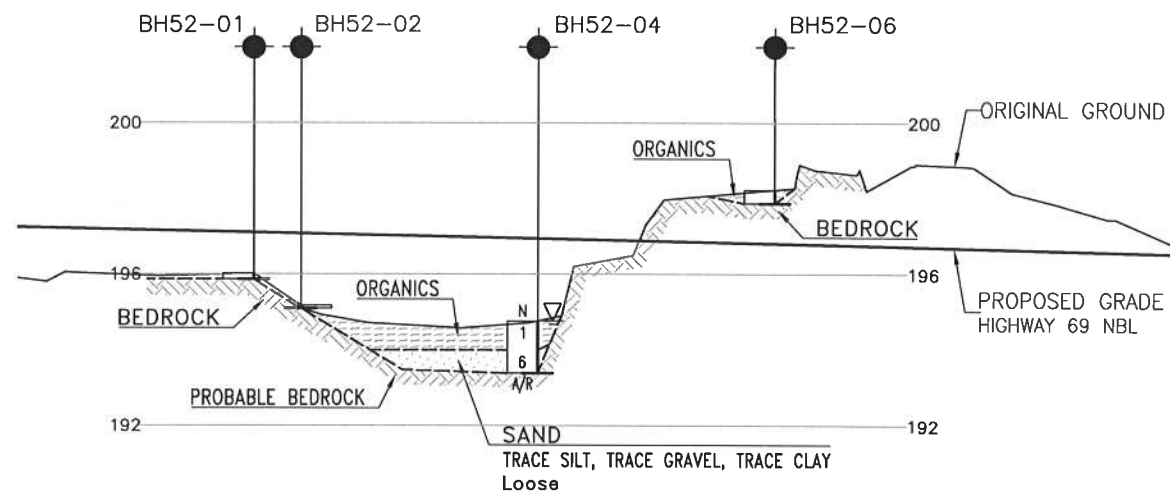
GEOCRES No. 41H-99

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

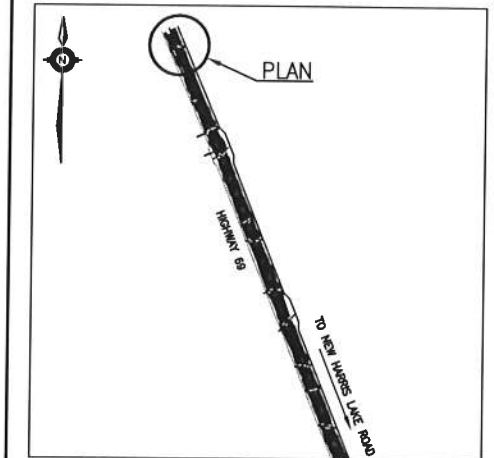
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
GWP No 5294-08-00

HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-CL
(STA 15+860 - 15+915)
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

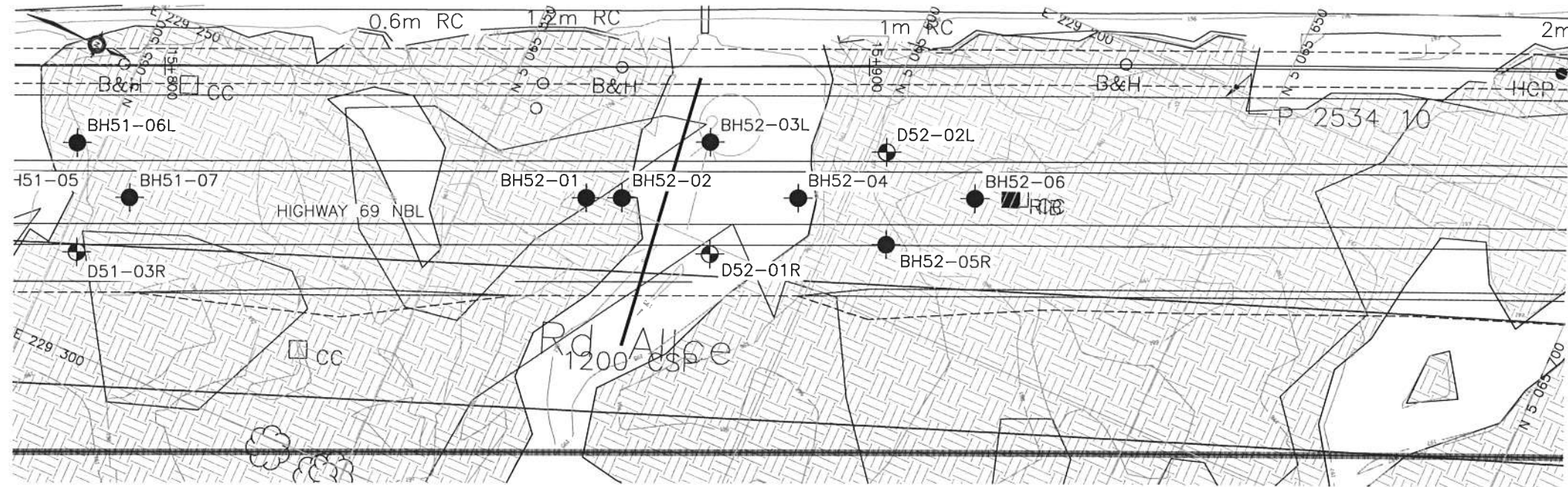
NO	ELEVATION	NORTHING	EASTING
BH52-01	196.0	5 065 566.1	229 250.8
BH52-02	195.2	5 065 570.7	229 248.8
BH52-03L	194.4	5 065 579.0	229 236.5
BH52-04	194.8	5 065 593.6	229 238.9
BH52-05R	196.6	5 065 607.7	229 240.0
BH52-06	198.2	5 065 616.6	229 229.0
D52-01R	194.7	5 065 585.3	229 251.2
D52-02L	197.5	5 065 602.5	229 227.9

-NOTES-

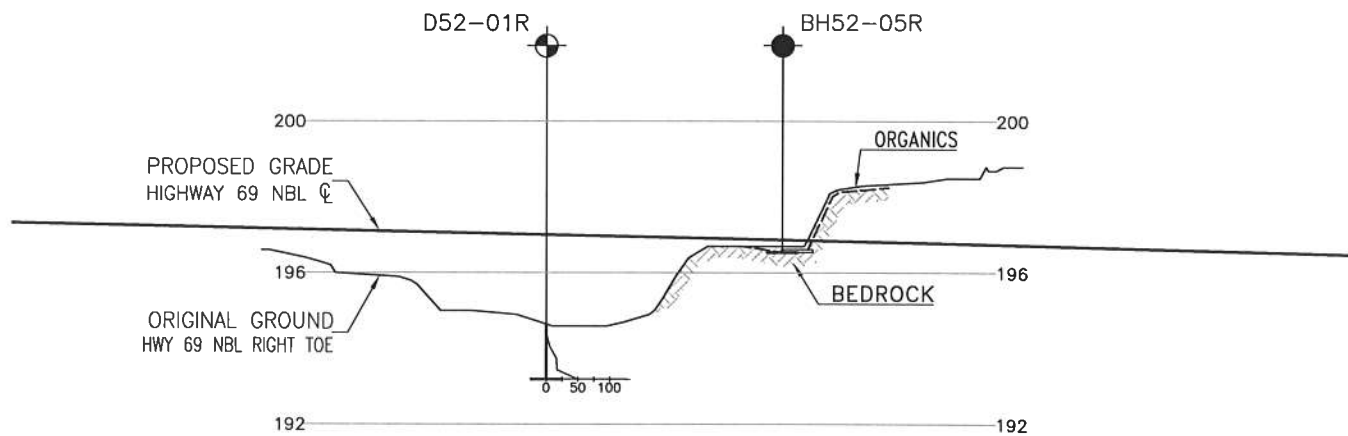
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GEOCRES No. 41H-99

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



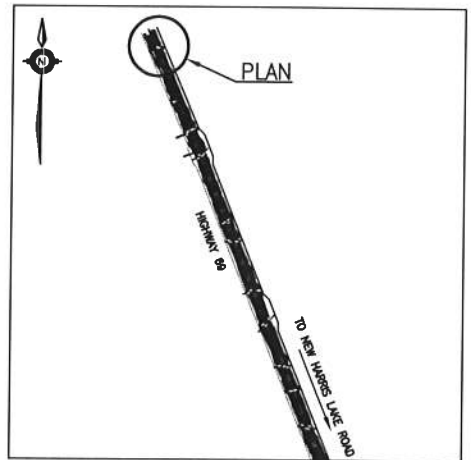
PROFILE ALONG RIGHT TOE HIGHWAY 69 NBL
0 16 32 48m H 1:800
0 4 8 12m V 1:200

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

CONT No
GWP No 5294-08-00
HIGHWAY 69 FOUR-LANING
WALLBRIDGE HWY 69 NBL-RT TOE
(STA 15+860 - 15+915)
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
BH52-01	196.0	5 065 566.1	229 250.8
BH52-02	195.2	5 065 570.7	229 248.8
BH52-03L	194.4	5 065 579.0	229 236.5
BH52-04	194.8	5 065 593.6	229 238.9
BH52-05R	196.6	5 065 607.7	229 240.0
BH52-06	198.2	5 065 616.6	229 229.0
D52-01R	194.7	5 065 585.3	229 251.2
D52-02L	197.5	5 065 602.5	229 227.9

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