



TABLE A
ROCK CORE DESCRIPTIONS

CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
C1-1 (Sta.10+080 36 m Rt.)	10	6.5 – 8.0	98	83	6.5 – 9.5	GRANITIC GNEISS: Grey, fine to medium crystalline, with occasional dark grey to black bands, high strength, slightly weathered to unweathered, close to moderate spaced flat to dipping cross joints, rough planar, tight to slightly altered with red oxidation and/or scale on partings, good to excellent quality.
	11	8.0 – 9.5	97	93		
C1-2 (Sta.10+098 3 m Rt.)	2	0.3 – 1.3	100	40	0.3 – 3.4	GRANITIC GNEISS: Pink and grey, fine to medium crystalline, high strength, slightly weathered, very close to close becoming close to moderate spaced flat to dipping cross joints, rough planar, tight to slightly altered with red oxidation and/or scale on partings, poor to good quality.
	3	1.3 – 1.8	100	40		
	4	1.8 – 3.4	97	79		
C2-1 (Sta.10+133 6 m Lt.)	5	3.8 – 5.3	77	50	3.8 – 5.8	SYENITE: Pink to red, fine to medium crystalline, occasional steeply dipping bands of white feldspar and dark mafic material, high strength, slightly weathered, close to moderate spaced flat to dipping cross joints, rough planar, with green to dark green secondary mineralization and/or scale on partings, fair quality. GABBRO: Dark grey to black, medium crystalline, high strength, slightly weathered, close spaced flat to dipping cross joints, rough planar, with scale and/or silt on partings, fair quality.
	6	5.3 – 6.9	93	52	5.8 – 6.9	

Originated: FP
 Compiled: JW
 Checked: MN/ CN



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CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
C2-3 (Sta.10+148 35 m Lt.)	2	0.9 – 2.0	100	33	0.9 – 3.4	SYENITE: Light grey to pink, fine to medium crystalline, high strength, slightly weathered, very close to moderate spaced flat to dipping cross joints, multiple sets, rough planar, tight to slightly oxidized, numerous vertical fissures, with orange oxidation on surface, poor quality, over steeply dipping composite layer (2 mm thick black mafic breccia over 25 mm thick red, fine crystalline material). SYENITE: Pink to red, fine crystalline, with occasional irregular porous seams, high strength, slightly weathered, close (locally very close) spaced flat cross joints, rough planar, with green secondary mineralization and/or scale on partings, good quality.
	3	2.0 – 3.5	100	39		
	4	3.5 – 4.2	100	80	3.4 – 4.2	
SX-1 (Sta.10+800 31 m Lt.)	1	0.8 – 2.3	100	86	0.8 – 3.8	GRANITIC GNEISS: Pink and grey, fine to medium crystalline, with pegmatitic layer, high strength, slightly weathered, close to moderate (locally very close) spaced flat to dipping cross joints, rough planar, slightly altered with red oxidation and/or silt on partings, good to excellent quality.
	2	2.3 – 3.8	100	99		
SX-2 (Sta.10+800 CL)	1	1.2 – 2.0	76	24	1.2 – 4.5	GRANITIC GNEISS: Pink, fine to medium crystalline, high strength, slightly weathered, close to wide (locally very close) spaced flat to dipping cross joints, rough planar, slightly altered with red oxidation stains on partings, multiple vertical fractures in upper 330 mm, very poor becoming excellent quality.
	2	2.0 – 3.4	100	90		
	3	3.4 – 4.5	98	98		
SX-3 (Sta.10+798)	1	0.7 – 2.1	100	38	0.7 – 3.8	GRANITIC GNEISS: Pink and grey, fine to medium crystalline, high strength, slightly weathered, close to moderate spaced flat to dipping
	2	2.1 – 3.5	100	93		

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HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
30 m Rt.)	3	3.5 – 3.8	100	73		cross joints, rough planar, slightly altered with dark red oxidation and/or scale on partings, poor to excellent quality.
C8/9-1 (Sta.12+590 38 m Lt.)	5	2.4 – 3.2	100	53	2.4 – 5.2	GRANITIC GNEISS: Pink to light grey, slight near vertical banding, fine to medium crystalline, with near vertical irregular pink vein, high strength, slightly weathered to unweathered, close to moderate becoming wide spaced dipping cross joints, rough planar, tight to slightly altered with dark red oxidations stains and/or scale on partings, some vertical fissures in upper 0.7 m, locally open to 0.5 mm, with dark mineralization on parting, fair, becoming excellent quality.
	6	3.2 – 4.8	100	93		
	7	4.8 – 5.2	100	100		
C8/9-4 (Sta.12+590 36 m Rt.)	9	7.2 – 8.0	100	30	7.2 – 10.2	GRANITIC GNEISS: Pink, fine crystalline, no banding, with veinlets throughout rock mass, medium strength, slightly weathered to unweathered, very close to close (locally moderate) spaced dipping cross joints (multiple sets), rough planar, tight to occasionally slightly altered with silt on partings, poor to fair quality.
	10	8.0 – 9.5	100	74		
	11	9.5 – 10.2	100	68		
C15-1 (Sta.13+206 48 m Lt.)	8	5.5 – 6.5	100	93	5.5 – 8.3	MIGMATITE: Dark grey, fine to medium crystalline, with near vertical banding, high strength, slightly weathered to unweathered, moderate to wide (locally close) spaced flat cross joints, rough planar, tight to slightly altered with red oxidation stains on partings, good to excellent quality.
	9	6.5 – 8.0	98	98		
	10	8.0 – 8.3	83	83		

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ROCK CORE DESCRIPTIONS

CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
C15-3 (Sta.13+206 39.5 m Rt.)	6	5.5 – 5.7	100	100	5.5 – 8.5	GRANITIC GNEISS: Pink to light grey, medium crystalline, no banding, high strength, slightly weathered to unweathered, moderate to wide (locally close) spaced flat to dipping cross joints, rough planar, tight to slightly altered with dark oxidation stains and/or silt on partings, possible 50 mm void at 7.3 m depth, good to excellent quality.
	7	5.7 – 6.4	92	92		
	8	6.4 – 7.9	97	79		
	9	7.9 – 8.5	100	100		
C16-1 (Sta.8+240 CLRSC 13 m Lt.)	4	2.3 – 3.5	100	100	2.3 – 5.4	MIGMATITE: Light grey, fine to medium crystalline, with near vertical dark grey to black distorted banding, occasional metallic mineralization, high strength, slightly weathered to unweathered, close to moderate spaced flat to dipping cross joints, rough planar, with silt and/or scale on partings, good to excellent quality.
	5	3.5 – 5.0	100	88		
	6	5.0 – 5.4	100	100		
C-37/38-3 (Sta.15+310 47 m Lt.)	4	4.1 – 5.1	100	100	4.1 – 7.2	MIGMATITE: Dark grey, medium to coarse crystalline, biotite rich with occasional bands of white to pink feldspar, medium strength, slightly weathered with occasional highly weathered layers, close to moderate spaced flat to dipping cross joints, rough planar, slightly altered with oxidation and/or silt on partings, vertical fissures, smooth planar (locally polished appearance) with oxidized friable infilling up to 20 mm wide, good to excellent quality.
	5	5.1 – 6.5	100	81		
	6	6.5 – 7.2	100	100		

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CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
C41-1 (Sta.15+885 5 m Lt.)	7	5.8 – 6.6	100	100	5.8 – 8.9	GRANITIC GNEISS: Pink and grey, medium crystalline, high strength, slightly weathered, close to wide spaced flat to dipping cross joints, rough planar, slightly altered with oxidation and/or scale on partings, excellent quality.
	8	6.6 – 8.1	100	100		
	9	8.1 – 8.9	100	100		
C41-2 (Sta.15+888 46 m Lt.)	5	2.4 – 3.7	100	94	2.4 – 5.6	BIOTITE GNEISS: Dark grey to black, fine to medium crystalline, medium strength, slightly weathered, close to moderate spaced flat to dipping cross joints, rough planar, slightly altered with oxidation and/or scale on partings, excellent quality.
	6	3.7 – 5.1	100	100		
	7	5.1 – 5.6	97	97		
C-44/45-3 (Sta.10+523 37 m Rt.)	7	6.6 – 6.8	100	100	6.6 – 9.8	SYENITE: Pink, fine crystalline, high strength, slightly weathered, close to moderate spaced flat to dipping cross joints, rough planar, slightly altered with silt and/or scale on partings, occasional vertical fissure, rough planar, oxidized, good to excellent, becoming poor quality.
	8	6.8 – 7.8	100	88		
	9	7.8 – 9.3	100	83		
	10	9.3 – 9.8	100	41		

NOTE: RQD = Rock Quality Designation

Originated: FP
 Compiled: JW
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EXPLANATION OF TERMS USED IN REPORT

N VALUE: THE STANDARD PENETRATION TEST (SPT) N VALUE IS THE NUMBER OF BLOWS REQUIRED TO CAUSE A STANDARD 51mm O.D. SPLIT BARREL SAMPLER TO PENETRATE 0.3m INTO UNDISTURBED GROUND IN A BOREHOLE WHEN DRIVEN BY A HAMMER WITH A MASS OF 63.5kg, FALLING FREELY A DISTANCE OF 0.76m. FOR PENETRATIONS OF LESS THAN 0.3m N VALUES ARE INDICATED AS THE NUMBER OF BLOWS FOR THE PENETRATION ACHIEVED. AVERAGE N VALUE IS DENOTED THUS \bar{N} .

DYNAMIC CONE PENETRATION TEST: CONTINUOUS PENETRATION OF A CONICAL STEEL POINT (51mm O.D. 60° CONE ANGLE) DRIVEN BY 475 J IMPACT ENERGY ON 'A' SIZE DRILL RODS. THE RESISTANCE TO CONE PENETRATION IS MEASURED AS THE NUMBER OF BLOWS FOR EACH 0.3m ADVANCE OF THE CONICAL POINT INTO THE UNDISTURBED GROUND.

SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSENESS.

CONSISTENCY: COHESIVE SOILS ARE DESCRIBED ON THE BASIS OF THEIR UNDRAINED SHEAR STRENGTH (c_u) AS FOLLOWS:

c_u (kPa)	0 - 12	12 - 25	25 - 50	50 - 100	100 - 200	> 200
	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD

DENSENESS: COHESIONLESS SOILS ARE DESCRIBED ON THE BASIS OF DENSENESS AS INDICATED BY SPT N VALUES AS FOLLOWS:

N (BLOWS/0.3m)	0 - 5	5 - 10	10 - 30	30 - 50	> 50
	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

ROCKS ARE DESCRIBED BY THEIR COMPOSITION AND STRUCTURAL FEATURES AND / OR STRENGTH.

RECOVERY: SUM OF ALL RECOVERED ROCK CORE PIECES FROM A CORING RUN EXPRESSED AS A PERCENT OF THE TOTAL LENGTH OF THE CORING RUN.

MODIFIED RECOVERY: SUM OF THOSE INTACT CORE PIECES, 100mm+ IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF THE CORING RUN. THE ROCK QUALITY DESIGNATION (RQD), FOR MODIFIED RECOVERY, IS:

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
	VERY POOR	POOR	FAIR	GOOD	EXCELLENT

JOINTING AND BEDDING:

SPACING	50mm	50 - 300mm	0.3m - 1m	1m - 3m	> 3m
JOINTING	VERY CLOSE	CLOSE	MOD. CLOSE	WIDE	VERY WIDE
BEDDING	VERY THIN	THIN	MEDIUM	THICK	VERY THICK

ABBREVIATIONS AND SYMBOLS

FIELD SAMPLING

S S	SPLIT SPOON	T P	THINWALL PISTON
W S	WASH SAMPLE	O S	OSTERBERG SAMPLE
S T	SLOTTED TUBE SAMPLE	R C	ROCK CORE
B S	BLOCK SAMPLE	P H	T W ADVANCED HYDRAULICALLY
C S	CHUNK SAMPLE	P M	T W ADVANCED MANUALLY
T W	THINWALL OPEN	F S	FOIL SAMPLE
F V	FIELD VANE		

STRESS AND STRAIN

u_w	kPa	PORE WATER PRESSURE
u	1	PORE PRESSURE RATIO
σ	kPa	TOTAL NORMAL STRESS
σ'	kPa	EFFECTIVE NORMAL STRESS
τ	kPa	SHEAR STRESS
$\sigma_1, \sigma_2, \sigma_3$	kPa	PRINCIPAL STRESSES
ϵ	%	LINEAR STRAIN
$\epsilon_1, \epsilon_2, \epsilon_3$	%	PRINCIPAL STRAINS
E	kPa	MODULUS OF LINEAR DEFORMATION
G	kPa	MODULUS OF SHEAR DEFORMATION
μ	1	COEFFICIENT OF FRICTION

MECHANICAL PROPERTIES OF SOIL

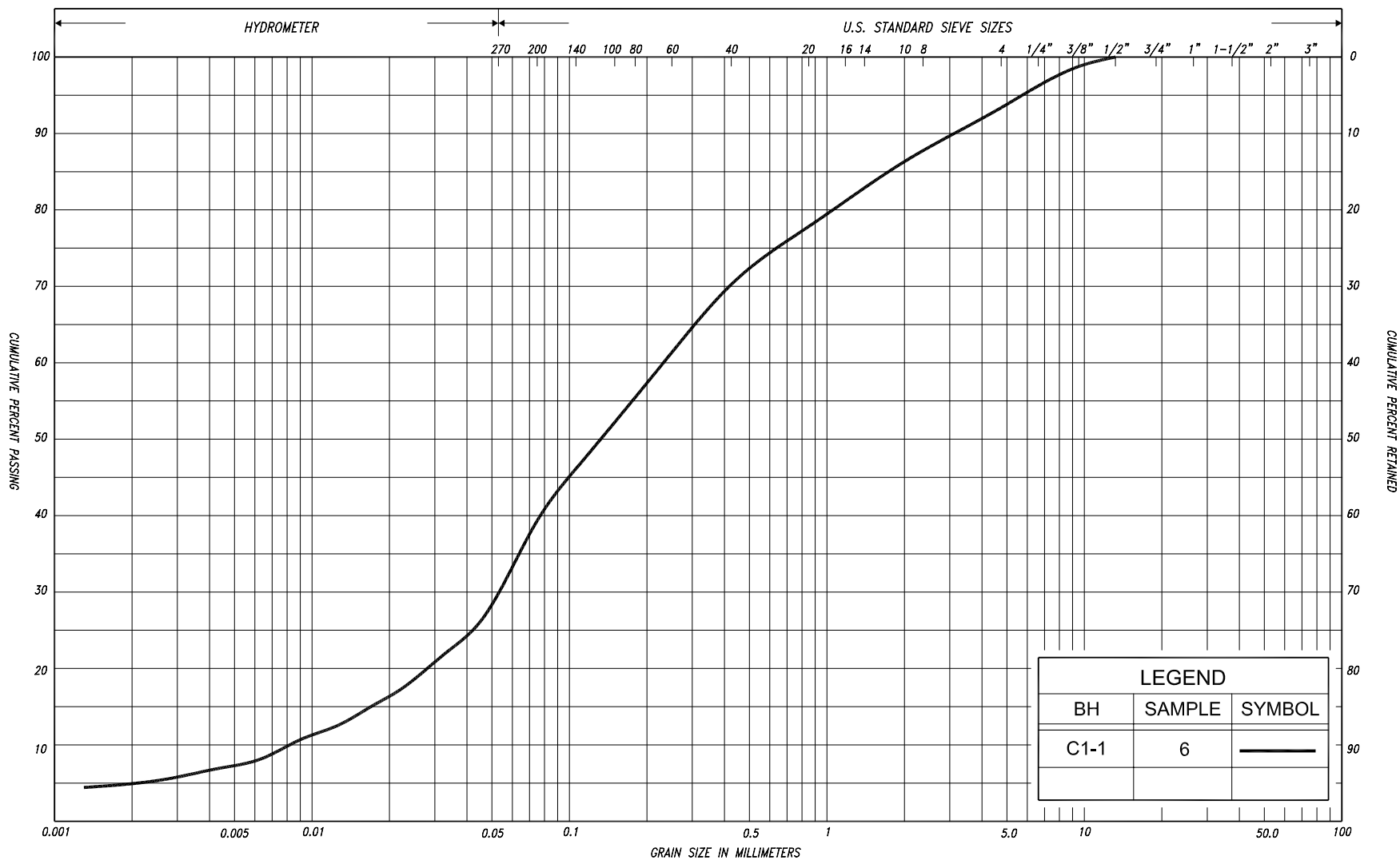
m_v	kPa^{-1}	COEFFICIENT OF VOLUME CHANGE
C_c	1	COMPRESSION INDEX
C_s	1	SWELLING INDEX
C_α	1	RATE OF SECONDARY CONSOLIDATION
c_v	m^2/s	COEFFICIENT OF CONSOLIDATION
H	m	DRAINAGE PATH
T_v	1	TIME FACTOR
U	%	DEGREE OF CONSOLIDATION
σ'_{vo}	kPa	EFFECTIVE OVERBURDEN PRESSURE
σ'_p	kPa	PRECONSOLIDATION PRESSURE
τ_f	kPa	SHEAR STRENGTH
c'	kPa	EFFECTIVE COHESION INTERCEPT
ϕ'	-°	EFFECTIVE ANGLE OF INTERNAL FRICTION
c_u	kPa	APPARENT COHESION INTERCEPT
ϕ_u	-°	APPARENT ANGLE OF INTERNAL FRICTION
τ_R	kPa	RESIDUAL SHEAR STRENGTH
τ_r	kPa	REMOULDED SHEAR STRENGTH
S_t	1	SENSITIVITY = $\frac{c_u}{\tau_r}$

PHYSICAL PROPERTIES OF SOIL

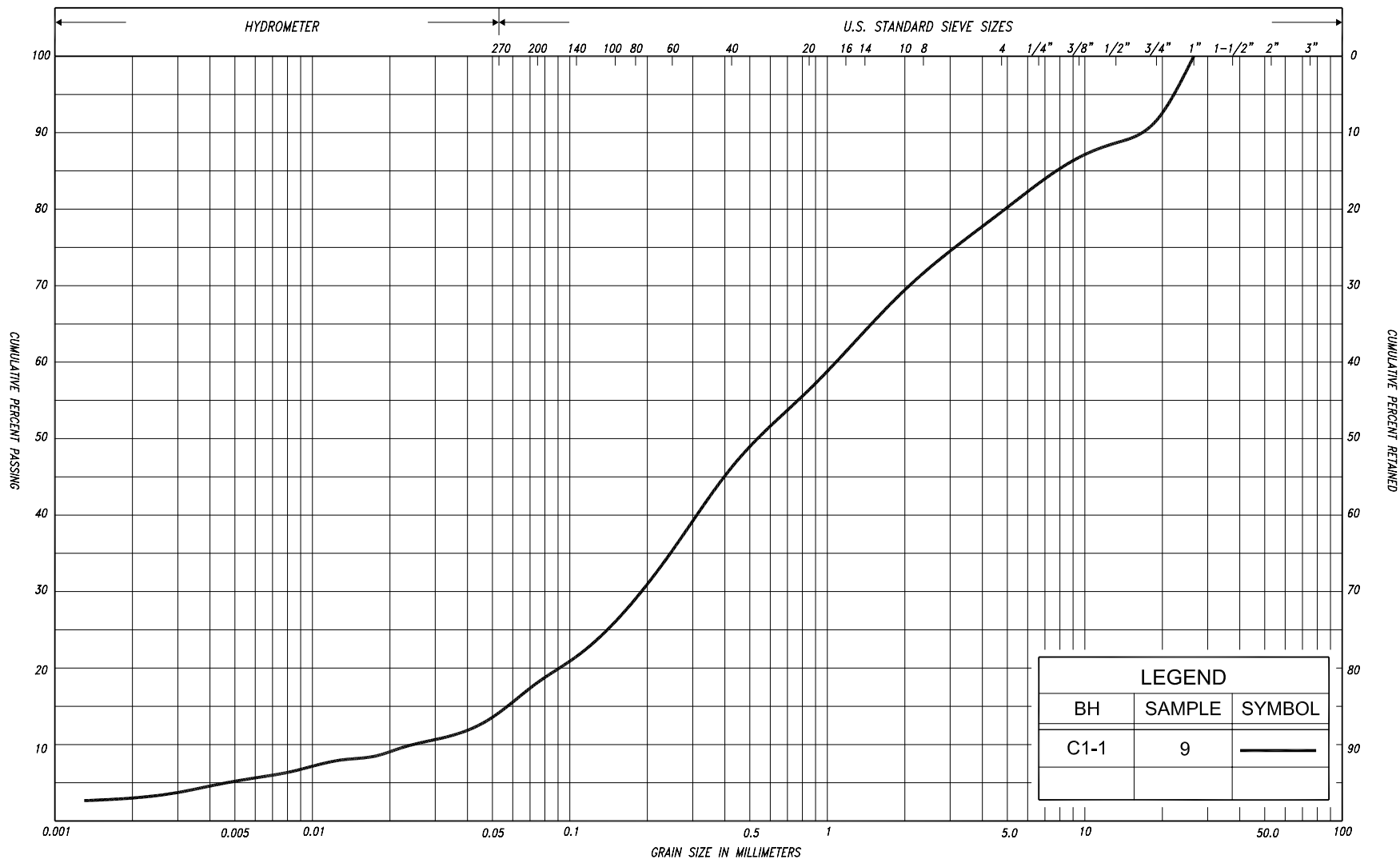
ρ_s	kg/m^3	DENSITY OF SOLID PARTICLES	n	1, %	POROSITY	e_{max}	1, %	VOID RATIO IN LOOSEST STATE
γ_s	kN/m^3	UNIT WEIGHT OF SOLID PARTICLES	w	1, %	WATER CONTENT	e_{min}	1, %	VOID RATIO IN DENSEST STATE
ρ_w	kg/m^3	DENSITY OF WATER	S_r	%	DEGREE OF SATURATION	I_D	1	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
γ_w	kN/m^3	UNIT WEIGHT OF WATER	w_L	%	LIQUID LIMIT	D	mm	GRAIN DIAMETER
ρ	kg/m^3	DENSITY OF SOIL	w_p	%	PLASTIC LIMIT	D_n	mm	n PERCENT - DIAMETER
γ	kN/m^3	UNIT WEIGHT OF SOIL	w_s	%	SHRINKAGE LIMIT	C_u	1	UNIFORMITY COEFFICIENT
ρ_d	kg/m^3	DENSITY OF DRY SOIL	I_p	%	PLASTICITY INDEX = $w_L - w_p$	h	m	HYDRAULIC HEAD OR POTENTIAL
γ_d	kN/m^3	UNIT WEIGHT OF DRY SOIL	I_L	1	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$	q	m^3/s	RATE OF DISCHARGE
ρ_{sat}	kg/m^3	DENSITY OF SATURATED SOIL	I_C	1	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$	v	m/s	DISCHARGE VELOCITY
γ_{sat}	kN/m^3	UNIT WEIGHT OF SATURATED SOIL	DTPL		DRIER THAN PLASTIC LIMIT	i	1	HYDRAULIC GRADIENT
ρ'	kg/m^3	DENSITY OF SUBMERGED SOIL	APL		ABOUT PLASTIC LIMIT	k	m/s	HYDRAULIC CONDUCTIVITY
γ'	kN/m^3	UNIT WEIGHT OF SUBMERGED SOIL	WTPL		WETTER THAN PLASTIC LIMIT	j	kN/m^3	SEEPAGE FORCE
e	1, %	VOID RATIO						

Culvert at Sta. 10+100 (NBL) (C1), Cox Township

Figures C1-GS-1 to C1-GS-2 – Results of Grain Size Distribution Analyses
Record of Borehole Sheets
Drawing C1-1 – Borehole Locations and Soil Strata



SILT & CLAY					FINE		MEDIUM		COARSE		GRAVEL			COB BLES	UNIFIED			
					SAND													
CLAY	FINE		MEDIUM		COARSE		FINE		MEDIUM		COARSE		GRAVEL			COBBLES	M.I.T.	
	SILT																	
CLAY			SILT			V. FINE		FINE	MED.		COARSE		GRAVEL					U.S. BUREAU
						SAND												



SILT & CLAY					FINE		MEDIUM		COARSE	GRAVEL			COBBLES	UNIFIED	
					SAND										
CLAY	FINE		MEDIUM	COARSE	FINE		MEDIUM		COARSE		GRAVEL			COBBLES	M.I.T.
	SILT														
CLAY		SILT			V. FINE	FINE	MED.	COARSE	GRAVEL						U.S. BUREAU
					SAND										

RECORD OF BOREHOLE No C1-1										1 of 1		METRIC				
G.W.P. 5217-06-00			LOCATION Co-ords: 5 111 256.9 N ; 328 470.7 E Hwy 69, Sta. 10+080, o/s 36m Rt.			ORIGINATED BY F.P.										
DIST 54 HWY 69			BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring			COMPILED BY M.N.										
DATUM Geodetic			DATE June 22 & 23, 2009			CHECKED BY C.N.										
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	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									
193.4	Ground surface						20	40	60	80	100					
0.0	Fine fibrous peat with layers of sand trace silt Grey Wet (FILL)		1	SS	2											
192.6	Peat, fine fibrous Dark brown		2	SS	6											
0.8			3	SS	1											
	Amorphous		4	SS	WH**											
190.7	Organic clayey silt Very soft Dark grey Wet		5	SS	WH											
2.7																
189.7	Silty sand trace clay, trace gravel Compact Grey Wet		6	SS	10											
3.7			7	SS	10											
			8	SS	20											
	Sand, with gravel some silt, trace clay		9	SS	12											
186.9																
6.5	Granitic Gneiss bedrock Slightly weathered to unweathered High strength Good to excellent quality		10	RC NQ	REC 98%											
			11	RC NQ	REC 97%											
183.9																
9.5	End of borehole Sample 9: Sampler bouncing * 2009 06 22 ▽ Water level observed during drilling WH** denotes penetration due to weight of rods and hammer C.F.S.S.A. denotes Continuous Flight Solid Stem Augers															

RECORD OF BOREHOLE No C1-2										1 of 1		METRIC					
G.W.P. 5217-06-00			LOCATION Co-ords: 5 111 254.0 N ; 328 433.1 E Hwy 69, Sta. 10+098, o/s 3m Rt.			ORIGINATED BY F.P.											
DIST 54 HWY 69			BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring			COMPILED BY M.N.											
DATUM Geodetic			DATE June 22, 2009			CHECKED BY C.N.											
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									
193.8	Ground surface																
0.0 193.5 0.3	Peat, fine fibrous Dark brown Granitic Gneiss bedrock Slightly weathered High strength Poor to good quality		1	SS	1												
			2	RC NQ	REC 100%		193										RQD 40%
			3	RC NQ	REC 100%		192										RQD 40%
			4	RC NQ	REC 97%		191										RQD 79%
190.4 3.4	End of borehole Sample 1: Sampler bouncing * Borehole charged with drilling water C.F.S.S.A. denotes Continuous Flight Solid Stem Augers																

RECORD OF BOREHOLE No 601-8

1 of 1

METRIC

G.W.P.	5217-06-00	LOCATION	Hwy 69 (New), Sta. 10+075, o/s 30.5m Lt. CL Med.	ORIGINATED BY	K.H.
DIST	54	HWY	69	BOREHOLE TYPE	Manual Sampling
				COMPILED BY	G.D.
DATUM	Geodetic	DATE	November 07, 2007	CHECKED BY	C.N.

[illegible]

RECORD OF PENETRATION TEST No 601-9

1 of 1 METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+075 CL Med. ORIGINATED BY K.H.
 DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
 DATUM Geodetic DATE March 08, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT w_p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								WATER CONTENT (%)	
194.4	Top of Ice							20	40	60	80	100					
0.0	Probable ice																
	Probable peat																
	Probable clayey silt																
	Firm																
192.0	End of dynamic cone penetration test																
2.4	Refusal on probable bedrock																

RECORD OF BOREHOLE No 601-9A

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+080, o/s 8.0m Lt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Sampling COMPILED BY G.D.
 DATUM Geodetic DATE October 09, 2008 CHECKED BY C.N.

SOIL PROFILE				SAMPLES			GROUND WATER * CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)							GR	SA	SI	CL			
						○ UNCONFINED			● QUICK TRIAXIAL	+	×	FIELD VANE	LAB VANE											
195.7	Ground Surface																							
0.0	Bedrock at surface																							
	* Borehole dry																							

RECORD OF BOREHOLE No 601-10

1 of 1

METRIC

G.W.P.	5217-06-00	LOCATION	Hwy 69 (New), Sta. 10+100, o/s 18.8m Lt. CL Med.	ORIGINATED BY	K.H.
DIST	54	HWY	69	BOREHOLE TYPE	Manual Sampling
				COMPILED BY	G.D.
DATUM	Geodetic	DATE	November 07, 2007	CHECKED BY	C.N.

[illegible]

RECORD OF BOREHOLE No 601-10A

1 of 1

METRIC

G.W.P. 5217-06-00	LOCATION	Hwy 69 (New), Sta. 10+100, o/s 6.0m Lt. CL Med.	ORIGINATED BY	F.P.
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DIST 54 HWY 69 BOREHOLE TYPE Manual Sampling COMPILED BY G.D.

DATUM Geodetic DATE October 09, 2008 CHECKED BY C.N.

[illegible]

RECORD OF BOREHOLE No 601-11

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+100, o/s 12.0m Rt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE C.F.H.S.A. and Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE September 26, 2007 CHECKED BY C.N.

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									
195.5	Ground Surface							20	40	60	80	100					
0.0	Sand some gravel, trace silt Compact Brown Moist		1	SS	30		195										
	cobbles _____ and boulders _____ Loose (FILL)		2	SS	10		194										15 78 (7)
			3	SS	7		193										
			4	SS	9		192										
			5	SS	6/10cm		191										
			6	RC NQ	**		190										**
191.1	Clayey silt, some sand organic inclusions Firm Grey Moist		7	SS	9		189										0 12 75 13
4.4				FV			190										
189.7																	
5.8	Sand some gravel, some silt Compact Grey Wet		8	SS	28		189										20 62 (18)
188.8	End of borehole Probable sand																
6.7	Compact						188										
188.0	End of dynamic cone penetration test Refusal on probable bedrock Sample 5: Sampler bouncing * Borehole dry on completion of drilling ** Blast rock coring C.F.H.S.A. denotes Continuous Flight Hollow Stem Augers																
7.5																	

RECORD OF BOREHOLE No 601-12

1 of 1

METRIC

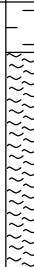
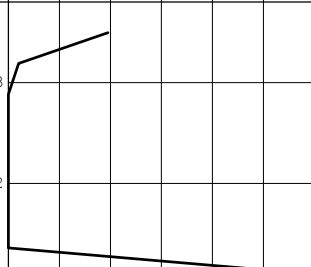
G.W.P.	5217-06-00	LOCATION	Hwy 69 (New), Sta. 10+125, o/s 34.5m Lt. CL Med.	ORIGINATED BY	K.H.
DIST	54	HWY	69	BOREHOLE TYPE	Manual Sampling
				COMPILED BY	G.D.
DATUM	Geodetic	DATE	March 09, 2008	CHECKED BY	C.N.

[illegible]

RECORD OF PENETRATION TEST No 601-13

1 of 1 METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+125, o/s 4.5m Lt. CL Med. ORIGINATED BY K.H.
DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE March 08, 2008 CHECKED BY C.N.

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					
193.8 0.0	Top of Ice Probable ice Probable peat												
191.1 2.7	End of dynamic cone penetration test Refusal on probable bedrock						120/20cm						

METRIC

+⁷, ×⁵: Numbers refer to Sensitivity

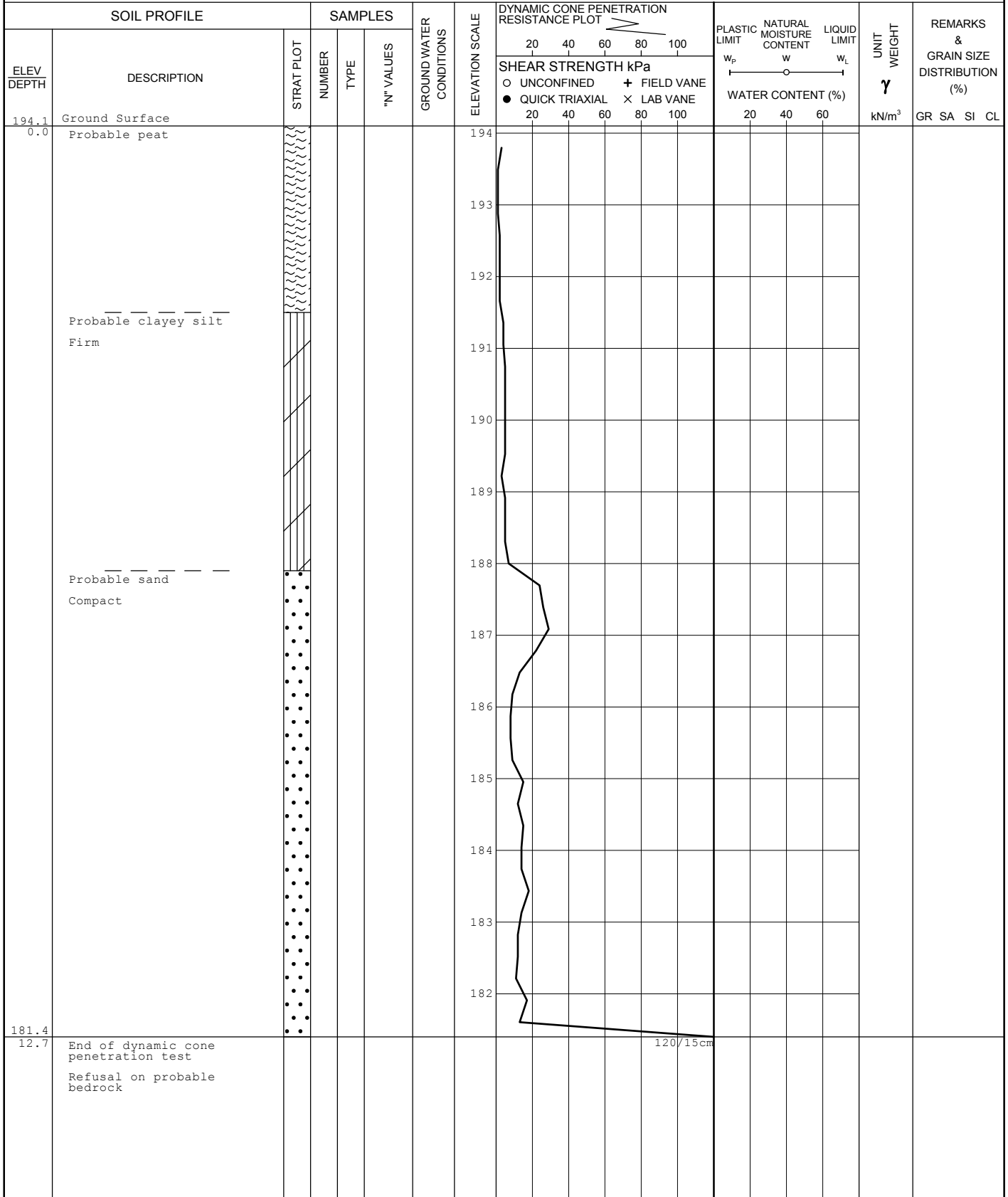
20
15 — ○ — 5
10

(%) STRAIN AT FAILURE

RECORD OF PENETRATION TEST No 601-15

1 of 1 METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+125, o/s 38.0m Rt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE March 30, 2008 CHECKED BY C.N.



METRIC

— CHECKED BY C.N.

(%) STRAIN AT FAILURE

CONT No

GWP No 5217-06-00

GWP No 5379-02-00

CULVERT AT STA. 10+100 (NBL) (C1)

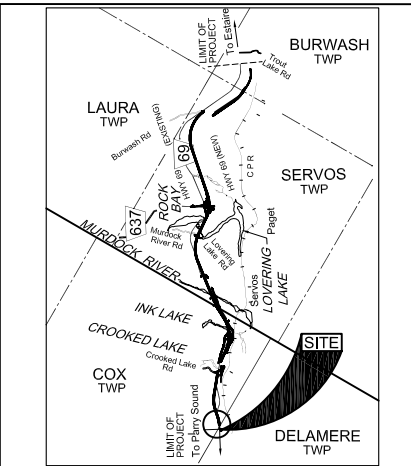
HIGHWAY 69 FOUR-LANING - COX TWP

BOREHOLE LOCATIONS AND SOIL STRATA



SHEET

PML Peto MacCallum Ltd.
CONSULTING ENGINEERS



KEY PLAN
SCALE
0 2 4 6 km

LEGEND

- Borehole
- Dynamic Cone Penetration Test (Cone)
- Borehole & Cone
- N Blows/0.3m (Std. Pen Test, 475 J / blow)
- CONE Blows/0.3m (60° Cone, 475 J / blow)
- * Water level not established
- W L at time of investigation June 2009
- Head
- ARTESIAN WATER Encountered
- PIEZOMETER

(Legend Continued)

BH No	ELEVATION	STA COX TWP	o/s CL MED
601-8	197.4	10+075	30.5m Lt.
601-9	194.4	10+075	CL
601-9A	195.7	10+080	8.0m Lt.
601-10	197.2	10+100	18.8m Lt.
601-10A	195.6	10+100	6.0m Lt.
601-11	195.5	10+100	12.0m Rt.
601-12	197.2	10+125	34.5m Lt.
601-13	193.8	10+125	4.5m Lt.
601-14	194.4	10+125	4.5m Rt.
601-15	194.1	10+125	38.0m Rt.
N1-2	194.6	10+082	45.2m Rt.

(Legend Continues)

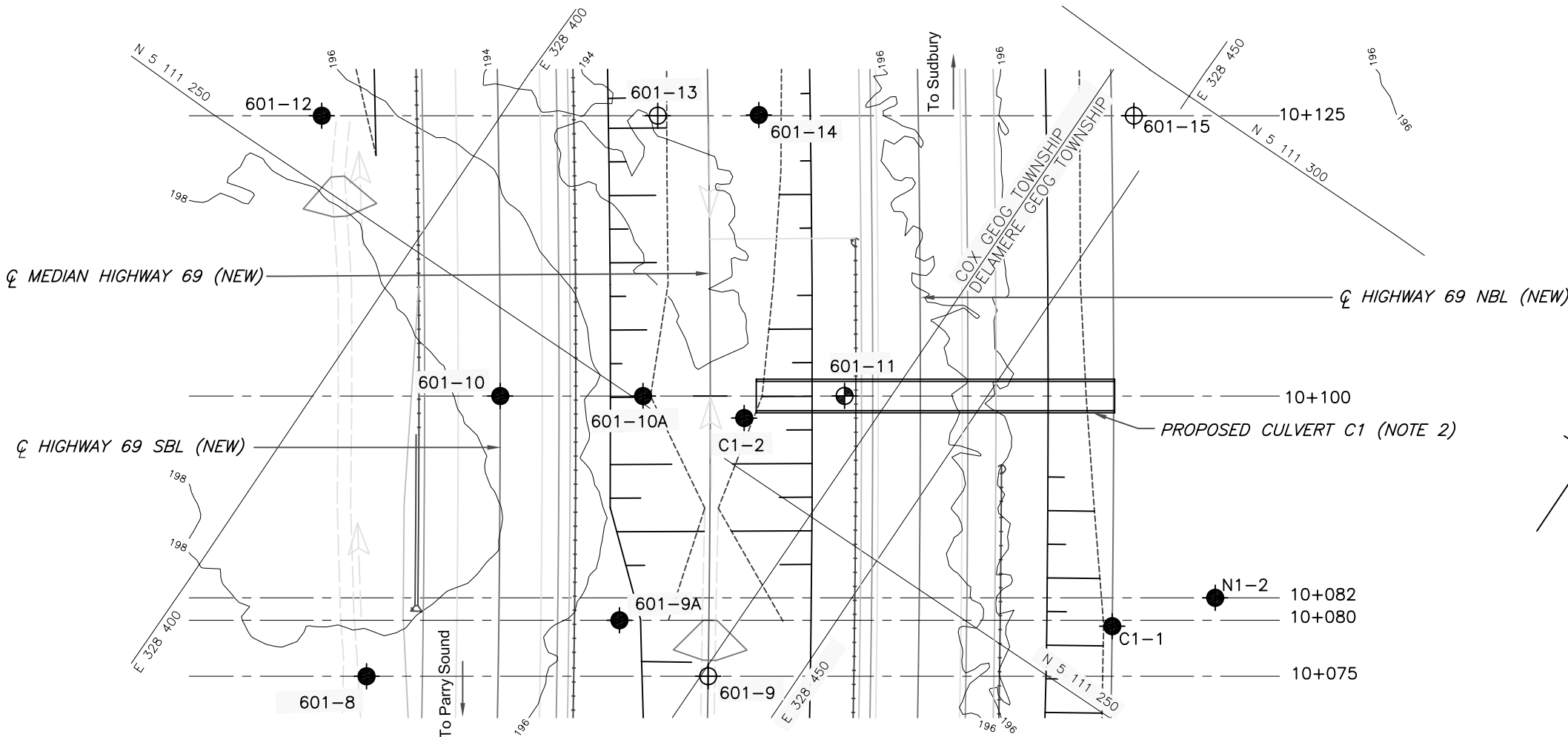
- NOTE -

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

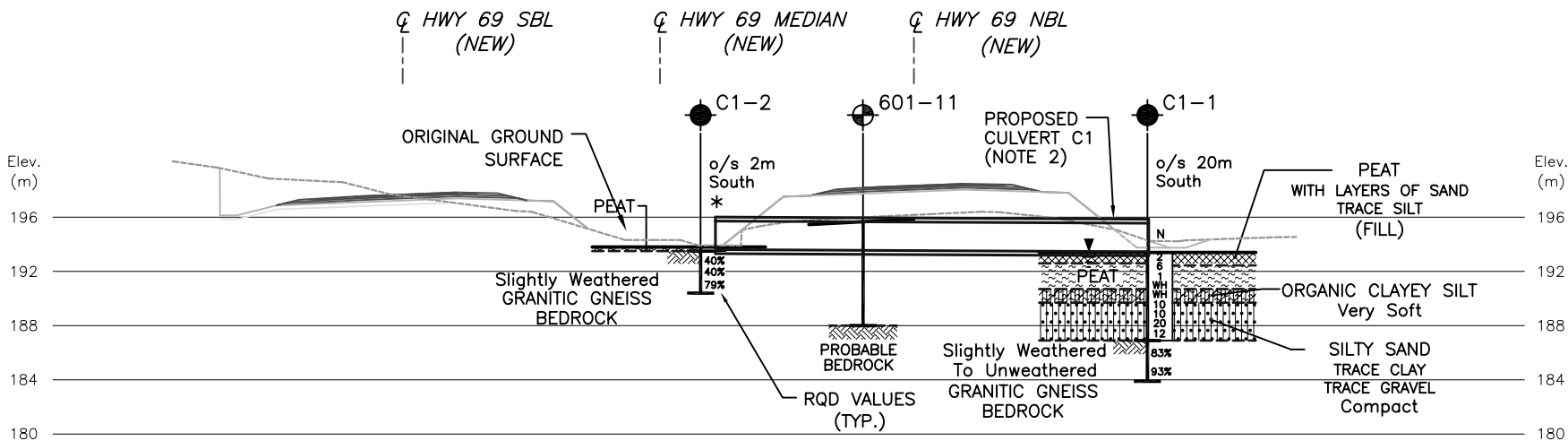
REVISIONS	DATE	BY	DESCRIPTION

Geocres No. 411-262

HWY No	69	DIST	Sudbury Area
SUBM'D	MN	CHECKED	MN
DATE	AUG. 30, 2010	SITE	
DRAWN	NA	CHECKED	CN
APPROVED	BRG	DWG	C1-1



PLAN
SCALE
0 5 10m



PROFILE CULVERT STA. 10+100 (NBL) (C1)

SCALE
0 5 10m

NOTES:

- DRAWING C1-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND RECORD OF BOREHOLE LOGS.
- CULVERT AT STA. 10+100 WAS DESIGNATED AS CULVERT C1 FOR THE INVESTIGATION.
- THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
- DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

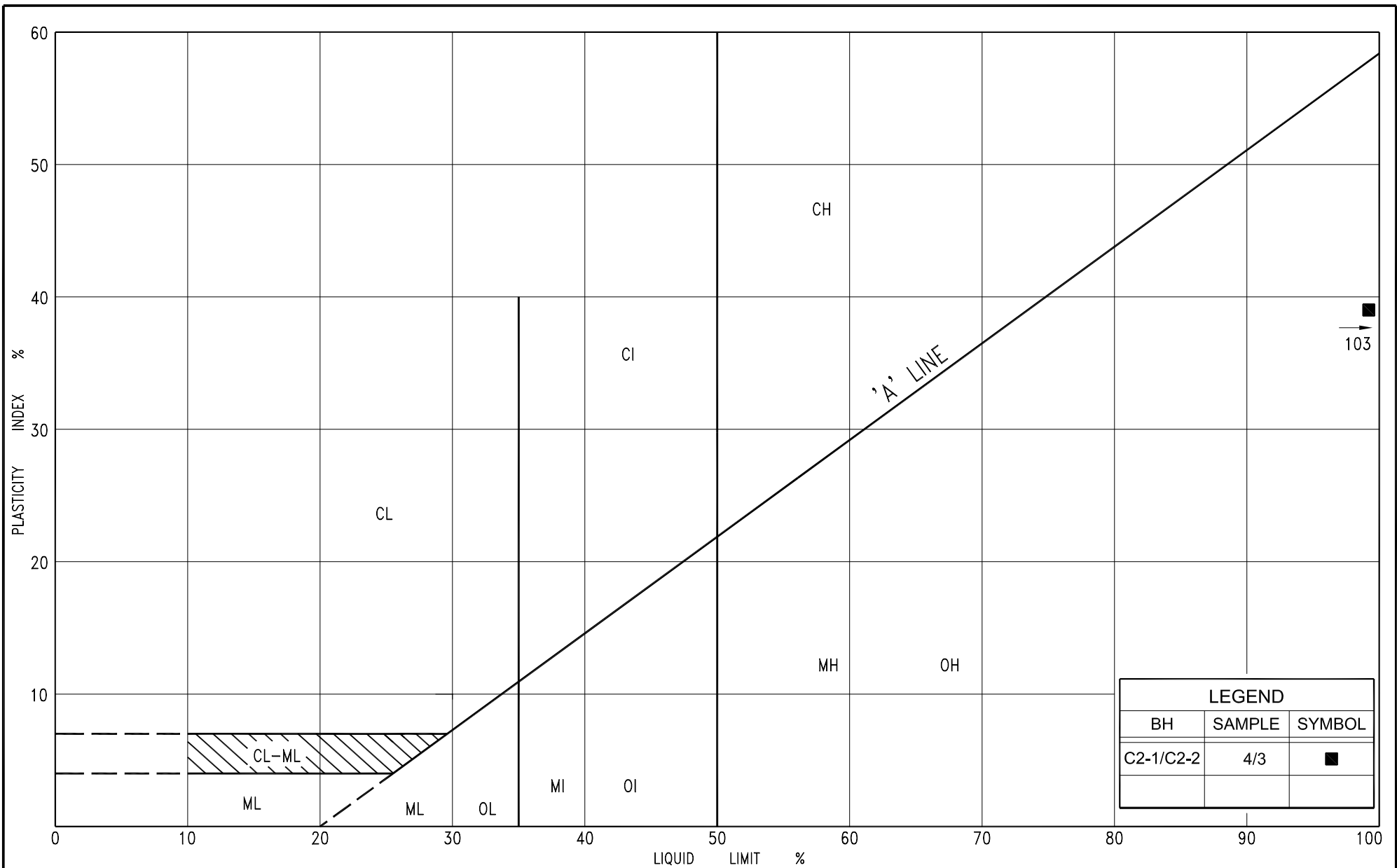
REF AECOM Drawings:
C3-HWY69-Base.dwg dated Jan. 15, 2010;
C3-Hwy69-Des.dwg dated April 15, 2010; Hwy 69 Servos - Cont 3 -Structural -PC Conc Box Culv Prof 10+100 10+140 12+750 13+206 CLRSC 8+240.dwg, dated April 23, 2010 and C3-Lidar-ctrs.dwg, dated May 14, 2008.



Culvert at Sta. 10+140 (SBL) (C2), Cox Township

Figure C2-PC-1 – Result of Atterberg Limit Testing
Record of Borehole Sheets

Drawing C2-1 – Borehole Locations and Soil Strata



LEGEND		
BH	SAMPLE	SYMBOL
C2-1/C2-2	4/3	■

RECORD OF BOREHOLE No C2-1										1 of 1		METRIC			
G.W.P. 5217-06-00			LOCATION Co-ords: 5 111 277.4 N ; 328 405.9 E Hwy 69, Sta. 10+133, o/s 6m Lt.			ORIGINATED BY M.R.									
DIST 54 HWY 69			BOREHOLE TYPE C.F.H.S.A. and Rotary Diamond Coring			COMPILED BY M.N.									
DATUM Geodetic			DATE February 22, 2010			CHECKED BY C.N.									
SOIL PROFILE			SAMPLES			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	GROUND WATER CONDITIONS	ELEVATION SCALE	SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE		W _p	W	W _L	γ		
194.3	Ground surface					▽*		20 40 60 80 100							
0.0	Ice						194								
193.7	Water														
0.6	Peat, fine fibrous														
	Dark brown		1	SS	WH**		193						734		
			2	SS	WH								287		
192.1	Organic clayey silt						192						227		
2.2	Very soft Dark brown/ green Wet		3	SS	WH								103	Org. 13.9%	
190.8	Clayey silt, some sand		4	SS	1		191								
3.5	Very soft Grey Wet														
190.5	Syenite bedrock						190								
3.8	Slightly weathered		5	RC NQ	REC 77%									RQD 50%	
	High strength						189								
	Fair quality														
188.5	Gabbro bedrock						188								
5.8	Slightly weathered		6	RC NQ	REC 93%									RQD 52%	
	High strength														
187.4	Fair quality														
6.9	End of borehole														
<p>* 2010 02 22</p> <p>▽ Water level observed during drilling</p> <p>▽ Water level measured after drilling</p> <p>WH** Denotes penetration due to weight of rods and hammer</p> <p>C.F.H.S.A. denotes Continuous Flight Hollow Stem Augers</p> <p>Sample 4 was combined with sample 3 from borehole C2-2 for testing</p>															

RECORD OF BOREHOLE No C2-2 1 of 1 METRIC											
G.W.P. 5217-06-00		LOCATION		Co-ords: 5 111 276.0 N ; 328 391.5 E Hwy 69, Sta. 10+140, o/s 19m Lt.				ORIGINATED BY M.R.			
DIST 54 HWY 69		BOREHOLE TYPE		Continuous Flight Hollow Stem Augers				COMPILED BY M.N.			
DATUM Geodetic		DATE		February 22, 2010				CHECKED BY C.N.			
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT		UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	20 40 60 80 100	W _p W W _L		
194.3	Ground surface										
0.0	Ice										
193.7	Water										
0.6	Peat, fine fibrous										
	Dark brown		1	SS	WH**						155
192.6	Organic clayey silt										
1.7	Very soft Dark brown/ green		2	SS	WH						Org. 18.8%
191.7	Silt and sand, trace clay										
2.6	Very loose Grey		3	SS	WH						103
191.3	End of borehole										Org. 13.9%
3.0	Refusal on probable bedrock										
<p>* 2010 02 22</p> <p>▽ Water level observed during drilling</p> <p>▼ Water level measured after drilling</p> <p>WH** Denotes penetration due to weight of rods and hammer</p> <p>Sample 3 was combined with sample 4 from borehole C2-1 for testing</p>											

METRIC

+⁷, ×⁵: Numbers refer to Sensitivity

20
15 — ○ — 5
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 601-12

1 of 1

METRIC

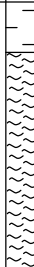
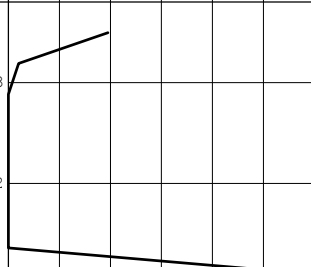
G.W.P.	5217-06-00	LOCATION	Hwy 69 (New), Sta. 10+125, o/s 34.5m Lt. CL Med.	ORIGINATED BY	K.H.
DIST	54	HWY	69	BOREHOLE TYPE	Manual Sampling
				COMPILED BY	G.D.
DATUM	Geodetic	DATE	March 09, 2008	CHECKED BY	C.N.

SOIL PROFILE					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES	* GROUND WATER CONDITIONS	ELEVATION SCALE
197.2 0.0	Ground Surface				
0.1	Topsoil End of borehole Refusal on probable bedrock				
	* Borehole dry				

RECORD OF PENETRATION TEST No 601-13

1 of 1 **METRIC**

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+125, o/s 4.5m Lt. CL Med. ORIGINATED BY K.H.
 DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
 DATUM Geodetic DATE March 08, 2008 CHECKED BY C.N.

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						
193.8 0.0	Top of Ice Probable ice Probable peat						193 192							
191.1 2.7	End of dynamic cone penetration test Refusal on probable bedrock							120/20cm						

METRIC

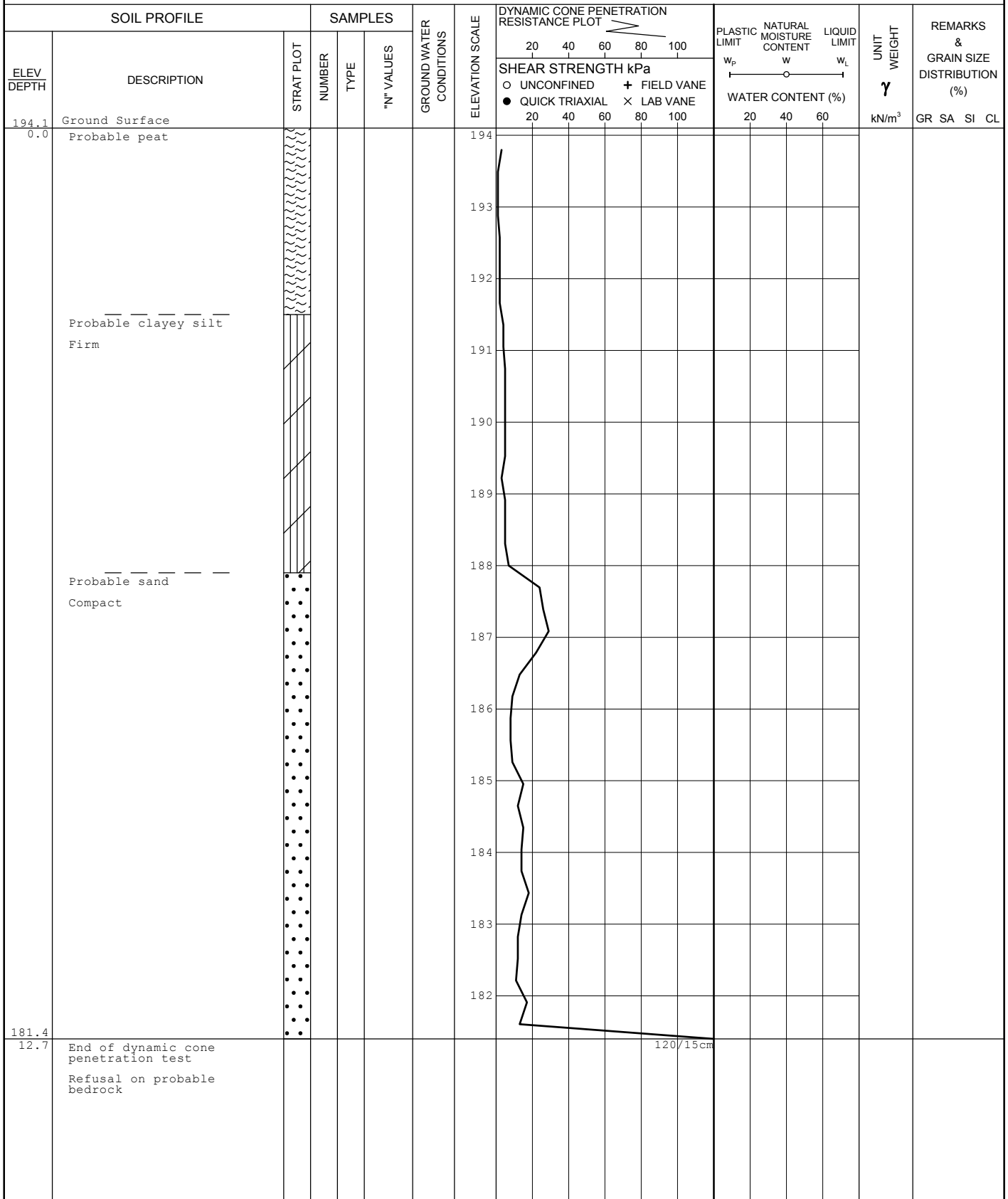
+⁷, X⁵: Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

RECORD OF PENETRATION TEST No 601-15

1 of 1 METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+125, o/s 38.0m Rt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE March 30, 2008 CHECKED BY C.N.



RECORD OF BOREHOLE No 601-16

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+150, o/s 19.0m Lt. CL Med. ORIGINATED BY K.H.
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY G.D.
DATUM Geodetic DATE March 07, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					W _P	W	W _L					
193.8	Top of Ice					▽* 														

METRIC[illegible]

RECORD OF BOREHOLE No 601-17A

1 of 2

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+165, o/s 6.0m Rt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY G.D.
DATUM Geodetic DATE October 09, 2008 CHECKED BY C.N.

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							
196.2	Ground Surface						20	40	60	80	100						
0.0	Sand and gravel		1	SS	5												
	Loose Brown																
	(FILL)		2	SS	7												
	cobbles and boulders		3	SS	4												
	(ROCKFILL)		4	SS	11/15cm												
			5	SS	25/15cm												
			6	SS	21/15cm												
			7	SS	30/8cm												
191.2	Silty clay, trace sand organics to 5.9m depth		8	SS	1												
5.0	Firm Grey Wet			FV													
	layers of clayey sil		9	SS	4												
	layers of sand trace silt, trace gravel			FV													
	cobbles		10	SS	47												
			11	SS	2												
184.6	Sand trace silt, trace gravel		12	SS	15												
11.6	Compact Grey Wet																
	some silt, trace clay		13	SS	15												
181.7	End of borehole																
14.5	Refusal on probable bedrock																

RECORD OF BOREHOLE No 601-17A

2 of 2

METRIC

G.W.P. 5217-06-00	LOCATION	Hwy 69 (New), Sta. 10+165, o/s 6.0m Rt. CL Med.	ORIGINATED BY F.P.
-------------------	----------	---	--------------------

DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY G.D.

DATUM Geodetic DATE October 09, 2008 CHECKED BY C.N.

[illegible]

CONT No
GWP No 5217-06-00
GWP No 5379-02-00

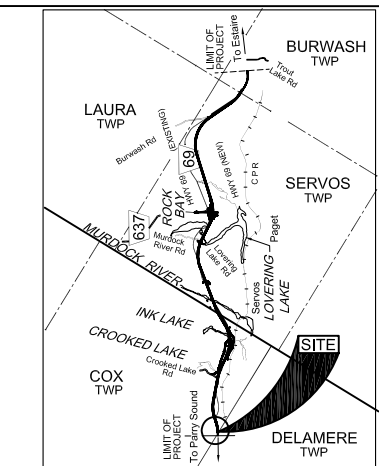


CULVERT AT STA. 10+140 (SBL) (C2)

SHEET

HIGHWAY 69 FOUR-LANING - COX TWP

BOREHOLE LOCATIONS AND SOIL STRATA



LEGEND

- Borehole
- Dynamic Cone Penetration Test (Cone)
- Borehole & Cone
- N Blows/0.3m (Std. Pen Test, 475 J/blow)
- CONE Blows/0.3m (60° Cone, 475 J/blow)
- WH Penetration due to weight of hammer and rods
- W L at time of investigation February, 2010
- Head
- ARTESIAN WATER
- Encountered
- PIEZOMETER

(Legend Continued)

BH No	ELEVATION	STA COX TWP	o/s CL MED
601-12	197.2	10+125	34.5m Lt.
601-13	193.8	10+125	4.5m Lt.
601-14	194.4	10+125	4.5m Rt.
601-15	194.1	10+125	38.0m Rt.
601-16	193.8	10+150	19.0m Lt.
601-17	196.1	10+150	26.0m Rt.
601-17A	196.2	10+165	6.0m Rt.

BH No	ELEVATION	NORTHINGS	EASTINGS
C2-1	194.3	5 111 277.4	328 405.9
C2-2	194.3	5 111 276.0	328 391.5
C2-3	194.3	5 111 274.3	328 373.1

(Legend Continues)

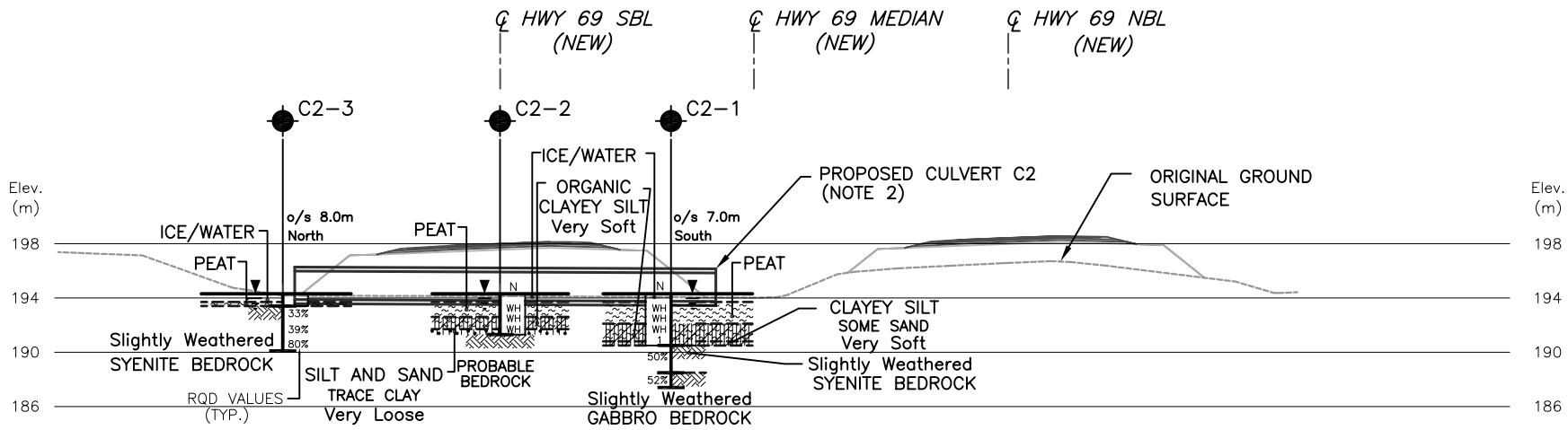
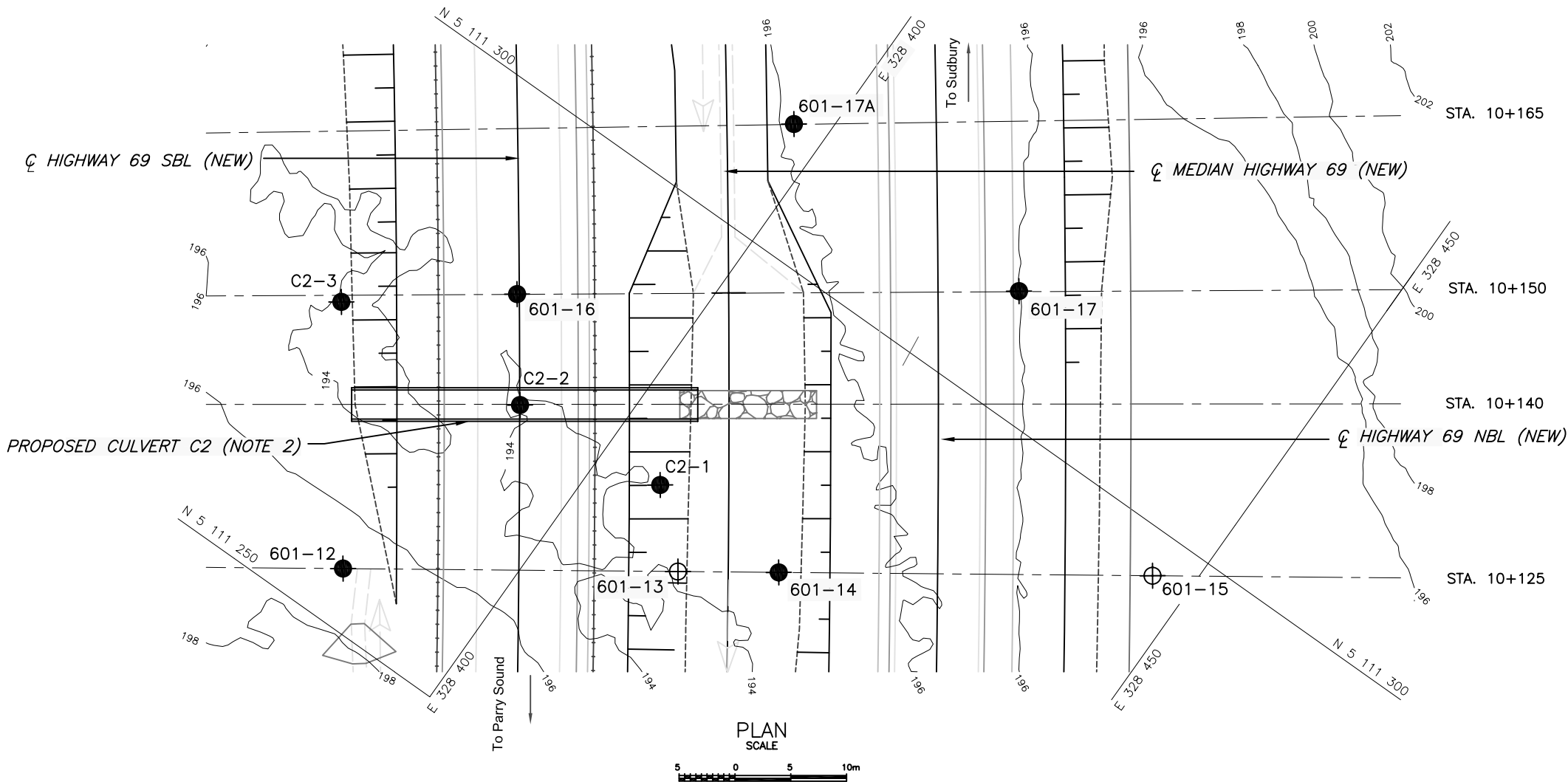
NOTE

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

REVISIONS	DATE	BY	DESCRIPTION

Geocres No. 411-262

HWY No 69				DIST Sudbury Area	
SUBM'D	MN	CHECKED	MN	DATE AUG. 30, 2010	SITE ----
DRAWN	NA	CHECKED	CN	APPROVED BRG	DWG C2-1



PROFILE & CULVERT STA. 10+140 (SBL) (C2)

SCALE



NOTES:

- DRAWING C2-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND RECORD OF BOREHOLE LOGS.
- THE CULVERT AT STA. 10+140 WAS DESIGNATED AS CULVERT C2 FOR THE INVESTIGATION.
- THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
- DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

REF AECOM Drawings:
C3-HWY69-Base.dwg dated Jan. 15, 2010;
C3-HWY69-Des.dwg dated April 15, 2010;
Hwy 69 Servos - Cont 3 -Structural -PC Conc
Box Culv Prof 10+100 10+140 12+750 13+206
CLRSC 8+240.dwg, dated April 23, 2010 and
C3-Lidar-ctrs.dwg, dated May 14, 2008.



Culvert at Sta. 10+800 (SBL and NBL) (SX), Cox Township

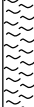

Record of Borehole Sheets

Drawing SX-1 – Borehole Locations and Soil Strata

METRIC

+⁷, ×⁵: Numbers refer to Sensitivity

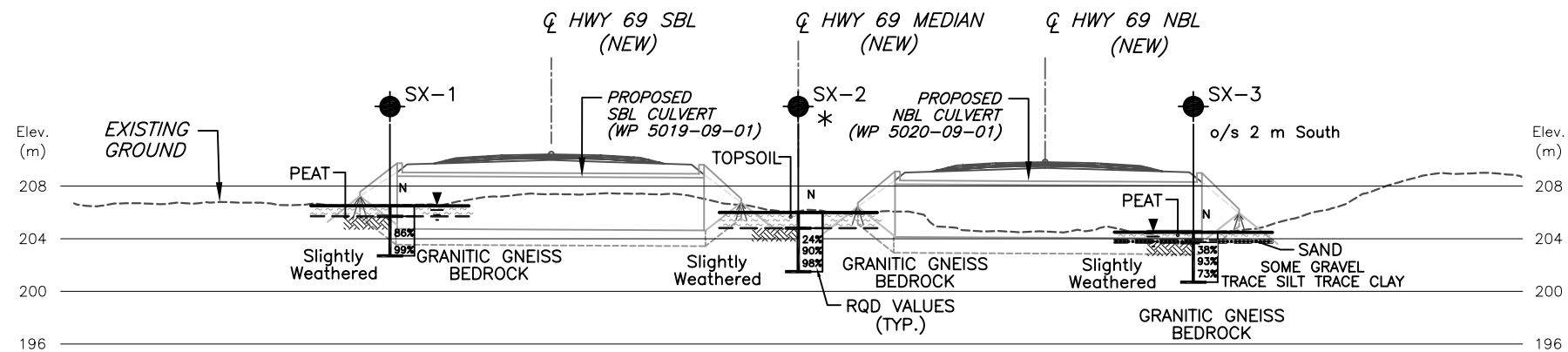
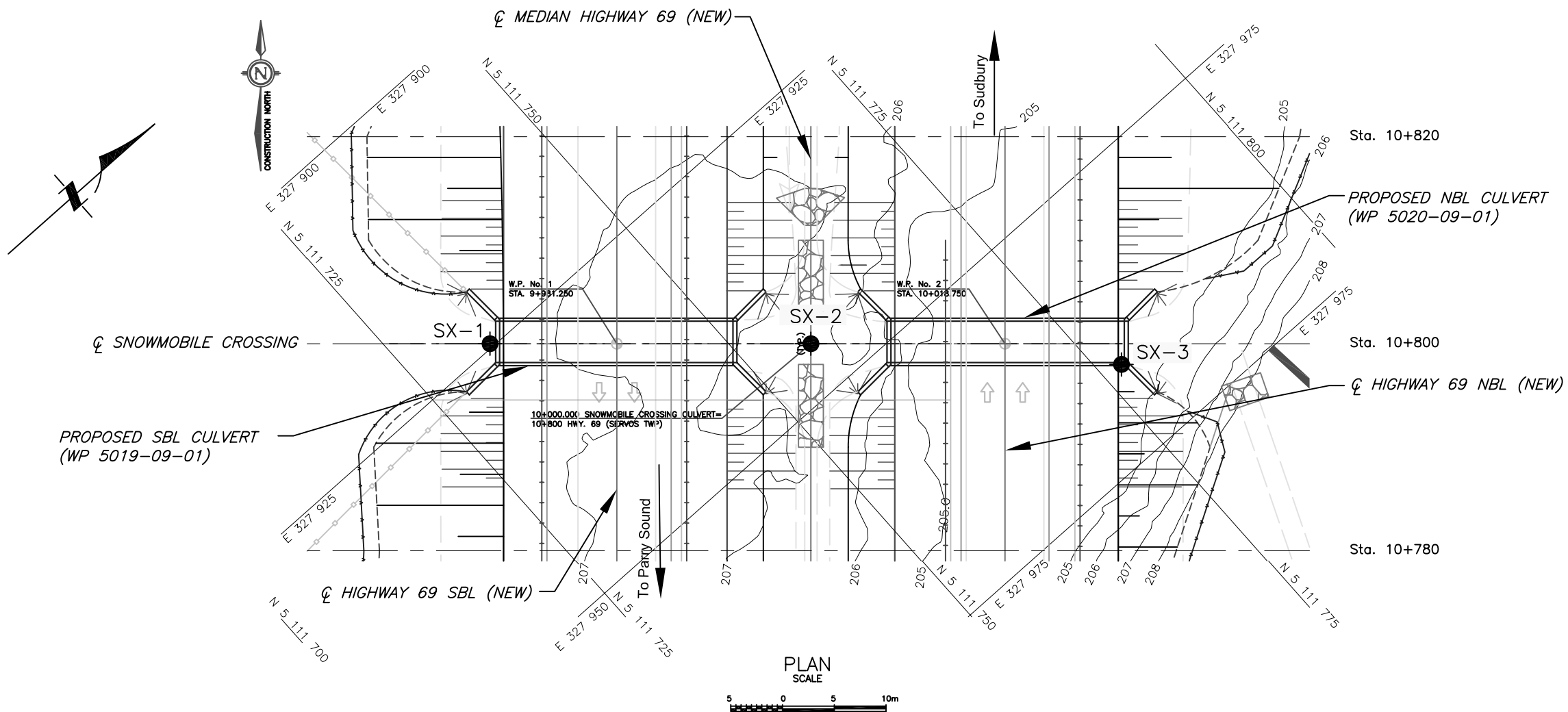
15 — 20 — 5
|
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No SX-2 1 of 1 METRIC																
G.W.P. 5217-06-00		LOCATION		Co-ords: 5 111 756.1 N ; 327 945.1 E Hwy 69, Sta. 10+800, CL.				ORIGINATED BY F.P.								
DIST 54 HWY 69		BOREHOLE TYPE		C.F.S.S.A. and Rotary Diamond Coring				COMPILED BY M.N.								
DATUM Geodetic		DATE		June 18, 2009				CHECKED BY C.N.								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS *	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES		SHEAR STRENGTH kPa									
205.9	Ground surface						20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%) 20 40 60				
0.0	Topsoil cobbles and boulders						205									
204.7	Granitic Gneiss bedrock Slightly weathered High strength Very poor** to excellent quality		1	RC NQ	REC 76%		204									RQD 24%
1.2			2	RC NQ	REC 100%		203									RQD 90%
			3	RC NQ	REC 98%		202									RQD 98%
201.4	End of borehole															
4.5	* Borehole charged with drilling water ** From 1.2 to 1.5m depth multiple vertical fractures resulting in lower recovery and a low RQD value. C.F.S.S.A. denotes Continuous Flight Solid Stem Augers															

METRIC

G.W.P.	5217-06-00	LOCATION	Hwy 69, Sta. 10+798, o/s 30m Rt.	ORIGINATED BY	F.P.
DIST	54	HWY	69	BOREHOLE TYPE	C.F.S.S.A. and Rotary Diamond Coring
DATUM	Geodetic	DATE	June 19, 2009	CHECKED BY	C.N.

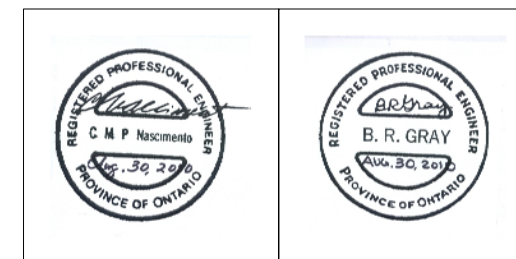
+⁷, ×⁵: Numbers refer to Sensitivity




PROFILE \varnothing CULVERTS AT STA. 10+800 (SBL & NBL) (SX)

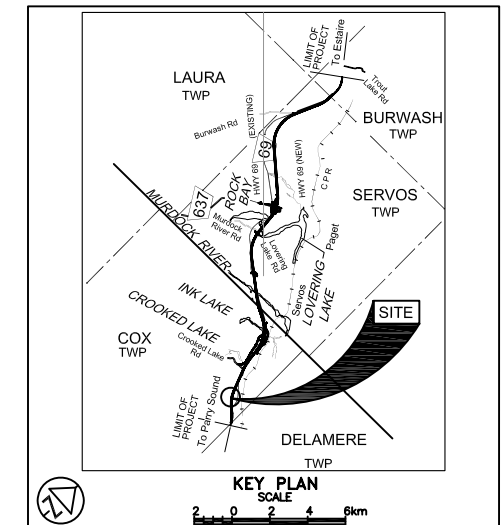
NOTES:

1. DRAWING SX-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND THE RECORD OF BOREHOLE LOGS.
2. CULVERTS AT STA. 10+800 WERE DESIGNATED AS CULVERT SX FOR THE INVESTIGATION.
3. THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
4. DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.



REF AECOM DRAWINGS:
42-91088-SNOWMOBILE CROSSING-1-t350-GA.dwg dated
January 26, 2010 AND C3-Lidar-ctrs.dwg, dated May 14, 2008

CONT No GWP No 5217-06-00 GWP No 5379-02-00	
<u>CULVERT AT STA. 10+800 (SBL & NBL) (SX)</u> HIGHWAY 69 FOUR-LANING - COX TWP. BOREHOLE LOCATIONS & SOIL STRATA	SHEET



LEGEND			
	Borehole		
	Dynamic Cone Penetration Test (Cone)		
	Borehole & Cone		
N	Blows/0.3m (Std. Pen Test, 475 J / blow)		
CONE	Blows/0.3m (60° Cone, 475 J / blow)		
*	Water level not established		
W L	W L at time of investigation June 2009		
	Head		
	ARTESIAN WATER Encountered		
	PIEZOMETER		
BH No	ELEVATION	NORTHINGS	EASTINGS
SX-1	206.4	5 111 732.9	327 924.5
SX-2	205.9	5 111 756.1	327 945.1
SX-3	204.3	5 111 777.1	327 966.6

(Legend Continues)

NOTE

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

REVISIONS	DATE	BY	DESCRIPTION

Geocres No. 411-262

HWY No 69	CHECKED CN	DATE AUG. 30, 2010	DIST 54
SUBM'D MN	CHECKED CN	APPROVED BRG	SITE 46-543/1&2
DRAWN NA	CHECKED CN	APPROVED BRG	DWG SX-1

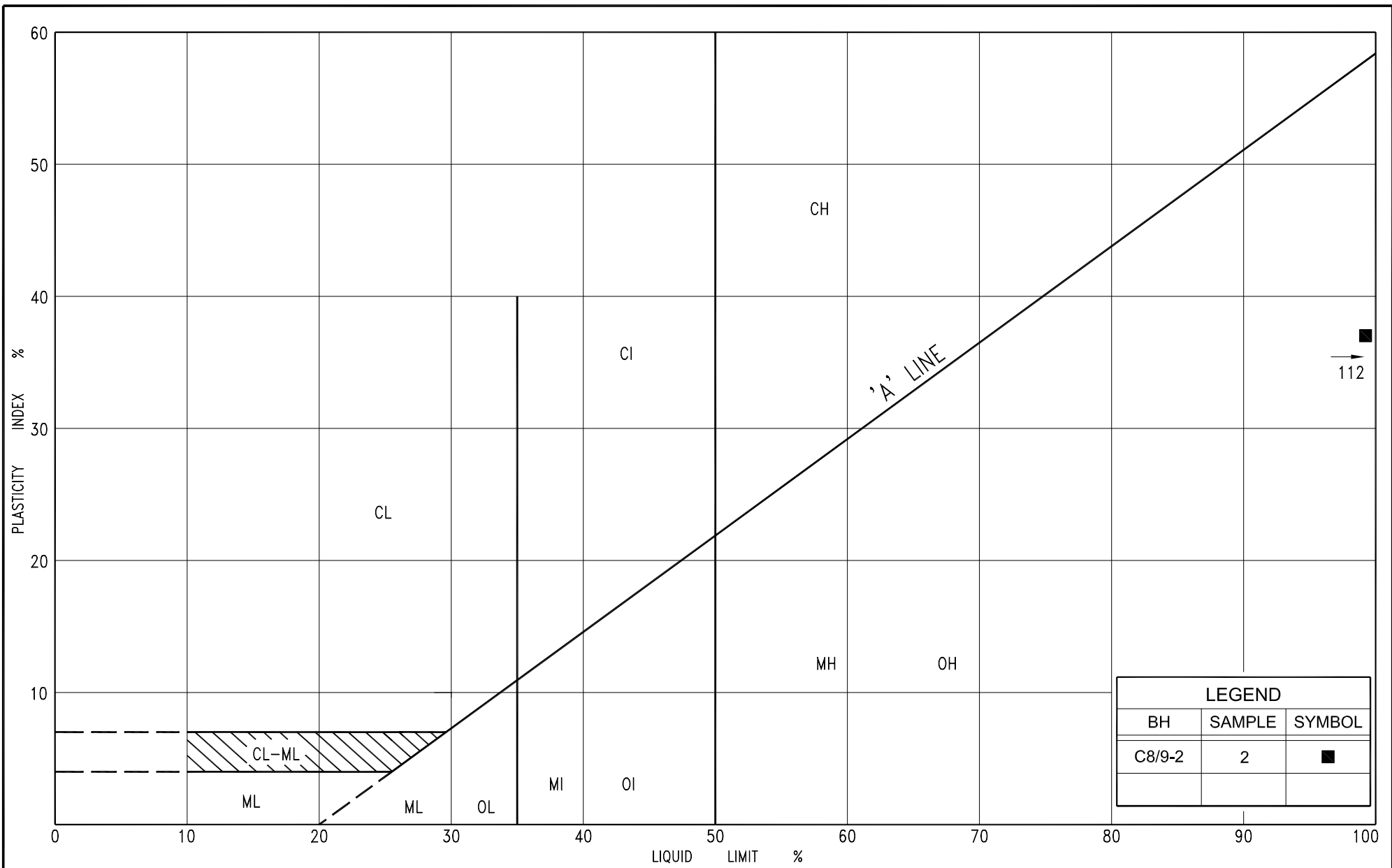
Culvert at Sta. 12+590 (SBL and NBL) (C8/9), Cox Township

Figures C8/9-PC-1 and C8/9-PC-2 – Result of Atterberg Limit Testing

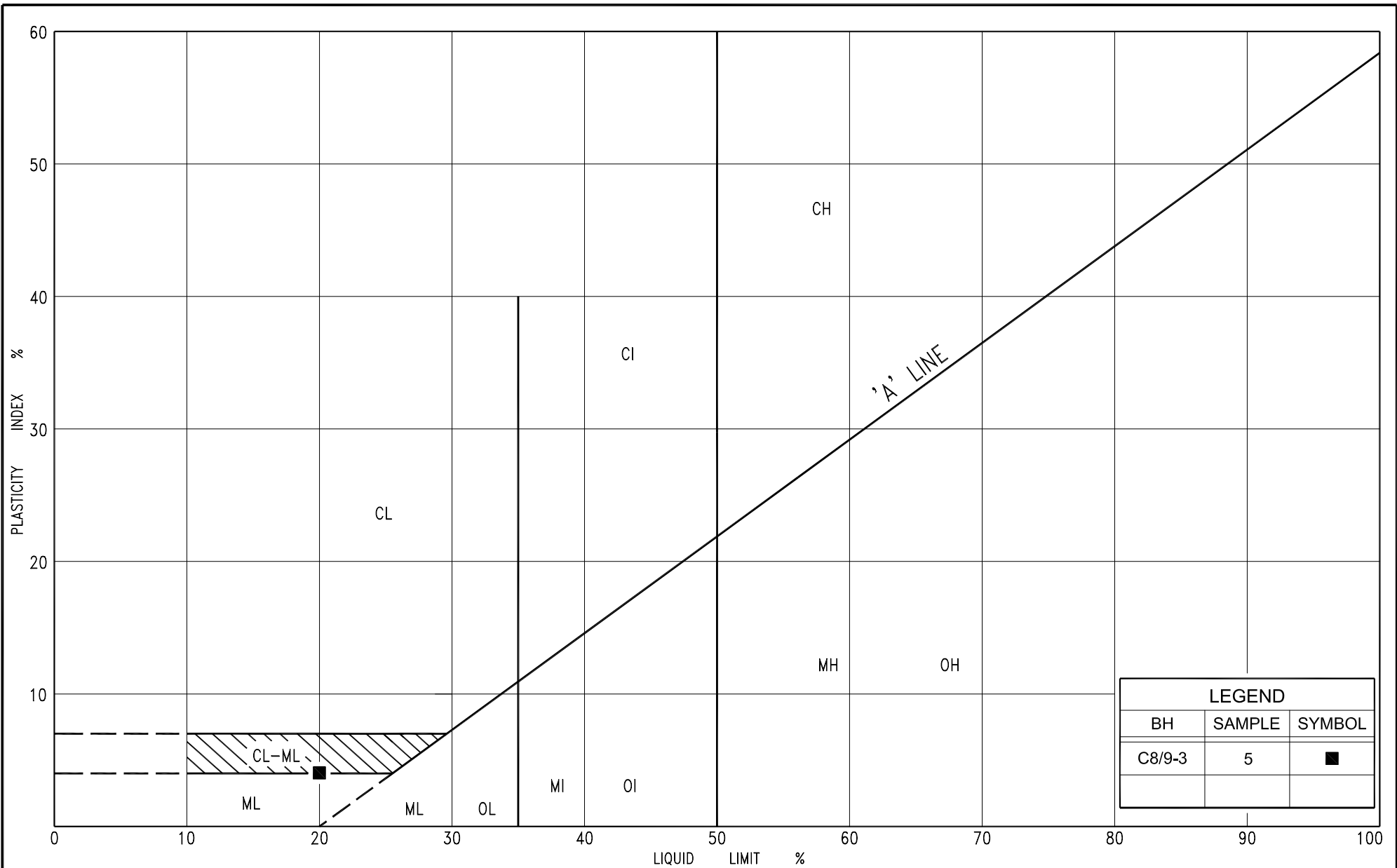
Figure C8/9-GS-1 – Results of Grain Size Distribution Analyses

Record of Borehole Sheets

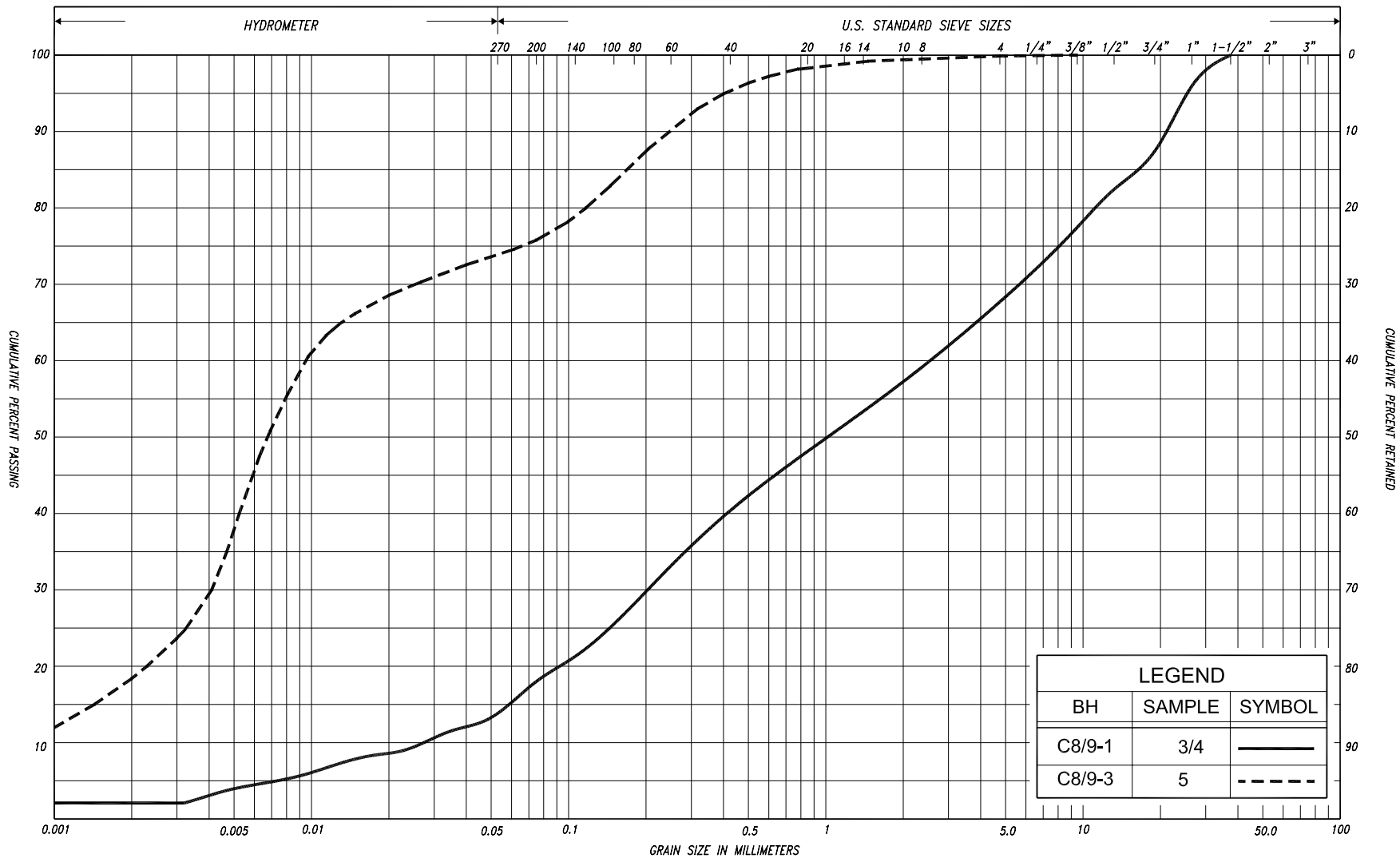
Drawing C8/9-1 – Borehole Locations and Soil Strata



LEGEND		
BH	SAMPLE	SYMBOL
C8/9-2	2	■



LEGEND		
BH	SAMPLE	SYMBOL
C8/9-3	5	■



SILT & CLAY				FINE SAND			MEDIUM SAND		COARSE SAND	GRAVEL		COBBLES	UNIFIED
CLAY	FINE SILT		COARSE SILT	FINE SAND		MEDIUM SAND	COARSE SAND		GRAVEL		COBBLES		M.I.T.
	CLAY		SILT	V. FINE SAND	FINE SAND	MED. SAND	COARSE SAND		GRAVEL				U.S. BUREAU



Ministry of
Transportation
Ontario

GRAIN SIZE DISTRIBUTION

GRAVELLY SAND/ SAND WITH SILT

FIG No. C8/9- GS-1

HWY: 69

G.W.P. No. 5217-06-00

RECORD OF BOREHOLE No C8/9-1										1 of 1		METRIC					
G.W.P. 5217-06-00			LOCATION Co-ords: 5 113 303.4 N ; 327 088.7 E Hwy 69, Sta. 12+590, o/s 38m Lt.			ORIGINATED BY M.R.											
DIST 54 HWY 69			BOREHOLE TYPE C.F.H.S.A. and Rotary Diamond Coring			COMPILED BY M.N.											
DATUM Geodetic			DATE February 19, 2010			CHECKED BY C.N.											
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									
198.0	Ground surface																
0.0	Peat, fine fibrous Dark brown		1	SS	1										132		
	organic silty clay inclusions		2	SS	WH**										268		
196.6	Gravelly sand some silt, trace clay Cobbles		3	SS	23												32 50 (18)
1.4	Compact Grey Wet		4	SS	50/10cm												
195.6	Granitic Gneiss bedrock		5	RC NQ	REC 100%												RQD 53%
2.4	Slightly weathered to unweathered High strength Fair*** to excellent quality		6	RC NQ	REC 100%												RQD 93%
			7	RC NQ	REC 100%												RQD 100%
192.8	End of borehole																
5.2	Sample 4: Sampler bouncing																
	* 2010 02 19																
	▽ Water level observed during drilling																
	WH** Denotes penetration due to weight of rods and hammer																
	*** From 2.4 to 3.1m depth vertical fissures resulted in a lower RQD value.																
	C.F.H.S.A. denotes Continuous Flight Hollow Stem Augers																
	Sample 3 and 4 were combined for testing																

RECORD OF BOREHOLE No C8/9-2

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Co-ords: 5 113 318.7 N ; 327 123.7 E
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers ORIGINATED BY M.R.
 DATUM Geodetic DATE February 21, 2010 COMPILED BY M.N.
 CHECKED BY C.N.

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	● QUICK TRIAXIAL	+	FIELD VANE	×						LAB VANE		
197.9	Ground surface						20	40	60	80	100									
0.0	Peat, fine fibrous																			
	Dark brown																			
			1	SS	1															
194.9	Organic silty clay																			
3.0	Very soft Dark Wet		2	SS	WH**										112	Org.				
	brown														179	19.6%				
193.7	Silty clay																			
4.2	Very soft Grey Wet		3	SS	WH															
	to soft			FV																
192.0	Sand																			
5.9	some gravel, some silt		4	SS	2															
	Very loose Grey Wet																			
190.6	End of borehole																			
7.3	Refusal on probable bedrock																			

RECORD OF BOREHOLE No C8/9-3										1 of 1		METRIC					
G.W.P. 5217-06-00			LOCATION Co-ords: 5 113 319.4 N ; 327 133.1 E Hwy 69, Sta. 12+590, o/s 9m Rt.			ORIGINATED BY M.R.											
DIST 54 HWY 69			BOREHOLE TYPE Continuous Flight Hollow Stem Augers			COMPILED BY M.N.											
DATUM Geodetic			DATE February 20 & 21, 2010			CHECKED BY C.N.											
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	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		ELEVATION SCALE	SHEAR STRENGTH kPa									
197.4	Ground surface						20 40 60 80 100	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
0.0	Peat, fine fibrous Dark brown		1	SS	WH**	▽* ▽*	197										
			2	SS	WH		196								877		
	amorphous		3	SS	WH		195								570		
193.8	Organic silty clay		4	SS	WH		194										
3.6	Very soft Dark brown Wet				FV		193										
4.2	Silty clay						193										
192.6	Very soft Grey Wet		5	SS	WH		192										
4.8	Silt with sand some clay, trace gravel						191										
191.7	Very loose Grey Wet						190										
5.7	Sand some silt, some gravel		6	SS	1		189										
	Very loose Grey Wet to compact						188										
			7	SS	25		187										
							186										
185.7	very dense		8	SS	103												
11.7	End of borehole Refusal on probable bedrock																
* 2010 02 20 & 21 ▽ Water level observed during drilling ▽ Water level measured after drilling WH** Denotes penetration due to weight of rods and hammer																	

RECORD OF BOREHOLE No C8/9-4

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Co-ords: 5 113 328.6 N ; 327 158.5 E
Hwy 69, Sta. 12+590, o/s 36m Rt. ORIGINATED BY M.R.
DIST 54 HWY 69 BOREHOLE TYPE C.F.H.S.A. and Rotary Diamond Coring COMPILED BY M.N.
DATUM Geodetic DATE February 20, 2010 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)		
								○ UNCONFINED		+ FIELD VANE								○		
196.9 0.0	Ground surface						20	40	60	80	100					GR SA SI CL				
196.8 0.1	Ice		1	SS	WH**															
	Peat, fine fibrous																			
	Dark brown																			
	decayed wood		2	SS	6		196													
			3	SS	WR***		195													
			4	SS	WH		194													
			5	FV	WH									543						
193.3 3.6	Organic silty clay						193							292						
	Very soft Dark brown Wet		6	SS	WH															
192.5 4.4	Sand some silt, some gravel cobbles						192													
	Compact Grey Wet		7	SS	10															
							191													
			8	SS	19		190													
189.7 7.2	Granitic Gneiss bedrock		9	RC NQ	REC 100%		189									RQD 30%				
	Slightly weathered to unweathered																			
	Medium strength																			
	Poor to fair quality		10	RC NQ	REC 100%		188									RQD 74%				
			11	RC NQ	REC 100%		187									RQD 68%				
186.7 10.2	End of borehole																			

RECORD OF BOREHOLE No 603-16

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 12+575, o/s 25.2m Lt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Power Auger COMPILED BY G.D.
 DATUM Geodetic DATE October 04, 2007 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100	W _p	W	W _L		
201.5	Ground Surface					*											
0.0	Gravelly sand, trace silt _____ Brown _____ Moist _____ some gravel, some silt (FILL)						201										
200.5	End of borehole Refusal on probable bedrock																
1.0																	
	* Borehole dry																

METRIC

1 of 1 **METRIC**

$+^7, \times^5$: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 603-19

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 12+587.5, o/s CL Med. ORIGINATED BY M.R.
DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE February 20, 2008 CHECKED BY

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	● QUICK TRIAXIAL	+ FIELD VANE	× LAB VANE									
197.5	Ground Surface						20	40	60	80	100	20	40	60						
0.0	Peat, fine fibrous Dark brown					▽*														
194.6	Organic silty clay Dark brown		1	SS	WH															
193.9	Silty clay Very soft Grey Wet			FV																
3.6			2	SS	1															
				FV																
191.7	Clayey silt, trace sand Very loose Grey Wet		3	SS	1															
190.3	Sand, some silt Compact Brown/ Wet grey																			
7.2																				
188.1	End of borehole Refusal on probable bedrock																			
9.4																				
	* 2008 02 20																			
	▽ Water level observed during drilling																			
	WH** Denote penetration due to weight of rods and hammer																			
	*** C.F.S.S.A. Denotes Continuous Flight Solid Stem Augers																			

RECORD OF BOREHOLE No 603-20

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 12+587.5, o/s 35.0m Rt. CL Med. ORIGINATED BY M.R.
DIST 54 HWY 69 BOREHOLE TYPE Manual Probe COMPILED BY G.D.
DATUM Geodetic DATE February 21, 2008 CHECKED BY C.N.

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									
197.0 0.0	Top of Ice							20	40	60	80	100					
196.9 0.1	Ice							20	40	60	80	100					
	Peat, fine fibrous																
	Dark brown																
193.9 3.1	Silty clay, trace sand																
	Brown Moist																
192.2 4.8	End of borehole																
	Refusal on probable bedrock																
	Note: Insufficient ice thickness to conduct using a drill rig at the time of investigation																
	* 2008 02 21																
	▽ Water level observed during drilling																

RECORD OF BOREHOLE No 603-21

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 12+590, o/s 11.1m Lt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY G.D.
DATUM Geodetic DATE May 26, 2009 CHECKED BY C.N.

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									
201.5	Ground Surface						20	40	60	80	100						
0.0	70mm asphalt over sand and gravel, trace silt																
	Brown/ Moist grey (FILL)																
	Rockfill																
199.2	End of borehole																
2.3	Refusal on probable boulder																
	* Borehole dry																

RECORD OF BOREHOLE No 603-22

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 12+600.0, o/s 19.0m Rt. CL Med. ORIGINATED BY M.R.
DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE February 21, 2008 CHECKED BY

SOIL PROFILE				SAMPLES			* GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION		STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				w _p w w _L				WATER CONTENT (%)				
									○ UNCONFINED	+	FIELD VANE	● QUICK TRIAXIAL	×	LAB VANE							
197.1	Ground Surface							20	40	60	80	100									
0.0	Peat, fine fibrous																				
	Dark brown																				
195.0	Sand, some silt																				
2.1	Loose Brown/ Wet			1	SS	6															
	grey																				
				2	SS	5															
191.4	End of borehole and dynamic cone penetration test																				
5.7	Refusal on probable bedrock																				
	* Borehole dry																				
	** C.F.S.S.A. Denotes Continuous Flight Solid Stem Augers																				

RECORD OF BOREHOLE No 603-23

1 of 1

METRIC

G.W.P.	5217-06-00	LOCATION	Hwy 69 (New), Sta. 12+610.0, o/s 36.0m Lt. CL Med.	ORIGINATED BY	M.R.
DIST	54	HWY	69	BOREHOLE TYPE	Continuous Flight Solid Stem Augers
DUM				Geodetic	DATE
February 25, 2008				CHECKED BY	

[illegible]

RECORD OF PENETRATION TEST No 603-24

1 of 1 **METRIC**

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 12+610 CL Med. ORIGINATED BY M.R.
DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE February 21, 2008 CHECKED BY C.N.




SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100	w_p	w	w_L		
198.4 0.0	Ground Surface																
	Probable peat																
	Probable silty clay																
196.3 2.1	End of dynamic cone penetration test																
	Refusal on probable bedrock																

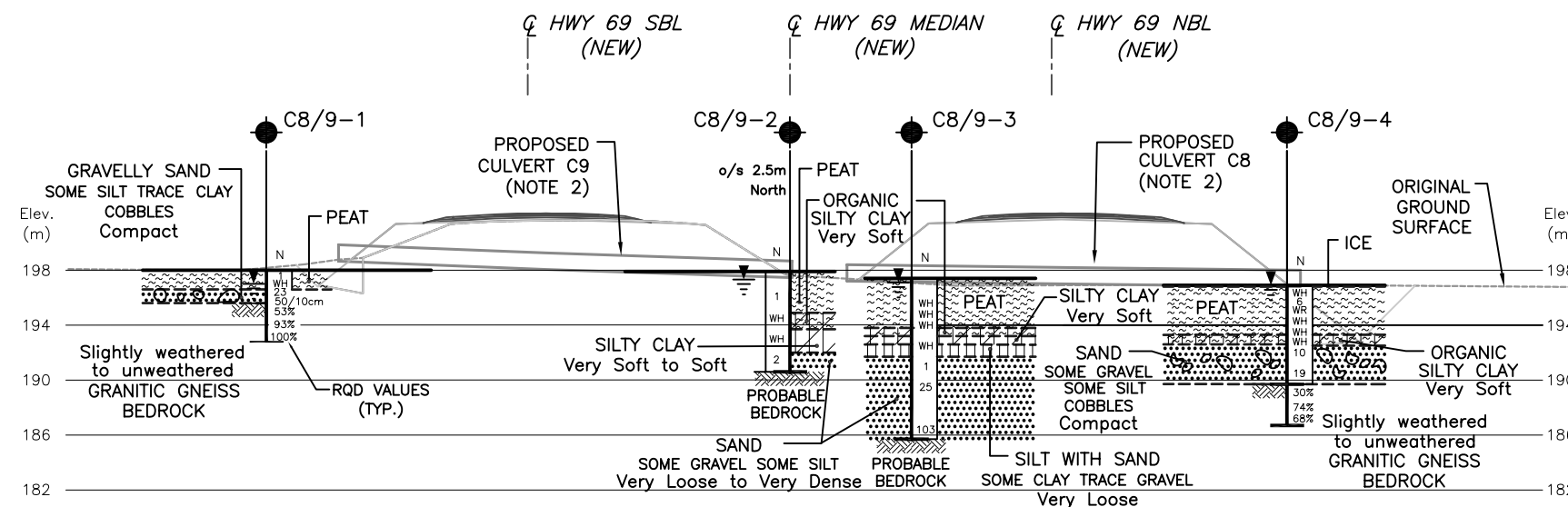
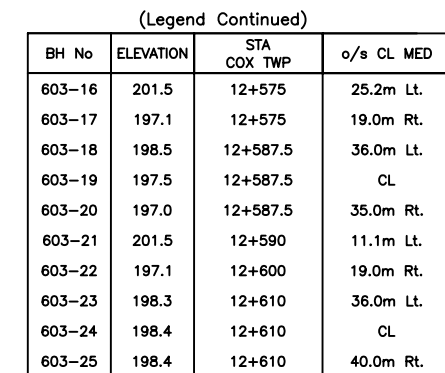
RECORD OF BOREHOLE No 603-25

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 12+610, o/s 40.0m Rt. CL Med. ORIGINATED BY M.R.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY G.D.
 DATUM Geodetic DATE February 21, 2008 CHECKED BY C.N.

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									
198.4	Ground Surface							20	40	60	80	100					
0.0 198.1	Peat, fine fibrous Dark brown					▽*	198										
0.3	Sand with silt, trace gravel																
197.5 0.9	Brown Wet End of borehole Refusal on probable bedrock																
	* 2008 02 21																
	▽ Water level observed during drilling																



PROFILE @ CULVERTS STA. 12+590 (SBL AND NBL) (C8/9)

REVISIONS			
DATE	BY	DESCRIPTION	

HWY No 69				DIST Sudbury Area	
SUBM'D	MN	CHECKED MN	DATE AUG. 30, 2010		SITE ---
DRAWN	NA	CHECKED CN	APPROVED BRG		DWG C8/9-1

Culvert at Sta. 12+750 (SBL and NBL) (C10/11), Cox Township

Data from Geotechnical Pavement Investigation (PML Ref.: 06TF054C)
Drawing C10/11 – Borehole Locations and Soil Strata



Proposed Hwy 69, Cox Twp, Culverts
DATUM: Proposed Centrlne Median

12+750.0	34.0	Lt C/L	D-1.5	HA	14+580.0	35.0	Rt C/L	D-1.2	HA
0 - 100		Fr Wat			0 - 100		Br/Dk Br Sa(y) Si Tps W Roots Moist		
100 - 1.5		Blk F Fib Peat Sat			100 - 400		Br Sa(y) Si Moist		
1.5 - 1.7		Gry Si(y) Sa Sat			400 - 2.0		Br Si(y) Cl Tr Sa Firm Moist-Wet		
1.7		NFP BR			2.0 - 4.1		Br/Gry Si(y) Cl Soft Sat		
		Fr Wat @ 0			4.1 - 4.4		Gry Sa Some Si Sat		
					4.4		NFP BR		
12+896.0	33.0	Lt C/L	D-0.5	HA			Fr Wat @ 1.8		
0 - 100		Fr Wat			14+883.0	45.0	Lt C/L	D-0.2	HA
100 - 400		Gry Sa Some Si Tr Gr Wet			Toe of Slope				
400		NFP BR			0 - 050		Dk Br/Blk Si Tps Moist		
		Fr Wat @ 0			050 - 500		Gry Cl(y) Si Some Sa Wet-Sat		
14+580.0		C/L	D	HD	500		NFP BR		
0 - 400		Dk Br/Blk Amor Peat Tr Sa Wet-Sat					Fr Wat @ 200		
400 - 1.2		Br/Gry Si(y) Cl Some Gr Some Si Sat			14+883.0	35.0	Rt C/L	D-3.2	HA
1.2 - 3.6		Br/Gry Cl(y) Si Tr Sa Mott Firm Moist-Sat			0 - 200		Dk Br/Blk Si Tps W Roots Moist		
3.6 - 5.5		Gry Cl(y) Si Soft Sat			200 - 1.7		Br Si(y) Cl Tr Sa Firm Wet		
5.5 - 5.8		Gry Sa Some Si Sat			1.7 - 2.8		Br Si(y) Cl Tr Sa Soft Wet		
		Fr Wat @ 100			2.8 - 3.1		Br Sa Some Gr Some Si Wet		
14+580.0	19.0	Lt C/L	D+0.6	HA					
0 - 200		Br/Dk Br Sa(y) Si Tps W Roots Moist			16+318.0		C/L	D	HA
200 - 1.7		Br Si(y) Cl Tr Sa Firm Moist			0 - 200		Blk Sa(y) Si Tps Moist		
1.7 - 2.2		Br Si(y) Cl Soft Sat			200 - 800		Gry/Br Si(y) Cl Mott Moist		
2.2 - 2.4		Br Sa Some Si Sat			800		NFP BR		
2.4		NFP BR			16+321.0	33.0	Rt C/L	D+0.9	HA
		Fr Wat @ 1.7			0 - 200		Blk Si Tps Moist		
14+580.0	35.0	Lt C/L	D+0.7	HA	200 - 500		Br Sa(y) Si Moist		
0 - 300		Dk Br/Blk Amor Peat Tr Sa Wet			500		NFP BR		
300 - 900		Br Si(y) Cl Tr Sa Firm Sat							
900		NFP BR							
		Fr Wat @ 100							
14+580.0	19.0	Rt C/L	D-0.7	HA					
0 - 100		Dk Br/Blk Amor Peat Tr Sa Wet							
100 - 2.5		Br/Gry Si(y) Cl Occ Co Sa Seams Firm Moist-Sat							
2.5 - 3.4		Br Si(y) Cl Tr Sa Soft Sat							
3.4 - 3.7		Gry Sa Some Si Sat							
3.7		NFP BR							
		Fr Wat @ 1.4							



Proposed Hwy 69, Cox Twp, Sta 12+001 to 13+000

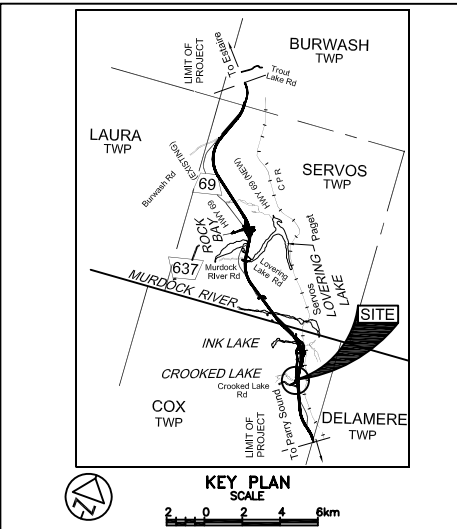
DATUM: Proposed Centreline Median

12+650.	11.2	Lt C/L	D-0.8	EP	12+700.	21.9	Lt C/L	D-0.1	EP
0 - 230		Asph			0 - 225		Asph		
230 - 320		Br Cr Sa W Gr Tr Si Moist			225 - 420		Lt Br Cr Sa Some Gr Tr Si Moist		
320 - 900		Lt Br Sa Some Gr Some Si Num Cob Moist			420 - 700		Br/Lt Br Sa Some Gr Some Si Moist		
900		NFP RF			700		NFP RF		
12+660.	7.0	Rt C/L	D+0.6	HA	12+700.	24.6	Lt C/L	D-0.1	SHR
0		NFP BR			0 - 310		Br/Dk Br Cr Gr(y) Sa Tr Si Moist		
12+660.	19.0	Rt C/L	D+0.8	HA	310 - 600		Lt Br Sa Some Gr Some Si Moist		
0 - 025		Dk Br Si Tps W Roots Moist			600 - 1.1		Br Gr(y) Sa Tr Si Occ Cob Moist		
025		NFP BR			1.1		NFP BR		
12+660.	33.0	Rt C/L	D-0.3	HA	12+700.	7.0	Rt C/L	D-0.1	HA
0 - 050		Dk Br Si Tps W Roots Moist			0 - 050		Dk Br Si Tps W Roots Moist		
050		NFP BR			050		NFP BR		
12+670.	6.0	Rt C/L	D+/-0	HA	12+700.	19.0	Rt C/L	D+0.8	HA
0 - 200		Dk Br/Blk Si Tps W Roots Moist			0 - 200		Dk Br Si Tps W Roots Num Bld Moist		
200		NFP Weath BR			200		NFP BR		
12+670.	19.0	Rt C/L	D-0.5	PA	12+700.	33.0	Rt C/L	D+0.5	HA
0 - 400		Dk Br/Blk Sa(y) Si Tps W Roots Moist			0		NFP BR		
400		NFP Weath BR			12+720.	7.0	Rt C/L	D+0.1	HA
12+670.	33.0	Rt C/L	D-1.4	HA	0		NFP BR		
0 - 300		Dk Br/Blk Si Tps W Roots Moist			12+720.	19.0	Rt C/L	D+/-0	HA
300		NFP Weath BR			0		NFP BR		
12+680.	7.0	Rt C/L	D-0.1	HA	12+720.	33.0	Rt C/L	D+0.7	HA
0 - 300		Dk Br Si Tps W Roots Moist			0 - 050		Dk Br Si Tps W Roots Moist		
300		NFP BR			050		NFP BR		
12+680.	19.0	Rt C/L	D+0.3	HA	12+730.	19.0	Rt C/L	D+0.7	HA
0		NFP BR			0		NFP BR		
12+680.	33.0	Rt C/L	D-1.7	HA	12+745.	10.1	Lt C/L	D+2.2	MSH
0 - 250		Dk Br Si Tps Num Cob Num Bld W Roots Moist			0 - 050		Asph		
250		NFP BR			050 - 200		Dk Br Cr Gr(y) Sa Tr Si Moist		
					200 - 1.1		Br/Lt Br Sa Some Si Tr Gr Occ Cob Moist		
					1.1		NFP RF		



Proposed Hwy 69, Cox Twp, Sta 12+001 to 13+000
DATUM: Proposed Centreline Median

12+745.	11.5	Lt C/L	D+2.2	EP	12+800.	23.2	Lt C/L	D+1.8	MSH
0 - 190		Asph			0 - 040		Asph		
190 - 240		Br Cr Sa Some Gr Tr Si Moist			040 - 340		Lt Br Cr Sa Some Gr Tr Si Moist		
240 - 800		Lt Br Sa Some Si Tr Gr Moist			340 - 650		Br/Lt Br Sa Some Gr Some Si Moist		
800		NFP BR			650		NFP BR		
12+750.		C/L	D	PA	12+800.	19.0	Rt C/L	D-2.3	HD
0 - 500		Br/Gry Sa And Gr Tr Si Moist			0 - 100		Ice		
500		NFP Bld			100 - 1.2		Dk Br F Fib Peat Sat		
12+750.	19.0	Rt C/L	D-1.7	HD	1.2 - 1.6		Dk Br Si(y) Cl W Org Very Soft Sat		
0 - 200		Ice			1.6		NFP BR		
200 - 1.2		Dk Br F Fib Peat Sat					Fr Wat @ 100		
1.2		NFP BR			12+800.	47.0	Rt C/L	D-2.3	HD
		Fr Wat @ 200			0 - 200		Ice		
12+750.	47.0	Rt C/L	D-1.7	HD	200 - 2.0		Dk Br F Fib Peat Sat		
0 - 200		Ice			2.0 - 3.2		Dk Br Amor Peat Sat		
200 - 4.0		Dk Br F Fib Peat Sat			3.2 - 4.0		Dk Br Si(y) Cl W Org Very Soft Sat		
4.0 - 4.5		Dk Br Si(y) Cl W Org Sat			4.0 - 4.5		Gry Si(y) F Sa Very L Sat		
4.5		NFP BR			4.5		NFP BR		
12+775.	19.0	Rt C/L	D-1.8	HD			Fr Wat @ 200		
0 - 200		Ice			12+825.		C/L	D	HA
200 - 600		Dk Br F Fib Peat Sat			0 - 300		Br Gr Some Sa Tr Si W Org Moist		
600		NFP BR			300		NFP BR		
		Fr Wat @ 200			12+825.	19.0	Rt C/L	D-1.2	HA
12+800.		C/L	D	PA	0 - 050		Dk Br Si Tps W Roots Moist		
0 - 400		Br Sa And Gr Tr Si Moist			050		NFP BR		
400		NFP BR			12+825.	45.0	Rt C/L	D-1.8	HD
12+800.	21.9	Lt C/L	D+1.8	EP	0 - 100		Ice		
0 - 240		Asph			100 - 2.5		Dk Br F Fib Peat Sat		
240 - 340		Lt Br Cr Sa Some Gr Tr Si Moist			2.5 - 2.9		Dk Br Si(y) Cl W Org Very Soft Sat		
340 - 700		Br Sa Some Gr Some Si Moist			2.9		NFP BR		
700		NFP BR					Fr Wat @ 100		
					12+850.		C/L	D	HA
					0 - 300		Br Sa Tr Si Tr Gr Moist		
					300		NFP Bld		



LEGEND			
	Borehole		
	Dynamic Cone Penetration Test (Cone)		
	Borehole & Cone		
N	Blows/0.3m (Std. Pen Test, 475 J/blow)		
CONE	Blows/0.3m (60° Cone, 475 J/blow)		
WH	Penetration due to weight of hammer and rods		
	WL at time of investigation February 2008 to September 2009		
	Head		
	ARTESIAN WATER Encountered		
	PIEZOMETER		

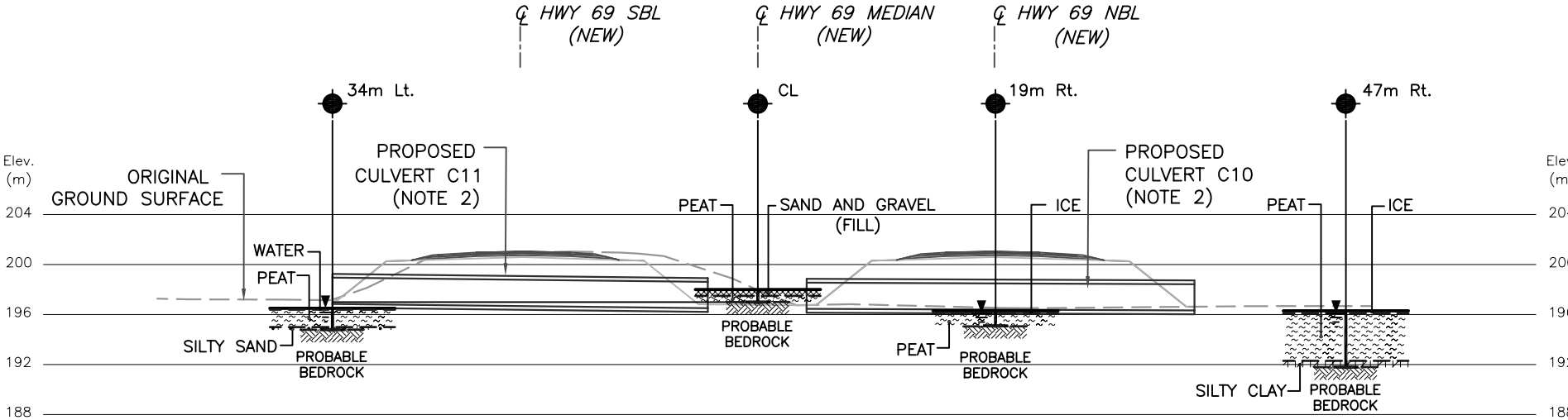
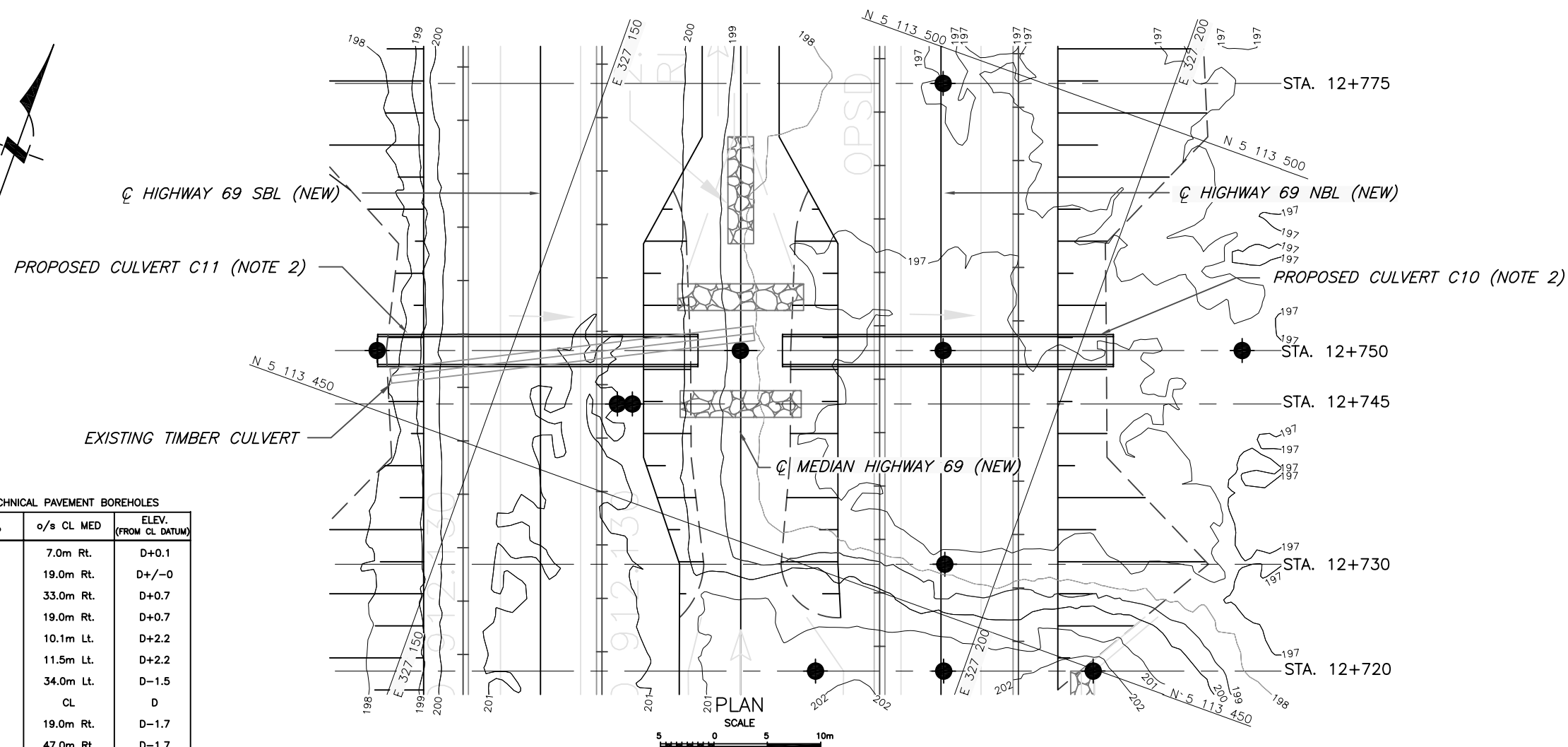
BH No	ELEVATION	NORTHINGS	EASTINGS

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

REVISIONS	DATE	BY	DESCRIPTION

Geocres No. 411-262					
HWY No	69				DIST Sudbury Area
SUBM'D	MN	CHECKED MN	DATE AUG. 30, 2010	SITE	---
DRAWN	NA	CHECKED CN	APPROVED BRG	DWG	C10/11-1

GEOTECHNICAL PAVEMENT BOREHOLES		
STA COX TWP	o/s CL MED	ELEV. (FROM CL DATUM)
12+720	7.0m Rt.	D+0.1
12+720	19.0m Rt.	D+/-0
12+720	33.0m Rt.	D+0.7
12+730	19.0m Rt.	D+0.7
12+745	10.1m Lt.	D+2.2
12+745	11.5m Lt.	D+2.2
12+750	34.0m Lt.	D-1.5
12+750	CL	D
12+750	19.0m Rt.	D-1.7
12+750	47.0m Rt.	D-1.7
12+775	19.0m Rt.	D-1.8



- NOTES:
- DRAWING C10/11-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND THE GEOTECHNICAL PAVEMENT DATA.
 - THE CULVERTS AT STA. 12+750 WERE DESIGNATED AS CULVERT C10/11 FOR THE INVESTIGATION.
 - THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
 - DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

REF AECOM Drawings:
C3-HWY69-Base.dwg dated Jan. 15, 2010;
C3-Hwy69-Des.dwg dated April 15, 2010; Hwy 69 Servos - Cont 3 -Structural -PC Conc Box Culv Prof 10+100 10+140 12+750 13+206 CLRSC 8+240.dwg, dated April 23, 2010 and C3-Lidar-ctrs.dwg, dated May 14, 2008.



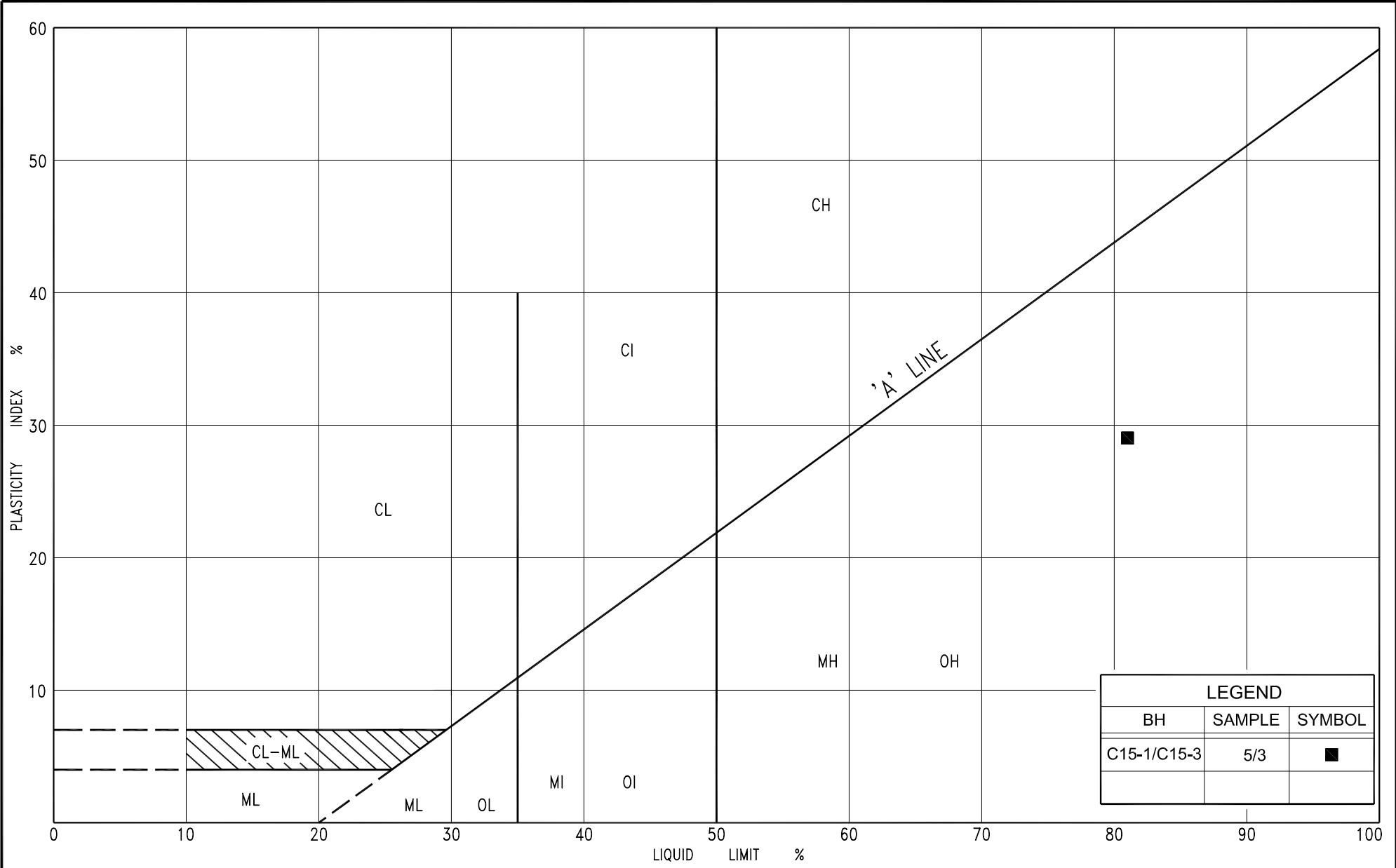
Culvert at Sta. 13+206 (SBL and NBL) (C15), Cox Township

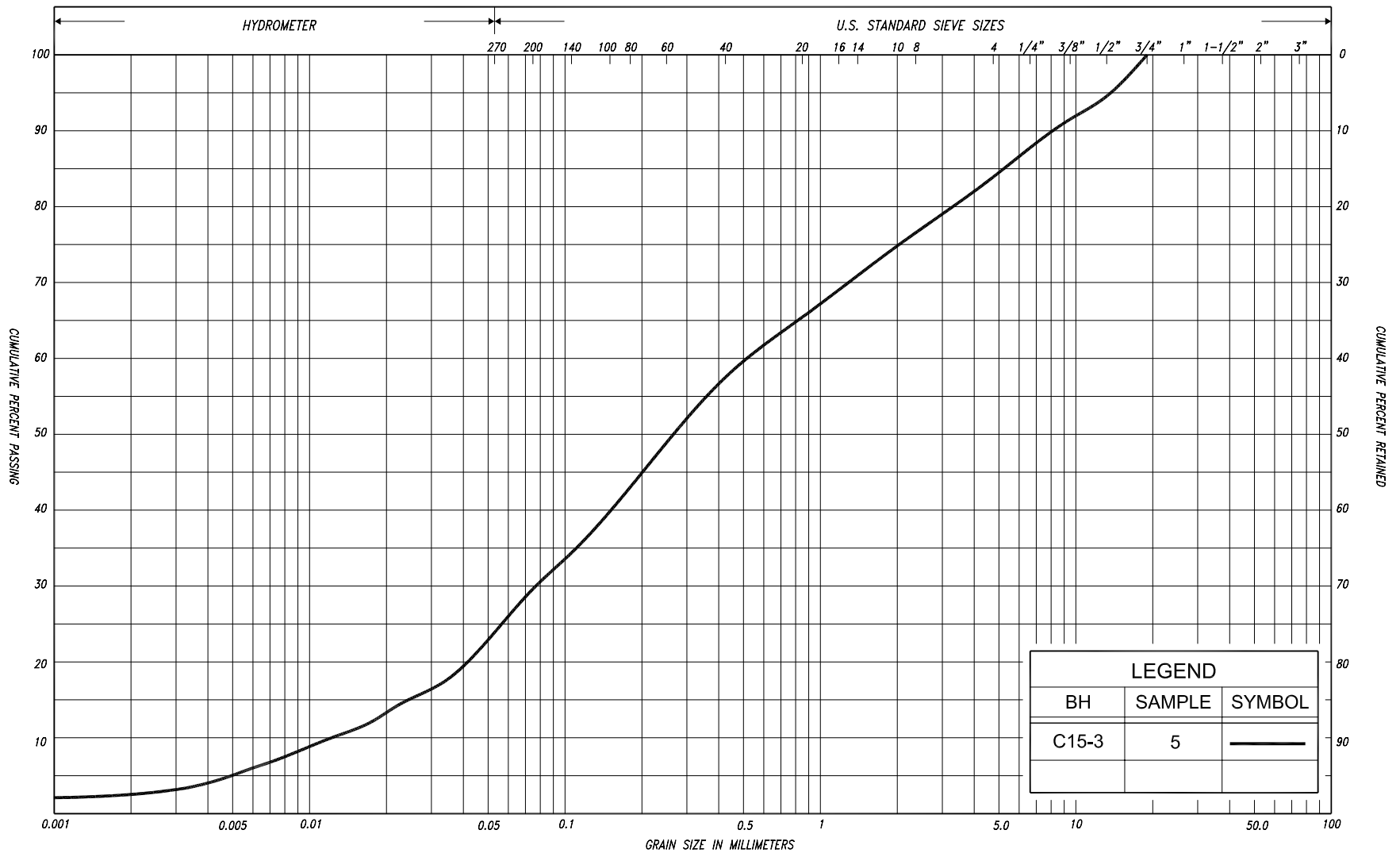
Figure C15-PC-1 – Result of Atterberg Limit Testing

Figure C15-GS-1 – Results of Grain Size Distribution Analyses

Record of Borehole Sheets

Drawing C15-1 – Borehole Locations and Soil Strata





LEGEND		
BH	SAMPLE	SYMBOL
C15-3	5	—

SILT & CLAY				FINE SAND			MEDIUM SAND		COARSE SAND	GRAVEL			COBBLES	UNIFIED
														M.I.T.
CLAY	FINE	MEDIUM SILT	COARSE	FINE	MEDIUM SAND	COARSE							COBBLES	
CLAY		SILT		V. FINE	FINE	MED.	COARSE	GRAVEL						U.S. BUREAU

RECORD OF BOREHOLE No C15-1										1 of 1		METRIC				
G.W.P. 5217-06-00			LOCATION Co-ords: 5 113 886.9 N ; 326 877.1 E Hwy 69, Sta. 13+206, o/s 48m Lt.			ORIGINATED BY M.R.										
DIST 54 HWY 69			BOREHOLE TYPE C.F.H.S.A. and Rotary Diamond Coring			COMPILED BY M.N.										
DATUM Geodetic			DATE February 17, 2010			CHECKED BY C.N.										
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	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 (%)
191.3 0.0	Ground surface Peat, fine fibrous Dark brown		1	SS	1		191								443 490 81 252 Org. 12.3%	
			2	SS	1		190									
			3	SS	WH**		189									
188.7 2.6	Organic silt Very loose Dark Wet brown		4	SS	WH		188									
187.8 3.5	Gravelly sand, some silt cobbles and boulders Compact to Grey Wet very dense	5	SS	WH	187											
		6	SS	71/15cm	186											
		7	RC NQ	-	185											
185.8 5.5	Migmatite bedrock Slightly weathered to unweathered High strength Good to excellent quality	8	RC NQ	REC 100%	184											
		9	RC NQ	REC 98%	183											
183.0 8.3	End of borehole Sample 6: Sampler bouncing * 2010 02 17 Water level observed during drilling WH** Denotes penetration due to weight of rods and hammer C.F.H.S.A. denotes Continuous Flight Hollow Stem Augers Sample 5 was combined with sample 3 from borehole C15-2 for testing	10	RC NQ	REC 83%												

RECORD OF BOREHOLE No C15-2

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Co-ords: 5 113 898.6 N ; 326 924.1 E
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers ORIGINATED BY M.R.
 DATUM Geodetic DATE February 18, 2010 COMPILED BY M.N.
 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE						
192.1 0.0	Ground surface Ice																
191.5 0.6	Water Peat, amorphous Dark brown		1	SS	WR**												
			2	SS	WR												
			3	SS	WH***										703		
188.9 3.2	Organic silt Very loose Dark Wet brown		4	SS	WH												
187.2 4.9	Gravelly sand, some silt Compact Grey Wet		5	SS	10										151		
186.2 5.9	End of borehole Refusal on probable bedrock																
	<div>* 2010 02 18</div> <div> Water level observed during drilling</div> <div> Water level measured after drilling</div> <div>WR** Denotes penetration due to weight of rods only</div> <div>WH*** Denotes penetration due to weight of rods and hammer</div>																

RECORD OF BOREHOLE No C15-3										1 of 1		METRIC	
G.W.P. 5217-06-00			LOCATION Co-ords: 5 113 908.1 N ; 326 962.4 E Hwy 69, Sta. 13+206, o/s 39.5m Rt.			ORIGINATED BY M.R.							
DIST 54 HWY 69			BOREHOLE TYPE C.F.H.S.A. and Rotary Diamond Coring			COMPILED BY M.N.							
DATUM Geodetic			DATE February 18, 2010			CHECKED BY C.N.							
SOIL PROFILE			SAMPLES			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	GROUND WATER CONDITIONS	ELEVATION SCALE	20 40 60 80 100	W _p W W _L				
192.1	Ground surface												
0.0	Ice												
191.4	Water												
0.7	Peat, amorphous												
	Dark brown												
			1	SS	WR**								
	fine fibrous		2	SS	WR					466			
189.2	Organic silt												
2.9	Very loose Dark brown Wet		3	SS	WR					81			
										185	Org. 12.3%		
188.3	Sand with silt some gravel, trace clay		4	SS	9								
3.8	Loose to Grey Wet compact		5	SS	13								
											16 54 27 3		
186.6	Granitic Gneiss bedrock		6	RC	REC100%						RQD 100%		
5.5	Slightly weathered to unweathered		7	RC NQ	REC 92%						RQD 92%		
	High strength		8	RC NQ	REC 97%						RQD 79%		
	Good to excellent quality		9	RC NQ	REC 100%						RQD 100%		
183.6	End of borehole												
8.5													
<p>* 2010 02 18</p> <p>▽ Water level observed during drilling</p> <p>▼ Water level measured after drilling</p> <p>WR** Denotes penetration due to weight of rods only</p> <p>C.F.H.S.A. denotes Continuous Flight Hollow Stem Augers</p> <p>Sample 3 was combined with sample 5 from borehole C15-1 for testing</p>													

RECORD OF BOREHOLE No 604-6

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 13+187.5, o/s 45m Lt. CL Med. ORIGINATED BY A.D.
 DIST 54 HWY 69 BOREHOLE TYPE Power Auger COMPILED BY G.D.
 DATUM Geodetic DATE April 11, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)				
								○ UNCONFINED	● QUICK TRIAXIAL	✕ LAB VANE	✚ FIELD VANE											
191.1 0.0	Top of Ice Ice					▼*											GR SA SI CL					
190.9 0.2	Peat, fine fibrous					▽*																
190.3 0.8	Black																					
190.2 0.9	Gravelly sand, some silt cobbles and boulders Grey Wet End of borehole Refusal on probable boulder																					
	* 2008 04 11																					
	▽ Water level observed during drilling																					
	▼ Water level measured after drilling																					

1 of 1

METRIC

Foundation Design

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m³	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									
192.0 0.0	Top of Ice Ice					▼*		20	40	60	80	100	W _P	W	W _L				
191.0 1.0	Water					▽*													
187.7 4.3	Peat, fine fibrous Dark brown		1	SS	1														
187.0 5.0	Organic silt		2	SS	WH**												474	Org. 45.3%	
186.0 6.0	Very loose Dark to loose grey Wet		3	SS	WH												362		
	Gravelly sand, some silt		4	SS	WH												283		
	Loose Grey Wet		5	SS	5								○						
	End of borehole Refusal on probable bedrock																		
<div>* 2008 03 17</div> <div>▽ Water level observed during drilling</div> <div>▼ Water level measured after drilling</div> <div>WH** Denotes penetration due to weight of rods and hammer</div>																			

RECORD OF PENETRATION TEST No 604-8

1 of 1 METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 13+187.5, o/s 40m Rt. CL Med. ORIGINATED BY K.H.
DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE March 18, 2008 CHECKED BY C.N.

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					
192.0 0.0	Top of Ice Ice Water Probable peat													
	Probable sand													
183.2 8.8	End of dynamic cone penetration test Refusal on probable bedrock													

RECORD OF BOREHOLE No 604-9

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 13+209, o/s 20m Lt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. + NW Casing COMPILED BY G.D.
 DATUM Geodetic DATE May 26, 2009 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS *	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE									
196.4	Ground Surface					*		20	40	60	80	100					
0.0	70mm asphalt over sand and gravel, trace silt						196										
	Brown/ Moist grey																
	(FILL)																
	Rockfill						195										
							194										
							193										
192.6	End of borehole																
3.8	Refusal on probable boulder																
	* Borehole dry																
	C.F.S.S.A. Denotes Continuous Flight Solid Stem Augers																

RECORD OF BOREHOLE No 604-11

1 of 1

METRIC

G.W.P. 5217-06-00	LOCATION	Hwy 69 (New), Sta. 13+212.5, o/s 45m Lt. CL Med.	ORIGINATED BY	A.D.
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DIST	54	HWY	69	BOREHOLE TYPE	Power Auger	COMPILED BY	G.D.
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DATUM Geodetic DATE April 11, 2008 CHECKED BY C.N.

[illegible]

RECORD OF PENETRATION TEST No 604-12

1 of 1 **METRIC**

G.W.P.	5217-06-00	LOCATION	Hwy 69 (New), Sta. 13+212.5 CL Med.	ORIGINATED BY	K.H.
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DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.

DATUM Geodetic DATE March 19, 2008 CHECKED BY C.N.

[illegible]

RECORD OF BOREHOLE No 604-13

1 of 1

METRIC

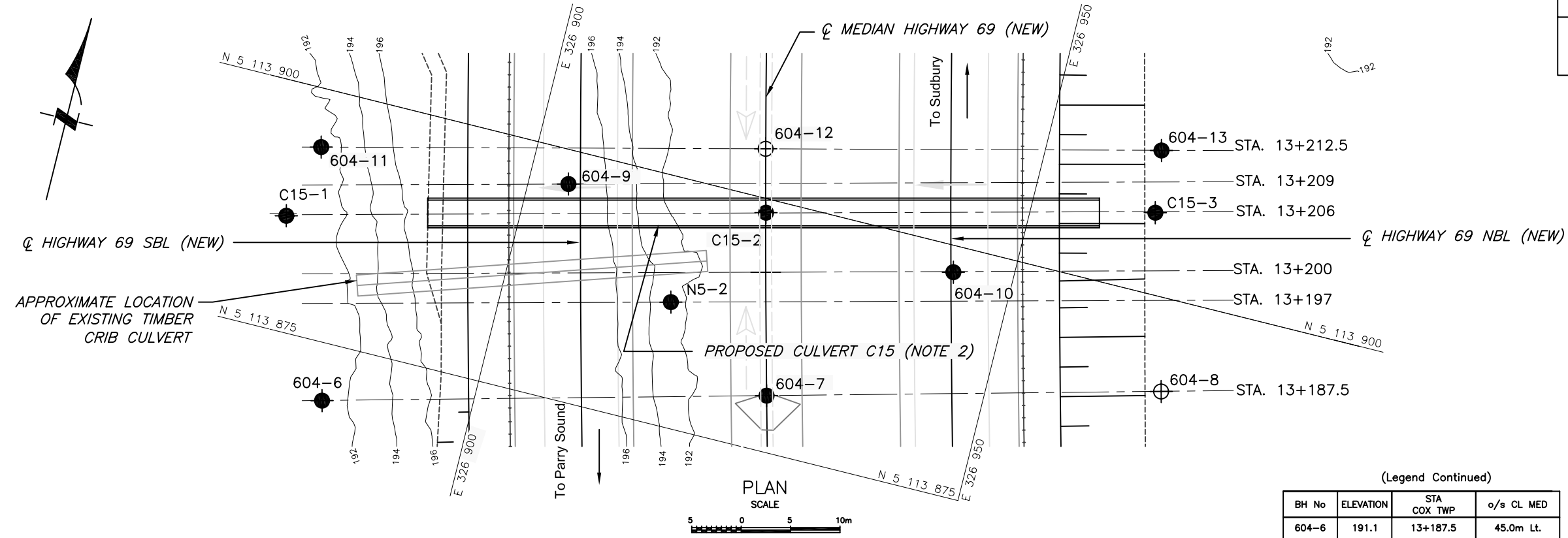
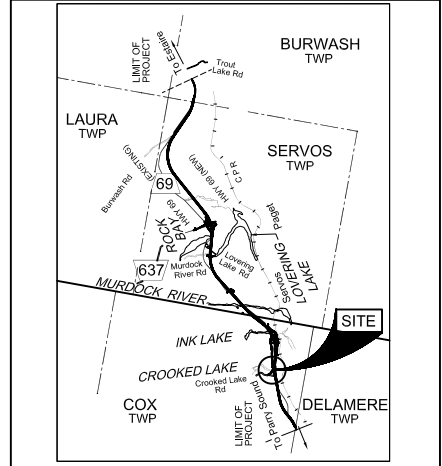
G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 13+212.5, o/s 40m Rt. CL Med. ORIGINATED BY K.H.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY G.D.
 DATUM Geodetic DATE March 18, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER * CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
								○ UNCONFINED	+	FIELD VANE							
192.0	Top of Ice					▼*	20	40	60	80	100						
0.0	Ice					▽*											
191.5	Water																
0.5	Peat, fine fibrous																
	Dark brown																
190.5	Organic silt		1	SS	WH**												
1.5	Very loose Dark Wet																
190.0	grey																
2.0	Gravelly sand, some silt																
	Compact Grey Wet		2	SS	106/18cm												
189.2	End of borehole																
2.8	Refusal on probable bedrock																
Sample 2: Sampler bouncing																	
* 2008 03 18																	
▽ Water level observed during drilling																	
▼ Water level measured after drilling																	
WH** Denotes penetration due to weight of rods and hammer																	

RECORD OF BOREHOLE No N5-2 1 of 1 **METRIC**

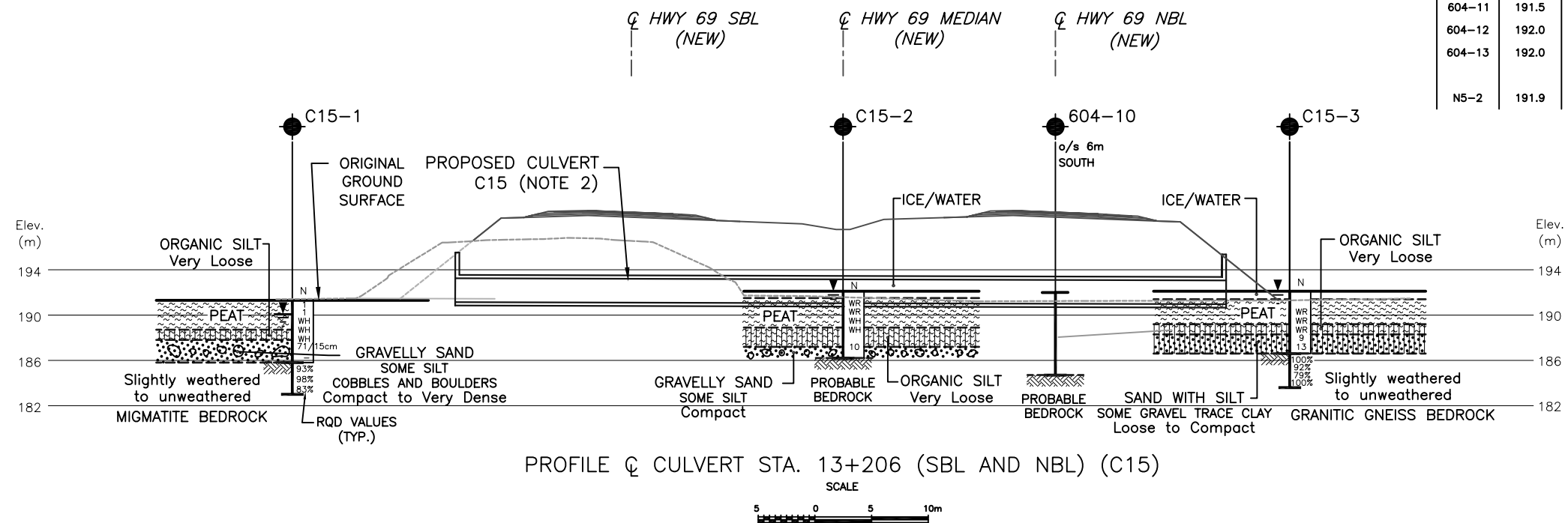
G.W.P. 5217-06-00 LOCATION Hwy. 69 (New), Sta. 13+197, o/s 9.6m Lt.
Co-ords. 5 113 888 N; 326 917 E ORIGINATED BY R.E.
DIST 54 HWY 69 BOREHOLE TYPE Manual Hand Augers COMPILED BY R.E.
DATUM Geodetic DATE April 19, 2004 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)		
								○ UNCONFINED	● QUICK TRIAXIAL	✚ FIELD VANE	✕ LAB VANE							w _p	w	w _L
191.9	Top of Water					▽*														
0.0	Water																			
190.9	Organic silt																			
1.0	Very loose Dark grey Wet (Alluvium) (Unsampled)																			
189.6	End of borehole																			
2.3	Refusal on probable bedrock or boulders/rockfill																			
* 2004 04 19																				
▽ Water level observed during drilling																				
▼ Water level measured after drilling																				



(Legend Continued)

BH No	ELEVATION	STA COX TWP	o/s CL MED
604-6	191.1	13+187.5	45.0m Lt.
604-7	192.0	13+187.5	CL
604-8	192.0	13+187.5	40.0m Rt.
604-9	196.4	13+209	20.0m Lt.
604-10	192.0	13+200	19.0m Rt.
604-11	191.5	13+212.5	45.0m Lt.
604-12	192.0	13+212.5	CL
604-13	192.0	13+212.5	40.0m Rt.
N5-2	191.9	13+197	9.6m Lt.



LEGEND

	Borehole
	Dynamic Cone Penetration Test (Cone)
	Borehole & Cone
N	Blows/0.3m (Std. Pen Test, 475 J/blow)
CONE	Blows/0.3m (60° Cone, 475 J/blow)
WH	Penetration due to weight of hammer and rods
WR	Penetration due to weight of rods only
W L	at time of investigation February 2010
Head	ARTESIAN WATER
Encountered	PIEZOMETER

BH No	ELEVATION	NORTHINGS	EASTINGS
C15-1	191.3	5 113 886.9	326 877.1
C15-2	192.1	5 113 898.6	326 924.1
C15-3	192.1	5 113 908.1	328 962.4

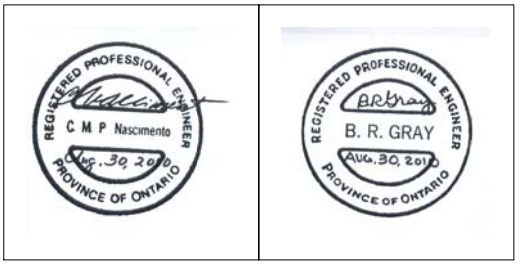
(Legend Continues)

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

NOTES:

- DRAWING C15-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND RECORD OF BOREHOLE LOGS.
- THE CULVERT AT STA. 13+206 WAS DESIGNATED AS CULVERT C15 FOR THE INVESTIGATION.
- THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
- DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

REF AECOM Drawings:
C3-Hwy69-Base.dwg dated Jan. 15, 2010;
C3-Hwy69-Des.dwg dated April 15, 2010; Hwy 69 Servos - Cont 3 -Structural -PC Conc Box Culv Prof 10+100 10+140 12+750 13+206 CLRSC 8+240.dwg, dated April 23, 2010 and C3-Lidar-ctrs.dwg, dated May 14, 2008.



REVISIONS

DATE	BY	DESCRIPTION

Geocres No. 411-262

HWY No 69	CHECKED MN	DATE AUG. 30, 2010	DIST Sudbury Area
SUBM'D MN	CHECKED CN	APPROVED BRG	SITE ---
DRAWN NA	CHECKED CN	APPROVED BRG	DWG C15-1

Culvert at Sta. 8+240 (Crooked Lake Road South Connection) (C16), Cox Township

Data from Geotechnical Pavement Investigation (PML Ref.: 06TF054C)

Record of Borehole Sheets



Drawing C16-1 – Borehole Locations and Soil Strata



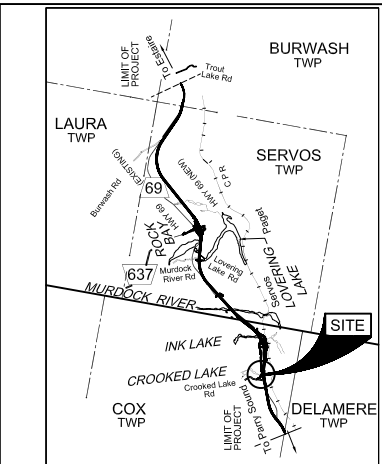
Proposed Crooked Lake Road South Connection
DATUM: Proposed Centreline

08+120.	C/L	D	HA	08+250.	C/L	D	HA
0 - 200	Dk Br/Blk Sa(y) Si Tps W Roots Moist			0 - 2.3	Blk Amor Peat Sat		
200 - 2.5	Br/Gry Cl(y) Si Tr Sa Mott Wet-Sat			2.3	NFP BR		
2.5 - 3.3	Gry/Br Sa Some Si Tr Cl Sat				Fr Wat @ 0		
3.3	NFP Bld						
	Fr Wat @ 100			08+250.	14.0	Lt C/L	HA
08+120.	13.0	Lt C/L	D+0.7 HA	0 - 2.3	Blk Amor Peat Sat		
0 - 200	Dk Br Sa(y) Si Tps W Roots Moist			2.3	NFP BR		
200 - 600	Br Sa(y) Si Tr Cl Moist				Fr Wat @ 0		
600	NFP Bld			08+250.	14.0	Rt C/L	HA
08+120.	13.0	Rt C/L	D-0.2 HA	0 - 2.5	Blk Amor Peat Sat		
0 - 200	Dk Br Sa(y) Si Tps W Roots Wet			2.5 - 3.4	Gr(y) Si(y) Cl Sat		
200 - 1.1	Br/Gry Cl(y) Si Mott Sat			3.4 - 3.9	Gry Sa Some Si Tr Gr Sat		
1.1 - 1.7	Gry/Br Sa Some Si Tr Cl Sat				Fr Wat @ 0		
1.7	NFP Bld			08+275.	C/L	D	HA
	Fr Wat @ 200			0	NFP BR		
08+160.	C/L	D	HA	08+300.	C/L	D	HA
0 - 300	Dk Br Sa(y) Si Tps W Roots Moist			0	NFP BR		
300	NFP BR			08+310.	C/L	D	HA
08+200.	C/L	D	HA	0	NFP BR		
0 - 400	Dk Br Sa(y) Si Tps W Roots Moist			08+310.	8.0	Lt C/L	D-0.1 HA
400	NFP BR			0	NFP BR		
08+200.	12.0	Lt C/L	D+0.6 HA	08+310.	8.0	Rt C/L	D+0.5 HA
0 - 100	Dk Br Sa(y) Si Tps W Roots Moist			0 - 100	Dk Br Sa(y) Si Tps W Roots Moist		
100	NFP BR			100	NFP BR		
08+200.	12.0	Rt C/L	D+/-0 HA	08+330.	C/L	D	HA
0 - 100	Dk Br Sa(y) Si Tps W Roots Moist			0	NFP BR		
100	NFP BR			08+330.	8.0	Lt C/L	D-0.2 HA
08+225.	C/L	D	HA	0	NFP BR		
0 - 400	Blk Amor Peat Wet-Sat			08+330.	8.0	Rt C/L	D-0.3 HA
400	NFP BR			0	NFP BR		
	Fr Wat @ 0						

RECORD OF BOREHOLE No C16-1										1 of 1		METRIC						
G.W.P. 5217-06-00			LOCATION Co-ords: 5 113 877.2 N ; 326 838.4 E Crooked Lake Road S. Conn., Sta. 8+240, o/s 13m Lt.			ORIGINATED BY M.R.												
DIST 54 HWY 69			BOREHOLE TYPE C.F.H.S.A. and Rotary Diamond Coring			COMPILED BY M.N.												
DATUM Geodetic			DATE February 18 & 19, 2010			CHECKED BY C.N.												
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	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											
191.1	Ground surface						20	40	60	80	100							
0.0	Ice																	
190.9 0.2	Peat, fine fibrous Dark brown		1	SS	8	▽*									543	Org. 32.6%		
			2	SS	WH**										352			
189.7 1.4	Organic silt Very loose Dark Wet brown		3	SS	WH												Org. 12.3%	
188.8 2.3	Migmatite bedrock Slightly weathered to unweathered High strength Good to excellent quality		4	RC NQ	REC 100%													RQD 100%
			5	RC NQ	REC 100%													RQD 88%
			6	RC NQ	REC 100%													RQD 100%
185.7 5.4	End of borehole																	
<p>* 2010 02 18</p> <p>▽ Water level observed during drilling</p> <p>WH** Denotes penetration due to weight of rods and hammer</p> <p>C.F.H.S.A. denotes Continuous Flight Hollow Stem Augers</p>																		

RECORD OF BOREHOLE No C16-2 1 of 1 METRIC																
G.W.P. 5217-06-00		LOCATION		Co-ords: 5 113 883.5 N ; 326 863.5 E Crooked Lake Road S. Conn., Sta. 8+240, o/s 12.5m Rt.				ORIGINATED BY M.R.								
DIST 54 HWY 69		BOREHOLE TYPE		Continuous Flight Hollow Stem Augers				COMPILED BY M.N.								
DATUM Geodetic		DATE		February 19, 2010				CHECKED BY C.N.								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	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									
191.0	Ground surface						20	40	60	80	100					
0.0	Ice															
190.8 0.2	Peat, fine fibrous Dark brown		1	SS	0										452	
			2	SS	WR**											
			3	SS	WR											
188.6 2.4	Organic silt Very loose Dark Wet brown		4	SS	WH***										337	
187.7 3.3	Gravelly sand, with silt Compact Grey Wet cobbles and boulders		5	SS	11										170	
186.7 4.3	End of borehole Refusal on probable bedrock															
* 2010 02 19  Water level observed during drilling  Water level measured after drilling WR** Denotes penetration due to weight of rods only WH*** Denotes penetration due to weight of rods and hammer																

RECORD OF BOREHOLE No C15-1										1 of 1		METRIC					
G.W.P. 5217-06-00			LOCATION Co-ords: 5 113 886.9 N ; 326 877.1 E Hwy 69, Sta. 13+206, o/s 48m Lt.			ORIGINATED BY M.R.											
DIST 54 HWY 69			BOREHOLE TYPE C.F.H.S.A. and Rotary Diamond Coring			COMPILED BY M.N.											
DATUM Geodetic			DATE February 17, 2010			CHECKED BY C.N.											
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	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 (%)
191.3 0.0	Ground surface Peat, fine fibrous Dark brown		1	SS	1		191									443 490 81 252 Org. 12.3%	
			2	SS	1		190										
			3	SS	WH**		189										
188.7 2.6	Organic silt Very loose Dark Wet brown		4	SS	WH		188										
187.8 3.5	Gravelly sand, some silt cobbles and boulders Compact to Grey Wet very dense	5	SS	WH	187												
		6	SS	71/15cm	186												
		7	RC NQ	-	185												
185.8 5.5	Migmatite bedrock Slightly weathered to unweathered High strength Good to excellent quality	8	RC NQ	REC 100%	184												
		9	RC NQ	REC 98%	183												
183.0 8.3	End of borehole Sample 6: Sampler bouncing * 2010 02 17 Water level observed during drilling WH** Denotes penetration due to weight of rods and hammer C.F.H.S.A. denotes Continuous Flight Hollow Stem Augers Sample 5 was combined with sample 3 from borehole C15-2 for testing	10	RC NQ	REC 83%													



LEGEND			
	Borehole		
	Dynamic Cone Penetration Test (Cone)		
	Borehole & Cone		
N	Blows/0.3m (Std. Pen Test, 475 J/blow)		
CONE	Blows/0.3m (60° Cone, 475 J/blow)		
WH	Penetration due to weight of hammer and rods		
WR	Penetration due to weight of Rods only		
W L	W L at time of investigation February 2010		
	Head		
	ARTESIAN WATER Encountered		
	PIEZOMETER		

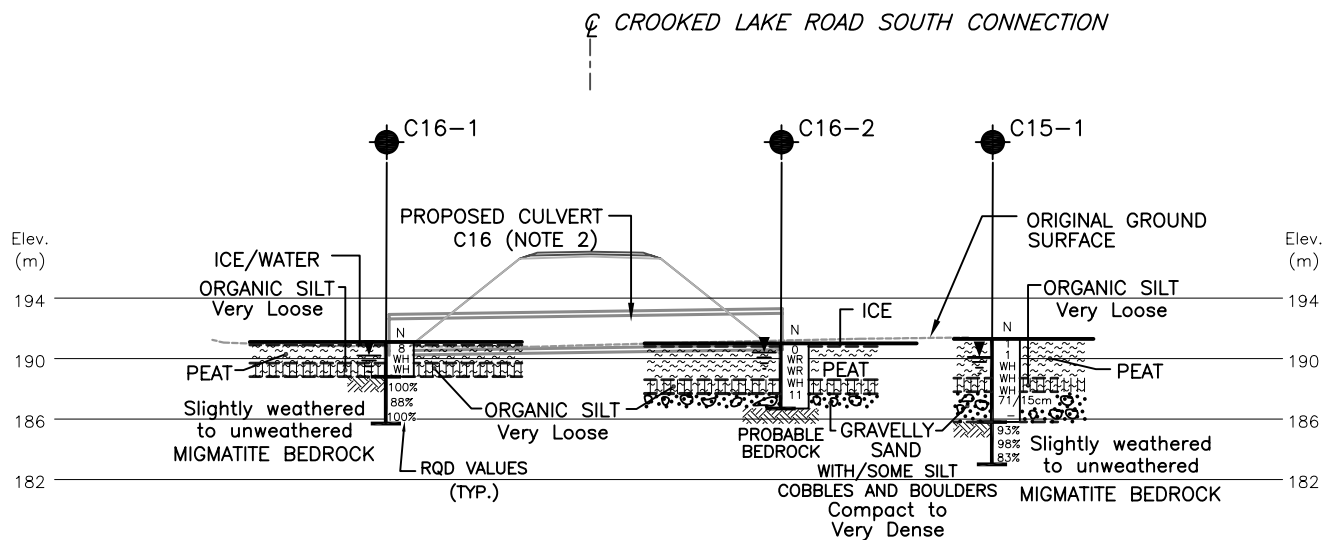
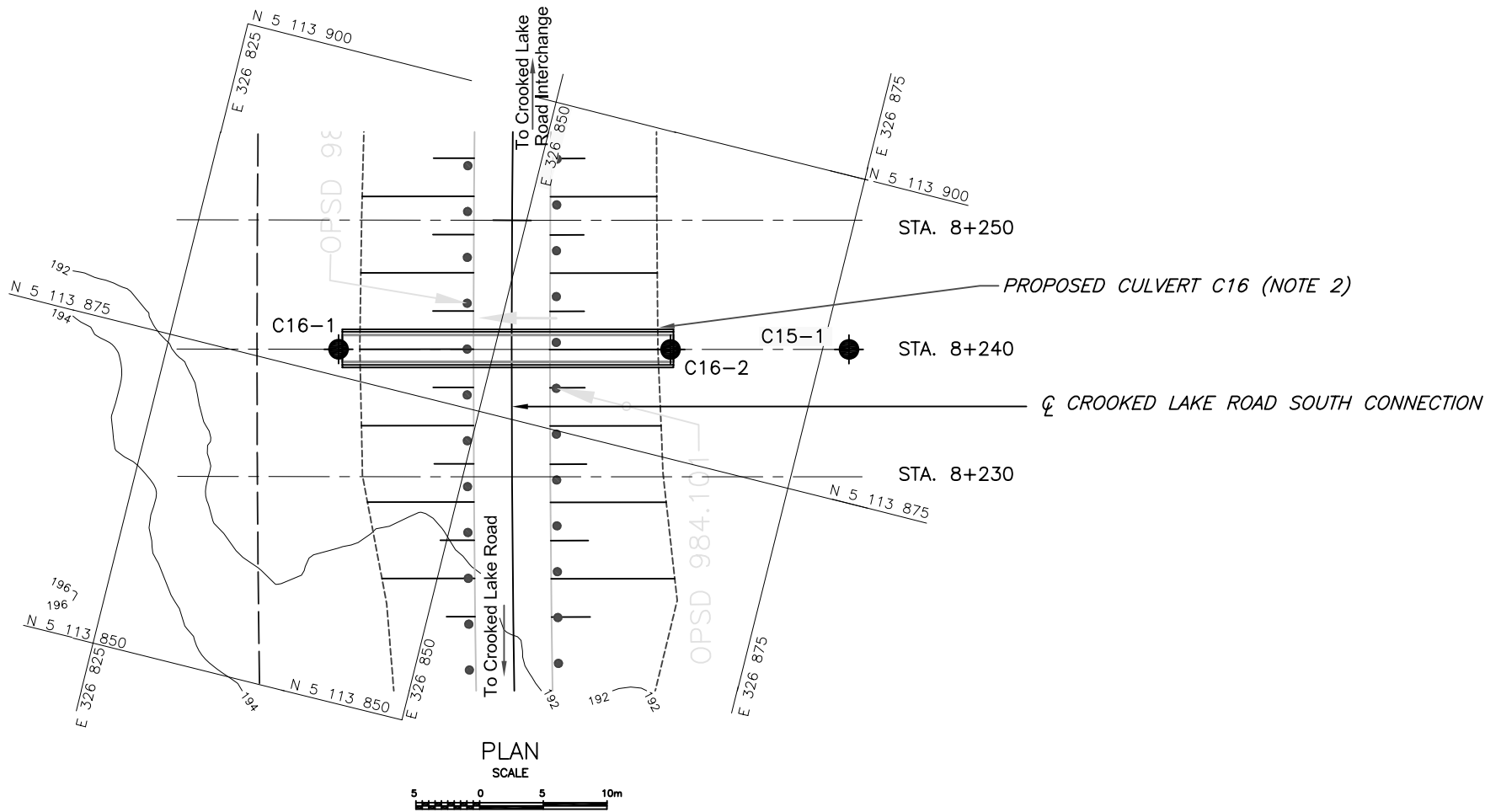
BH No	ELEVATION	NORTHINGS	EASTINGS
C16-1	191.1	5 113 877.2	326 838.4
C16-2	191.0	5 113 883.5	326 863.5
C15-1	191.3	5 113 886.9	326 877.1

(Legend Continues)

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

REVISIONS	DATE	BY	DESCRIPTION

Geocres No. 411-262			
HWY No 69	CHECKED MN	DATE AUG. 30, 2010	DIST Sudbury Area
SUBM'D	NA	CHECKED CN	APPROVED BRG
DRAWN	NA	CHECKED CN	APPROVED BRG



PROFILE \perp CULVERT STA. 8+240 (CROOKED LAKE ROAD SOUTH CONNECTION) (C16)

NOTES:

- DRAWING C16-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND RECORD OF BOREHOLE LOGS.
- THE CULVERT AT STA. 8+240 (CROOKED LAKE ROAD SOUTH CONNECTION) WAS DESIGNATED AS CULVERT C16 FOR THE INVESTIGATION.
- THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
- DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

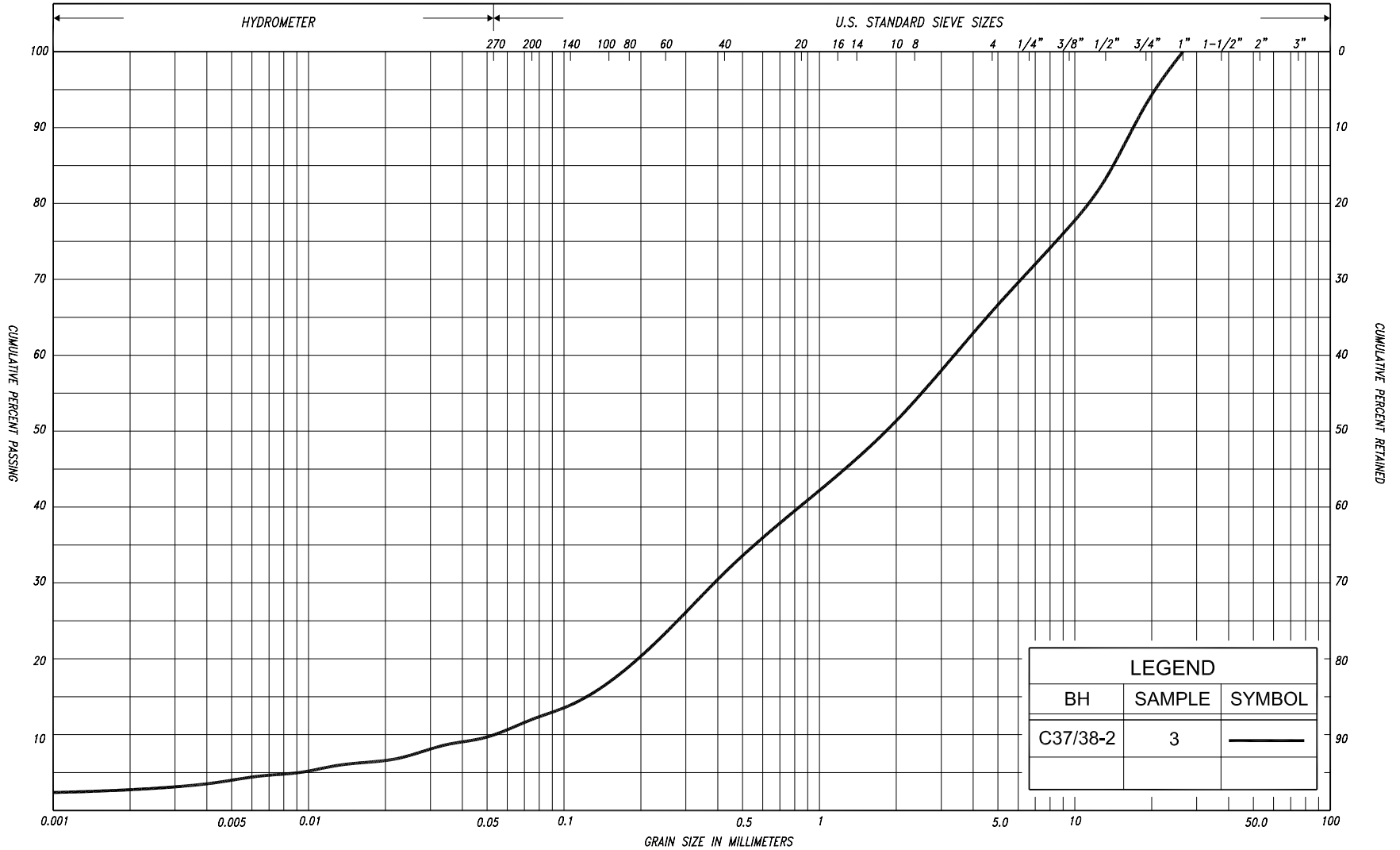
REF AECOM Drawings:
C3-HWY69-Base.dwg dated Jan. 15, 2010;
C3-Hwy69-Des.dwg dated April 15, 2010; Hwy 69 Servos - Cont 3 -Structural -PC Conc Box Culv Prof 10+100 10+140 12+750 13+206 CLRSC 8+240.dwg, dated April 23, 2010 and C3-Lidar-ctrs.dwg, dated May 14, 2008.



Culvert at Sta. 15+279.1 (SBL and NBL) (C37/38), Cox Township

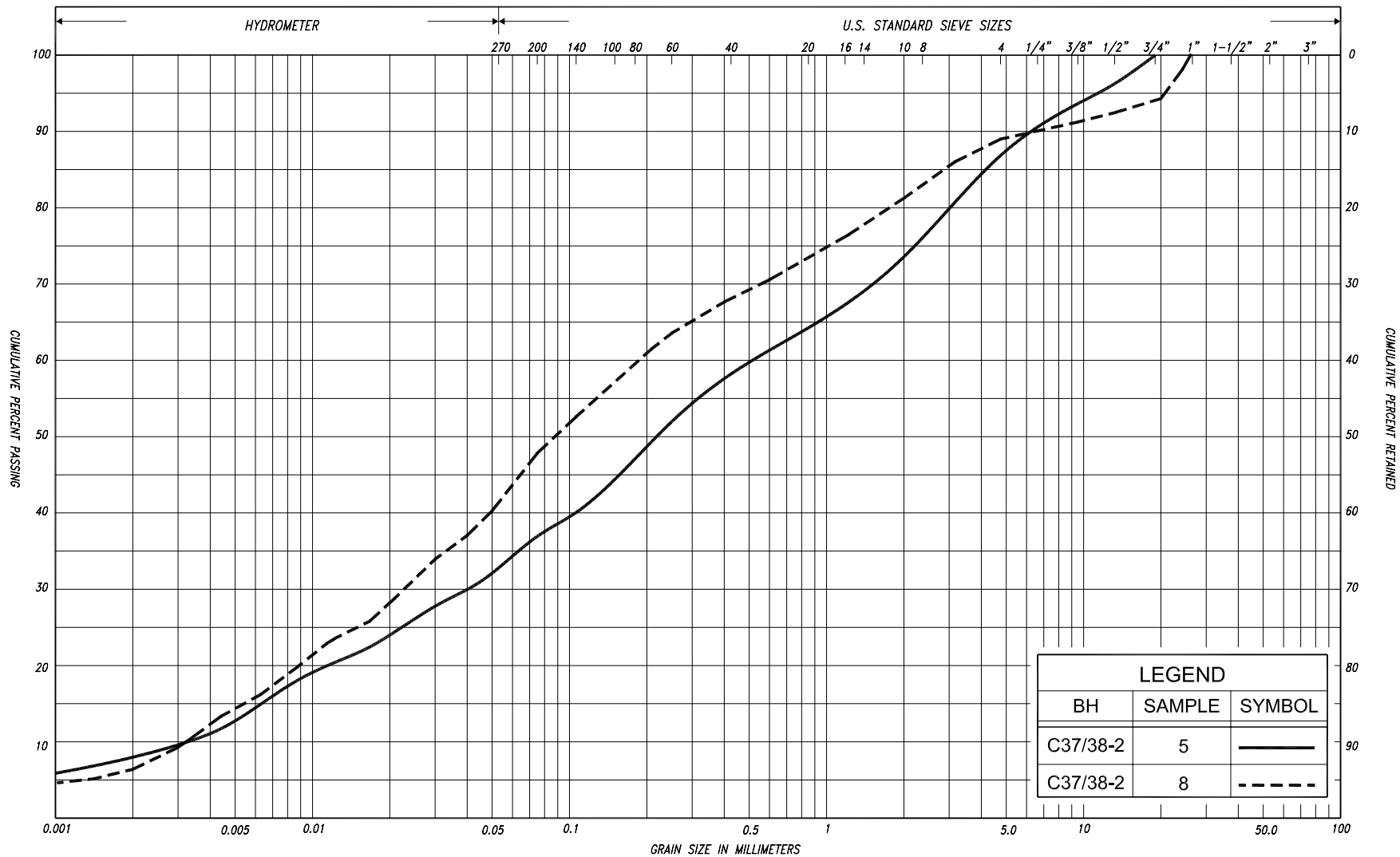
Figures C37/38-GS-1 and C37/38-GS-2 – Results of Grain Size Distribution Analyses
Record of Borehole Sheets

Drawing C37/38-1 – Borehole Locations and Soil Strata



LEGEND		
BH	SAMPLE	SYMBOL
C37/38-2	3	—

SILT & CLAY				FINE		MEDIUM		COARSE		GRAVEL			COBBLES	UNIFIED
				SAND										
CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	GRAVEL			COBBLES			M.I.T.	
	SILT			SAND										
CLAY		SILT		V. FINE	FINE	MED.	COARSE	GRAVEL						U.S. BUREAU
				SAND										



SILT & CLAY				FINE		MEDIUM		COARSE		GRAVEL			COBBLES	UNIFIED		
				SAND												
CLAY	FINE		MEDIUM		COARSE		FINE		MEDIUM		COARSE		GRAVEL		COBBLES	M.I.T.
	SILT															
CLAY			SILT			V. FINE		FINE	MED.	COARSE		GRAVEL				U.S. BUREAU
						SAND										

RECORD OF BOREHOLE No C37/38-1

1 of 1















METRIC

G.W.P. 5217-06-00 LOCATION Co-ords: 5 113 884.5 N ; 326 461.0 E
 DIST 54 HWY 69 BOREHOLE TYPE Rotary Diamond Coring and Wash Boring
 DATUM Geodetic DATE February 11 & 12, 2010

ORIGINATED BY M.R.

COMPILED BY M.N.

CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)		
								○ UNCONFINED		+ FIELD VANE								● QUICK TRIAXIAL		
197.8	Ground surface							20	40	60	80	100								
0.0	Silty sand organics		1	SS	7		197													
197.5	Loose Dark brown Wet (FILL)		2	SS	80/16cm		196													
0.3	Sand and gravel, some silt cobbles and boulders						195													
	Compact to Brown Moist very dense to wet						194													
	Grey		3	SS	25		193													
							192													
			4	SS	7		191													
							190													
			5	SS	50/10cm		189													
																				
188.7	End of borehole		8	SS	50/0cm															
9.1	Samples 2, 6, 7 & 8: Sampler bouncing																			
	Sample 4: Hydrostatic disturbance influenced the "N" value.																			
	* 2010 02 11																			
	 Water level observed during drilling																			

METRIC

Co-ords: 5 115 875.5 N ; 326 421.7 E

G.W.P. 5217-06-00 LOCATION Hwy 69, Sta. 15+279, o/s 11m Rt. ORIGINATED BY M.R.

DIST 54 HWY 69 BOREHOLE TYPE Wash Boring COMPILED BY M.N.

DATUM Geodetic DATE February 16, 2010 CHECKED BY C.N.

[illegible]

RECORD OF BOREHOLE No C37/38-3

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Co-ords: 5 115 861.0 N ; 326 358.1 E
Hwy 69, Sta. 15+310, o/s 47m Lt. ORIGINATED BY M.R.
DIST 54 HWY 69 BOREHOLE TYPE Rotary Diamond Coring and Wash Boring COMPILED BY M.N.
DATUM Geodetic DATE February 10, 2010 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE					w _p w w _L				
								● QUICK TRIAXIAL × LAB VANE									
198.9 0.0	Ground surface					▽*		20	40	60	80	100		20	40	60	GR SA SI CL
198.4 0.5	Ice																
	Water																
	Sand and gravel, some silt cobbles and boulders		1	RC NQ	-		198										
	Compact Brown/ Wet grey						197										
			2	SS	23		196										
			3	SS	19		195										
194.8 4.1	Migmatite bedrock						194										
	Slightly weathered with occasional highly weathered layers		4	RC NQ	REC 100%		193										
	Medium strength		5	RC NQ	REC 100%		192										
	Good to excellent quality		6	RC NQ	REC 100%												
191.7 7.2	End of borehole																
	Sample 2: Sampler bouncing																
	 * 2010 02 10																
	▽ Water level observed during drilling																

RECORD OF BOREHOLE No 605-6

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+262.5, o/s 41.0m Lt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY M.N.
 DATUM Geodetic DATE May 06, 2009 CHECKED BY C.N.

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	● QUICK TRIAXIAL	+	×	FIELD VANE	LAB VANE									
202.7 0.0						*		20	40	60	80	100										
202.5 0.2	Topsoil																					
202.3 0.4	Gravelly sand, trace silt organic inclusions cobbles																					
	Brown Moist																					
	End of borehole																					
	* Borehole dry																					

RECORD OF BOREHOLE No 605-7

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+265.5, o/s 4.0m Rt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY M.N.
DATUM Geodetic DATE May 06, 2009 CHECKED BY C.N.




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	● QUICK TRIAXIAL	+	×	FIELD VANE						LAB VANE		
203.0 0.0	Bedrock at surface							20	40	60	80	100		20	40	60				
	* Borehole dry																			

RECORD OF BOREHOLE No 605-8

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+262.5, o/s 41.0m Rt. CL Med. ORIGINATED BY K.H.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY G.D.
 DATUM Geodetic DATE March 20, 2008 CHECKED BY C.N.

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									
197.7	Ground surface					*											
0.0 197.4	Peat, fine fibrous															Frozen	
0.3	Dark brown																
197.0 0.7	Clayey silt cobbles and boulders						197										
	Dark Wet brown																
	End of borehole																
	Refusal on probable boulder																
			</														

RECORD OF BOREHOLE No 605-9

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+272 o/s 29.0m Lt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY M.N.
DATUM Geodetic DATE June 15, 2009 CHECKED BY C.N.


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					
201.5	Ground surface																
0.0	Bedrock at surface																
	* Borehole dry																

RECORD OF BOREHOLE No 605-10

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+275, o/s 18.8m Rt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY G.D.
DATUM Geodetic DATE April 09, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS *	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)			
197.4 0.0	Ground surface Sand and gravel cobbles and boulders Brown Moist					*	197													
196.2 1.2	End of borehole Refusal on probable boulder																			
	* Borehole dry																			

RECORD OF BOREHOLE No 605-11

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+287.5, o/s 29.0m Lt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY M.N.
DATUM Geodetic DATE May 06, 2009 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER * CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	*N VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)			GR	SA	SI	CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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201.1 0.0	Bedrock at surface																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

RECORD OF PENETRATION TEST No 605-12

1 of 1 **METRIC**

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+287.5, o/s 40.0m Rt. CL Med. ORIGINATED BY K.H.
 DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
 DATUM Geodetic DATE March 20, 2008 CHECKED BY C.N.

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		
203.9 0.0	Top of Snow Snow Probable peat Probable sand cobbles and boulders Compact to dense						20	40	60	80	100					
199.6 4.3	End of dynamic cone penetration test															

RECORD OF BOREHOLE No 605-13

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+290, o/s 4.0m Rt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY G.D.
DATUM Geodetic DATE April 11, 2008 CHECKED BY C.N.

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										
197.3	Ground surface							20	40	60	80	100						
0.0	Topsoil																	
197.1 0.2	Silty sand, trace gravel cobbles and boulders Brown Moist																	
196.1 1.2	Sandy silt, trace gravel cobbles and boulders Dense Grey Moist (TILL)		1	SS	16/10cm													
195.2 2.1	End of borehole Refusal on probable boulder <																	

RECORD OF BOREHOLE No 605-14

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+300, o/s 10.0m Lt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Power Auger COMPILED BY G.D.
 DATUM Geodetic DATE April 14, 2009 CHECKED BY C.N.

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	● QUICK TRIAXIAL	+	×	FIELD VANE LAB VANE					
205.3	Ground surface																
0.0	200mm topsoil over sand and gravel, trace silt																
204.9																	
0.4	Brown Moist (FILL)																
	End of borehole																
	Refusal on probable boulder																

RECORD OF BOREHOLE No 605-15

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+300, o/s 18.8m Rt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY G.D.
 DATUM Geodetic DATE April 09, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
								20	40	60	80	100						
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%)						
201.5	Ground surface						20	40	60	80	100	20	40	60	kN/m ³	GR SA SI CL		
0.0	Sand and gravel cobbles and boulders																	
	Brown Moist (FILL)						201											
200.0							200											
1.5	Sand and gravel cobbles and boulders		1	SS	21/8cm													
	Very dense Brown Wet																	
198.6																		
2.9	End of borehole																	
	Refusal on probable bedrock																	
	Sample 1: Sampler bouncing																	
	* 2008 04 09																	
	Water level observed during drilling																	
	Water level measured after drilling																	

RECORD OF BOREHOLE No 605-16

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+312.5, o/s 42.5m Lt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY M.N.
 DATUM Geodetic DATE May 06, 2009 CHECKED BY C.N.

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																	
200.7 0.0	Rockfill at surface							20	40	60	80	100					
	* Borehole dry																

RECORD OF BOREHOLE No N8-1 1 of 1 METRIC												
G.W.P. 5218-06-00		LOCATION		Hwy. 69 Sta. 15+345, o/s 50m Rt. Co-ords. 5 115 876 N; 326 481 E				ORIGINATED BY RE				
DIST 54 HWY 69		BOREHOLE TYPE		Casing and Washboring				COMPILED BY RE				
DATUM Geodetic		DATE		March 12, 2004				CHECKED BY				
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC NATURAL LIQUID UNIT WEIGHT REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	20 40 60 80 100	W _p W W _L	WATER CONTENT (%)	γ	GR SA SI CL
198.5	Ground Surface	△				▽*						
0.0	Mixture of clay, rootmat, cobbles and boulders											
198.3	(FILL)											
0.2	End of borehole											
	Refusal on probable bedrock											
	* 2004 03 12											
	▽ Water level observed during drilling											
	▽ Water level measured after drilling											

RECORD OF BOREHOLE No N8-2

1 of 1

METRIC

G.W.P. 5217-06-00

LOCATION

Hwy. 69 (New), Sta. 15+257.5, o/s 19.8m Rt.

Co-ords. 5 115 867 N; 326 447 E

ORIGINATED BY R.E.

DIST 54 HWY 69BOREHOLE TYPE Casing and Washboring

COMPILED BY R.E.

DATUM Geodetic

DATE March 12, 2004

CHECKED BY C.N.

[illegible]

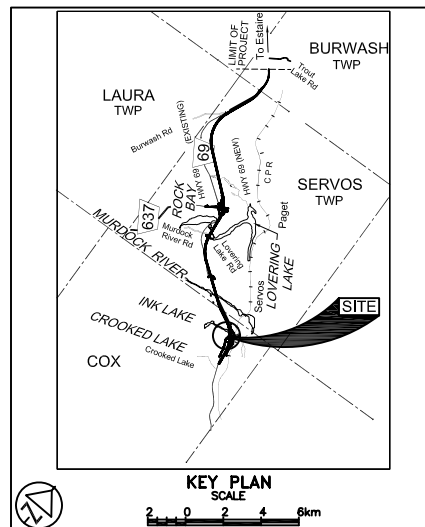
CONT No
GWP No 5217-06-00
GWP No 5379-02-00



CULVERT AT STA. 15+279.1
(SKEWED) (C37/38)
HIGHWAY 69 FOUR-LANING - COX TWP
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET

PMI Peto MacCallum Ltd.
CONSULTING ENGINEERS



LEGEND

- Borehole
- Dynamic Cone Penetration Test (Cone)
- Borehole & Cone
- N Blows/0.3m (Std. Pen Test, 475 J/blow)
- CONE Blows/0.3m (60° Cone, 475 J/blow)
- W L at time of investigation February 2010
- Head
- ARTESIAN WATER
- Encountered
- PIEZOMETER

BH No	ELEVATION	NORTHINGS	EASTINGS
C37/38-1	197.8	5 111 884.5	326 461.0
C37/38-2	198.5	5 115 875.5	326 421.7
C37/38-3	198.9	5 115 861.0	326 358.1

(Legend Continues)

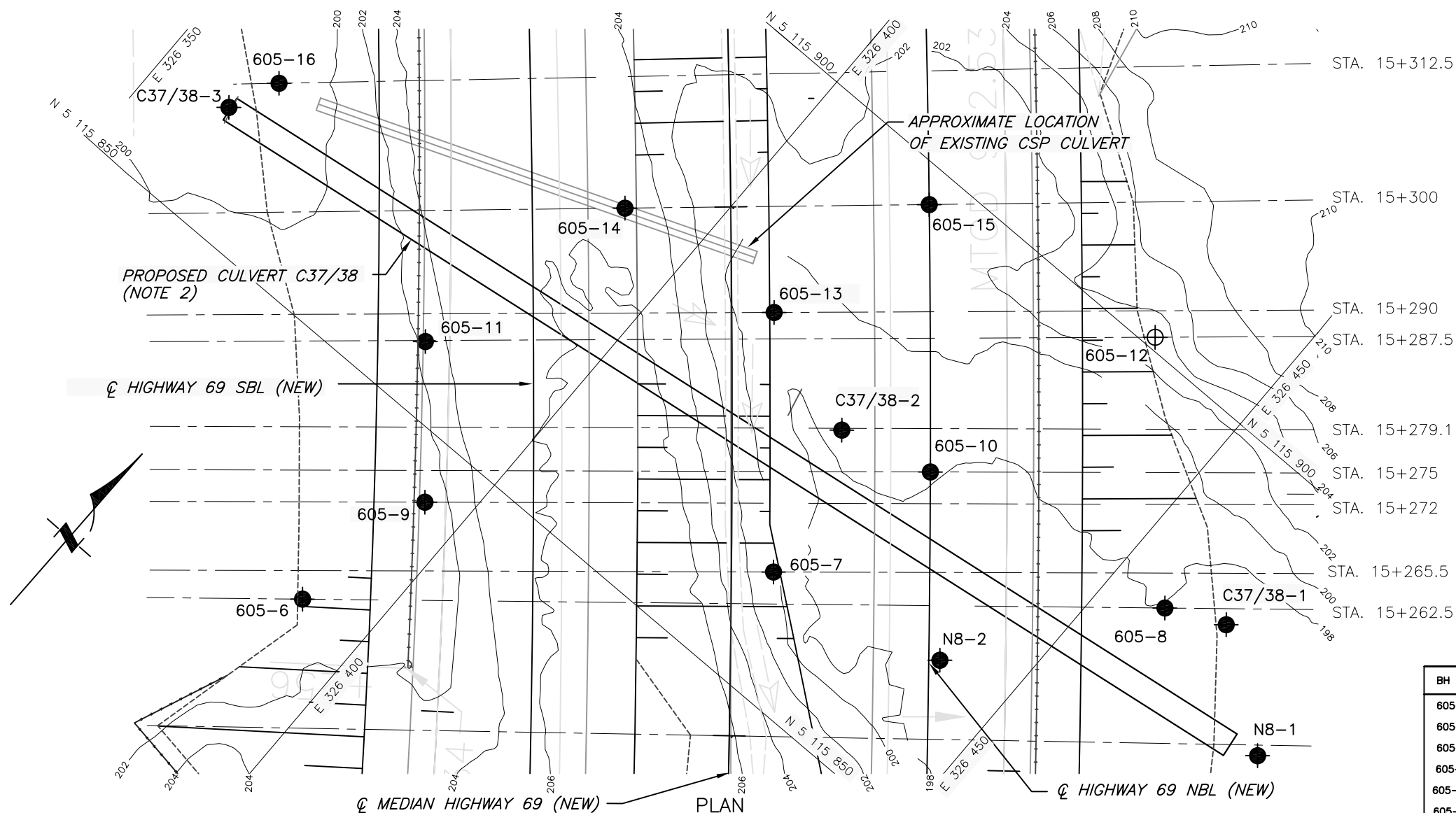
- NOTE -

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

REVISIONS	DATE	BY	DESCRIPTION

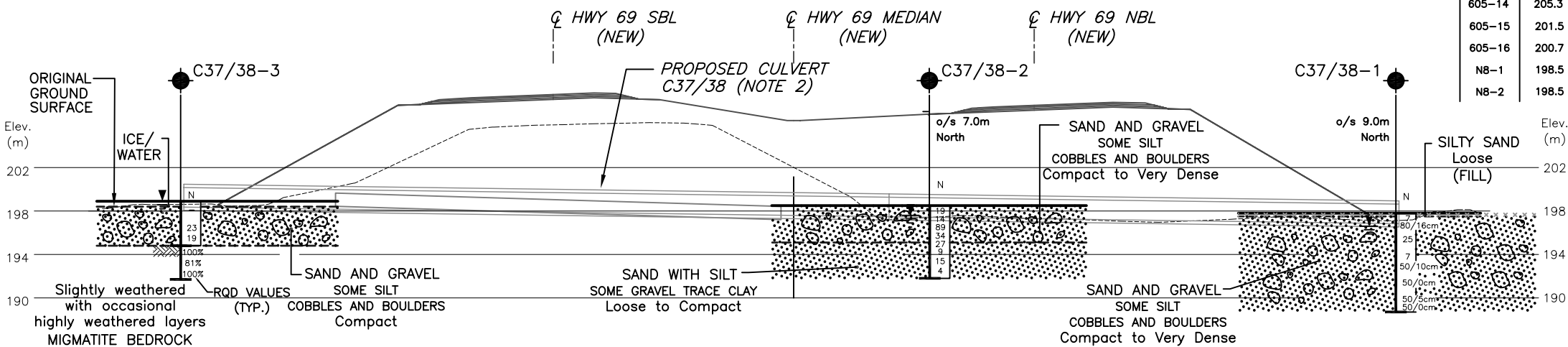
Geocres No. 411-262

HWY No	69	CHECKED	MN	DATE	AUG. 30, 2010	SITE	DIST Sudbury Area
SUBM'D	MN	CHECKED	CN	APPROVED	BRG	DWG	C37/38-1



(Legend Continued)

BH No	ELEVATION	STA COX TWP	o/s CL MED
605-6	202.7	15+262.5	41.0m Lt.
605-7	203.0	15+265.5	4.0m Rt.
605-8	197.7	15+262.5	41.0m Rt.
605-9	201.5	15+272	29.0m Lt.
605-10	197.4	15+275	18.8m Rt.
605-11	201.1	15+287.5	29.0m Lt.
605-12	203.9	15+287.5	40.0m Rt.
605-13	197.3	15+290	4.0m Rt.
605-14	205.3	15+300	10.0m Lt.
605-15	201.5	15+300	18.8m Rt.
605-16	200.7	15+312.5	42.5m Lt.
N8-1	198.5	15+249	50.0m Rt.
N8-2	198.5	15+257.5	19.8m Rt.

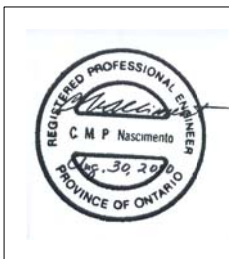


PROFILE Q CULVERT AT STA. 15+279.1 (SKEWED) (C37/38)

NOTES:

- DRAWING C37/38-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND RECORD OF BOREHOLE LOGS.
- THE CULVERT AT STA. 15+279.1 (SKEWED) WAS DESIGNATED AS CULVERT C37/38 FOR THE INVESTIGATION.
- THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
- DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.
- LOCATION OF CULVERT AT STA. 15+279.1 C37/38 WAS SHIFTED AFTER COMPLETION OF FIELD WORK.

REF AECOM Drawings:
C3-HWY69-Base.dwg dated Jan. 15, 2010;
C3-HWY69-Des.dwg dated April 15, 2010;
C3-Ink Lake Culv-15+279.1 Profile.dwg dated June 30, 2010 and
C3-Lidar-ctrs.dwg, dated May 14, 2008



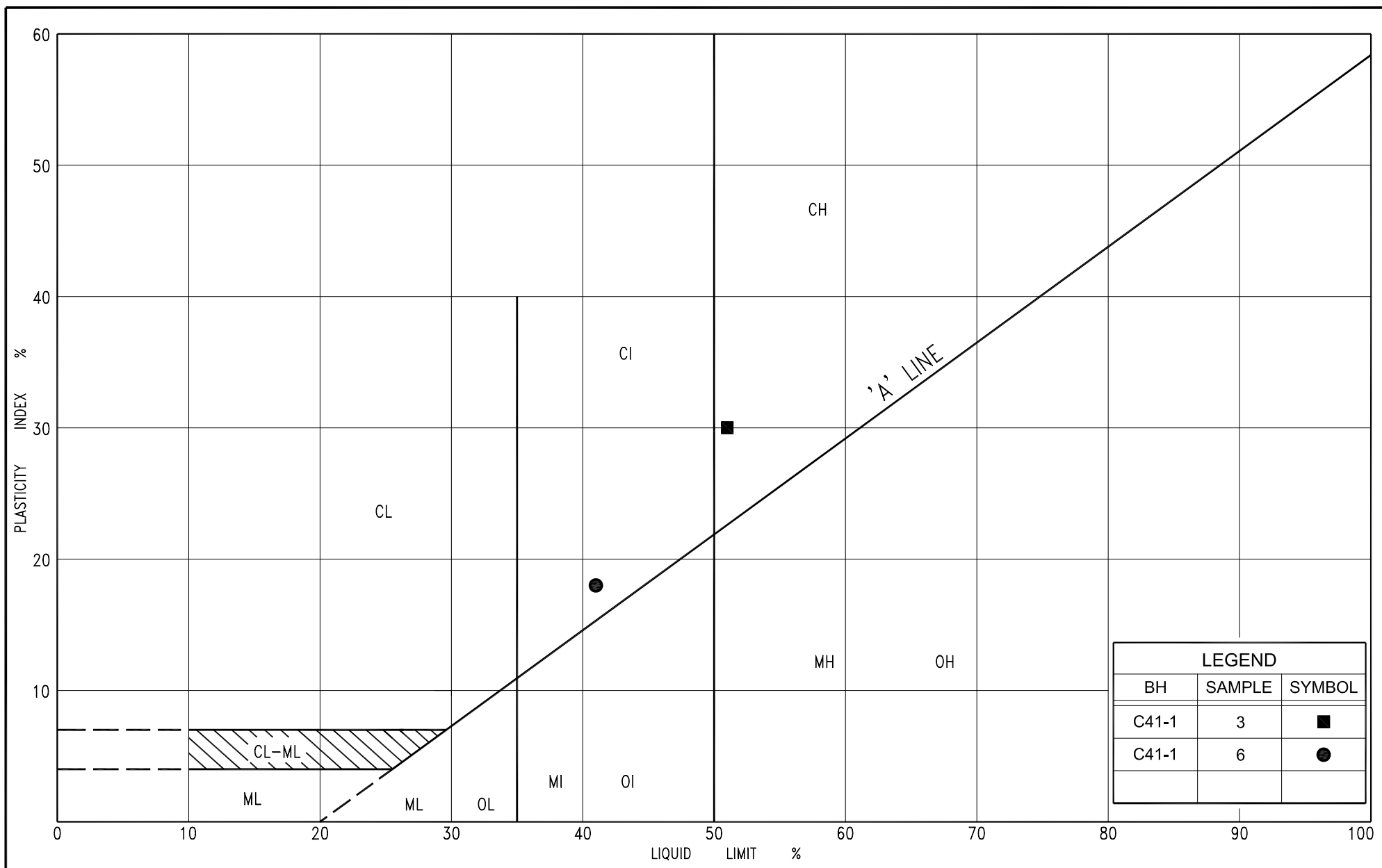
Culvert at Sta. 15+883 (SBL) (C41), Cox Township

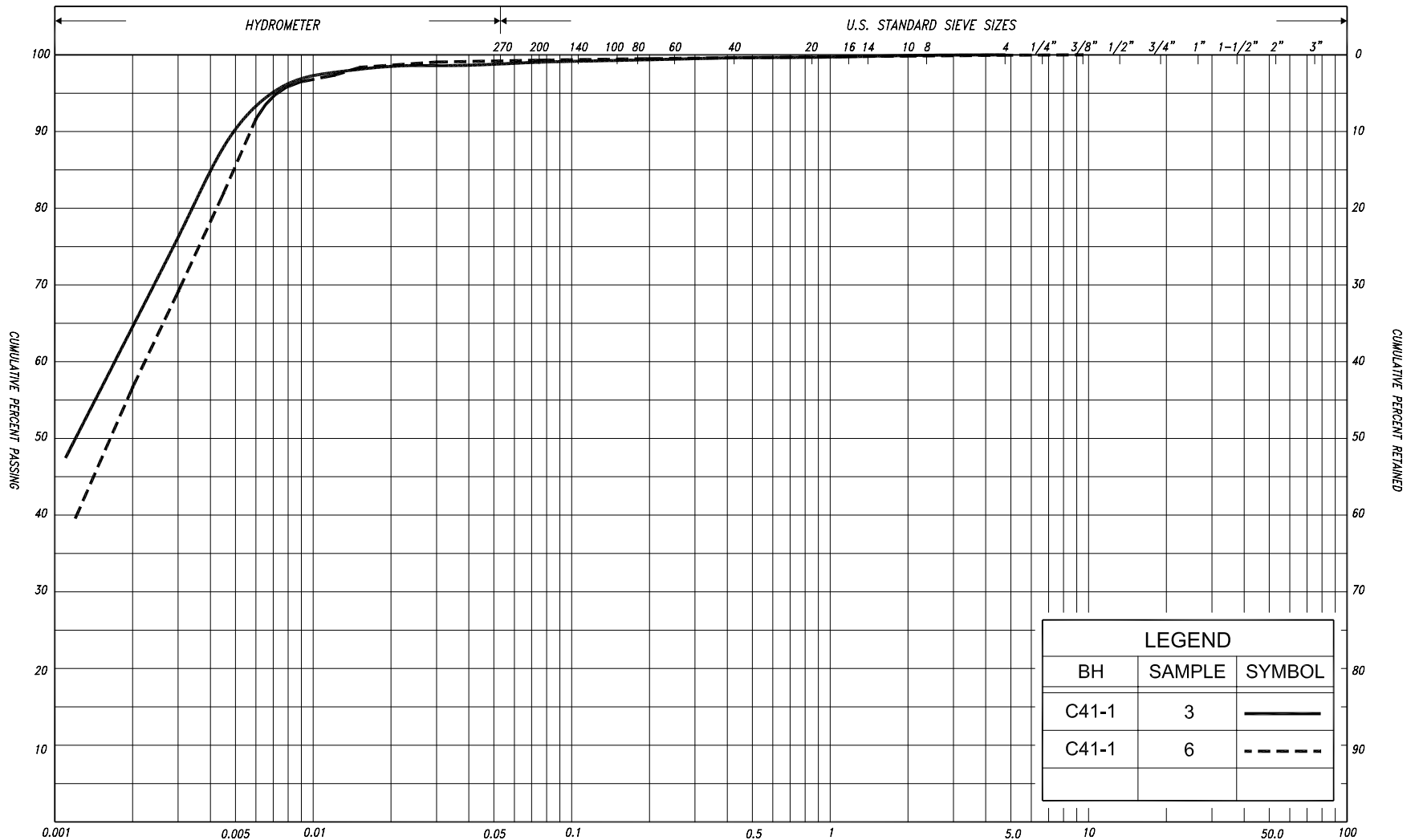
Figure C41-PC-1 – Result of Atterberg Limit Testing

Figure C41-GS-1 – Results of Grain Size Distribution Analyses

Record of Borehole Sheets

Drawing C41-1 – Borehole Locations and Soil Strata





SILT & CLAY				FINE		MEDIUM		COARSE	GRAVEL			COBBLES	UNIFIED			
				SAND												
CLAY	FINE		MEDIUM		COARSE		FINE		MEDIUM		COARSE		GRAVEL		COBBLES	M.I.T.
	SILT															
CLAY			SILT			V. FINE	FINE	MED.	COARSE		GRAVEL					U.S. BUREAU
						SAND										

GRAIN SIZE DISTRIBUTION

CLAY / SILTY CLAY, trace sand

FIG No. C41-GS-1

HWY: 69

G.W.P. No. 5217-06-00

RECORD OF BOREHOLE No C41-1										1 of 1	METRIC
G.W.P. 5217-06-00		LOCATION		Co-ords: 5 116 247.7 N ; 325 946.2 E Hwy 69, Sta. 15+885, o/s 5m Lt.				ORIGINATED BY F.P.			
DIST 54 HWY 69		BOREHOLE TYPE		C.F.S.S.A. and Rotary Diamond Coring				COMPILED BY M.N.			
DATUM Geodetic		DATE		June 17, 2009				CHECKED BY C.N.			

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 (%)					
205.7	Ground surface													
0.0	Topsoil		1	SS	2									
205.4	Clay, trace sand organics to 1.4m		2	SS	7									
0.3	Stiff to Mottled Moist firm grey/brown		3	SS	4									
203.4	Silty clay, trace sand		4	SS	3									
2.3	Firm Grey Wet		5	SS	1									
				FV										
	Soft		6	SS	2									
				FV										
199.9	Granitic Gneiss bedrock		7	RC NQ	REC 100%									
5.8	Slightly weathered		8	RC NQ	REC 100%									
	High strength		9	RC NQ	REC 100%									
	Excellent quality													
196.7	End of borehole													
9.0														

* 2009 06 17

▽ Water level observed during drilling

■ Penetrometer test

C.F.S.S.A. denotes Continuous Flight Solid Stem Augers

RECORD OF BOREHOLE No C41-2										1 of 1		METRIC					
G.W.P. 5217-06-00			LOCATION Co-ords: 5 116 213.8N ; 325 923.7 E Hwy 69, Sta. 15+888, o/s 46m Lt.			ORIGINATED BY F.P.											
DIST 54 HWY 69			BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring			COMPILED BY M.N.											
DATUM Geodetic			DATE June 17, 2009			CHECKED BY C.N.											
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	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										
206.0	Ground surface						20	40	60	80	100						
0.0	Peat, fine fibrous Dark brown		1	SS	1												
			2	SS	WR**												
204.2	Silty sand, some gravel cobbles		3	SS	6												
203.6	Loose Grey Wet		4	SS	8/15cm												
2.4	Biotite Gneiss bedrock Slightly weathered Medium strength Excellent quality		5	RC NQ	REC 100%												RQD 94%
			6	RC NQ	REC 100%												RQD 100%
			7	RC NQ	REC 97%												RQD 97%
200.4	End of borehole																
5.6	Sample 4: Sampler bouncing																
	* 2009 06 17																
	▽ Water level observed during drilling																
	WR** denotes penetration due to weight of rods only																
	C.F.S.S.A. denotes Continuous Flight Solid Stem Augers																

RECORD OF BOREHOLE No C41-3

1 of 1

METRIC

G.W.P. 5217-06-00	LOCATION
-------------------	----------

Co-ords: 5 116 235.5 N ; 325 939.3 E
Hwy 69, Sta. 15+885, o/s 19m Lt.

ORIGINATED BY F.P.

DIST 54 HWY 69 BOREHOLE

Continuous Flight Solid Stem Augers

COMPILED BY M.N.

DATUM Geodetic DATE

June 18, 2009

 CHECKED BY C.N.

[illegible]

RECORD OF BOREHOLE No 606-1

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+870, o/s 18.8m Lt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY G.D.
 DATUM Geodetic DATE November 13, 2007 CHECKED BY C.N.


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									
								20	40	60	80	100					
								20	40	60	80	100					

RECORD OF BOREHOLE No 606-2

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+870, o/s 18.8m Rt. CL Med. ORIGINATED BY N.L.B.
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY G.D.
 DATUM Geodetic DATE October 18, 2007 CHECKED BY C.N.

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																		
208.3 0.0	Ground Surface							20	40	60	80	100		20	40	60		
207.9 0.4	Topsoil						208											
207.4 0.9	Cobbles and boulders																	
	End of borehole Refusal on probable bedrock																	
	* Borehole dry																	

RECORD OF PENETRATION TEST No 606-3

1 of 1 **METRIC**

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+875, o/s 38.8m Lt. CL Med. ORIGINATED BY M.R.
 DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
 DATUM Geodetic DATE February 25, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100	W _p	W	W _L		
207.7 0.0	Ground Surface Probable peat ----- Probable silty clay																
205.3 2.4	End of dynamic cone penetration test Refusal on probable bedrock																

METRIC



+⁷, **×**⁵: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 606-5

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+875, o/s 31.0m Rt. CL Med. ORIGINATED BY N.L.B.
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY G.D.
 DATUM Geodetic DATE October 18, 2007 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS *	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					W _p W W _L				WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE													
212.0	Ground Surface							20	40	60	80	100		20	40	60		GR	SA	SI	CL
0.0	Topsoil																				
211.6																					
0.4	Cobbles and boulders																				
211.1																					
0.9	End of borehole Refusal on probable bedrock																				
	* Borehole dry																				

RECORD OF BOREHOLE No 606-6

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+900, o/s 18.8m Lt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY G.D.
DATUM Geodetic DATE November 13, 2007 CHECKED BY C.N.

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										
206.4	Ground Surface							20	40	60	80	100						
0.0	Peat, coarse fibrous Dark brown		1	CS	3	▽*	206											
205.9	Silty clay, trace sand layers of organic clay and amorphous peat to 1.8m Stiff Grey Moist to firm to wet						206											
0.5			2	SS	5		205											
				FV			204											
			3	SS	2		203											
				FV			203											
202.1	Clayey silt, trace sand Firm Grey Wet						202											
4.3			4	SS	2		201											
				FV			201											
			5	SS	2		200											
				FV			200											
199.1	Sand some gravel, trace silt Compact Grey Wet						199											
7.3			6	SS	21													
198.2	End of borehole Refusal on probable bedrock																	
8.2																		
	* 2007 11 13																	
	▽ Water level observed during drilling																	
	▽ Water level measured after drilling																	

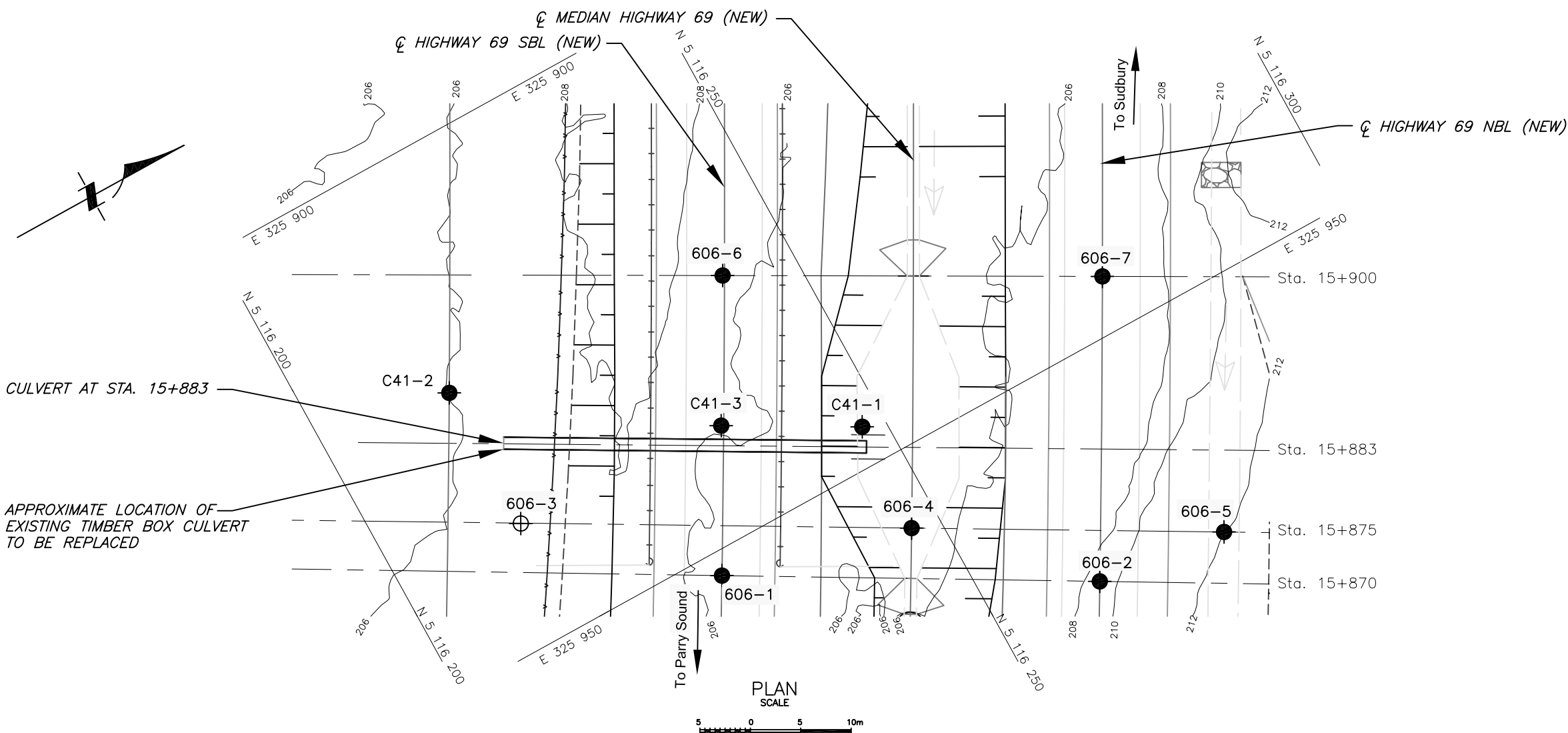
RECORD OF BOREHOLE No 606-7

1 of 1

METRIC

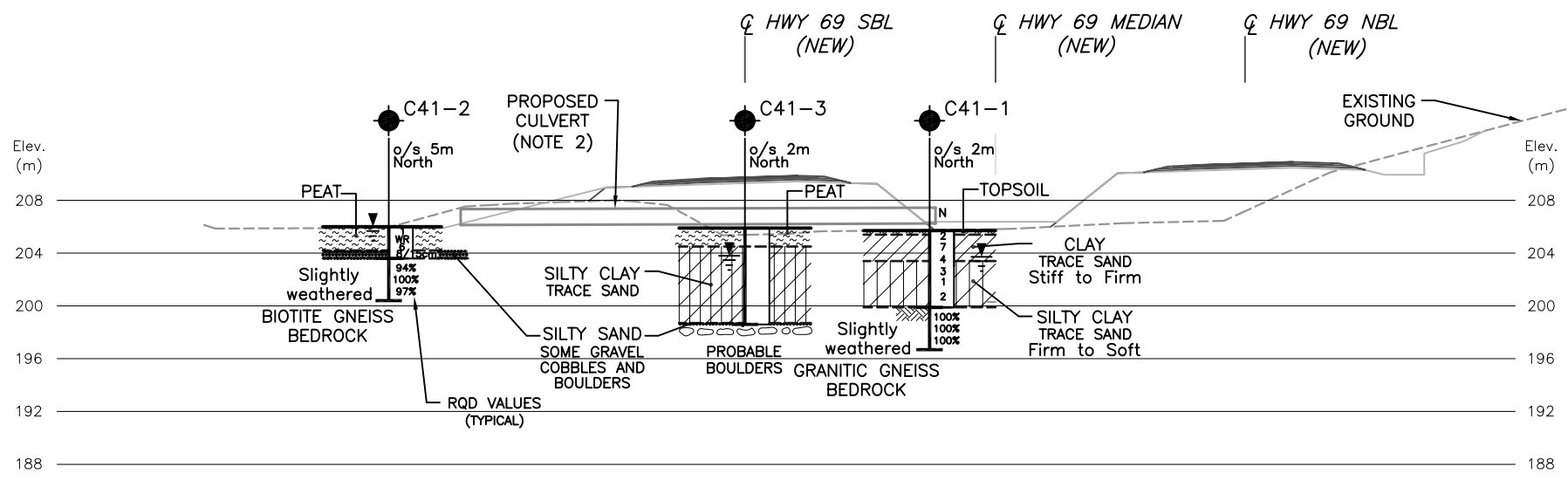
G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 15+900, o/s 18.8m Rt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY G.D.
 DATUM Geodetic DATE November 13, 2007 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS *	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100					w _p w w _L							
								SHEAR STRENGTH kPa					WATER CONTENT (%)							
								○ UNCONFINED + FIELD VANE												
206.4 0.0	Ground Surface																			
206.2 0.2	Topsoil		1	SS	12		206													
205.9 0.5	Silty sand, some gravel																			
	Compact Brown Moist																			
	Clay trace sand, trace gravel																			
	Stiff Brown Moist						205													
	Mottled grey/ brown		2	SS	9													1 2 42 55		
							204													
203.2 3.2	End of borehole		3	SS	10/5cm															
	Refusal on probable bedrock																			
	Sample 3: Sampler bouncing																			
	* Borehole dry																			
	■ Penetrometer test																			



CULVERT AT STA. 15+883

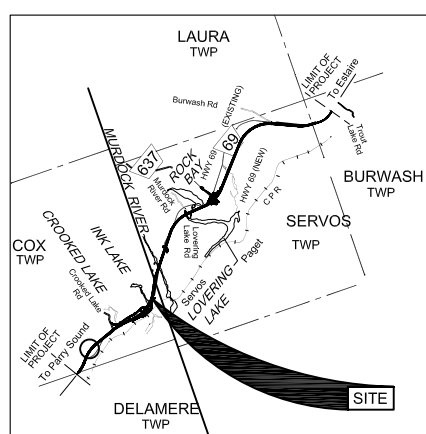
APPROXIMATE LOCATION OF EXISTING TIMBER BOX CULVERT TO BE REPLACED



PROFILE Q CULVERT AT STA. 15+883 (SBL) (C41)

- NOTES:
- DRAWING C41-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND RECORD OF BOREHOLE LOGS.
 - CULVERT AT STA. 15+883 WAS DESIGNATED AS CULVERT C41 FOR THE INVESTIGATION.
 - THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
 - DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

REF AECOM Drawings:
C3-HWY69-Base.dwg dated Jan. 15, 2010;
C3-HWY69-Des.dwg dated April 15, 2010;
Hwy69 Servos-Cont3-Culvert Profiles.dwg dated Jan. 21 2010 and C3-Lidar-ctrs.dwg dated May 14, 2008



KEY PLAN
SCALE
0 2 4 6km

- LEGEND
- Borehole
 - Dynamic Cone Penetration Test (Cone)
 - Borehole & Cone
 - N Blows/0.3m (Std. Pen Test, 475 J / blow)
 - CONE Blows/0.3m (60° Cone, 475 J / blow)
 - W L at time of investigation Oct 2006 Mar 2007
 - Head
 - ARTESIAN WATER Encountered
 - PIEZOMETER

BH No	ELEVATION	COORDINATES	
		NORTHINGS	EASTINGS
C41-1	205.7	5 116 247.7	325 946.2
C41-2	206.0	5 116 213.8	325 923.7
C41-3	205.9	5 116 235.5	325 939.3
BH No	ELEVATION	STA SERVOS TWP	o/s CL MED
606-1	206.0	15+870	18.8m Lt.
606-2	208.3	15+870	18.8m Rt.
606-3	207.7	15+875	38.8m Lt.
606-4	205.9	15+875	CL
606-5	212.0	15+875	31.0m Rt.
606-6	206.4	15+900	18.8m Lt.
606-7	206.4	15+900	18.8m Rt.

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



REVISIONS				
	DATE	BY	DESCRIPTION	

Geacres No. 411-262

HWY No 69				DIST Sudbury Area	
SUBM'D	MN	CHECKED CN	DATE AUG. 30, 2010	SITE	---
DRAWN	NA	CHECKED CN	APPROVED BRG	DWG	C41-1

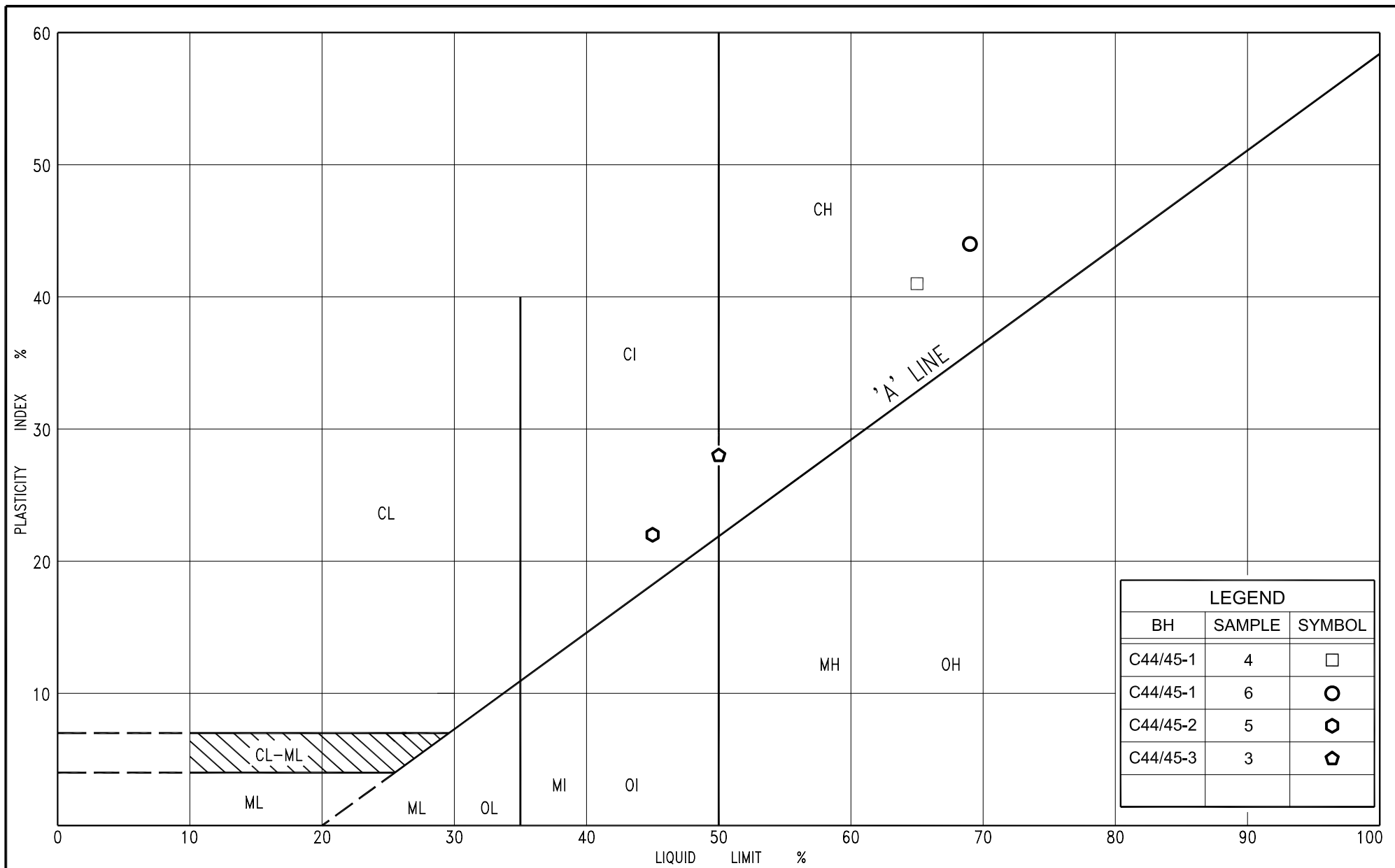
Culvert at Sta. 10+523 (SBL) (C44), Servos Township

Figure C44/45-PC-1 – Result of Atterberg Limit Testing

Figures C44/45-GS-1 to C44/45-GS-3 – Results of Grain Size Distribution Analyses

Record of Borehole Sheets

Drawing C44-1 – Borehole Locations and Soil Strata



Ministry of
Transportation
Ontario

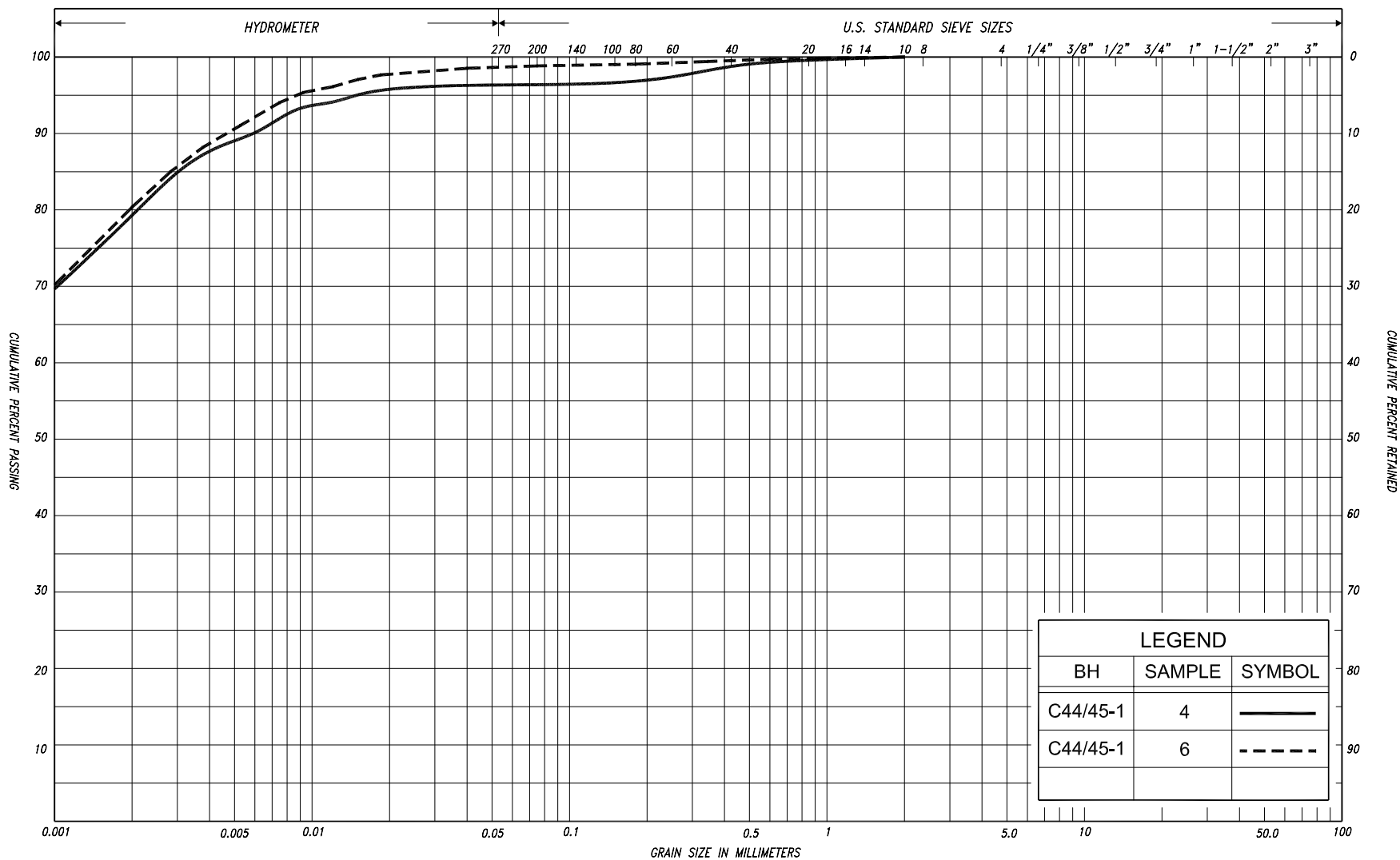
PLASTICITY CHART

CLAY/SILTY CLAY, trace sand

FIG No. C44/45-PC-1

HWY: 69

G.W.P. No. 5217-06-00



SILT & CLAY			FINE			MEDIUM			COARSE			GRAVEL			COBBLES	UNIFIED
CLAY			FINE			MEDIUM			COARSE			GRAVEL			COBBLES	M.I.T.
CLAY			SILT			SAND			GRAVEL			GRAVEL			U.S. BUREAU	

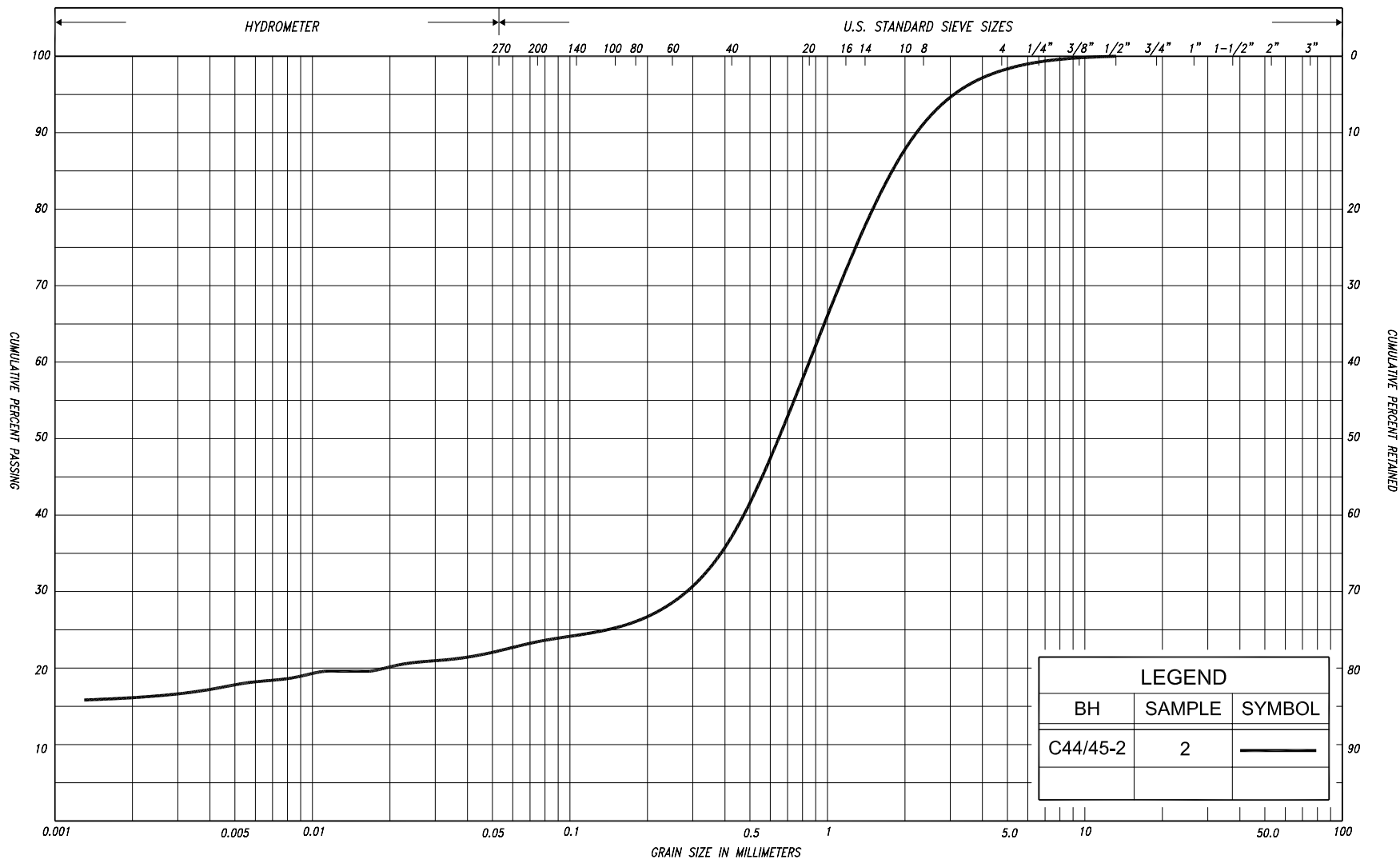
GRAIN SIZE DISTRIBUTION

CLAY, trace sand

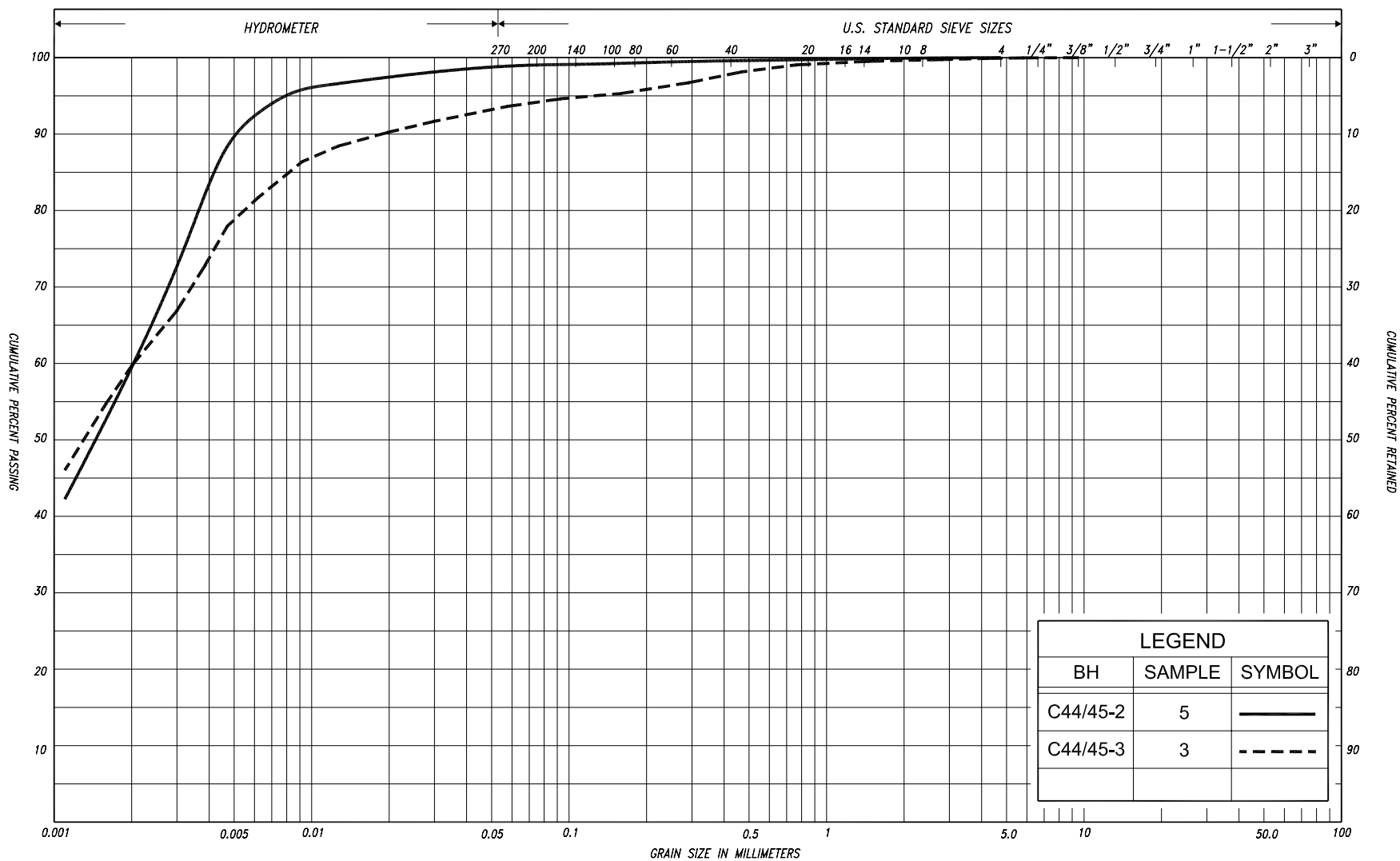
FIG No. C44/45-GS-1

HWY: 69

G.W.P. No. 5217-06-00



SILT & CLAY					FINE		MEDIUM		COARSE	GRAVEL			COBBLES	UNIFIED	
					SAND										
CLAY	FINE		MEDIUM	COARSE	FINE		MEDIUM		COARSE		GRAVEL			COBBLES	M.I.T.
	SILT						SAND								
CLAY		SILT			V. FINE	FINE	MED.	COARSE	GRAVEL						U.S. BUREAU
					SAND										



SILT & CLAY					FINE		MEDIUM		COARSE	GRAVEL			COB BLES	UNIFIED	
CLAY	FINE		MEDIUM		COARSE	SAND			GRAVEL			COBBLES	M.I.T.		
						FINE		MEDIUM						COARSE	
CLAY			SILT			V. FINE	FINE	MED.	COARSE	GRAVEL					U.S. BUREAU
						SAND									

RECORD OF BOREHOLE No C44/45-1

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Co-ords: 5 116 745.1 N ; 325 044.5 E
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers ORIGINATED BY M.R.
DATUM Geodetic DATE February 10, 2010 COMPILED BY M.N.
CHECKED BY C.N.

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION			STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					w _p	w			w _L
204.8	Ground surface								20 40 60 80 100										
0.0	Silty sand								○ UNCONFINED + FIELD VANE										
	Loose Dark brown Moist to wet				1	SS	5	▼* ▽*	● QUICK TRIAXIAL × LAB VANE										
203.9	(FILL)								20 40 60 80 100										
0.9	Peat, fine fibrous				2	SS	4												
203.6	Dark brown																		
1.2	Organic silty clay																		
203.2	Soft to firm Dark grey Wet				3	SS	9												
1.6	Sand, some silt																		
202.4	trace clay, trace gravel																		
2.4	Loose Dark brown Wet				4	SS	1												
	Clay, trace sand																		
	Soft to firm Brown Wet				5	SS	WH**												
						FV													
	Mottled grey																		
					6	SS	WH												
199.3						FV													
5.5	Silty clay, trace sand																		
	Firm Grey Wet																		
					7	SS	WH												
197.3	Sand and gravel																		
7.5	trace silt																		
	Compact Brown Wet				8	SS	15												
195.5																			
9.3	End of borehole																		
	Refusal on probable bedrock																		
	* 2010 02 10																		
	▽ Water level observed during drilling																		
	▼ Water level measured after drilling																		
	WH** denotes penetration due to weight of rods and hammer																		

* 2010 02 10

▽ Water level observed during drilling

▼ Water level measured after drilling

WH** denotes penetration due to weight of rods and hammer

+⁷, X⁵: Numbers refer to Sensitivity

20
15—5
10
(%) STRAIN AT FAILURE

METRIC

Co-ords: 5 116 765.6 N ; 325 058.9 E

G.W.P. 5217-06-00

LOCATION

Hwy 69, Sta. 10+523 CL

ORIGINATED BY M.R.

DIST 54

HWY 69

BOREHOLE

Continuous Flight Hollow Stem Augers














COMPILED BY M.N.

DATUM Geodetic

DATE _____

February 09, 2010

CHECKED BY C.N.

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION			STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					w _p	w		w _L	GR	SA	SI	CL
									○ UNCONFINED + FIELD VANE						WATER CONTENT (%)							
204.7 0.0	Ground surface				1	SS	2	 *  *														
204.2 0.5	Peat, fine fibrous				2	SS	9															
	Dark brown																					
	Sand, some clay trace silt, trace gravel																					
203.3 1.4	Loose Brown Wet				3	SS	1															
	Clay, trace sand																					
	Firm Mottled Wet grey/brown					FV																
	____ ____ ____ ____																					
	Reddish brown layers				4	SS	WH**															
						FV																
																						
200.2 4.5	Silty clay, trace sand				5	SS	WH															
	Firm Grey Wet					FV																
																						
198.5 6.2	Sand some silt, some gravel				6	SS	2															
198.1 6.6	Very loose Brown Wet																					
End of borehole																						
Refusal on probable bedrock																						
Sample 6: Sampler bouncing																						
* 2010 02 10																						
 Water level observed during drilling																						
 Water level measured after drilling																						
WH** denotes penetration due to weight of rods and hammer																						

METRIC

G.W.P. <u>5217-06-00</u>	LOCATION <u>Co-ords: 5 116 796.0 N ; 325 080.4 E Hwy 69, Sta. 10+523, o/s 37m Rt.</u>	ORIGINATED BY <u>M.R.</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>C.F.H.S.A. and Rotary Diamond Coring</u>	COMPILED BY <u>M.N.</u>
DATUM <u>Geodetic</u>	DATE <u>February 09, 2010</u>	CHECKED BY <u>C.N.</u>

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)									
ELEV DEPTH	DESCRIPTION			STRAT PLOT	NUMBER	TYPE			"N" VALUES	20 40 60 80 100					w _p	w		w _L	GR	SA	SI	CL					
										SHEAR STRENGTH kPa													WATER CONTENT (%)				
										○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE																	
204.7	Ground surface							▽*																			
0.0	Peat, fine fibrous																										
0.2	Dark brown																										
0.2	Sandy silt, trace clay				1	SS	6																				
0.4	Loose Brown Moist																										
0.7	Clayey silt, trace sand				2	SS	4																				
203.3	Firm Mottled Moist brown/grey																										
1.4	Silty clay, trace sand																										
	Firm Brown/ grey Moist to wet				3	SS	2																				
						FV																					
	Clay, trace sand layers																										
				4	SS	WH**																					
					FV																						
	sand layers cobbles																										
198.1				6	SS	WH																					
6.6	Syenite bedrock			7	RC	REC 100%																					
	Slightly weathered																										
	High strength			8	RC NQ	REC 100%																					
	Good to excellent quality																										
				9	RC NQ	REC 100%																					
	Poor quality																										
194.9				10	RC NQ	REC 100%																					
9.8	End of borehole																										
	Sample 6: Sampler bouncing																										
	* 2010 02 09																										
	▽ Water level observed during drilling																										
	WH** denotes penetration due to weight of rods and hammer																										
	C.F.H.S.A. denotes Continuous Flight Hollow Stem Augers																										

METRIC

+⁷, **×**⁵: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 607-7

1 of 1

METRIC

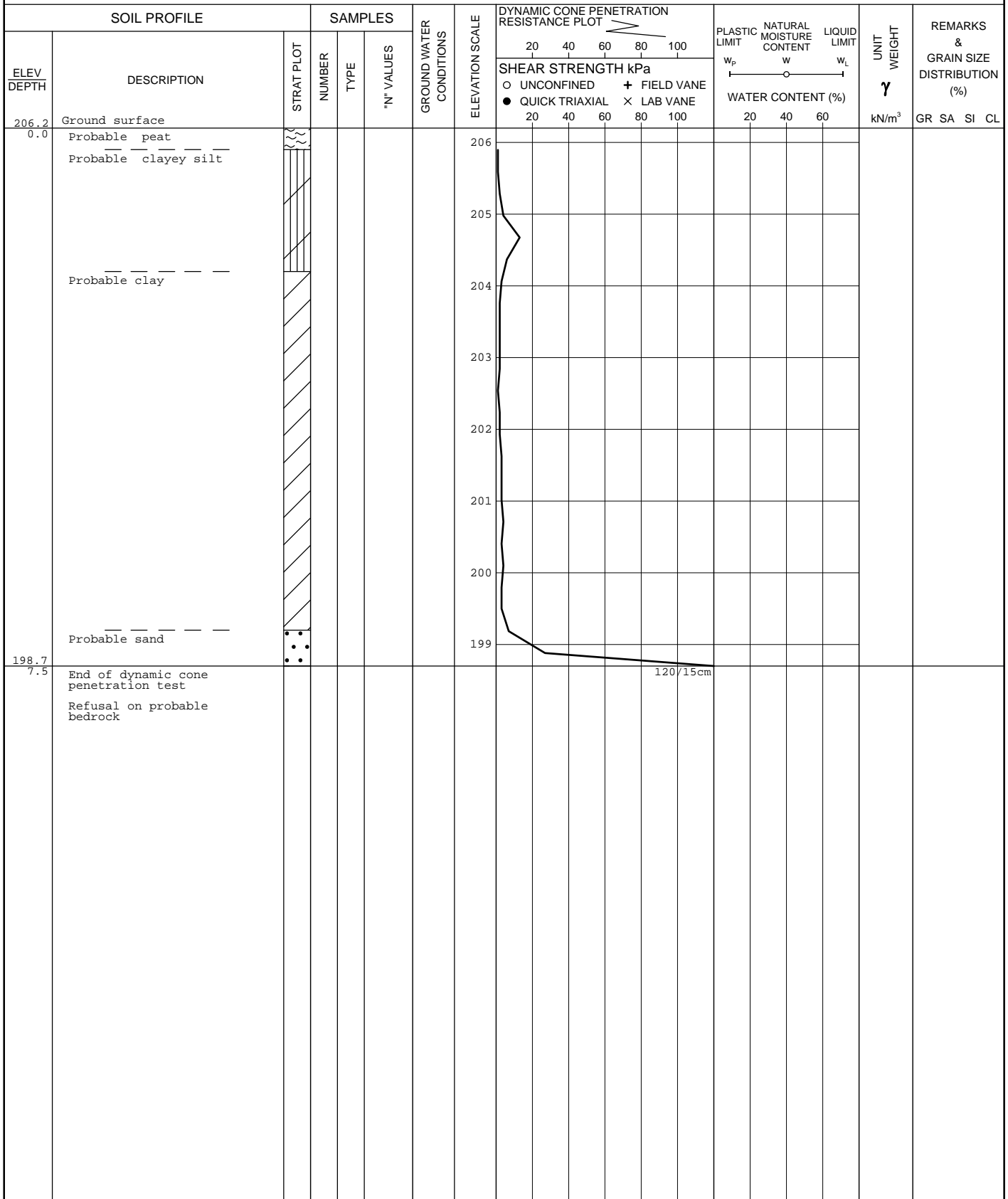
G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+500, 26.7m Rt. CL Med. ORIGINATED BY N.L.B.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.S.B.
 DATUM Geodetic DATE February 27, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					W _p W W _L							
								○ UNCONFINED + FIELD VANE					○ UNCONFINED + FIELD VANE							
								● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%)							
205.8	Ground surface																			
0.0	Peat, coarse fibrous																			
205.6	Dark brown		1	SS	3															
205.2	Sand, some silt																			
0.6	Very loose Brown Wet																			
	Clayey silt, some sand		2	SS	11															
	layers of sand																			
204.2	Stiff Brown Moist																			
1.6	Silty clay, trace sand		3	SS	8															
	Firm Mottled Moist																			
	brown/grey																			
	Soft Grey Wet																			
			4	SS	2															
				FV																
			5	SS	WH**															
				FV																
199.6	End of borehole		6	SS	25/3cm															
6.2																				
	Sample 6: Sampler bouncing																			
	* 2008 02 27																			
	▽ Water level observed during drilling																			
	WH** Penetration due to the weight of rods and hammer																			

RECORD OF PENETRATION TEST No 607-8

1 of 1 **METRIC**

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+512.5, o/s 27.8m Lt. CL Med. ORIGINATED BY M.R.
 DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY N.S.B.
 DATUM Geodetic DATE March 05, 2008 CHECKED BY C.N.



METRIC

+⁷, ×⁵: Numbers refer to Sensitivity

20
15 — ○ — 5
10

(%) STRAIN AT FAILURE

RECORD OF PENETRATION TEST No 607-10


1 of 1 **METRIC**

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+512.5, o/s 35.4m Rt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY N.S.B.
 DATUM Geodetic DATE March 04, 2008 CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100	W _p	W	W _L		
206.6 0.0	Ground surface Probable peat Probable clayey silt						206										
	End of dynamic cone penetration test Refusal on probable bedrock																

METRIC

+⁷, ×⁵: Numbers refer to Sensitivity



(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 607-12

1 of 2

METRIC



G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+525, o/s 27.1m Rt. CL Med. ORIGINATED BY N.L.B.
DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE February 26, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			*GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		W _p	W	W _L		
205.0	Ground surface							20 40 60 80 100						
0.0 204.7	Peat, coarse fibrous Black		1	SS	6			20 40 60 80 100						
0.3 204.4	Silty sand organic inclusions													
0.6	Loose Grey Wet Clayey silt, trace sand layers of sand to 1.5m Stiff Brown Moist to firm		2	SS	15									0 71 10 19
			3	SS	4									
				FV										
202.3	Clay, trace sand													
2.7	Firm Grey/ Wet brownish red		4	SS	WH**									
				FV										
	Grey		5	SS	WH									0 3 27 70
				FV										
	thin layers of silt		6	SS	1									
				FV										
			7	SS	1									
				FV										
195.9	Sand, some silt trace gravel, trace clay Very loose Grey Wet		8	SS	3									10 62 19 9
9.1														
	silty clay pockets		9	SS	3									
193.7	End of borehole													
11.3	Probable sand Loose to compact													
191.1														
13.9	End of dynamic cone penetration test Refusal on probable bedrock													

Cont'd

RECORD OF BOREHOLE No 607-12 2 of 2 METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+525, o/s 27.1m Rt. CL Med. ORIGINATED BY N.L.B.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Dynamic Cone Penetration Test COMPILED BY G.D.
 DATUM Geodetic DATE February 26, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100	W _p	W	W _L		
190.0	* 2008 02 26  Water level observed during drilling  Water level measured after drilling WH** Denotes penetration due to weight of rods and hammer *** C.F.S.S.A. denotes Continuous Flight Solid Stem Augers																

RECORD OF BOREHOLE No 607-13

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+537.5, o/s 28.0m Lt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.S.B.
 DATUM Geodetic DATE March 05, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT							PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							WATER CONTENT (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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204.8	Ground surface							20	40	60	80	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

RECORD OF PENETRATION TEST No 607-14 1 of 1 **METRIC**

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+537.5, o/s 9.0m Rt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY N.S.B.
 DATUM Geodetic DATE March 05, 2008 CHECKED BY C.N.

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							
204.7 0.0	Ground surface Probable peat Probable clayey silt														
201.7 3.0	End of dynamic cone penetration test Refusal on probable bedrock														

RECORD OF PENETRATION TEST No 607-15

1 of 1 **METRIC**

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+537.5, o/s 27.6m Rt. CL Med. ORIGINATED BY N.L.B.
DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE February 26, 2008 CHECKED BY C.N.

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							
204.8 0.0	Ground surface							20	40	60	80	100			
	Probable peat							20	40	60	80	100			
	Probable clayey silt														
	Probable clay														

RECORD OF BOREHOLE No 607-16

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+537.5, o/s 45.2m Rt. CL Med. ORIGINATED BY N.L.B.
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY G.D.
DATUM Geodetic DATE February 26, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
								20	40	60	80	100					
								20	40	60	80	100					
204.6	Ground surface																
0.0	Peat, coarse fibrous		1	CS	-												
204.1	Dark brown						204										
0.5	Organic clay some silt, trace sand		2	SS	4												
	Firm Black/ Moist grey																
202.9	Clay, trace sand organics to 2.4 m		3	SS	2		203										
1.7	Stiff Brown/ Moist grey			FV							8						
	Firm Grey Wet						202										
			4	SS	1		201										0 1 27 72
				FV					6								
							200										
			5	SS	1												
							199										
			6	SS	15/5cm		198										
197.3	End of borehole																
7.3	Refusal on probable bedrock																

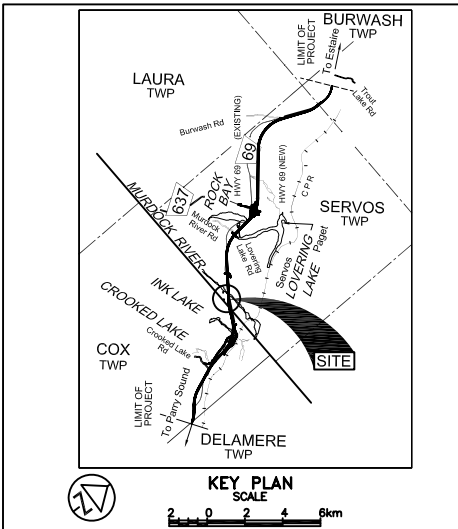
RECORD OF BOREHOLE No N10-2

1 of 1

METRIC

G.W.P. 5379-02-00 LOCATION Hwy. 69 (New), Sta. 10+531, o/s 6.0m Lt.
Co-ords. 5 116 766 N; 325 050 E ORIGINATED BY M.R.
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY M.R.
DATUM Geodetic DATE March 13, 2004 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE								
204.8	Ground Surface															
0.0	Peat, fine fibrous															
204.5	Dark brown															
0.3	Clay, trace sand															
	Stiff Reddish Moist brown to grey															
			1	SS	5											
201.8	Sand, with gravel, trace silt, trace clay															
3.0	Compact Brown Wet		2	SS	18											



LEGEND

Borehole

Dynamic Cone Penetration Test (Cone)

Borehole & Cone

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

CONE Blows/0.3m (60° Cone, 475 J/blow)

WH Penetration due to weight of hammer and rods

WL at time of investigation February 2010

Head

ARTESIAN WATER Encountered

PIEZOMETER

BH No	ELEVATION	COORDINATES	
		NORTHINGS	EASTINGS
C44/45-1	204.8	5 116 745.1	325 044.5
C44/45-2	204.7	5 116 765.6	325 058.9
C44/45-3	204.7	5 116 796.0	325 080.4

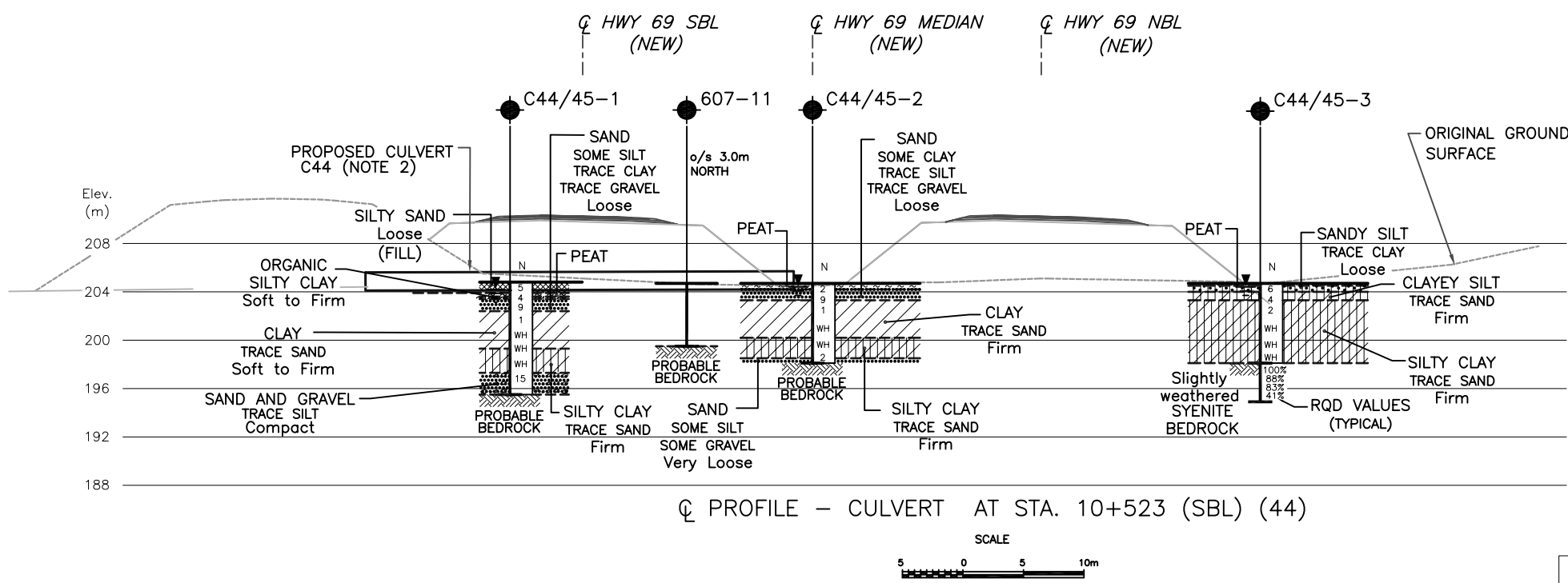
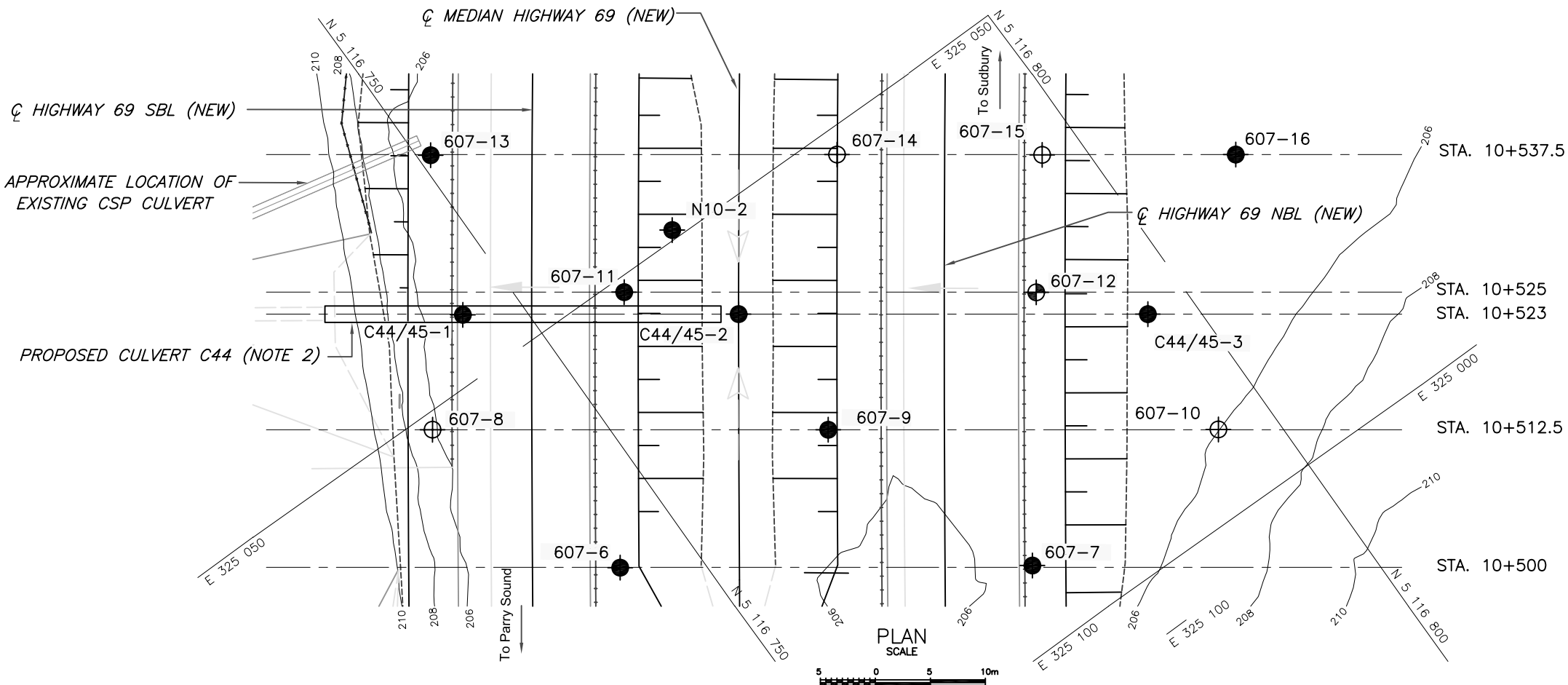
— NOTE —
The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.

REVISIONS

DATE	BY	DESCRIPTION

Geocres No. 411-262

HWY No	69	DIST	Sudbury Area
SUBM'D	MN	CHECKED	MN
DATE	AUG. 30, 2010	SITE	---
DRAWN	NA	CHECKED	CN
APPROVED	BRG	DWG	C44-1



- NOTES:
- DRAWING C44 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND RECORD OF BOREHOLE LOGS.
 - THE CULVERT AT STA. 10+523 WAS DESIGNATED AS CULVERT C44 FOR THE INVESTIGATION.
 - THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
 - DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

REF AECOM Drawings:
C3-HWY69-Base.dwg dated Jan. 15, 2010;
C3-Hwy69-Des.dwg dated April 15, 2010;
Hwy 69 Servos - Contract 3 - Culvert
10+523 (#44) 10+550 (#45) Profile.dwg
dated April 16, 2010; and C3-Lidar-ctrs.dwg,
dated May 14, 2008



Culvert at Sta. 10+550 (NBL) (C45), Servos Township

Record of Borehole Sheets

Drawing C45-1 – Borehole Locations and Soil Strata

RECORD OF BOREHOLE No C44/45-1

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Co-ords: 5 116 745.1 N ; 325 044.5 E
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers ORIGINATED BY M.R.
DATUM Geodetic DATE February 10, 2010 COMPILED BY M.N.
CHECKED BY C.N.

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION			STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					w _p	w			w _L	GR
204.8	Ground surface																			
0.0	Silty sand																			
	Loose	Dark brown	Moist to wet		1	SS	5	▼*	▽*											
203.9	(FILL)																			
0.9	Peat, fine fibrous				2	SS	4													
203.6	Dark brown																			
1.2	Organic silty clay																			
203.2	Soft to firm	Dark grey	Wet		3	SS	9													
1.6																				
	Sand, some silt																			
202.4	trace clay, trace gravel																			
2.4	Loose	Dark brown	Wet		4	SS	1													
	Clay, trace sand																			
	Soft to firm	Brown	Wet		5	SS	WH**													
	Mottled grey				6	SS	WH													
199.3																				
5.5	Silty clay, trace sand																			
	Firm	Grey	Wet																	
					7	SS	WH													
197.3	Sand and gravel																			
7.5	trace silt																			
	Compact	Brown	Wet		8	SS	15													
195.5																				
9.3	End of borehole																			
	Refusal on probable bedrock																			

* 2010 02 10

▽ Water level observed during drilling

▼ Water level measured after drilling

WH** denotes penetration due to weight of rods and hammer

METRIC

Co-ords: 5 116 765.6 N ; 325 058.9 E

G.W.P. 5217-06-00

LOCATION

Hwy 69, Sta. 10+523 CL

ORIGINATED BY M.R.

DIST 54

HWY 69

BOREHOLE

Continuous Flight Hollow Stem Augers

COMPILED BY M.N.

DATUM Geodetic

DATE _____

February 09, 2010

CHECKED BY C.N.

[illegible]

METRIC

CHECKED BY C.N.

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No C44/45-4

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Co-ords: 5 116 781.3.0 N ; 325 036.8 E ORIGINATED BY J.H.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probe COMPILED BY M.N.
 DATUM Geodetic DATE April 30, 2010 CHECKED BY C.N.

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa					w _p w w _L			WATER CONTENT (%)	GR	SA		SI	CL			
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE																
205.5	Ground surface					*																
0.0	Bedrock at surface																					
	* Borehole dry																					

METRIC

20
15 — 5 (%) STRAIN AT FAILURE
10

RECORD OF BOREHOLE No 607-12

1 of 2

METRIC



G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+525, o/s 27.1m Rt. CL Med. ORIGINATED BY N.L.B.
DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE February 26, 2008 CHECKED BY C.N.

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		
205.0	Ground surface							20 40 60 80 100						
0.0 204.7	Peat, coarse fibrous Black		1	SS	6			20 40 60 80 100						
0.3 204.4	Silty sand organic inclusions							20 40 60 80 100						
0.6	Loose Grey Wet Clayey silt, trace sand layers of sand to 1.5m Stiff Brown Moist to firm		2	SS	15			20 40 60 80 100						0 71 10 19
			3	SS	4			20 40 60 80 100						
				FV				20 40 60 80 100						
202.3	Clay, trace sand							20 40 60 80 100						
2.7	Firm Grey/ Wet brownish red		4	SS	WH**			20 40 60 80 100						
				FV				20 40 60 80 100						
	Grey		5	SS	WH			20 40 60 80 100						0 3 27 70
				FV				20 40 60 80 100						
	thin layers of silt							20 40 60 80 100						
			6	SS	1			20 40 60 80 100						
				FV				20 40 60 80 100						
			7	SS	1			20 40 60 80 100						
				FV				20 40 60 80 100						
195.9	Sand, some silt trace gravel, trace clay		8	SS	3			20 40 60 80 100						10 62 19 9
9.1	Very loose Grey Wet							20 40 60 80 100						
								20 40 60 80 100						
	silty clay pockets		9	SS	3			20 40 60 80 100						
193.7	End of borehole							20 40 60 80 100						
11.3	Probable sand Loose to compact							20 40 60 80 100						
								20 40 60 80 100						
191.1	End of dynamic cone penetration test							20 40 60 80 100						
13.9	Refusal on probable bedrock							20 40 60 80 100						

Cont'd

RECORD OF BOREHOLE No 607-12 2 of 2 METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+525, o/s 27.1m Rt. CL Med. ORIGINATED BY N.L.B.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Dynamic Cone Penetration Test COMPILED BY G.D.
 DATUM Geodetic DATE February 26, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100	W _p	W	W _L		
190.0	* 2008 02 26  Water level observed during drilling  Water level measured after drilling WH** Denotes penetration due to weight of rods and hammer *** C.F.S.S.A. denotes Continuous Flight Solid Stem Augers																

RECORD OF BOREHOLE No 607-13

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+537.5, o/s 28.0m Lt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.S.B.
 DATUM Geodetic DATE March 05, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							WATER CONTENT (%)				GR	SA	SI	CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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204.8	Ground surface							20	40	60	80	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													</

RECORD OF PENETRATION TEST No 607-14 1 of 1 METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+537.5, o/s 9.0m Rt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY N.S.B.
 DATUM Geodetic DATE March 05, 2008 CHECKED BY C.N.

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							
204.7 0.0	Ground surface Probable peat Probable clayey silt														
201.7 3.0	End of dynamic cone penetration test Refusal on probable bedrock														

RECORD OF PENETRATION TEST No 607-15

1 of 1 **METRIC**

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+537.5, o/s 27.6m Rt. CL Med. ORIGINATED BY N.L.B.
DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY G.D.
DATUM Geodetic DATE February 26, 2008 CHECKED BY C.N.

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				
204.8 0.0	Ground surface													
	Probable peat													
	Probable clayey silt													
	Probable clay													
195.8 9.0	Probable sand													
	End of dynamic cone penetration test													
	Refusal on probable bedrock													

RECORD OF BOREHOLE No 607-16

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+537.5, o/s 45.2m Rt. CL Med. ORIGINATED BY N.L.B.
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY G.D.
DATUM Geodetic DATE February 26, 2008 CHECKED BY C.N.


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ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
								20	40	60	80	100					
								20	40	60	80	100					
204.6	Ground surface																
0.0	Peat, coarse fibrous		1	CS	-												
204.1	Dark brown						204										
0.5	Organic clay some silt, trace sand		2	SS	4												
	Firm Black/ Moist grey																
202.9	Clay, trace sand organics to 2.4 m		3	SS	2		203										
1.7	Stiff Brown/ Moist grey			FV							8						
	Firm Grey Wet						202										
			4	SS	1		201										0 1 27 72
				FV					6								
							200										
			5	SS	1												
							199										
			6	SS	15/5cm		198										
197.3	End of borehole																
7.3	Refusal on probable bedrock																

RECORD OF BOREHOLE No 607-17

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+550, o/s 9.8m Lt. CL Med. ORIGINATED BY J.H.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Sampling COMPILED BY N.S.B.
 DATUM Geodetic DATE September 27, 2007 CHECKED BY C.N.






SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS *	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)							
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	*N* VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)				GR	SA	SI	CL
								○ UNCONFINED	● QUICK TRIAXIAL	+	×	FIELD VANE					LAB VANE							
205.6	Ground surface																							
0.0	Topsoil																							
205.3	End of borehole																							
0.3	Refusal on probable bedrock																							
	* Borehole dry																							

RECORD OF BOREHOLE No 607-18

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+550, o/s 27.8m Rt. CL Med. ORIGINATED BY N.L.B.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY G.D.
 DATUM Geodetic DATE February 26, 2008 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT						PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						W _p w W _L							
204.7	Ground surface							20	40	60	80	100									
0.0	Peat, coarse fibrous		1	SS	WH**																
204.2	Black																				
0.5	Silty clay, trace sand																				
	Stiff Grey/ Moist		2	SS	7																
	brown																				
203.2	End of borehole																				
1.5	Refusal on probable bedrock																				

RECORD OF BOREHOLE No 607-19

1 of 1

METRIC

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+562.5, o/s 25.0m Lt. CL Med. ORIGINATED BY J.H.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Sampling COMPILED BY N.S.B.
 DATUM Geodetic DATE September 27, 2007 CHECKED BY C.N.

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)							GR	SA	SI	CL		
						○ UNCONFINED			● QUICK TRIAXIAL	+	×	FIELD VANE	LAB VANE									20	40
208.6	Ground surface					*																	
0.0	Bedrock at surface																						
	* Borehole dry																						


METRIC

20
15 — 5 (%) STRAIN AT FAILURE
10

RECORD OF PENETRATION TEST No 607-21

1 of 1 **METRIC**

G.W.P. 5217-06-00 LOCATION Hwy 69 (New), Sta. 10+562.5, o/s 45.0m Rt. CL Med. ORIGINATED BY F.P.
DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY N.S.B.
DATUM Geodetic DATE March 04, 2008 CHECKED BY C.N.

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							
204.9 0.0	Ground surface Probable peat Probable silty clay														
199.7 5.2	End of dynamic cone penetration test Refusal on probable bedrock														

RECORD OF BOREHOLE No N10-2

1 of 1

METRIC



G.W.P. 5379-02-00 LOCATION Hwy. 69 (New), Sta. 10+531, o/s 6.0m Lt.
Co-ords. 5 116 766 N; 325 050 E ORIGINATED BY M.R.
DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY M.R.
DATUM Geodetic DATE March 13, 2004 CHECKED BY C.N.

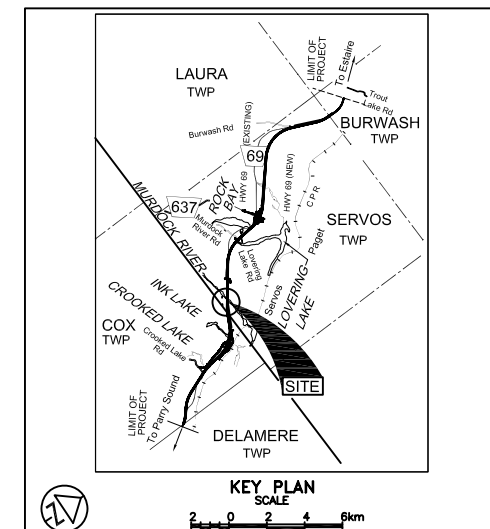
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa														
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%)									
204.8	Ground Surface						20	40	60	80	100	20	40	60		GR	SA	SI	CL			
0.0	Peat, fine fibrous																					
204.5	Dark brown																					
0.3	Clay, trace sand																					
	Stiff Reddish Moist brown to grey																					
			1	SS	5													0	1	29	70	
201.8	Sand, with gravel, trace silt, trace clay																					
3.0	Compact Brown Wet		2	SS	18															25	64	(11)

RECORD OF PENETRATION TEST No N10-3

1 of 1 **METRIC**

G.W.P. 5379-02-00 LOCATION Hwy. 69 (New), Sta. 10+558, o/s 32.2m Rt.
Co-ords. 5 116 814 N; 325 047 E ORIGINATED BY M.R.
DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY M.R.
DATUM Geodetic DATE March 13, 2004 CHECKED BY C.N.

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							
204.9 0.0	Ground Surface Probable Peat														
	Probable Clay, trace sand Firm to stiff														
202.6 2.3	End of dynamic cone penetration test Refusal on probable bedrock														
	Top 0.3 m frozen														

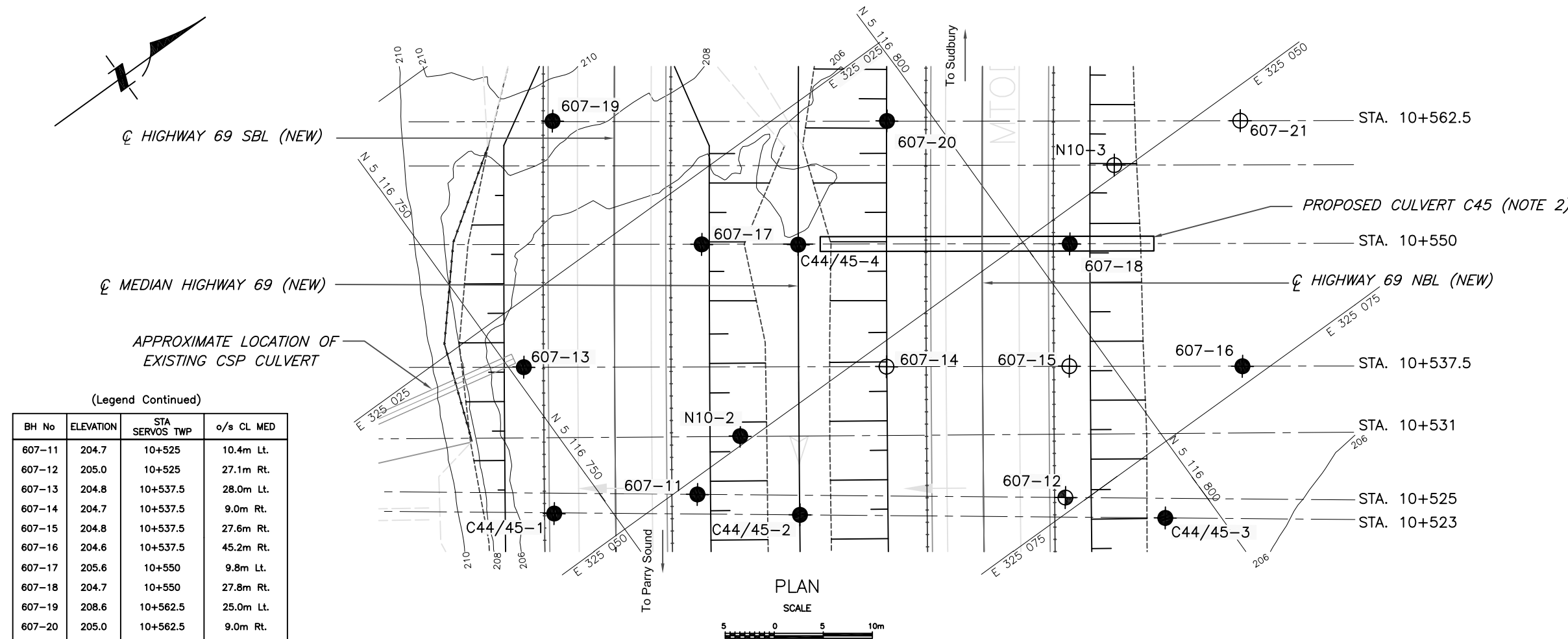


LEGEND				
	Borehole			
	Dynamic Cone Penetration Test (Cone)			
	Borehole & Cone			
N	Blows/0.3m (Std. Pen Test, 475 J/blow)			
CONE	Blows/0.3m (60° Cone, 475 J/blow)			
WH	Penetration due to weight of hammer and rods			
	WL at time of investigation April 2010 and February 2008			
	Head			
	ARTESIAN WATER			
	Encountered			
	PIEZOMETER			
BH No	ELEVATION	COORDINATES		
		NORTHINGS	EASTINGS	
C44/45-1	204.8	5 116 745.1	325 044.5	
C44/45-2	204.7	5 116 765.6	325 058.9	
C44/45-3	204.7	5 116 796.0	325 080.4	
C44/45-4	205.5	5 116 781.3	325 036.8	

(Legend Continues)

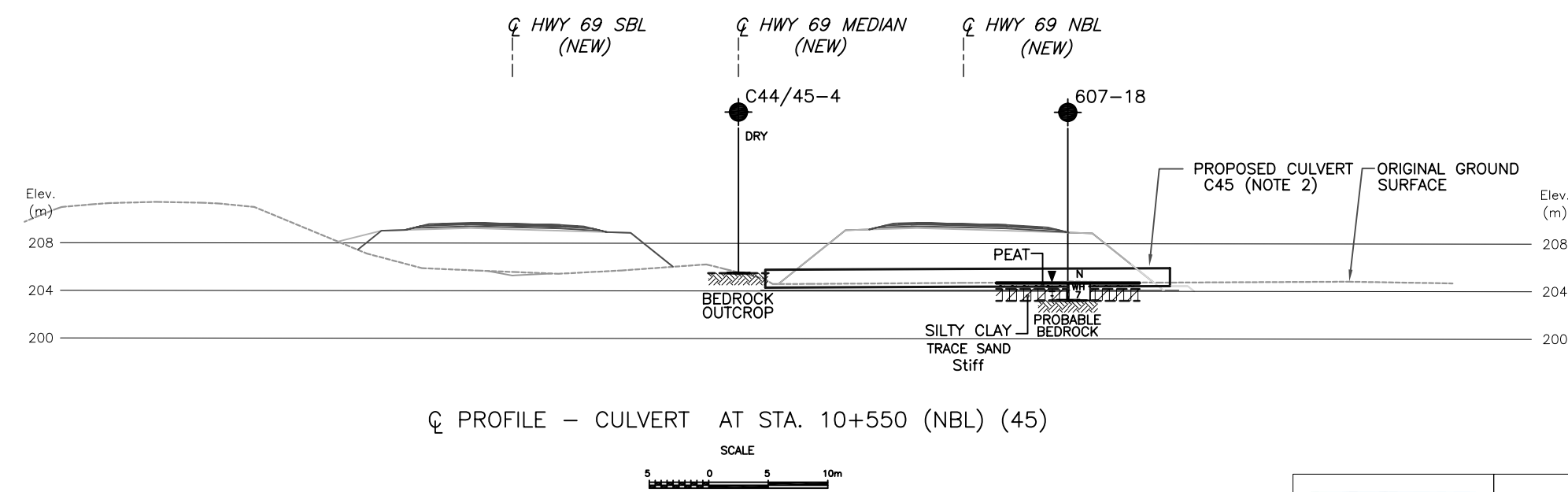
— NOTE —
The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.

REVISIONS			Geocres No. 41I-262		
DATE	BY	DESCRIPTION	HWY No	69	DIST Sudbury Area
SUBM'D	MN	CHECKED MN	DATE	AUG. 30, 2010	SITE ---
DRAWN	NA	CHECKED CN	APPROVED BRG		DWG C45-1



(Legend Continued)

BH No	ELEVATION	STA SERVOS TWP	o/s CL MED
607-11	204.7	10+525	10.4m Lt.
607-12	205.0	10+525	27.1m Rt.
607-13	204.8	10+537.5	28.0m Lt.
607-14	204.7	10+537.5	9.0m Rt.
607-15	204.8	10+537.5	27.6m Rt.
607-16	204.6	10+537.5	45.2m Rt.
607-17	205.6	10+550	9.8m Lt.
607-18	204.7	10+550	27.8m Rt.
607-19	208.6	10+562.5	25.0m Lt.
607-20	205.0	10+562.5	9.0m Rt.
607-21	204.9	10+562.5	45.0m Rt.
N10-2	204.8	10+531	6.0m Lt.
N10-3	204.9	10+558	32.2m Rt.



PROFILE - CULVERT AT STA. 10+550 (NBL) (45)

- NOTES:
- DRAWING C45-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND RECORD OF BOREHOLE LOGS.
 - THE CULVERT AT STA. 10+550 WAS DESIGNATED AS CULVERT C45 FOR THE INVESTIGATION.
 - THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
 - DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

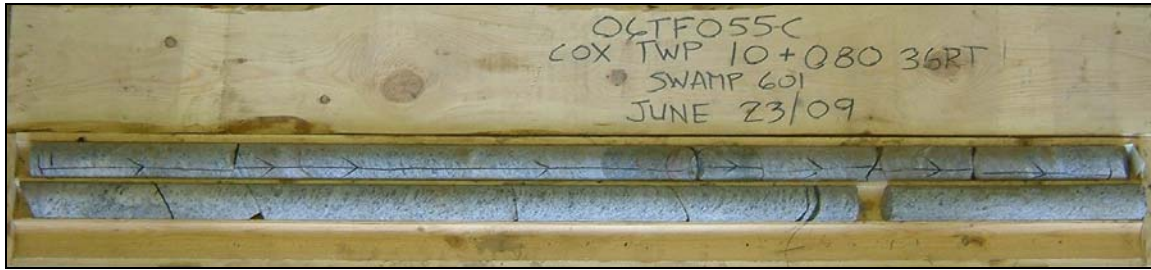
REF AECOM Drawings:
C3-HWY69-Base.dwg dated Jan. 15, 2010;
C3-Hwy69-Des.dwg dated April 15, 2010;
Hwy 69 Servos - Contract 3 - Culvert
10+523 (#44) 10+550 (#45) profile.dwg,
April 16, 2010; and C3-Lidar-ctrs.dwg,
dated May 14, 2008





APPENDIX A

Rock Core Photographs



Photograph 1: Culvert at Sta. 10+100 (NBL) (C1), Cox Township, borehole C1-1. Cores 10 and 11 from 6.5 to 9.5 m depth. RQD values of 83 and 93%, indicating good to excellent rock quality.



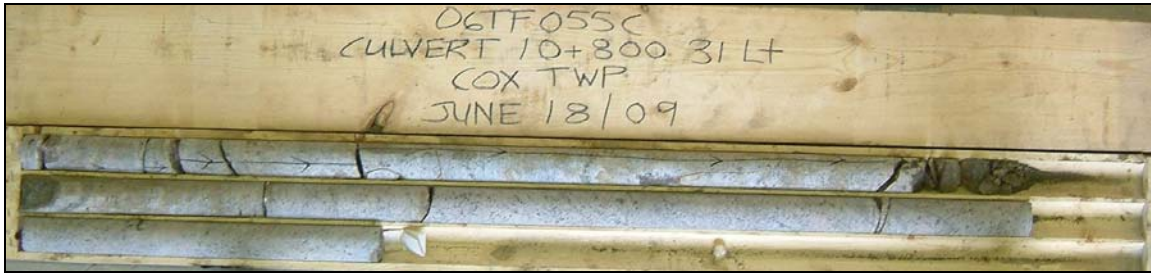
Photograph 2: Culvert at Sta. 10+100 (NBL) (C1), Cox Township, borehole C1-2. Cores 2 to 4 from 0.3 to 3.4 m depth. RQD values ranged from 40 to 79%, indicating poor to good rock quality.



Photograph 3: Culvert at Sta. 10+140 (SBL) (C2), Cox Township, borehole C2-1. Cores 5 and 6 from 3.8 to 6.9 m depth. RQD values ranged from 50 to 52%, indicating fair rock quality.



Photograph 4: Culvert at Sta. 10+140 (SBL) (C2), Cox Township, borehole C2-3. Cores 2 to 4 from 0.9 to 4.2 m depth. RQD values ranged from 33 to 80%, indicating poor to good rock quality.



Photograph 5: Culvert at Sta. 10+800 (SBL and NBL) (SX), Cox Township, borehole SX-1. Cores 1 and 2 from 0.8 to 3.8 m depth. RQD values ranged from 86 to 99%, indicating good to excellent rock quality.



Photograph 6: Culvert at Sta. 10+800 (SBL and NBL) (SX), Cox Township, borehole SX-2. Cores 1 to 3 from 1.2 to 4.5 m depth. RQD values of 24 to 98%, indicating very poor to excellent rock quality.



Photograph 7: Culvert at Sta. 10+800 (SBL and NBL) (SX), Cox Township, borehole SX-3. Cores 1 to 3 from 0.7 to 3.8 m depth. RQD values of 38 to 93%, indicating poor to excellent rock quality.



Photograph 8: Culvert at Sta. 12+590 (SBL and NBL) (C8/9), Cox Township, borehole C8/9-1. Cores 5 to 7 from 2.4 to 5.2 m depth. RQD values of 53 to 100%, indicating fair becoming excellent rock quality. Vertical fissures in the upper 0.7 m of the rock resulted in the lower rock quality.



Photograph 9: Culvert at Sta. 12+590 (SBL and NBL) (C8/9), Cox Township, borehole C8/9-4. Cores 9 to 11 from 7.2 to 10.2 m depth. RQD values of 30 to 74%, indicating poor to fair rock quality.



Photograph 10: Culvert at Sta. 13+206 (SBL and NBL) (C15), Cox Township, borehole C15-1. Cores 8 to 10 from 5.5 to 8.3 m depth. RQD values of 83 to 98%, indicating good to excellent rock quality.



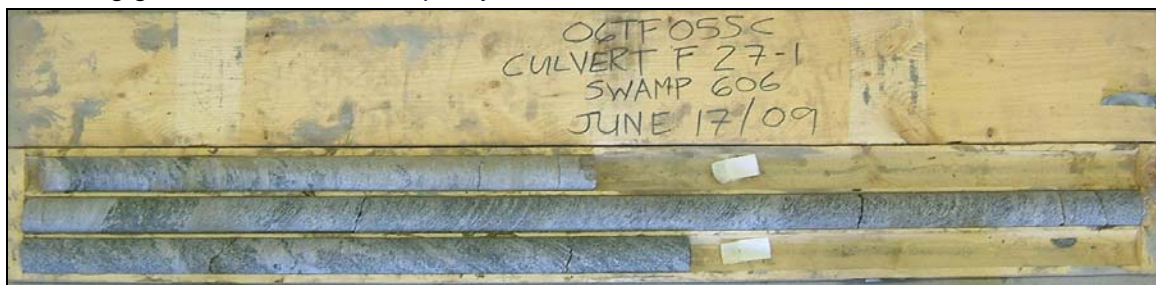
Photograph 11: Culvert at Sta. 13+206 (SBL and NBL) (C15), Cox Township, borehole C15-3. Cores 6 to 9 from 5.5 to 8.5 m depth. RQD values of 79 to 100%, indicating good to excellent rock quality.



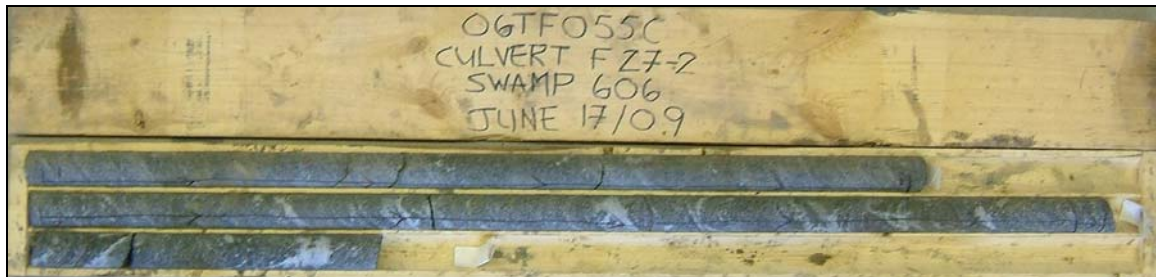
Photograph 12: Culvert at Sta. 8+240 (Crooked Lake Road South Connection) (C16), Cox Township, borehole C16-1. Cores 4 to 6 from 2.3 to 5.4 m depth. RQD values of 88 to 100%, indicating good to excellent rock quality.



Photograph 13: Culvert at Sta. 15+279.1 (SBL and NBL) (C37/38), Cox Township, borehole C37/38-3. Cores 4 to 6 from 4.1 to 7.2 m depth. RQD values of 81 to 100%, indicating good to excellent rock quality.



Photograph 14: Culvert at Sta. 15+883 (SBL) (C41), Cox Township, borehole C41-1. Cores 7 to 9 from 5.8 to 8.9 m depth. RQD values of 100%, indicating excellent rock quality.



Photograph 15: Culvert at Sta. 15+883 (SBL) (C41), Cox Township, borehole C41-2. Cores 5 to 7 from 2.4 to 5.6 m depth. RQD values ranged from 94 to 100%, indicating excellent rock quality.



Photograph 16: Culvert at Sta. 10+523 (SBL) (C44), Servos Township, borehole C44/45-3. Cores 7 to 10 from 6.6 to 9.8 m depth. RQD values ranged from 83 to 100%, indicating good to excellent rock quality. Locally at 9.3 to 9.8 m depth, a RQD value of 41% was found indicating poor rock quality.