



TABLE 1
SUMMARIZED SUBSURFACE INFORMATION FOR PROBED BOREHOLES

BOREHOLE NO.	LOCATION	GROUND SURFACE ELEVATION (m)	SUBSOIL SUMMARY	TOTAL DEPTH (m)	BEDROCK ELEVATION (m)
N1	N 5099401.9; E 335960.4	209.4	Outcrop	0.0	209.4
N2	N 5099408.8; E 335942.3	208.3	Outcrop	0.0	208.3
N7	N 5099424.3; E 335953.5	208.1	Outcrop	0.0	208.1
202-49	Swamp 202 Sta. 11+974 CL	208.9	200 mm of topsoil mantling probable bedrock	0.2	208.7
202-50	Swamp 202 Sta. 11+975 o/s 36.0 m Rt	210.3	Outcrop	0.0	210.3
202-52	Swamp 202 Sta. 12+000 o/s 18.8 m Rt.	208.0	Outcrop	0.0	208.0
202-54	Swamp 202 Sta. 12+025 CL	206.5	200 mm of topsoil mantling probable bedrock	0.2	206.3



TABLE 2
ROCK CORE DESCRIPTION

CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
N3	1	0.1 – 0.8	100	93	0.1 – 3.5	GRANITIC GNEISS: Pink and grey, slight banding, with dipping black biotite rich layers, fine to medium grained, high strength, unweathered, close to moderate, becoming wide spaced flat to dipping cross joints, generally associated with biotite layers, occasional vertical fissures, rough planar, tight to slightly altered with brown silt on some partings, excellent quality.
	2	0.8 – 2.2	100	94		
	3	2.2 – 3.5	100	100		
N4	2	1.0 – 2.2	94	94	1.0 – 4.2	GRANITIC GNEISS: Pink and grey, slight banding, with dipping black biotite rich layers, fine to medium grained, high strength, unweathered, close, becoming wide spaced flat to dipping cross joints, rough planar, tight, excellent quality.
	3	2.2 – 3.7	100	100		
	4	3.7 – 4.2	100	100		
N5	3	1.2 – 1.4	100	100	1.2 – 4.2	GRANITIC GNEISS: Light grey, with dipping black biotite rich layers, fine to medium grained, high strength, unweathered, moderate (locally close) spaced flat to dipping cross joints, rough planar, tight to oxidized, excellent quality.
	4	1.4 – 3.0	100	100		
	5	3.0 – 4.2	100	100		
N6	1	0.1 – 1.3	98	98	0.1 – 3.1	GRANODIORITE/GRANITIC GNEISS: White and black, with occasional layer of pink feldspar, becoming slightly banded, fine to medium grained, high strength, unweathered, moderate to wide (locally close) spaced flat to dipping cross joints, rough planar, tight to slightly altered with silt on partings, excellent quality.
	2	1.3 – 2.8	100	100		
	3	2.8 – 3.1	100	100		

NOTE: RQD = Rock Quality Designation

Originated:	FP
Compiled:	PML
Checked:	CN

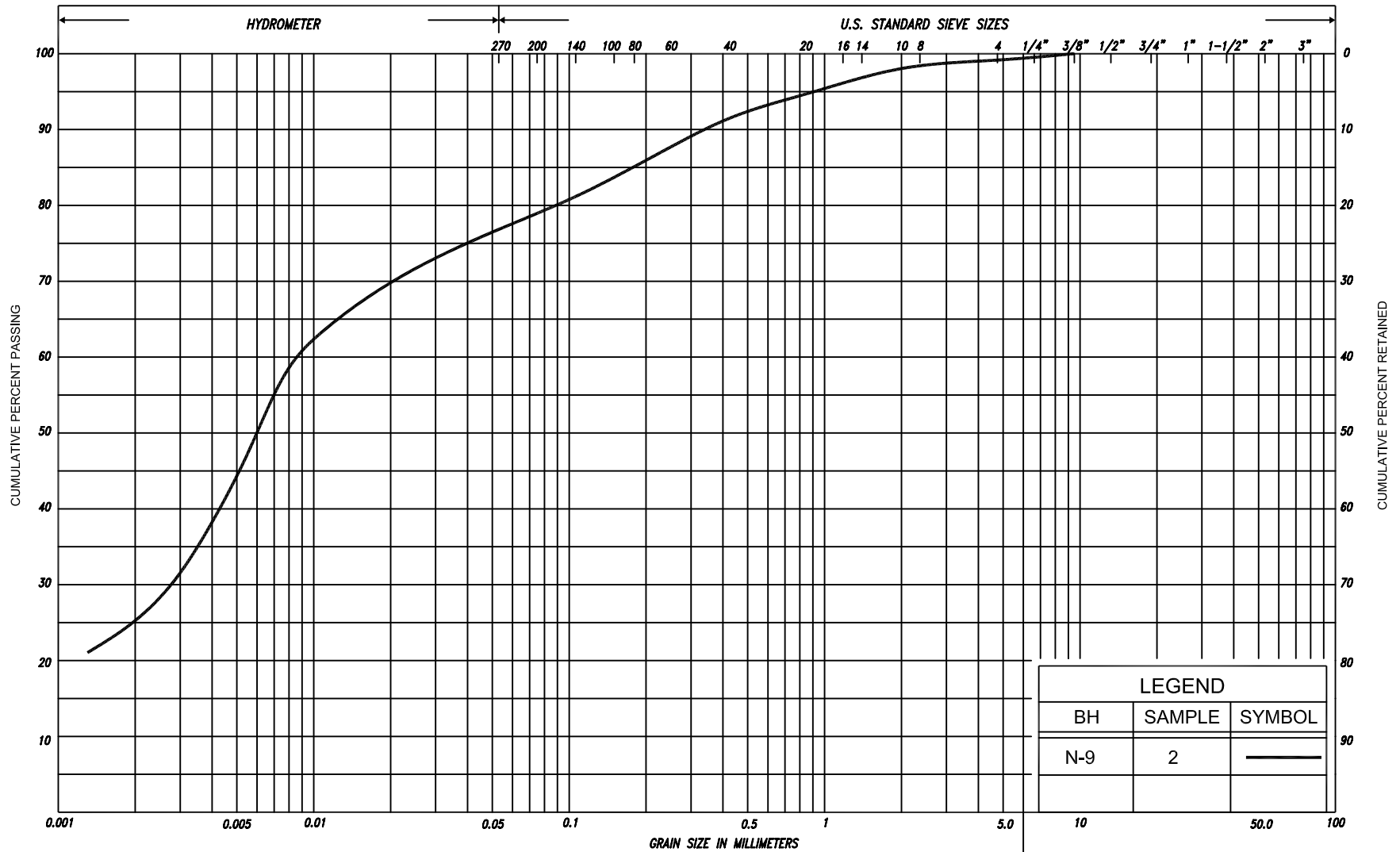


TABLE 2
ROCK CORE DESCRIPTION

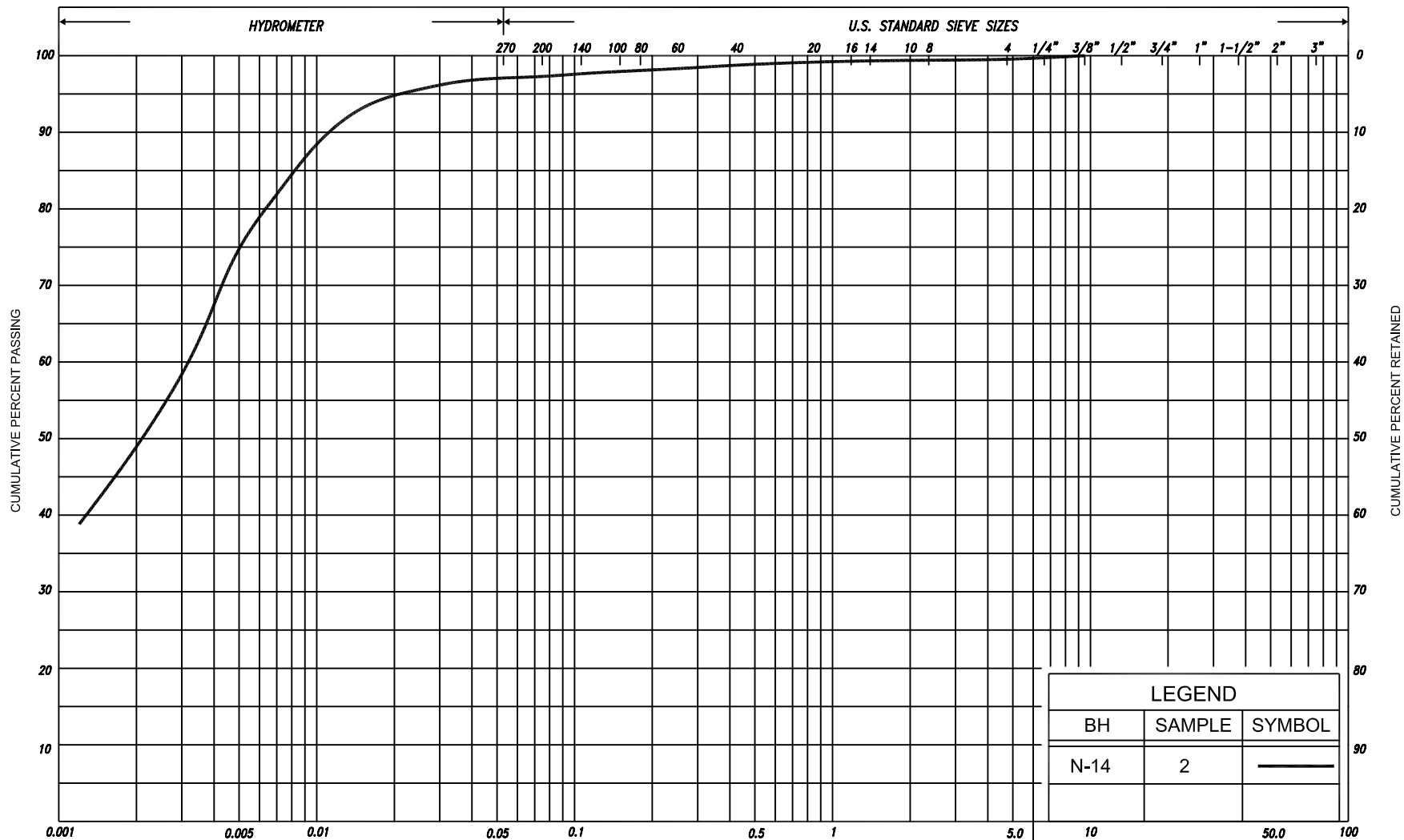
HOLE NO.	CORE RECOVERY				CORE DESCRIPTION	
	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
N9	3	1.3 – 1.6	100	100	1.3 – 4.5	GRANITIC GNEISS: Light grey, fine to medium crystalline, with occasional pink feldspar inclusions, coarse crystalline, becoming slightly banded, occasional concentrations of black biotite, high strength, unweathered, moderate to wide spaced flat to dipping cross joints, rough planar, tight to slightly altered, excellent quality.
	4	1.6 – 3.1	100	100		
	5	3.1 – 4.5	100	100		
N10	1	0.4 – 1.4	100	100	0.4 – 3.6	GRANITIC GNEISS: Pink and grey, fine to medium crystalline, with occasional dipping black biotite rich layers, high strength, unweathered, close to moderate spaced flat cross joints, rough planar, tight, excellent quality.
	2	1.4 – 2.9	100	100		
	3	2.9 – 3.6	100	100		
N11	1	0.1 – 1.3	100	100	0.1 – 3.4	GRANITIC GNEISS: Pink and grey, fine to medium crystalline, slight banding, high strength, unweathered, moderate to wide (locally close) spaced flat cross joints, rough planar, tight to slightly altered with silt on partings, excellent quality.
	2	1.3 – 2.7	100	100		
	3	2.7 – 3.4	100	100		
N12	2	0.9 – 1.5	95	84	0.9 – 4.2	GRANITIC GNEISS: Pink and grey, fine to medium crystalline, slight banding, high strength, unweathered, close to moderate becoming wide spaced flat to dipping cross joints, rough planar, tight to slightly altered with silt on partings, occasional vertical fissure, good to excellent quality.
	3	1.5 – 3.0	100	92		
	4	3.0 – 4.2	100	96		

NOTE: RQD = Rock Quality Designation

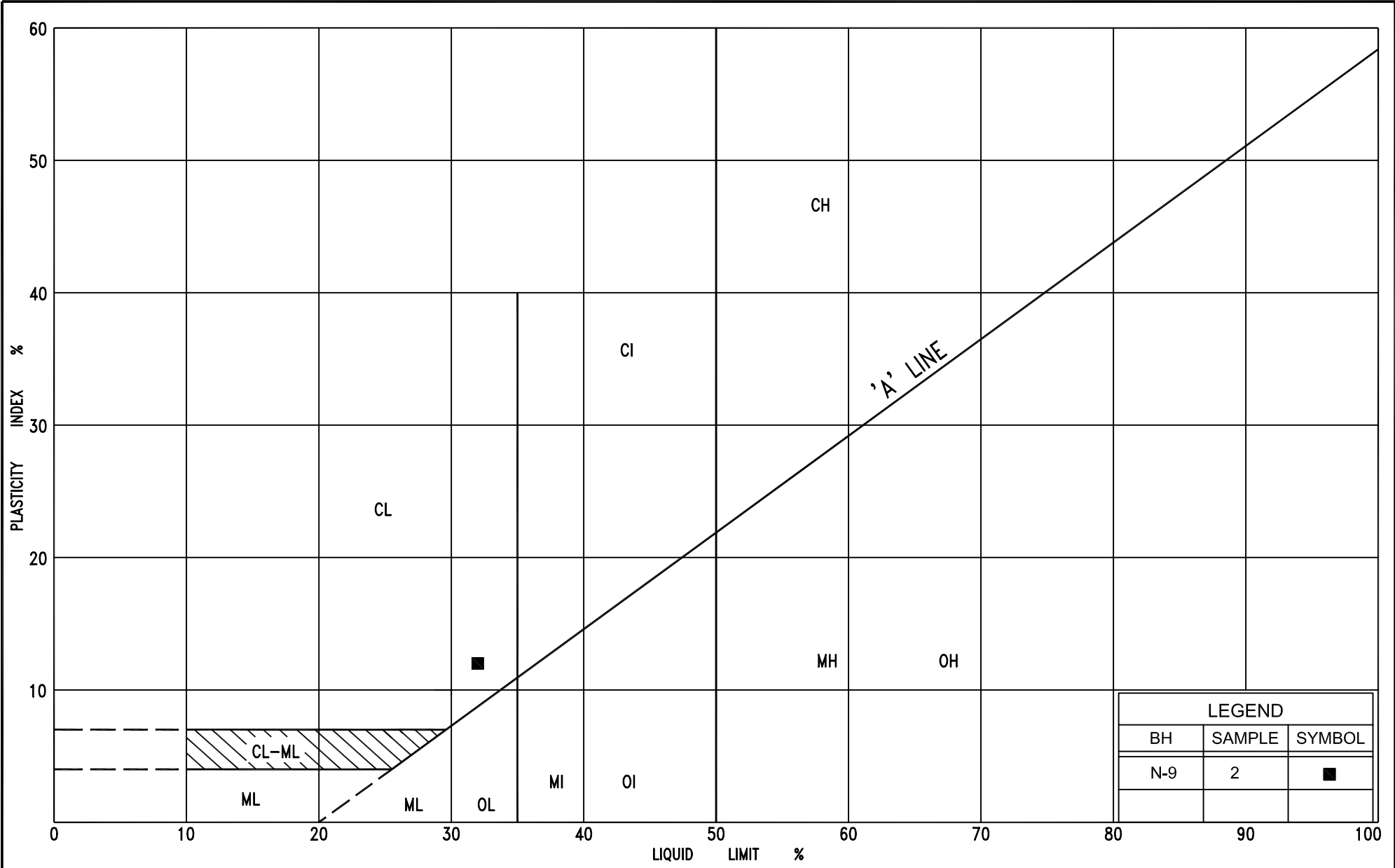
Originated: FP
 Compiled: PML
 Checked: CN



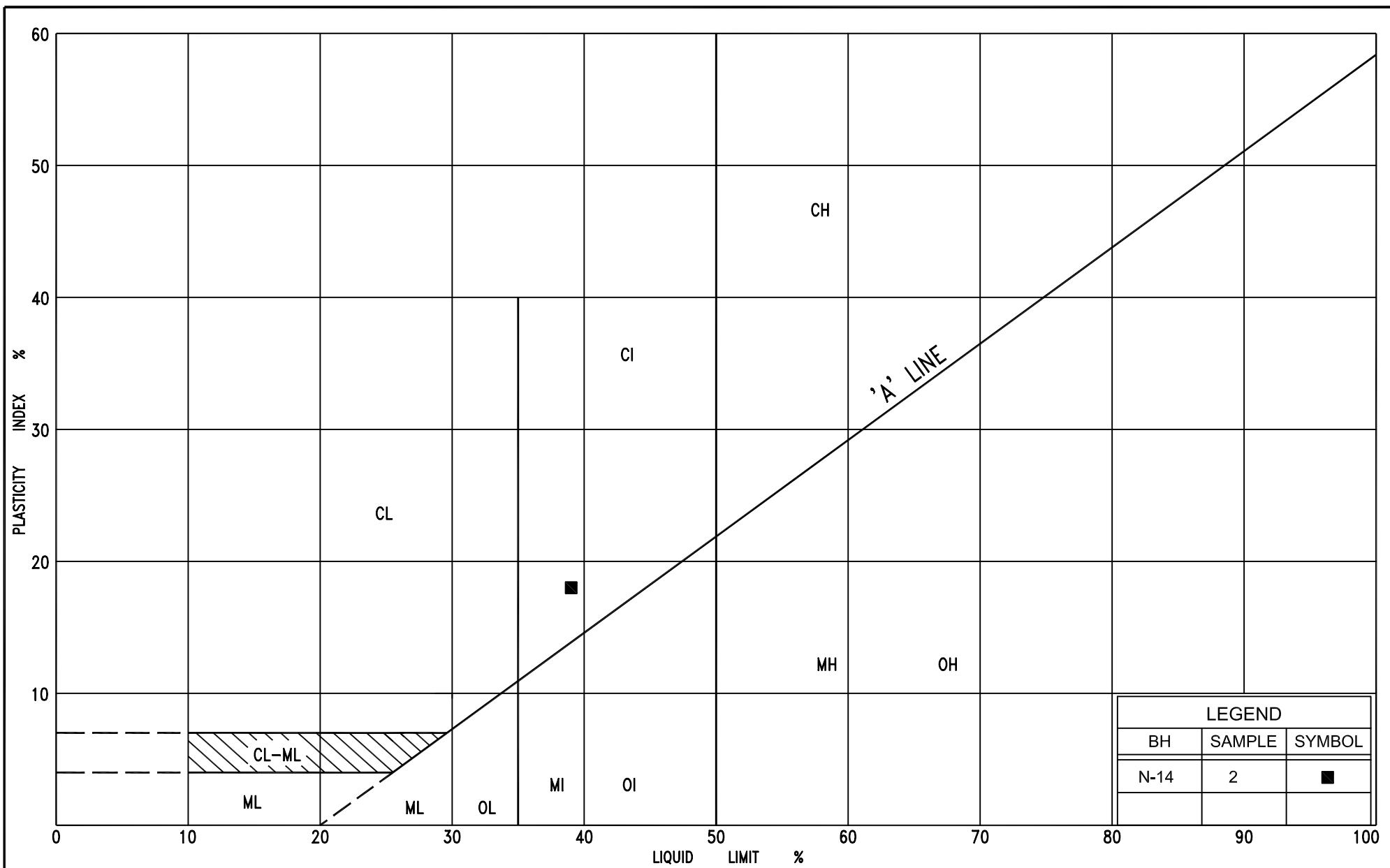
SILT & CLAY				FINE		MEDIUM		COARSE		GRAVEL				COBBLES	UNIFIED			
CLAY	FINE		MEDIUM		COARSE		FINE		MEDIUM		COARSE		GRAVEL				COBBLES	M.I.T.
	CLAY		SILT				V. FINE		FINE		MED.		COARSE		GRAVEL			



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										



LEGEND		
BH	SAMPLE	SYMBOL
N-9	2	■



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						

RECORD OF BOREHOLE No N1

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Co-ords. 5 099 401.9 N; 335 960.4 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY N.R.
 DATUM Geodetic DATE March 10, 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			20	40	60	80	100					
209.4	Ground Surface																
0.0	Bedrock at surface																
	* Borehole dry																

RECORD OF BOREHOLE No N2

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Co-ords. 5 099 408.8 N; 335 942.3 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY N.R.
 DATUM Geodetic DATE March 10, 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			20	40	60	80	100					
208.3	Ground Surface																
0.0	Bedrock at surface																
	* Borehole dry																

RECORD OF BOREHOLE No N3

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Co-ords. 5 099 420.9 N; 335 956.4 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. + Rotary Diamond Drilling COMPILED BY N.R.
 DATUM Geodetic DATE March 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 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									
208.3 0.0	Ground Surface						20	40	60	80	100						
208.2 0.1	Topsoil																
	Granitic Gneiss Bedrock		1	RC NQ	REC 100%											RQD 93%	
	Unweathered																
	High strength		2	RC NQ	REC 100%											RQD 94%	
	Excellent quality																
			3	RC NQ	REC 100%											RQD 100%	
204.8 3.5	End of borehole																
						</											

METRIC












(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No N5

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Co-ords. 5 099 417.1 N; 335 947.5 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. + Rotary Diamond Drilling COMPILED BY N.R.
 DATUM Geodetic DATE March 14, 2009 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			WATER CONTENT (%)
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE										
207.8	Ground Surface							20	40	60	80	100						
0.0 207.5	Topsoil		1	SS	25/15cm													Top 0.2m frozen
0.3	Clayey silt, trace sand																	
	Hard Brown Wet		2	SS	20/8cm													
206.6																		
1.2	Granitic Gneiss Bedrock		3	RC NQ	REC 100%													RQD 100%
	Unweathered																	
	High strength		4	RC NQ	REC 100%													RQD 100%
	Excellent quality																	
																		
			5	RC NQ	REC 100%													RQD 100%
203.6																		
4.2	End of borehole																	

RECORD OF BOREHOLE No N6

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Co-ords. 5 099 412.3 N; 335 939.4 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. + Rotary Diamond Drilling COMPILED BY N.R.
 DATUM Geodetic DATE March 13, 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								
208.3 0.0	Ground Surface						20	40	60	80	100							
208.2 0.1	Topsoil Granodiorite/Granitic Gneiss Bedrock Unweathered High strength Excellent quality		1	RC NQ	REC 98%		208										RQD 98%	
			2	RC NQ	REC 100%		207											RQD 100%
			3	RC NQ	REC 100%		206											RQD 100%
205.2 3.1	End of borehole																	
	* Borehole charged with drilling water C.F.S.S.A. denotes Continuous Flight Solid Stem Augers																	

RECORD OF BOREHOLE No N7

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Co-ords. 5 099 424.3 N; 335 953.5 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY N.R.
 DATUM Geodetic DATE March 10, 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			20	40	60	80	100					
208.1	Ground Surface																
0.0	Bedrock at surface																
	* Borehole dry																

RECORD OF BOREHOLE No N8

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Co-ords. 5 099 436.2 N; 335 919.0 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE March 10, 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
								○ UNCONFINED	● QUICK TRIAXIAL	+	×	FIELD VANE					LAB VANE						
207.2	Ground Surface																						
0.0	Topsoil		1	SS	3		207												Top 0.2m				
206.9	Clayey silt, trace sand																		frozen				
0.3	Stiff Brown Wet																						
206.4	End of borehole																						
0.8	Refusal on probable bedrock																						
	* Borehole dry																						

RECORD OF BOREHOLE No N9

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Co-ords. 5 099 448.2 N; 335 933.0 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. + Rotary Diamond Drilling COMPILED BY N.R.
 DATUM Geodetic DATE March 13, 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										
								○ UNCONFINED	+	FIELD VANE								
207.1	Ground Surface						20	40	60	80	100							GR SA SI CL
0.0 206.8	Topsoil		1	SS	20/8cm	▼* ▼*	20	40	60	80	100							Top 0.2m frozen
0.3	Clayey silt trace sand, trace gravel																	
206.1	Hard Brown Moist		2	SS	6/15cm												1 20 54 25	
1.0 205.8	Sand, trace gravel																	
1.3	Dense Grey Wet Granitic Gneiss Bedrock		3	RC NQ	REC 100%												RQD 100%	
	Unweathered High strength Excellent quality		4	RC NQ	REC 100%												RQD 100%	
			5	RC NQ	REC 100%												RQD 100%	
202.6 4.5	End of borehole																	
<div>* 2009 03 11</div> <div>▽ Water level observed during drilling</div> <div>▼ Water level measured after drilling</div> <div>C.F.S.S.A. denotes Continuous Flight Solid Stem Augers</div>																		

RECORD OF BOREHOLE No N10										1 of 1		METRIC					
W.P. 5277-05-01		LOCATION		Co-ords.: 5 099 443.0 N; 335 925.4 E						ORIGINATED BY F.P.							
DIST 54 HWY 69		BOREHOLE TYPE		C.F.S.S.A. + Rotary Diamond Drilling						COMPILED BY N.R.							
DATUM Geodetic		DATE		March 13, 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									
206.8	Ground Surface																
0.0	Topsoil																
206.4	Granitic Gneiss Bedrock																
0.4	Unweathered		1	RC NQ	REC 100%	206										RQD 100%	
	High strength		2	RC NQ	REC 100%	205										RQD 100%	
	Excellent quality		3	RC NQ	REC 100%	204										RQD 100%	
203.2	End of borehole																
3.6																	
* Borehole charged with drilling water C.F.S.S.A. denotes Continuous Flight Solid Stem Augers																	

METRIC

20
15 — 5 (%) STRAIN AT FAILURE
10

METRIC

20
15 — 5 (%) STRAIN AT FAILURE
10

RECORD OF BOREHOLE No N13

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Co-ords. 5 099 451.7 N; 335 930.1 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE March 10, 2009 CHECKED BY C.N.

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS *	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT CONTENT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES		SHEAR STRENGTH kPa					W _p	W	W _L		
209.2	Ground Surface						20	40	60	80	100					
0.0 208.9	Topsoil		1	SS	24	209									Org. 8.7%	
0.3	Silty clay, trace sand organics inclusion															
208.3 0.9	Very stiff Brown Moist End of borehole Refusal on probable bedrock		2	AS	10/15cm											
	* Borehole dry															

METRIC[illegible]

METRIC

20
15 — 5 (%) STRAIN AT FAILURE
10

RECORD OF BOREHOLE No 202-50

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Hwy 69 (New), Sta. 11+975, o/s 36.0m Rt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY N.S.B.
 DATUM Geodetic DATE July 25, 2007 CHECKED BY G.D.

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 (%)									
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE																	
210.3	Ground Surface					*				20	40	60	80	100		20	40	60		GR	SA	SI	CL
0.0	Bedrock at surface																						
	* Borehole dry																						

RECORD OF BOREHOLE No 202-52

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Hwy 69 (New), Sta. 12+000, o/s 18.8m Rt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY N.S.B.
 DATUM Geodetic DATE September 13, 2007 CHECKED BY G.D.

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

RECORD OF BOREHOLE No 202-55

1 of 1

METRIC

W.P. 5277-05-01 LOCATION Hwy 69 (New), Sta. 12+025, o/s 34.1m Rt. CL Med. ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probing COMPILED BY N.S.B.
 DATUM Geodetic DATE July 25, 2007 CHECKED BY G.D.

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS *	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20	40	60	80	100	W _p	W		
207.1	Ground Surface															
0.0	Silty sand mixed with topsoil	X				207										
206.3	Loose Brown Moist	X														
0.8	(FILL)															
	End of borehole															
	Refusal on probable bedrock															
	* Borehole dry															

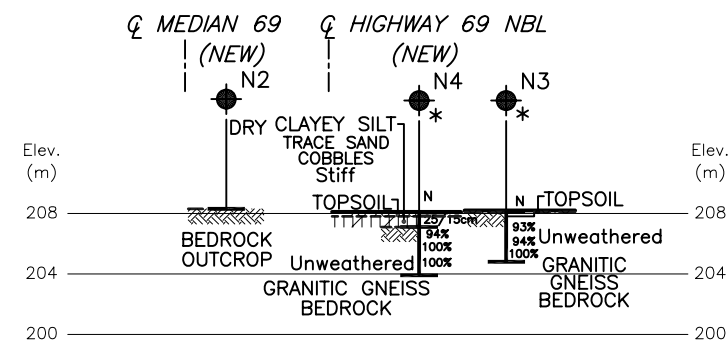
RECORD OF BOREHOLE No H607-2

1 of 1

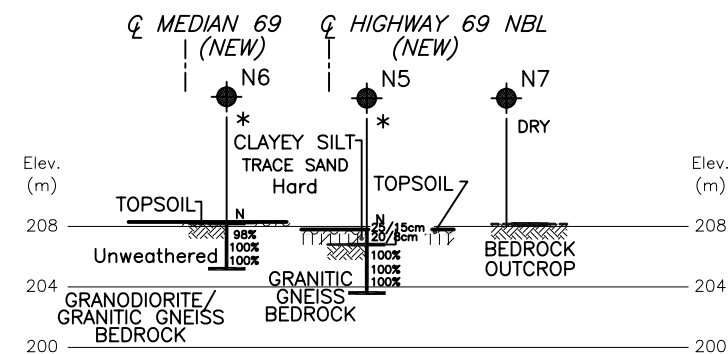
METRIC

W.P. 5277-05-01 LOCATION Highway 607 Underpass ORIGINATED BY M.R.
 Co-ords. 5 099 417 N; 335 920 E
 DIST 54 HWY 69 BOREHOLE TYPE C.F.H.S.A. & NQ Rock Coring COMPILED BY M.R.
 DATUM Geodetic DATE May 25, 2004 CHECKED BY D.W.K.

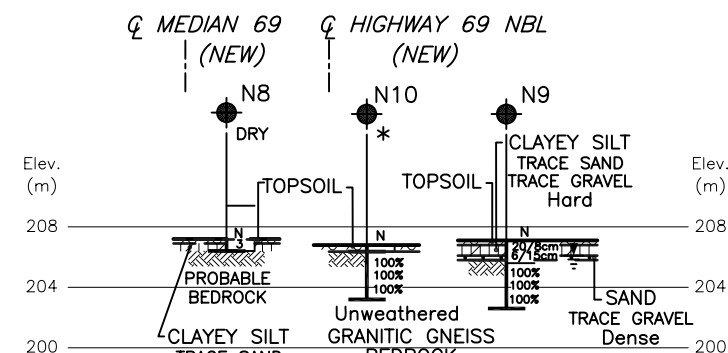
SOIL PROFILE			SAMPLES			GROUND WATER * CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					w _p	w	w _L					
								○ UNCONFINED	● QUICK TRIAXIAL	✕ LAB VANE	✕ LAB VANE	✕ LAB VANE					✕ LAB VANE	✕ LAB VANE	✕ LAB VANE	✕ LAB VANE
206.9 0.0	Ground Surface							20	40	60	80	100								
206.8 0.1	Topsoil		1	SS	1															
206.2 0.7	Silty sand																			
206.2 0.7	Very Rusty Wet loose brown		2	SS	35															
205.7 1.2	Sand and silt, trace clay																			
205.7 1.2	Dense Brown Dry Bedrock																			
205.7 1.2	Granitic Gneiss		3	RC NQ	REC 100%														RQD 63%	
205.7 1.2	High strength																			
205.7 1.2	Fair to excellent quality																			
205.7 1.2			4	RC NQ	REC 100%														RQD 98%	
202.6 4.3	End of borehole																			
202.6 4.3	* Borehole charged with drilling water																			



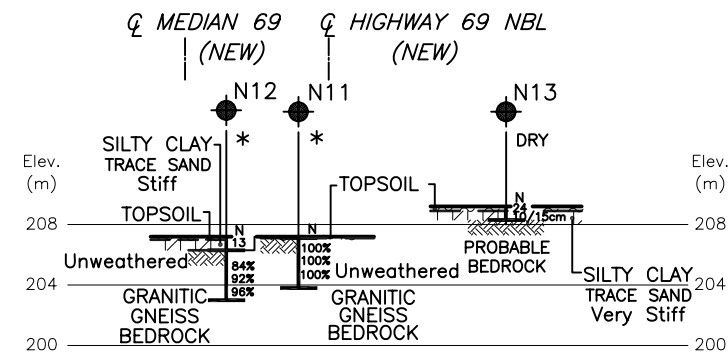
SECTION A-A



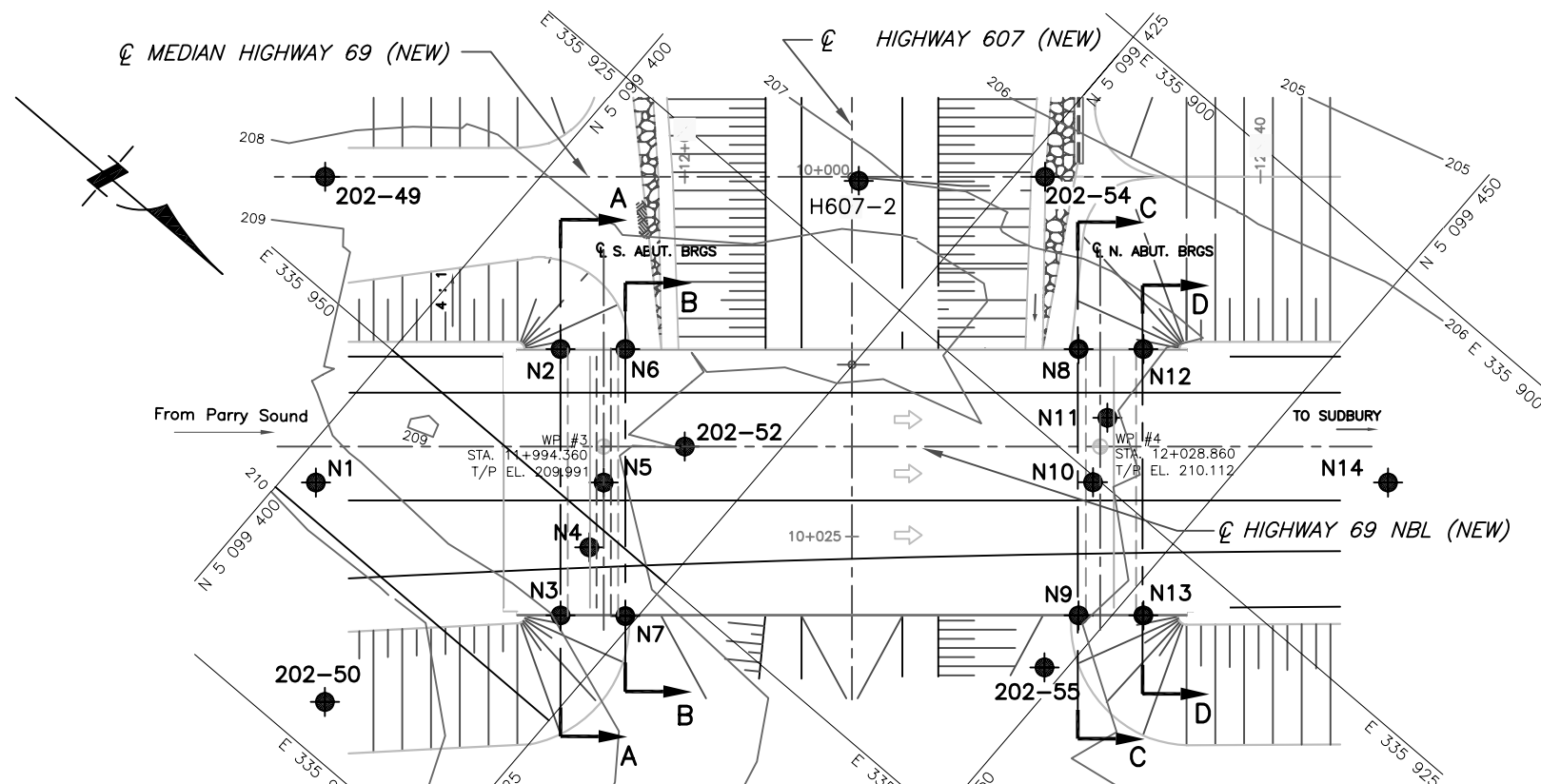
SECTION B-B



SECTION C-C

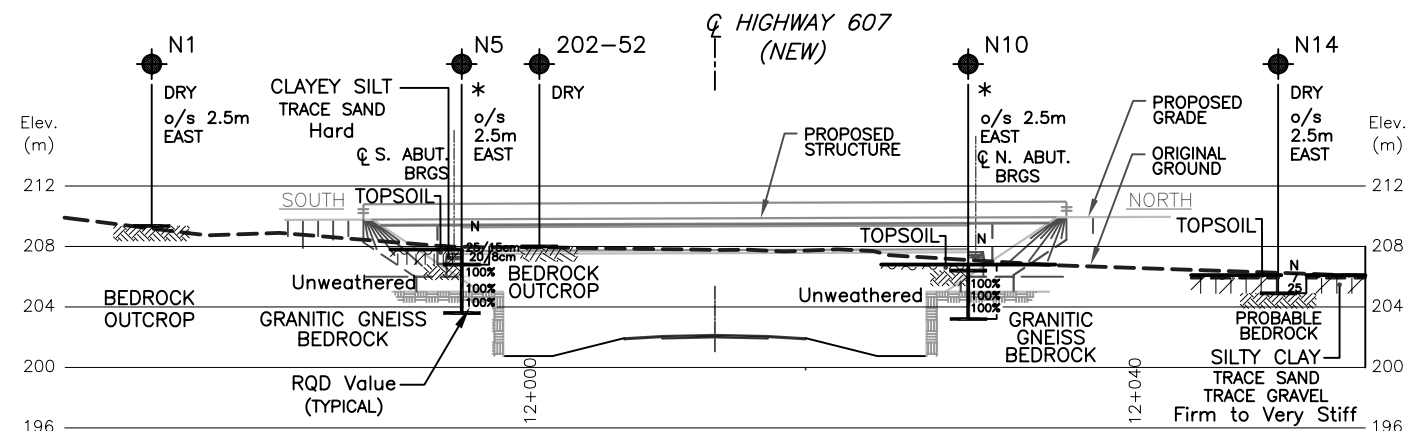


SECTION D-D



PLAN

SCALE
0 5 10m



PROFILE \varnothing HWY 69 NBL (NEW)

SCALE
0 5 10m

NOTES:

- THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
- BOREHOLE H607-2 WAS DRILLED FOR THE PRELIMINARY INVESTIGATION IN 2004 (GEOCRE No. 411-178), AND BOREHOLES 202-49 TO 202-55 WERE DRILLED FOR SWAMP 202 (PML REF. 06TF033B).
- COORDINATES OF BOREHOLES WERE PROVIDED BY MRC IN REFERENCE DRAWING.
- DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

(Legend Continued)

BH No	ELEVATION	STA BIGWOOD TWP	o/s CL MED
202-49	208.9	11+975	CL
202-50	210.3	11+975	36.5m Rt.
202-52	208.0	12+000	18.8m Rt.
202-54	206.5	12+025	CL
202-55	207.1	12+025	34.1m Rt.

(Legend Continued)

BH No	ELEVATION	CO-ORDINATES NORTHINGS	EASTINGS
N11	207.2	5 099 440.8	335 921.3
N12	207.2	5 099 439.6	335 916.0
N13	209.2	5 099 451.7	335 930.1
N14	206.1	5 099 458.6	335 912.0
H607-2	206.9	5 099 417.0	335 920.0

(Legend Continues)



REF No. MRC Drawings: H6454xb02 contours zone 12.dwg;
S6454-325-001GA.dwg Modified March 2009

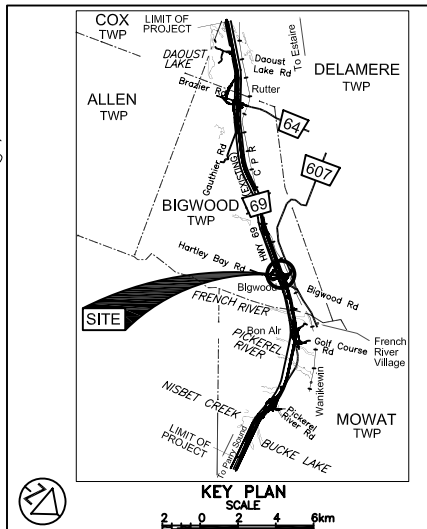
CONT No
WP No 5277-05-01

HIGHWAY 607 OVERPASS NBL
HIGHWAY 69
BOREHOLE LOCATIONS AND SOIL STRATA



SHEET

PML 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 Mar 2009; 200 Series April and Sept 2007; H607 Series May 2004
*	Water level not established
	Head
	ARTESIAN WATER Encountered
	PIEZOMETER

BH No	ELEVATION	CO-ORDINATES	
		NORTHINGS	EASTINGS
N1	209.4	5 099 401.9	335 960.4
N2	208.3	5 099 408.8	335 942.3
N3	208.3	5 099 420.9	335 956.4
N4	208.1	5 099 419.3	335 951.5
N5	207.8	5 099 417.1	335 947.5
N6	208.3	5 099 412.3	335 939.4
N7	208.1	5 099 424.3	335 953.5
N8	207.2	5 099 436.2	335 919.0
N9	207.1	5 099 448.2	335 933.0
N10	206.8	5 099 443.0	335 925.4

(Legend Continues)

- NOTE -

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

REVISIONS	DATE	BY	DESCRIPTION

Geocres No. 411-238

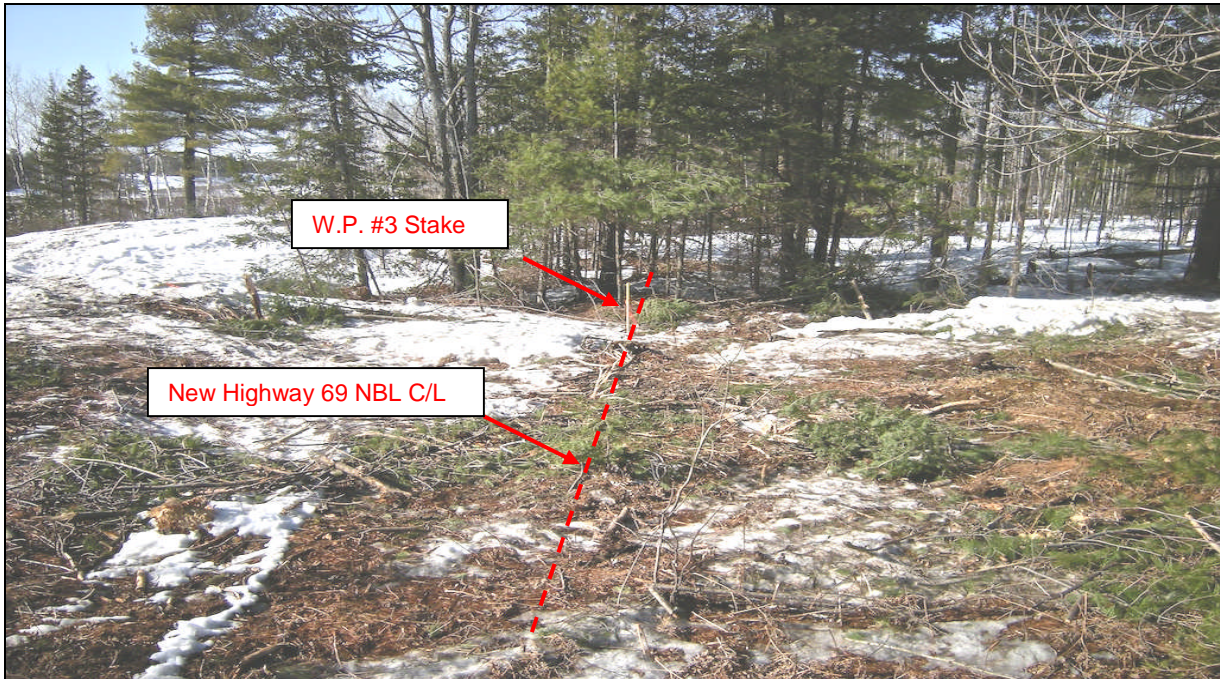
HWY No. 69	DIST 54
SUBM'D NR	CHECKED CN
DRAWN NA	CHECKED CN
DATE AUG. 26, 2009	APPROVED BRG
SITE 44-434/1	DWG 607-N

Highway 607 Overpass Northbound
Highway 69 Four-Laning, Phase 2
Site No. 44-434/1, W.P. 5277-05-01, Index No.: 1702FIR
PML Ref.: 06TF032F, August 28, 2009



APPENDIX A

Site Photographs



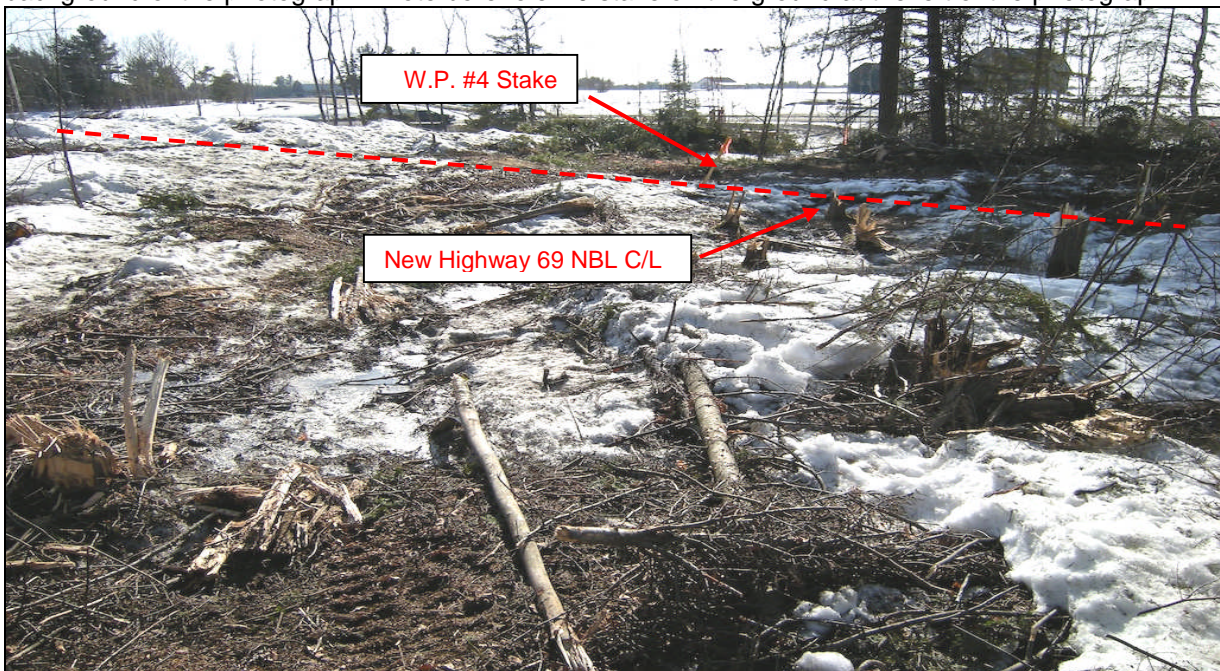
Photograph 1: Looking north from the south abutment, Station 11+994. Sparse woodland in the background of the photograph. Centre line of the future Highway 69 NBL depicted. Note W.P. #3 stake on the ground at the centre of the photograph.



Photograph 2: Looking east from the south abutment, Station 11+994. Sparse wooded area in the background of the photograph. Note borehole N2 stake on the ground at the right of the photograph.



Photograph 3: Looking east from the north abutment, Station 12+029 viewing sparse woodland in the background of the photograph. Note borehole N9 stake on the ground at the left of the photograph.

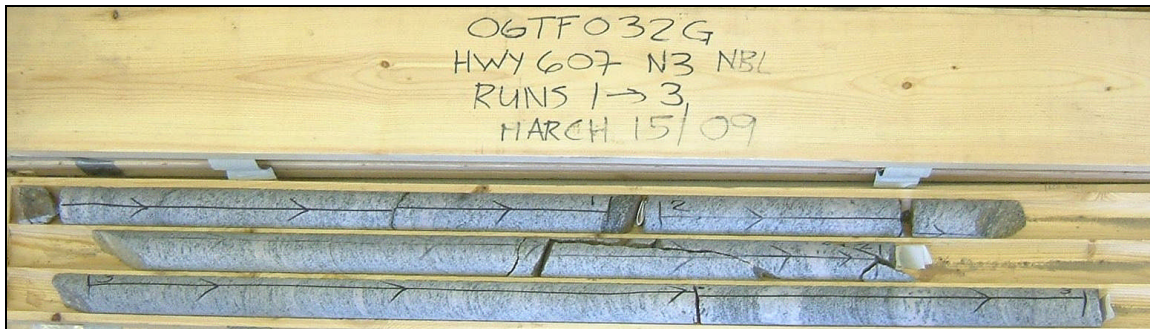


Photograph 4: Looking west from the north abutment, Station 12+029. Sparse trees and farmhouses in an open field area in the background of the photograph are in view. Centre line of the future Highway 69 NBL depicted. Note W.P. #4 stake on the ground at the centre of the photograph.



APPENDIX B

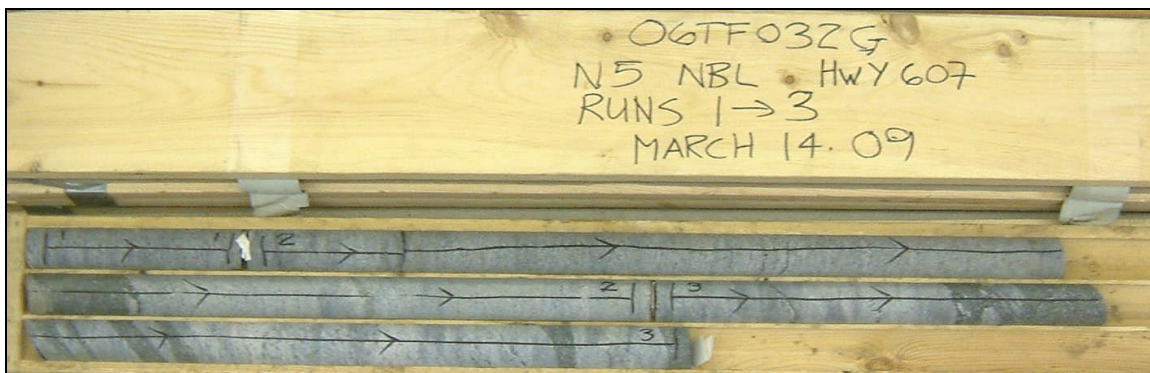
Rock Core Photographs



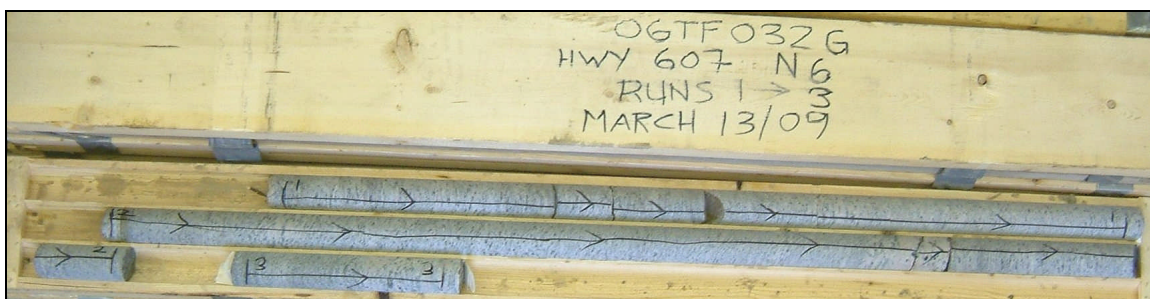
Photograph 1: Cores retrieved from Borehole N3. Runs 1 to 3.



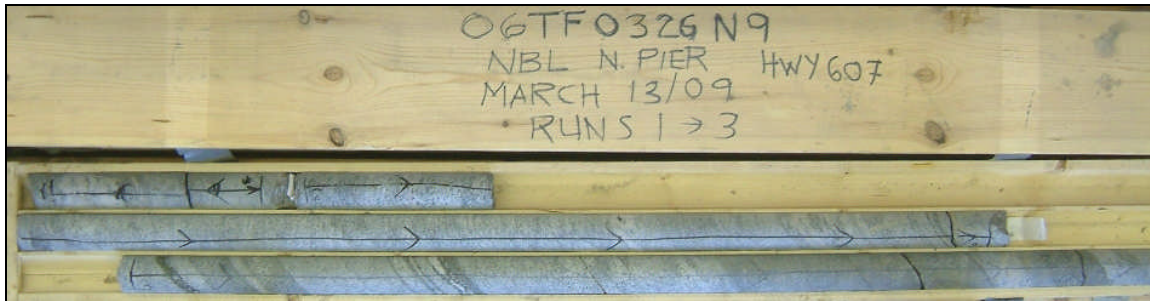
Photograph 2: Cores retrieved from Borehole N4. Runs 2 to 4.



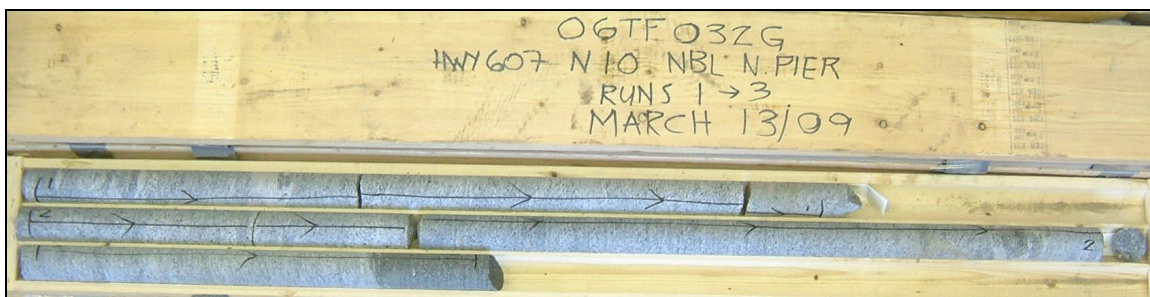
Photograph 3: Cores retrieved from Borehole N5. Runs 3 to 5.



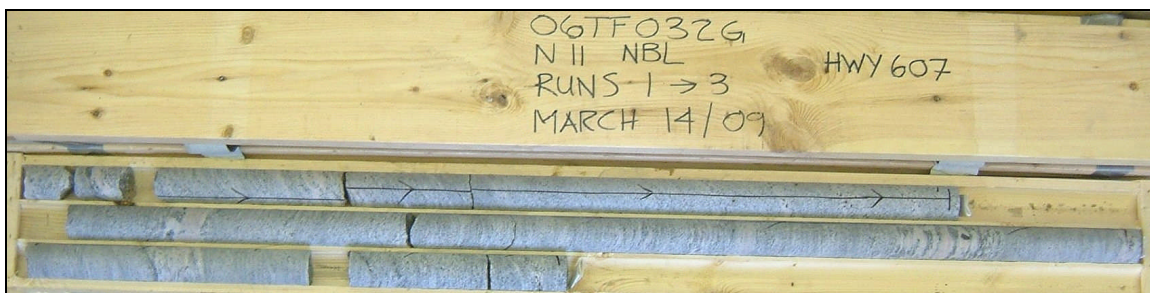
Photograph 4: Cores retrieved from Borehole N6. Runs 1 to 3.



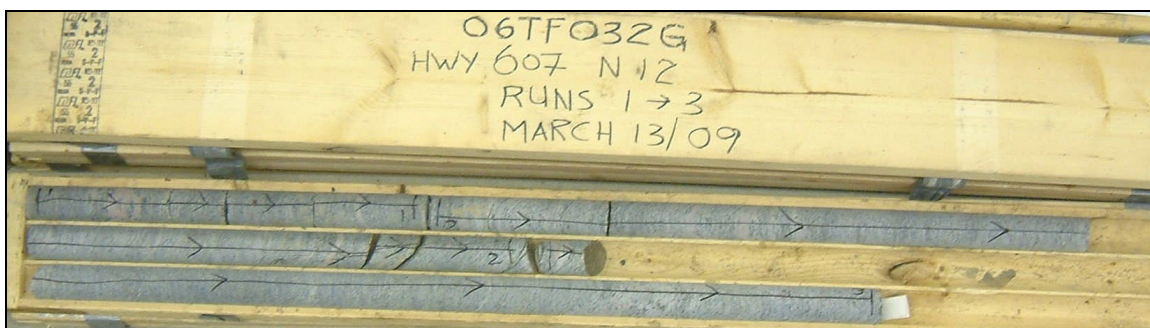
Photograph 5: Cores retrieved from Borehole N9. Runs 3 to 5.



Photograph 6: Cores retrieved from Borehole N10. Runs 1 to 3.



Photograph 7: Cores retrieved from Borehole N11. Runs 1 to 3.



Photograph 8: Cores retrieved from Borehole N12. Runs 2 to 4.