



TABLE 1
LIST OF ATTERBERG LIMITS

SOIL TYPE	BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
Clayey Silt	1	4	2.3 – 2.9	25	19	6	23
	2	2	0.8 – 1.4	25	19	6	25
	5	3	2.3 – 2.9	25	19	6	28
	7	4	2.3 – 2.9	24	20	4	25
	8	5	3.0 – 3.7	23	19	4	27
	9	4	2.3 – 2.9	25	19	6	29
	10	3	2.3 – 2.9	31	20	11	29
	11	6	3.8 – 4.4	22	17	5	24
	14	3	2.3 – 2.9	24	18	6	26
	16	2	0.8 – 1.4	30	19	11	26
	18	4	2.3 – 2.9	23	17	6	25
	19	3	2.3 – 2.9	23	19	4	25
Silty Clay	12	2	0.8 – 1.4	38	20	18	28
Silt	3	4	2.3 – 2.9	23	20	3	27
	4	3	1.5 – 2.1	22	19	3	24
	17	2	0.8 – 1.4	22	19	3	24



TABLE 2
 ROCK CORE DESCRIPTION

CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
2	4	1.9 – 3.4	100	76	1.9 – 4.9	GRANITIC GNEISS: Pink and grey, fine crystalline, high strength, slightly weathered to unweathered, close to moderate (locally very close) becoming wide (locally close) spaced flat to dipping cross joints, rough planar, tight to slightly altered with occasional scale, silt or sand on partings, good to excellent quality.
	5	3.4 – 4.9	95	90		
4	4	2.1 – 3.4	100	60	2.1 – 5.6	GRANITIC GNEISS: Pink and grey, fine to medium crystalline, high strength, unweathered, close to wide spaced flat to dipping cross joints, rough planar, tight, fair to excellent quality.
	5	3.4 – 5.0	98	90		
	6	5.0 – 5.6	100	100		
5	5	2.8 – 3.5	98	65	2.8 – 6.4	GRANITIC GNEISS: Pink and grey, fine to medium crystalline, high strength, slightly weathered to unweathered, close to moderate (locally very close) spaced flat to dipping cross joints, rough planar, tight to oxidized, with vertical fissures, poor to fair becoming good to excellent quality
	6	3.5 – 4.8	100	41		
	7	4.8 – 5.6	100	100		
	8	5.6 – 6.4	98	88		
7	6	3.2 – 4.5	100	89	3.2 – 6.5	GRANITIC GNEISS: Pink and grey, fine to medium crystalline, high strength, slightly weathered to unweathered, wide spaced flat to dipping cross joints, rough planar, tight, occasional vertical joints with yellow oxidation stains, good to excellent quality.
	7	4.5 – 5.9	100	99		
	8	5.9 – 6.5	100	100		

Originated: FP
 Compiled: JFW
 Checked: NR/CN



TABLE 2
 ROCK CORE DESCRIPTION

HOLE NO.	CORE RECOVERY				CORE DESCRIPTION	
	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
8	7	4.3 – 5.0	100	100	4.3 – 7.6	GRANITIC GNEISS: Grey, fine crystalline, high strength, unweathered, close to moderate spaced dipping cross joints, smooth planar, typically up to 1 mm thick and infilled with dark green mineralization (possible serpentine), excellent quality.
	8	5.0 – 6.5	98	98		
	9	6.5 – 7.6	100	100		
9	6	4.4 – 4.8	100	100	4.4 – 7.4	GRANITIC GNEISS: Grey, fine to medium crystalline, high strength, unweathered, close to wide spaced flat to dipping cross joints, rough planar, tight to slightly oxidized, core separates readily on black biotite layers, excellent quality.
	7	4.8 – 6.4	100	100		
	8	6.4 – 7.4	100	100		
10	7	4.2 – 4.9	100	52	3.9 – 4.2 4.2 – 7.3	BOULDER GRANITIC GNEISS: Pink and grey, fine to medium crystalline, with dipping vein of pyrite, high strength, slightly weathered to unweathered, close to wide spaced flat to dipping cross joints, rough planar, tight, with vertical fissure up to 5 mm wide, infilled with silt, with oxidation stains, fair to excellent quality.
	8	4.9 – 6.4	97	97		
	9	6.4 – 7.3	96	96		

Originated: FP
 Compiled: JFW
 Checked: NR/CN

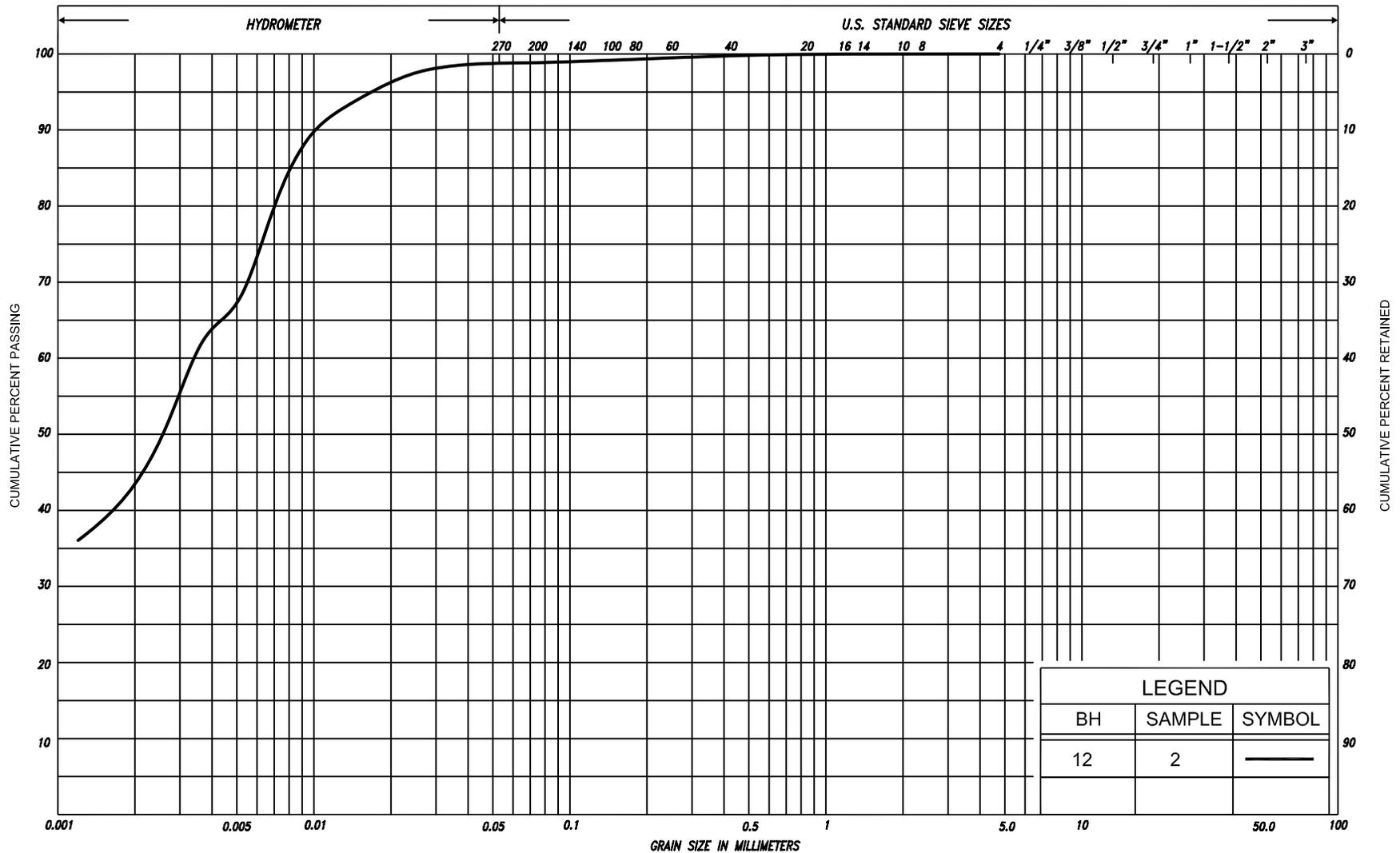


TABLE 2
 ROCK CORE DESCRIPTION

CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
13	4	3.3 – 3.5	100	100	3.3 – 6.5	GRANITIC GNEISS: Pink and grey, fine to medium crystalline, high strength, slightly weathered to unweathered, moderate spaced flat cross joints, rough planar, tight to oxidized, occasional vertical joints with rust coloured oxidation stains, excellent becoming fair quality at depth.
	5	3.5 – 5.1	95	95		
	6	5.1 – 6.5	100	66		
15	5	3.9 – 4.6	96	96	3.9 – 4.6 4.6 – 7.9	PROBABLE BOULDER GRANITIC GNEISS: Grey, fine to medium crystalline, high strength, moderately weathered (based on low recovery), close to very close spaced flat cross joints (see note), excellent, becoming very poor quality at depth. NOTE: Difficulties with extracting core required recoring to be necessary affecting RQD and recovery values.
	6	4.6 – 6.4	68	15		
	7	6.4 – 7.9	80	22		
16	6	5.0 – 6.4	95	95	5.0 – 8.2	GRANITIC GNEISS: Grey, fine to medium crystalline, high strength, unweathered, wide (locally close) spaced flat cross joints, rough planar, tight, excellent quality.
	7	6.4 – 7.9	100	94		
	8	7.9 – 8.2	100	100		
18	5	5.2 – 5.5	67	67	5.2 – 8.5	GRANITIC GNEISS: Grey, medium crystalline, high strength, slightly weathered to unweathered, wide (locally close) spaced flat to dipping cross joints, rough planar, oxidation stains on partings, fair becoming excellent quality.
	6	5.5 – 7.1	100	100		
	7	7.1 – 8.5	100	100		

NOTE: RQD = Rock Quality Designation

Originated: FP
 Compiled: JFW
 Checked: NR/CN



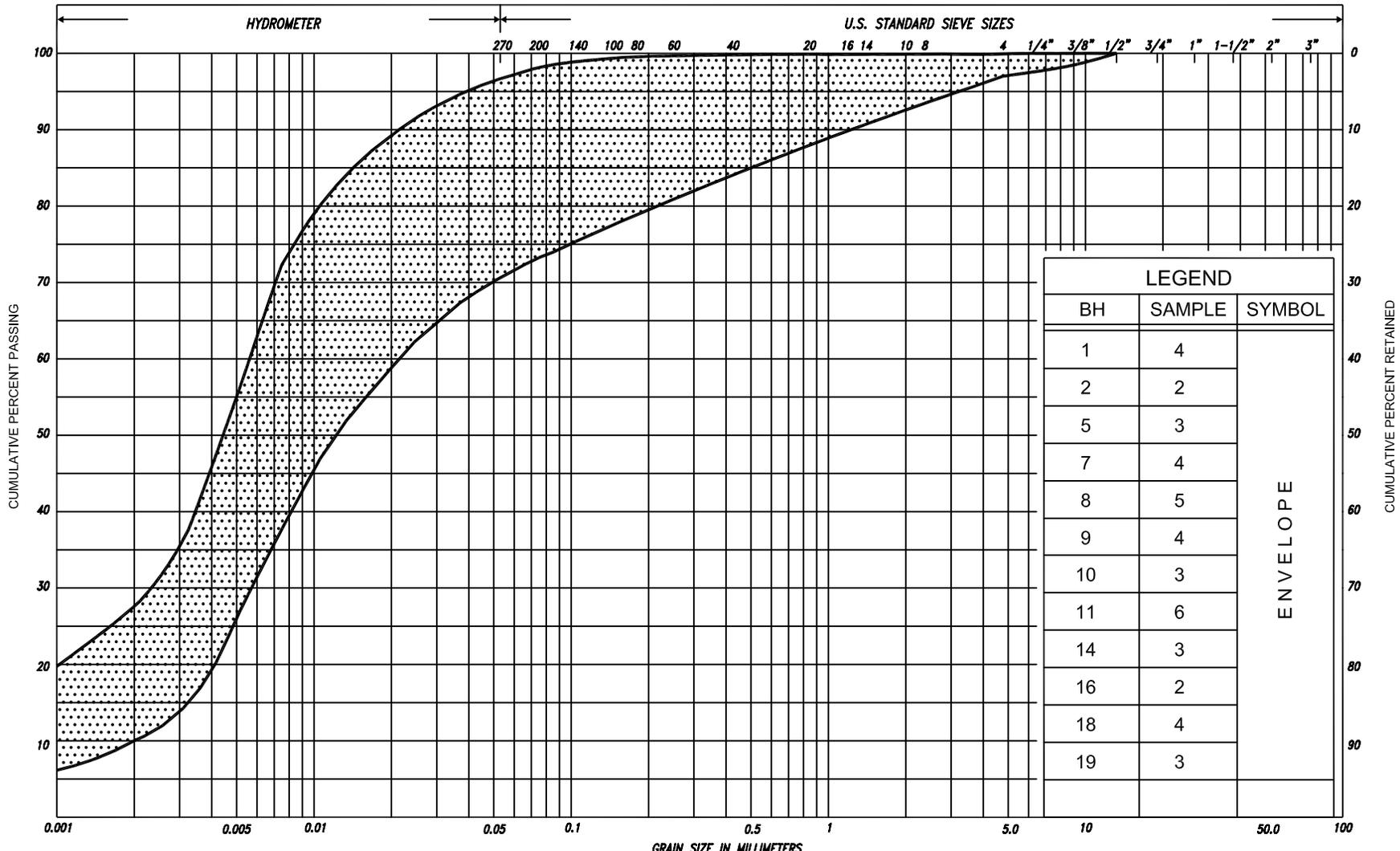
LEGEND		
BH	SAMPLE	SYMBOL
12	2	—

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

GRAIN SIZE DISTRIBUTION
SILTY CLAY, trace sand



FIG No. SR-GS-1
HWY: 69
W.P. No. 5271-05-01



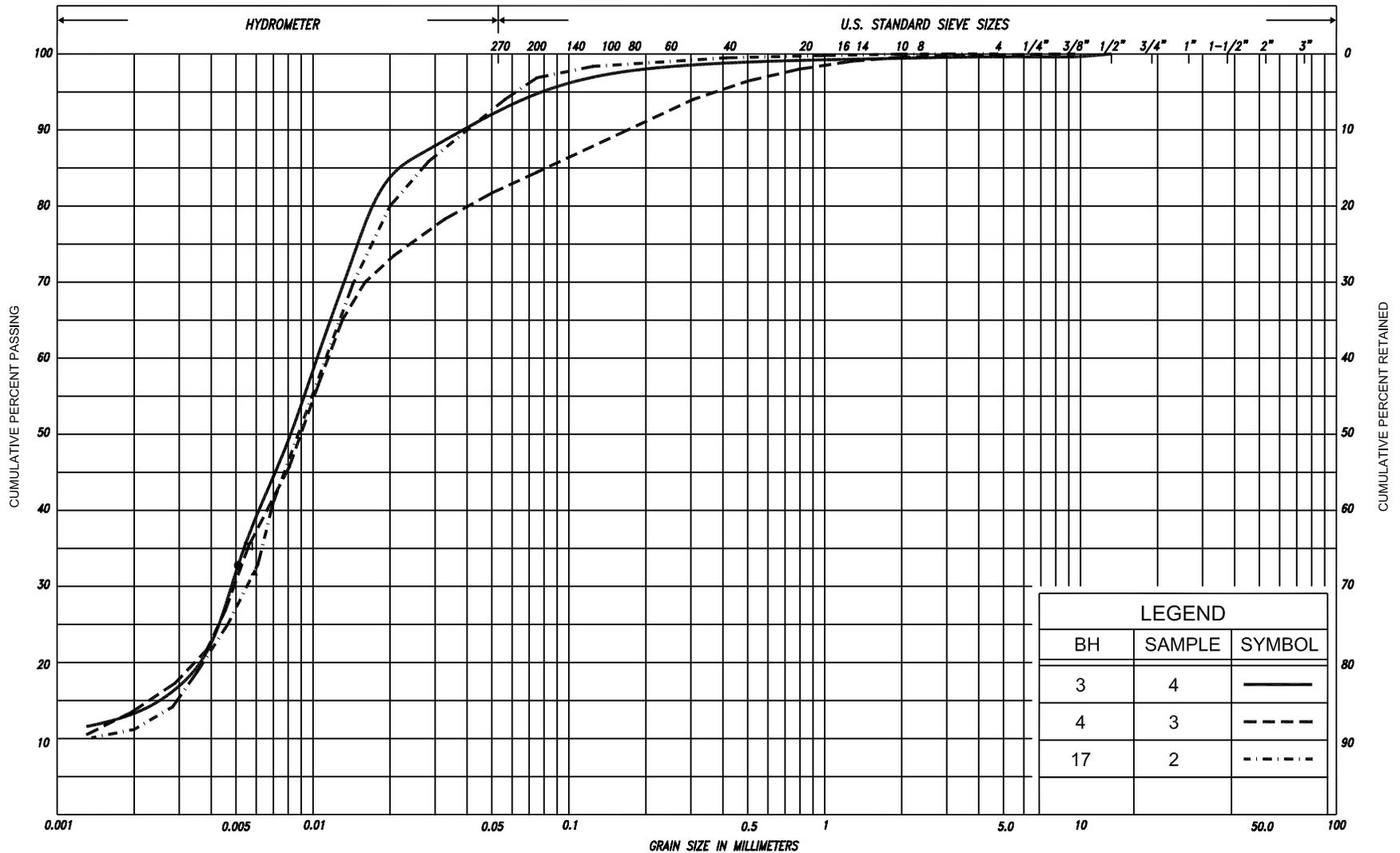
SILT & CLAY				FINE SAND			MEDIUM SAND		COARSE SAND		GRAVEL		COBBLES	UNIFIED	
CLAY	FINE SILT		MEDIUM SILT		COARSE SILT		FINE SAND		MEDIUM SAND		COARSE SAND		GRAVEL	COBBLES	M.I.T.
	CLAY		SILT			V. FINE SAND		FINE SAND		MED. SAND		COARSE SAND			



GRAIN SIZE DISTRIBUTION

CLAYEY SILT, trace to with sand, trace gravel

FIG No. SR-GS-2
 HWY: 69
 W.P. No. 5271-05-01



LEGEND		
BH	SAMPLE	SYMBOL
3	4	————
4	3	-----
17	2	- · - · - ·

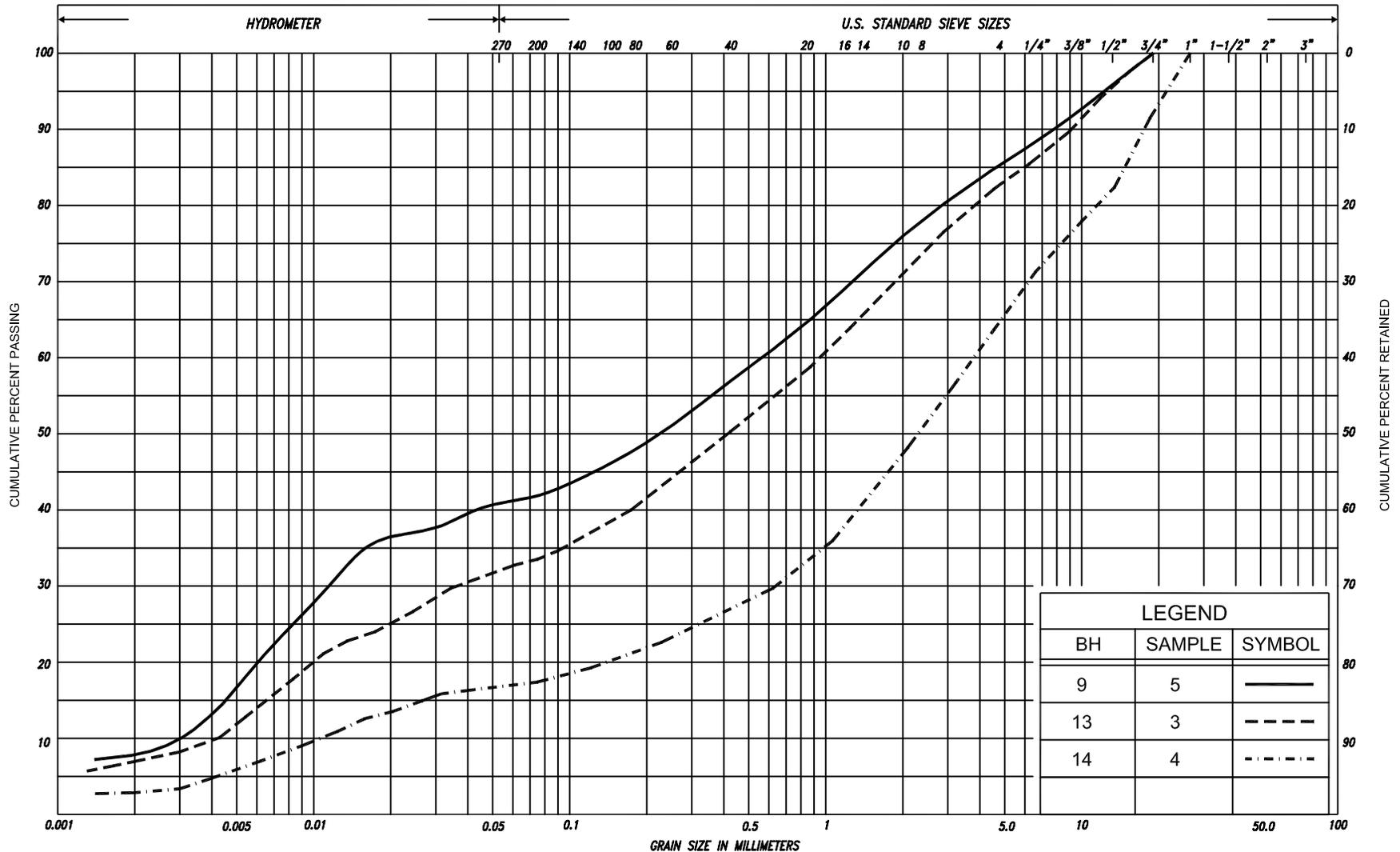
SILT & CLAY			FINE SAND			MEDIUM SAND			COARSE SAND			GRAVEL			COBBLES	UNIFIED	
CLAY	FINE SILT		MEDIUM SILT		COARSE SILT	FINE SAND		MEDIUM SAND		COARSE SAND		GRAVEL			COBBLES	M.I.T.	
CLAY		SILT			V. FINE SAND		FINE SAND		MED. SAND		COARSE SAND		GRAVEL			COBBLES	U.S. BUREAU



GRAIN SIZE DISTRIBUTION

SILT, some clay, trace to some sand, trace gravel

FIG No. SR-GS-3
 HWY: 69
 W.P. No. 5271-05-01



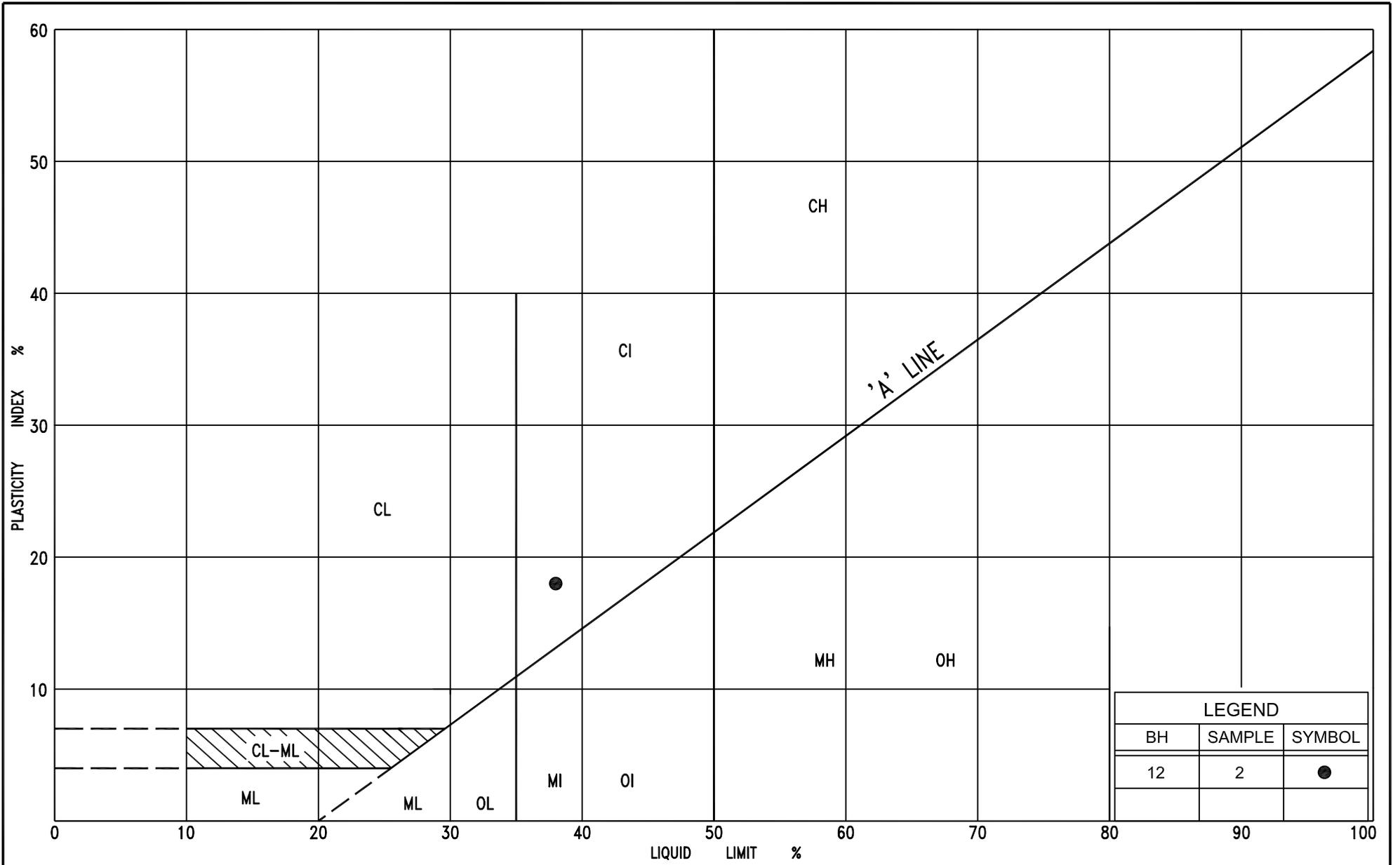
LEGEND		
BH	SAMPLE	SYMBOL
9	5	—————
13	3	- - - - -
14	4	- · - · -

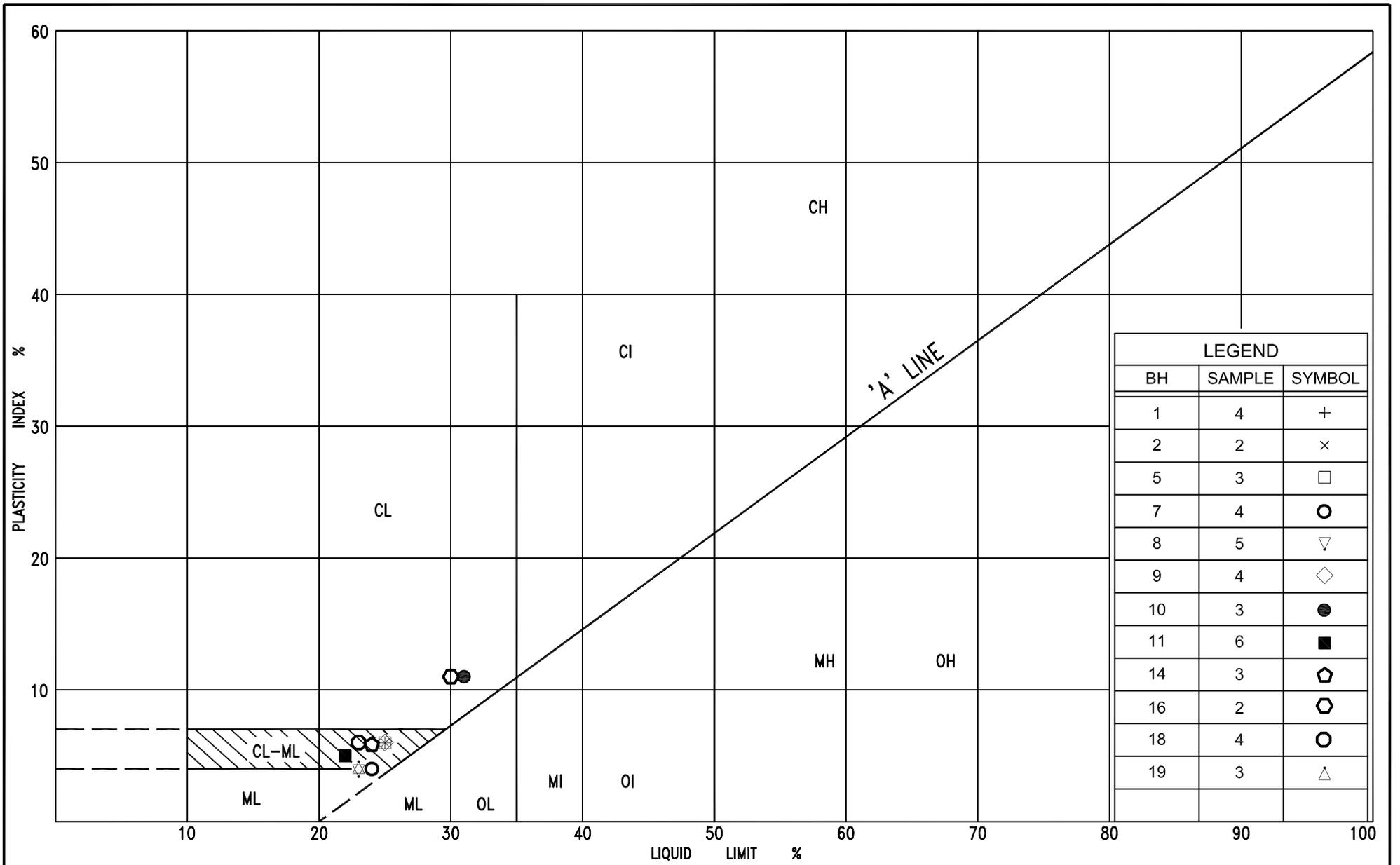
SILT & CLAY			FINE SAND			MEDIUM SAND			COARSE SAND			GRAVEL			COBBLES	UNIFIED
CLAY			SILT			SAND			SAND			GRAVEL			COBBLES	M.I.T.
CLAY			SILT			V. FINE SAND	FINE SAND	MED. SAND	COARSE SAND	GRAVEL			COBBLES	U.S. BUREAU		

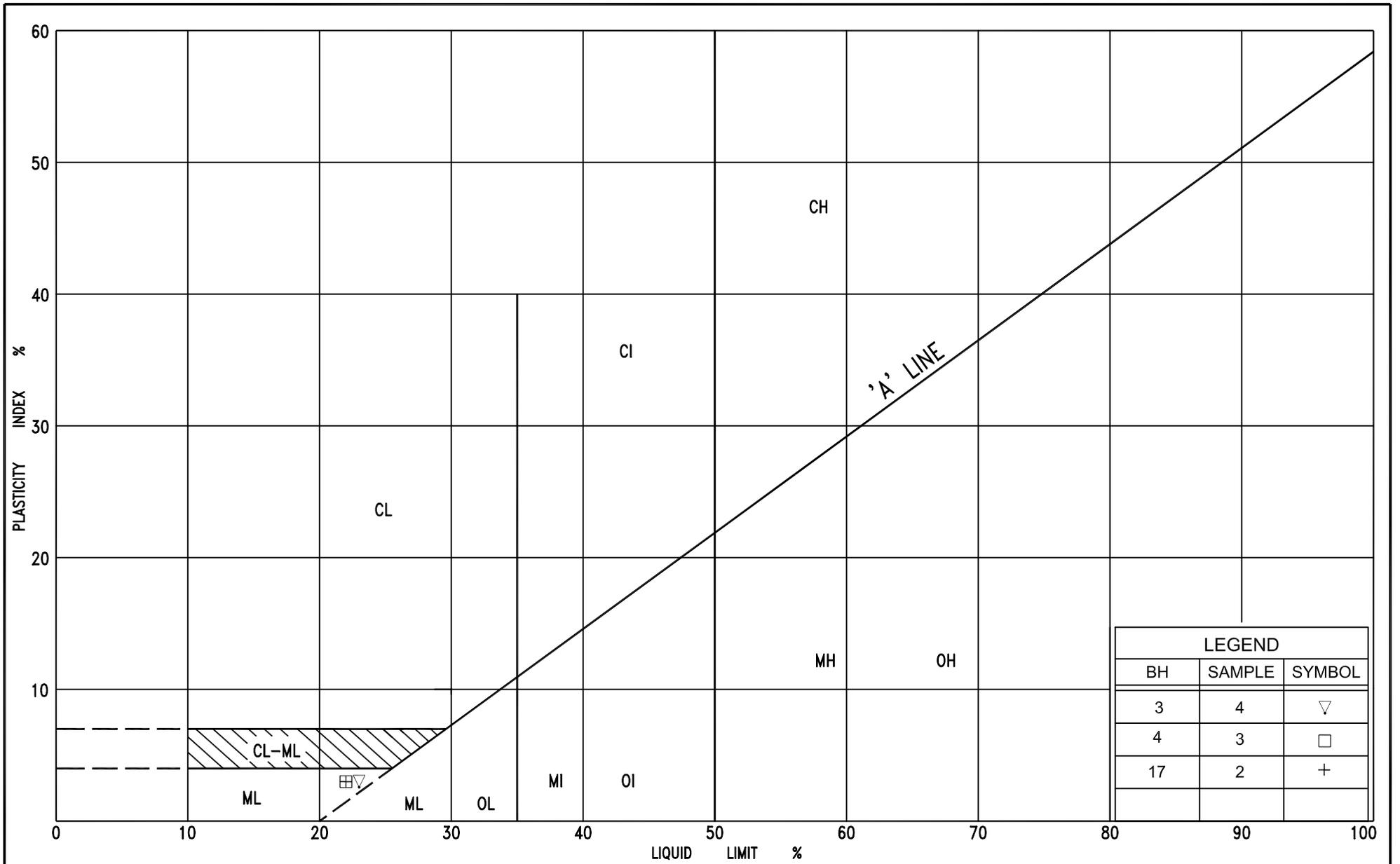
GRAIN SIZE DISTRIBUTION
 SILTY SAND, some gravel to
 SAND with silt, some gravel to
 GRAVELLY SAND, some silt, trace clay

FIG No. SR-GS-4
 HWY: 69
 W.P. No. 5271-05-01









PLASTICITY CHART

SILT, some clay, trace to some sand, trace gravel

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 (R Q D), 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
WS	WASH SAMPLE	OS	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
r_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 1

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 904.0 N; 221 614.7 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 03, 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
											○ UNCONFINED	+ FIELD VANE	WATER CONTENT (%)				GR SA SI CL
208.9	Ground surface																
0.0	Topsoil																
0.3	Silty clay, trace sand Very stiff Brown Moist		1	SS	4												
			2	SS	13					150							
			3	SS	6					138							
206.8	Clayey silt trace sand, trace gravel Very stiff		4	SS	24												1 1 86 12
2.1	Stiff		5	SS	8												
205.0	End of borehole Refusal on probable bedrock		6	SS	10/8cm												
3.9	Sample 6: Sampler bouncing * Borehole dry ■ Penetration test																

RECORD OF BOREHOLE No 2

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 905.0 N; 221 598.0 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.
 DATUM Geodetic DATE June 02, 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
											○ UNCONFINED	+ FIELD VANE	WATER CONTENT (%)			GR SA SI CL	
209.2	Ground surface																
0.0	Topsoil																
209.0	Clayey silt		1	SS	6												
0.2	trace sand, trace gravel																
	Firm <u> </u> Brown <u> </u> Wet <u> </u>		2	SS	13												1 2 87 10
	Silt seams																
207.3	Stiff Mottled grey/brown		3	SS	9/15cm												
1.9	Sand seams																
	Grey		4	RC NQ	REC 100%											RQD 76%	
	Granitic Gneiss bedrock																
	Slightly weathered to unweathered																
	High strength																
	Good to excellent quality.		5	RC NQ	REC 95%											RQD 90%	
204.3	End of borehole																
4.9	Sample 3: Sampler bouncing																
	* 2009 06 02																
	▽ Surface water observed during drilling																
	■ Penetrometer test																
	C.F.S.S.A. denotes Continuous Flight Solid Stem Augers																

RECORD OF BOREHOLE No 3

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 916.7 N; 221 601.7 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 03, 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
											○ UNCONFINED	+ FIELD VANE	WATER CONTENT (%)				
											● QUICK TRIAXIAL	× LAB VANE					
207.4	Ground surface																
0.0	Topsoil																
207.2	Clayey silt		1	SS	5												
0.2	trace sand, trace gravel																
	Very stiff Brown Moist		2	SS	11												
	Stiff		3	SS	6												
205.3	Silt, some clay																
2.1	trace sand, trace gravel																
	Compact Brown Wet																
	Sand seams																
204.1	Grey Wet																
3.3	End of borehole																
	Refusal on probable bedrock																
	Sample 5: Sampler bouncing																
	* 2009 06 03																
	▽ Water level observed during drilling																
	■ Penetrometer test																

RECORD OF BOREHOLE No 4

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 908.8 N; 221 597.0 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.
 DATUM Geodetic DATE June 02, 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	20
209.2	Ground surface																	
0.0	Topsoil		1	SS	6													
0.3	Clayey silt, trace sand organic inclusions		2	SS	10													
207.7	Stiff <u>Brown</u> <u>Moist</u> Silt seams																	
1.5	Silt some sand, some clay		3	SS	9													0 15 71 14
207.1	Loose <u>Grey</u> <u>Wet</u> Granitic Gneiss bedrock		4	RC NQ	REC 100%													RQD 60%
2.1	Unweathered High strength Fair to excellent quality.		5	RC NQ	REC 98%													RQD 90%
203.6			6	RC NQ	REC 100%													RQD 100%
5.6	End of borehole																	

* 2009 06 02
 ▽ Surface water observed during drilling
 ■ Penetrometer test
 C.F.S.S.A. denotes Continuous Flight Solid Stem Augers

RECORD OF BOREHOLE No 5

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 912.4 N; 221 596.5 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.
 DATUM Geodetic DATE June 02, 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	20	40	60
209.2	Ground surface																			
0.0	Topsoil																			
209.0	Clayey silt trace sand, trace gravel organic inclusions Firm to Brown Wet stiff	STRAT PLOT	1	SS	2															
0.2			2	SS	12															
			3	SS	11															
			4	SS	5															
206.4	Sand seams																			
2.8	Grey																			
	Granitic Gneiss bedrock Slightly weathered to unweathered High strength Poor to fair becoming good to excellent quality.	STRAT PLOT	5	RC NQ	REC 98%															
			6	RC NQ	REC 100%															
			7	RC NQ	REC 100%															
			8	RC NQ	REC 98%															
202.8	End of borehole																			
6.4																				

RECORD OF BOREHOLE No 6

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 907.7 N; 221 592.2 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 03, 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	20
209.0	Ground surface																	
0.0	Topsoil																	
208.8	Clayey silt trace sand, trace gravel organic inclusions		1	SS	1													
0.2			2	SS	10													
207.8	Firm Brown Moist					208												
1.2	End of borehole Refusal on probable bedrock																	

* 2009 06 03

∇ Surface water observed during drilling

∇ Surface water runoff after drilling

RECORD OF BOREHOLE No 7

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 918.7 N; 221 597.2 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.
 DATUM Geodetic DATE June 01, 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	20
209.0	Ground surface																	
0.0	Topsoil																	
208.8	Clayey silt trace sand, trace gravel organic inclusions		1	SS	8													
0.2	Very stiff Brown Wet		2	SS	11					125								
	Firm Mottled grey/brown		3	SS	11													
	silt seams		4	SS	9													
206.1	Sand, trace gravel		5	SS	20/5cm													
2.9	Compact Grey Wet																	
205.8	Granitic Gneiss bedrock		6	RC NQ	REC 100%													RQD 89%
	Slightly weathered to unweathered		7	RC NQ	REC 100%													RQD 99%
	High strength		8	RC NQ	REC 100%													RQD 100%
202.5	End of borehole																	
6.5	Sample 5: Sampler bouncing																	

RECORD OF BOREHOLE No 8

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 925.6 N; 221 553.1 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.
 DATUM Geodetic DATE June 03, 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					
											○ UNCONFINED	+ FIELD VANE				
											● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)			
209.5	Ground surface															
0.0	Topsoil		1	SS	3											Org. 5.8%
0.3	Silty clay, trace sand															
	Very stiff Brown Wet to firm		2	SS	9											
			3	SS	6											
	Silt seams		4	SS	6											
206.5	Clayey silt, trace sand															
3.0	Stiff to Grey Wet hard		5	SS	8											0 3 84 13
			6	SS	4/15cm											
205.2	Granitic Gneiss bedrock															
4.3	Unweathered		7	RC NQ	REC 100%											RQD 100%
	High strength															
	Excellent quality.		8	RC NQ	REC 98%											RQD 98%
			9	RC NQ	REC 100%											RQD 100%
201.9	End of borehole															
7.6	Sample 6: Sampler bouncing															
	* 2009 06 03															
	▽ Surface water observed during drilling															
	▽ Surface water runoff after drilling															
	■ Penetrometer test															

RECORD OF BOREHOLE No 9

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 936.6 N; 221 558.1 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.
 DATUM Geodetic DATE June 04, 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					
											○ UNCONFINED	+ FIELD VANE				
											● QUICK TRIAXIAL	× LAB VANE				
											WATER CONTENT (%)					
											20	40	60			
209.6	Ground surface															
0.0	Topsoil															
209.3			1	SS	7											
0.3	Silty clay, trace sand															
	Firm to Brown Moist stiff		2	SS	9							125		○		
208.1																
1.5	Clayey silt trace sand, trace gravel		3	SS	7									○		
	Stiff Grey Wet		4	SS	7									○		1 3 84 12
206.6																
3.0	Silty sand some gravel, trace clay		5	SS	24									○		15 43 34 8
	Compact Grey Wet															
205.2	cobbles and boulders															
4.4	Granitic Gneiss bedrock		6	RC NQ	REC 100%											RQD 100%
	Unweathered															
	High strength		7	RC NQ	REC 100%											RQD 100%
	Excellent quality.															
			8	RC NQ	REC 100%											RQD 100%
202.2	End of borehole															
7.4																

* 2009 06 04

▽ Water level observed during drilling

■ Penetrometer test

Sample 6: top 0.4m of coring was done in cobbles and boulders

RECORD OF BOREHOLE No 10

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 931.9 N; 221 553.7 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.
 DATUM Geodetic DATE June 03, 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	SHEAR STRENGTH kPa					
											○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)			GR	SA	SI	CL		
209.4	Ground surface																						
0.0	Topsoil		1	SS	2																		
0.3	Clayey silt trace sand, trace gravel		2	SS	9																		
	Firm to Brown Moist stiff		3	SS	4																		
	Silt seams		4	SS	10																		
			5	SS	4																		
205.5	Sand seams		6	SS	10/0cm																		
3.9	Boulder		7	RC NQ	REC 100%																		
205.2	Granitic Gneiss bedrock		8	RC NQ	REC 97%																		
	Slightly weathered to unweathered		9	RC NQ	REC 96%																		
	High strength																						
	Fair to excellent quality.																						
202.1	End of borehole																						
7.3	Sample 6: Sampler bouncing																						
	* 2009 06 03																						
	▽ Surface water observed during drilling																						
	▽ Surface water runoff after drilling																						
	■ Penetrometer test																						
	C.F.S.S.A. denotes Continuous Flight Solid Stem Augers																						

RECORD OF BOREHOLE No 11

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 930.0 N; 221 550.7 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 04, 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	SHEAR STRENGTH kPa					
											○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)			GR	SA	SI	CL		
209.3	Ground surface																						
0.0	Topsoil		1	SS	6																		
0.3	Clayey silt trace to some sand trace gravel																						
	Very stiff Brown Wet to firm		2	SS	11																		
	Silt seams		3	SS	5																		
			4	SS	8																		
			5	SS	6																		
	Sand seams		6	SS	6																		
204.9	Grey																						
4.4	End of borehole Refusal on probable bedrock																						

RECORD OF BOREHOLE No 12

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 927.3 N; 221 549.4 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 03, 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					
209.4	Ground surface															
0.0	Topsoil															
209.2	Silty clay, trace sand		1	SS	6											
0.2	Firm to Brown Moist stiff		2	SS	12											0 1 55 44
	Silt seams		3	SS	6											
	Grey		4	SS	5											
	Sand seams		5	SS	8											
205.1	End of borehole		6	SS	12											
4.3	Refusal on probable bedrock															

RECORD OF BOREHOLE No 13

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 947.2 N; 221 505.7 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. + Wash Boring and Rotary Diamond Coring COMPILED BY N.R.
 DATUM Geodetic DATE June 04, 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					
210.8 0.0	Ground surface Topsoil															
210.6 0.2	Clayey silt, trace sand Stiff Brown Moist		1	SS	11											
			2	SS	12											
209.3 1.5	Sand with silt some gravel, trace clay Dense Brown Wet cobble and boulders		3	SS	33											18 48 27 7
207.5 3.3	Granitic Gneiss bedrock Slightly weathered to unweathered High strength Excellent becoming fair quality at depth.		4	RC NQ	REC 100%											RQD 100%
			5	RC NQ	REC 95%											RQD 95%
			6	RC NQ	REC 100%											RQD 66%
204.3 6.5	End of borehole															

RECORD OF BOREHOLE No 14

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 958.3 N; 221 510.8 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 05, 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
											○ UNCONFINED	+ FIELD VANE					
											● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)				
210.3	Ground surface																
0.0	Topsoil																
210.1	Clayey silt trace sand, trace gravel Stiff Brown Wet	[Strat Plot]	1	SS	10												
0.2			2	SS	14												
			3	SS	8												
	silt seams																1 4 81 14
207.9	Gravelly sand some silt, trace clay Compact Brown Wet End of borehole Refusal on probable boulder	[Strat Plot]	4	SS	25												
2.4																	
207.6																	
2.7																	

* 2009 06 05
 ∇ Water level observed during drilling
 ▼ Water level measured after drilling
 ■ Penetration test

RECORD OF BOREHOLE No 15

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 953.5 N; 221 506.5 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.
 DATUM Geodetic DATE June 05, 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			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		
210.5 0.0	Ground surface Topsoil															
210.3 0.2	Clayey silt, trace sand Stiff <u>Brown</u> <u>Moist</u> silt layers		1	SS	8											
			2	SS	12											
			3	SS	15											
208.1	sand seams															
2.4	Sand trace silt, trace gravel cobbles and boulders Very dense <u>Brown</u> <u>Wet</u>		4	SS	10/8cm											
206.6	Probable boulder		5	RC NQ	REC 96%											RQD 96%
205.9	Granitic Gneiss bedrock Moderately weathered High strength Very poor quality.		6	RC NQ	REC 68%											RQD 15%**
			7	RC NQ	REC 80%											RQD 22%**
202.6	End of borehole															
7.9	Sample 4: Sampler bouncing * Borehole charged with drilling water ■ Penetration test ** Difficulties with extracting core caused recoring to be required, affecting RQD and recovery values. C.F.S.S.A. denotes Continuous Flight Solid Stem Augers															

RECORD OF BOREHOLE No 16

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 957.1 N; 221 505.9 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 09, 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					
											○ UNCONFINED	+ FIELD VANE	WATER CONTENT (%)			
											● QUICK TRIAXIAL	× LAB VANE	20	40	60	
210.5 0.0	Ground surface Topsoil															
210.3 0.2	Silty clay, trace sand		1	SS	7											
209.6 0.9	Firm to Brown Moist stiff		2	SS	10											1 4 68 27
	Clayey silt trace sand, trace gravel		3	SS	9											
	Stiff Brown Moist															
207.9 2.6	sand layers		4	SS	14/15cm											
	Sand, trace gravel cobbles and boulders															
	Very dense Brown Wet		5	SS	20/5cm											
205.5 5.0	Granitic Gneiss bedrock Unweathered High strength Excellent quality.		6	RC NQ	REC 95%											RQD 95%
			7	RC NQ	REC 100%											RQD 94%
202.3 8.2	End of borehole		8	RC NQ	REC 100%											RQD 100%
	Samples 4 & 5: Sampler bouncing															
	* 2009 06 09															
	∇ Water level observed during drilling															

RECORD OF BOREHOLE No 17

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 949.3 N; 221 501.2 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 04, 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	20
210.7 0.0	Ground surface Topsoil																	
210.5 0.2	Clayey silt, trace sand		1	SS	9													
209.9 0.8	Stiff Brown Moist Silt some clay, trace sand		2	SS	12	▽*												0 4 85 11
208.9 1.8	Compact Brown Wet Sand, trace gravel		3	SS	27	▽												
208.4 2.3	Compact Brown Wet End of borehole Refusal on probable bedrock																	

* 2009 06 02

▽ Water level observed during drilling

▽ Water level measured after drilling

RECORD OF BOREHOLE No 18

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 960.4 N; 221 506.3 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. + Wash Boring and Rotary Diamond Coring COMPILED BY N.R.
 DATUM Geodetic DATE June 08, 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	20
210.4 0.0	Ground surface Topsoil																	
210.2 0.2	Clayey silt trace sand, trace gravel Stiff to Brown Moist very stiff		1	SS	8							o						
	silt seams		2	SS	15				■			o						
			3	SS	15			■				o						
	with sand		4	SS	13													4 22 62 12
207.6 2.8	Sand trace silt, trace gravel cobbles and boulders																	
205.2 5.2	Granitic Gneiss bedrock Slightly weathered to unweathered High strength		5	RC NQ	REC 67%													RQD 67%
	Fair becoming excellent quality.		6	RC NQ	REC 100%													RQD 100%
			7	RC NQ	REC 100%													RQD 100%
201.9 8.5	End of borehole																	

RECORD OF BOREHOLE No 19

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 961.9 N; 221 488.3 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 08, 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	20	40
210.0	Ground surface																		
0.0	Topsoil																		
209.8	Clayey silt, some sand, trace gravel Stiff Brown Moist to wet silt layers		1	SS	8														
0.2			2	SS	13														
			3	SS	14														
208.2	Sand trace silt, trace gravel																		
1.8																			
207.6	Compact Brown Wet																		
2.4	End of borehole Refusal on probable boulder																		

RECORD OF BOREHOLE No AP2 1 of 1 **METRIC**

W.P. 5271-05-01 LOCATION Coords: 5 096 944.4 N; 221 502.2 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 09, 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/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		
210.9 0.0	Ground surface Topsoil															
210.7 0.2	Clayey silt, trace sand Stiff Brown Moist															
	silt layers															
	sand layers															
208.5 2.4	Sand, trace gravel cobble and boulders															
207.7 3.2	Compact Brown Wet End of borehole Refusal on probable boulder															

* 2009 06 09

Water level observed during drilling

NOTE: Consistency and relative density estimated from observed auger resistance to advance the probe hole.

RECORD OF BOREHOLE No AP3

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 951.1 N; 221 511.9 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 09, 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	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
210.5	Ground surface																		
0.0	Topsoil																		
210.2	Clayey silt, trace sand																		
0.3	Stiff Brown Moist silt layers																		
	sand layers																		
208.2	Sand, trace gravel cobbles and boulders																		
2.3	Compact Brown Wet																		
207.6	End of borehole																		
2.9	Refusal on probable boulder																		

* 2009 06 09

∇ Water level observed during drilling

\blacktriangledown Water level measured after drilling

NOTE: Consistency and relative density estimated from observed auger resistance to advance the probe hole.

RECORD OF BOREHOLE No AP4

1 of 1

METRIC

W.P. 5271-05-01 LOCATION Coords: 5 096 964.6 N; 221 511.5 E ORIGINATED BY F.P.
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.
 DATUM Geodetic DATE June 09, 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	20	40	60	80						100
											○ UNCONFINED	+ FIELD VANE					
											● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)				
210.1	Ground surface																
0.0	Clayey silt, trace sand																
	Stiff Brown Moist																
	silt layers																
207.8																	
2.3	Sand, trace gravel cobbles and boulders																
206.9	Compact Brown Wet																
3.2	End of borehole Refusal on probable boulder																

* 2009 06 09

▽ Surface water observed during drilling

▼ Surface water runoff after drilling

NOTE: Consistency and relative density estimated from observed auger resistance to advance the probe hole.

RECORD OF BOREHOLE No SR-1 1 of 1 **METRIC**

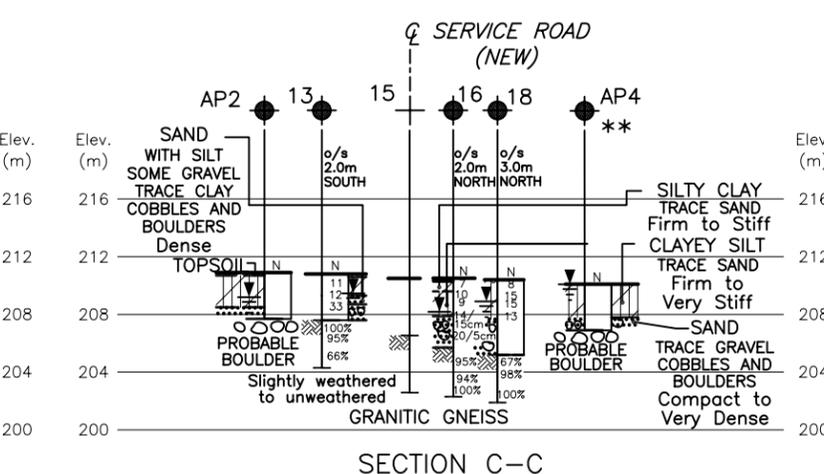
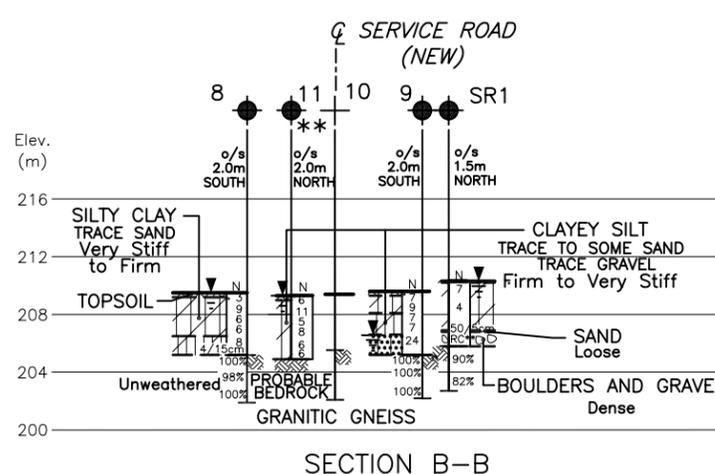
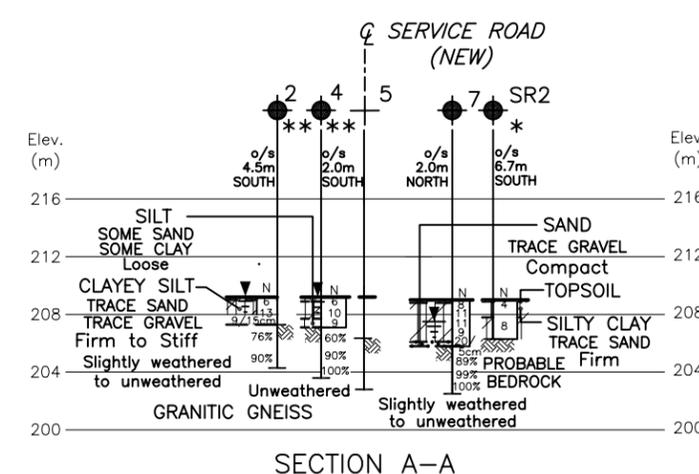
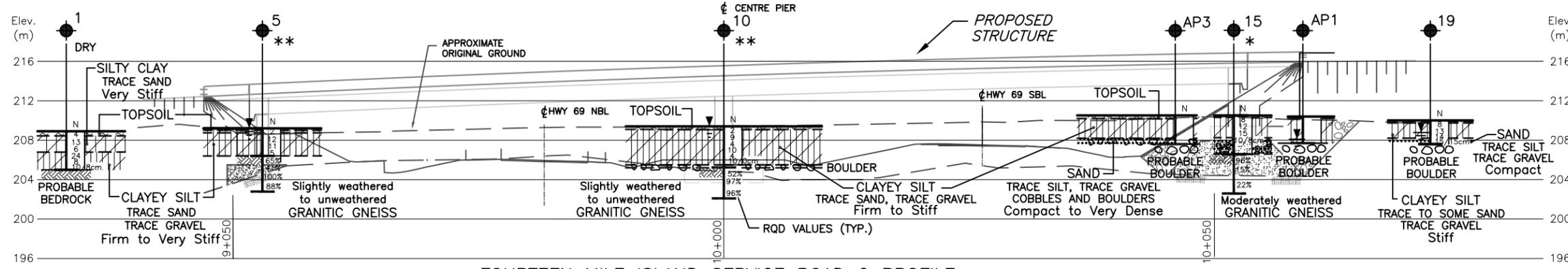
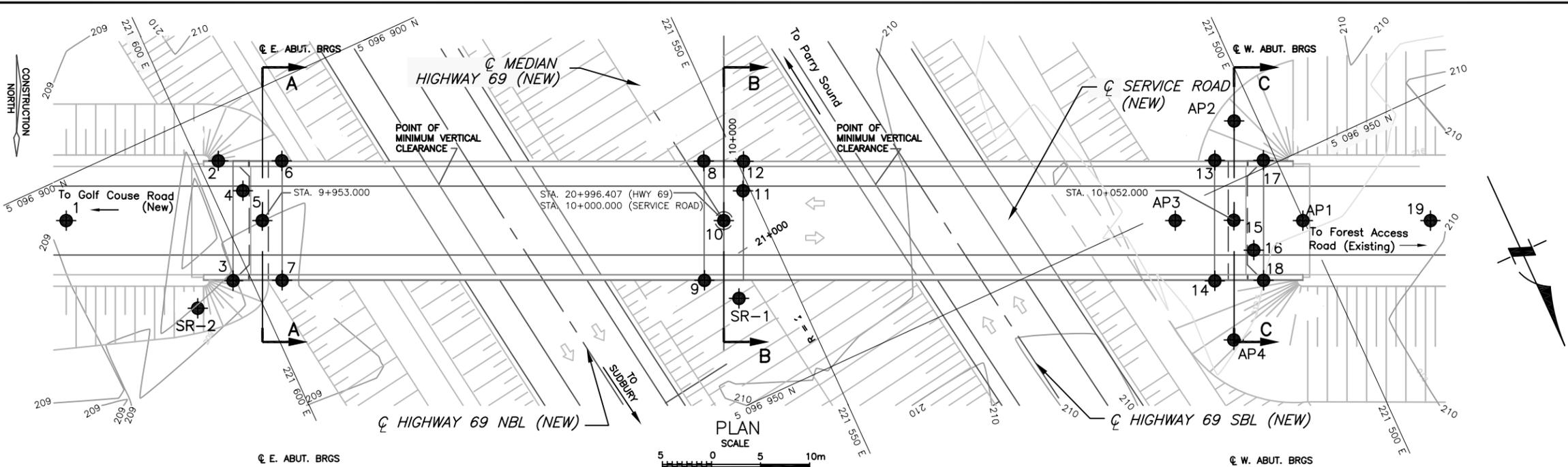
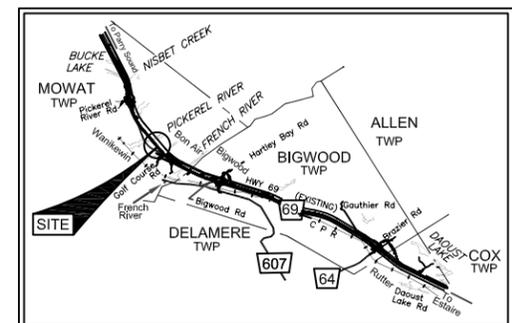
W.P. 5271-05-01 LOCATION Service Road Underpass ORIGINATED BY M.R.
 Co-ords. 5 096 939.8 N; 221 555.6 E
 DIST 54 HWY 69 BOREHOLE TYPE C.F.H.S.A. & NQ Rock Coring COMPILED BY M.R.
 DATUM Geodetic DATE May 26, 2004 CHECKED BY D.W.K.

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					
210.3 0.0	Ground Surface															
210.2 0.1	Topsoil Silty clay, trace sand silt lenses Firm <u> </u> <u>Brown</u> <u> </u> <u>APL</u> thin layers of silt		1	SS	7											
			2	SS	4											
206.9 3.4			3	SS	50/5cm											
206.8 3.5	Sand, fine to medium Loose <u> </u> <u>Brown</u> <u>Wet</u> Boulders and gravel in silty sand matrix		4	RC NQ	RC**											
205.8 4.5	Dense <u> </u> <u>Grey</u> <u>Wet</u> Bedrock Granitic Gneiss High strength Good quality		5	RC NQ	REC 95%											RQD 90%
			6	RC NQ	REC 97%											RQD 82%
202.7 7.6	End of borehole															

RECORD OF BOREHOLE No SR-2 1 of 1 METRIC

W.P. 5271-05-01 LOCATION Service Road Underpass ORIGINATED BY M.R.
 Co-ords. 5 096 917.7 N; 221 606.2 E
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Hollow Stem Augers COMPILED BY M.R.
 DATUM Geodetic DATE May 26, 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	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20	40	60	80	100	W _p	w			W _L	GR
209.0 0.0	Ground Surface																	
208.9 0.1	Topsoil Silty clay, trace sand Firm Brown Moist		1	SS	4													
207.8 1.2	Clayey silt, trace sand Firm Brown Wet to stiff		2	SS	8													
206.3 2.7	End of borehole Refusal on probable bedrock * Borehole dry on completion of drilling																	



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: June 2009 and May 2004.
- * Water level not established
- ** Surface water observed
- ▽ Head
- ▽ ARTESIAN WATER
- ▽ Encountered
- PIEZOMETER

BH No	ELEVATION	CO-ORDINATES	
		NORTHINGS	EASTINGS
1	208.9	5 096 904.0	221 614.7
2	209.2	5 096 905.0	221 598.0
3	207.4	5 096 916.7	221 601.7
4	209.2	5 096 908.8	221 597.0
5	209.2	5 096 912.4	221 596.5
6	209.0	5 096 907.7	221 592.2
7	209.0	5 096 918.7	221 597.2
8	209.5	5 096 925.6	221 553.1
9	209.6	5 096 936.6	221 558.1
10	209.4	5 096 931.9	221 553.7
11	209.3	5 096 930.0	221 550.7
12	209.4	5 096 927.3	221 549.4
13	210.8	5 096 947.2	221 505.7
14	210.3	5 096 958.3	221 510.8

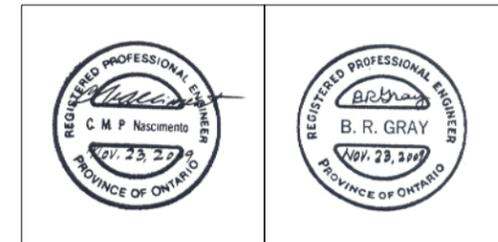
- NOTES:**
- DRAWING FMSR-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND RECORD OF BOREHOLE LOGS.
 - THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
 - COORDINATES OF BOREHOLES WERE PROVIDED BY MRC IN REFERENCED GENERAL ARRANGEMENT DRAWING.
 - ALL DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES + METRES.

Legend Continued

BH No	ELEVATION	CO-ORDINATES	
		NORTHINGS	EASTINGS
AP1	210.4	5 096 956.5	221 500.1
AP2	210.9	5 096 944.4	221 502.2
AP3	210.5	5 096 951.1	221 511.9
AP4	210.1	5 096 964.6	221 511.5
SR-1	210.3	5 096 939.8	221 555.6
SR-2	209.0	5 096 917.7	221 606.2

Legend Continued

BH No	ELEVATION	CO-ORDINATES	
		NORTHINGS	EASTINGS
15	210.5	5 096 953.5	221 506.5
16	210.5	5 096 957.1	221 505.9
17	210.7	5 096 949.3	221 501.2
18	210.4	5 096 960.4	221 506.3
19	210.0	5 096 961.9	221 488.3



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. 411-246

HWY No 69	CHECKED NR	DATE NOV. 23, 2009	SITE 44-431	DIST 54
SUBM'D MN	CHECKED CN	APPROVED BRG	DWG FMSR-1	

REF No. MRC Drawings;
S6454-330-001GA.dwg; dated JUN 2009 MODIFIED NOV. 20, 2009
and H6454xb2 contours zone 10

Fourteen Mile Island Service Road Underpass
Highway 69 Four-Laning, Phase 2
Site No. 44-431, W.P. 5271-05-01, Index No.: 1865FIR
PML Ref.: 06TF032H, November 23, 2009



APPENDIX A

Site Photographs



Photograph 1: Looking south from the west abutment, approximate Sta. 10+060. Flat ground heavily wooded to the west with a slight dip in ground elevation at west end of the west abutment is in view of the photograph. (May 27, 2009).

Fourteen Mile Island Service Road Underpass
Highway 69 Four-Laning, Phase 2
Site No. 44-431, W.P. 5271-05-01, Index No.: 1865FIR
PML Ref.: 06TF032H, November 23, 2009



APPENDIX B

Rock Core Photographs



Photograph 1: Cores retrieved from borehole 2. RQD values obtained 76 and 90% for runs 4 and 5 from 1.9 to 4.9 m depth, respectively. Good to excellent rock quality.



Photograph 2: Cores retrieved from borehole 4. RQD values obtained 60, 90 and 100% for runs 4 to 6, respectively, from 2.1 to 5.6 m depth. Rock quality is fair becoming excellent.



Photograph 3: Cores retrieved from borehole 5. RQD values obtained 65, 41, 100 and 88% for runs 5 to 8, respectively, from 2.8 to 6.4 m depth, indicating poor to fair becoming good to excellent rock quality.



Photograph 4: Cores retrieved from borehole 7. Runs 6 to 8 from 3.2 to 6.5 m depth. RQD ranged from 89 to 100%, indicating good to excellent rock quality.



Photograph 5: Cores retrieved from borehole 8. Runs 7 to 9 from 4.3 to 7.6 m depth. RQD values obtained 98 to 100%, indicating excellent rock quality.



Photograph 6: Cores retrieved from borehole 9. Runs 6 to 8 from 4.4 to 7.4 m depth. RQD values obtained are 100%, indicating excellent rock quality.



Photograph 7: Cores retrieved from borehole 10. Runs 7 to 9 from 4.2 to 7.3 m depth. RQD values obtained are 52, 97 and 96%, indicating fair to excellent rock quality.



Photograph 8: Cores retrieved from borehole 13. RQD values obtained are 100, 95 and 66% for runs 4 to 6, respectively, from 3.3 to 6.5 m depth, indicating excellent rock quality becoming fair at depth.



Photograph 9: Cores retrieved from borehole 15. RQD value obtained 96% for run 5 in possible boulder from 3.9 to 4.6 m depth, and 15 and 22% for runs 6 and 7, respectively, from 4.6 to 7.9 m depth in Granitic Gneiss bedrock, indicating very poor rock quality. (Note: Technical difficulties with extracting cores required recoring, affecting recovery and RQD values of runs 6 and 7.)



Photograph 10: Cores retrieved from borehole 16. Runs 6 to 8 from 5.0 to 8.2 m depth. RQD values obtained ranged from 94 to 100%, indicating excellent rock quality.



Photograph 11: Cores retrieved from borehole 18. RQD values obtained 67, 100 and 100% for runs 5, 6 and 7, respectively, from 5.2 to 8.5 m depth, indicating fair becoming excellent rock quality.