



**TABLE 1**  
**LIST OF ATTERBERG LIMITS**

SOIL TYPE	BOREHOLE NO.	SAMPLE NO.	DEPTH (m)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
Clayey Silt	BH-2	4	2.3 – 2.9	23	16	7	22
	BH-4	2	0.8 – 1.4	32	19	13	25
Silty Clay	BH-2	2	0.8 – 1.4	46	22	24	34
Silt	BH-19	1	0.0 – 0.6	Non-plastic			16



**TABLE 2**  
**ROCK CORE DESCRIPTIONS**

CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
BH-3	5	4.1 – 4.2	100	100	4.1 – 7.1	AMPHIBOLITE: Dark green to black with pink matrix, fine to medium crystalline, with inclusion of quartz and biotite, coarse crystalline, with occasional white bands, trace metallic, medium to high strength, slightly weathered to unweathered, close to moderate becoming very close to close spaced flat to dipping cross joints, rough to smooth planar, tight to oxidized with silt or minor scale on parting surface, occasional vertical joints with orange oxidation stains, good to excellent quality.
	6	4.2 – 5.6	96	76		
	7	5.6 – 7.1	100	78		
BH-4	4	3.3 – 3.7	100	100*	3.3 – 3.5	COBBLES
	5	3.7 – 4.6	100	97	3.5 – 5.6	MIGMATITE: Grey, fine to medium grained, slight banding, high strength, slightly weathered to unweathered, close to moderate spaced flat to dipping cross joints, rough planar, tight to oxidized with silt on parting surface, excellent quality.  * Upper portion of core is cobbles, not included in RQD.
	6	4.6 – 5.6	100	93		
BH-5	2	2.7 – 3.0	81	0	2.7 – 3.3	COBBLES & BOULDERS  AMPHIBOLITE/MIGMATITE: Dark grey to black, becoming light grey with dipping bands, fine to medium crystalline, with red layer, trace metallic, high strength, slightly weathered to unweathered, very close to close becoming close to wide spaced flat to dipping cross joints, rough planar, tight to oxidized with scale on parting surface, good to excellent quality.
	3	3.0 – 3.3	50	0	3.3 – 6.5	
	4	3.3 – 4.4	88	81		
	5	4.4 – 5.9	100	93		
	6	5.9 – 6.5	100	100		

Originated: MR and FP

Compiled: JW

Checked: NR/CN



**TABLE 2**  
**ROCK CORE DESCRIPTIONS**

CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
BH-6	4	2.7 – 3.5	100	89	2.7 – 5.8	AMPHIBOLITE/MIGMATITE: Dark grey to black and white, becoming light grey, dipping bands, 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 silt or slight scale on parting surface, dipping pink layer at 5.4 m depth, 5 to 10 mm thick with discontinuous voiding, secondary crystals, good to excellent quality.
	5	3.5 – 5.1	100	98		
	6	5.1 – 5.8	98	98		
BH-9	1	0.1 – 1.7	100	100	0.1 – 3.4	MIGMATITE: Pink and grey, dipping bands, fine to medium crystalline, with some coarse feldspar, high strength, slightly weathered to unweathered, close to moderate spaced flat to dipping cross joints, rough planar, tight to oxidized with silt on parting surface, excellent quality.
	2	1.7 – 2.5	98	98		
	3	2.5 – 3.4	100	97		
BH-10	1	0.2 – 1.5	100	100	0.2 – 3.5	MIGMATITE: Pink and grey, dipping bands, fine to medium crystalline, with some coarse feldspar, high strength, slightly weathered to unweathered with 10 mm thick highly weathered (friable) layer at 3.0 m depth, close to moderate spaced flat to dipping cross joints, rough planar, tight to oxidized with silt (locally sandy) on parting surface, excellent quality.
	2	1.5 – 3.1	98	98		
	3	3.1 – 3.5	100	97		

Originated: MR and FP

Compiled: JW

Checked: NR/CN



TABLE 2  
ROCK CORE DESCRIPTIONS

CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
BH-11	1	0.0 – 1.2	98	93	0.0 – 3.4	AMPHIBOLITE/MIGMATITE: Pink and light grey with black layers, becoming dark grey to black with occasional white dipping bands, fine to medium crystalline, with occasional pegmatite layers, coarse crystalline, core occasionally separating on biotite concentrations, high strength, slightly weathered, moderate to wide (locally very close) spaced flat to dipping cross joints, rough planar, tight to oxidized with silt on parting surface, occasional vertical fissure, excellent quality.
	2	1.2 – 2.7	100	95		
	3	2.7 – 3.4	100	90		
BH-12	1	0.0 – 1.3	98	93	0.0 – 3.5	AMPHIBOLITE/MIGMATITE: Dark grey with white dipping bands, with white layers, fine to medium crystalline, high strength, slightly weathered to unweathered, moderate to wide spaced flat cross joints, rough planar, tight to oxidized, excellent quality.
	2	1.3 – 2.8	100	95		
	3	2.8 – 3.5	100	90		
BH-15	2	0.7 – 1.7	100	100	0.7 – 3.6	MIGMATITE: Light grey with occasional pink dipping bands, becoming light grey to pink with dark grey dipping layers, occasional green seams, fine to medium grained, high strength, slightly weathered to unweathered, close to moderate spaced flat to dipping cross joints, rough planar, tight to oxidized with silt or slight scale on parting surface, good to excellent quality.
	3	1.7 – 3.1	98	93		
	4	3.1 – 3.6	97	82		
BH-16	4	2.3 – 3.1	95	95	2.3 – 5.5	AMPHIBOLITE/MIGMATITE: Dark grey with dipping bands, becoming light grey and pink with dipping layers, fine to medium crystalline, high strength, slightly weathered to unweathered, close to moderate spaced flat to dipping cross joints, rough planar, tight to oxidized with silt on parting surface, excellent quality, with close spaced dipping to vertical joints below 5.0 m depth, slickensided planar, altered dark green on parting, fair to excellent quality.
	5	3.1 – 4.6	100	95		
	6	4.6 – 5.5	100	71		

Originated: MR and FP

Compiled: JW

Checked: NR/CN



**TABLE 2**  
**ROCK CORE DESCRIPTIONS**

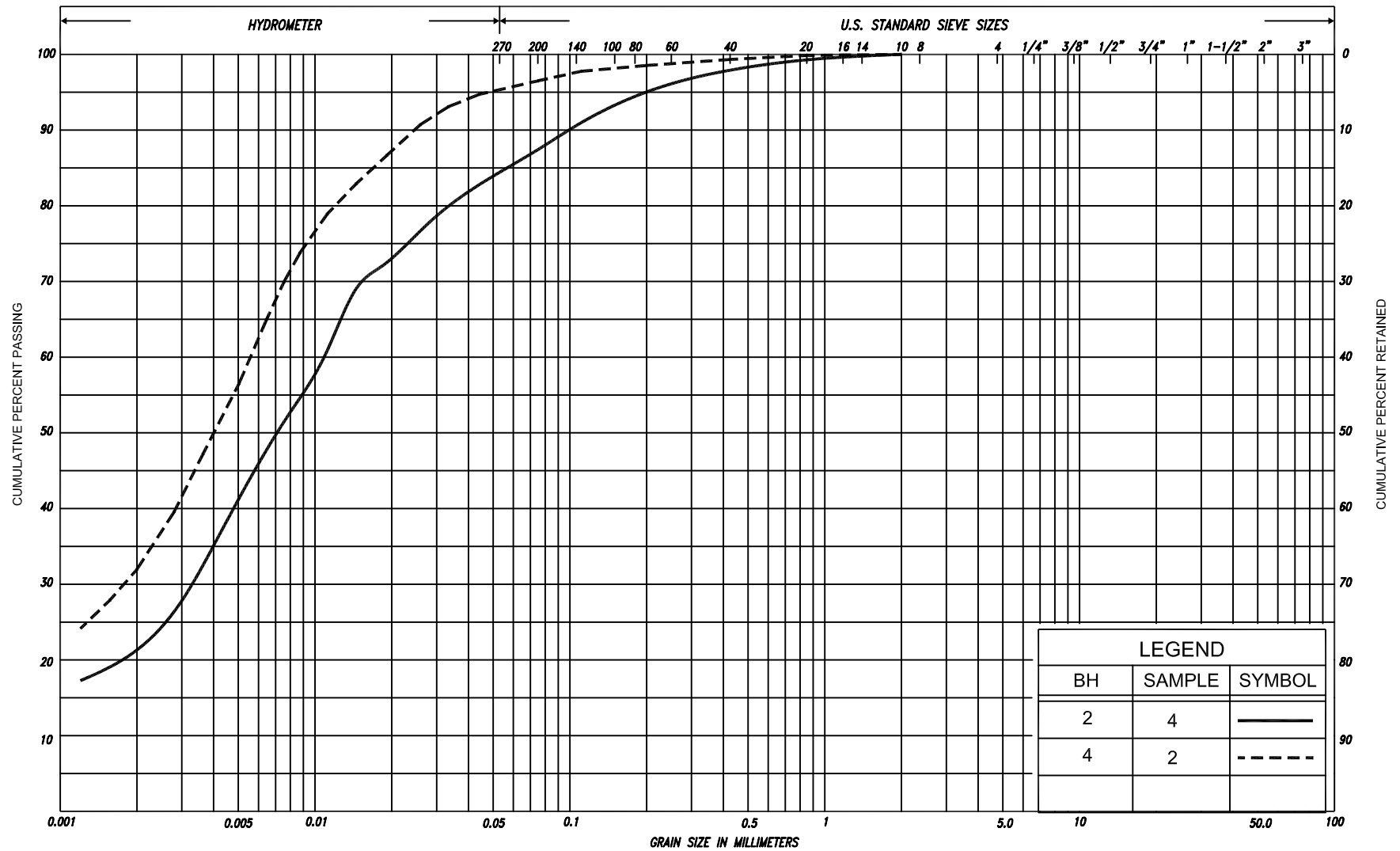
CORE RECOVERY					CORE DESCRIPTION	
HOLE NO.	CORE NO.	DEPTH (m)	RECOVERY (%)	RQD (%)	DEPTH (m)	DESCRIPTION
BH-17	4	3.0 – 3.7	100	79	3.0 – 5.1	MIGMATITE: Light grey with dark dipping bands, becoming light grey to pink with dark grey dipping layers, occasional green seams, fine to medium crystalline, high strength, slightly weathered to unweathered, close to moderate spaced flat to dipping cross joints, rough planar, tight to oxidized with silt or slight scale on parting surface, good to very poor becoming excellent quality.
	5	3.7 – 4.7	100	0		
	6	4.7 – 5.1	100	100		
BH-18	3	2.2 – 3.7	100	97	2.2 – 4.9	AMPHIBOLITE/MIGMATITE: Predominantly dark grey to black with dipping light grey layers, becoming light grey and dark grey dipping bands, fine to medium crystalline, high strength, slightly weathered to unweathered, close to moderate spaced flat to dipping cross joints, rough planar, tight to oxidized, good to excellent quality.
	4	3.7 – 4.2	80	80		
	5	4.2 – 4.9	100	92		
BH-21	1	1.0 – 1.3	100	0	1.0 – 1.3	BOULDER AMPHIBOLITE/MIGMATITE: Dark grey with light grey dipping bands, garnetiferous layers, with biotite concentrations, high strength, unweathered, close to moderate spaced flat to dipping cross joints, rough planar, tight with occasional slight scale on parting surface, excellent quality.
	2	2.3 – 2.9	100	94	2.3 – 5.3	
	3	2.9 – 4.5	100	100		
	4	4.5 – 5.3	100	100		

NOTE: RQD = Rock Quality Designation

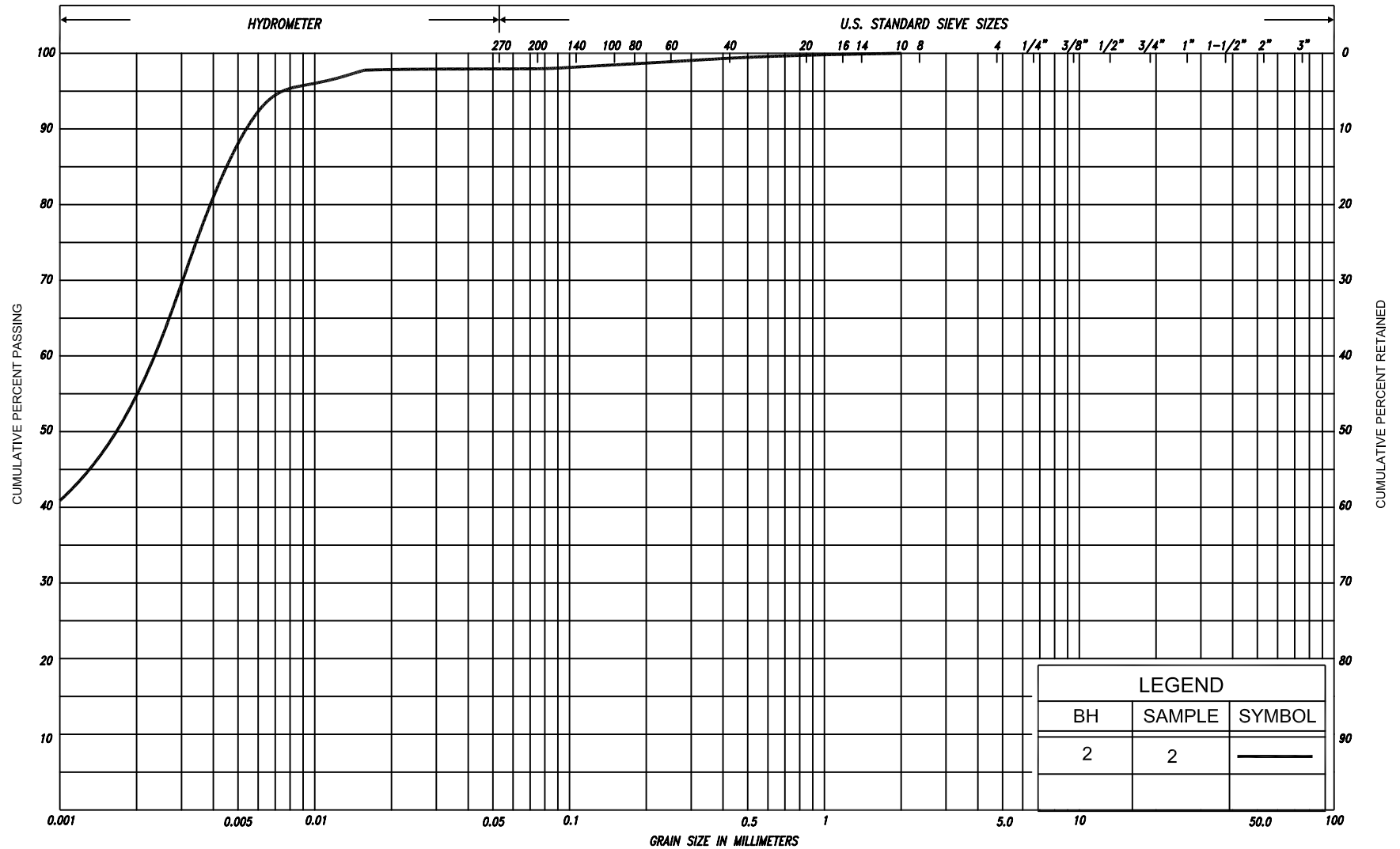
Originated: MR and FP

Compiled: JW

Checked: NR/CN



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												

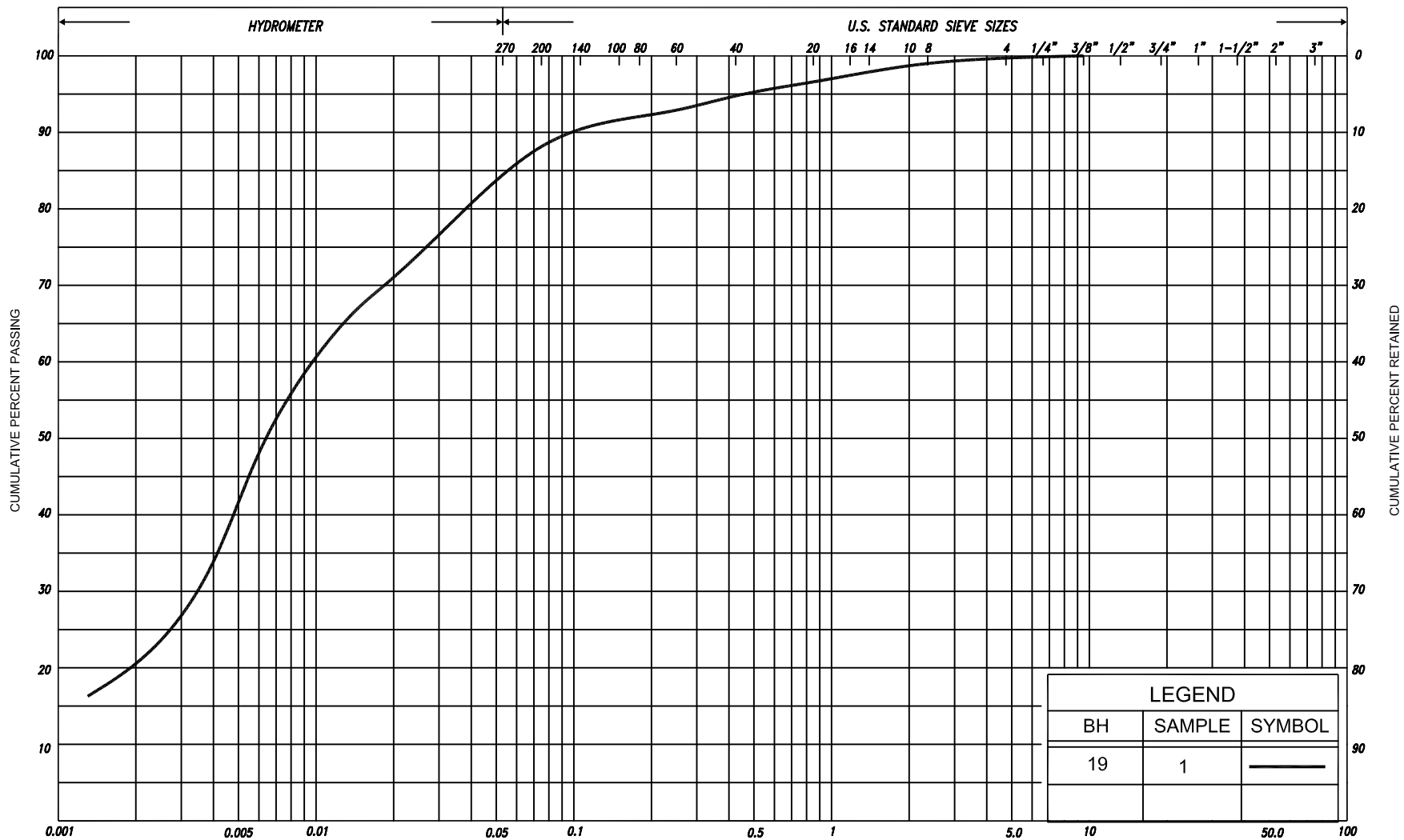


SILT & CLAY					FINE		MEDIUM		COARSE	GRAVEL				COBBLES	UNIFIED		
					SAND												
CLAY	FINE		MEDIUM		COARSE	FINE		MEDIUM		COARSE		GRAVEL				COBBLES	M.I.T.
	SILT																
CLAY		SILT			V. FINE	FINE	SAND		MED.	COARSE	GRAVEL						U.S. BUREAU

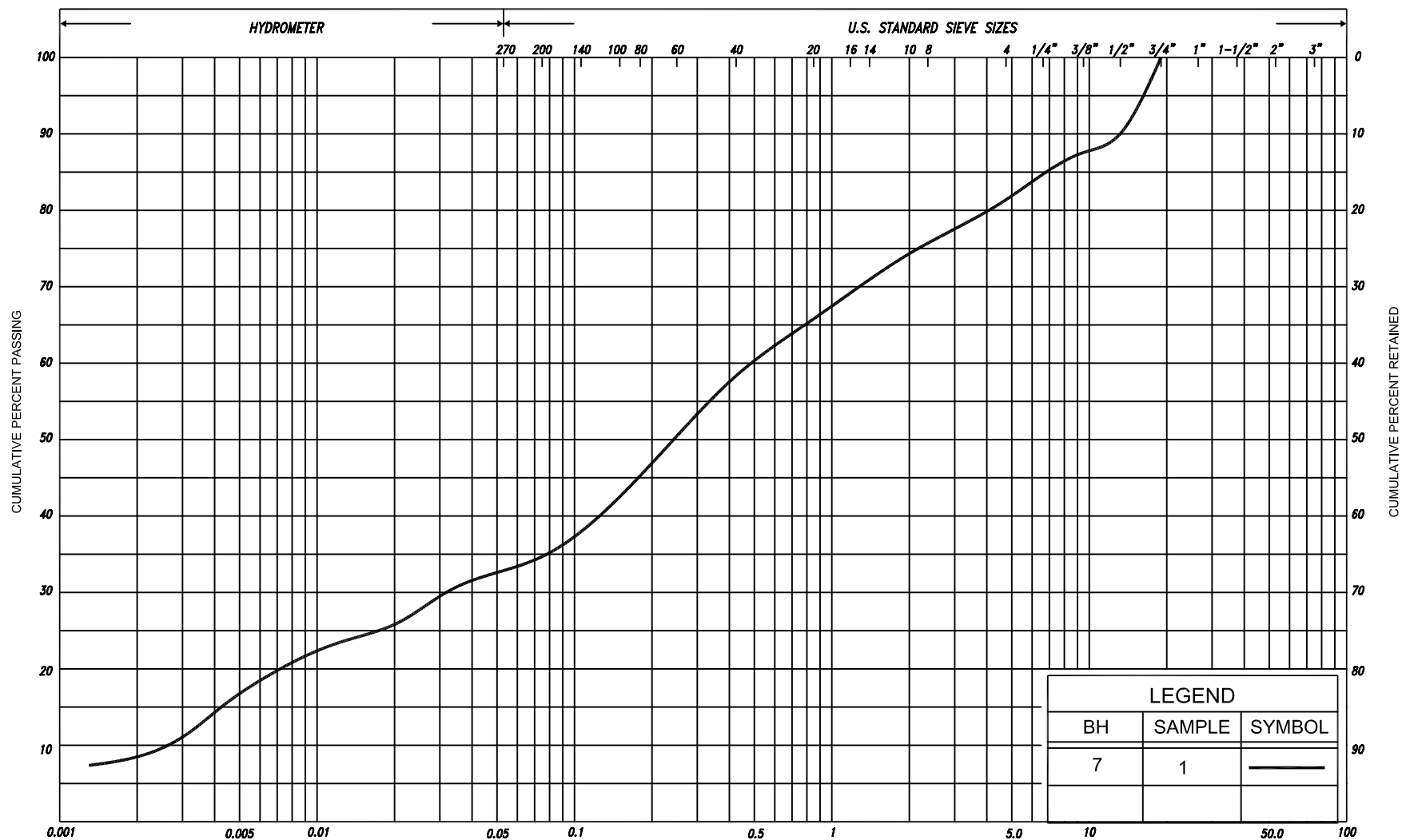


SILT & CLAY				FINE			MEDIUM			COARSE			GRAVEL			COBBLES	UNIFIED



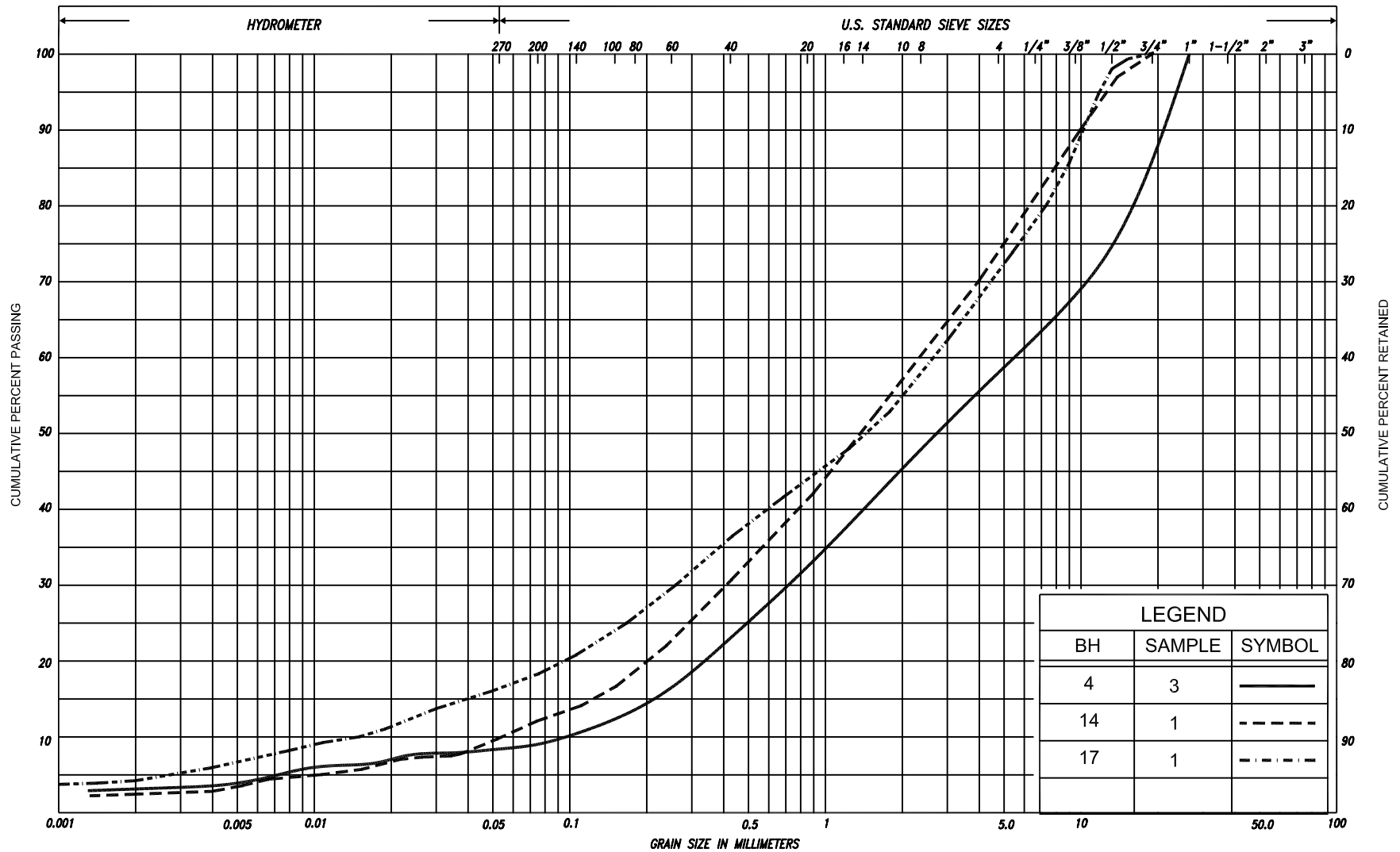


SILT & CLAY				FINE		MEDIUM		COARSE		GRAVEL			COBBLES	UNIFIED		
				SAND												
CLAY	FINE		MEDIUM		COARSE		FINE		MEDIUM		COARSE		GRAVEL	COBBLES	M.I.T.	
	SILT															
CLAY		SILT			V. FINE		FINE		MED.		COARSE		GRAVEL			U.S. BUREAU
					SAND											



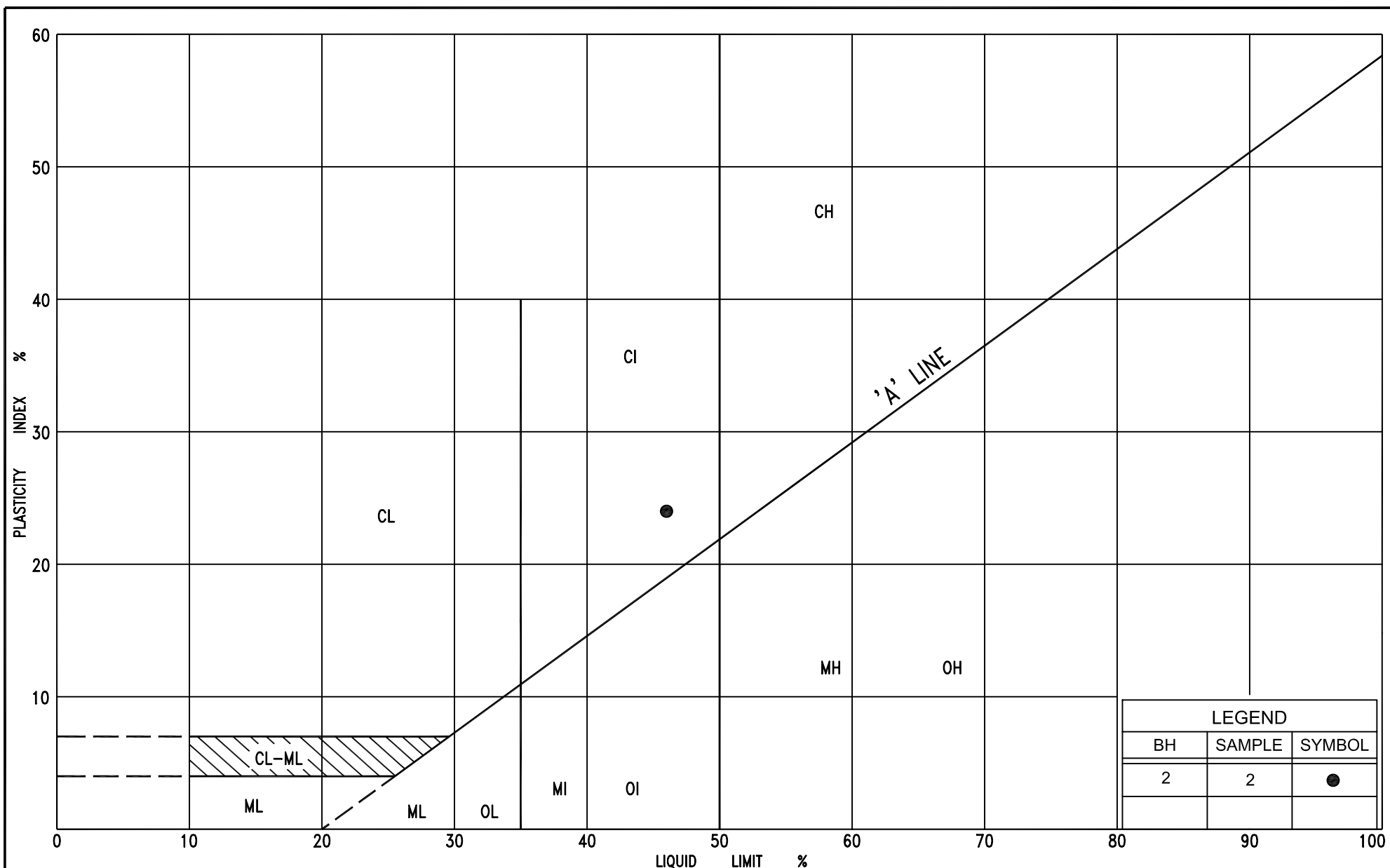
LEGEND		
BH	SAMPLE	SYMBOL
7	1	—

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			



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													





## 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
$\sigma$	kPa	TOTAL NORMAL STRESS
$\sigma'$	kPa	EFFECTIVE NORMAL STRESS
$\tau$	kPa	SHEAR STRESS
$\sigma_1, \sigma_2, \sigma_3$	kPa	PRINCIPAL STRESSES
$\epsilon$	%	LINEAR STRAIN
$\epsilon_1, \epsilon_2, \epsilon_3$	%	PRINCIPAL STRAINS
E	kPa	MODULUS OF LINEAR DEFORMATION
G	kPa	MODULUS OF SHEAR DEFORMATION
$\mu$	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
$C_\alpha$	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
$\sigma'_{vo}$	kPa	EFFECTIVE OVERBURDEN PRESSURE
$\sigma'_p$	kPa	PRECONSOLIDATION PRESSURE
$\tau_f$	kPa	SHEAR STRENGTH
$c'$	kPa	EFFECTIVE COHESION INTERCEPT
$\phi'$	-°	EFFECTIVE ANGLE OF INTERNAL FRICTION
$c_u$	kPa	APPARENT COHESION INTERCEPT
$\phi_u$	-°	APPARENT ANGLE OF INTERNAL FRICTION
$\tau_R$	kPa	RESIDUAL SHEAR STRENGTH
$\tau_r$	kPa	REMOULDED SHEAR STRENGTH
$S_t$	1	SENSITIVITY = $\frac{c_u}{\tau_r}$

### PHYSICAL PROPERTIES OF SOIL

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

**RECORD OF BOREHOLE No BH-1**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 386.2 N; 326 638.5 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 14, 2009 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 (%)				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					w <sub>p</sub> w w <sub>L</sub>				
206.0	Ground Surface							20	40	60	80	100					
0.0	Clayey silt, some sand		1	SS	10												
205.4	Stiff Brown Moist																
0.6	Sandy silt some clay, trace gravel		2	SS	20												
204.9	Compact Brown Wet																3 38 42 17
1.1	End of borehole Refusal on probable bedrock																

\* 2009 04 14


▼ Water level measured  
after drilling

**RECORD OF BOREHOLE No BH-2**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 398.1 N; 326 653.1 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 08, 2009 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 $\gamma$  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)										
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE					w <sub>p</sub> w w <sub>L</sub>										
206.1	Ground Surface																				
0.0	Silty sand trace clay, trace gravel roots and wood pieces	•	1	SS	26		206														
205.2	Compact Brown Wet	•																			
0.9	Silty clay, trace sand Very stiff Brown Moist		2	SS	12		205											0 2 43 55			
204.0			3	SS	10																
2.1	Clayey silt, some sand Firm Brown Wet		4	SS	6		204											0 13 66 21			
203.0							203														
3.1	End of borehole Refusal on probable bedrock																				
<div>* 2009 08 14</div> <div> Water level measured after drilling</div>																					

\* 2009 08 14

▼ Water level measured  
after drilling



**RECORD OF BOREHOLE No BH-3**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 387.8 N; 326 657.3 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.  
 DATUM Geodetic DATE April 14, 2009 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  $\gamma$  kN/m <sup>3</sup>	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 x LAB VANE												
						20 40 60 80 100					w <sub>p</sub> w w <sub>L</sub>							
206.3	Ground Surface					$\nabla$ *	206											
0.0	Silty clay, trace sand cobbles Firm Brown Wet		1	SS	5													
			2	SS	8													
204.9							205											
1.4	Clayey silt, trace sand Very stiff Brown Wet		3	SS	11													
							204											
203.4																		
2.9	Silty sand trace clay, some gravel Dense Brown Wet		4	SS	14/15cm		203											
202.2							202											
4.1	Amphibolite bedrock Slightly weathered to unweathered Medium to high strength Good to excellent quality		5	RC NQ	REC 100%												RQD 100%	
			6	RC NQ	REC 96%	201											RQD 76%	
			7	RC NQ	REC 100%	200											RQD 78%	
199.2																		
7.1	End of borehole																	
	Sample 4: sampler bouncing																	
	* 2009 08 14																	
	$\nabla$ Water level observed during drilling																	
	C.F.S.S.A. Denotes Continuous Flight Solid Stem Augers																	

**RECORD OF BOREHOLE No BH-4**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 391.3 N; 326 659.2 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.  
 DATUM Geodetic DATE April 09, 2009 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT  w <sub>p</sub>	NATURAL MOISTURE CONTENT  w	LIQUID LIMIT  w <sub>L</sub>	UNIT WEIGHT  γ  kN/m <sup>3</sup>	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		
206.2	Ground Surface						20	40	60	80	100									
0.0	Topsoil		1	SS	2	V*	206							○			0 4 64 32			
205.9	Clayey silt, trace sand																			
0.3	Stiff Brown Moist		2	SS	13		205													
204.8	Sand and gravel trace silt, trace clay																			
1.4	Very dense Brown Moist		3	SS	19/15cm		204													
	cobbles and boulders																			
202.7	Migmatite bedrock		4	RC NQ	REC 100%	203											RQD 100%			
3.5	Slightly weathered to unweathered		5	RC NQ	REC 100%	202											RQD 97%			
	High strength																			
	Excellent quality		6	RC NQ	REC 100%	201											RQD 93%			
200.6	End of borehole																			
5.6	Sample 3: Sampler bouncing																			
	* 2009 04 09																			
	 Water level observed during drilling																			
	C.F.S.S.A. Denotes Continuous Flight Solid Stem Augers																			

**METRIC**

20  
15 — 5 (%) STRAIN AT FAILURE  
10

**RECORD OF BOREHOLE No BH-6**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 399.6 N; 326 656.8 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 08, 2009 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	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									
					WATER CONTENT (%)												
206.0	Ground Surface							20	40	60	80	100					
0.0	Topsoil		1	SS	3/15cm												
205.8	Clayey silt, trace sand																
0.2	Stiff      Brown      Wet																
			2	SS	12												
203.9	Silty sand, with gravel cobbles and boulders																
2.1	Very dense Brown      Wet		3	SS	32/25cm												
203.3	Amphibolite/Migmatite bedrock		4	RC NQ	REC 100%												RQD 89%
2.7	Slightly weathered to unweathered																
	High strength		5	RC NQ	REC 100%												RQD 98%
	Good to excellent quality																
200.2	End of borehole		6	RC NQ	REC 98%												RQD 98%
5.8																	
	Samples 1 and 3: Sampler bouncing on cobbles and boulders																
	 *      2009   04   08																
	 ▽      Water level observed during drilling																

**RECORD OF BOREHOLE No BH-7**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 389.3 N; 326 661.0 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 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/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					W <sub>p</sub> W      W <sub>L</sub>							
								○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL      × LAB VANE					WATER CONTENT (%)							
206.5	Ground Surface							20	40	60	80	100								
0.0	Sand, with silt some gravel, trace clay	•••	1	SS	4	▼*	206								c			19 46 27 8		
206.0	Very loose Brown Wet	▧																		
0.5	Clayey silt some sand, trace gravel	▧																		
205.4	Stiff Brown Moist	▧	2	SS	33															
1.1	Silty sand, some gravel	••													o					
204.8	Dense Brown Moist	•	3	SS	8/15cm	205														
1.7	End of borehole																			
	Refusal on probable boulder																			
	Sample 3: Sampler bouncing on probable boulder																			
	*      2009   04   09																			
	▼      Water level measured after drilling																			

**RECORD OF BOREHOLE No BH-8**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 412.4 N: 326 688.3 E ORIGINATED BY F.P.  
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probe COMPILED BY N.R.  
 DATUM Geodetic DATE April 02, 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	SHEAR STRENGTH kPa					w <sub>p</sub>	w	w <sub>L</sub>	WATER CONTENT (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
						○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL    × LAB VANE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
208.2	Ground Surface									20	40	60	80	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

**RECORD OF BOREHOLE No BH-9**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 402.1 N; 326 692.5 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 April 02, 2009 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER * CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	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									
208.2 0.0	Ground Surface					20	40	60	80	100							
208.1 0.1	Topsoil		1	RC NQ	REQ 100%												
	Migmatite bedrock		2	RC NQ	REQ 98%												RQD 100%
	Slightly weathered to unweathered		3	RC NQ	REQ 100%												RQD 98%
	High strength																RQD 97%
204.8 3.4	End of borehole																
	*    Borehole charged with drilling water																
	C.F.S.S.A. Denotes Continuous Flight Solid Stem Augers																

**METRIC**

20  
15 — 5 (%) STRAIN AT FAILURE  
10



**RECORD OF BOREHOLE No BH-11**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 408.0 N; 326 692.3 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 April 01, 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  $\gamma$  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)				GR	SA	SI	CL
								<div><div></div><div></div><div></div><div></div><div></div></div>					<div><div></div><div></div><div></div></div>							
207.6	Ground Surface																			
0.0	Amphibolite/Migmatite bedrock		1	RC NQ	REC 98%	*	207											RQD 93%		
	Slightly weathered		2	RC NQ	REC 100%			206											RQD 95%	
	High strength																			
	Excellent quality		3	RC NQ	REC 100%			205												RQD 90%
204.2																				
3.4	End of borehole																			
</																				

**RECORD OF BOREHOLE No BH-12**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 413.9 N; 326 692.0 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 April 02, 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  $\gamma$  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						w <sub>p</sub>	w	w <sub>L</sub>					
								○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL    x LAB VANE													
207.7	Ground Surface							20	40	60	80	100									
0.0	Amphibolite/Migmatite bedrock  Slightly weathered to unweathered  High strength  Excelleny quality		1	RC NQ	REC 98%		207												RQD 93%		
			2	RC NQ	REC 100%			206													RQD 95%
			3	RC NQ	REC 100%			205													
204.2	End of borehole																				
3.5																					

**RECORD OF BOREHOLE No BH-13**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 403.6 N; 326 696.2 E ORIGINATED BY F.P.  
 DIST 54 HWY 69 BOREHOLE TYPE Manual Probe COMPILED BY N.R.  
 DATUM Geodetic DATE April 02, 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	SHEAR STRENGTH kPa					w <sub>p</sub>	w	w <sub>L</sub>	WATER CONTENT (%)	GR	SA		SI	CL			
						○ UNCONFINED			● QUICK TRIAXIAL	+	×	FIELD VANE	LAB VANE									
207.8	Ground Surface																					
0.0	Bedrock at surface																					
	*     Borehole dry																					

**METRIC**






20  
15 — 5 (%) STRAIN AT FAILURE  
10

**RECORD OF BOREHOLE No BH-15**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 416.0 N; 326 726.8 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.  
 DATUM Geodetic DATE April 16, 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			SHEAR STRENGTH kPa					WATER CONTENT (%)					
								○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL    × LAB VANE										
204.9	Ground Surface							20	40	60	80	100						
0.0	Topsoil		1	SS	13	▽*											Org. 3.6%	
204.7	Sandy silt																	3 32 53 12
0.2	some clay, trace gravel																	
204.2	Compact Brown Moist																	
0.7	Migmatite bedrock																	
	Slightly weathered to unweathered		2	RC NQ	REC 100%		204										RQD 100%	
	High strength																	
	Good to excellent quality			3	RC NQ	REC 98%		203									RQD 93%	
																		
				4	RC NQ	REC 97%		202									RQD 82%	
201.3	End of borehole																	
3.6																		

**RECORD OF BOREHOLE No BH-16**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 421.9 N; 326 726.6 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 April 03, 2009 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER * CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT						PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	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							
204.5	Ground Surface					20	40	60	80	100								
0.0	Topsoil		1	SS	22													
0.3	Sandy silt, trace gravel cobbles and boulders																	
	Very dense Brown Moist		2	SS	10/5cm													
			3	SS	20/8cm													
202.2																		
2.3	Amphibolite/Migmatite bedrock		4	RC NQ	REC 95%													
	Slightly weathered to unweathered															RQD 95%		
	High strength		5	RC NQ	REC 100%													
	Fair to excellent quality															RQD 95%		
			6	RC NQ	REC 100%													
																RQD 71%		
199.0	End of borehole																	
5.5																		
	Samples 2, 3: Sampler bouncing on probable cobbles and boulders																	
	* Borehole charged with drilling water																	
	C.F.S.S.A. Denotes Continuous Flight Solid Stem Augers																	

# RECORD OF BOREHOLE No BH-17

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 424.2 N; 326 724.4 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.  
 DATUM Geodetic DATE April 16, 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 <sub>p</sub>	W	W <sub>L</sub>						
								○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL    × LAB VANE					WATER CONTENT (%)								
204.3	Top of Ice							20	40	60	80	100						GR	SA	SI	CL
0.0 204.0	Ice		1	SS	37		204														
0.3	Sand, with gravel trace silt, trace clay																				
	Dense      Brown      Wet      boulders		2	RC NQ	REC 100%		203														
			3	RC NQ	REC 100%		202														
201.3	Migmatite bedrock		4	RC NQ	REC 100%		201														
3.0	Slightly weathered to unweathered		5	RC NQ	REC 100%		200														
	High strength																				
	Good to very poor, becoming excellent quality		6	RC NQ	REC 100%																
199.2	End of borehole																				
5.1	Samples 2 & 3: Ran coring and cored through boulders.																				
	*      Borehole charged with drilling water																				
	C.F.S.S.A. Denotes Continuous Flight Solid Stem Augers																				

**RECORD OF BOREHOLE No BH-18**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 427.8 N; 326 726.3 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE C.F.S.S.A. and Rotary Diamond Coring COMPILED BY N.R.  
 DATUM Geodetic DATE April 14, 15, 2009 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  $\gamma$  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)								
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE													
204.1	Ground Surface						20	40	60	80	100								
0.0	Topsoil		1	SS	43	V <sub>L</sub> *	204										Org. 5.3%	Frozen ground surface	
203.9	Silty sand with gravel, trace clay																		
0.2	Dense _____ Brown _____ Moist _____ cobbles and boulders		2	SS	-		203												
																			
																			
201.9	Amphibolite/Migmatite bedrock						202												
2.2	Slightly weathered to unweathered  High strength  Good to excellent quality		3	RC NQ	REC 100%	201												RQD 97%	
			4	RC NQ	REC 80%	200												RQD 80%	
			5	RC NQ	REC 100%													RQD 92%	
199.2	End of borehole																		
4.9	Sample 2: sampler bouncing on probable cobbles and boulders. N value not obtained   * 2009 04 14 & 15   Water level observed during drilling  C.F.S.S.A. Denotes Continuous Flight Solid Stem Augers																		



**RECORD OF BOREHOLE No BH-19**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 417.5 N; 326 730.5 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 16, 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 $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES		SHEAR STRENGTH kPa					W <sub>p</sub>	W	W <sub>L</sub>		
204.6	Ground Surface						20	40	60	80	100					
0.0	Silt, with clay some sand, trace gravel Very loose Grey Wet		1	SS	4											1 11 67 21
203.7						204										
0.9	Sand, with silt		2	SS	10											
203.2	Compact Brown Wet															
1.4	End of borehole Refusal on probable bedrock															
	* Borehole dry															

**RECORD OF BOREHOLE No BH-20**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 429.4 N; 326 745.1 E ORIGINATED BY F.P.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 01, 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					WATER CONTENT (%)				GR	SA	SI	CL
								○ UNCONFINED	+	FIELD VANE	● QUICK TRIAXIAL	×	LAB VANE							
204.0	Ground Surface																			
0.0	Topsoil	~																		
203.7	End of borehole																			
0.3	Refusal on probable bedrock																			
	* Borehole dry																			

**METRIC**

**+<sup>7</sup>, ×<sup>5</sup>:** Numbers refer to Sensitivity

20  
15 — ○ — 5  
10


(%) STRAIN AT FAILURE

**RECORD OF BOREHOLE No APE 1**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 414.9 N; 326 724.0 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 17, 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 <sub>p</sub>	w	w <sub>L</sub>		WATER CONTENT (%)	GR	SA	SI	CL
								20	40	60	80	100	○ UNCONFINED									
205.0	Ground Surface					*																
0.0	Silty sand, with gravel cobbles and boulders																					
204.2	Dense Brown Wet																					
0.8	End of borehole  Refusal on probable bedrock  <																					

**RECORD OF BOREHOLE No APE 2**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 414.7 N; 326 731.6 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 17, 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 <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						W <sub>p</sub> W                      W <sub>L</sub>				GR	SA	SI	CL
								○ UNCONFINED	● QUICK TRIAXIAL	+	×	FIELD VANE	LAB VANE	WATER CONTENT (%)							
204.7	Ground Surface							20	40	60	80	100									
0.0	Silty sand, with gravel cobbles and boulders																				
203.9	Dense Brown Wet						204														
0.8	End of borehole  Refusal on probable bedrock   <																				

**RECORD OF BOREHOLE No APE 3**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 431.7 N; 326 728.0 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 17, 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 $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES		SHEAR STRENGTH kPa					W <sub>p</sub>	W	W <sub>L</sub>		
203.9 0.0	Ground Surface Topsoil						20	40	60	80	100					
203.7 0.2	Silty sand, with gravel cobbles and boulders															
203.1 0.8	Dense Brown Moist End of borehole Refusal on probable boulder															
	* Borehole dry															
	Note: Relative density estimated from observed auger resistance to advance the borehole															

**RECORD OF BOREHOLE No APW 1**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 400.0 N; 326 649.2 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 20, 2009 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER * CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT						PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)							
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	*N VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)				GR	SA	SI	CL
								○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL    × LAB VANE																	
205.5	Ground Surface					*		20	40	60	80	100		20	40	60									
0.0	Clayey silt, trace sand																								
	Stiff      Brown      Moist																								
202.9																									
2.6	End of borehole																								
	Refusal on probable bedrock																								
	*      Borehole dry																								
	Note: Consistency estimated from observed auger resistance to advance the borehole																								

**RECORD OF BOREHOLE No APW 2**

1 of 1

**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 383.9 N; 326 655.6 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 20, 2009 CHECKED BY C.N.

SOIL PROFILE			SAMPLES				GROUND WATER * CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT						PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	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													
205.4	Ground Surface							20	40	60	80	100							
0.0 205.1	Clayey silt, trace sand																		
0.3	Stiff      Brown      Wet End of borehole Refusal on probable boulder																		
	*      Borehole dry																		
	Note: Consistency estimated from observed auger resistance to advance the borehole																		



**METRIC**

20  
15 — 5 (%) STRAIN AT FAILURE  
10

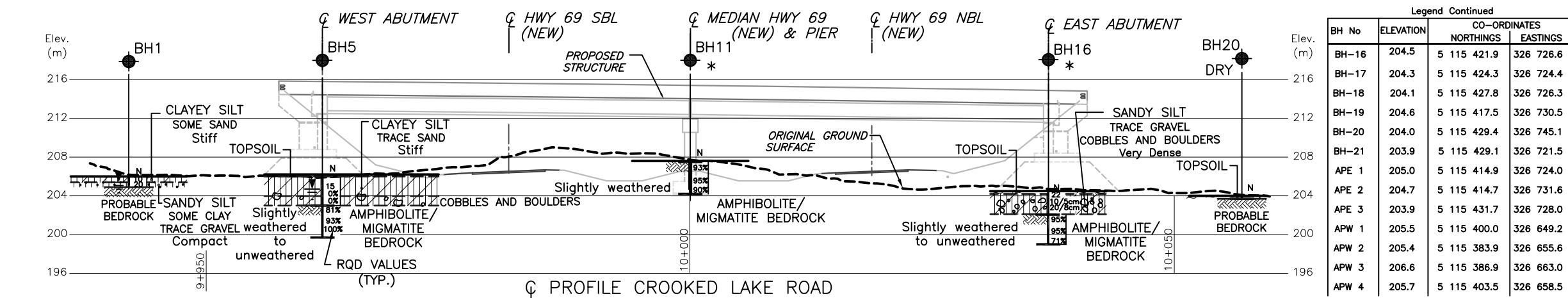
**RECORD OF BOREHOLE No APW 4**

1 of 1

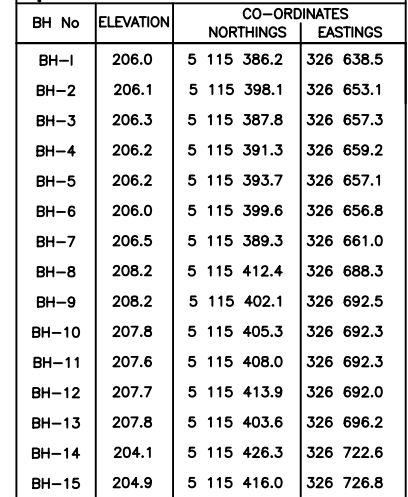
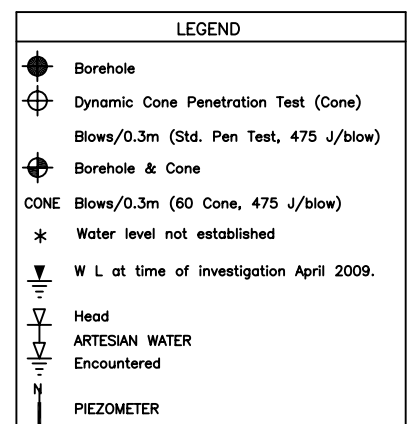
**METRIC**

W.P. 5264-05-01 LOCATION Co-ords: 5 115 403.5 N; 326 658.5 E ORIGINATED BY M.R.  
 DIST 54 HWY 69 BOREHOLE TYPE Continuous Flight Solid Stem Augers COMPILED BY N.R.  
 DATUM Geodetic DATE April 20, 2009 CHECKED BY C.N.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS *	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
205.7	Ground Surface							20	40	60	80	100					
0.0	Topsoil																
205.5	Clayey silt, trace sand																
0.2	Stiff            Brown            Moist						205										
							204										
203.7																	
2.0	End of borehole																
	Refusal on probable bedrock																
			</														

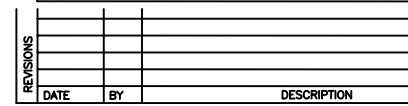


Legend Continued				
BH No	ELEVATION	CO-ORDINATES		
		NORTHINGS		EASTINGS
BH-16	204.5	5 115 421.9	326 726.6	
BH-17	204.3	5 115 424.3	326 724.4	
BH-18	204.1	5 115 427.8	326 726.3	
BH-19	204.6	5 115 417.5	326 730.5	
BH-20	204.0	5 115 429.4	326 745.1	
BH-21	203.9	5 115 429.1	326 721.5	
APF 1	205.0	5 115 414.9	326 724.0	
APF 2	204.7	5 115 414.7	326 731.6	
APF 3	203.9	5 115 431.7	326 728.0	
APW 1	205.5	5 115 400.0	326 649.2	
APW 2	205.4	5 115 383.9	326 655.6	
APW 3	206.6	5 115 386.9	326 663.0	
APW 4	205.7	5 115 403.5	326 658.5	



**- NOTE -**

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



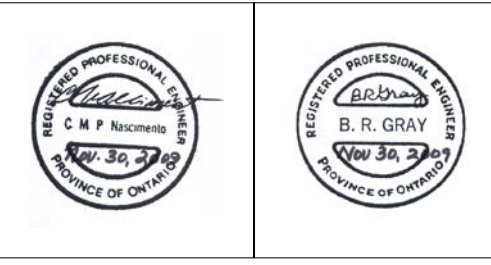
Geocres No. 411-241

HWY No 69				DIST
SUBM'D NR	CHECKED NR	DATE NOV. 30, 2009		SITE
DRAWN NA	CHECKED CN	APPROVED BRG		DWG

NOTES:

1. DRAWING CL-1 SHOULD BE READ IN CONJUNCTION WITH THE TEXT AND RECORD OF BOREHOLE LOGS.
2. THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
3. DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

REF. TSH Drawings;  
Hwy 69 Servos Contract 2 Lidar Contours.dwg  
dated December 19, 2007; and  
91088-CROOKED LAKE RD-1-GA.dwg;  
dated April 01, 2009





## **APPENDIX A**

### Site Photographs



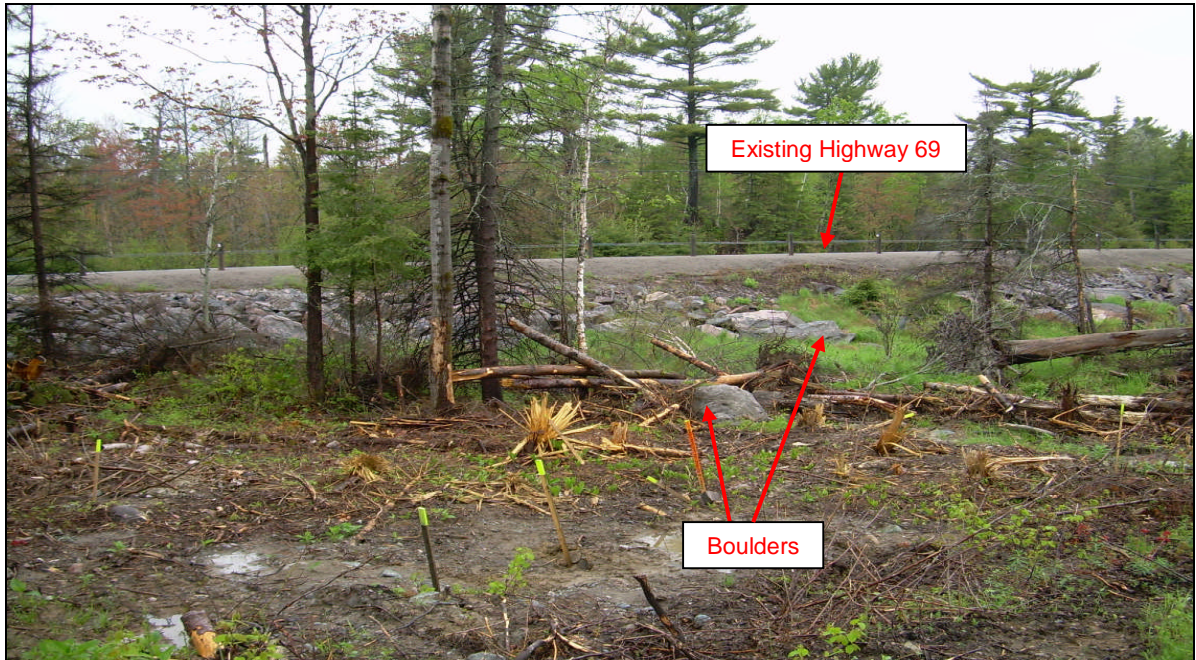


**Photograph 1:** Looking east from the east abutment, Station 10+037. Note boulders of different sizes and wooded areas (in the background) are in view of the photograph. (May 27, 2009)



**Photograph 2:** Looking northeast from the pier, Station 10+000. Bedrock outcrop exposed and wooded areas in the background of the photograph. (May 27, 2009)





**Photograph 3:** Looking northwest from the west abutment, approximate Sta. 9+962. Different sizes of boulders on the ground and existing Highway 69 in the background of photograph. (May 27, 2009)

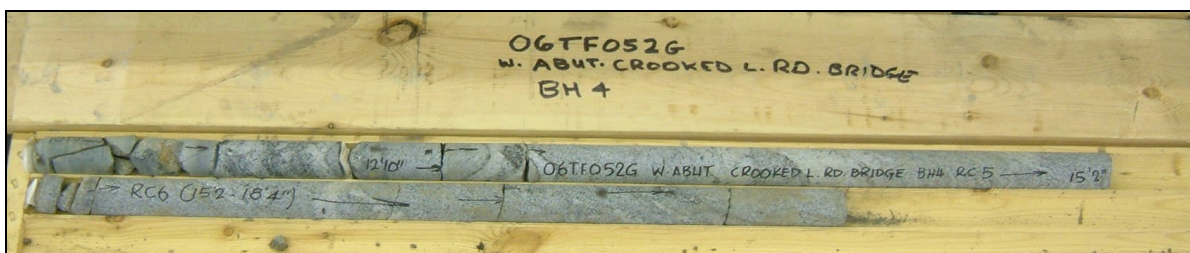


## **APPENDIX B**

### Rock Core Photographs



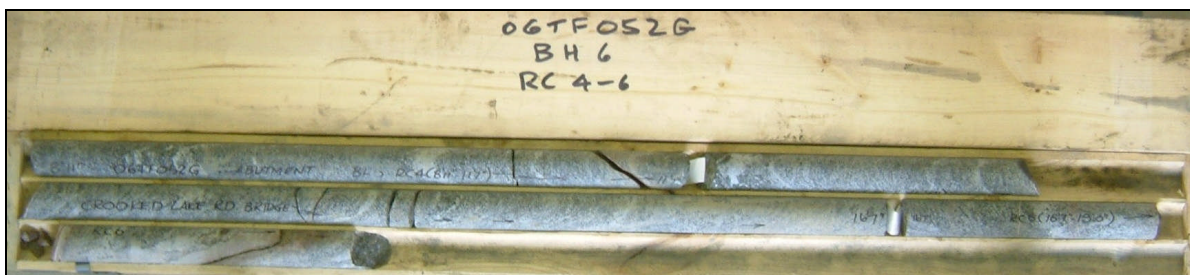
**Photograph 1:** Cores retrieved from borehole BH-3. Runs 5 to 7 from 4.1 to 7.1 m depth. RQD ranged from 76 to 100%. Good to excellent rock quality.



**Photograph 2:** Cores retrieved from borehole BH-4. Runs 4 to 6 from 3.3 to 5.6 m depth. RQD values obtained 93 to 100%. Rock quality is excellent.



**Photograph 3:** Cores retrieved from borehole BH-5. Runs 4 to 6 from 3.3 to 6.5 m depth. RQD ranged from 81 to 100%. Good to excellent rock quality.



**Photograph 4:** Cores retrieved from borehole BH-6. Runs 4 to 6 from 2.7 to 5.8 m depth. RQD ranged from 89 to 98%, indicating good to excellent rock quality.





**Photograph 5:** Cores retrieved from borehole BH-9. Runs 1 to 3 from 0.1 to 3.4 m depth. RQD values obtained 97 to 100%, indicating excellent rock quality.



**Photograph 6:** Cores retrieved from borehole BH-10. Runs 1 to 3 from 0.2 to 3.5 m depth. RQD ranged from 97 to 100%, indicating excellent rock quality.



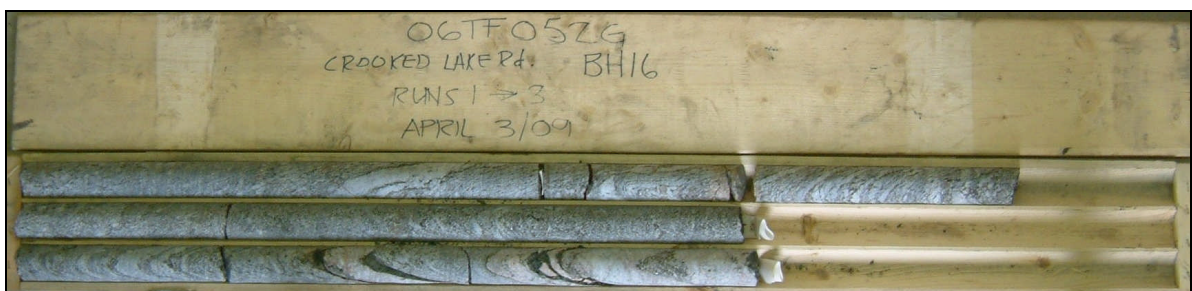
**Photograph 7:** Cores retrieved from borehole BH-11. Runs 1 to 3 from 0.0 to 3.4 m depth. RQD values obtained are 90 to 95%, indicating excellent rock quality.



**Photograph 8:** Cores retrieved from borehole BH-12. Runs 1 to 3 from 0.0 to 3.5 m depth. RQD values obtained are 90 to 95%, indicating excellent rock quality.



**Photograph 9:** Cores retrieved from borehole BH-15. Runs 2 to 4 from 0.7 to 3.6 m depth. RQD values obtained ranged from 82 to 100%, indicating good to excellent rock quality.



**Photograph 10:** Cores retrieved from borehole BH-16. Runs 4 to 6 from 2.3 to 5.5 m depth. RQD values obtained ranged from 71 to 95%, indicating fair to excellent rock quality.



**Photograph 11:** Cores retrieved from borehole BH-17. Runs 4 to 6 from 3.0 to 5.1 m depth. RQD values obtained 79, 0 and 100% for runs 4, 5 and 6, respectively, indicating good to very poor becoming excellent rock quality.



**Photograph 12:** Cores retrieved from borehole BH-18. Runs 3 to 5 from 2.2 to 4.9 m depth. RQD values obtained ranged from 80 to 97%, indicating good to excellent rock quality.





**Photograph 13:** Cores retrieved from borehole BH-21. Runs 2 to 4 from 2.3 to 5.3 m depth. RQD values obtained 94% for run 2 and 100% for runs 3 and 4, indicating excellent rock quality.