

# **FOUNDATION INVESTIGATION REPORT**

**CONTRACT NO. 95-56**



Ministry of  
Transportation

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Note: For purposes of the contract, this report supersedes all other Foundation Reports prepared by, or for the Ministry in connection with the above mentioned project.

## EXPLANATION OF TERMS USED IN REPORT

2

**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

### STRESS AND STRAIN

$u_w$	kPa	PORE WATER PRESSURE
$r_u$	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 <sup>-1</sup>	COEFFICIENT OF VOLUME CHANGE
$C_c$	1	COMPRESSION INDEX
$C_s$	1	SWELLING INDEX
$C_\alpha$	1	RATE OF SECONDARY CONSOLIDATION
$C_v$	m <sup>2</sup> /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
$s_r$	1	SENSITIVITY = $\frac{c_u}{\tau_r}$

### PHYSICAL PROPERTIES OF SOIL

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

## FOUNDATION INVESTIGATION REPORT

For

Partial Culvert Replacement

Hawkestone Creek

W.P. 173-93-00 Site No. 30-506

Hwy 11, District 5, Owen Sound

### Introduction

This report summarizes the results of the Foundation Investigation for Hawkestone Creek culvert rehabilitation. The investigation was carried out at the request of The Structural Section of the Southwestern Region. This report applies to the Hawkestone Creek culvert only (Station 25+110 to 25+150m, Hwy 11 chainage).

### Site Description

The Hawkestone Creek culvert is located in the Township of Oro in the county of Simcoe and in the District of Owen Sound. At this location Hwy 11 runs north-south. Highway 11 is a two lane roadway and is about 17m wide. The culvert is located at station 25+132 (Hwy 11 chainage) under an embankment which carries Hwy 11 over the creek. The embankment is about 7m high with 2H:1V side slopes. The creek runs through the culvert perpendicular to Hwy 11. The water in the creek was 0.6m deep at the inlet and 0.8m deep at the outlet. On both sides of the embankment ditches run parallel to the embankment and connect to the creek. Both sides of the highway are vegetated with small shrubs and trees such as Cedar, Maple and Hemlock up to 10m high.

The area adjacent to highway 11 and Hawkestone creek is vacant treed land.

### Investigation Procedures

The field investigation was carried out between 93 05 12 and 93 05 18. A total of six boreholes (BH 1 through 6) were advanced for the Foundation investigation. All boreholes were accompanied by dynamic cone penetration tests. The boreholes were advanced using track-mounted auger machines equipped with 83mm ID hollow stem augers and NX size casings.

Samples were recovered by means of a 50 mm OD split spoon sampler driven into the soil according to the specifications of the Standard Penetration Test (ASTM D 1586). Generally samples were retrieved at 0.75m intervals for the first 6m of the boring, then every 1.5m. However, sampling intervals were revised to obtain more details of soil at specific locations.

Traffic protection was needed during the Foundation Investigation. The traffic protection was provided by the Maintenance Section of District 5, Southwestern Region.

The borehole locations were selected by the Foundation Design Section and the locations and elevations were provided by the Southwestern Region Surveys & Plans Section.

The laboratory testing program for representative samples consisted of:

- Grain Size Analyses
- Natural Moisture Content Determinations and
- Atterberg Limit Tests

The results of the laboratory testing are plotted on the Record of Borehole sheets (Appendix).

### Subsurface Conditions

#### General

The Record of Borehole sheets in the Appendix illustrate the subsurface conditions at the borehole locations. The appended Drawings 1739300-A & 1739300-B provide a plan of borehole locations and stratigraphical profile interpreted from the borehole data. Following are detailed descriptions of the soil strata encountered.

#### Fill Material

The embankment consists of fill material. The fill material was encountered in Boreholes 2,3,4 and 5 which were advanced through the embankment. The fill material mainly consisted of non-cohesive silty sand to sandy silt, however, occasional layers and pockets of clayey silt material with cobbles and boulders were also encountered within the fill.

The top elevation of fill (embankment) ranged from 262.2m to 262.5m. The thickness of fill ranged from 6.6m (BH 5) to 7.1m (BH 2 to 4). The Standard Penetration Test N-values ranged from 3 to 37 with average N-value of 10 blows. The results of N-values suggest that the fill material is in loose to dense state but on average it is compact.

Figure 1 illustrates typical grain size distribution envelope for the fill material within the embankment.

### Clayey Silt to Silt

This cohesive material was underlying the fill material (embankment) and was encountered in all boreholes. This deposit was encountered at elevations ranging from 255.1m to 257.3m. The thickness of clayey silt deposit ranged from 4.5m to 7.6m. The Standard Penetration N-values ranged from 7 to 112 blows with average N-value of 25 blows. This suggests that the material is firm to hard but on average very stiff.

Typical properties of the material, as determined by laboratory tests of representative samples from the boreholes are summarized as follows:

	Range (%)	Average (%)
Water Content (w)	8 - 16	10
Plastic Limit (wP)	9 - 12	10
Liquid Limit (wL)	15 - 30	19

Figure 2 illustrates typical grain size distribution curves for this deposit.

Figure 3 illustrates typical plasticity chart for this deposit.

### Silty Sand to Sandy Silt

This non-cohesive material was underlying the clayey silt deposit. This material was encountered in all boreholes. The boreholes were advanced to a depth of 14.2m within this material without exploring the full thickness of this deposit. The top elevation of this deposit ranged from 247.5m to 256.9m. The N-values ranged from 18 to 120 blows but generally were more than 50 blows. The average N-values ranged from 80 to 100 blows. This suggests that the deposit is compact to very dense but generally very dense.

Figure 4 illustrates a typical grain size distribution envelope for this deposit.

### Groundwater Condition

Groundwater was observed during drilling of the boreholes and were measured immediately after the boreholes were drilled and where possible several hours after the completion of the boreholes. The stabilized groundwater elevation ranged from 255.0m (BH 6) to 256.5m (BH 2). This corresponds to depths ranging from 1.3m to 1.9m below ground surface and 5.9 to 6.5m below top of the embankment.

### Miscellaneous

The field work for this project was carried out under the supervision of J. Curtis an engineering student.

The equipment used was owned and operated by Malones Soil Samples Co. Ltd.

The report was produced by K.S.Q. Ahmad, Foundation Engineer, reviewed by D. Dundas, Senior Foundation Engineer and approved by M. Devata, Chief Foundation Engineer.



*Taecheul Kim*  
T.C. Kim, P. Eng.  
Senior Foundation Engineer

APPENDIX

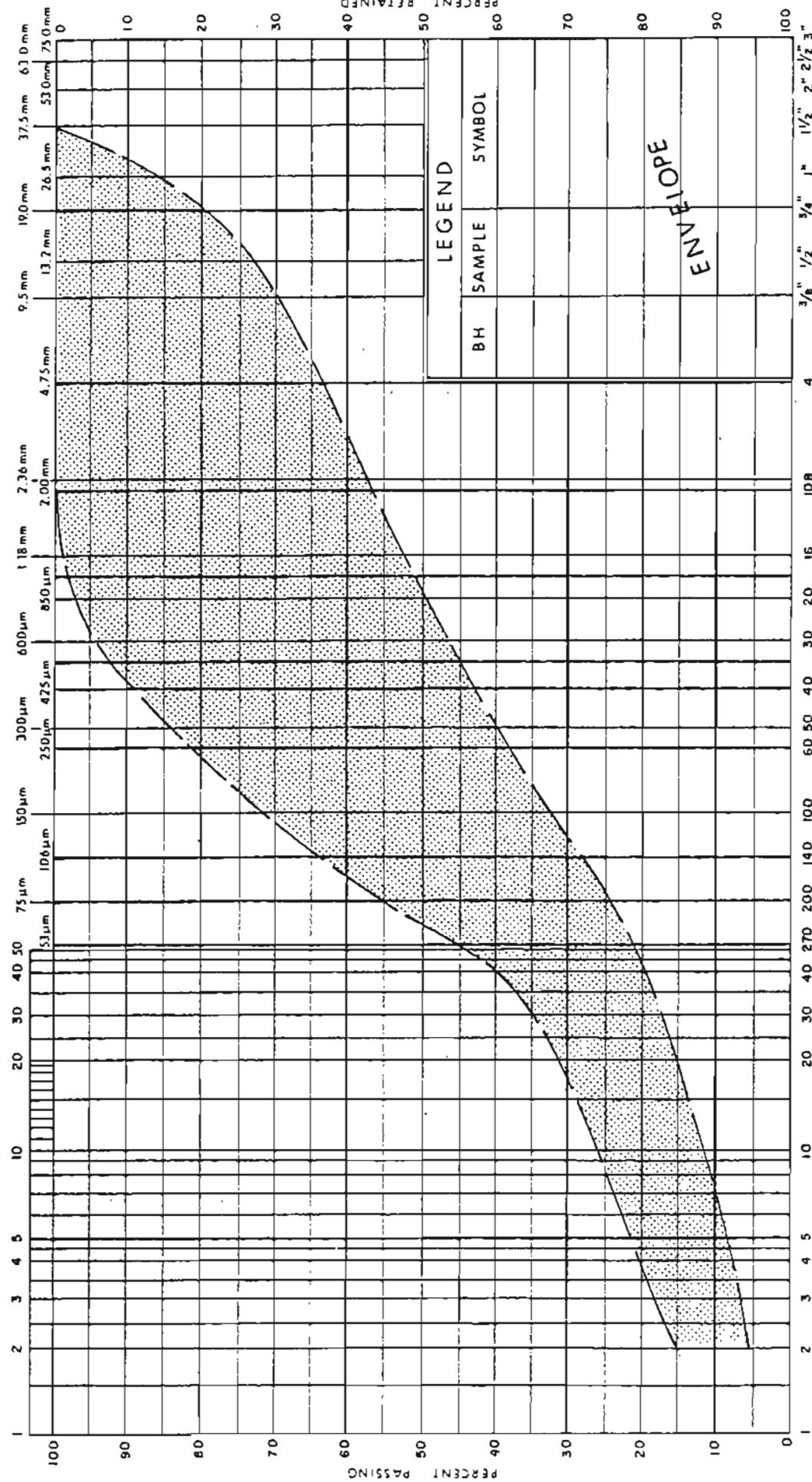


# UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT		SAND			GRAVEL		
		Fine	Medium	Coarse	Fine	Coarse	

GRAIN SIZE IN MICROMETERS

MINISTRY SIEVE DESIGNATION (Metric)



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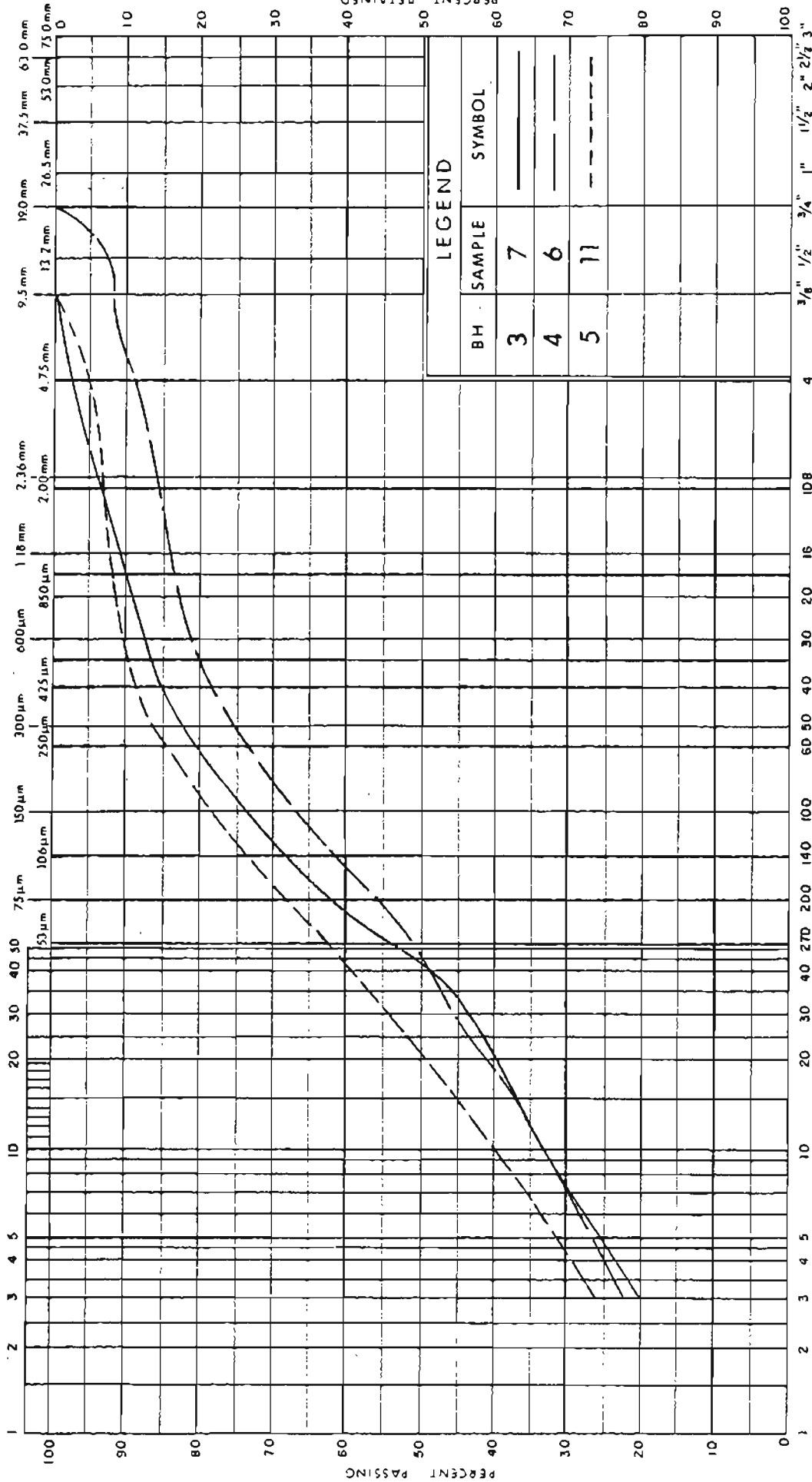
FIG No 1  
GRAIN SIZE DISTRIBUTION  
SILTY SAND TO SANDY SILT  
SOME / WITH GRAVEL (Fill)

W P 173-93-00

# UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT		SAND			GRAVEL		
		Fine	Medium	Coarse	Fine	Coarse	
		MINISTRY SIEVE DESIGNATION (Metric)					

GRAIN SIZE IN MICROMETERS




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GRAIN SIZE DISTRIBUTION  
CLAYEY SILT TO SILT  
WITH SAND, TRACE GRAVEL (Glacial Till)

FIG No 2

W P 173-93-00



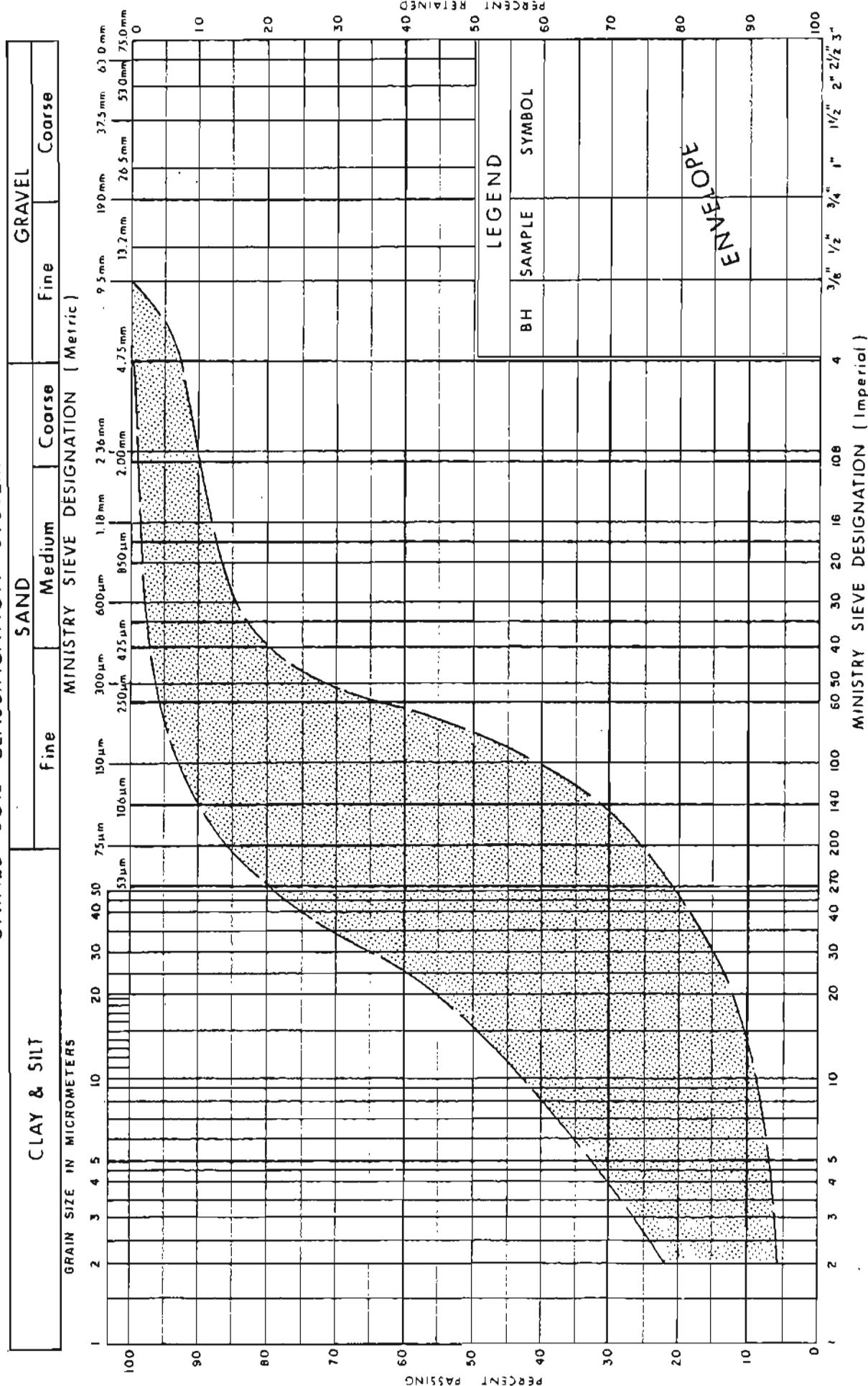
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PLASTICITY CHART  
CLAYEY SILT TO SILT  
WITH SAND, TRACE GRAVEL (Glacial)

FIG No . 3

WP 173-93-00

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### GRAIN SIZE DISTRIBUTION SILTY SAND TO SANDY SILT TRACE GRAVEL (Glacial Till)

FIG No 4

W.P. 173-93-00

RECORD OF BOREHOLE No 1

1 OF 1

METRIC

W.P. 344-88-88 173-93-00 LOCATION Sta. 25+133.6; O/s 25.40m Lt. ORIGINATED BY JC  
 DIST 5 HWY 11 BOREHOLE TYPE Hollow Stem Auger, Cone Test COMPILED BY RV  
 DATUM Geodetic DATE 1993 05 18 CHECKED BY DO

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 7 kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			20 40 60 80 100	20 40 60 80 100					
257.3	Ground Surface												
0.0			1	SS	7								
			2	SS	20								
			3	SS	21								
			4	SS	25								
			5	SS	36								
252.3			6	SS	56								
5.0			7	SS	120	/23cm							24 31 31 14
			8	SS	120	/23cm							3 24 63 10
			9	SS	120								
246.2			10	SS	120	/28cm							
11.1	End of Borehole												

RECORD OF BOREHOLE No 2

1 of 1

METRIC

W.P. 344-88-88-173-93-00 LOCATION Sta. 25+122.7; O/s 10.8m Lt. ORIGINATED BY JC  
DIST 5 HWY 11 BOREHOLE TYPE Hollow Stem Auger, Cone Test COMPILED BY RV  
DATUM Geodetic DATE 1993 05 17 CHECKED BY DD

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 7 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							
								20 40 60 80 100	20 40 60 80 100	20 40 60 80 100					
262.4	Ground Surface														
0.0	Silty Sand to Sandy Silt Trace Gravel, Trace Organics Occ. Clayey Silt Layers Loose to Dense  (Fill)		1	SS	9		262								7 43 36 14
			2	SS	12		260								3 45 39 13
			3	SS	9		258								3 44 38 15
			4	SS	12		256								
			5	SS	17		254								
			6	SS	9		252								
			7	SS	20		250								
			8	SS	37		248								
255.3															
7.1	Clayey Silt to Silt Same Sand, Trace Gravel Very Stiff to Hard  (Glacial Till)		9	SS	28										
			10	SS	36										
			11	SS	27										
250.8															
11.6	Sandy Silt Same Clay, Same Gravel Very Dense  (Glacial Till)		12	SS	117										
			13	SS	67										
246.7															
15.7	End of Borehole		14	SS	105										

RECORD OF BOREHOLE No 3

1 OF 1

METRIC

W.P. 344-88-88 173-93-00 LOCATION Sta. 25+139.2; O/s 10.50m Lt. ORIGINATED BY JC  
DIST 5 HWY 11 BOREHOLE TYPE Hollow Stem Auger, Cone Test COMPILED BY RV  
DATUM Geodetic DATE 1993 05 17-18 CHECKED BY DD

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 (%)
								20 40 60 80 100	20 40 60 80 100	20 40 60 80 100						10 20 30
262.2	Ground Surface															
0.0	Sandy Silt with some gravel Tr. organics, Tr. clay Occ. cobbles V. loose to compact  (Fill)		1	SS	8										36 37 21 6	
			2	SS	16											
			3	SS	3											
			4	SS	8											
255.1																
7.1	Clayey Silt with Sand Tr. gravel, Occ. cobbles V. stiff to hard  (Glacial Till)		5	SS	24										3 35 45 17	
			6	SS	25											
			7	SS	32											
			8	SS	33											
			9	SS	112										8 37 38 17	
247.5																
14.7	Sandy Silt with gravel Tr. clay, V. Dense  (Glacial Till)		10	SS	91											
245.0			11	SS	120											
17.2	End of Borehole															

RECORD OF BOREHOLE No 4

1 OF 1 METRIC

W.P. ~~344-66-86~~ 173-93-00 LOCATION Sta. 25+126.7; D/s 10.30m RL ORIGINATED BY JC  
DIST 5 HWY 11 BOREHOLE TYPE Hollow Stem Auger, Cone Test, NX Casing COMPILED BY RV  
DATUM Geodetic DATE 1993 05 12 CHECKED BY DD

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT 7 KN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPo			WATER CONTENT (%)				
								20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	10 20 30	10 20 30	10 20 30		
262.5	Ground Surface														
0.0	Silty Sand to Gravelly Sand Trace/Some Organics Compact		1	SS	24		262								33 42 14 11
	Clayey Silt with Some Sand Some Gravel Occ. Cobbles & Boulders Soft to Stiff		2	SS	10		260								14 43 29 14
	(Fill)		3	SS	3		258								0 44 50 6
255.4			4	SS	10		256								
7.1	Clayey Silt with some sand, Trace gravel Occ. cobbles and boulders V. Stiff to hard		5	SS	25		254								12 33 37 18
	(Glacial Till)		6	SS	35		252								
			7	SS	27		250								
249.4			8	SS	24		248								
13.1	Sandy Silt to Gravelly Sand Very Dense Occ. Cobbles and Boulders		9	SS	62		246								37 49 (14)
	(Glacial Till)		10	SS	63		244								
			11	SS	83										
243.8			12	SS	120										
18.7	End of Borehole														



RECORD OF BOREHOLE No 5

1 OF 1

METRIC

W.P. 344-88-88-173-93-00 LOCATION Sta. 25+143.8; O/s 10.80m Rl. ORIGINATED BY JC  
DIST 5 HWY 11 BOREHOLE TYPE Hollow Stem Auger, Cone Test COMPILED BY RV  
DATUM Geodetic DATE 1993 05 12 CHECKED BY DD

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				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			20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100		
262.2	Ground Surface												
0.0	Silty Sand to Sandy Silt Some Gravel Occasional Clayey Silt pockets Loose to compact		1	SS	9		262						
			2	SS	16		260						11 47 28 14
			3	SS	12								
			4	SS	8		258						26 40 21 13
			5	SS	6								
			6	SS	6								
			7	SS	9		256						1 49 40 10
255.6			8	SS	15								
6.6	Clayey Silt to Silt with a trace of Clay, Some Sand Trace gravel Occasional Cobbles (Glacial Till)		9	SS	26		254						
			10	SS	36								
			11	SS	*		252						5 27 45 23
			12	SS	32								
			13	SS	37		250						
249.0			14	SS	78		248						
13.2	Silty Sand to Sandy Silt Tr. Clay, Tr. Gravel Occasional cobbles and boulders Very Dense (Glacial Till)		15	SS	75		246						0 74 20 6
			16	SS	73								
			17	SS	107		244						
			18	SS	70		242						1 58 30 11
			19	SS	66		240						
			20	SS	120								
237.4			21	SS	120		238						
24.8	End of Borehole • Hammer bouncing hit concrete. Moved the borehole at a different location and continued sampling below old borehole's bottom.												

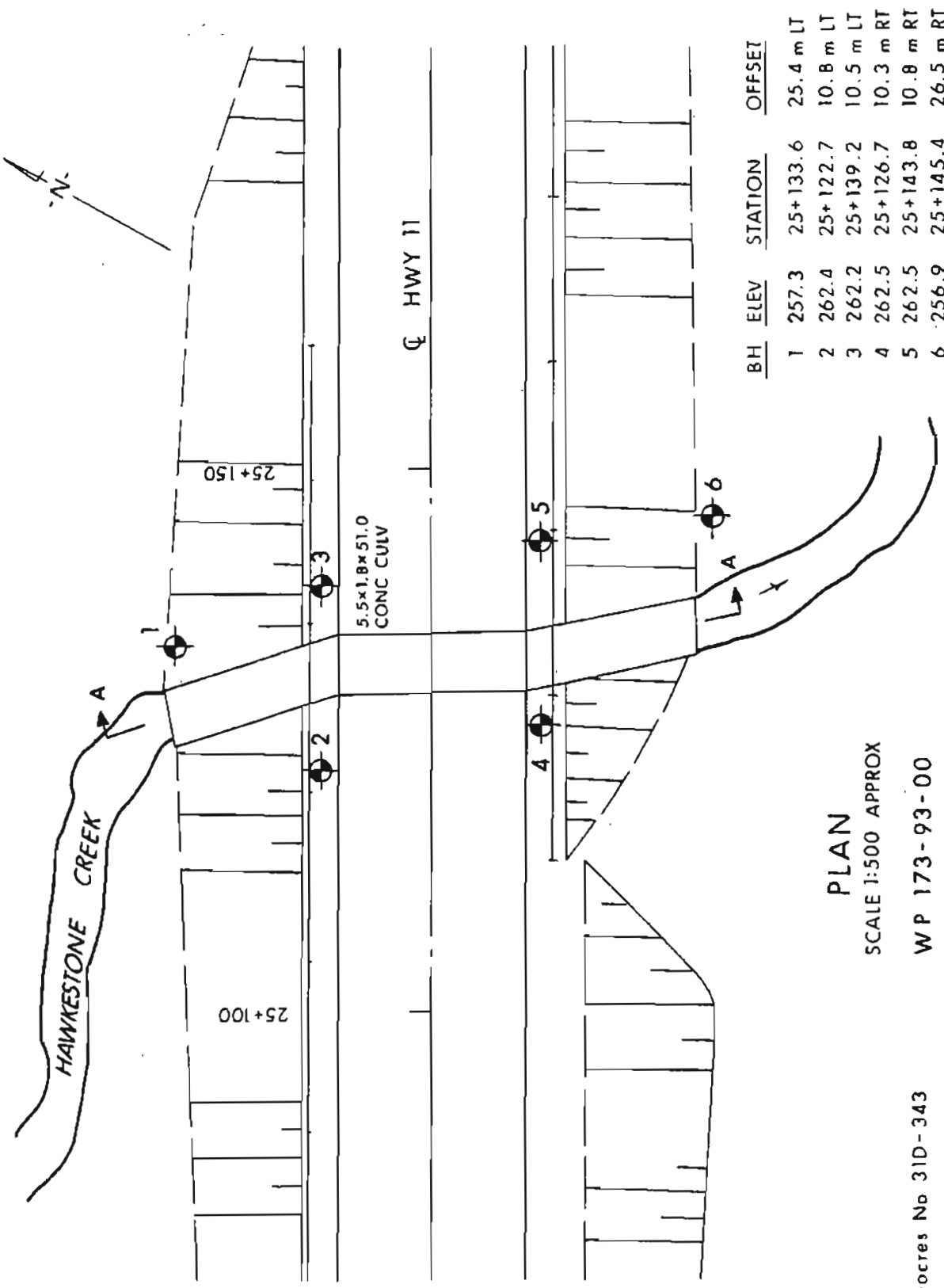
RECORD OF BOREHOLE No 6

1 OF 1

METRIC

W.P. 344-88-89 173-93-00 LOCATION Sta. 25+145.4; O/s 26.50m Rt. ORIGINATED BY JC  
DIST S HWY 11 BOREHOLE TYPE Hollow Stem Auger, Cone Test COMPILED BY RV  
DATUM Geodetic DATE 1993 05 14 CHECKED BY DD

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT 7 kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	W <sub>P</sub> W W <sub>L</sub>				
256.9	Ground Surface													
0.0														
	Grovelly Sand		1	SS	18		256							33 40 20 7
			2	SS	27									
			3	SS	34									
			4	SS	34									
	Silty Sand to Sandy Silt. Tr. Clay, Tr. Gravel Occasional cobbles and boulders Compact to V. Dense Occasional Clayey Silt Layers (Glacial Till)		5	SS	67									0 14 70 18
			6	SS	28									
			7	SS	43									7 43 37 13
			8	SS	55									
			9	SS	67									
			10	SS	63									
	Silty Clay		11	SS	43									2 22 55 21
			12	SS	120									6 44 30 20
242.7			13	SS	150									
14.2	End of Borehole													



BH	ELEV	STATION	OFFSET
1	257.3	25+133.6	25.4 m LT
2	262.4	25+122.7	10.8 m LT
3	262.2	25+139.2	10.5 m LT
4	262.5	25+126.7	10.3 m RT
5	262.5	25+143.8	10.8 m RT
6	256.9	25+145.4	26.5 m RT

PLAN  
 SCALE 1:500 APPROX  
 WP 173-93-00  
 Dwg No 1739300-A

Geocres No 31D-343

