

GEOCRES No. 30mly-297

DIST. \_\_\_\_\_ REGION \_\_\_\_\_

W.P. No. EGG-000-6 269-59-2

CONT. No. GGE 311

W. O. No. \_\_\_\_\_

STR. SITE No. \_\_\_\_\_

HWY. No. GO ALRT

LOCATION CHURCH STREET - DUFFINS CREEK

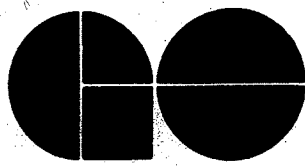
STRUCTURE

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. \_\_\_\_\_

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



# **TRANSIT**

## **Foundation Investigation Report**

**Contract No. GGE-311**



Ministry of  
Transportation and  
Communications

## INDEX

<u>Page No.</u>	<u>Description</u>
1	Index
2	Abbreviations and Symbols
3-55	Foundation Investigation Reports For:
	Brock Road Retaining Walls
	Church Street/Duffins Creek Crossing
	GO Transit

NOTE: For purposes of the contract, this report supersedes all other foundation reports prepared for GO Transit in connection with the above-mentioned project.

**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
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

$m_v$	$\text{kPa}^{-1}$	COEFFICIENT OF VOLUME CHANGE
$C_c$	1	COMPRESSION INDEX
$C_s$	1	SWELLING INDEX
$C_\alpha$	1	RATE OF SECONDARY CONSOLIDATION
$c_v$	$\text{m}^2/\text{s}$	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

$\rho_s$	$\text{kg}/\text{m}^3$	DENSITY OF SOLID PARTICLES	e	1, %	VOID RATIO	$e_{\min}$	1, %	VOID RATIO IN DENSEST STATE
$\gamma_s$	$\text{kN}/\text{m}^3$	UNIT WEIGHT OF SOLID PARTICLES	n	1, %	POROSITY	$I_D$	1	DENSITY INDEX = $\frac{e_{\max} - e}{e_{\max} - e_{\min}}$
$\rho_w$	$\text{kg}/\text{m}^3$	DENSITY OF WATER	w	1, %	WATER CONTENT	D	mm	GRAIN DIAMETER
$\gamma_w$	$\text{kN}/\text{m}^3$	UNIT WEIGHT OF WATER	$S_r$	%	DEGREE OF SATURATION	$D_n$	mm	n PERCENT - DIAMETER
$\rho$	$\text{kg}/\text{m}^3$	DENSITY OF SOIL	$w_L$	%	LIQUID LIMIT	$C_u$	1	UNIFORMITY COEFFICIENT
$\gamma$	$\text{kN}/\text{m}^3$	UNIT WEIGHT OF SOIL	$w_p$	%	PLASTIC LIMIT	h	m	HYDRAULIC HEAD OR POTENTIAL
$\rho_d$	$\text{kg}/\text{m}^3$	DENSITY OF DRY SOIL	$w_s$	%	SHRINKAGE LIMIT	q	$\text{m}^3/\text{s}$	RATE OF DISCHARGE
$\gamma_d$	$\text{kN}/\text{m}^3$	UNIT WEIGHT OF DRY SOIL	$I_p$	%	PLASTICITY INDEX = $\frac{w_L - w_p}{I_p}$	v	m/s	DISCHARGE VELOCITY
$\rho_{\text{sat}}$	$\text{kg}/\text{m}^3$	DENSITY OF SATURATED SOIL	$I_L$	1	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$	i	1	HYDRAULIC GRADIENT
$\gamma_{\text{sat}}$	$\text{kN}/\text{m}^3$	UNIT WEIGHT OF SATURATED SOIL	$I_C$	1	CONSISTENCY INDEX = $\frac{w_L - w}{I_a}$	k	m/s	HYDRAULIC CONDUCTIVITY
$\rho'$	$\text{kg}/\text{m}^3$	DENSITY OF SUBMERGED SOIL				i	$\text{KN}/\text{m}^2$	SEEPAGE FORCE

# FOUNDATION INVESTIGATION REPORT

For

Brock Road Retaining Walls

GO Transit

## INTRODUCTION:

Geocon Inc., under the technical supervision of the Ministry's Foundations Design Section, was retained by the GO-ALRT Program to carry out a geotechnical investigation in the area of the existing Brock Road structure along the proposed alignment of the GO-ALRT system.

This report written by Geocon Inc., summarizes the factual information obtained from the foundation investigation carried out during the periods of July 20-28, 1983, Aug. 30, 31, 1983, and Jan. 20, 31, 1984. The investigation program consisted of 16 boreholes advanced by means of hollow stem augers. Eleven of the 16 boreholes were accompanied by dynamic cone penetration tests. The depths of the boreholes ranged from 5.9 to 22.6 m.

## SITE AND GEOLOGY

The proposed GO-ALRT line is to cross the south portion of Durham County, in Pickering Township, about 2 km north of Lake Ontario. The site is located about 1.7 km south of the Town of Pickering immediately south of the intersection of the MacDonald Cartier Freeway (Hwy. 401) at Brock Road. The borehole investigation was carried out immediately north of the existing CNR lines at locations ranging from 125 m west to 100 m east of Brock Road along the south access ramps to the Freeway.

The topography of the general area is flat with the surrounding land being grass covered or in industrial use. The local drainage has been altered to follow shallow to deep drainage ditches which run parallel to the east-west CNR lines.

The Hwy. 401 access ramps rise about 11 m above the general level of the railway lines. The sides of the embankments have been constructed at about 2H:1V.

In general the site is underlain by fill and silty clay soil. These strata are underlain by glacial till. Bedrock has been encountered at an elevation of about 76.5 m in boreholes previously put down throughout the site. The bedrock is grey to black shale of the Whitby (Billings) formation.

## SUBSURFACE CONDITIONS

The boundaries between the various soil types, insitu and laboratory test results, as well as stabilized groundwater levels, are shown on the Record of Borehole Sheets included in the Appendix. The locations and elevations of the borings, along with three profiles showing estimated stratigraphical sections based on borehole data, are shown on the Contract Drawings.

The various soil types encountered are briefly described in the following paragraphs.

### Topsoil

A surficial stratum of topsoil was encountered in Boreholes 1, 2, 3, 6, 7, 9, 12, 13 and 15. This stratum ranges from 0.1 to 0.3 m in thickness. The topsoil is typically brown to dark brown silty clay with trace to some sand. Roots and organics are present throughout. The topsoil consistency is estimated to range from very soft to stiff.

### Sand, Some Silt to Sand and Silt (Fill)

The surficial topsoil in Boreholes 1, 2, 6, 7, 9 and 15 was underlain by a fill stratum. The fill was encountered as a surficial stratum in Boreholes 4, 5, 8, 10, 11 and 14. The above fill was encountered underlying silty clay in Borehole 12. The stratum ranged in thickness from 0.9 m in Borehole 8 to 11.0 m in Borehole 5.

The sand, some silt to sand and silt fill contained trace gravel and trace clay. Occasional layers of silty clay up to 0.6 m in thickness were encountered within the stratum. Coarse gravel to cobbles was also occasionally encountered in the stratum.

Grain size distribution analyses on selected samples of this stratum are shown as an envelope on Fig. 5 in the Appendix. The samples as tested ranged from sand, some silt, trace clay, trace gravel to sand and silt trace gravel.

Recovered samples of the fill were generally dry to moist. The natural moisture content of selected samples as tested ranged from 3.2 to 17.2%.

Standard Penetration Tests carried out in this stratum gave 'N' values of 4 to 70 blows per 0.3 m indicating the relative density of this deposit to be loose to very dense.

#### Silty Clay, Some Sand, Trace Gravel (Fill)

The sand, some silt, trace gravel (fill) stratum was underlain by silty clay, some sand, trace gravel (fill) in Boreholes 2 and 6. The subject stratum underlay topsoil in Boreholes 12 and 13. The stratum was 1.9 to 3.0 m thick in the respective boreholes.

The stratum was generally cohesive however some silt and sand layers were observed. The stratum was brown in colour.

The results of Atterberg Limit Tests are shown on the Plasticity Chart of Fig. 1 in the Appendix and indicate the soil to be a low plasticity clay.

Standard Penetration Tests carried out in the stratum yielded values ranging from 6 to 30 blows per 0.3 m indicating the stratum is of a firm to very stiff consistency.

#### Silty Clay, Some Sand and Organics

A stratum of silty clay, some sand and organics was encountered underlying the fill strata at 8 of the borehole locations. The stratum as investigated ranged in thickness from 0.1 to 0.6 m.

The stratum was generally dark brown to black in colour, however, dark green samples were also recovered. The stratum contained a trace to some clay. Roots, grass and other organic fibre in various states of decay were present in the recovered samples. The stratum probably represents the original topsoil stratum which was present at the site prior to the placement of the fill.

The results of Atterberg Limit Tests carried out on samples from Boreholes 2A and 14 indicate the soil to be a low plasticity clay, however the silty clay classification is considered to be more representative of the stratum in general. The test results have been plotted on Fig. 2 of the Appendix.

The results of Standard Penetration Tests, carried out within the stratum, indicate that the soil is generally firm to very stiff. A Quick Triaxial Test was carried out on a sample of the stratum recovered from Borehole 2A and yielded an undrained shear strength value of about 205 kPa. The shear strength value measured in this test indicates a hard consistency which is not considered representative of the stratum in general.

#### Silty Clay, Trace Sand and Gravel (CL)

The sand and silt fill in Boreholes 8 and 11, and the silt clay, some sand and organics in Boreholes 4, 5, 6, 7, 9 and 10 and the silty clay fill in Borehole 13 is underlain by silty clay, trace sand and gravel. The stratum ranges in thickness from 3.7 m in Boreholes 7 and 8 to 6.3 m in Boreholes 6 and 10.

The stratum ranges in colour from brown to grey. Brown and grey varves, typically 4 to 8 mm in thickness were frequently encountered in the upper 2 m of the stratum.

The results of Atterberg Limit Tests, carried out on selected samples of this stratum, have been plotted on the Records of Boreholes and on the Plasticity Chart of Fig. 3 of the Appendix. The results of the tests indicate that the stratum consists of a low plasticity silty clay (CL).

The natural moisture content of samples of the stratum as tested, ranged from 16.1 to 38.7%.

A total of four Quick Triaxial tests were carried out on samples of the stratum and the results of these tests have been plotted on the Record of Boreholes in the Appendix. The undrained shear strength of the samples ranged from 26.8 to 46.4 kPa indicating a firm soil consistency.

In-situ vane tests, carried out within the stratum in Boreholes 10 and 11, yielded values of undrained shear strength ranging from 60 to 21 kPa, indicating a stiff to soft soil consistency. In general, the shear strength of the soil reduced with depth of penetration into the stratum. Sensitivity of the soil typically ranged from 2 to 6 as determined by a comparison of natural and remoulded shear strength values. Results of the in-situ vane tests, and the above quick triaxial tests, have been plotted as undrained shear strength versus depth on Fig. 7 in the Appendix.



In-situ vane tests carried out within the stratum in Borehole 13 yielded values of undrained shear strength ranging from 65 to 122 kPa, indicating a stiff to very stiff consistency. The local deposit of silty clay encountered to the west of Brock Road in the immediate vicinity of Borehole 13 was generally stiffer than the silty clay to the east of the structure. The test results have been plotted on the Record of Borehole 13.

Standard Penetration tests carried out in the stratum yielded 'N' values ranging from 45 to 2 blows per 0.3 m. Very soft to firm soil was encountered over the lower 5 m of the stratum in Borehole 6.

The unit weight of four samples of the stratum ranged from 17.9 to 21.4 kN/m<sup>3</sup> and are plotted on the Record of Boreholes.

#### Silty Sand, Trace Gravel, Trace Clay

The silty clay stratum in Borehole 13, is underlain by silty sand, trace gravel, trace clay. The stratum is grey in colour and is about 2.2 m in thickness.

The relative density of the stratum is described as very loose to loose.

#### Sand, Some Gravel, Trace Silt

A thin stratum of sand, some gravel, trace silt underlies sand and silt fill in Borehole 12. The relative density of the stratum is described as dense and the soil colour was grey.

#### Silt and Sand, Some Gravel, Trace Clay (Till)

Silt and sand, some gravel, trace clay (till) was the deepest stratum encountered in all boreholes. The stratum was present at elevations ranging from 91.1 m in Borehole 2 to 80.0 m in Borehole 11. The stratum was penetrated for variable depths, to elevations as low as 78.9 m, however underlying bedrock was not encountered.

The stratum was brown to grey in colour and frequently exhibited a brown mottled appearance within the upper portion of the stratum. Occasional sand seams were observed in the recovered samples. In general, the till becomes more coarse grained with depth. Angular dark grey shale fragments were

frequently present in samples recovered from near the base of the sampled stratum. Coarse gravel and cobbles were occasionally encountered during the advance of the auger hole.

Grain size distribution analyses on selected samples of this stratum are shown as an envelope on Fig. 6 in the Appendix. The samples as tested ranged from silty sand to silt and sand (till), trace to some gravel and some clay.

The results of one Atterberg Limit Test carried out on the till matrix are plotted on the Plasticity Chart of Fig. 4 of the Appendix. The results of the test indicate that the sample is a borderline CL to ML soil which is described as a silt of low plasticity.

The natural moisture content of six samples as tested ranged from 6.1 to 23%.

Standard Penetration Tests carried out in this stratum gave 'N' values ranging from 7 to over 100 blows per 0.3 m indicating the relative density of the stratum ranges from loose to very dense. The relative density of the till generally increases with depth and is typically dense to very dense at depths of 1 to 2 m below the till surface.

#### Groundwater Conditions

At the time of the investigation, the groundwater level was observed at elevations ranging from 85.5 to 89.2 m. The groundwater surface was located within the till stratum in Boreholes 2, 3, 4 and 15 located to the west of Brock Road. The groundwater surface was present within the silty clay, trace sand and gravel stratum in Boreholes 5, 8 and 11. Groundwater surface was encountered within the fill or in the underlying silt, some sand and organic strata in Boreholes 6, 7, 9, 12 and 13.

A piezometer was installed at elevation 87.3 m within the fill stratum in Borehole 5. No water level was present within the piezometer during the period of the investigation. In general the fill, located to the west of Brock Road, was moist.

Final water levels were recorded about one month following installation of standpipes and piezometers in Boreholes 2 to 10. The recorded water level is typically at about elevation 87 m however water levels at elevations 88.1 and 89.4 m were recorded in Boreholes 7 and 9 respectively.

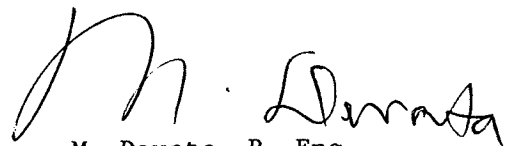
Water levels in Boreholes 12, 13 and 15 were recorded during the January field investigations, and were encountered at elevations ranging from 87.3 to 88.5 m.

The groundwater level may be expected to vary seasonally throughout the site.

The depth to groundwater and the depth of the piezometer and standpipe installations have been tabulated on Table 1 in the Appendix.

A handwritten signature in black ink, appearing to read 'L. Politano', with a long horizontal stroke extending to the right.

L. Politano  
Project Foundations Engineer

A handwritten signature in black ink, appearing to read 'M. Devata', with a large, stylized 'M' and a long horizontal stroke extending to the right.

M. Devata, P. Eng.  
Chief Foundations Engineer  
(East)

## A P P E N D I X

**Ministry of  
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 **Ontario**

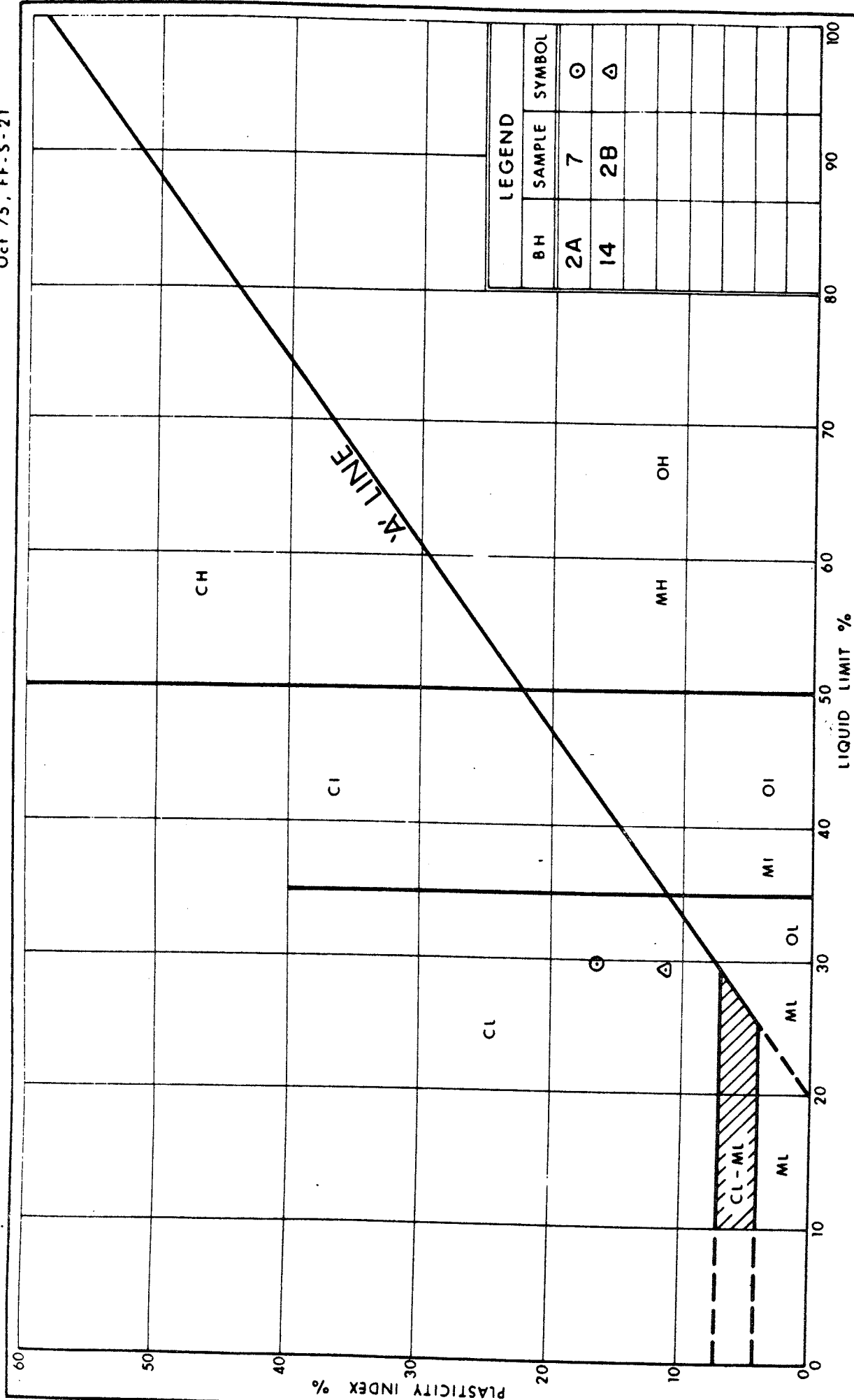
PLASTICITY CHART  
SILTY CLAY (FILL)  
SOME SAND TRACE GRAVEL

FIG No 1

WP 470-711-609

11

Oct 75, FF-S-21

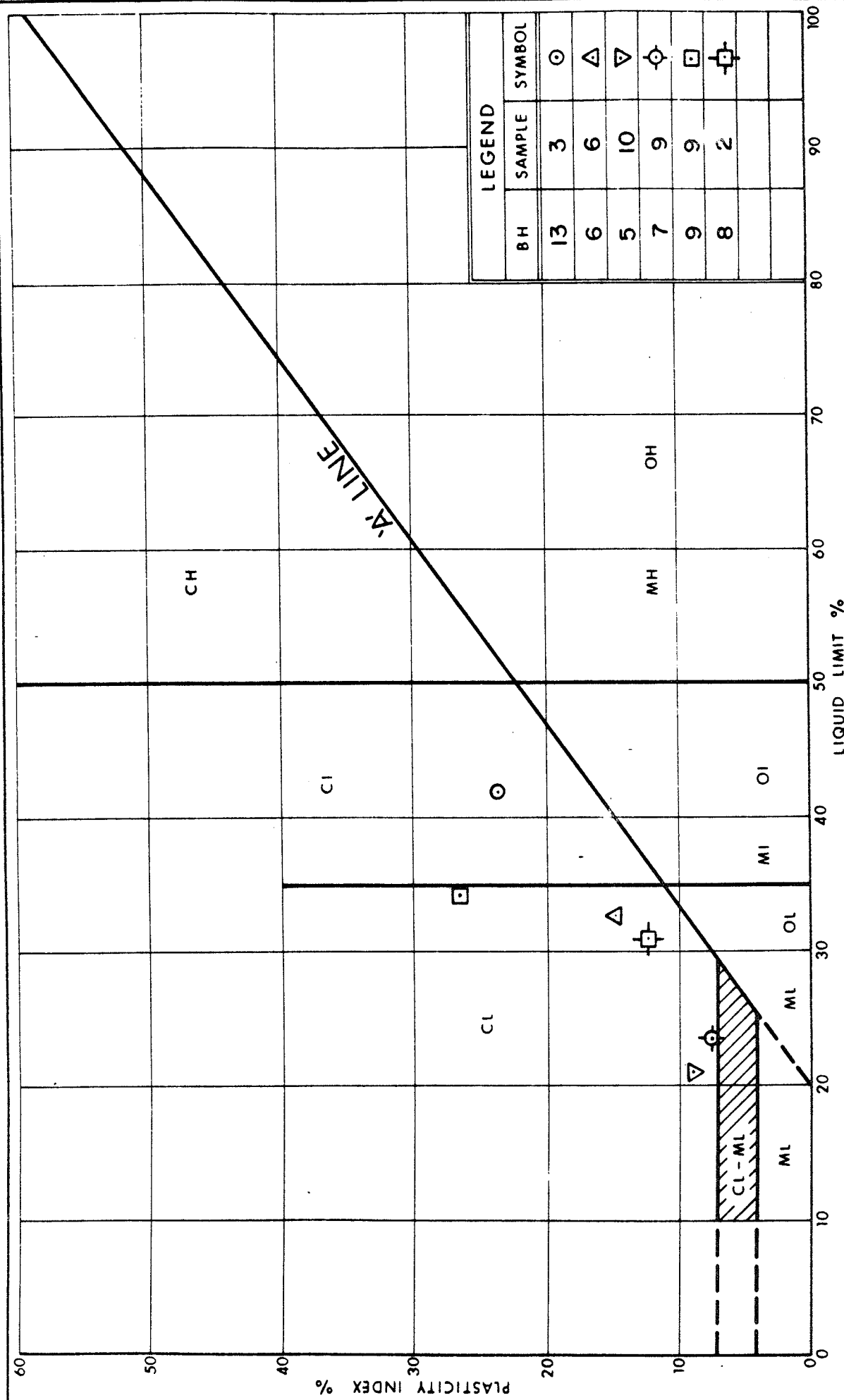
Ministry of  
Transportation and  
Communications

PLASTICITY CHART  
SILTY CLAY  
SOME SAND & ORGANICS

FIG No 2

W P 470-711-609

12



PLASTICITY CHART  
SILTY CLAY  
TRACE SAND AND GRAVEL

FIG No 3

W P 470-711-609

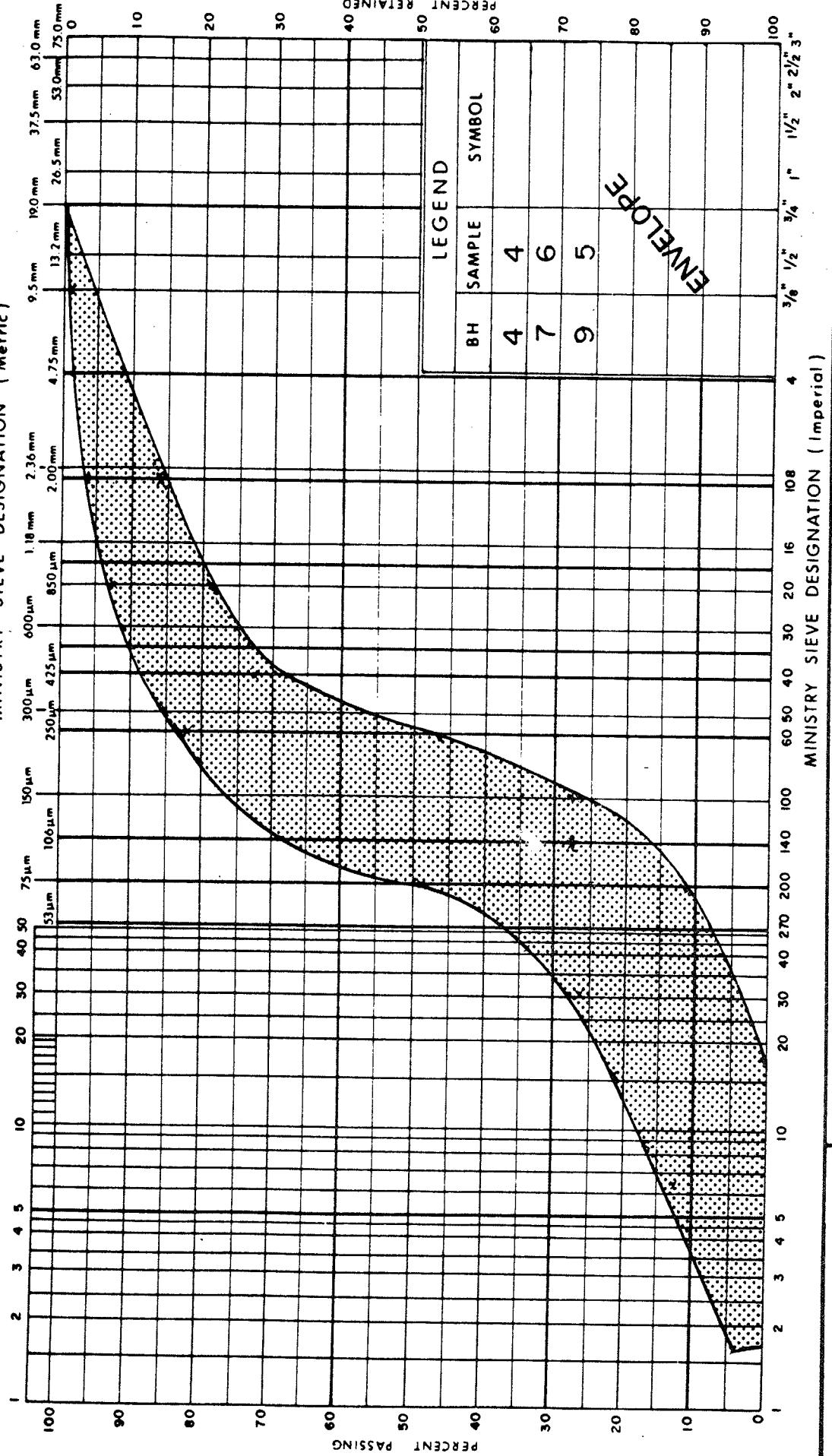
PLASTICITY CHART  
SILT AND SAND (TILL)  
SOME GRAVEL, TRACE CLAY

 Ontario  
Ministry of  
Transportation and  
Communications



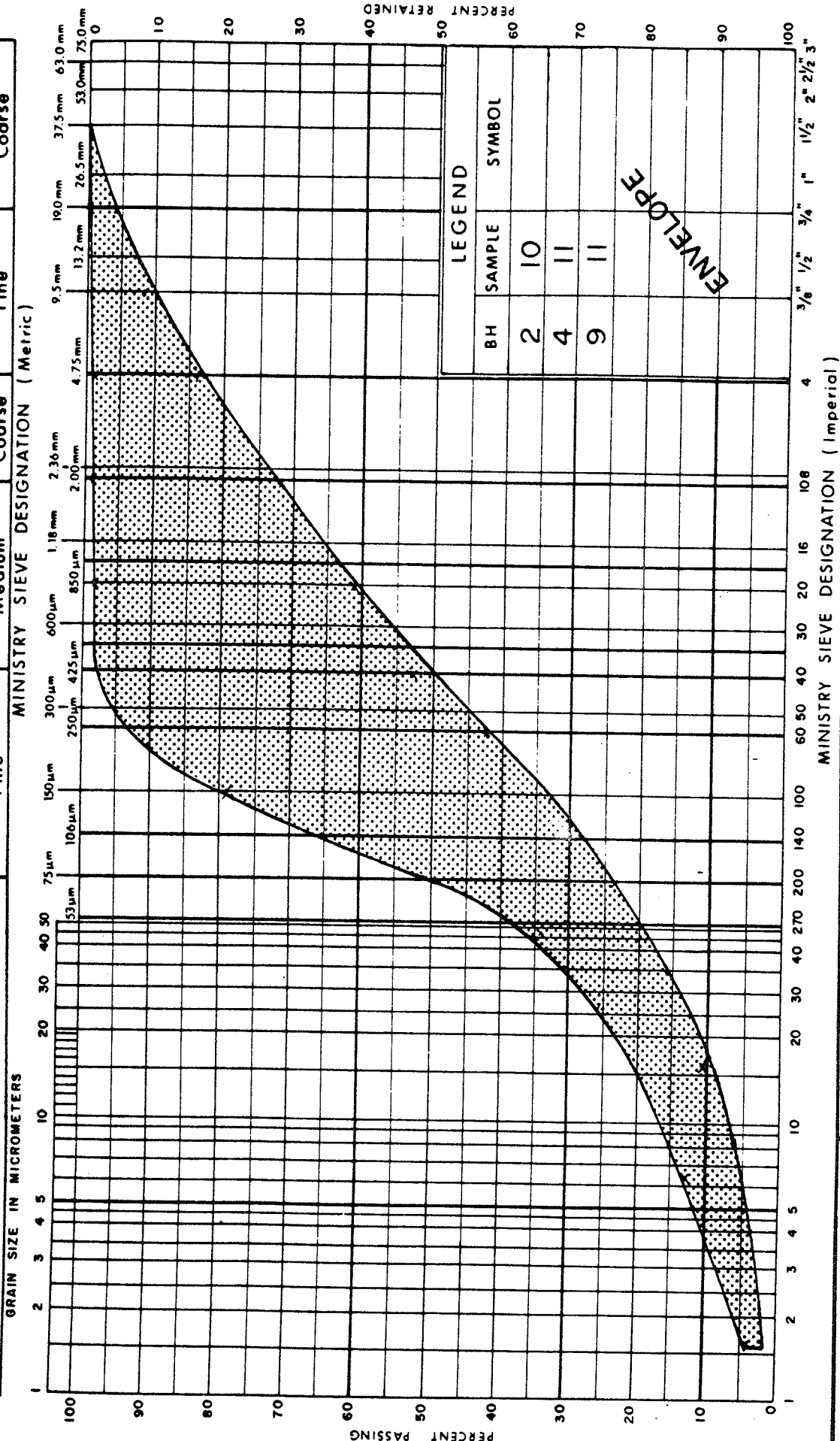
# UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT		SAND			GRAVEL	
GRAIN SIZE IN MICROMETERS		Fine	Medium	Coarse	Fine	Coarse
MINISTRY SIEVE DESIGNATION (Metric)						



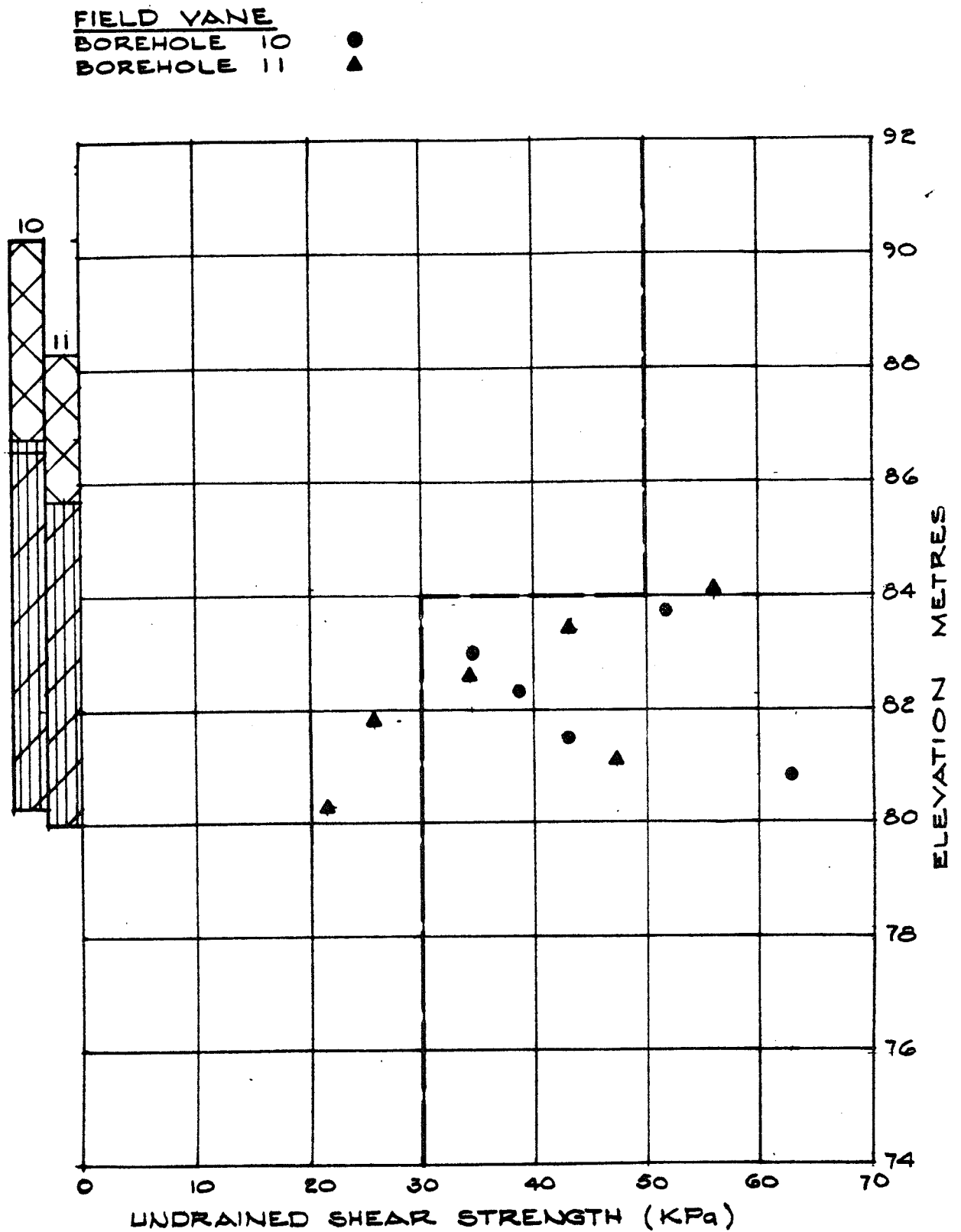
# UNIFIED SOIL CLASSIFICATION SYSTEM

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



# UNDRAINED SHEAR STRENGTH VERSUS ELEVATION SILTY CLAY

APPENDIX II  
FIGURE 7  
WP 470-711-690



GEOCON

TABLE 1  
GROUNDWATER LEVELS

Borehole Number	Ground Elevation	Depth (m)		Depth to Water Level (m)						
		To Bottom of Standpipe	To Bottom of Piezometer	1983						
				07/22	07/25	07/26	07/27	07/28	08/02	08.31
1	91.63	*	*							
2A	96.29		12.47		9.17	9.24	9.27	9.27	9.24	9.35
3	90.90	8.89		6.07	3.89	3.96	3.89	3.86	3.86	3.94
4	97.56	13.92				10.08		10.13	10.19	10.24
5	97.62		10.36					Dry	Dry	Dry
5	97.62	18.64						12.17	12.17	10.72
6	90.16	10.59						3.40	3.48	3.51
7	96.65	9.14						6.20	8.51	8.56
8	88.02	5.44						1.42	1.47	1.37
9	95.40	6.10						Dry	6.20	6.05
10	90.30	*	*							
11	88.30	3.20								2.77
				Depth to Water Level (m)						
				01/20	01/31	1984				
12	91.20	*	*	4.00**						
13	90.90	10.50		2.40						
14	94.10	*	*							
15	91.00							3.65**		

\* No Standpipe or Piezometer installed in Boreholes 1, 10, 12, 14 and 15

\*\* Water level in open hole

# RECORD OF BOREHOLE No 1

METRIC

W P 470-711-609 LOCATION 4 855 178.5N : 339 259.0E ORIGINATED BY TH  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Hollow Stem Auger & Cone Test COMPILED BY GAB  
 DATUM Geodetic DATE 1983 07 20 CHECKED BY RWB

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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100				
91.6	Ground Level															
0.0	Topsoil		1	SS	19											
0.3	Sand, some silt, trace gravel (fill) Very Dense Brown		2	SS	70											
87.9			3	SS	52											
3.7			4	SS	69											
	Silt and Sand, some Gravel, trace clay (till) Very dense Brown to Grey		5	SS	110/0.15m											
			6	SS	115											
			7	SS	74											
80.7			8	SS	85/0.2m											
10.9	End of Borehole															

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 2

METRIC

W P 470-711-609 LOCATION 4 855 205.0N ; 339 281.5E ORIGINATED BY TH  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Hollow Stem Auger & Cone Test COMPILED BY GAB  
 DATUM Geodetic DATE 1983 07 21 CHECKED BY RWB

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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100					
96.3	Ground Level													
0.0	Topsoil		1	SS	12		96							
0.2	Sand, some silt, trace gravel (fill)													
94.6	Compact Brown		2	SS	22									
1.7	Silty Clay, some sand trace gravel (fill) occasional sand layers													
	Stiff to Very Stiff		3	SS	11		94							
91.6	Brown													
4.7	Silty Clay, some Sand and Organics		4	SS	9		92							
5.2	Silt and Sand some Gravel, trace clay (till)													
	Compact to Very Dense		5	SS	24		90							
88.2	Brown to Grey		6	SS	60/0.2m									
8.1	End of Borehole													
Note: Borehole 2 terminated upon auger refusal in cobbles. See Record of Borehole 2A for continuation of stratigraphy.														

OFFICE REPORT ON SOIL EXPLORATION

## RECORD OF BOREHOLE No 2A

METRIC

W P	470-711-609	LOCATION	4 855 205.0N : 339 281.5E	ORIGINATED BY	TH
DIST	6 HWY GO ALRT	BOREHOLE TYPE	Hollow Stem Auger	COMPILED BY	GAB
DATUM	Geodetic	DATE	1983 07 22	CHECKED BY	RWB

[illegible]

OFFICE REPORT ON SOIL EXPLORATION

+3, x5 : Numbers refer to Sensitivity

20  
15  $\phi$  5 (%) STRAIN AT FAILURE  
10

# RECORD OF BOREHOLE No 3

METRIC

W P 470-711-609 LOCATION 4 855 210.ON ; 339 315.8E ORIGINATED BY TH  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Hollow Stem Auger & Cone Test COMPILED BY GAB  
 DATUM Geodetic DATE 1983 07 21 CHECKED BY RWB

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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100					
90.9	Ground Level													
0.0	Topsoil		1	SS	16									
0.3	Silt and Sand, some gravel, trace clay (till)  Compact to Very Dense  Brown to Grey		2	SS	40									
			3	SS	29									
			4	SS	30									
			5	SS	31									
			6	SS	85									
			7	SS	74									
79.8			8	SS	100	0.2m								
11.1	End of Borehole													

OFFICE REPORT ON SOIL EXPLORATION



## RECORD OF BOREHOLE No 4

METRIC

W P 470-711-609

LOCATION 4 855 235.ON ; 339 327.OE

ORIGINATED BY TH

DIST 6 HWY GO ALRT

BOREHOLE TYPE Hollow Stem Auger &amp; Cone Test

COMPILED BY GAB

DATUM Geodetic

DATE 1983 07 25

CHECKED BY RWB

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			20 40 60 80 100	20 40 60 80 100					
97.6	Ground Level												
0.0	Sand, some silt, trace to some gravel (fill)		1	SS	16								8 81 (11)
	Compact to Dense Brown		2	SS	24								
	Layer of silty clay		3	TW	PH								
			4	SS	59								
			5	SS	47								
90.0	Silty Clay, some Sand and Organic		6	SS	14								17 59 22 2
7.6	Silty Clay, trace sand and gravel stiff		7	SS	13								
7.9	Brown												
87.2													
10.4	Silt and Sand, some gravel, trace clay (till)		8	SS	21								
	Compact to Very Dense		9	SS	86								
	Brown to Grey		10	SS	66								
			11	SS	125/0.15m								
			12	SS	147								
			13	SS	50/0.15m								
78.9	End of Borehole												
18.7													

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to Sensitivity

20  
15 5 (%) STRAIN AT FAILURE  
10

# RECORD OF BOREHOLE No 5

METRIC

W P 470-711-609

LOCATION 4 855 266.5N ; 339 375.5E

ORIGINATED BY TH

DIST 6 HWY GO ALRT

BOREHOLE TYPE Hollow Stem Auger & Cone Test

COMPILED BY GAB

DATUM Geodetic

DATE 1983 07 26

CHECKED BY RWB

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 Y 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
97.6	Ground Level													
0.0	Sand, some silt to Sand and Silt, trace to some gravel (fill)  Compact to Very Dense  Brown		1	SS	19									
			2	SS	21									
			3	SS	39									
			4	SS	72									
			5	SS	43									
			6	SS	27									
			7	TW	PH									
	Layer of silt clay													
86.6	Silty Clay, some Sand		8	SS	37									
11.0	and Organics													
	Silty Clay, trace sand and gravel, varves 11.1 to 13.0 m (CL)  Firm to Hard  Grey		9	SS	7									
			10	TW	PH									
			11	TW	PH									
81.1														
16.5	Silt and Sand, some gravel, trace clay (tilly)		12	SS	11									
	Compact to Very Dense													
78.9	Grey		13	SS	115									
18.7	End of Borehole													

+3, x5: Numbers refer to  
Sensitivity

20  
15  
10  
5 (%) STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 6

METRIC

W P 470-711-609 LOCATION 4 855 260.5N ; 339 396.5E ORIGINATED BY TH  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Motorized Tripod Drill COMPILED BY GAB  
 DATUM Geodetic DATE 1983 07 26 CHECKED BY RWB

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			20	40	60	80	100				
90.1	Ground Level															
0.1	100 Topsoil		1	SS	4		90									
88.9	Sand, some silt, trace gravel (fill) Loose Brown															
1.2	Silty Clay, some sand trace gravel (fill) Hard Brown		2	S	34		88									
86.7																
3.4	Silty Clay, some Sand and Organics		3	SS	10		86									
3.7																
			4	SS	19		84									
	Silty Clay, trace sand and gravel, varves 3.7 to 5.7 m (CL) Very Stiff to Very Soft Grey		5	SS	2		82									
			6	TW	PM											
80.1			7	SS	2		80									
79.5	Silt and Sand (till)		8	SS	29											
10.6	End of Borehole															

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 7

METRIC

W P 470-711-609 LOCATION 4 855 285.0N ; 339 406.0E ORIGINATED BY TH  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Hollow Stem Auger & Cone Test COMPILED BY GAB  
 DATUM Geodetic DATE 1983 07 27 CHECKED BY RWB

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			20	40	60	80	100					
96.6	Ground Level																
0.0	100 Topsoil		1	SS	19		96										
			2	SS	23		94										
	Sand, some silt to Sand and Silt, trace gravel (fill) Compact to Dense Brown		3	SS	23		92										
			4	SS	41		90										
			5	SS	33		88										
			6	SS	20		86										
87.2	Silty Clay, some Sand and Organics		7	SS	18		84										
9.4	Silty Clay, trace sand and gravel (CL) Firm to Very Stiff Brown to Grey		8	SS	17		82										
83.5			9	TW	PH		80										
13.1	Silt and Sand, some gravel, trace clay (till) Dense to Very Dense Grey		10	SS	38												
			11	SS	72												
79.4			12	SS	56												
17.2	End of Borehole																

OFFICE REPORT ON SOIL EXPLORATION

+<sup>3</sup>, x<sup>5</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
5 (%) STRAIN AT FAILURE

## RECORD OF BOREHOLE No 8

METRIC

W P 470-711-609 LOCATION 4 855 286.4N ; 339 430.0E ORIGINATED BY TH  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Motorized Tripod Drill COMPILED BY GAB  
 DATUM Geodetic DATE 1983 07 27 CHECKED BY RWB

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
88.0	Ground Level												
0.0	Sand, some silt, trace gravel (fill)		1	SS	5								
87.1	Loose Brown												
0.9	Silty Clay, trace sand and gravel (CL) Stiff Brown to Grey		2	SS	11		86						
			3	SS	8		84						
83.4													
4.6	Silt and Sand, some gravel, trace clay (till)		4	SS	7								
82.1	Loose to Dense Grey		5	SS	44								
5.9	End of Borehole												

OFFICE REPORT ON SOIL EXPLORATION

+<sup>3</sup>, x<sup>5</sup>: Numbers refer to  
Sensitivity

20  
15  $\phi$  5 (%) STRAIN AT FAILURE  
10

# RECORD OF BOREHOLE No 9

METRIC

W P 470-711-609 LOCATION 4 855 306.5N ; 339 437.4E  
 DIST 6 HWY 60 ALRT BOREHOLE TYPE Hollow Stem Auger & Cone Test  
 DATUM Geodetic DATE 1983 07 28  
 ORIGINATED BY TH  
 COMPILED BY GAB  
 CHECKED BY RWB

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			20 40 60 80 100	20 40 60 80 100					
95.4	Ground Level													
0.0	90 Topsoil		1	SS	25									GR SA SI CL
			2	SS	26		94							
	Sand, some silt to sand and silt, trace gravel (fill)		3	SS	31		92							
	Compact to Dense		4	SS	42									
	Brown		5	SS	36		90							6 50 39 5
			6	SS	16		88							
86.3	Silty Clay, some Sand and Organics		7	SS	20		86							
9.1														
9.4	Silty Clay, trace sand and gravel (CL)		8	SS	4		84							
	Firm to Very Soft		9	TW	PH		82						18.32	
	Grey													
81.4			10	SS	17		80							
14.0	Silt and Sand, some gravel trace clay (till)													
79.8	Very Dense Grey		11	SS	50/0.08m									10 50 36 4
15.6	End of Borehole													

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to Sensitivity

20  
15 5 (%) STRAIN AT FAILURE  
10

# RECORD OF BOREHOLE No 10

METRIC

W P 470-711-609 LOCATION 4 855 259.5N ; 339 393.2E ORIGINATED BY JZ  
 DIST 6 HWY GO ALRT BOREHOLE TYPE MOTORIZED TRIPOD DRILL COMPILED BY GAB  
 DATUM Geodetic DATE 1983 08 30 CHECKED BY RWB

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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100					
90.3	Ground Level													
0.0	Sand, some silt trace gravel (fill) Compact Brown		1	SS	18	No Water Level Recorded	90							
			2	SS	38		88							
86.8			3	SS	13									
3.5			4	SS	45		86							
3.7			5	SS	21									
			6	SS	6		84							
	Silty Clay, some Sand and Organics Silty Clay, trace sand and gravel (CL) Very Stiff to Firm Brown to Grey					82								
80.3														
10.0	End of Borehole													

OFFICE REPORT ON SOIL EXPLORATION

+3, x5 : Numbers refer to 20  
Sensitivity 15  $\phi$  5 (%) STRAIN AT FAILURE  
10

## RECORD OF BOREHOLE No 11.

METRIC

W P 470-711-609 LOCATION 4 855 255.7N ; 339 401.5E ORIGINATED BY JZ  
 DIST 6 HWY GO ALRT BOREHOLE TYPE MOTORIZED TRIPOD DRILL COMPILED BY GAB  
 DATUM Geodetic DATE 1983 08 31 CHECKED BY RWB

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			20	40	60	80	100					
88.3	Ground Level																
0.0	Sand, some silt trace gravel (fill) Dense						88										
85.7	Brown		1	SS	37		86										
2.6	Silty Clay, trace sand and gravel (CL) Stiff to Soft Brown to Grey		2	SS	8		84										
							82										
80.0							80										
8.3	End of Borehole																

+3, x5: Numbers refer to  
Sensitivity

20  
15  
10  
5 (%) STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION



# RECORD OF BOREHOLE No 12

METRIC

W P 470-711-609 LOCATION 4 855 165.7 N ; 339 239.1 E  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Hollow Stem Auger and Cone Test  
 DATUM Geodetic DATE 1984 01 20  
 ORIGINATED BY SRP  
 COMPILED BY AEL  
 CHECKED BY RWB

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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	SHEAR STRENGTH					
91.2	Ground Level													
0.0	Topsoil													
0.2	Silty Clay, some sand, trace gravel (fill) Firm to very stiff Brown		1	SS	25									
89.1														
2.1	Sand, some silt to Sand and Silt trace gravel, trace clay (fill) Very Dense Brown to Grey Brown		2	SS	68									
86.7														
4.5	Sand, some gravel trace		3	SS	46									
86.4	Silt Dense Grey													
4.8	Silt and Sand, some gravel, trace clay (till) Dense to Very Dense Grey		4	SS	72									
			5	SS	78									
			6	SS	73									
81.6														
9.6	End of Borehole													

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 13

METRIC

W P 470-711-609 LOCATION 4 855 103.2 N : 339 251.0 E ORIGINATED BY SRP  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Hollow Stem Auger and Cone Test COMPILED BY AEL  
 DATUM Geodetic DATE 1984 01 20 CHECKED BY RWB

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>		
90.9	Ground Level												
0.0	Topsoil												
0.2	Silty Clay, some sand, trace gravel (fill)												
	Firm												
	Brown		1	SS	6								
87.9													
3.0	Silty Clay, trace to some sand		2	TW	PM								
	Stiff to Very Stiff												
	Grey		3	TW	PM								
			4	TW	PM								
83.3													
7.6	Silty Sand, trace gravel, trace clay		5	TW	PM								
	Loose to Very Loose												
	Grey		6	SS	2								
81.1													
9.8	Silt and Sand, some clay trace of gravel (till)												
	Occasional shale fragments												
	Very Dense												
	Grey												
80.1													
10.8	End of Borehole												

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 14

METRIC

W P 470-711-609 LOCATION 4 855 142.0 N; 339 246.0 E ORIGINATED BY SRP  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Hollow Stem Auger and Cone Test COMPILED BY AEL  
 DATUM Geodetic DATE 1984 01 31 CHECKED BY RWB

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 (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPa						
94.1	Ground Level													
0.0	Sand and Silt, some gravel, trace clay (Fill) Compact  Brown					No Water Level Recorded	94							
			1	SS	27		93							
91.0	100 mm Sand Layer						92							
3.1	Silty Clay, some Sand and Organics		2	SS	5		91							
90.4							90							
3.7	Silt and Sand, some gravel, trace clay (Till)  Dense to Very Dense  Grey		3	SS	37		89							
			4	SS	44	88								
			5	SS	45	87								
			6	SS	83	86								
84.5						85								
9.6	End of Borehole													

OFFICE REPORT ON SOIL EXPLORATION

## RECORD OF BOREHOLE No 15

METRIC

W P 470-711-609 LOCATION 4 855 055.9 N ; 339 221.2 E ORIGINATED BY SRP  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Hollow Stem Auger and Cone Test COMPILED BY AEL  
 DATUM Geodetic DATE 1984 01 31 CHECKED BY RWB

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
91.0	Ground Level												
0.0	Topsoil												
0.2	Sand and Silt, some gravel, trace clay (Fill) Very Dense Brown		1	SS	55								
88.3													
2.7	Silt and Sand, some gravel, trace clay (Till) Dense to Very Dense Grey		2	SS	57								
			3	SS	42								
84.4			4	SS	49								
6.6	End of Borehole												

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to Sensitivity

20  
15 5 (%) STRAIN AT FAILURE  
10

# RECORD OF BOREHOLE No 1 (Previous Investigation)

METRIC

W P 29-67-07 (470-711-609) LOCATION 4 855 249.1N; 339 359.7E ORIGINATED BY Others  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Washboring - NX Casing; Cone COMPILED BY  
 DATUM Geodetic DATE 1969 08 08 (1984 02 23) CHECKED BY

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 kg/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							
								SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE							
							WATER CONTENT (%) 10 20 30								
87.9	Ground Level														
0.0	Topsoil														
0.3	Silty Clay with some sand trace gravel. Stiff to Very Stiff		1	SS	12										
			2	SS	16										
84.8			3	TW	PM										
3.1	Glacial Till, Het-mix. silt, sand & gravel, trace to some clay Compact to Very Dense Grey		4	SS	14										
			5	SS	38										
			6	SS	79										
			7	SS	99										
79.3															
8.6	with occ. boulders up to 240 mm size & shale fragments		8	SS	100/0	0.1m									
			9	SS	150/0	0.2m									
77.2															
76.8	Weathered		12	SS	100/0	0.1m									
11.1	Shale Bedrock Sound		13	RC	80%										
			14	AXT	90%										
75.1															
12.8	End of Borehole														

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 1A

METRIC

W P 29-67-07 (470-711-609) LOCATION 4 855 236 N; 339 346.0E (Previous Investigation)  
 DIST 6 HWY GO ALRT BOREHOLE TYPE Dynamic Cone Test ORIGINATED BY Others  
 DATUM Geodetic DATE 1969 08 08 (1984 02 23) COMPILED BY \_\_\_\_\_  
 CHECKED BY \_\_\_\_\_

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		NATURAL MOISTURE CONTENT			UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100		
88.8	Ground Level													
0.0	Probably Silty Clay						88							
86.3														
2.4	Probably Glacial Till						86							
84.3														
4.5	End of Cone Test													Practical refusal

OFFICE REPORT ON SOIL EXPLORATION

+<sup>3</sup>, x<sup>5</sup>: Numbers refer to Sensitivity

20  
15  
10  
5 (%) STRAIN AT FAILURE

For  
Church Street/Duffins Creek Crossing  
GO Transit

INTRODUCTION:

C. Mirza Engineering Inc., under the technical supervision of the Ministry's Foundations Design Section, was retained by the Ministry of Transportation and Communications on behalf of GO-ALRT to carry out a geotechnical investigation at the site of the proposed GO-ALRT structure over Church Street and Duffins in the Town of Ajax.

This report written by C. Mirza Engineering Inc., summarizes the factual information obtained from the foundation investigation at the above-mentioned site. The fieldwork for the investigation was carried out between July 7 and 8, 1983. A total of six boreholes were advanced by means of muskeg-vehicle mounted standard hollow stem augers. Five of the boreholes were taken into the underlying shale bedrock and one hole was accompanied by a dynamic cone penetration test. In addition, three more cone tests were conducted to supplement the information obtained from the boreholes.

The depths of the boreholes ranged from 9.0 to 12.5 m below the ground surface.

SITE DESCRIPTION AND GEOLOGY

The site is located in the Town of Ajax, Ontario, near its boundary with the Town of Pickering. Specifically, the proposed structure site is located between the Hwy. 401 and CNR trackage at the crossing of Church Street and Duffins Creek.

Topographically, the site is flat; however, road and rail construction has resulted in the build-up of fills across much of the site. Duffins Creek has cut a channel through the relatively flat lying ground and therefore there is some natural relief in the immediate area of the crossing. Physiographically, the site lies within the South Slope region which is characterized by glacial tills of fluvio-glacial origin.

Duffins Creek is a meandering stream which has a width of about 12 m at the crossing location. The channel bottom is flat and cobble strewn. The stream can swell up during wet periods and cause erosion of the banks. Therefore, along the channel from Hwy. 401 northerly to Church Street, the east bank of the stream has been provided with a concrete slab facing to protect against erosion.

## SUBSURFACE CONDITIONS

The predominant stratum across the site is a glacial till deposit which overlies shale bedrock at depths of 6.6 to over 9.2 m. Above the glacial till deposit there are several soil types present including loose surficial sands and organic silts, loose to compact sands and gravel, and fill materials of variable character.

The boundaries between the various soil types, insitu and laboratory test results, as well as stabilized groundwater levels, are shown on the Record of Borehole Sheets included in the Appendix. The locations and elevations of the borings, along with profiles showing estimated stratigraphical sections based on borehole data, are shown on the Contract Drawings.

The various soil types encountered are briefly described in the following paragraphs.

### Fill Material

Fill material is present at both the east and west approach locations. On the west side of Church Street, in the vicinity of the west abutment, the fill material consists primarily of sands and gravel, associated with the construction of the Hwy.401-Church Street interchange ramp. Its composition is quite variable, changing from a sand and gravel (see Fig.1) at Borehole 1 to a mixture of silt, sand and gravel at Borehole 2. The thickness of the fill ranges from 1.1 m to 2.4 m, and increases westerly from Church Street towards the Off-Ramp.

At the east approach location, the fill material consists of a cohesive silty clay of low plasticity mixed with sand and some gravel with organic inclusions. The organic bands in the fill were up to 5 mm in thickness. The fill thickness at the east approach and east abutment locations varied from 2.1 to 2.7 m.

It is believed that an old mill once stood near the location of Borehole 6. Duffins Creek once flowed east of its present course directly below the mill. It is understood that the bottom of the creek was excavated for the construction of a water wheel to drive the grist mill. The mill fed railway cars which stopped on the CN tracks just south of the mill building. Hence, the fill composition, lateral extent and density in the vicinity of Borehole 6 could vary considerably from that found in this investigation.



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The 'N' values in the fill material ranged from 4 to 22. One moisture content in the sand and gravel fill was found to be 9%. Based on the 'N' values, the non-cohesive portion of the fill is in a loose to compact state; the cohesive portions are presumed to be of soft to firm consistency.

### Sand

Below the fill material at the location of Borehole 2, and at grade near the locations of Boreholes 3, 4 and Cone Tests 8 and 9, there is a sand deposit consisting of fine to medium grained uniformly graded brown sand, with ochre staining. The thickness of the sand deposit ranges from 1.7 m at Borehole 2 to 4.3 m as inferred from a cone test at Cone location 8.

The sand is presumed to be of fluvial origin, due to absence of cross-bedding. Its moisture content is about 10 per cent. 'N' values in the sand deposit varied between 2 and 12 blows per 0.3 m indicating it to be very loose to compact, being generally loose. In the dynamic cone penetration tests the blows were generally below 10 per 0.3 m, again confirming the loose nature of the deposit.

### Organic Silt

A thin stratum of organic silt was encountered below the sand at Borehole 2 and below the fill material at Borehole 5. It is also presumed to have been encountered at the location of Cone Test 7. The organic silt stratum varies in thickness between 0.6 m (at Borehole 2) to 1.5 to 1.6 m at Borehole 5 and Cone Test 7. It occurs at depths of 2.1 to 2.8 m below grade. 'N' values ranged from 4 to 18 blows per 0.3 m. The higher value was obtained in a test conducted near the boundary of this deposit with the underlying fill. Ignoring this 'N' value, the relative density of the organic silt may be described as loose.

### Sand and Gravel

All of the Boreholes and Cone Tests with the exception of Borehole 2 encountered a sand and gravel deposit at depths ranging from 2.4 to 4.3 m. It is presumed that this sand and gravel deposit is of glacio-fluvial origin and represents random lenses or seams deposited during interstadial glacial melt-off periods. The thickness of these lenses vary between 1.3 and 2.1 m at the Borehole locations where encountered. At the cone test locations, the thickness of the lenses could not be determined due to the inferred termination of the dynamic cone penetration tests within these lenses.

Typical gradation curves are shown in Fig.2. The lenses contain from 10 to 15% of silt and clay sized materials. Moisture contents ranged from 6 to 11%.

The 'N' values in these lenses ranged from lows of 8 blows per 0.3 m to highs of 66 blows per 0.3 m. Hence, the relative density of these lenses is considered to range from loose to very dense.

#### Glacial Till-Silty Fine Sand

The predominant stratum across the site is a glacial till deposit consisting of a silty fine sand with some gravel and a trace of clay. The deposit is essentially non-cohesive. It is typically grey in colour. It occurs at depths of 3.4 to 5.1 m below grade corresponding to elevations ranging from 73.5 to 78.0.

The composition of the till varies across the site and with depth. At Borehole 1, the till contains silty clay (of low plasticity) zones; at Boreholes 2 and 5, the lower portions of the till contain gravelly zones in a more coarse sandy matrix. Gradation curves for the glacial till stratum are shown in Fig.3, along with two gradation curves for samples obtained from the lower more coarse zones. The Atterberg Limits for the silty clay zones are shown on Fig.4.

The moisture content of the till ranged from 5 to 16%, being typically about 10%. The Atterberg Limits show the cohesive portion to be a silt to silty clay of low plasticity.

The Standard Penetration Resistance 'N' values were always in excess of 50 blows per 0.3 m, indicating the glacial till to be generally in a very dense state of compaction.

#### Glacial Till - Sandy Gravel

At the location of Borehole 6, the upper silty fine sand glacial till is underlain by another till deposit consisting of a sandy gravel which becomes coarser and bouldery with depth. This till sheet was not encountered at the other Borehole locations. Due to sampling problems, representative samples of the till could not be recovered; hence no tests for gradation were possible. However, visual inspection of the recovered samples indicates this material to be distinct from the sand and gravel zones encountered in the silty fine

sand glacial till deposit. The till consists predominantly of gravel sizes in a sand matrix with a trace of silt and clay. The gravel and boulders were found to consist essentially of igneous materials (gneisses, granites and diabases) rather than sedimentary rock. Hence, the till is not of local origin. Due to the large number of boulders encountered at depth, further penetration of the till deposit was not possible to identify positively the shale bedrock elevation at this particular Borehole location.

Reconstruction of the possible geology at this site indicates that the basal till (sandy gravel) may have been eroded prior to the deposition of the upper silty fine sand till. The upper till contains little gravel and may be of glacio-lacustrine origin due to the fine texture. The lower till is more coarse and of morainic origin. It probably represents an uneroded remnant near the location of Borehole 6.

#### Shale Bedrock

Shale bedrock was encountered and proven by diamond drill coring at the locations of Boreholes 1 to 5 inclusive. It occurs at depths of about 9 m at locations of Boreholes 1 to 4 and at a much shallower depth (6.6 m) at the location of Borehole 5. The bedrock profile generally corresponds to the ground profile along the centreline of the proposed structure, as shown on the Profile in the contract drawings.

The bedrock was encountered at elevations ranging from 68.3 at the location of Borehole 3 to elevation 72.0 at the location of Borehole 5. It consists of a grey to black thinly bedded shale, with numerous clayey mud seams. A sample from a highly weathered upper zone was found to have a moisture content of about 9% with corresponding liquid and plastic limits of 22 and 14%.

Two zones of weathering have been identified. The upper zone is highly weathered, and consists of disintegrated shale which is almost mud-like in appearance. This upper highly weathered zone ranges in thickness from 0.2 m at Boreholes 1, 2 and 3 to 1.6 m at Borehole 4.

The lower weathered zone consists of thinly bedded shale, with siltstone and more calcereous zones.

Core recoveries ranged from 42 to 100%. However, the Rock Quality Designation values were almost always zero in the upper highly weathered zone

and ranged from 0 to 37% in the lower weathered zone. These low RQD values A are attributed to the presence of close jointing and thin bedding throughout the depths cored.

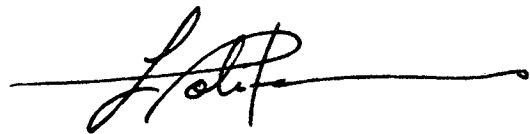
Geologically, the bedrock belongs to the Whitby Formation of Upper Ordovician age. Shear zones are noticeable in the clay filled joints.

#### GROUNDWATER CONDITIONS

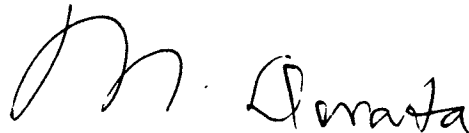
The groundwater conditions at the site were monitored in open slotted standpipes installed in each borehole upon completion. The water levels were observed until 1983 08 09, by which time they had stabilized to the levels indicated on the borehole log sheets.

The groundwater table at the site follows the general landform and is controlled by the stream level in Duffins Creek. Elevations measured in August ranged from 76.0 to 76.9 m at Borehole 3. The corresponding stream water elevation was 75.8 m ASL.

As noted earlier in this report, Duffins Creek floods during the wet periods, particularly the Spring runoff. During flooding, it is quite likely that the water table adjacent to the river banks rises in response to the flood level. However, further away from the banks, the response of the water table may not be as fast or great. Hence, local conditions could change depending upon the duration of the flooding condition.



L. Politano  
Project Foundations Engineer

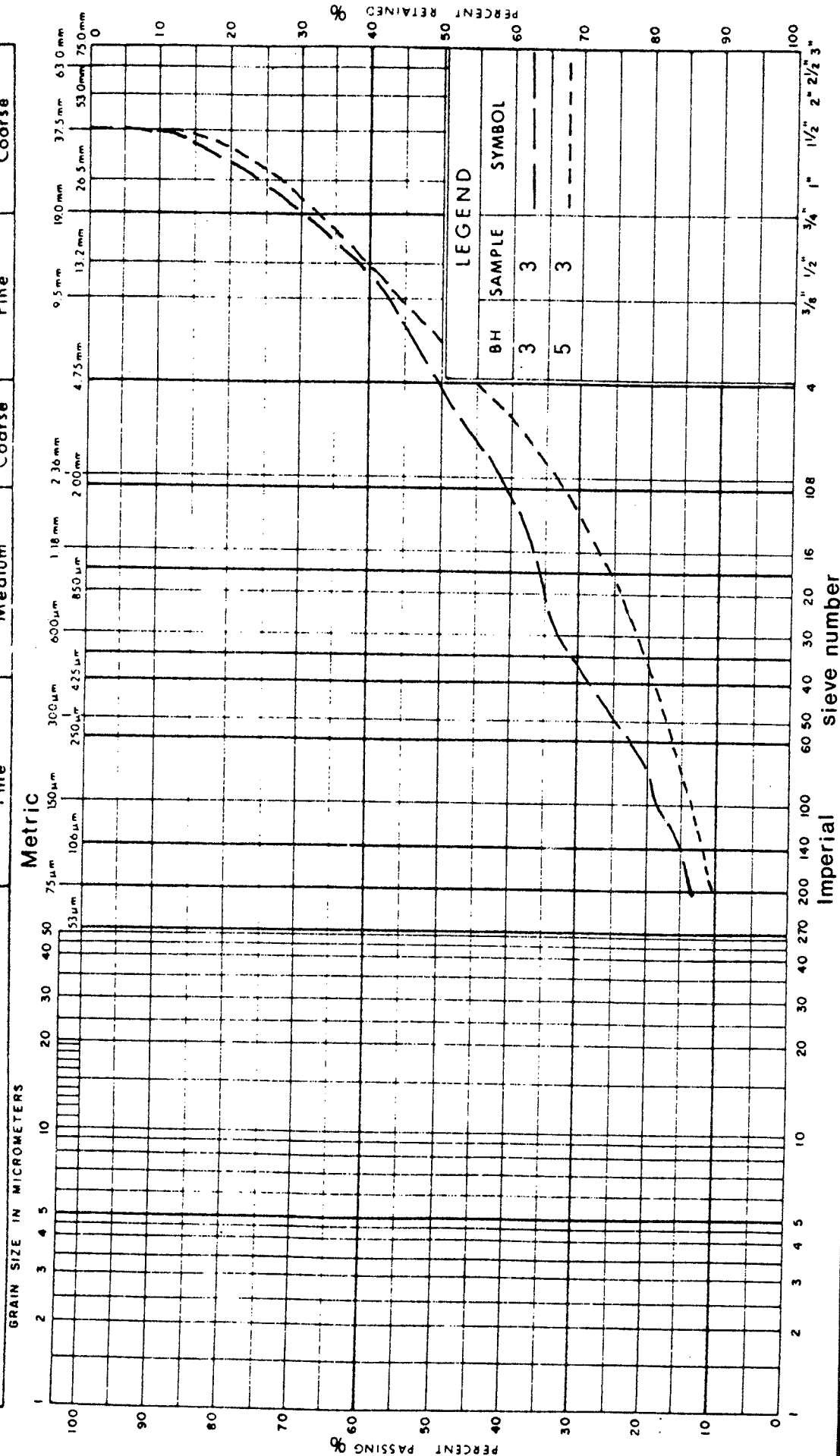


M. Devata, P. Eng.  
Chief Foundations Engineer (East)

## A P P E N D I X

## UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse
GRAIN SIZE					

Ministry of  
Transportation and  
Communications

## GRAIN SIZE DISTRIBUTION

**SAND AND GRAVEL**

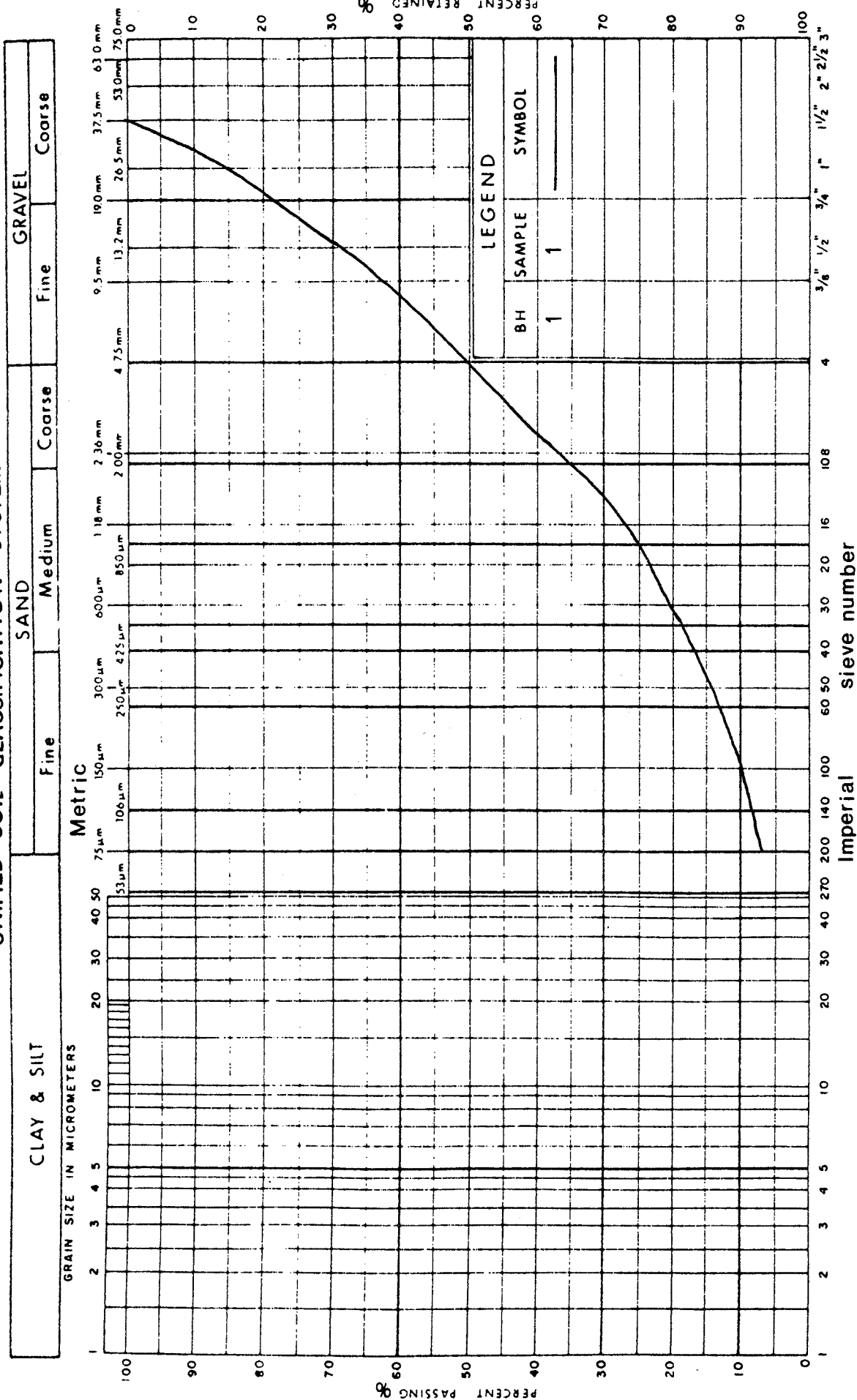
FIG No

2

W P EGG-000-6 G0-ALRT

Town of Ajax

# UNIFIED SOIL CLASSIFICATION SYSTEM

Ministry of  
Transportation and  
Communications

# GRAIN SIZE DISTRIBUTION

FILL MATERIAL (Sand &amp; Gravel)

FIG No

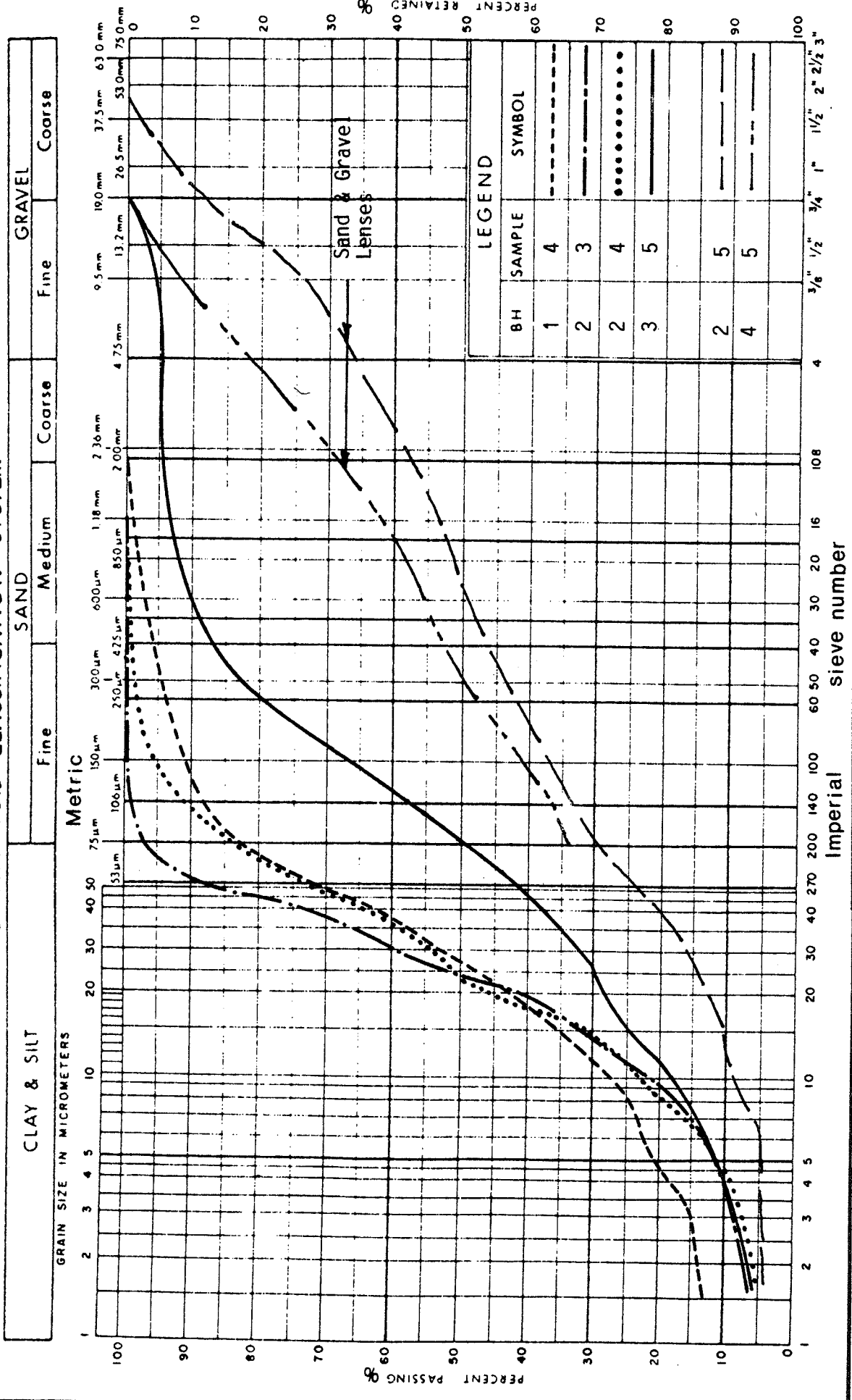
1

W P  
EGG-000-6 GO-ALRT

Town of Ajax

78 12 M

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION

GLACIAL TILL - Silty Fine Sand, occ. gravel  
(including sand & gravel lenses)

FIG No

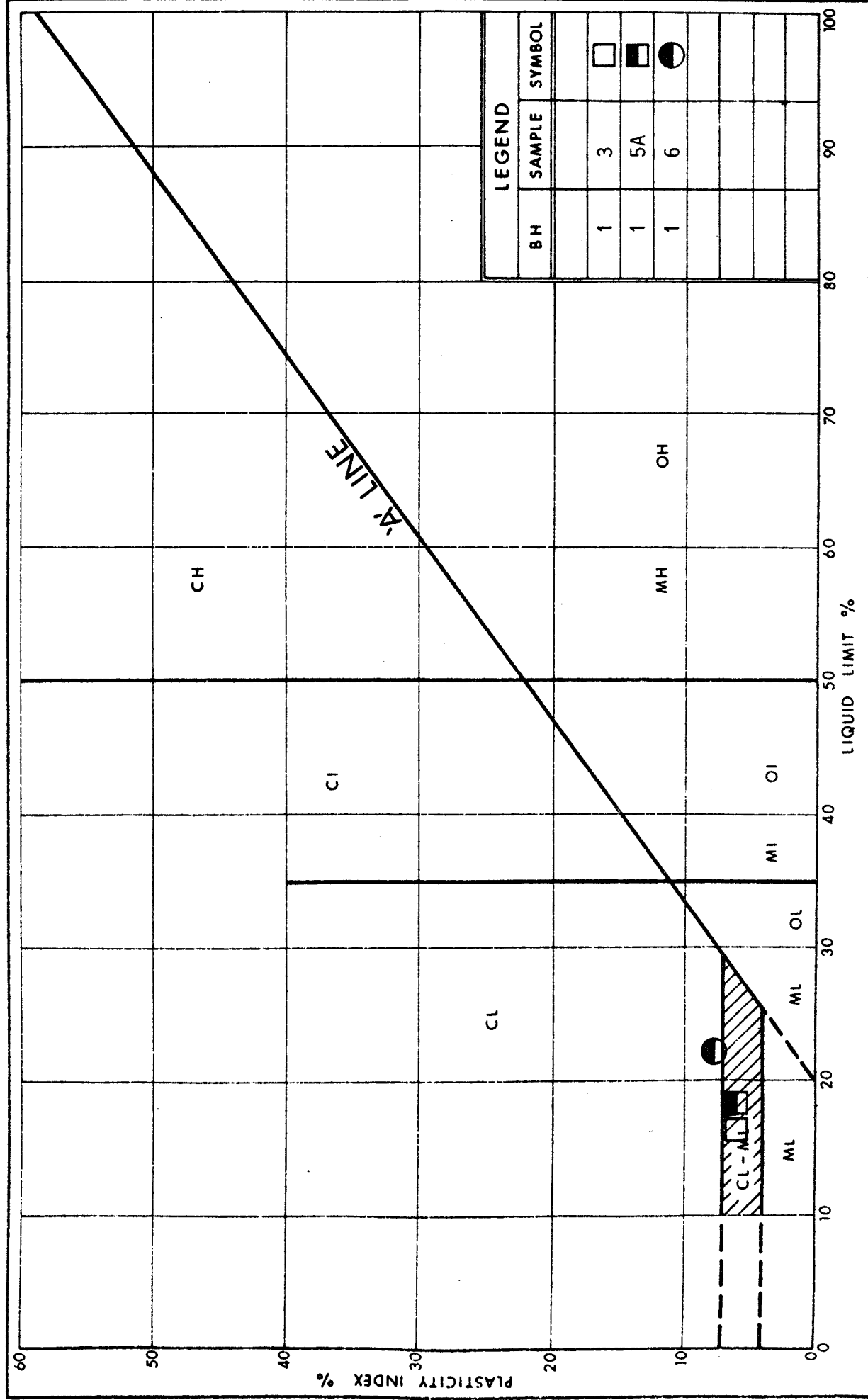
3

W P EGG-000-6 G0-ALR1

Town of Ajax



Oct 75, FF-S-21



# PLASTICITY CHART

GLACIAL TILL (Silty Fine Sand with Clayey Silt Zones)

# RECORD OF BOREHOLE No 1

METRIC

W P EGG 000-6 LOCATION 4856099.5 N, 340792.5 E ORIGINATED BY MH/RB  
 DIST 6 HWY 60-ALRT BOREHOLE TYPE Hollow Stem and BQ Core and Cone Test COMPILED BY SQA  
 DATUM Geodetic DATE 1983-07-18 CHECKED BY CM

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			20	40						60	80	100	WATER CONTENT (%)
								SHEAR STRENGTH										

# RECORD OF BOREHOLE No 2

METRIC

W P EGG 000-6 LOCATION 4856108.0 N, 340811.0 E ORIGINATED BY MH  
 DIST 6 HWY GO-ALRT BOREHOLE TYPE Hollow Stem and BQ Core and Cone Test COMPILED BY SQA  
 DATUM Geodetic DATE 1983-07-18 CHECKED BY CM

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 Y	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40					
80.2														
0.0	FILL MATERIAL Het. Mix. Silt, Sand and Gravel with some clay and Organics.													
79.1														
1.1	SAND Fine - Med. Compact Rusty Brown		1	SS	12									
77.4														
2.8	ORGANIC SILT Tr. Sand, Gravel		2	SS	18									
76.8														
3.4	GLACIAL TILL Silty Fine Sand with Occ. Gravel  V. Dense Grey  Becoming coarser with depth.  Shaley inclusions at base.		3	SS	185									W.L. on 83-08-24
71.0			4	SS	72/15	cm								0 2 (98)
9.2	Highly weathered		6	SS	102/9	cm								0 17 (83)
9.4	SHALE BEDROCK weathered Closely jointed, Occ. mud seams. Grey to Black		7	RC	100%									32 39 (29)
69.3			8	RC	100%									RQD: 0%
10.9	End of Borehole		9	RC	100%									RQD: 0%

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 3

METRIC

W P EGG 000-6 LOCATION 4856118.0 N, 340842.5 E ORIGINATED BY MH/RB  
DIST 6 HWY GO-ALRT BOREHOLE TYPE Hollow Stem and BQ Core COMPILED BY SQA  
DATUM Geodetic DATE 1983-07-18 CHECKED BY CM

[illegible]

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to Sensitivity

# RECORD OF BOREHOLE No 4

METRIC

W P EGG 000-6 LOCATION 4856132.0 N, 340867.0 E ORIGINATED BY MH/RB  
 DIST 6 HWY GO-ALRT BOREHOLE TYPE Hollow Stem and BQ Core COMPILED BY SQA  
 DATUM Geodetic DATE 1983-07-18 CHECKED BY CM

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			20 40 60 80 100								WATER CONTENT (%)		
								SHEAR STRENGTH								WATER CONTENT (%)		

# RECORD OF BOREHOLE No 5

METRIC

W P EGG 000-6 LOCATION 4856143.5 N, 340890.5 E ORIGINATED BY MH/RB  
 DIST 6 HWY GO-ALRT BOREHOLE TYPE Hollow Stem BQ Core COMPILED BY SQA  
 DATUM Geodetic DATE 1983-07-19 CHECKED BY CM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT  Y	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH							WATER CONTENT (%)		
								20 40 60 80 100							PLASTIC LIMIT Wp	NATURAL MOISTURE CONTENT W	LIQUID LIMIT Wl
78.6 0.0	FILL MATERIAL Silty Clay of low Plasticity with Sand Gravel and Organic seams, upto 5mm thick  Soft																
76.5 2.1	ORGANIC SILT Loose Dk. Brown - Grey		1	SS	4												
75.0 3.6	SAND & GRAVEL Tr. Silt & Clay V. Dense, Grey		2	SS	4												
73.5 5.1	GLACIAL TILL Silt, Sand and Shaley Gravel. V. Dense Grey		3	SS	66												
72.0 6.6	Highly weathered with several mud filled fissures		4	SS	90/25cm												
71.1 7.5	SHALE BEDROCK weathered Closely jointed Occ. mud seams		5	RC	100%												
69.6 9.0	End of Borehole		6	RC	100%												
			7	RC	100%												
			8	RC	100%												

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 6

METRIC

W P EGG 000-6 LOCATION 4856127.5 N, 340916.0 E ORIGINATED BY MH/RB  
 DIST 6 HWY GO-ALRT BOREHOLE TYPE Hollow Stem, Cone Test & BQ Core COMPILED BY SQA  
 DATUM Geodetic DATE 1983-08-05 CHECKED BY CM

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			20 40 60 80 100	WATER CONTENT (%)					
82.0 0.0	FILL MATERIAL Silty Clay of low Plasticity with Sand Gravel and Organic seams, upto 5mm thick		1	SS	8									
79.3 2.7	Soft		2	SS	60									
78.0 4.0	SAND & GRAVEL Tr. Silt & Organics		3	SS	148/28cm									
76.5 5.5	GLACIAL TILL Silty Fine Sand with Tr. Gravel V. Dense		4	SS	86									
	GLACIAL TILL Sandy Gravel with Tr. Silt & Clay		5	SS	56									
	becoming Bouldery with depth		6	SS	100/2cm									
	V. Dense		7	RC	100%									
72.1 9.9	End of Borehole		8	RC	100%									

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 7

METRIC

W P EGG 000-6 LOCATION 4856134.0 N, 340893.5 E ORIGINATED BY RB  
 DIST 6 HWY GO-ALRT BOREHOLE TYPE Cone Test COMPILED BY SQA  
 DATUM Geodetic DATE 1983-08-05 CHECKED BY CM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES						
78.6											
0.0	Probable FILL MATERIAL						78				
76.5							77				
2.1	Probable ORGANIC SILT						76				
74.9							75				
3.7	Probable SAND & GRAVEL										
74.0											
4.6	End of Cone Test Practical Refusal										

OFFICE REPORT ON SOIL EXPLORATION



# RECORD OF BOREHOLE No 8

METRIC

W P EGG 000-6 LOCATION 4856126.0 N, 340868.5 E ORIGINATED BY R.B.  
 DIST 6 HWY GO-ALRT BOREHOLE TYPE Cone Test COMPILED BY S.Q.A.  
 DATUM Geodetic DATE 1983-08-05 CHECKED BY C.M.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES									
78.7 0.0	Probable SAND													
74.4 4.3	Probable SAND & GRAVEL													
74.0 4.7	End of Cone Test							70/15cm						
	Practical Refusal													

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 8

METRIC

W P EGG 000-6 LOCATION 4856126.0 N, 340868.5 E ORIGINATED BY R.B.  
 DIST 6 HWY GO-ALRT BOREHOLE TYPE Cone Test COMPILED BY S.Q.A.  
 DATUM Geodetic DATE 1983-08-05 CHECKED BY C.M.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>		
78.7 0.0	Probable SAND																
78																	
77																	
76																	
74.4 4.3 74.0 4.7	Probable SAND & GRAVEL																
	End of Cone Test						70/15cm										
	Practical Refusal																

OFFICE REPORT ON SOIL EXPLORATION

