

GEOCRES No. 4072-40DIST. 1 REGION W.P. No. 143-91-00CONT. No. W. O. No. STR. SITE No. HWY. No. 3LOCATION Hwy 3 - WindsorH.M.L.No of PAGES -

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. REMARKS:

1
COMPUTER B

C:\BOREHOLE\TAE
14391BH1.DWG
14391BH2.DWG
14391BH3.DWG
14391BH4.DWG



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FILE No. _____ DATE _____

REMARKS Journey and Site 99-977-9707 (winder)

ENGINEERING MATERIALS OFFICE
FOUNDATION DESIGN SECTION

WP 143-91-00 DIST 1
HWY 401/Hwy 3 STR SITE -
High Mast Lighting Foundations

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FOUNDATION INVESTIGATION REPORT
For
High Mast Lighting Foundations
Hwy. 401/Hwy. 3 Intersection
W.P. 143-91-00
District 1, Chatham

INTRODUCTION

This report summarizes the factual information obtained from a foundation investigation performed at the above-mentioned site between 93 06 08 and 93 06 09. The field work consisted of advancing one borehole at each High Mast Lighting location (HML) in order to establish soil parameters for the design of the 4 HML foundations. For borehole location refer to Drawing A. Boreholes ranged from 12.6 m to 15.7 m in depth and one borehole was accompanied by cone penetration tests.

SITE DESCRIPTION

The site is located at the intersection between HWY. 401 and HWY. 3 in the City of Windsor. The topography in the immediate area is generally flat to gently undulating. The surrounding area is farmland with some buildings.

Physiographically, the site is located in the region referred to as the St. Clair Clay Plains (Ref.: Chapman and Putnam 1984).

SUBSURFACE CONDITIONS

The subsoil at the sites consists of a stratum of clayey silt with sand and trace of gravel (Glacial Till), some 38 m thick, underlain by limestone bedrock, based on the previous investigation in the vicinity of the sites. However, for this investigation, boreholes were driven to depths ranged from 12.6 m at BH 2 to 15.7 m at BH 3. The upper 2.7 to 3.8 m of brown layer is generally harder than below due to desiccation. A clayey silt fill with some granular base was found to overlie the site at two borehole locations (BH's 1 and 4).

A more detailed description of the subsurface conditions encountered is given below.

Clayey Silt Fill

A thin layer of Clayey Silt fill, ranged from 0.8 to 1.2 m thick was found at two borehole locations (BH's 1 and 4). No index tests were carried out on this material. However, from the visual observation, it is apparent that the fill material can be classified as Clayey Silt with some Granular Base.

Clayey Silt with Sand and trace of Gravel (Glacial Till)

Below the Clayey Silt Fill or from the ground surface, a thick deposit of Clayey Silt Till was encountered in all boreholes. The top 2.7 to 3.8 m of this material is brown in colour, being desiccated and oxidized.

The results from the Atterberg Limit Test performed on this material are plotted on Figure 1 and summarized as follows

Index Properties	Range (%)
Moisture Content (w)	12.0 - 17.5
Liquid Limit (w_L)	22.0 - 29.0
Plastic Limit (w_p)	13.0 - 15.0
Plasticity Index (I_p)	9.0 - 14.0

From the plasticity chart, it is evident that the layer can be classified as a clayey silt with sand and trace of gravel (Glacial Till) with low plasticity (CL).

Grain Size Distribution tests were carried out on these materials. Figure 2 in Appendix show the results in an envelope form.

Undrained Shear Strength of the soil was determined by in-situ vane tests and by laboratory tests, namely unconfined compression tests. The results are plotted on the Record of Borehole log sheets in Appendix and summarized as follows:

Undrained Shear Strength	C_u (kPa)	Sensitivity
In-Situ Vane Tests	63 - 89	1 - 2
Unconfined Compression Tests	51.4	

The shear strengths measured within the layer varied from 63 kPa to 89 kPa, indicating stiff consistency. This layer has a sensitivity varying from 1 to 2 based on the measured undisturbed and remoulded vane strengths. This would indicate that the clayey silt till is normal.

GROUNDWATER CONDITIONS

Groundwater conditions were observed through the measurement of water level in the open boreholes. The groundwater level after completion ranged from an elevation of 183.6 m at BH 2 to 187.1 m at BH 3. The following groundwater levels were observed during the field investigation.

BH No.	Elevation of Water Level (m)	Depth (m)
1	186.2	1.0
2	183.6	3.0
3	187.1	0.7
4	186.5	0.7

DISCUSSION AND RECOMMENDATIONS

A foundation investigation was carried out between 93 06 08 and 93 06 09 at the above-noted site in order to establish soil parameters for the design of the 4 HML foundations. The investigation consisted of advancing 1 borehole at each of the HML locations to a depth ranging between 12.6 and 15.7 m below the ground level.

Table 1 indicates the proposed location of each of the 30 m high HML.

DESIGN CONSIDERATIONS

The High Mast Lighting foundations will be supported on a single concrete caisson and the design should be in accordance with the method described by Broms as per the following papers.

BROMS, B.B.: Lateral Resistance of Piles in Cohesive Soils, Journal of the Soil Mechanics and Foundation Division, ASCE, Vol. 90, No. SM2, Paper No. 3825, March 1964.

BROMS, B.B.: Lateral Resistance of Piles in Cohesionless Soils, Journal of the Soil Mechanics and Foundation Division, ASCE, Vol. 90, No. SM3, Paper No. 3909, May 1964.

BROMS, B.B.: Design of Laterally Loaded Piles, Journal of the Soil Mechanics and Foundation Division, ASCE, Vol. 91, Paper No. SM3, May 1965.

The soil parameters provided in Table 1 are recommended for the design of the HML foundations. The following notation has been adopted:

- ϕ = apparent angle of friction for cohesionless soils in degrees
- q_u = unconfined compressive strength in kPa ($q_u = 2 \times C_u$) for cohesive soils
- γ = bulk unit weight in kN/m^3

The material within the zone of frost penetration depth should not be included in calculations of lateral resistance. At this site, the depth of frost penetration is 1.2 m.

CONSTRUCTION CONSIDERATIONS

Some of the caissons in part will be located within layers of non-cohesive subsoil, and the groundwater level is at a higher level. In view of this, the following Special Provisions should be included in the contract documents:

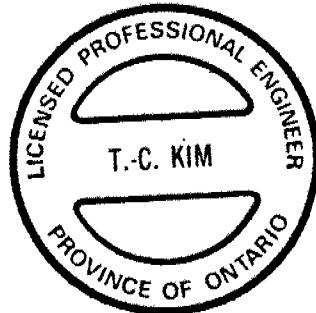
"The Contractor shall install concrete footings in earth for high mast poles. At the various pole locations, soil deposits consist of mixtures of silts, sand and trace of gravels. Groundwater is likely to be encountered above the base level.

The soil is susceptible to conditions of unbalanced hydrostatic head and seepage forces and is likely to 'boil' and become unstable under such conditions. The Contractor shall maintain the stability of the soil in the sides and bases of the holes for the concrete footings at all times from commencement of their construction to the placing of concrete".

MISCELLANEOUS

The field work for this project was carried out under the supervision of E. Magni, Soils Supervisor of Geotechnical Section from Southwestern Region and Tae C. Kim, Sr. Foundation Engineer. The equipment was owned and operated by Dominion Soils Investigation Inc., Windsor.

This report was written by Tae C. Kim, Sr. Foundation Engineer, and reviewed by M. Devata, Chief Foundation Engineer.



Tae C. Kim
Tae C. Kim, P.Eng
Sr. Foundation Engineer

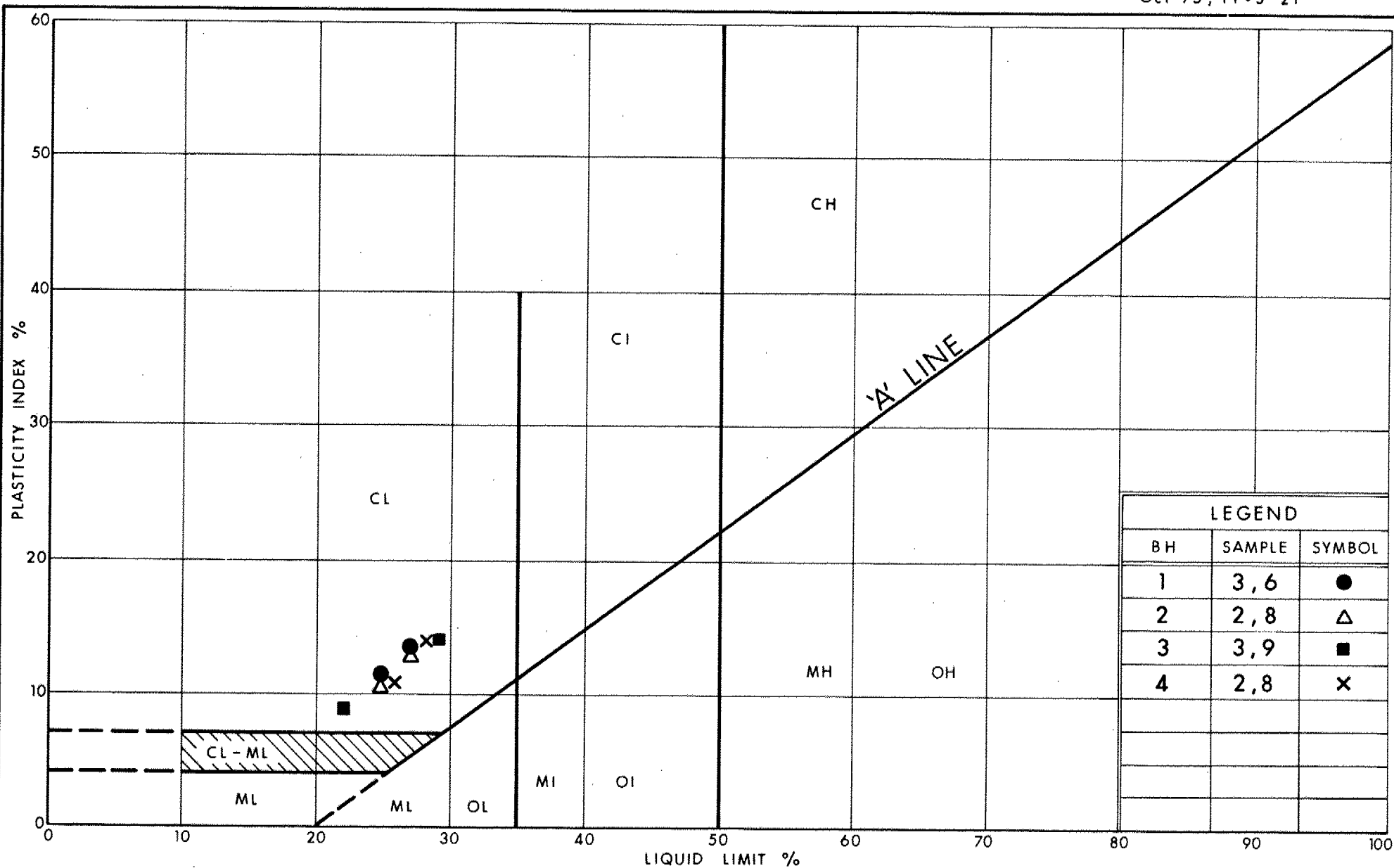


M. Devata
M. Devata, P.Eng.
Chief Foundation Engineer

TABLE 1. Location and Soil Parameters

Borehole No.	Elevation (m) From To		Type of Soil	Denseness or Consistency	ϕ (Deg.)	q_u (kPa)	γ (kN/m ³)
1	187.2	186.0	Cohesive	Stiff	-	0	19.5
Sta. 10+539.7	186.0	183.5	Cohesive	Very Stiff	-	350	21.0
O/S 28.6m L	183.5	181.5	Cohesive	Stiff to Very Stiff	-	170	19.9
℄ of HWY. 3	181.5	173.8	Cohesive	Firm to Stiff	-	140	19.5
2	186.6	185.4	Cohesive	Hard	-	0	21.2
Sta. 10+684.6	185.4	184.4	Cohesive	Very Stiff	-	350	21.2
O/S 29.0m L	184.4	182.0	Cohesive	Stiff	-	190	20.1
℄ of HWY. 3	182.0	174.0	Cohesive	Stiff	-	160	19.6
3	187.8	186.6	Cohesive	Stiff	-	0	19.5
Sta. 10+836.9	186.6	185.5	Cohesive	Stiff	-	170	19.9
O/S 9.1m L	185.5	184.0	Cohesive	Very Stiff	-	350	21.2
℄ of HWY. 3	184.0	182.0	Cohesive	Stiff	-	170	19.9
	182.0	172.1	Cohesive	Stiff	-	160	19.5
4	187.2	186.0	Cohesive	Very Stiff	-	0	20.1
Sta. 10+293.3	186.0	184.5	Cohesive	Very Stiff	-	350	21.2
O/S 22.9m R	184.5	183.0	Cohesive	Stiff to Very Stiff	-	170	19.9
℄ of HWY. 401	183.0	173.8	Cohesive	Stiff	-	160	19.5

APPENDIX



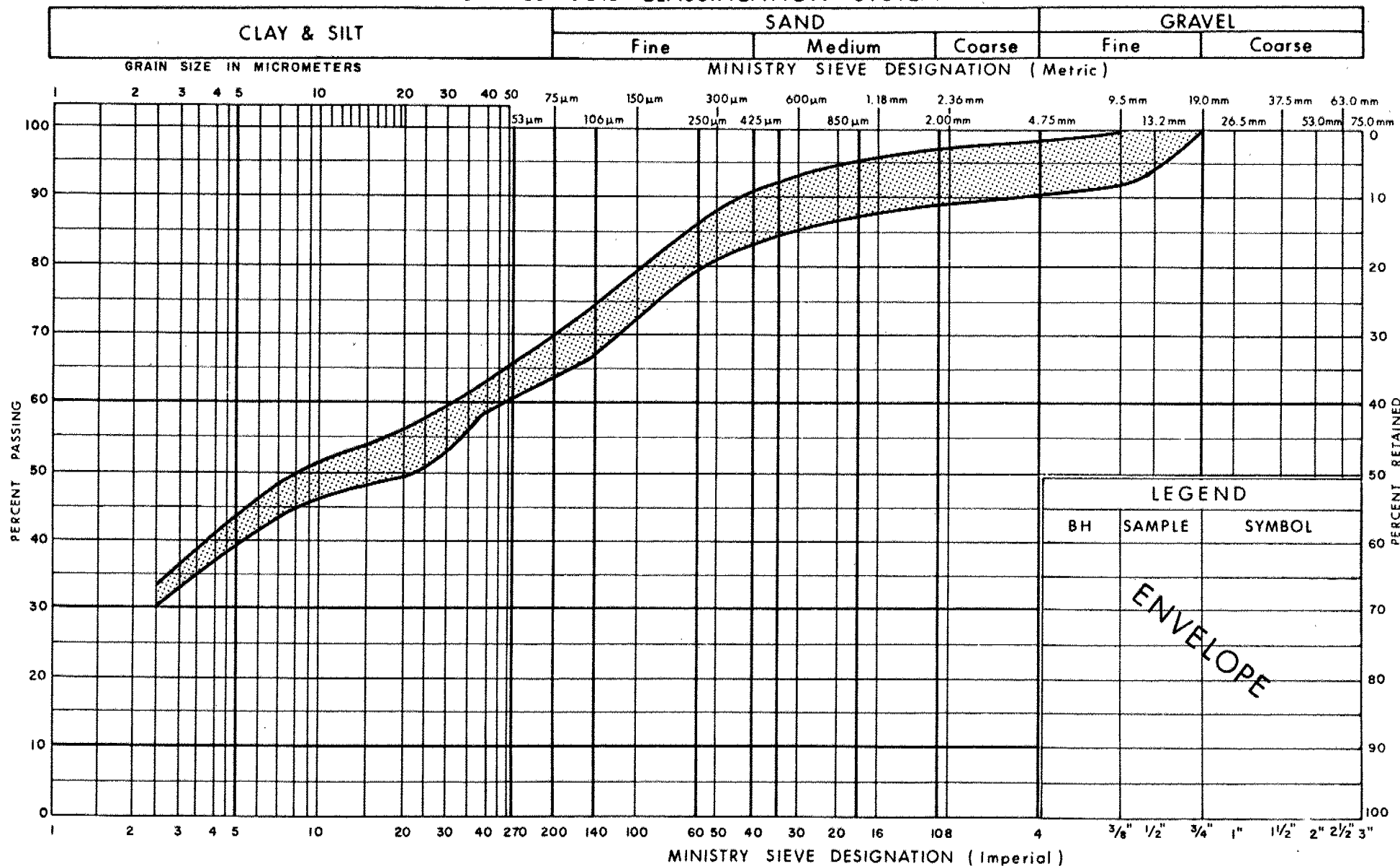
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PLASTICITY CHART
CLAYEY SILT, WITH SAND TRACE OF GRAVEL
(Glacial Till)

FIG No 1

W P 143-91-00

UNIFIED SOIL CLASSIFICATION SYSTEM



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

FIG No 2

W P 143-91-00

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

MECHANICAL PROPERTIES OF SOIL

m_v	kPa^{-1}	COEFFICIENT OF VOLUME CHANGE
C_c	1	COMPRESSION INDEX
C_s	1	SWELLING INDEX
C_α	1	RATE OF SECONDARY CONSOLIDATION
c_v	m^2/s	COEFFICIENT OF CONSOLIDATION
H	m	DRAINAGE PATH
T_v	1	TIME FACTOR
U	%	DEGREE OF CONSOLIDATION
σ'_{vo}	kPa	EFFECTIVE OVERBURDEN PRESSURE
σ'_p	kPa	PRECONSOLIDATION PRESSURE
τ_f	kPa	SHEAR STRENGTH
c'	kPa	EFFECTIVE COHESION INTERCEPT
ϕ'	-°	EFFECTIVE ANGLE OF INTERNAL FRICTION
c_u	kPa	APPARENT COHESION INTERCEPT
ϕ_u	-°	APPARENT ANGLE OF INTERNAL FRICTION
τ_R	kPa	RESIDUAL SHEAR STRENGTH
τ_r	kPa	REMOULDED SHEAR STRENGTH
S_t	1	SENSITIVITY = $\frac{c_u}{\tau_r}$

STRESS AND STRAIN

u_w	kPa	PORE WATER PRESSURE
r_u	1	PORE PRESSURE RATIO
σ	kPa	TOTAL NORMAL STRESS
σ'	kPa	EFFECTIVE NORMAL STRESS
τ	kPa	SHEAR STRESS
$\sigma_1, \sigma_2, \sigma_3$	kPa	PRINCIPAL STRESSES
ϵ	%	LINEAR STRAIN
$\epsilon_1, \epsilon_2, \epsilon_3$	%	PRINCIPAL STRAINS
E	kPa	MODULUS OF LINEAR DEFORMATION
G	kPa	MODULUS OF SHEAR DEFORMATION
μ	1	COEFFICIENT OF FRICTION

PHYSICAL PROPERTIES OF SOIL

ρ_s	kg/m^3	DENSITY OF SOLID PARTICLES	e	1, %	VOID RATIO	e_{min}	1, %	VOID RATIO IN DENSEST STATE
γ_s	kn/m^3	UNIT WEIGHT OF SOLID PARTICLES	n	1, %	POROSITY	I_D	1	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
ρ_w	kg/m^3	DENSITY OF WATER	w	1, %	WATER CONTENT	D	mm	GRAIN DIAMETER
γ_w	kn/m^3	UNIT WEIGHT OF WATER	S_r	%	DEGREE OF SATURATION	D_n	mm	n PERCENT - DIAMETER
ρ	kg/m^3	DENSITY OF SOIL	w_L	%	LIQUID LIMIT	C_u	1	UNIFORMITY COEFFICIENT
γ	kn/m^3	UNIT WEIGHT OF SOIL	w_p	%	PLASTIC LIMIT	h	m	HYDRAULIC HEAD OR POTENTIAL
ρ_d	kg/m^3	DENSITY OF DRY SOIL	w_s	%	SHRINKAGE LIMIT	q	m^3/s	RATE OF DISCHARGE
γ_d	kn/m^3	UNIT WEIGHT OF DRY SOIL	I_p	%	PLASTICITY INDEX = $w_L - w_p$	v	m/s	DISCHARGE VELOCITY
ρ_{sat}	kg/m^3	DENSITY OF SATURATED SOIL	I_L	1	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$	i	1	HYDRAULIC GRADIENT
γ_{sat}	kn/m^3	UNIT WEIGHT OF SATURATED SOIL	I_C	1	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$	k	m/s	HYDRAULIC CONDUCTIVITY
ρ'	kg/m^3	DENSITY OF SUBMERGED SOIL	e_{max}	1, %	VOID RATIO IN LOOSEST STATE	j	kn/m^3	SEEPAGE FORCE
γ'	kn/m^3	UNIT WEIGHT OF SUBMERGED SOIL						

RECORD OF BOREHOLE No 1

1 OF 1

METRIC

W.P. 143-91-00 LOCATION Sta. 10+539.7 O/S 28.6m Lt (from Centreline of Hwy. 3) ORIGINATED BY E.M.
 DIST 1 HWY 401 and 3 BOREHOLE TYPE Hollow Stem Auger and Vane Tests COMPILED BY D.S.
 DATUM Geodetic DATE June 9, 1993 CHECKED BY T.K.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL													
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100	W _P	W	W _L															
187.2	Ground Surface																													
0.0	Clayey Silt Fill --- Granular Base																													
186.0	Stiff		1	SS	8																									
1.2	Very Stiff to Hard		2	SS	37																									
			3	SS	64																									
	----- Brown		4	SS	31																									
	----- Grey		5	SS	19																									
			6	SS	15																									
	Clayey Silt with Sand and trace of Gravel occasional Sand Layers (Glacial Till)		7	SS	10																									
			8	SS	6																									
	Firm to Very Stiff		9	SS	10																									
			10	SS	7																									
			11	SS	8																									
173.8																														
13.4	End of Borehole																													
	* <table border="1"> <thead> <tr> <th>Date</th> <th>Water Level</th> </tr> </thead> <tbody> <tr> <td>June 9</td> <td>12.1m Dry</td> </tr> <tr> <td>June 11</td> <td>6.9m</td> </tr> <tr> <td>June 15</td> <td>1.2m</td> </tr> <tr> <td>June 16</td> <td>1.0m</td> </tr> <tr> <td>June 17</td> <td>1.0m</td> </tr> <tr> <td>June 18</td> <td>1.0m</td> </tr> </tbody> </table>	Date	Water Level	June 9	12.1m Dry	June 11	6.9m	June 15	1.2m	June 16	1.0m	June 17	1.0m	June 18	1.0m															
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+3, x5: Numbers refer to
Sensitivity

20
15-5 (%) STRAIN AT FAILURE
10

METRIC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ KN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20 40 60 80 100	W _p	W		
186.6	Ground Surface						SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100					

0.0	<div>Very Stiff to Hard</div> <div>Brown</div> <div>Grey</div> <div>Clayey Silt with Sand and trace of Gravel occasional Sand Layers (Glacial Till)</div> <div>Firm to Very Stiff</div>	<table><tr><td>1</td><td>SS</td><td>42</td></tr><tr><td>2</td><td>SS</td><td>48</td></tr><tr><td>3</td><td>SS</td><td>27</td></tr><tr><td>4</td><td>SS</td><td>16</td></tr><tr><td>5</td><td>SS</td><td>16</td></tr><tr><td>6</td><td>SS</td><td>11</td></tr><tr><td>7</td><td>SS</td><td>8</td></tr><tr><td>8</td><td>TW</td><td>PH</td></tr><tr><td>9</td><td>SS</td><td>9</td></tr><tr><td>10</td><td>SS</td><td>7</td></tr><tr><td>11</td><td>SS</td><td>8</td></tr><tr><td>12</td><td>SS</td><td>11</td></tr></table>	1	SS	42	2	SS	48	3	SS	27	4	SS	16	5	SS	16	6	SS	11	7	SS	8	8	TW	PH	9	SS	9	10	SS	7	11	SS	8	12	SS	11	<div>186</div> <div>184</div> <div>182</div> <div>180</div> <div>178</div> <div>176</div> <div>174</div> <div>151</div> <div>151</div>	21.1	1 24 45 30
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12.6	<div>*</div> <table><thead><tr><th>Date</th><th>Water Level</th></tr></thead><tbody><tr><td>June 8</td><td>10.7m Dry</td></tr><tr><td>June 9</td><td>9.0m</td></tr><tr><td>June 11</td><td>6.4m</td></tr><tr><td>June 15</td><td>5.2m</td></tr><tr><td>June 17</td><td>3.3m</td></tr><tr><td>June 18</td><td>3.0m</td></tr></tbody></table>	Date	Water Level	June 8	10.7m Dry	June 9	9.0m	June 11	6.4m	June 15	5.2m	June 17	3.3m	June 18	3.0m																										
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1 OF 1

METRIC

SOIL PROFILE			SAMPLES			 GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		NATURAL MOISTURE CONTENT	Liquid Limit	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	SHEAR STRENGTH kPa	P L W L	%		
187.8	Ground Surface								o UNCONFINED + FIELD VANE • QUICK TRIAXIAL x LAB VANE				
0.0													
	Organics	[Pattern]	1	SS	8								
	Stiff to Hard	[Pattern]	2	SS	17								
	Brown Grey	[Pattern]	3	SS	45								
		[Pattern]	4	SS	37								
		[Pattern]	5	SS	17								
		[Pattern]	6	SS	17								
	Cloyey Silt with Sand and trace of Gravel occasional Sand Layers (Glacial Till)	[Pattern]	7	SS	11								
	Firm to Very Stiff	[Pattern]	8	SS	11								
		[Pattern]	9	SS	8								
		[Pattern]	10	SS	8								
		[Pattern]	11	SS	8								
		[Pattern]	12	SS	7								
172.1		[Pattern]	13	SS	8								
15.7	End of Borehole												

* Date Water Level

June 8	14.9m Dry
June 8	6.6m
June 11	0.3m
June 15	0.6m
June 17	0.7m
June 18	0.7m

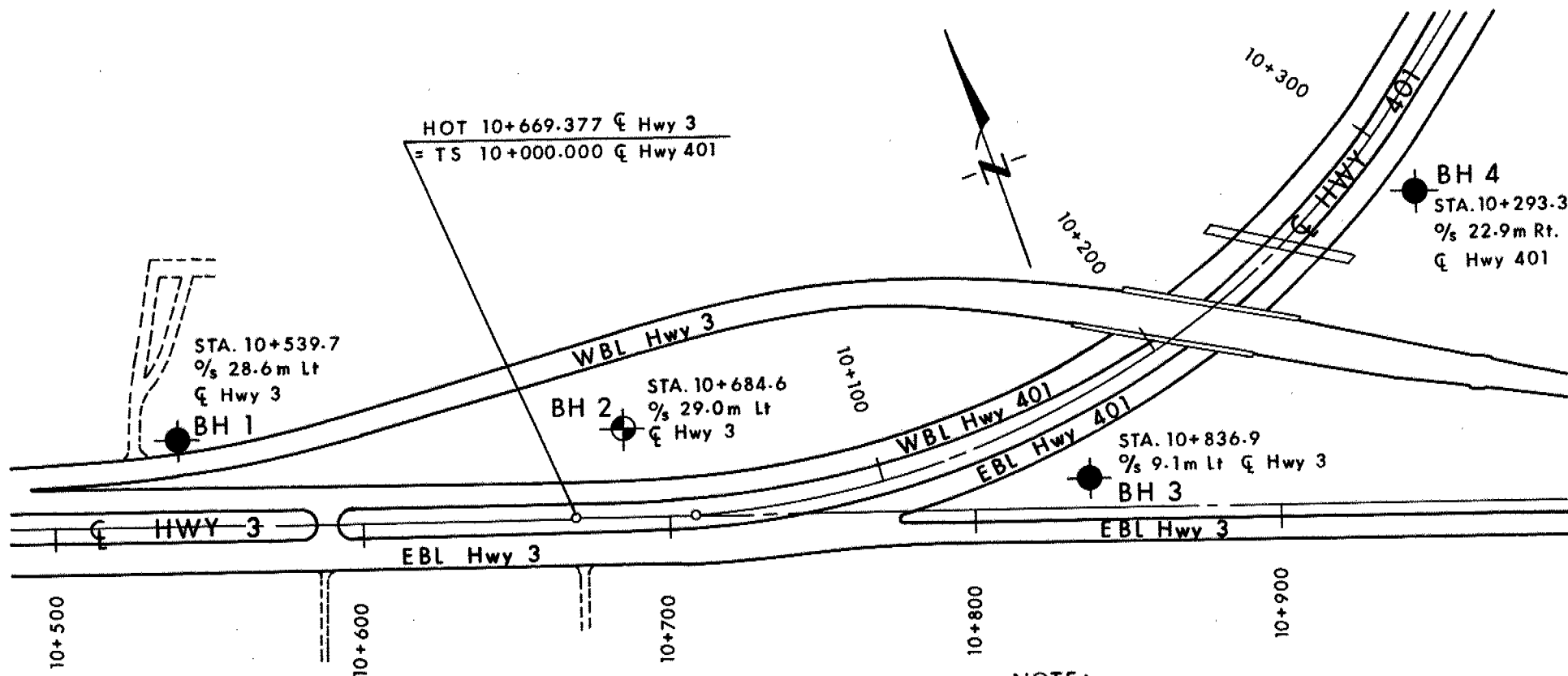
RECORD OF BOREHOLE No 4

1 OF 1

METRIC

W.P. 143-91-00 LOCATION Sta. 10+293.3 O/S 22.9m Rt (from Centreline of Hwy. 401) ORIGINATED BY E.M.
 DIST 1 HWY 401 and 3 BOREHOLE TYPE Hollow Stem Auger and Vane Tests COMPILED BY D.S.
 DATUM Geodetic DATE June 9, 1993 CHECKED BY T.K.

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	Stiff to Very Stiff		8	SS	6																									
			9	SS	9																									
	Fine Sand Layer		10	SS	11																									
	Medium Sand Layer		11	SS	8																									
173.8																														
13.4	End of Borehole																													
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HIGH MAST LIGHTING-HWY 401 & HWY 3 INTERSECTION

Geocres No 40J2-40
Dist 1, Chatham
WP 143-91-00
Dwg. A