

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 30M 12-206

DIST. 6 REGION

W.P. No. 48-71-22

CONT. No. 90-32

W. O. No.

STR. SITE No.

HWY. No. 409/427

LOCATION Turning Roadway N-E
Overhead Sign Foundations

No of PAGES -

=====

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:



Ministry of
Transportation and
Communications

CONT 90-32

FOUNDATION DESIGN SECTION

**foundation
investigation and
design report**

ENGINEERING MATERIALS OFFICE
FOUNDATION DESIGN SECTION

CONT. 90-32

WP 48-71-22

DIST 6

HWY 427

STR SITE

F.T.M.S. - Overhead Signs
Hwy. 427 SB to Turning Roadway
Over Hwy. 409

DISTRIBUTION

G.C.E. Burkhardt (3)
R.D. Gunter
A. Wittenberg
J. Smrcka (2)
K. Bassi
J.H. Peer
T. Yakutchuk
G. Szekreny
B. Steeves (Cover Only)
M. MacLean (Cover Only)
File

FOUNDATION INVESTIGATION REPORT

For

F.T.M.S. - Overhead Signs

Hwy. 427 SB to Turning Roadway

Over Hwy. 409

W.P. 48-71-22

District 6, Toronto

INTRODUCTION

The following is a summary of the results of a foundation investigation implemented at the aforementioned site. Installation of three standard overhead signs is proposed at stations on the existing Hwy. 427 SBL and the proposed Turning Roadway N-E. The purpose of the investigation was to:

- 1) determine the subsurface conditions at the locations of the signs.
- 2) provide pertinent geotechnical parameters and recommendations for foundation design and related earthworks.

SITE DESCRIPTION

The site coincides with the stations of the three independent signs. Sign No. 1 is located at the approach fills placed in preparation for construction of the proposed 6-span Turning Roadway N-E. It is located at the junction of the proposed Turning Roadway and the Ramp N-409 W. Sign No. 2 is positioned at the junction of Hwy. 427 SB and Turning Roadway N-E. The sign is located approximately 100 m south of the Hwy. 427 SB-CNR overpass. Sign No. 3 is located further north approximately 150 m north of the Hwy. 427 SB Woodbine Entrance Overpass.

The areas of investigation are located in the City of Etobicoke. The surrounding terrain is flat to gently undulating. Numerous structures have been constructed in association with Hwy. 427 including overpasses at the crossing of the Mimico Creek Complex - Goreway Drive, Canadian National Railway and Hwy. 409.

Geologically, the site is located in the physiographic region known as the "Peel Plain". The characteristic deposit in this region is a ground moraine laid down during the Wisconsin Glacial Age. In the vicinity of the area under investigation, the moraine is primarily composed of a cohesive glacial till whose thickness generally ranges from 10.6 m-19.8 m (35 to 65 ft). The overburden is underlain by grey shale bedrock of the Dundas-Meaford formation.

Approach fills ranging in depths of 6 to 11 m overly the glacial till at the sign locations.

Field Investigation

A total of six sampled boreholes were advanced, one per leg of the proposed overhead signs, between 88 03 29 and 88 04 01. Dynamic cone penetration tests accompanied the sampled boreholes.

Continuous flight solid stem auger equipment was used to advance the boreholes with subsoil samples retrieved by a split spoon sampler in accordance with the Standard Penetration (ASTM D 1586). The samples were identified in the field and then transported to the laboratory for applicable testing on selected samples.

Water levels were obtained in the open boreholes until approximate stabilized levels were observed.

Survey information related to location and elevation of boreholes was provided by Surveys and Plans, Central Region.

Subsurface Conditions

At each 'leg' location, depths of approach fills ranging from 6.0 m at Sign No. 1 to 11 m at Sign No. 2 overly the parent overconsolidated heterogeneous mixture of clayey silt, sand and gravel (glacial till). The approach fills consist of a cohesive mixture of clayey silt, sand and gravel. Organic inclusions were found throughout the fills. The fills are generally in a compact state of condition. The underlying virgin soil is cohesive and generally of low plasticity. The

consistency of the deposit to the depths penetrated (3 m to 6 m) ranged from very stiff to hard.

Water levels were obtained in the open boreholes until approximate stabilized levels were observed. In general, the phreatic surface of the water table is approximately 1 m beneath the fill-parent soil interface.

Factual data on the subsurface conditions is contained on the Record of Borehole Sheets. A plan of the site illustrating the locations of the boreholes are provided on Dwg. 487122-A.

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

Fill (Irregular Mixture of Clayey Silt, Sand and Gravel)

The approach fills at Hwy. 427 SB (FTMS signs #1 & #2) and fills deposited in preparation for Turning Roadway NE (FTMS sign #3) are cohesive and generally in a moderately compact state. The fill material consists of a mixture of clayey silt, sand and gravel. Grain size distribution curves for the fill material are illustrated in Figure 1.

Atterberg Limits were also obtained and the results are plotted in Figure 2. A summary of the indices and unit weights are provided in Table 1 below.

TABLE 1

	<u>Range</u>	<u>Avg.</u>
Natural Moisture Content (w)	7.5-21.5	14.6
Liquid Limit (w_L)	17-46.5	32.2
Plastic Limit (w_p)	11-21.5	16.9
Unit Weight (kN/m^3)	20.2-22.8	21.8

The results reveal that the fill is cohesive and ranges in plasticity from low to high. Generally, the fill is of low plasticity.

'N' values as determined by the SPT confirm that the consistency of the fill ranges from stiff to hard.

Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till)

A heterogeneous unstratified mixture of clayey silt, sand and gravel underlies the approach fills at the locations of the overhead signs. Grain size distribution curves for the soil as determined by mechanical analyses is given in Figure 3. Atterberg Limits were also obtained to evaluate the behaviour of the fine grained portion of the material and the results are plotted in Figure 4. A summary of the indices are proved in Table 2 below. Unit weights are also included.

TABLE 2

	<u>Range</u>	<u>Avg.</u>
Natural Moisture Content (w)	11.5-15	13.4
Liquid Limit (w_L)	23.5-26	24.5
Plastic Limit (w_p)	13.5-16.5	14.8
Unit Weight (kN/m^3)	21.7-22.6	22.1

It is evident from the results that the deposit is cohesive and predominantly of low plasticity. It should be noted that although not encountered during the investigation, it is characteristic of tills to contain occasional cobbles and boulders and consequently these may be encountered in this deposit.

The consistency of the deposit as indicated by 'N' values of the Standard Penetration Test ranges from very stiff to hard, but generally is in a hard condition.

DISCUSSION AND RECOMMENDATIONS

In order to inform motorists of the Turning Roadway N-E and the Ramp N-409 W, FTMS signs are proposed at three locations on Highway 427 SB in advance of these structures. The signs are 6.4 m in height and the spans are 19.8 m, 22.9 m and 13.7 m for Signs No. 1, 2 and 3 respectively. The existing ground surface elevations are 173.2-173.5 m (568.1-569.1 ft.), 173-173.2 m (567.5-568.3 ft.) and 171.1 m (561.4 ft.) for Signs No. 1, 2 and 3 respectively.

The following provides recommendations pertaining to:

- 1) Design of FTMS overhead signs.
- 2) Construction of FTMS overhead signs.

1) Design

One recommended method of calculating the ultimate lateral resistance, deflections and applied moments of laterally loaded foundations is provided by Brom's Method as per the following paper.

Broms, B.B.

Lateral Resistance of Piles in Cohesive Soils, Journal of the Soil Mechanics and Foundations Division, ASCE

Vol. 90, No. SM²

Table 3 summarizes the pertinent geotechnical parameter, the unconfined compressive strengths ($q_u = 2C_u$) for the soil encountered at each sign location. Unit weights of the soil are also provided.

It is important to remember that in the design, the coefficient of horizontal subgrade reaction should be reduced to account for repeated dynamic loading, consolidation and creep of the soil. Generally, the coefficient is reduced from 1/6 to 1/3 the initial value for soft to firm soils and from 1/4 to 1/2 the initial value for stiff to hard soils. The coefficient of horizontal subgrade reaction can be assumed to remain constant within the layers identified in Table 3.

TABLE 3

FTMS Sign #	BH #	Elevation (m) From - To	*Type of Soil	Consistency	qu (kPa)	γ (kN/m ³) Average
1	1	173.5-162.4	Fill Material	V. Stiff to hard	300	21.8
		162.4-159.3	Het. Mixture Clayey Silt, Sand, Gravel (Glacial Till)	Hard	500	22.1
	2	173.2-168.6	Fill Material	V. Stiff	200	21.8
		168.6-165.6		Stiff	100	21.8
		165.6-162.1		Hard	300	21.8
2		162.1-160.6	Het. Mixture Clayey Silt, Sand, Gravel (Glacial Till)	Hard	500	22.1
	3	173.2-163.8	Fill Material	Stiff to V. Stiff	150	21.8
		163.8-157.5	Het. Mixture Clayey Silt, Sand, Gravel (Glacial Till)	Hard	500	22.1
	4	173.0-163.9	Fill Material	Stiff to V. Stiff	200	21.8
		163.9-160.4	Het. Mixture Clayey Silt, Sand, Gravel (Glacial Till)	Hard	500	22.1
3	5	171.1-165.0	Fill Material	Stiff to V. Stiff	150	21.8
		165.0-158.5	Het. Mixture Clayey Silt, Sand, Gravel (Glacial Till)	V. Stiff to Hard	200	22.1
	6	171.1-165.0	Fill Material	V. Stiff	200	21.8
		165.0-161.5	Het. Mixture Clayey Silt, Sand, Gravel (Glacial Till)	V. Stiff to Hard	200	22.1

*THE FILL MATERIAL AND GLACIAL TILL ARE COHESIVE MATERIALS

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

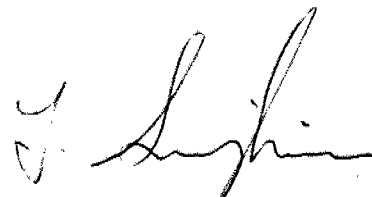
Construction Considerations

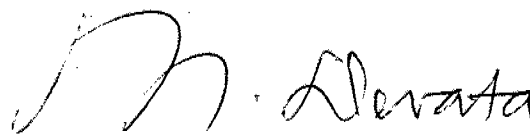
Due to the impervious nature of the glacial till deposit and a water table that is situated beneath the fill material, no major dewatering difficulty is anticipated during the foundation installation. Any localized seepage can be controlled by conventional pumping techniques. The contractor is responsible, however, for protecting the soil at the base and the sides of the foundation against disturbance or caving, ensuring the soils stability throughout the construction process.

MISCELLANEOUS

The fieldwork for this investigation was carried out under the supervision of T. Sangiuliano, Foundation Engineer, utilizing equipment owned and operated by Master Soil Drilling, Toronto. This report was written by T. Sangiuliano and reviewed by Mr. M. S. Devata, Chief Foundation Engineer (East).

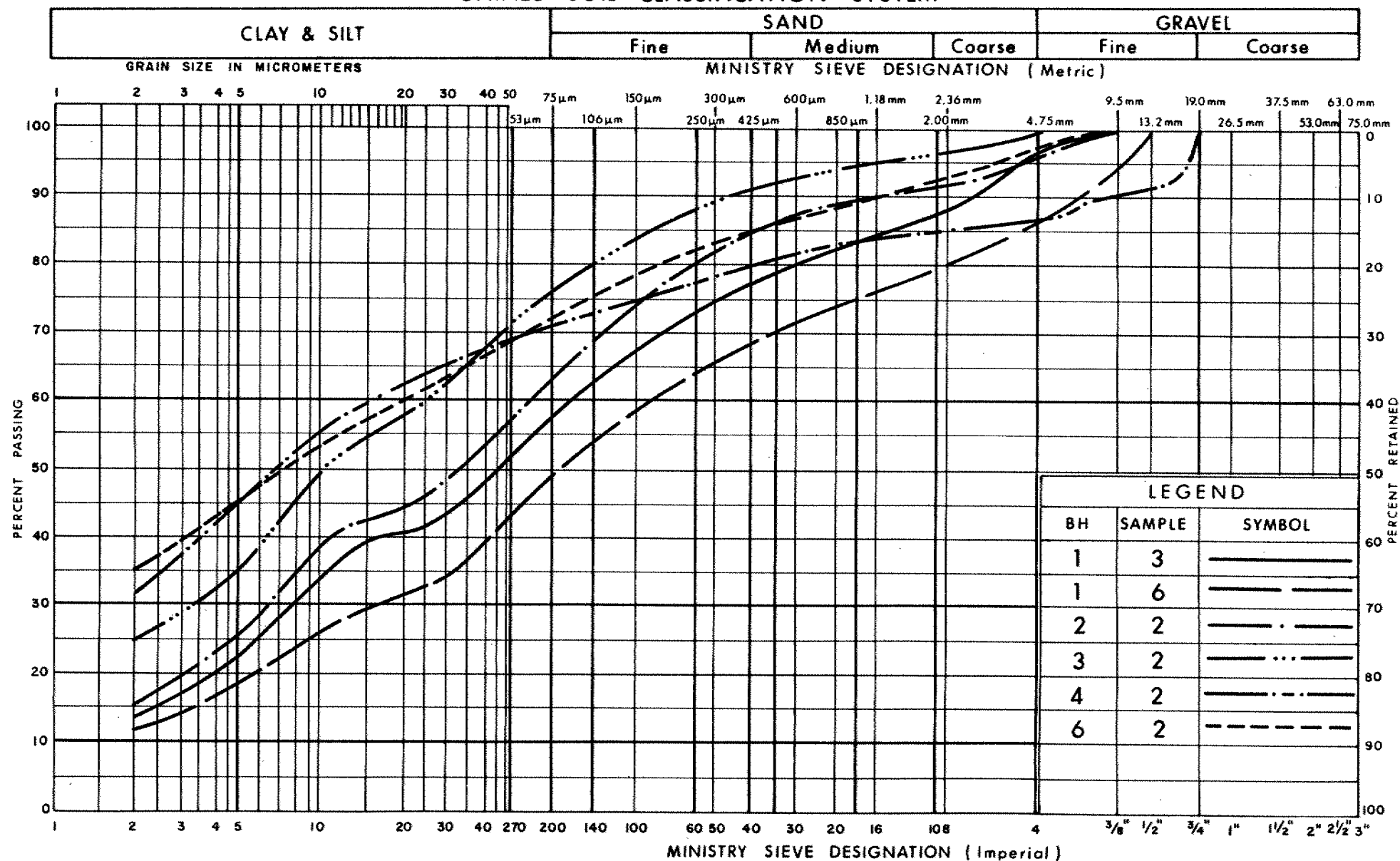



Tony Sangiuliano, P.Eng.
Foundations Engineer


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

APPENDIX

UNIFIED SOIL CLASSIFICATION SYSTEM

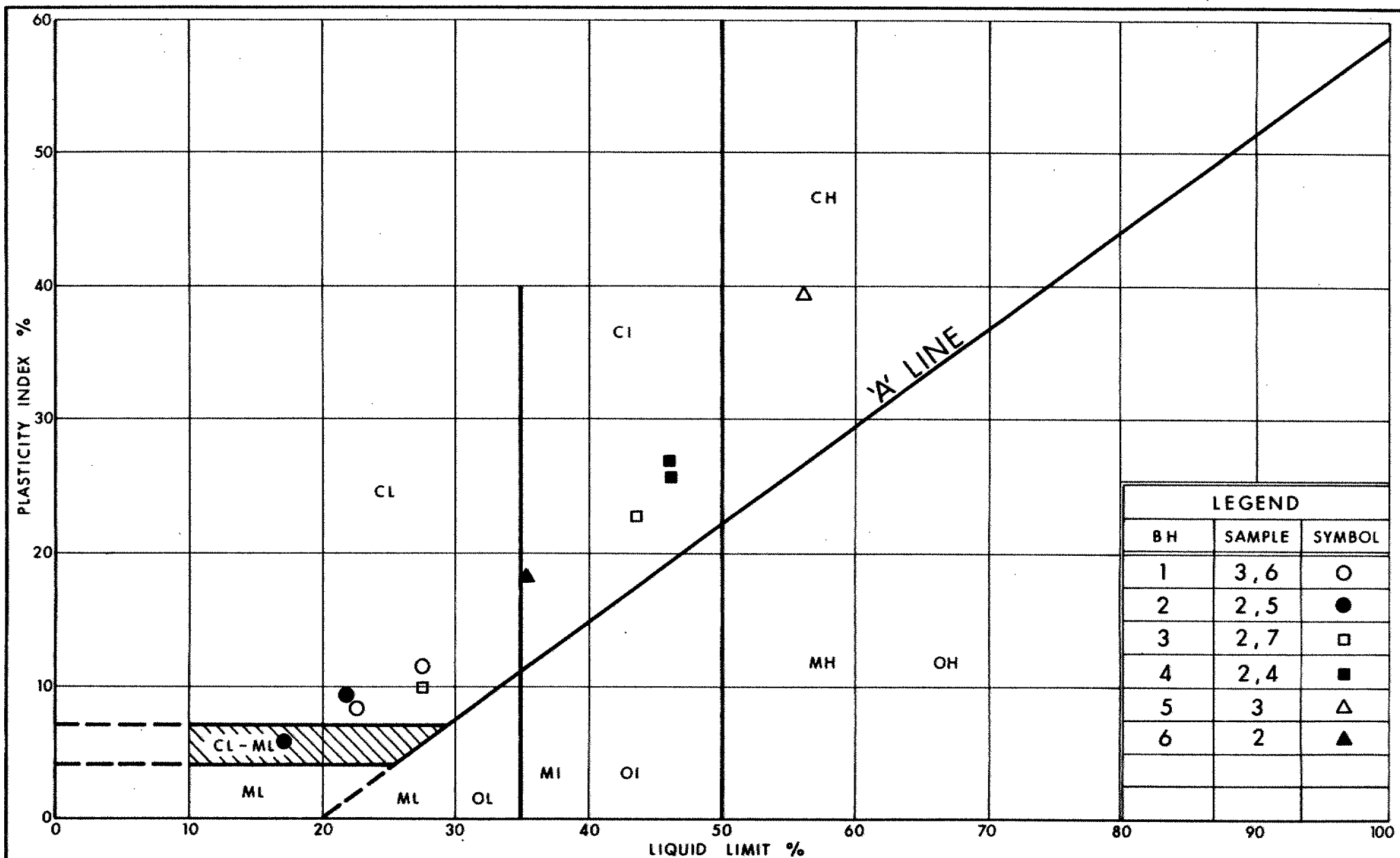


Ministry of
Transportation

GRAIN SIZE DISTRIBUTION
IRREGULAR MIXTURE OF
CLAYEY SILT, SAND & GRAVEL (Fill)

FIG No 1

WP 48-71-22



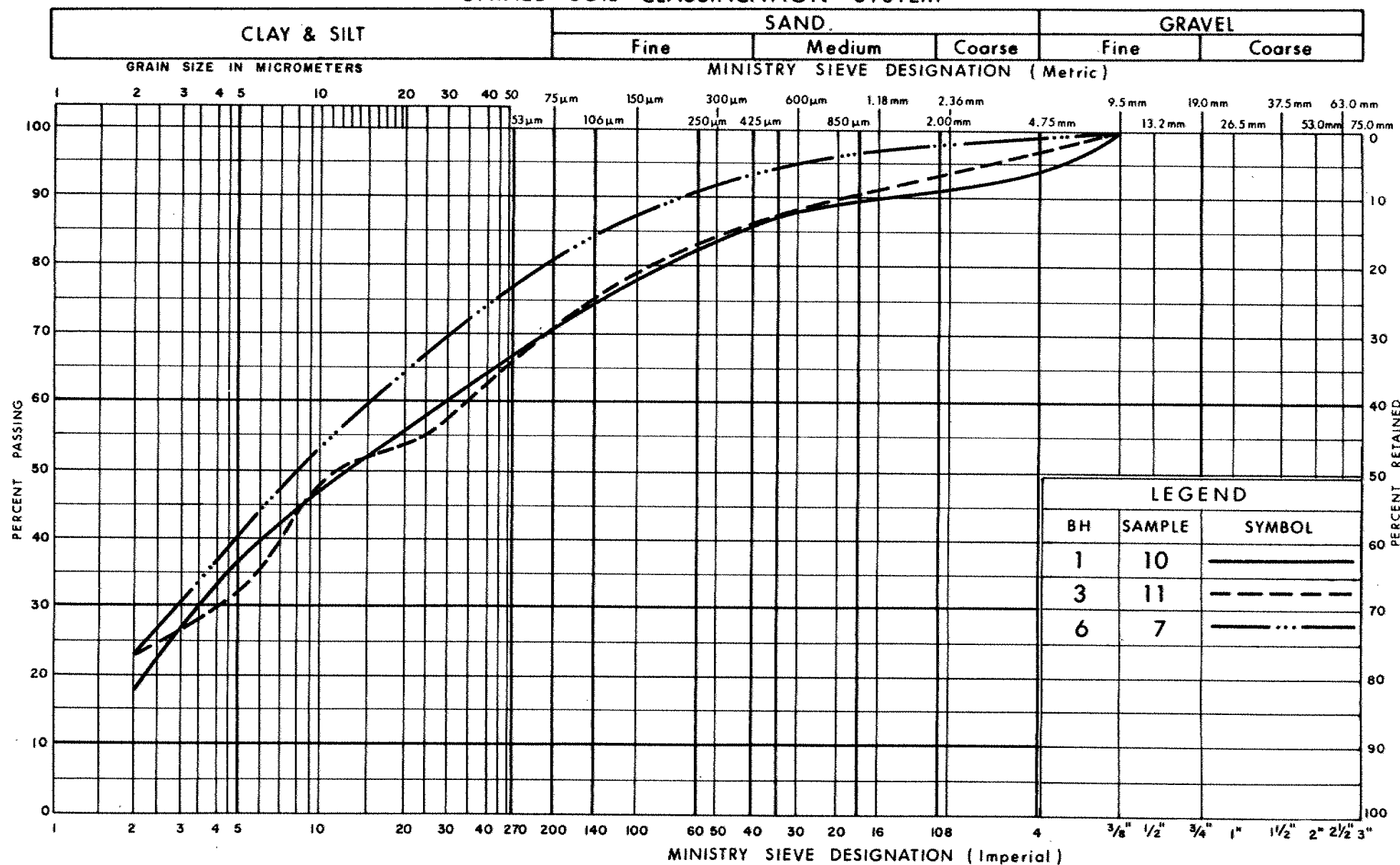
Ministry of
Transportation

PLASTICITY CHART
IRREGULAR MIXTURE OF
CLAYEY SILT, SAND & GRAVEL (Fill)

FIG No 2

W P 48-71-22

UNIFIED SOIL CLASSIFICATION SYSTEM

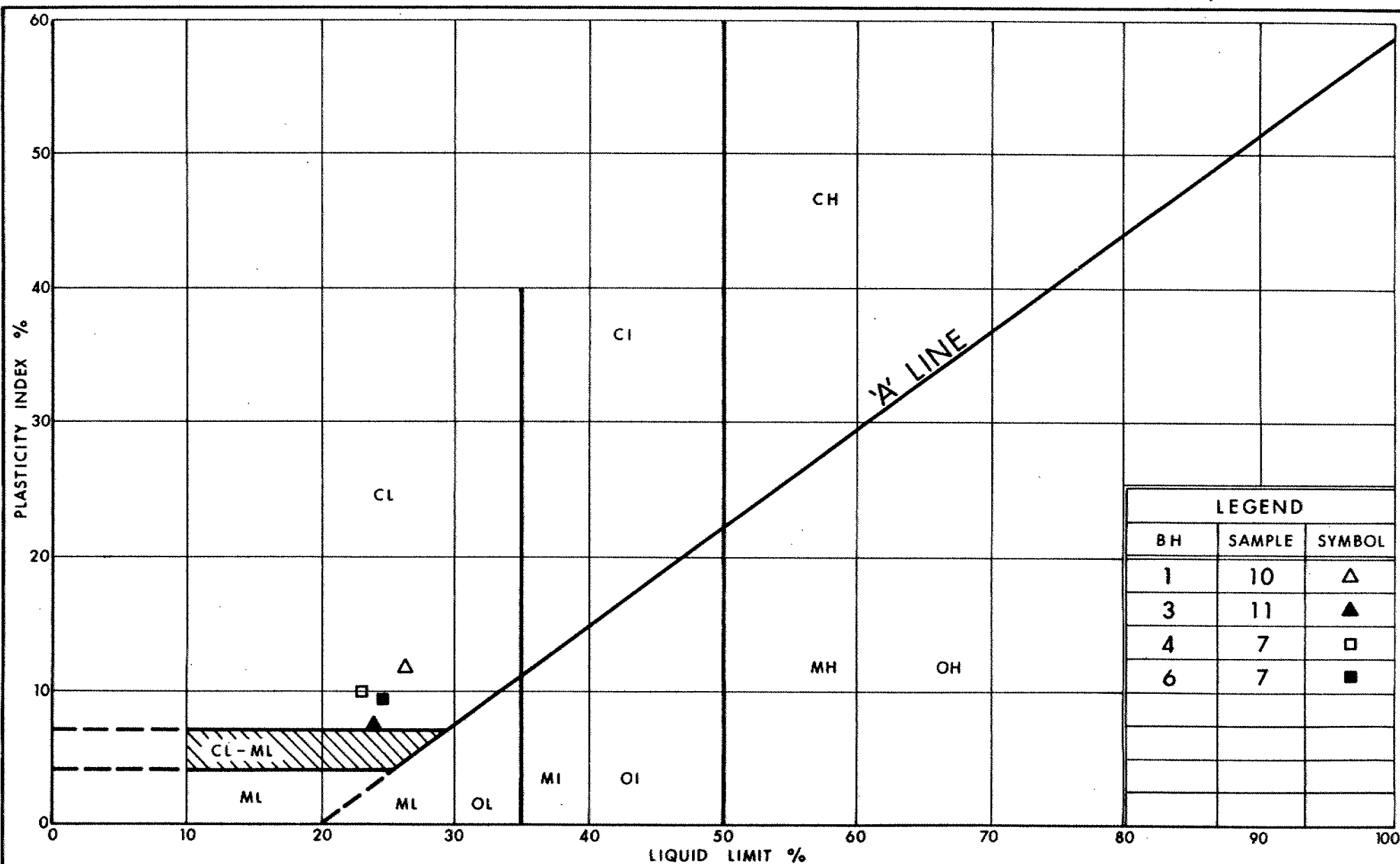


Ministry of
Transportation

GRAIN SIZE DISTRIBUTION
HET MIXTURE OF
CLAYEY SILT, SAND & GRAVEL (Glacial Till)

FIG No 3

W P 48-71-22

Ministry of
Transportation

Ontario

PLASTICITY CHART
HET MIXTURE OF
CLAYEY SILT, SAND AND GRAVEL (Glacial Till)

EXPLANATION OF TERMS USED IN REPORT

N VALUE: THE STANDARD PENETRATION TEST (SPT) N VALUE IS THE NUMBER OF BLOWS REQUIRED TO CAUSE A STANDARD 51mm O.D. SPLIT BARREL SAMPLER TO PENETRATE 0.3m INTO UNDISTURBED GROUND IN A BOREHOLE WHEN DRIVEN BY A HAMMER WITH A MASS OF 63.5kg, FALLING FREELY A DISTANCE OF 0.76m. FOR PENETRATIONS OF LESS THAN 0.3m N VALUES ARE INDICATED AS THE NUMBER OF BLOWS FOR THE PENETRATION ACHIEVED. AVERAGE N VALUE IS DENOTED THUS \bar{N} .

DYNAMIC CONE PENETRATION TEST: CONTINUOUS PENETRATION OF A CONICAL STEEL POINT (51mm O.D. 60° CONE ANGLE) DRIVEN BY 475 J IMPACT ENERGY ON 'A' SIZE DRILL RODS. THE RESISTANCE TO CONE PENETRATION IS MEASURED AS THE NUMBER OF BLOWS FOR EACH 0.3m ADVANCE OF THE CONICAL POINT INTO THE UNDISTURBED GROUND.

SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSENESS.

CONSISTENCY: COHESIVE SOILS ARE DESCRIBED ON THE BASIS OF THEIR UNDRAINED SHEAR STRENGTH (c_u) AS FOLLOWS:

c_u (kPa)	0 - 12	12 - 25	25 - 50	50 - 100	100 - 200	> 200
	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD

DENSENESS: COHESIONLESS SOILS ARE DESCRIBED ON THE BASIS OF DENSENESS AS INDICATED BY SPT N VALUES AS FOLLOWS:

N (BLOWS/0.3m)	0 - 5	5 - 10	10 - 30	30 - 50	> 50
	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

ROCKS ARE DESCRIBED BY THEIR COMPOSITION AND STRUCTURAL FEATURES AND/OR STRENGTH.

RECOVERY: SUM OF ALL RECOVERED ROCK CORE PIECES FROM A CORING RUN EXPRESSED AS A PERCENT OF THE TOTAL LENGTH OF THE CORING RUN.

MODIFIED RECOVERY: SUM OF THOSE INTACT CORE PIECES, 100mm* IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF THE CORING RUN. THE ROCK QUALITY DESIGNATION (R Q D), FOR MODIFIED RECOVERY, IS:

R Q D (%)	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
σ	kPa	TOTAL NORMAL STRESS
σ'	kPa	EFFECTIVE NORMAL STRESS
τ	kPa	SHEAR STRESS
$\sigma_1, \sigma_2, \sigma_3$	kPa	PRINCIPAL STRESSES
ϵ	%	LINEAR STRAIN
$\epsilon_1, \epsilon_2, \epsilon_3$	%	PRINCIPAL STRAINS
E	kPa	MODULUS OF LINEAR DEFORMATION
G	kPa	MODULUS OF SHEAR DEFORMATION
μ	1	COEFFICIENT OF FRICTION

MECHANICAL PROPERTIES OF SOIL

m_v	kPa ⁻¹	COEFFICIENT OF VOLUME CHANGE
C_c	1	COMPRESSION INDEX
C_s	1	SWELLING INDEX
C_a	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'_{v0}	kPa	EFFECTIVE OVERBURDEN PRESSURE
σ'_p	kPa	PRECONSOLIDATION PRESSURE
τ_f	kPa	SHEAR STRENGTH
c'	kPa	EFFECTIVE COHESION INTERCEPT
ϕ'	-°	EFFECTIVE ANGLE OF INTERNAL FRICTION
c_u	kPa	APPARENT COHESION INTERCEPT
ϕ_u	-°	APPARENT ANGLE OF INTERNAL FRICTION
τ_R	kPa	RESIDUAL SHEAR STRENGTH
τ_r	kPa	REMOULDED SHEAR STRENGTH
S_t	1	SENSITIVITY = $\frac{c_u}{\tau_r}$

PHYSICAL PROPERTIES OF SOIL

ρ_s	kg/m ³	DENSITY OF SOLID PARTICLES	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						



Ministry of
Transportation and
Communications

RECORD OF BOREHOLE No 1

METRIC

W P 48-71-22 LOCATION Sta. 389 + 26; o/s 50.0' Lt. (Imperial Chainage) ORIGINATED BY TS
DIST 6 HWY 427/409 BOREHOLE TYPE Cone Test, Solid Stem Auger COMPILED BY TS
DATUM Geodetic DATE 88 04 01 CHECKED BY

OFFICE REPORT ON SOIL EXPLORATION

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ KN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100					
								SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE					
(Feet)													
569.2	173.5	Ground Surface											
0.0	0.0	Irregular Mixture of Clayey Silt, Sand and Gravel (Fill) Brown/Grey Very Stiff to Hard				*							
			1	SS	30		172						
			2	SS	33								
			3	SS	31		170					22.7	7 34 45 14
			4	SS	26								
		Organic inclusions	5	SS	30		168						
			6	SS	30							22.0	13 36 37 14
			7	SS	25		166						
			8	SS	35		164						
532.7	162.4		9	SS	48		162						
36.5	11.1	Heterogeneous mixture of Clayey Silt, Sand and Gravel (Glacial Till)	10	SS	58		160					21.7	5 24 55 16
522.7	159.3	Brown, hard	11	SS	65								
46.5	14.2	End of Borehole											
		* Dry Hole											

+³, x⁵: Numbers refer to
Sensitivity

20
15
10
5
0
5
10
15
20
(%) STRAIN AT FAILURE



Ministry of
Transportation and
Communications

RECORD OF BOREHOLE No 2

METRIC

W P 48-71-22 LOCATION Sta. 389 + 26; o/s 26.0' Rt. (Imperial Chainage) ORIGINATED BY TS
DIST 6 HWY 427/409 BOREHOLE TYPE Cone Test, Solid Stem Auger COMPILED BY TS
DATUM Geodetic DATE 88 03 31 CHECKED BY _____

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 (feet) (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES		20 40 60 80 100		W _p	W	W _L		
							SHEAR STRENGTH		WATER CONTENT (%)				
							○ UNCONFINED + FIELD VANE		10 20 30				
							● QUICK TRIAXIAL x LAB VANE						
568.2	173.2												
0.0	0.0												
	Irregular Mixture of Clayey Silt, Sand and Gravel (Fill)		1	SS	21	*							
	Brown/Grey		2	SS	27							22.8	4 31 50 15
			3	SS	19								
	V. Stiff		4	SS	18								
			5	SS	11							22.0	
	Organic inclusions		6	SS	10								
			7	SS	34								
	Stiff Hard		8	SS	33								
531.7	162.1		9	SS	33								
36.5	11.1												
	Het. Mix. of Clayey Silt, Sand and Gravel (Glacial Till)												
526.7	160.6		10	SS	74								
41.5	12.6												
	End of Borehole												
	* Dry Hole												

+³, x⁵: Numbers refer to
Sensitivity

20
15 5 (%) STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION



METRIC

DATUM Geodetic DATE 88 03 29 CHECKED BY _____

OFFICE REPORT ON SOIL EXPLORATION

20
15 ϕ 5 (%) STRAIN AT FAILURE
10



METRIC

W P 48-71-22 LOCATION Sta. 406 + 50; o/s 26.0' Lt. (Imperial Chainage) ORIGINATED BY TS
DIST 6 HWY 427/409 BOREHOLE TYPE Cone Test, Solid Stem Auger COMPILED BY TS
DATUM Geodetic DATE 88 03 29 CHECKED BY _____

[illegible]

+3, x5 : Numbers refer to Sensitivity

15 ϕ 5 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 5

METRIC

W P 48-71-22 LOCATION Sta. 422 + 90; o/s 83.0' Lt. (Imperial Chainage) ORIGINATED BY TS
DIST 6 HWY 427/409 BOREHOLE TYPE Cone Test, Solid Stem Auger COMPILED BY TS
DATUM Geodetic DATE 88 03 31 CHECKED BY

OFFICE REPORT ON SOIL EXPLORATION

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 _p NATURAL MOISTURE CONTENT W LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV (feet)	DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER						
561.4	171.1	Ground Surface								
0.0	0.0	Irregular Mixture of Clayey Silt Sand and Gravel (Fill)		1	SS	18				
		Brown/Grey Stiff		2	SS	16				
				3	SS	10				
				4	SS	16				
				5	SS	14				
541.4	165.0			6	SS	30				
20.0	6.1	Brown Grey		7	SS	30				
		Het. Mixture of Clayey Silt Sand and Gravel (Glacial Till)		8	SS	18				
		Very Stiff to Hard		9	SS	19				
519.9	158.5			10	SS	16				
41.5	12.6	End of Borehole								

RECORD OF BOREHOLE No 6

METRIC

W P 48-71-22 LOCATION Sta. 422 + 90; o/s 26.0' Rt. (Imperial Chainage) ORIGINATED BY TS
DIST 6 HWY 427/409 BOREHOLE TYPE Cone Test, Solid Stem Auger COMPILED BY TS
DATUM Geodetic DATE 88 03 30 CHECKED BY

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ KN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
(feet)	ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER			TYPE	'N' VALUES	20 40 60 80 100	W _p		
561.4	171.1	Ground Surface										
0.0	0.0	Irregular Mixture of Clayey Silt Sand and Gravel (Fill) Brown/Grey Stiff to Very Stiff ----- Organic Inclusions		1	SS	16					20.6	4 24 37 35
				2	SS	16						
				3	SS	18						
				4	SS	23						
				5	SS	30						
541.4	165.0	Het. Mix. of Clayey Silt, Sand and Gravel Brown Grey (Glacial Till)		6	SS	20						1 17 58 24
20.0	6.1			7	SS	41						
				8	SS	20						
529.9	161.5	V. Stiff to Hard										
31.5	9.6	End of Borehole										

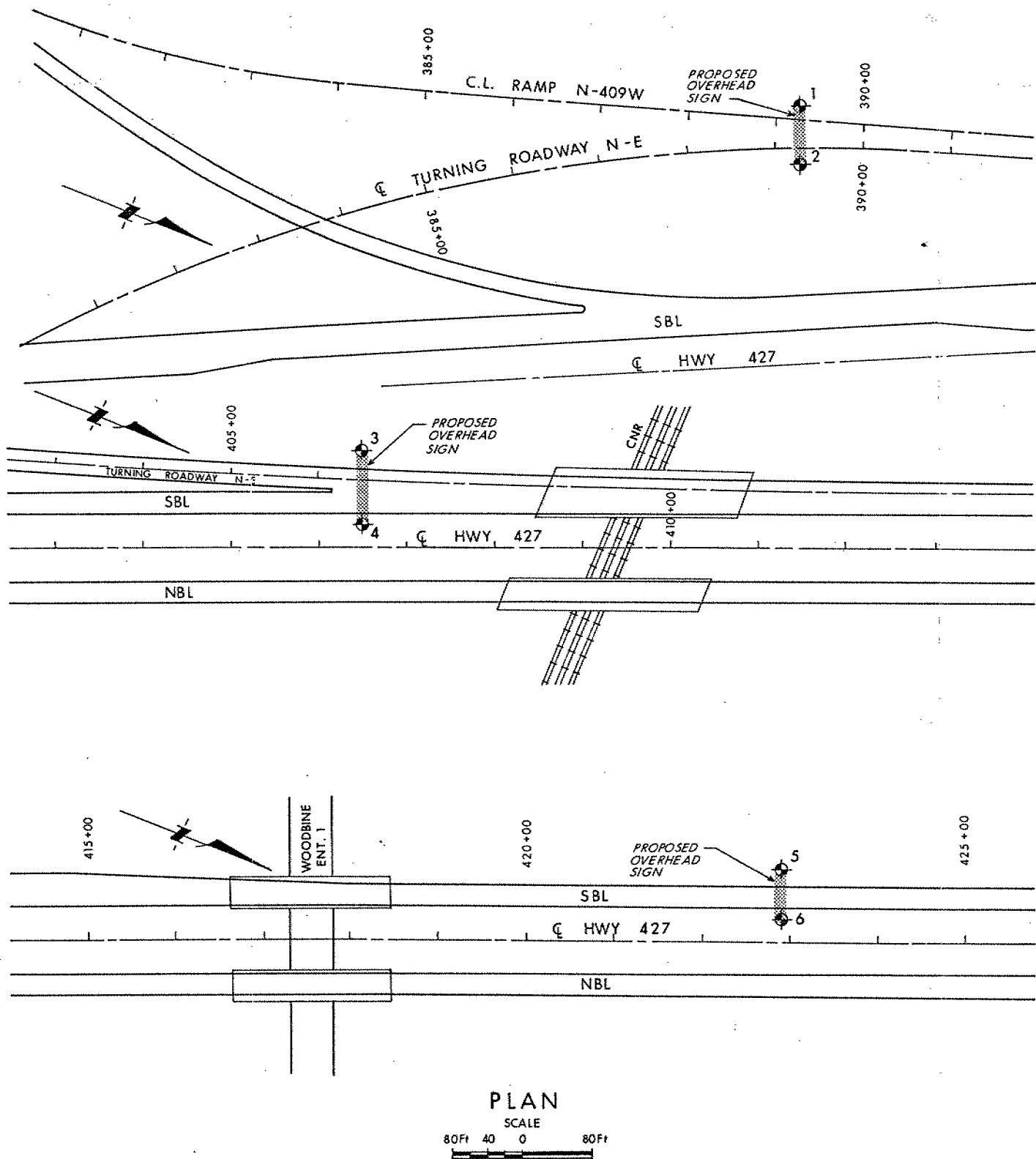
IMPERIAL

CONT Jo
WP No 48-71-22



OVERHEAD SIGNS
HWY 409/427
BORE HOLE LOCATIONS & SOIL STRATA

SHEET



LEGEND			
	Bore Hole		
	Dynamic Cone Penetration Test (Cone)		
	Bore Hole & Cone		
N	Blows/ft (Std Pen Test 350 ft lbs energy)		
CONE	Blows/ft (60° Cone, 350 ft lbs energy)		
WL	WL at time of investigation Mar 88 and Apr 88		

No	ELEVATION	STATION	OFFSET
1	569.2	389+26	50.0' Lt
2	568.2	389+26	26.0' Rt
3	568.2	406+50	111.0' Lt
4	567.6	406+50	26.0' Lt
5	561.4	422+90	83.0' Lt
6	561.4	422+90	26.0' Lt

NOTE: The complete foundation investigation and design report for this project and other related documents may be examined at the Engineering Materials Office, Downsview. Information contained in this report and related documents is specifically excluded in accordance with the conditions of Section 102-2 of Form 100.

NOTE:
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

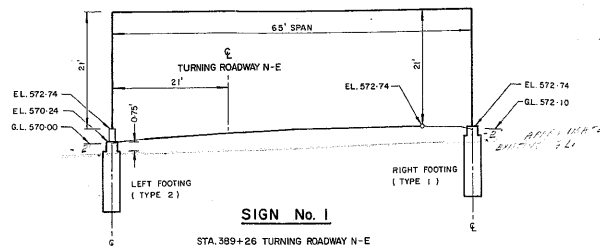
Note:
For subsurface details refer to Record of Borehole sheets.

REVISIONS	DATE	BY	DESCRIPTION

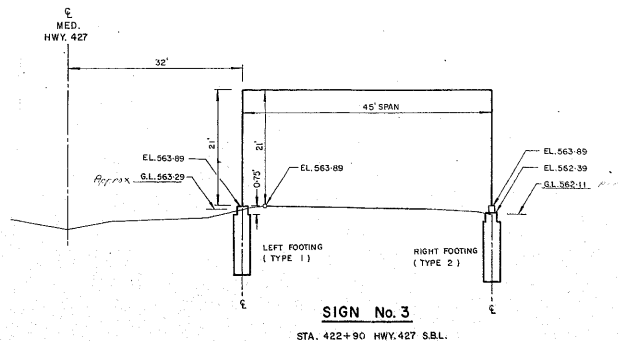
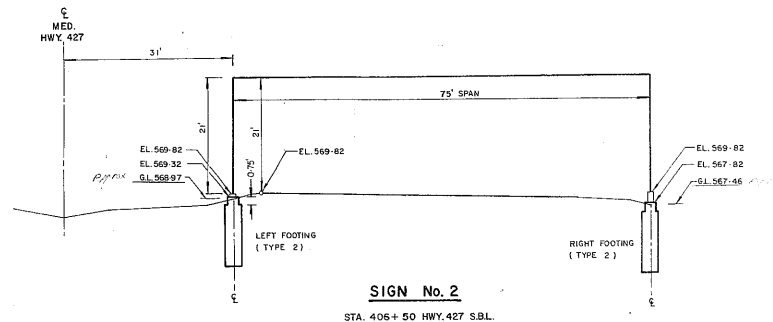
Geocres No 30 M12-206

HWY No 427	DIST 6
SUBM'D T5	CHECKED
DRAWN DT	CHECKED
DATE 18 MAY 88	SITE
APPROVED	IDWG 487122-A

PLATE No	
CONT No 82-78	
WP No 48-71-22	
OVERHEAD SIGNS FOOTING LAYOUT DETAILS	SHEET 59
MCCORMICK RANKIN CONSULTING ENGINEERS	



NOTE:
ELEVATIONS SHOWN ARE FRONT
ELEVATIONS OF THE SIGNS
FACING THE DIRECTION OF
APPROACHING TRAFFIC.



SCALE
1" = 10'