

G.I.-30 SEPT. 1976

DIST. 6 REGION

W.P. No. 144-87-00(A)

CONT. No. 94-37

W. O. No. _____

STR. SITE No. _____

HWY. No. 407

LOCATION Thumber River to Weston Rd.
HML

No. of PAGES - 1

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: _____

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	High Mast Light Poles
	From Humber River to Weston Road
	W.P. 144-87-00(A)
	Hwy 407, District 6, Toronto
	High Mast Light Poles
	From Weston Road to Jane Street
	W.P. 144-87-00(B)
	Hwy 407, District 6, Toronto

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

EXPLANATION OF TERMS USED IN REPORT

2

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

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

SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSENESS.

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

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

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

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

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

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

MODIFIED RECOVERY: SUM OF THOSE INTACT CORE PIECES, 100mm+ IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF THE CORING RUN. THE ROCK QUALITY DESIGNATION (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_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_i	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						

FOUNDATION INVESTIGATION REPORT

For

High Mast Lighting

Humber River to Weston Road

WP 144-87-00A, Site N/A

Highway 407, Central Region, TorontoIntroduction

This report presents representative subsurface information for the proposed high mast lights at the above-noted site. Soil information was collected from previous subsurface investigations in the area and supplemented by advancing 14 additional boreholes. In total, 24 borehole logs are provided. The previous investigations were carried out under work project numbers indicated on the Record of Borehole Sheets. Reference is made to appended Drawing No. 1448700A - A.

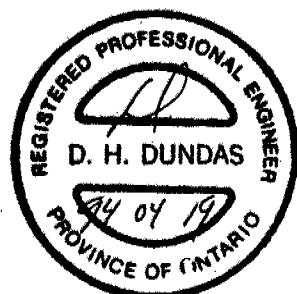
Miscellaneous

The fieldwork was carried out under the supervision of Brenda Liegler, Engineering Trainee utilizing equipment owned and operated by Dominion Soil Investigation Inc. and Malone's Soil Samples Co. Ltd. The report was written by B. Iyer, Sr. Foundation Engineer and approved by M. Devata, Chief Foundation Engineer.



A handwritten signature of B. Bennett in black ink.

B. Bennett, P.Eng.
Sr. Foundation Engineer (Acting)



A handwritten signature of D. Dundas in black ink.

D. Dundas, P. Eng.
Chief Foundation Engineer (Acting)

APPENDIX

New WP 144-87-00A

RECORD OF BOREHOLE No 2

METRIC

Former

W P 88-78-32; 88-78-15 LOCATION Co-ords. 4,847,372.8N;298,011.6E

ORIGINATED BY AJW

DIST 6 HWY 407 BOREHOLE TYPE Hollow Stem Augers

COMPILED BY ASP

DATUM Geodetic DATE March 23, 1990

CHECKED BY

OFFICE REPORT ON SOIL EXPLORATION

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 (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPa					W _p	W	W _L		
								20	40	60	80	100					GR SA SI CL
135.11	Ground Surface																
0.00	Organic Silt.																
133.81	Firm Brown		1	SS	6		134										
1.30	Sandy Silt, trace clay, some organics.		2	SS	9		Water Level Elev. 135.8 m April 5, 1990										
133.01	Loose Brown																
2.10	Sand and gravel, trace silt		3	SS	21												
132.21	Compact Grey																
2.90	Stratified Silty Clay and clayey silt, trace sand, frequent silt partings.		4	SS	11												
	Very Stiff Grey		5	SS	16												
			6	SS	15												
			7	SS	14												
127.81																	
7.30	Silt, trace clay interlayered with clayey silt and sandy silt.		8	SS	17												
125.51	Loose to compact Grey		9	SS	8												
9.60	End of Borehole.																

+3, x5: Numbers refer to
Sensitivity

20
15
10
5 (%) STRAIN AT FAILURE

New WP 144-87-00A

RECORD OF BOREHOLE No II

METRIC

Former

W P 88-78-32; 88-78-15

LOCATION Co-ords. 4,847,469.3N; 298,147.6E

ORIGINATED BY JR

DIST 6 HWY 407

BOREHOLE TYPE Hollow Stem Auger; BW Casing - Wash Boring

COMPILED BY ASP

DATUM Geodetic

DATE February 14 to February 20, 1990

CHECKED BY

OFFICE REPORT ON SOIL EXPLORATION

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100		
135.33	Ground Surface.													
0.00	Topsoil													
134.84														
0.50	Sandy Silt, trace clay		1	SS	8									
133.93	and organics. Loose													
1.40	Silty Sand, silt inter-		2	SS	3									
133.23	layers. Very Loose													
2.10	Silty clay, gravel		3	SS	10									
132.43	seams. Stiff													
2.90	Clayey Silt, trace to		4	SS	15									
	some sand, occasional		5	SS	14									
	to trace gravel (Till-		6	SS	15									
	like texture). Very Stiff	Grey												
			7	SS	12									
128.77														
6.60	Silty Clay, stratified		8	TW	PH									
	with silt partings. Very Stiff	Grey	9	SS	13									
126.83														
8.50	Clayey Silt, some sand		10	SS	13									
	trace gravel (Till). Very Stiff	Grey												
125.33			11	SS	9									
10.00	Silt and sand, fine,													
	trace clay. Occasional		12	SS	WR									
	interlayer of clayey													
	silt. Loose	Grey												
121.93			13	SS	110									
13.40	Silty Clay and clayey													
	silt, stratified with		14	SS	115									
	silt partings. Hard	Grey												
			15	SS	184									
118.87														
16.46	End of Borehole.													

New WP 144-87-00A			RECORD OF BOREHOLE No 8			1 OF 1			METRIC								
Former			LOCATION			Coords: N 4 847 537, E 298 336			ORIGINATED BY M.M.								
W.P. 141-87-00			DIST 5			HWY 417			BOREHOLE TYPE Hollow Stem Auger, Cone Penetration Test								
DATE 91/07/09			COMPILED BY M.M.			CHECKED BY B.J.											
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC NATURAL LIQUID UNIT MOISTURE CONTENT			UNIT WEIGHT			REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	20 40 60 80 100	20 40 60 80 100	W _p W W _L	WATER CONTENT (%)	7	GR SA SI CL				
158.0	GROUND SURFACE																
0.0	TRACE ORGANICS		1	SS	3												
	SILTY SAND		2	SS	5												
155.9	VERY LOOSE TO COMPACT		3	SS	15												
2.1	BROWN GREY		4	SS	6												
	CLAYEY SILT		5	SS	4												
153.6	TRACE SAND		6	SS	2												
4.4	SOFT TO FIRM		7	TW	PH												
			8	SS	2	/30cm											
			9	SS	2	/30cm											
			10	SS	2	/30cm											
			11	SS	1	/30cm											
			12	SS	2	/30cm											
			13	SS	1	/30cm											
			14	SS	1	/30cm											
	CLAYEY SILT		15	SS	2												
	TRACE SAND		16	TW	PH												
	TRACE GRAVEL		17	SS	5												
	(GLACIAL TILL)																
	VERY SOFT TO SOFT		18	SS	4												
			19	SS	4												
			20	SS	2												
			21	SS	1	/30cm											
138.7			22	SS	22												
19.3	SILT																
137.2	TRACE CLAY																
20.8	VERY STIFF																
136.2	CLAYEY SILT		23	SS	41												
	TRACE SAND																
	HARD																
21.8	End of Borehole																
135.1																	
22.9	End of Cone Test																
91/07/10 • GROUND WATER CONDITIONS PIEZO. NO. 1 GROUND WATER ELEVATION (Metres) 142.0																	

+3, x³: Numbers refer to Sensitivity

New WP 144-87-00A RECORD OF BOREHOLE No 3 1 OF 2 METRIC

Former W.P. 88-78-18 LOCATION Co-ords: N 4 847 617 E 208 429 ORIGINATED BY HCO

DIST 5 HWY 407 BOREHOLE TYPE Hollow Stem Auger, Wash Boring COMPILED BY EFO

DATUM Geodetic DATE July 12-13, 1983 CHECKED BY HCO

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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100					
159.6	Ground Surface													
0.0 158.8	Sand and Gravel (Fill)													
0.8	Sandy Silt with interbedded layers of Clayey Silt Very Loose to Compact Brown Grey		1	SS	5		158							0 2 85 12
			2	SS	7									
			3	SS	15									
			4	SS	5		156							
			5	SS	4									
154.7			6	SS	3									
4.9	Clayey Silt with random Silt zones and Traces of Sand Firm to Stiff, Grey		7	SS	6		154							0 0 87 33
151.7			8	TW	PH		152						18.8	
7.9			9	TW	PH		150							
			10	SS	6									
	Clayey Silt, Some Sand, Trace Gravel (Clayey Till) Firm to Stiff, Grey		11	SS	6		148							
			12	SS	9		146							
			13	SS	16		144							
			14	SS	12		142							
			15	SS	10		140							
			16	SS	12									
			17	SS	11		138							
137.1			18	SS	34		136							
22.5	Clayey Silt with Occasional layers and pockets of Sand Very Stiff to Hard		19	SS	58		134							0 2 73 25
			20	SS	36									
			21	SS	30		132							
			22	SS	19		130							
129.8														
129.8	As below													

30.5 Continued

+3, +5: Numbers refer to
Sensitivity

20
15-5 (%) STRAIN AT FAILURE
10

Continued

New WP 144-87-00A		RECORD OF BOREHOLE No 3		2 OF 2		METRIC	
Former		LOCATION		Co-ords: N 4 847 617 E 298 429		ORIGINATED BY HCO	
W.P. 88-78-18		BOREHOLE TYPE		Hollow Stem Auger, Wash Boring		COMPILED BY EFO	
DIST 6 HWY 407		DATE		July 12-13, 1983		CHECKED BY HCO	
DATUM Ceodetic							

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 7 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					
129.1	Continued		23	SS	19								
30.5													
			24	SS	48								
			25	SS	20								
			26	SS	69								
123.0	Clayey Silt Hard		27	SS	67								
36.6													
121.0	Sandy Silt, Some Gravel Very Dense		28	SS	49								
38.6													
119.5			29	SS	76								
40.1	End of Borehole												
	• Water Level Elev. 154.9 m Aug. 24 / 83												
• GROUND WATER CONDITIONS													
PIEZO. NO.		GROUND WATER ELEVATION (Metres)											
1		154.9											

New WP 144-87-00A			RECORD OF BOREHOLE No A-1			1 OF 1			METRIC		
Former W.P. 141-87-00A			LOCATION Co-ords: N 4 847 751.6 ; E 298 751.3			ORIGINATED BY TS					
DIST 8 HWY 407			BOREHOLE TYPE HS Auger			COMPILED BY TS					
DATUM Geodetic			DATE 90 01 16-17			CHECKED BY BC					

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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40					
160.2	Ground Surface													
159.4	Topsoil													
0.8	Sand, Tr. Gravel		1	AS	-									
	Brown, Compact		2	SS	14									
157.2			3	SS	9									
156.7	Silt, Brown, Compact		4	SS	9									
3.5			5	SS	7									
	Clayey Silt with Random Nodules/ Seams of Silt		6	SS	6									
	Gray, Stiff to Very Stiff		7	SS	5									
154.1			8	SS	4									
6.1			9	SS	3									
			10	SS	5									
	Clayey Silt, Tr. Sand, Tr. Gravel (Glacial Till)		11	SS	3									
	Gray, Firm to Very Stiff		12	SS	8									
			13	SS	8									
			14	SS	8									
144.5														
15.7	End of Borehole													

* GROUND WATER CONDITIONS	
PIEZO. NO.	GROUND WATER ELEVATION (Metres)
1	158.2

New WP 144-87-00A		RECORD OF BOREHOLE No A-5		1 OF 1		METRIC						
Former W.P. 141-87-00A		LOCATION Co-ords: N 4 847 860.1 E 298 576.7		ORIGINATED BY TS								
DIST 5 HWY 407		BOREHOLE TYPE HS Auger		COMPILED BY TS								
DATUM Geodetic		DATE 90 01 15		CHECKED BY BC								
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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER			TYPE	'N' VALUES					
160.2	Ground Surface											
159.4	Topsoil											
0.8	Sand, Some Gravel		1	SS	11							11 82 (7)
	Brown, Compact		2	SS	10							25 68 (7)
157.2			3	SS	17							0 0 (100)
156.4	Silt, Brown, Compact		4	SS	14							
3.8			5	SS	10							
	Clayey Silt to Silty Clay with Random Nodules/Interbeds of Silt		6	SS	11							
	Gray, Stiff		7	SS	5							
			8	TW	PH							0 0 32 68 c'=0 φ'=28°
152.6			9	SS	13							
7.8			10	SS	2							
	Clayey Silt, Some Sand, Tr. Gravel (Glacial Till)		11	SS	4							
	Gray, Firm to Stiff		12	SS	5							
			13	SS	8							18.4 1 15 (84)
			14	SS	10							
			15	SS	6							
141.5			16	SS	5							
16.7	End of Borehole											
137.3												
22.9	End of Cone Test											

New WP 144-87-00A

RECORD OF BOREHOLE No A-9

1 OF 1

METRIC

Former

W.P. 141-87-00A

LOCATION Co-ords. N 4 847 921 ; E 298 877

ORIGINATED BY JS

DIST 6 HWY 407

BOREHOLE TYPE HS Auger

COMPILED BY JS

DATUM Geodetic

DATE 90 02 23

CHECKED BY BC

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 7 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	20 40 60 80 100	10 20 30							
180.1	Ground Surface																
159.3	Topsoil																
0.8	Sand, Tr. Gravel																
158.6	Brown																
1.5	Silt		1	SS	16												
157.8	Brown, Compact																
2.3	Clayey Silt with Random Nodules/ Seams of Silt		2	SS	14												
	Grey, Stiff to Very Stiff		3	SS	7												
154.0																	
6.1	Clayey Silt, Tr. Sand, Tr. Gravel (Glacial Till)		4	SS	3												
	Grey, Firm to Very Stiff		5	SS	3												
			6	SS	5												
			7	SS	8												
148.7																	
11.4	Sand, Tr. Silt																
147.3	Loose		8	SS	6												
12.6	End of Borehole																

+3, x3: Numbers refer to
Sensitivity

20
15-20 (%) STRAIN AT FAILURE
10

New WP 144-87-00A

RECORD OF BOREHOLE No 2

METRIC

Former

WP 99-87-01

LOCATION

Co-ords. N 4 848 859.5; E 301 089.0

ORIGINATED BY KZ

DIST 6 HWY 407

BOREHOLE TYPE

Solid Stem, Wash Boring-N Casing, Cone Test

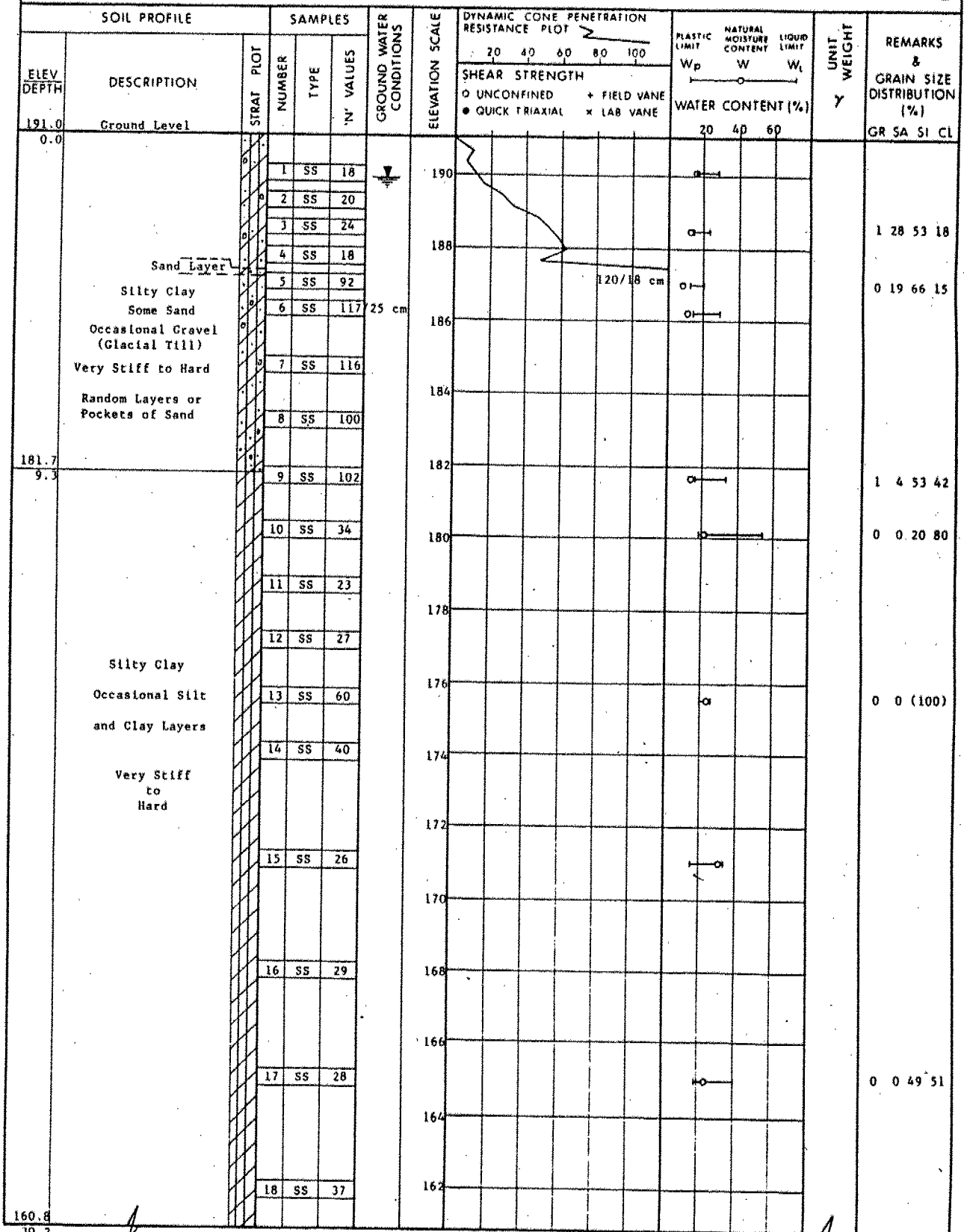
COMPILED BY KZ

DATUM Geodetic

DATE

1987 10 22, 23, 26

CHECKED BY



Continued

*3, *5: Numbers refer to Sensitivity

20
15
10
5 (%) STRAIN AT FAILURE

Continued

OFFICE REPORT ON SOIL EXPLORATION



New WP 144-87-00A

RECORD OF BOREHOLE No 2 Continued METRIC

Former

W P 99-87-01

LOCATION Co-ords. N 4 848 859.5; E 301 089.0

ORIGINATED BY KZ

DIST 6 HWY 407

BOREHOLE TYPE Solid Stem, Wash Boring-N Casing, Cone Test

COMPILED BY KZ

DATUM Geodetic

DATE 1987 10 22, 23, 26

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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	W _p	W	W _L	WATER CONTENT (%)	20 40 60			
160.8	Continued															
30.2	Silty Clay															
159.0	Occasional Silt															
32.0	and Clay Layers															
	Very Stiff to Hard															
	Silt		19	SS	75	5 cm									0 7 (93)	
	Traces of Sand															
	and Clay		20	SS	80	10 cm										
	Very Dense															
155.2																
35.8	End of Borehole		21	SS	152										0 17 (83)	

OFFICE REPORT ON SOIL EXPLORATION

43, x⁵: Numbers refer to
Sensitivity

20
15
10
5 (%) STRAIN AT FAILURE



New WP 144-87-00A

RECORD OF BOREHOLE No 3

METRIC

Former

WP 99-87-01

LOCATION

Co-ords. N 4 848 826.3; E 301 117.5

ORIGINATED BY KZ

DIST 6

HWY 407

BOREHOLE TYPE

Hollow Stem, Wash Boring-B Casing, Cone Test

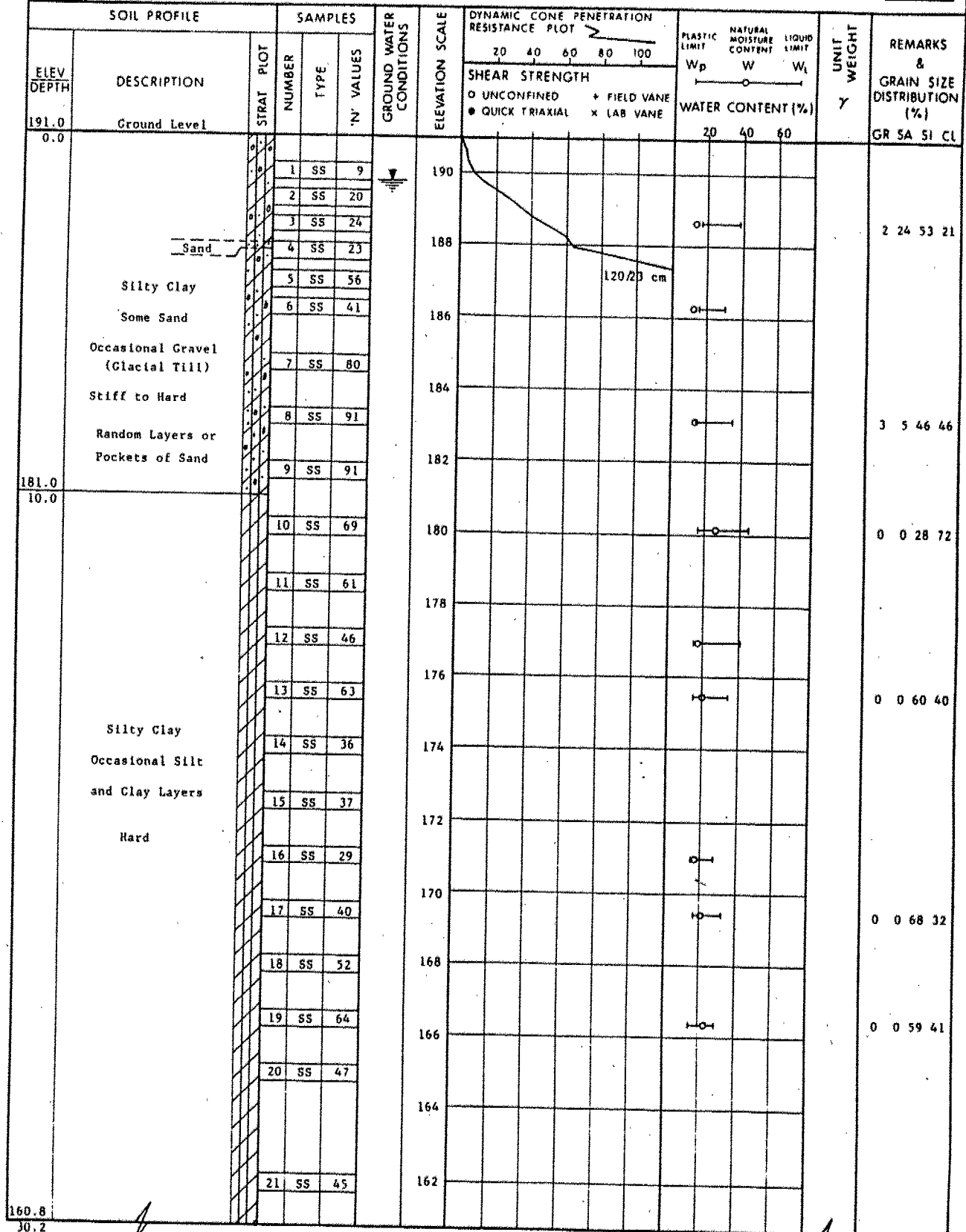
COMPILED BY KZ

DATUM Geodetic

DATE

1987 10 13, 14, 19, 20, 21

CHECKED BY



Continued

+3, x5: Numbers refer to Sensitivity

20
15
10
5 (%) STRAIN AT FAILURE

Continued

OFFICE REPORT ON SOIL EXPLORATION



New WP 144-87-00A

RECORD OF BOREHOLE No 3 Continued

METRIC

Former

WP 99-87-01

LOCATION

Co-ords. N 4 848 826.3; E 301 117.5

ORIGINATED BY KZ

DIST 6 HWY 407

BOREHOLE TYPE

Hollow Stem, Wash Boring-B Casing, Cone Test

COMPILED BY KZ

DATUM Geodetic

DATE

1987 10 13, 14, 19, 20

CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
160.8	Continued												
30.2			22	SS	38		160						0 0 37 63
160.0	Silty Clay, Hard												
31.0			23	SS	60	8 cm							
	Silt												
	Traces of Sand and Clay		24	SS	120	10 cm							0 13 80 7
	Very Dense		25	SS	120	10 cm							
155.8							156						
35.2	End of Borehole												

OFFICE REPORT ON SOIL EXPLORATION

+3, x5. Numbers refer to
Sensitivity

20
15
10
5 (%) STRAIN AT FAILURE

New WP 144-87-00A			RECORD OF BOREHOLE No 4			METRIC								
Former			LOCATION			Co-ords. N 4 848 777.2; E 301 102.0								
W P 99-87-01			DIST 6 HWY 407			BOREHOLE TYPE Solid Stem Auger and Cone Test								
DATE Geodetic			DATE 1987 10 28			ORIGINATED BY KZ								
						COMPILED BY KZ								
						CHECKED BY								
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	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER			TYPE	'N' VALUES						20	40
190.5	Ground Level													
0.0														
	Sandy Silt		1	SS	26							13 23 42 22		
			2	SS	18							3 25 57 15		
			3	SS	22							4 33 47 16		
			4	SS	72							3 28 54 15		
	Silty Clay		5	SS	53									
	Some Sand		6	SS	105									
	Occ. Gravel (Glacial Till)		7	SS	94									
	Very Stiff to Hard		8	SS	116									
	Random Layers or Pockets of Sand		9	SS	108									
			10	SS	114									
178.0			11	SS	130							2 1 55 42		
12.5	Silty Clay Occasional Silt and Clay Layers Hard		12	SS	36							0 0 11 89		
176.3														
14.2	End of Borehole													

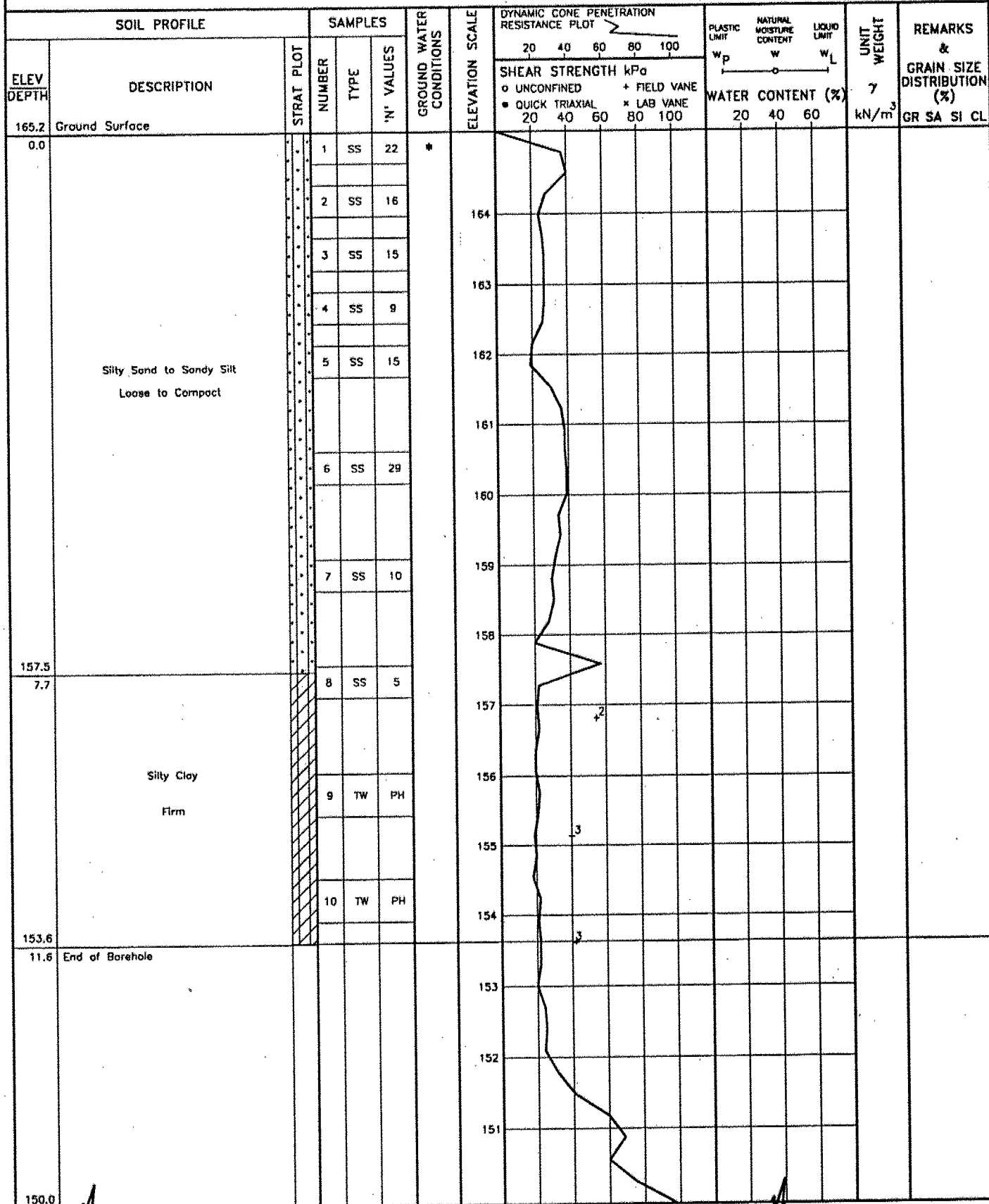
OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE No P9

1 OF 2

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 847 848.5, E 299 025.5 ORIGINATED BY PN
 DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY RV
 DATUM Geodetic DATE 1993 03 25 CHECKED BY BI



Continued

+3, x3: Numbers refer to
Sensitivity

20
15-5 (%) STRAIN AT FAILURE
10

Continued

RECORD OF BOREHOLE No P9

2 OF 2

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 847 848.5, E 299 025.5 ORIGINATED BY PN
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY RV
DATUM Geodetic DATE 1993 03 25 CHECKED BY BI

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT 7 kN/m 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		
150.0	Continued															
15.2																
149.0																
16.2	End of Cone Test • WL Not Established															

RECORD OF BOREHOLE No P10

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 848 137, E 299 057 ORIGINATED BY PN
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY RV
DATUM Geodetic DATE 1993 03 25 CHECKED BY BI

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES		20 40 60 80 100	20 40 60 80 100	W _P	W	W _L		
163.0	Ground Surface												
0.0			1	SS	30								
			2	SS	34								
	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Very Stiff to Hard		3	SS	34								
			4	SS	35								
			5	SS	12								
158.0			6	SS	9								
5.0													
	Silty Sand Loose		7	SS	8								
			8	SS	8								
155.0													
8.0			9	SS	33								
	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Very Stiff to Hard		10	SS	30								
			11	SS	34								
150.4													
12.6	End of Borehole												

RECORD OF BOREHOLE No P13

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 847 873.5, E 299 161.5 ORIGINATED BY BL
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY RV
DATUM Geodetic DATE 1993 03 25 CHECKED BY BI

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	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPa							WATER CONTENT (%)
								○ UNCONFINED 20 40 60 80 100	+ FIELD VANE × LAB VANE 20 40 60 80 100						
162.5	Ground Surface														
0.0 162.0	Silty Sand, Occasional Gravel (Fill)		1	SS	31		162								
0.5	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Stiff to Very Stiff		2	SS	20		161								
			3	SS	38										
			4	SS	18		160								
			5	SS	24		159								
			6	SS	9		158								
157.0			7	TW	PH		157								
5.5			8	SS	15		156								
			9	SS	19		155								
			10	SS	18		154								
152.9							153								
9.6	End of Borehole														

RECORD OF BOREHOLE No P15

1 OF 1

METRIC

W.P. 144-B7-00A LOCATION Co-ords: N 4 848 210, E 299 188 ORIGINATED BY PN
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 24 CHECKED BY BI

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 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa					
166.5	Ground Surface												
0.0	Clayey Silt with Organics		1	SS	10								
			2	SS	9								
164.8			3	SS	10								
1.7	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Very Stiff to Hard		4	SS	15								
			5	SS	27								
			6	SS	11								
			7	SS	33								
			8	SS	27								
			9	SS	49								
			10	SS	45								
155.4													
11.1	End of Borehole												

RECORD OF BOREHOLE No P16

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 848 142, E 299 352.5 ORIGINATED BY BL
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 24 CHECKED BY BI

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 7 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	20 40 60 80 100					
166.7	Ground Surface													
0.0														
	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Stiff to Very Stiff		1	SS	24									
			2	SS	42									
			3	SS	47									
			4	SS	31									
			5	SS	5									
			6	TW	PH									
160.5			7	SS	17									
6.2														
	Heterogeneous Mixture of Silt, Sand and Gravel (Glacial Till) Compact to Very Dense		8	SS	12									
			9	SS	34									
	With Boulders		10	SS	60	/15cm								
			11	SS	95	/22cm								
			12	SS	60	/15cm								
152.5														
14.2	End of Borehole													

RECORD OF BOREHOLE No P18

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 848 303, E 299 639 ORIGINATED BY PN
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 23-24 CHECKED BY BI

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	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100					
168.9	Ground Surface															
0.0	Hetrogeneous Mixture of Cloyey Silt, Sand and Gravel (Glacial Till) Stiff to Very Stiff		1	SS	24											
			2	SS	28											
			3	SS	32											
			4	SS	19											
			5	SS	5											
			6	TW	PH											
			7	SS	0											
161.3	Heterogeneous Mixture Of Silt, Sand and Gravel (Glacial Till) Dense to Very Dense		8	SS	29											
7.6			9	SS	120											
			10	SS	87											
157.8																
11.1	End of Borehole															

METRIC

CHECKED BY BI

+3, x⁵: Numbers refer to Sensitivity

RECORD OF BOREHOLE No P22

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 848 571.5, E 300 252 ORIGINATED BY PN
DIST 5 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 23 CHECKED BY BI

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	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20 40 60 80 100					
176.3	Ground Surface												
176.0	Clayey Silt with Organics		1	SS	31								
0.3	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Stiff to Hard		2	SS	12								
			3	SS	17								
			4	SS	20								
			5	SS	31								
			6	SS	22								
			7	SS	16								
			8	SS	48								
			9	SS	41								
			10	SS	37								
			165.2										
11.1	End of Borehole												

RECORD OF BOREHOLE No P24

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 848 658.5, E 300 537 ORIGINATED BY PN
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 22 CHECKED BY BI

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 7 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	20 40 60 80 100					
180.6	Ground Surface													
0.0	Clayey Silt with Organics		1	SS	5									
180.0			2	SS	73									
0.6			3	SS	45									
			4	SS	38									
			5	SS	29									
	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Very Stiff to Hard		6	SS	22									
			7	SS	28									
			8	SS	62									
			9	SS	71									
			10	SS	52									
168.0			11	SS	38									
12.6	End of Borehole. * Ground water level not detected													

RECORD OF BOREHOLE No P27

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 848 835 E 300 773 ORIGINATED BY BL
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 23 CHECKED BY BL

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	20 40 60 80 100	W _p	W		
190.8	Ground Surface												
0.0													
	Cloyey Silt with Organics		1	SS	7								
189.0			2	SS	11								
1.8			3	SS	15								
			4	SS	18								
	Heterogeneous Mixture of Cloyey Silt, Sand and Gravel (Glacial Till)		5	SS	37								
	Stiff to Hard		6	SS	88								
			7	SS	110								
			8	SS	114								
			9	SS	100	/28cm							
			10	SS	90	/28cm							
			11	SS	49								
176.6													
14.2	End of Borehole												

RECORD OF BOREHOLE No P28

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 848 809, E 300 948 ORIGINATED BY BL
DIST 5 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 25 CHECKED BY BL

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
188.3	Ground Surface											
188.0	Clayey Silt with Organics		1	SS	35							
0.3			2	SS	36							
	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till)		3	SS	55							
	Very Stiff to Hard		4	SS	37							
			5	SS	63							
	Silt		6	SS	50							
			7	SS	80							
	With Boulders		8	SS	74							
			9	SS	83							
			10	SS	40							
177.2	End of Borehole											

RECORD OF BOREHOLE No P29

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 848 770.5, E 300 923 ORIGINATED BY PN
DIST 5 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 22 CHECKED BY BI

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 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa						WATER CONTENT (%)	
								20							40
184.8	Ground Surface														
184.3	Clayey Silt with Organics		1	SS	58										
0.3	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Stiff to Very Stiff		2	SS	22										
			3	SS	17										
			4	SS	18										
			5	SS	14										
			6	SS	23										
			7	SS	18										
			8	SS	19										
			9	SS	40										
			10	SS	19										
			11	SS	22										
176.0															
8.6															
	Heterogeneous Mixture of Silt, Sand and Gravel (Glacial Till) Compact to Dense														
172.0															
12.6	End of Borehole														

RECORD OF BOREHOLE No P31

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 848 613, E 301 078 ORIGINATED BY BL
DIST 5 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 22.26 CHECKED BY BI

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 7 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						20 40 60 80 100
188.1	Ground Surface													
0.0	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Stiff to Very Stiff		1	SS	75	/15cm	188	Augered hole from 0m to 0.61m						
			2	SS	14			187						
			3	SS	22			186						
			4	SS	31			185	120/ 28cm					
			5	SS	30			184						
184.0	Heterogeneous Mixture of Silt, Sand and Gravel Occasional Boulders (Glacial Till) Very Dense		6	SS	74	/15cm	184							
4.1			7	SS	75	/15cm	183							
			8	SS	70	/15cm	182							
181.0	Heterogeneous Mixture of Clayey Silt, Sand and Gravel Occasional Boulders (Glacial Till)		9	SS	95	/25cm	181							
7.1			10	SS	96	/31cm	180							
			11	SS	85	/31cm	179							
177.6	End of Borehole * Overlap due to only .15 m of sample obtained from SS8						178							
10.5														

RECORD OF BOREHOLE No P33

1 OF 1

METRIC

W.P. 144-87-00A LOCATION Co-ords: N 4 849 055.5, E 301 011.5 ORIGINATED BY BL
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 22 CHECKED BY BI

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT 7 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	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100		
183.3	Ground Surface													
0.0	Clayey Silt with Organics													
192.3			1	SS	12									
1.0			2	SS	17									
	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Stiff		3	SS	15									
			4	SS	11									
189.0			5	SS	24									
4.3			6	SS	45									
	Heterogeneous Mixture of Silt, Sand and Gravel (Gravel Till) Compact to Dense		7	SS	31									
184.0			8	SS	40									
9.3	End of Borehole													

+3, x5: Numbers refer to
Sensitivity

20
15-5 (%) STRAIN AT FAILURE
10

Foundation Investigation Report
For
High Mast Lighting
Weston Road to Jane Street
WP 144-87-00B, Site N/A
Highway 407, Central Region, Toronto

Introduction

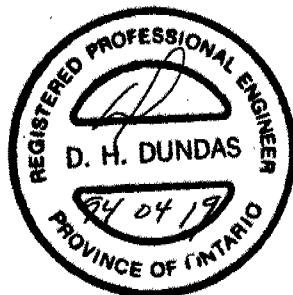
This report presents representative subsurface information for the proposed high mast lights at the above-noted site. Soil information was collected from previous subsurface investigations in the area and supplemented by advancing 7 additional boreholes. In total, 17 borehole logs are provided. The previous investigations were carried out under work project numbers indicated on the Record of Borehole Sheets. Reference is made to appended Drawing No. 1448700B - A.

Miscellaneous

The field investigation was carried out under the supervision of K. Ahmad, Foundation Engineer, using equipment owned and operated by Malone's Soil Samples Co. Ltd. The report was prepared by K. Ahmad, reviewed by D. Dundas, Sr. Foundation Engineer and approved by M. Devata, Chief Foundation Engineer.



B. Bennett
B. Bennett, P.Eng.
Sr. Foundation Engineer (Acting)



D. Dundas
D. Dundas, P. Eng.
Chief Foundation Engineer (Acting)

APPENDIX

RECORD OF BOREHOLE No P48 1 OF 1 METRIC

W.P. 144-87-00(B) LOCATION Co-ords: N 4 849 061.5; E 302 180.0 ORIGINATED BY KA
 DIST 6 HWY 407 BOREHOLE TYPE Solid Stem Auger COMPILED BY KA
 DATUM Geodetic DATE 1993 03 31 CHECKED BY DD

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	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	N' VALUES			20	40	60	80	100					
188.9	Ground Surface																
0.0			1	SS	22		188										
			2	SS	15												
			3	SS	38												
			4	SS	99		186										
			5	SS	112												
			6	SS	65		184										
			7	SS	55												
			8	SS	35		182										
			9	SS	60												
179.3			10	SS	26		180										
9.6	End of Borehole																
	Water Level on 1993 04 01																

RECORD OF BOREHOLE No P49

1 OF 1

METRIC

W.P. 144-87-00(B) LOCATION Co-ords: N 4 849 243.0; E 302 227.0 ORIGINATED BY KA
DIST 6 HWY 407 BOREHOLE TYPE Solid Stem Auger COMPILED BY KA
DATUM Geodetic DATE 1993 03 31 CHECKED BY DD

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT			UNIT WEIGHT 7 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
192.5	Ground Surface																
0.0	Clayey Silt to Silt with Sand, Trace Gravel Occ. Silty Sand Layers Occ. Cobbles & Boulders Brown to Grey Stiff to Hard (Glacial Till)		1	SS	12												
			2	SS	16												
			3	SS	28												
			4	SS	31												
			5	SS	41												
			6	SS	64												
			7	SS	40												
			8	SS	39												
			9	SS	100												
			10	SS	41												
182.9	End of Borehole																
9.8	Water Level on 1993 04 01																

RECORD OF BOREHOLE No P54

1 OF 1

METRIC

W.P. 144-87-00(B) LOCATION Co-ords: N 4 849 159.0; E 302 628.5 ORIGINATED BY KA
DIST 8 HWY 407 BOREHOLE TYPE Solid Stem Auger COMPILED BY KA
DATUM Geodetic DATE 1993 03 30 CHECKED BY DD

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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
195.8	Ground Surface																
0.0			1	SS	12												
			2	SS	13												
			3	SS	16												
			4	SS	10												
			5	SS	29												
			6	SS	52												
			7	SS	83												
			8	SS	84												
			9	SS	41												
186.0			10	SS	52												
9.8	End of Borehole																
	Water Level on 1993 03 31																

RECORD OF BOREHOLE No P58

1 of 1

METRIC

W.P. 144-87-00(B) LOCATION Co-ords: N 4 849 220.0; E 302 880.0 ORIGINATED BY KA
DIST 6 HWY 407 BOREHOLE TYPE Solid Stem Auger COMPILED BY KA
DATUM Geodetic DATE 1993 03 30 CHECKED BY DD

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 7 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					
197.4	Ground Surface																
0.0	Clayey Silt to Silt with Sand, Trace Gravel Occ. Cobbles & Boulders Stiff to V. Stiff (Glacial Till)		1	SS	14		196										
			2	SS	12												
			3	SS	20												
			4	SS	9		194										
193.0			5	SS	24												
4.4	Silty Sand to Fine Sand Grey, Wet Compact (Glacial Till)		6	SS	3		192										
			7	SS	22												
			8	SS	26												
			9	SS	24		190										
188.8																	
8.8	Clayey Silt, Hard (Glacial Till)		10	SS	33		188										
187.8																	
9.8	End of Borehole																
	* Water Level on 1993 03 31 ** Not Representative, Disturbed																

RECORD OF BOREHOLE No P59

1 OF 1

METRIC

W.P. 144-87-00(B) LOCATION Co-ords: N 4 849 428.0; E 302 883.0 ORIGINATED BY KA
DIST 6 HWY 407 BOREHOLE TYPE Solid Stem Auger COMPILED BY KA
DATUM Geodetic DATE 1993 03 29 CHECKED BY DD

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT 7 kN/m 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
199.1	Ground Surface																
0.0	Clayey Silt to Silt with Sand, Trace Gravel Occ. Silty Clay Layers Occ. Cobbles & Boulders Brown to Grey Stiff to Hard (Clodol III)		1	SS	10												
			2	SS	12												
			3	SS	20												
			4	SS	26												
			5	SS	26												
			6	SS	34												
			7	SS	39												
			8	SS	32												
			9	SS	69												
189.5				10	SS	51											
9.8	End of Borehole																
	* Water Level on 1993 03 30																

RECORD OF BOREHOLE No P61

1 of 1

METRIC

W.P. 144-87-00(B) LOCATION Co-ords: N 4 849 114.5; E 303 038.0 ORIGINATED BY KA
 DIST 6 HWY 407 BOREHOLE TYPE Solid Stem Auger COMPILED BY KA
 DATUM Geodetic DATE 1993 03 29 CHECKED BY DD

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)				
								20	40	60	80	100	W _p	W	W _L		
195.9	Ground Surface																
0.0			1	SS	13												
			2	SS	18												
			3	SS	31												
			4	SS	52												
			5	SS	39												
			6	SS	33												
			7	SS	50												
			8	SS	48												
			9	SS	71												
186.3			10	SS	110												
8.6	End of Borehole																
	Water Level on 1993 03 30																

RECORD OF BOREHOLE No P68

1 OF 1

METRIC

W.P. 144-87-00(B) LOCATION Co-ords: N 4 848 552.0; E 301 926.0 ORIGINATED BY KA
DIST 5 HWY 407 BOREHOLE TYPE Solid Stem Auger COMPILED BY KA
DATUM Geodetic DATE 1993 03 30 CHECKED BY DD

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT			UNIT WEIGHT 7 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		
195.4	Ground Surface																
0.0			1	SS	11												
			2	SS	17												
			3	SS	16												
			4	SS	14												
	Silty Clay to Clayey Silt some Sand, Trace Gravel Occ. Silt Layers Occ. Cobbles & Boulders Brown to Grey Stiff to Hard (Glacial Till)		5	SS	57												
			6	SS	33												
			7	SS	79												
			8	SS	84												
			9	SS	48												
185.8			10	SS	42												
9.6	End of Borehole																
	Water Level on 1993 03 31																

New WP 144-87-00B			RECORD OF BOREHOLE No 7-5			METRIC						
Former			LOCATION			Co-ords. N 4 849 076.0; E 301 875.5						
W P 137-87-01			LOCATION			ORIGINATED BY DD						
DIST 6 HWY 400/407			BOREHOLE TYPE			Cone Test, H-S Auger						
DATUM Geodetic			DATE			87 10 20						
						CHECKED BY DD						
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	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER			TYPE	'N' VALUES					
192.3	Ground Surface											
0.0	Clayey Silt Some Sand Trace Gravel Firm to Very Stiff (Glacial Till)		1	SS	18							
189.9			2	SS	31							
2.4	Silt, Very Dense (Lacustrine)		3	SS	54							
			4	SS	24							
	Silt/Clayey Silt Some Sand Trace Gravel Random Silt and Sand Pockets Occ. Boulders Compact to Very Dense/ Very Stiff to Hard (Glacial Till)		5	SS	59							
			6	SS	63							
			7	SS	62							
			8	SS	57							
			9	SS	23							
			10	SS	30							
			11	SS	24							
			12	SS	25							
178.9			13	SS	37							
13.4	Silt Compact (Lacustrine)		14	SS	22							
	Silty Clay to Clay with Thin Silt Seams Hard (Lacustrine)		15	SS	62/	15 cm						
173.6			16	SS	91/	25 cm						
18.7	End of Borehole											

OFFICE REPORT ON SOIL EXPLORATION

New WP 144-87-00B

RECORD OF BOREHOLE No 9-11

METRIC

Former

W P 137-87-06

LOCATION

Co-ords. N 4 848 825.0; E 301 771.0

ORIGINATED BY HS

DIST 6

HWY 400/407

BOREHOLE TYPE

Cone Test, H-S Auger, Tricone

COMPILED BY HS

DATUM

Geodetic

DATE

87 10 30 & 87 11 18

CHECKED BY DD

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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100				
191.5	Ground Surface														GR SA SI CL
0.0	Clayey Silt Some Sand Trace Gravel Very Stiff to Hard (Glacial Till)		1	SS	26										
189.4			2	SS	37										
2.1			3	SS	57										
	Silt to Silty Sand Compact to Very Dense (Lacustrine)		4	SS	24										0 38 60 2
			5	SS	100	25 cm									0 67 32 1
			6	SS	100	23 cm									
			7	SS	100	28 cm									0 10 86 4
			8	SS	105	25 cm									
	Silt/Clayey Silt Some Sand Trace Gravel Random Silt and Sand Pockets Occ. Boulders Very Dense/Hard (Glacial Till)		9	SS	100										1 15 57 27
			10	SS	95	25 cm									
			11	SS	117	28 cm									2 19 61 18
178.7			12	SS	108	25 cm									
12.8	Silty Clay to Clay With Thin Silt Seams Hard (Lacustrine)		13	SS	100										
176.3	Gravel		14	SS	126	25 cm									
15.2	End of Borehole														

+3, x5: Numbers refer to
Sensitivity

20
15 5 (%) STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

New WP 144-87-00B RECORD OF BOREHOLE No 10-11 METRIC

Former
W P 137-87-05 LOCATION Co-ords. N 4 849 155.0; E 301 780.5 ORIGINATED BY MS

DIST 6 HWY 400/407 BOREHOLE TYPE Cone Test, H-S Auger COMPILED BY DD

DATUM Geodetic DATE 87 10 19 CHECKED BY MS

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100		
191.8	Ground Surface													
0.0	Clayey Silt Some Sand Trace Gravel Very Stiff (Glacial Till)		1	SS	19									
189.5			2	SS	21									
2.3	Silt Dense to Very Dense (Lacustrine)		3	SS	31									
			4	SS	88									
			5	SS	108									
	Silt/Clayey Silt Some Sand Trace Gravel Random Silt and Sand Pockets		6	SS	71									
			7	SS	82	10 cm								
185.4	Dense to Very Dense/Hard (Glacial Till)		8	SS	90	13 cm								
6.4	End of Borehole													

OFFICE - REPORT ON SOIL EXPLORATION

New WP 144-87-00B

RECORD OF BOREHOLE No 11-10

METRIC

Former

WP 137-87-03 LOCATION Co-ords. N 4 848 913.0; E 301 853.0 ORIGINATED BY MS
DIST 6 HWY 400/407 BOREHOLE TYPE H-S Auger, Tricone COMPILED BY MS
DATUM Geodetic DATE 87 10 27 CHECKED BY MS

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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
192.0	Ground Surface																
0.0	Clayey Silt Some Sand Trace Gravel Very Stiff to Hard (Glacial Till)		1	SS	33		190										
189.3			2	SS	37												
2.7			3	SS	22												
	Silt Very Dense (Lacustrine)		4	SS	31		188										
			5	SS	53												
			6	SS	40												
			7	SS	42		186										2 22 62 14
	Silt/Clayey Silt Some Sand Trace Gravel Random Silt and Sand Pockets Occ. Boulders Dense to Very Dense/ Hard (Glacial Till)		8	SS	38												
			9	SS	110	25 cm	184										3 35 52 10
			10	SS	127	28 cm	182										
			11	SS	68												
180.1			12	SS	110	30 cm	180										3 79 17 1
11.9	Sand		13	SS	110	15 cm	178										
	Silty Clay to Clay With Thin Silt Seams Hard (Lacustrine)		14	SS	110	18 cm											
176.6																	
15.4	End of Borehole																

OFFICE REPORT ON SOIL EXPLORATION



New WP 144-87-00B

RECORD OF BOREHOLE No 11-11

METRIC

Former

W P 137-87-03

LOCATION

Co-ords. N 4 849 033.0; E 301 623.5

ORIGINATED BY TS

DIST 6 HWY 400/407

BOREHOLE TYPE Cone Test, Solid Stem Auger

COMPILED BY TS

DATUM Geodetic

DATE

87 11 18

CHECKED BY HS

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 WATER CONTENT (%)	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES						
192.9	Ground Surface										
0.0	Clayey Silt Some Sand Trace Gravel Very Stiff (Glacial Till)		1	SS	29		192				
			2	SS	29						
190.6	Silt, Dense (Lacustrine)		3	SS	31		190				
2.3			4	SS	50						
			5	SS	25						
			6	SS	54		188				
			7	SS	42						
			8	SS	43		186				
	Silt/Clayey Silt Some Sand Trace Gravel Random Silt and Sand Pockets Occ. Boulders Compact to Very Dense Very Stiff to Hard (Glacial Till)		9	SS	48		184				
			10	SS	52						
			11	SS	80		182				
180.3			12	SS	100						
12.6	End of Borehole										

New WP 144-87-00B

RECORD OF BOREHOLE No 12-9

METRIC

Former

W P 137-87-04

LOCATION

Co-ords: N 4 848 968.5; E 301 856.0

ORIGINATED BY MS

DIST 6

HWY 400/407

BOREHOLE TYPE

Cone Test, H-S Auger

COMPILED BY MS

DATUM

Geodetic

DATE

87 10 23

CHECKED BY MS

OFFICE REPORT ON SOIL EXPLORATION

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		20	40	60	80	100	
192.3	Ground Surface											
0.0	Clayey Silt Some Sand Trace Gravel Very Stiff to Hard (Glacial Till)		1	SS	29							
			2	SS	19							
189.6			3	SS	30							
2.7			4	SS	20							
	Silty Sand to Silt Compact to Dense (Lacustrine)		5	SS	37							
			6	SS	28							
			7	SS	43							
	Silt/Clayey Silt Some Sand Trace Gravel Random Silt and Sand Pockets Occ. Boulders Compact to Very Dense Very Stiff to Hard (Glacial Till)		8	SS	20							
			9	SS	100	23 cm						
			10	SS	52							
			11	SS	34							
180.1			12	SS	32							
12.2	Silt Silty Clay to Clay With Thin Silt Seams Hard (Lacustrine)		13	SS	100	20 cm						
			14	SS	120	17 cm						
176.9												
15.4	End of Borehole											

+3, x5: Numbers refer to
Sensitivity

20
15 5 (%) STRAIN AT FAILURE
10

New WP 144-87-00B

RECORD OF BOREHOLE No 13

METRIC

Former

W P 164-79-06

LOCATION

Co-ords. N 4 848 755.0; E 301 194.5

ORIGINATED BY KZ

DIST 6 HWY 407

BOREHOLE TYPE

Hollow Stem Augers & Cone Test

COMPILED BY KZ

DATUM Geodetic

DATE

88 05 24

CHECKED BY

OFFICE REPORT ON SOIL EXPLORATION

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 _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L		
190.8	Ground Level												
0.0	Clayey Silt, Some Sand Occ. Gravel, Random Layers or Pockets of Sand, Boulders & Cobbles, Stiff (Glacial Till)	Brown	1	SS	12		190						
188.4	Silty Clay Occ. Silt and Clay Layers	Grey	2	SS	14		188						0 10 50 40
186.8	Stiff (Lacustrine)		3	SS	49		186						2 19 65 14
4.0	Clayey Silt Some Sand Occasional Gravel Random Layers or Pockets of Sand Boulders & Cobbles Hard (Glacial Till)		4	SS	54		184						
			5	SS	73		182						
			6	SS	86		180						
179.2			7	SS	68		178						
11.6	Silty Clay Occasional Silt and Clay Layers Very Stiff (Lacustrine)		8	SS	25								0 0 28 72
176.6			9	SS	24								
14.2	End of Borehole												

+3, x⁵: Numbers refer to
Sensitivity

20
15 \pm 5 (%) STRAIN AT FAILURE
10

New WP 144-87-008
Former
W.P. 140-87-01 LOCATION Co-ord: N 4849136 ; E 302505
DIST 6 HWY 407 BOREHOLE TYPE Continuous Flight Auger (H.S.)
DATUM Geodetic DATE 90-02-01 to 90-02-02
1 OF 1 METRIC
ORIGINATED BY P.M.
COMPILED BY P.M.
CHECKED BY P.M.

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 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPa						
193.4	Ground Level							20 40 60 80 100						
0.0	Topsoil													
	CLAYEY SILT, With Sand, Trace of Gravel (fill)		1	SS	12									2 31 (67)
			2	SS	14									
			3	SS	11									
	brown		4	SS	8									
	grey		5	SS	46									3 30 (67)
			6	SS	99									3 31 52 14
	Occasional sandy silt layers		7	SS	33									4 26 (70)
	Stiff to Hard		8	SS	34									
186.7														1 18 60 21
6.7														
	CLAYEY SILT to SILTY CLAY		9	SS	21									
	Some Sand		10	SS	33									
	Occasional thin silt layers (Locustrine)		11	SS	44									
	Hard													0 6 (94)
180.8			12	SS	49									
12.6	End of Borehole													

New WP 144-87-00B			RECORD OF BOREHOLE No 44			1 OF 1			METRIC		
Former			LOCATION			Co-ord: N 4849137 ; E 302534			ORIGINATED BY P.M.		
W.P. 140-87-01			DIST 6 HWY 407			BOREHOLE TYPE Continuous Flight Auger (H.S.)			COMPILED BY P.M.		
DATUM Geodetic			DATE 90-01-31 to 90-02-01						CHECKED BY P.M.		

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT 7 KN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
193.8	Ground Level												
0.0	Topsoil												
	CLAYEY SILT, With Sand, Trace of Gravel (Till)		1	SS	18								4 35 (61)
			2	SS	16								
			3	SS	21								
	brown grey		4	SS	14								
	Occasional sandy silt layers		5	SS	32								7 22 (71)
	Very Stiff to Hard		6	SS	33								
188.8			7	SS	39								1 14 (85)
5.8	CLAYEY SILT to SILTY CLAY Trace of Sand		8	SS	42								
	Occasional thin silt layers (Locustrine)		9	SS	43								
185.4	Hard		10	SS	40								
8.4	End of Borehole												

New WP 144-87-008
Former
W.P. 140-87-01 LOCATION Co-ord: N 4849120 ; E 302380 ORIGINATED BY B.C.
DIST 6 HWY 407 BOREHOLE TYPE Continuous Flight Auger (S.S.) COMPILED BY P.M.
DATUM Geodetic DATE 90-02-07 CHECKED BY P.M.

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	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					
191.5	Ground Surface													
0.0	Topsoil													
	CLAYEY SILT, With Sand, Trace of Gravel (Glacial Till)		1	SS	16									
			2	SS	28									
			3	SS	38									
	brown		4	SS	133									
	grey		5	SS	145									
	Occasional sandy silt layers		6	SS	120	/18cm								
185.6	Very Stiff to Hard		7	SS	120	/18cm								
5.9	CLAYEY SILT to SILTY CLAY, Trace of Sand (Lacustrine)		8	SS	114									
183.4	Hard		9	SS	75									
8.1	End of Borehole													
	• Water Level Not Stabilized													

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investigation and
design report**

ENGINEERING MATERIALS OFFICE
FOUNDATION DESIGN SECTION

CONT 94-37

WP 144-87-00A DIST 6

HWY 407 STR SITE -

Proposed High Mast Light Poles
Highway 407, Humber River to Weston Road

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FOUNDATION INVESTIGATION REPORT
For
Proposed High Mast Light Poles
Highway 407, Humber River to Weston Road
W.P. 144-87-00A
District 6, Toronto

INTRODUCTION

As requested by the Central Region Structural Section, a foundation investigation has been carried out for the design of high mast light poles for Highway 407 from the Humber River to Weston Road. This investigation supplements several previous investigations in this area and it was conducted between 93 03 22 and 93 03 26. Existing information has been used to determine the subsurface conditions for high mast pole locations P1-P7, P32 and P34 while 14 new boreholes were investigated for the remaining 25 high mast pole locations.

This report summarizes the information collected and includes the foundation recommendations pertaining to the design of the high mast light poles. Proposed pole locations are illustrated in Drawing No. 1448700A-A in the Appendix.

SUMMARIZED SUBSURFACE CONDITIONS

The subsurface soil conditions encountered at the pole locations included the following four predominant strata - loose to compact silty sand to sandy silt, firm silty clay, very stiff to hard heterogeneous mixture of clayey silt, sand and gravel (cohesive glacial till) and compact to very dense heterogeneous mixture of silt, sand and gravel (non-cohesive glacial till). The latter two layers contained numerous boulders at several borehole locations. The detailed soil stratigraphy encountered at each borehole location is shown on the individual Record of borehole sheets included in the Appendix of this report. Also included in the Appendix are copies of select reference borehole logs from previous investigations.

The groundwater level recorded at each borehole location is shown on the individual Record of borehole sheet in the Appendix. Groundwater is generally subject to seasonal fluctuations and hence may differ from the elevations given in this report.

DISCUSSION AND RECOMMENDATIONS

General

Reference borehole numbers for each high mast pole have been summarized and tabulated in the attached table titled Reference Borehole Numbers. The subsurface conditions at each of the reference boreholes from both current and previous investigations are shown in the Record of Borehole sheets in the Appendix. Based on the subsurface information, the recommended geotechnical design parameters are summarized in the table titled Geotechnical Design Parameters.

Foundation

The design of caissons for the High Mast Light (HML) foundations shall be as per the "Procedures for the Design of High Mast Light Pole Foundations" prepared by the Structural Office, Procedures Section, dated January 1993.

The soils within 1.2 m of the finished grade should be neglected in the calculations for lateral resistance due to frost penetration. The finished grades of some of the HML poles is different from the existing ground surface. In these cases, the HML poles will be founded in a fill or a cut. The design of HML poles located in fills or cuts shall be as per the general guidelines given in a memorandum from the Foundation Design Section dated 1990 04 02. A copy of this memorandum is attached in this report for easy reference. It is recommended that the construction be closely monitored and any unforeseen subsoil conditions be reported to this office so that design may be reviewed to suit actual site conditions.

Construction Considerations

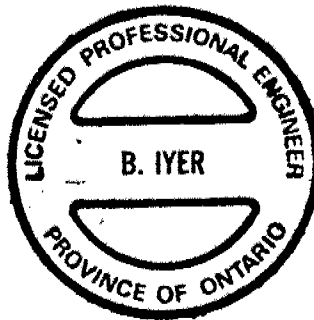
For caisson construction, liners should be used to stabilize the sides during installation and concreting of the caissons, especially when excavation advances below the groundwater level in cohesionless materials. The founding base of the caisson should be pumped dry prior to concreting. Alternatively, tremie concrete should be used for underwater concreting.

It should be noted that the glacial till stratum contains occasional boulders. Installation of caissons through glacial till stratum may encounter obstruction from boulders.

MISCELLANEOUS

The fieldwork for this investigation was carried out under the supervision of Brenda Liegler, Engineer in Training. Two track mounted hollow stem auger drill rigs were used for this investigation, one owned and operated by Dominion Soil Investigation Inc. and the other by Malones Soil Samples Co Ltd.

This report was written by Balu Iyer, P. Eng., Senior Foundation Engineer and approved by Murty Devata, P. Eng., Chief Foundation Engineer.



A handwritten signature in black ink, appearing to read "B. Iyer", written over a horizontal line.

Balu Iyer, P. Eng.
Senior Foundation Engineer



A handwritten signature in black ink, appearing to read "M. Devata", written over a horizontal line.

Murty Devata, P. Eng.
Chief Foundation Engineer

memorandum



To: V. Boehnke
Head, Structural Section
Central Region

From: Foundation Design Section
Room 315, Central Building

Re: High Mast Lighting Foundations
on Cut and Fill Slopes

Date: 1990 04 02

Further to our meeting of February 26, 1990 and your subsequent minutes we have reviewed your proposal for high mast light foundations on slopes. Following are our comments on

- general implications for HML foundation on the slopes as opposed to in the median
- design implications for HML foundations on cut slopes

These comments are intended for planning purposes only. A foundation investigation would have to be initiated for each specific HML site. Since the foundation conditions will be variable, some refinement in foundation recommendations should be expected in the design phase of the project.

Slope Versus Median

There are a number of disadvantages in placing caisson foundations on slopes.

- The lateral resistance would be decreased due to the proximity of the caisson to the slope, inferior compaction near the slope and the reduction in passive resistance due to movement of the slope. These factors would contribute to deeper caissons.
- Access ramps would be required for caisson installation and permanent berms/benches would be required to increase lateral resistance and for maintenance access. These factors would increase property requirements and the complexity of grading.
- By not utilizing the full depth of the highway embankment and due to the implications for lateral resistance on slopes, caissons would be deeper thus increasing the risk of encountering artesian groundwater conditions. If artesian conditions are encountered, installation costs could be considerably higher and a drainage/filter system would have to be installed below frost level outletting to a permanent drain.

Cut Slopes

The design parameters for HML foundations at the toe of cut slopes will require investigation on a site specific basis. If the caissons are located on a bench a minimum of 3 m from the toe of slope as indicated in your proposal there would be no implication for the caisson design. Since the proposed toe wall at the base of the cut slope would have to retain a considerable earth pressure, it would be expensive. Therefore we recommend deleting it from the design and grading the slopes at 2:1.

Fill Slopes

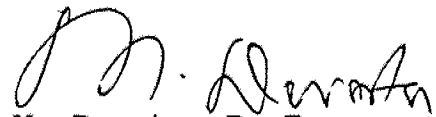
The implications for HML caissons on fill slopes are significant. The effects of settlement, slope movement, embankment compaction, and earth pressure on the caisson have been assessed resulting in the following recommendations.

Assuming that the proposed embankment geometry consists of an upper 4H:1V slope, 1.75 m high, then a 6 m berm, then 2H:1V slope:

- The design for caisson embedment can be calculated neglecting lateral resistance in the frost penetration zone but including lateral loads within the frost penetration zone.
- The caisson should be a minimum 3 m from the crest of the 2H:1V downslope.
- The properties of the fill will be site dependent but may involve a reduction of 10+% in strength parameters to account for uncertainties inherent in fill.
- The embankment should be preloaded prior to construction of the HML foundation in order to minimize settlement effects. The duration of the preload will be recommended on a site specific basis in the Foundation Report.
- The upper 60% of the embedment length within the fill (taken from frost penetration depth) should be disregarded for lateral resistance.

In conclusion, it is feasible to construct HML caissons on slopes as proposed. However, caissons would extend to a lower elevation and be more expensive. These costs should be compared to any savings that would result from locating HML's on the slopes instead of in the median.

If there are any questions, please advise.



M. Devata, P. Eng.
Chief Foundation Engineer

MD/BI/DD/mmj

cc: R. Dorton
B. Iyer
P. Payer
D. Dundas

APPENDIX

REFERENCE BOREHOLE NUMBERS

HML Pole #	Ref. BH No.	Project No.	Orig. Grade	Final Grade
P1	2	W.P. 88-78-32	135.1	142.2
P2	11	W.P. 88-78-15	135.3	142.8
P3	8	W.P.141-87-00B	158.0	145.4
P4	3	W.P. 88-78-18	159.6	150.4
P5	A5	W.P.141-87-00A	160.2	153.5
P6	A1	W.P.141-87-00A	160.2	154.9
P7	A9	W.P.141-87-00A	160.1	156.1
P8			163.5	157.3
P9	P9	W.P.144-87-00A	165.2	161.2
P10	P10	W.P.144-87-00A	163.0	164.1
P13	P13	W.P.144-87-00A	162.5	163.2
P14			165.3	159.6
P15	P15	W.P.144-87-00A	166.5	166.0
P16	P16	W.P.144-87-00A	166.7	162.7
P17			166.1	165.5
P18	P18	W.P.144-87-00A	168.9	168.5
P19			171.5	170.9
P20	P20	W.P.144-87-00A	170.6	172.7
P21			174.6	174.1
P22	P22	W.P.144-87-00A	176.3	176.1
P23			177.7	177.4
P24	P24	W.P.144-87-00A	180.6	178.9
P25			183.5	179.5
P26			185.3	185.4
P27	P27	W.P.144-87-00A	190.8	184.0
P28	P28	W.P.144-87-00A	188.3	188.2
P29	P29	W.P.144-87-00A	184.6	183.0
P30			191.3	191.2
P31	P31	W.P.144-87-00A	188.1	188.0
P32	2	W.P. 99-87-01	191.0	184.4
P33	P33	W.P.144-87-00A	193.3	192.4
P34	3	W.P. 99-87-01	187.1	185.8

GEOTECHNICAL DESIGN PARAMETERS

HML Pole #	Final Grade	Elevation	Gamma	Phi (°)	q _y (kPa)
P1	142.2	141.0 - 135.1 135.1 - 132.2 132.2 - 127.8	20 19 21	30 27	200
P2	142.8	141.6 - 135.3 135.3 - 133.3 133.3 - 125.3	20 19 21	30 27	200
P3	145.4	144.2 - 135.1	21		150
P4	150.4	149.2 - 129.8	19		120
P5	153.5	152.3 - 141.5	19		120
P6	154.9	153.7 - 144.5	19		120
P7	156.1	154.9 - 148.7 148.7 - 147.5	19 19	27	100
P8	157.3	156.1 - 153 153 -	19 19	27	100
P9	161.2	160.0 - 157.5 157.5 - 153.6	20 19	30	100
P10	164.1	162.9 - 158 158 - 155 155 - 150	20 19 20	27	200 200
P13	163.2	162.0 - 156.5 156.5 - 152.9	20 20	30	200
P14	159.6	158.4 -	20		200
P15	166.0	164.8 - 155.4	20		200
P16	162.7	161.5 - 160.5 160.5 - 152.5	20 20	35	200
P17	165.5	164.3 - 162 162 -	20 20	35	200
P18	168.5	167.3 - 163.0 163.0 - 157.8	20 20	30	200
P19	170.9	169.7 - 163 163 -	20 20	30	200

GEOTECHNICAL DESIGN PARAMETERS

HML Pole #	Final Grade	Elevation	Gamma	Phi (°)	q _y (kPa)
P20	172.7	171.5 - 170.6	20	30	
		170.6 - 169.0	19		50
		169.0 - 159.0	20		200
P21	174.1	172.9 -	20		200
P22	176.1	174.9 - 165.2	20		200
P23	177.4	176.2 -	20		200
P24	178.9	177.7 - 168.0	20		200
P25	179.5	178.3 -	20		200
P26	185.4	184.2 -	20		200
P27	184.0	182.8 - 176.6	20		200
P28	188.2	187.0 - 177.2	20		200
P29	183.0	181.8 - 176.0	20	30	200
		176.0 - 172.0	20		
P30	191.2	190.0 - 180	20	35	200
		180 - 176	20		
		176 -	20		200
P31	188.0	186.8 - 184.0	20	35	200
		184.0 - 181.0	20		
		181.0 - 177.6	20		200
P32	184.4	183.2 - 160.8	20		200
P33	192.4	191.2 - 189.0	20	35	200
		189.0 - 183.8	20		
P34	185.8	184.6 - 160.8	20		200

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:

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
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_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_f	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 = $\frac{w_L - w_p}{I_p}$	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						

POLE NO P1

W.P. 144-87-00A

FORMER

RECORD OF BOREHOLE No 2

METRIC

W P 88-78-32; 88-78-15 LOCATION Co-ords. 4,847,372.8N;298,011.6E ORIGINATED BY AJW
 DIST 6 HWY 407 BOREHOLE TYPE Hollow Stem Augers COMPILED BY ASP
 DATUM Geodetic DATE March 23, 1990 CHECKED BY

OFFICE REPORT ON SOIL EXPLORATION

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT			UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	W _p	W	W _L		
135.11	Ground Surface															
0.00	Organic Silt.															
133.81	Firm Brown		1	SS	6											
1.30	Sandy Silt, trace clay some organics.		2	SS	9											
133.01	Loose Brown															
2.10	Sand and gravel, trace silt		3	SS	21											
132.21	Compact Grey															
2.90	Stratified Silty Clay and clayey silt, trace sand, frequent silt partings.		4	SS	11											
	Very Stiff Grey		5	SS	16											
			6	SS	15											
			7	SS	14											
127.81																
7.30	Silt, trace clay interlayered with clayey silt and sandy silt.		8	SS	17											
125.51	Loose to compact Grey		9	SS	8											
9.60	End of Borehole.															

FORMER

RECORD OF BOREHOLE No 11

METRIC

W P 88-78-32; 88-78-15 LOCATION Co-ords. 4,847,469.3N; 298,147.6E ORIGINATED BY JR
DIST 6 HWY 407 BOREHOLE TYPE Hollow Stem Auger; BW Casing - Wash Boring COMPILED BY ASP
DATUM Geodetic DATE February 14 to February 20, 1990 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 Y	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
135.33	Ground Surface.																
135.84	Topsoil																
0.50	Sandy Silt, trace clay and organics. Loose		1	SS	8												
1.40	Silty Sand, silt inter- layers. Very Loose		2	SS	3												
2.10	Silty clay, gravel seams. Stiff		3	SS	10												
2.90	Clayey Silt, trace to some sand, occasional to trace gravel (Till- like texture). Very Stiff Grey		4	SS	15												
			5	SS	14												
			6	SS	15												
128.73			7	SS	12												
6.60	Silty Clay, stratified with silt partings. Very Stiff Grey		8	TW	PH												
			9	SS	13												
126.83																	
8.50	Clayey Silt, some sand trace gravel (Till). Very Stiff Grey		10	SS	13												
125.33																	
10.00	Silt and sand, fine. trace clay. Occasional interlayer of clayey silt. Loose Grey		11	SS	9												
			12	SS	WR												
121.93																	
13.40	Silty Clay and clayey silt, stratified with silt partings. Hard Grey		13	SS	110												
			14	SS	115												
118.87			15	SS	184												
16.46	End of Borehole.																

+3, x⁵: Numbers refer to
Sensitivity

20
15 \div 5 (%) STRAIN AT FAILURE
10

METRIC

+3, x5: Numbers refer to Sensitivity

FORMER

RECORD OF BOREHOLE No 3

1 OF 2

METRIC

W.P. 88-78-18 LOCATION Co-ords: N 4 847 617 E 298 429 ORIGINATED BY HCO
DIST 5 HWY 407 BOREHOLE TYPE Hollow Stem Auger, Wash Boring COMPILED BY EFO
DATUM Geodetic DATE July 12-13, 1983 CHECKED BY HCO

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	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100					
159.6	Ground Surface													
0.0 158.8	Sand and Gravel (Fill)													
0.8	Sandy Silt with interbedded layers of Clayey Silt Very Loose to Compact		1	SS	5		158							0 2 86 12
			2	SS	7									
			3	SS	15									
			4	SS	5		156							
			5	SS	4									
154.7			6	SS	3									
4.9	Clayey Silt with random Silt zones and Traces of Sand Firm to Stiff, Grey		7	SS	6		154							0 0 57 33
151.7			8	TW	PH		152						18.8	
7.9			9	TW	PH		150							
			10	SS	6		148							
			11	SS	6		146							
			12	SS	9		144							
			13	SS	16		142							
			14	SS	12		140							
			15	SS	10		138							
			16	SS	12		136							
			17	SS	11		134							
137.1			18	SS	34		132							
22.5			19	SS	58		130							
			20	SS	36									
			21	SS	30									
			22	SS	19									
129.8														
28.8 129.1														
30.5														

30.5

Continued

+3, x5: Numbers refer to
Sensitivity

20
15-5 (%) STRAIN AT FAILURE
10

Continued

FORMER

RECORD OF BOREHOLE No 3

2 OF 2 METRIC

W.P. 88-78-18 LOCATION Co-ords: N 4 847 617 E 298 429 ORIGINATED BY HCO
DIST 6 HWY 407 BOREHOLE TYPE Hollow Stem Auger, Wash Boring COMPILED BY EFO
DATUM Geodetic DATE July 12-13, 1983 CHECKED BY HCO

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	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100					
129.1	Continued		23	SS	19											
30.5	Sandy Silt to Silty Sand Compact to Very Dense		24	SS	48											
			25	SS	20											
			26	SS	69											
123.0			27	SS	67											
36.6	Clayey Silt Hard		28	SS	49											
121.0	Sandy Silt, Some Gravel Very Dense		29	SS	76											
38.6																
119.5	End of Borehole															
40.1	-- Water Level Elev. 154.9 m Aug. 24 /83 * GROUND WATER CONDITIONS PIEZO. NO. 1 GROUND WATER ELEVATION (Metres) 154.9															

FORMER

RECORD OF BOREHOLE No A-5

1 OF 1

METRIC

W.P. 141-87-00A LOCATION Co-ords: N 4 847 660.1 ; E 298 576.7 ORIGINATED BY JS
 DIST 6 HWY 407 BOREHOLE TYPE H5 Auger COMPILED BY JS
 DATUM Geodetic DATE 90 01 15 CHECKED BY BC

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 7 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					
160.2	Ground Surface																
159.4	Topsoil		1	SS	11												11 82 (7)
0.8	Sand, Some Gravel Brown, Compact		2	SS	10												25 68 (7)
157.2			3	SS	17											18.8	0 0 (100)
156.4	Silt, Brown, Compact		4	SS	14												
3.8			5	SS	10												
155.4	Cloyey Silt to Silty Clay with Random Nodules/interbeds of Silt Grey, Stiff		6	SS	11											22.6	
			7	SS	5												0 0 32 68 c'=0 φ'=28°
			8	TW	PH												
152.8			9	SS	13												
7.6			10	SS	2												
			11	SS	4												
	Cloyey Silt, Some Sand, Tr. Gravel (Glacial Till) Grey, Firm to Stiff		12	SS	5												
			13	SS	8											18.4	1 15 (84)
			14	SS	10												
			15	SS	6												
141.5			16	SS	5												
18.7	End of Borehole																
137.3																	
22.9	End of Cone Test																

+3, x3 Numbers refer to
Sensitivity

20
15-20 (x) STRAIN AT FAILURE
10

FORMER

RECORD OF BOREHOLE No A-1

1 OF 1

METRIC

W.P. 141-87-00A LOCATION Co-ords: N 4 847 751.6 : E 298 751.3 ORIGINATED BY TS
DIST 8 HWY 407 BOREHOLE TYPE HS Auger COMPILED BY TS
DATUM Geodetic DATE 90 01 16-17 CHECKED BY BC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					NATURAL MOISTURE CONTENT			UNIT WEIGHT 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa 20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE					WATER CONTENT (%) 10 20 30 W _P W W _L			
160.2	Ground Surface															
159.4	Topsoil															
0.8			1	AS	-											
	Sand, Tr. Gravel		2	SS	14											
	Brown, Compact		3	SS	9											
157.2			4	SS	9											
156.7	Silt, Brown, Compact		5	SS	7											
3.5			6	SS	8											
	Clayey Silt with Random Nodules/ Seams of Silt		7	SS	5											
	Gray, Stiff to Very Stiff		8	SS	4											
154.1			9	SS	3											
6.1			10	SS	5											
	Clayey Silt, Tr. Sand, Tr. Gravel (Glacial Till)		11	SS	3											
	Gray, Firm to Very Stiff		12	SS	8											
			13	SS	8											
144.5			14	SS	8											
15.7	End of Borehole															

• GROUND WATER CONDITIONS

PIEZO. NO.	GROUND WATER ELEVATION (Metres)
1	158.2

FORMER		RECORD OF BOREHOLE No A-9		1 OF 1		METRIC						
W.P. 141-87-00A		LOCATION Co-ords: N 4 847 921, E 295 877		ORIGINATED BY TS								
DIST 5 HWY 407		BOREHOLE TYPE HS Auger		COMPILED BY TS								
DATUM Geodetic		DATE 90 02 23		CHECKED BY BC								
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 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER			TYPE	'N' VALUES					
160.1	Ground Surface											
159.3	Topsoil											
0.8	Sand, Tr. Gravel											
158.8	Brown											
1.5	Silt		1	SS	16							
157.8	Brown, Compact											
2.3			2	SS	14							
	Clayey Silt with Random Nodules/ Seams of Sst											
	Grey, Stiff to Very Stiff		3	SS	7							
154.0												
8.1			4	SS	3							
	Clayey Silt, Tr. Sand, Tr. Gravel (Glacial Till)		5	SS	3							
	Grey, Firm to Very Stiff		6	SS	5							
148.7												
11.4			7	SS	8							
147.5	Sand, Tr. Sst Loose		8	SS	6							
12.8	End of Borehole											

RECORD OF BOREHOLE No P9

1 OF 2

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 847 848.5, E 299 025.5 ORIGINATED BY PN
DIST 5 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY RV
DATUM Geodetic DATE 1993 03 25 CHECKED BY BI

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 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40						60
165.2	Ground Surface														
0.0	Silty Sand to Sandy Silt Loose to Compact		1	SS	22	*									
			2	SS	16										
			3	SS	15										
			4	SS	9										
			5	SS	15										
			6	SS	28										
			7	SS	10										
157.5	Silty Clay Firm		8	SS	5										
7.7			9	TW	PH										
			10	TW	PH										
153.6															
11.6	End of Borehole														
150.0															

Continued

+3, x⁵: Numbers refer to
Sensitivity

20
15-5 (%) STRAIN AT FAILURE
10

Continued

RECORD OF BOREHOLE No P9

2 OF 2

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 847 848.5, E 299 025.5 ORIGINATED BY PN
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY RV
DATUM Geodetic DATE 1993 03 25 CHECKED BY BI

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT 7 KN/m 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		
150.0	Continued															
15.2																
149.0																
16.2	End of Cone Test • WL Not Established															

RECORD OF BOREHOLE No P10

1 OF 1

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 848 137, E 299 057 ORIGINATED BY PN
DIST 5 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY RV
DATUM Geodetic DATE 1993 03 25 CHECKED BY BI

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			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	20 40 60 80 100	10 20 30		
163.0	Ground Surface											
0.0	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Very Stiff to Hard		1	SS	30							
			2	SS	34		162					
			3	SS	34		161					
			4	SS	35		160					
			5	SS	12		145					
158.0	Silty Sand Loose		6	SS	9		158					
5.0			7	SS	8		157					
155.0	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Very Stiff to Hard		8	SS	8		156					
8.0			9	SS	33		155					
			10	SS	30		154					
			11	SS	34		153					
150.4	End of Borehole						152					
12.8							151					

RECORD OF BOREHOLE No P13

1 OF 1

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 847 873.5 E 299 161.5 ORIGINATED BY BL
 DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY RV
 DATUM Geodetic DATE 1993 03 25 CHECKED BY BI

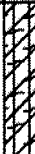


SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100					
162.5	Ground Surface													
0.0	Silty Sand, Occasional Gravel (Fill)		1	SS	31		162							
0.5	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Stiff to Very Stiff		2	SS	20		161							
			3	SS	38		160							
	Sandy Silt		4	SS	18		159							
			5	SS	24		158							
157.0			6	SS	9		157							
5.5			7	TW	PH		156							
			8	SS	15		155							
	Silty Sand Trace Gravel Compact		9	SS	19		154							
152.8			10	SS	18		153							
9.8	End of Borehole													

RECORD OF BOREHOLE No P15

1 OF 1

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 848 210, E 299 188 ORIGINATED BY PN
 DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
 DATUM Geodetic DATE 1993 03 24 CHECKED BY BI

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 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPa							WATER CONTENT (%)
								20 40 60 80 100	20 40 60 80 100						
166.5	Ground Surface							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							
0.0	Clayey Silt with Organics		1	SS	10		166								
			2	SS	9			165							
164.8			3	SS	10			164							
1.7	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Very Stiff to Hard		4	SS	15			163							
			5	SS	27			162							
			6	SS	11			161							
			7	SS	33			160							
			8	SS	27			159							
			9	SS	49			158							
			10	SS	45			157							
155.4			End of Borehole						156						
11.1															

METRIC

ORIGINATED BY BL

COMPILED BY BL

CHECKED BY BI

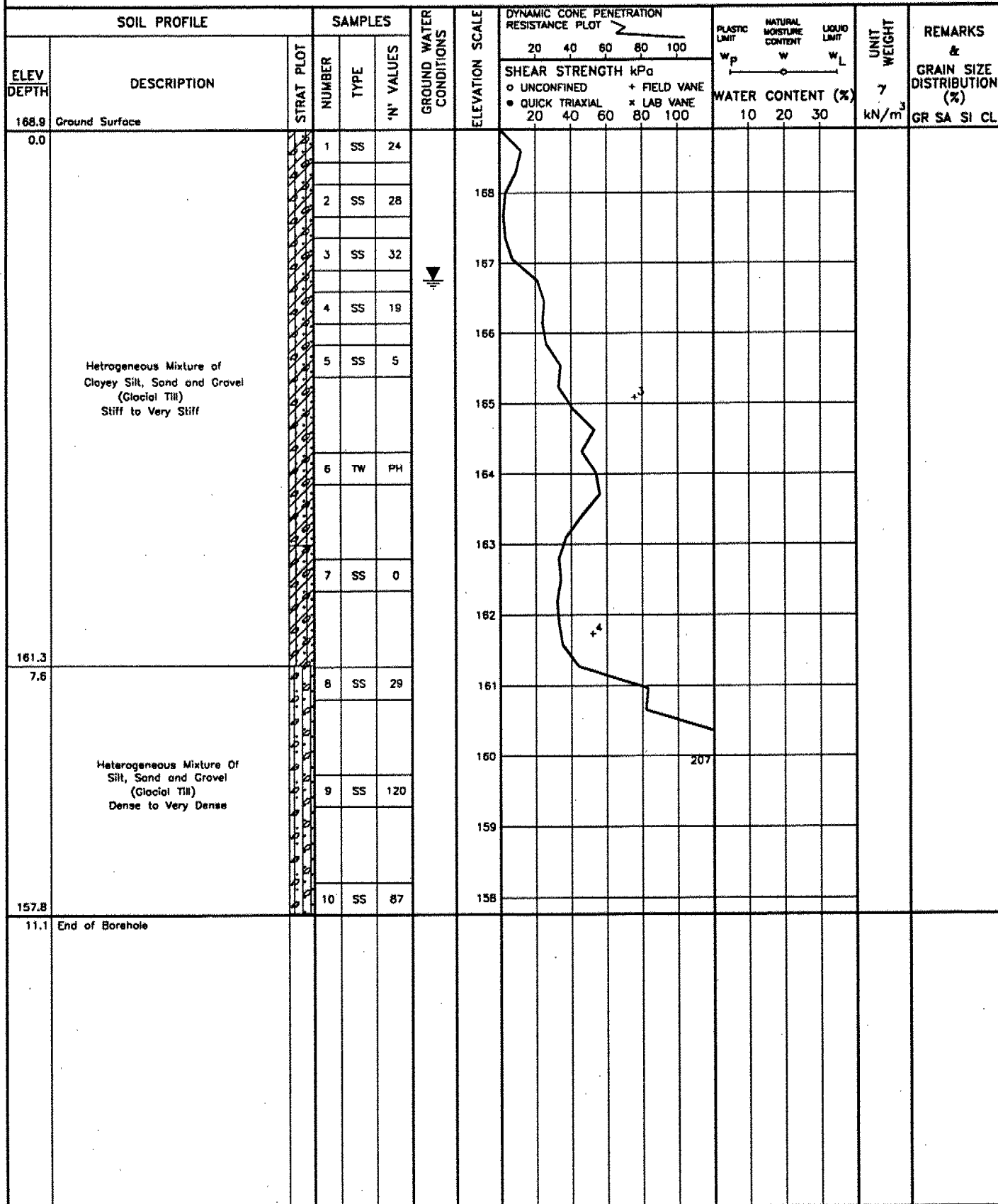
+3, x⁵: Numbers refer to Sensitivity

RECORD OF BOREHOLE No P18

1 OF 1

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 848 303, E 299 639 ORIGINATED BY PN
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 23-24 CHECKED BY BI



RECORD OF BOREHOLE No P20

1 OF 1

METRIC

W.P. 144-B7-00 LOCATION Co-ords: N 4 848 449, E 299 944 ORIGINATED BY BL
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 23-24 CHECKED BY BI

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 7 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	20 40 60 80 100					
170.6	Ground Surface													
0.0														
	Clayey Silt with Organics		1	SS	5									
169.0														
1.6														
	Boulders		2	SS	17									
			4	SS	40									
			5	SS	48									
			6	SS	42									
	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till)		7	SS	25									
	Very Stiff to Hard		8	SS	22									
			9	SS	22									
			10	SS	73	28cm								
159.0														
11.6	Heterogeneous Mixture of Silt, Sand and Gravel (Glacial Till)													
158.0			11	SS	85	31cm								
12.6	End of Borehole													
	<p>* SS3 attempted from 2.3 - 2.7m Rod was bouncing on boulder. SS4 onwards taken in a new borehole 1m to the east.</p> <p>** Artesian conditions encountered when driving SS11 - water was gently flowing out of hole. Borehole was backfilled with soil to a depth of approximately 3m and then filled with bentonite to the surface.</p>													

RECORD OF BOREHOLE No P22

1 OF 1

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 848 571.5, E 300 252 ORIGINATED BY PN
 DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
 DATUM Geodetic DATE 1993 03 23 CHECKED BY BI

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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100					
176.3	Ground Surface													
176.0	Clayey Silt with Organics		1	SS	31		176							
0.3			2	SS	12		175							
			3	SS	17		174							
			4	SS	20		173							
			5	SS	31		172							
			6	SS	22		171							
			7	SS	16		170							
			8	SS	46		169							
			9	SS	41		168							
			10	SS	37		167							
165.2							166							
11.1	End of Borehole													

RECORD OF BOREHOLE No P24

1 OF 1

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 848 658.5, E 300 537 ORIGINATED BY PN
DIST 5 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 22 CHECKED BY BI

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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100					
180.8	Ground Surface													
0.0	Clayey Silt with Organics		1	SS	5	*								
180.0														
0.6			2	SS	73									
			3	SS	45									
			4	SS	36									
			5	SS	29									
	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till)		6	SS	22									
	Very Stiff to Hard		7	SS	29									
			8	SS	62									
			9	SS	71									
			10	SS	52									
168.0			11	SS	36									
12.8	End of Borehole													
	* Ground water level not detected													

RECORD OF BOREHOLE No P27

1 OF 1

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 848 835 E 300 773 ORIGINATED BY BL
DIST 5 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 23 CHECKED BY BI

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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa					
190.8	Ground Surface												
0.0	Clayey Silt with Organics		1	SS	7								
189.0			2	SS	11								
1.8			3	SS	15								
			4	SS	18								
			5	SS	37								
	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Stiff to Hard		6	SS	88								
			7	SS	110								
			8	SS	114								
			9	SS	100	/28cm							
			10	SS	90	/28cm							
			11	SS	48								
176.6													
14.2	End of Borehole												

RECORD OF BOREHOLE No P28

1 OF 1

METRIC

W.P. 144-87-00

LOCATION Co-ords: N 4 848 609, E 300 948

ORIGINATED BY BL

DIST 5 HWY 407

BOREHOLE TYPE HS Auger, Cone Penetration Test

COMPILED BY BL

DATUM Geodetic

DATE 1993 03 25

CHECKED BY BI

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 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPa 20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
188.3	Ground Surface													
188.0	Clayey Silt with Organics		1	SS	35		188	Augered hole from 0m to 0.3m						
0.3	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Very Stiff to Hard		2	SS	36		187							
			3	SS	55		186							
			4	SS	37		185							
			5	SS	63		184							
			6	SS	50		183							
			7	SS	80		182							
			8	SS	74		181							
			9	SS	83		180							
			10	SS	40		179							
								178						
177.2														
11.1	End of Borehole													

RECORD OF BOREHOLE No P29

1 OF 1

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 848 770.5, E 300 923 ORIGINATED BY PN
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 22 CHECKED BY BI

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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES		20 40 60 80 100	20 40 60 80 100					
184.6	Ground Surface												
184.3	Clayey Silt with Organics		1	SS	58								
0.3			2	SS	22								
			3	SS	17								
			4	SS	19								
	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till)		5	SS	14								
	Stiff to Very Stiff		6	SS	23								
			7	SS	18								
			8	SS	19								
176.0													
8.6			9	SS	40								
	Heterogeneous Mixture of Silt, Sand and Gravel (Glacial Till)												
	Compact to Dense		10	SS	19								
172.0			11	SS	22								
12.6	End of Borehole												

RECORD OF BOREHOLE No P31

1 OF 1

METRIC

W.P. 144-87-00 LOCATION Co-ords: N 4 848 613, E 301 078 ORIGINATED BY BL
DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
DATUM Geodetic DATE 1993 03 22,26 CHECKED BY BI

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	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPa						
188.1	Ground Surface							20 40 60 80 100	20 40 60 80 100	10 20 30				
0.0	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Stiff to Very Stiff		1	SS	75	/15cm	188	Augered hole from 0m to 0.61m						
			2	SS	14		187							
			3	SS	22		186							
			4	SS	31		185							
			5	SS	30		184							
184.0	Heterogeneous Mixture of Silt, Sand and Gravel Occasional Boulders (Glacial Till) Very Dense		6	SS	74	/15cm	183							
4.1			7	SS	75	/15cm	182							
			8	SS	70	/15cm	181							
181.0	Heterogeneous Mixture of Clayey Silt, Sand and Gravel Occasional Boulders (Glacial Till)		9	SS	95	/25cm	180							
7.1			10	SS	96	/31cm	179							
			11	SS	85	/31cm	178							
177.6	End of Borehole • Overlap due to only .15 m of sample obtained from SS8													
10.5														



Ministry of
Transportation and
Communications
Design Division

POLE NO P32

W.P. 144-87-00A

FORMER

RECORD OF BOREHOLE No 2

METRIC

W P 99-87-01

LOCATION Co-ords. N 4 848 859.5; E 301 089.0

ORIGINATED BY KZ

DIST 6 HWY 407

BOREHOLE TYPE Solid Stem, Wash Boring-N Casing, Cone Test

COMPILED BY KZ

DATUM Geodetic

DATE 1987 10 22, 23, 26

CHECKED BY

OFFICE REPORT ON SOIL EXPLORATION

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES		20 40 60 80 100		W _p	W	W _L		
191.0	Ground Level												
0.0			1	SS	18								
			2	SS	20								
			3	SS	24								
			4	SS	18								
	Sand Layer		5	SS	92								
	Silty Clay		6	SS	117	25 cm							1 28 53 18
	Some Sand		7	SS	116								
	Occasional Gravel (Glacial Till)		8	SS	100								0 19 66 15
	Very Stiff to Hard		9	SS	102								
181.7			10	SS	34								
9.3			11	SS	23								
			12	SS	27								
	Silty Clay		13	SS	60								
	Occasional Silt and Clay Layers		14	SS	40								
	Very Stiff to Hard		15	SS	26								
			16	SS	29								
			17	SS	28								
			18	SS	37								
160.8													
30.2													

Continued

γ^3, γ^5 : Numbers refer to
Sensitivity

20
15 ϕ 5 (%) STRAIN AT FAILURE
10

Continued



Ministry of
Transportation and
Communications
Government of Ontario

POLE NO P32

W.P. 144-87-00A

FORMER

RECORD OF BOREHOLE No 2 Continued METRIC

W P 99-87-01 LOCATION Co-ords. N 4 848 859.5; E 301 089.0 ORIGINATED BY KZ
DIST 6 HWY 407 BOREHOLE TYPE Solid Stem, Wash Boring-N Casing, Cone Test COMPILED BY KZ
DATUM Geodetic DATE 1987 10 22, 23, 26 CHECKED BY

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	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI C
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100				
160.8	Continued															
30.2	Silty Clay															
159.0	Occasional Silt															
32.0	and Clay Layers															
	Very Stiff to Hard															
	Silt		19	SS	75	5 cm										0 7 (93)
	Traces of Sand															
	and Clay		20	SS	80	10 cm										
	Very Dense															
155.2			21	SS	152											0 17 (83)
35.8	End of Borehole															

OFFICE REPORT ON SOIL EXPLORATION

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

RECORD OF BOREHOLE No P33

1 OF 1

METRIC

W.P. 144-B7-00 LOCATION Co-ords: N 4 849 055.5, E 301 011.5 ORIGINATED BY BL
 DIST 6 HWY 407 BOREHOLE TYPE HS Auger, Cone Penetration Test COMPILED BY BL
 DATUM Geodetic DATE 1993 03 22 CHECKED BY BI

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	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa						WATER CONTENT (%)	
								○ UNCONFINED ● QUICK TRIAXIAL							+ FIELD VANE × LAB VANE
193.3	Ground Surface														
0.0	Clayey Silt with Organics		1	SS	12										
192.3			2	SS	17		192								
1.0	Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till) Stiff		3	SS	15		191								
			4	SS	11		190								
189.0		5	SS	24	189										
4.3	Heterogeneous Mixture of Silt, Sand and Gravel (Gravel Till) Compact to Dense	6	SS	45	188										
		7	SS	31	187										
		8	SS	40	186										
184.0															
9.3	End of Borehole														



Ministry of Natural Resources and Forestry
Canada

POLE NO P34

W.P. 144-87-00A

FORMER

RECORD OF BOREHOLE No 3

METRIC

W P 99-87-01 LOCATION Co-ords. N 4 848 826.3; E 301 117.5 ORIGINATED BY KZ
DIST 6 HWY 407 BOREHOLE TYPE Hollow Stem, Wash Boring-B Casing, Cone Test COMPILED BY KZ
DATUM Geodetic DATE 1987 10 13, 14, 19, 20, 21 CHECKED BY

OFFICE REPORT ON SOIL EXPLORATION

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			20 40 60 80 100		W _p	W	W _L		
191.0	Ground Level												
0.0			1	SS	9								
			2	SS	20								
			3	SS	24								
	Sand		4	SS	23								2 24 53 21
	Silty Clay		5	SS	56								
	Some Sand		6	SS	41								
	Occasional Gravel (Glacial Till)		7	SS	80								
	Stiff to Hard		8	SS	91								3 5 46 46
	Random Layers or Pockets of Sand		9	SS	91								
181.0			10	SS	69								0 0 28 72
10.0			11	SS	61								
			12	SS	46								
			13	SS	63								0 0 60 40
	Silty Clay		14	SS	36								
	Occasional Silt and Clay Layers		15	SS	37								
	Hard		16	SS	29								
			17	SS	40								0 0 68 32
			18	SS	52								
			19	SS	64								0 0 59 41
			20	SS	47								
			21	SS	45								
160.8													
30.2													

Continued

+3, x⁵: Numbers refer to
Sensitivity

20
15 5 (%) STRAIN AT FAILURE
10

Continued



Department of Transportation and Communications
Geotechnical Engineering

POLE NO P34

W.P. 144-87-00A

FORMER

RECORD OF BOREHOLE No 3 Continued METRIC

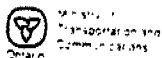
W P 99-87-01 LOCATION Co-ords. N 4 848 826.3; E 301 117.5 ORIGINATED BY KZ
DIST 6 HWY 407 BOREHOLE TYPE Hollow Stem, Wash Boring-B Casing, Cone Test COMPILED BY KZ
DATUM Geodetic DATE 1987 10 13, 14, 19, 20 CHECKED BY

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	WATER CONTENT (%) 20 40 60	UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES							
160.8	Continued											
30.2												
160.0	Silty Clay, Hard		22	SS	38		160					0 0 37 63
31.0												
	Silt		23	SS	60	8 cm						
	Traces of Sand and Clay		24	SS	120	10 cm	158					
	Very Dense											0 13 80 7
155.8			25	SS	120	10 cm	156					
35.2	End of Borehole											

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to
Sensitivity

20
15
10
5 (%) STRAIN AT FAILURE



POLE NO P34

W.P. 144-87-00A

FORMER			RECORD OF BOREHOLE No 4				METRIC					
W P 99-87-01		LOCATION Co-ords. N 4 848 777.2; E 301 102.0		ORIGINATED BY KZ								
DIST 6 HWY 407		BOREHOLE TYPE Solid Stem Auger and Cone Test		COMPILED BY KZ								
DATUM Geodetic		DATE 1987 10 28		CHECKED BY								
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	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER			TYPE	'N' VALUES					
190.5	Ground Level											
0.0												
			1	SS	26							13 23 42 22
			2	SS	18							
			3	SS	22							
	Sandy Silt		4	SS	72							3 25 57 15
			5	SS	53							
	Silty Clay		6	SS	105							4 33 47 16
	Some Sand											3 28 54 15
	Occ. Gravel (Glacial Till)		7	SS	94							
	Very Stiff to Hard		8	SS	116							
	Random Layers or Pockets of Sand		9	SS	108							
			10	SS	114							
178.0												
12.5	Silty Clay Occasional Silt and Clay Layers		11	SS	130							2 1 55 42
176.3	Hard		12	SS	36							
14.2	End of Borehole											0 0 11 89

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to Sensitivity

20
15 \div 5 (%) STRAIN AT FAILURE
10

METRIC

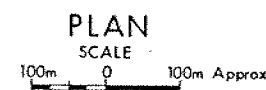
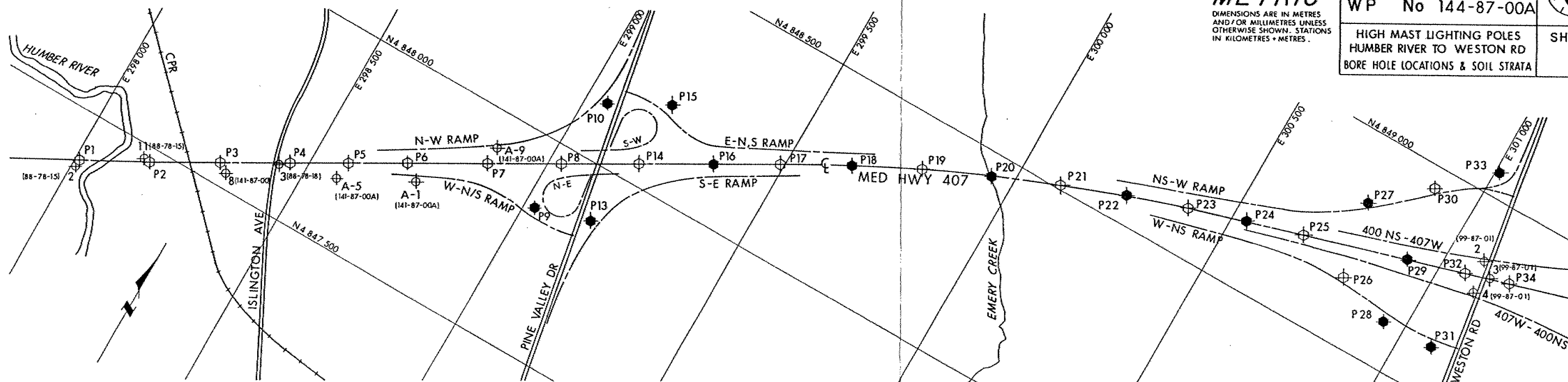
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES UNLESS
OTHERWISE SHOWN. STATIONS
IN KILOMETRES + METRES.

CONT No
WP No 144-87-00A

HIGH MAST LIGHTING POLES
HUMBER RIVER TO WESTON RD
BORE HOLE LOCATIONS & SOIL STRATA



SHEET



LEGEND

- Bore Hole
- ⊕ Bore Hole of Previous Investigations
- ⊕ Bore Hole & Cone
- N Blows/0.3m (Std Pen Test, 475 J/blow)
- CONE Blows/0.3m (60° Cone, 475 J/blow)
- W.L. at time of investigation 93 03
- ⊕ High Mast Lighting Pole
- Borehole at High Mast Lighting Pole

**BOREHOLES FROM
PREVIOUS INVESTIGATIONS**

No	ELEVATION	CO-ORDINATES NORTH	EAST
88-78-15	2	135.1	4 847 372.8
88-78-32	11	135.3	4 847 469.3
141-87-00	8	158.0	4 847 537.0
88-78-18	3	159.6	4 847 617.0
141-87-00A	A-1	160.2	4 847 751.6
	A-5	160.2	4 847 660.1
	A-9	160.1	4 847 921.0
99-87-01	2	191.0	4 848 859.5
	3	191.0	4 848 826.3
	4	190.5	4 848 777.2

Note:
For Subsoil information Refer to
Record of Borehole sheets

BORE HOLES FOR H.M.L.P.

No	ELEVATION	CO-ORDINATES NORTH	EAST
P9	165.2	4 847 848.5	299 025.5
P10	163.0	4 848 137.0	299 057.0
P13	162.5	4 847 873.5	299 161.5
P15	166.5	4 848 210.0	299 188.0
P16	166.7	4 848 142.0	299 352.5
P18	168.9	4 848 303.0	299 639.0
P20	170.6	4 848 449.0	299 944.0
P22	176.3	4 848 571.5	300 252.0
P24	180.6	4 848 658.5	300 537.0
P27	190.8	4 848 835.0	300 773.0
P28	188.3	4 848 609.0	300 948.0
P29	184.6	4 848 770.5	300 923.0
P31	188.1	4 848 613.0	301 078.0
P33	193.3	4 849 055.5	301 011.5

NOTE

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

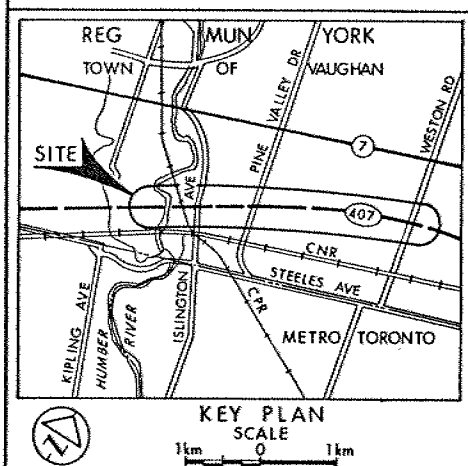
NOTE: The complete foundation investigation and design report for
this project and other related documents may be examined at the
Engineering Materials Office, Downsview. Information contained in
this report and related documents is specifically excluded in
accordance with the conditions of Section GC 2.01 of OPS Gen Cond

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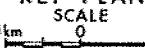
Geacres No 30M13-130

HWY No 407	SUBM'D BL	CHECKED	DATE 1993 04 13	DIST 6
DRAWN DT	CHECKED	APPROVED		SITE
				DWG 1448700A-A

REF PLAN from TOTTEN SIMS HUBICKI Associates



KEY PLAN
SCALE



METRIC

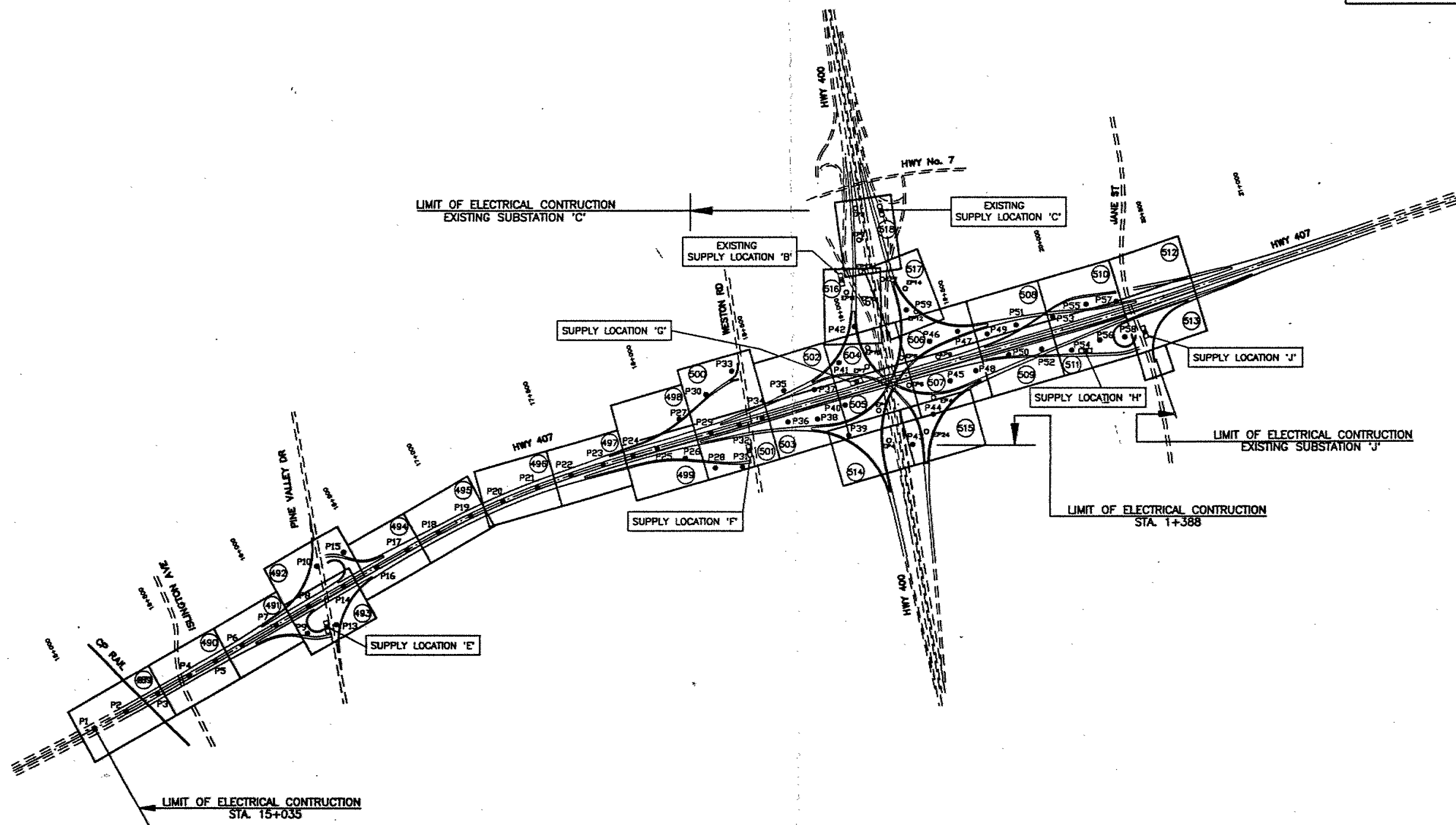
PLATE No
CONT No
WP No 146-87-01



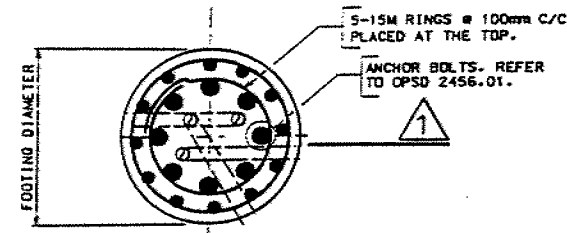
ELECTRICAL LAYOUT-PART B
KEY PLAN & SHEET INDEX

SHEET
512

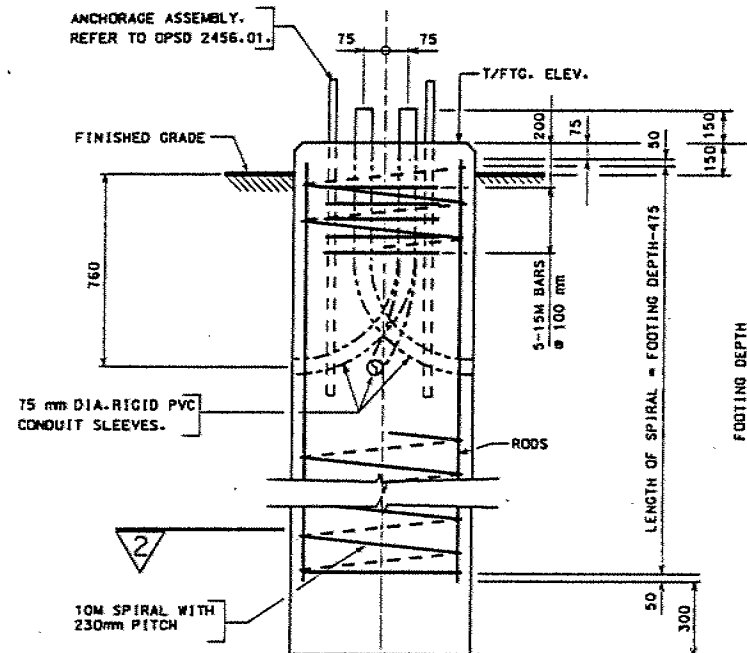
FENCO MacLAREN



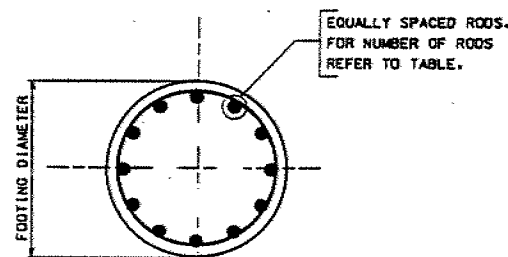
SCALE
0 500m



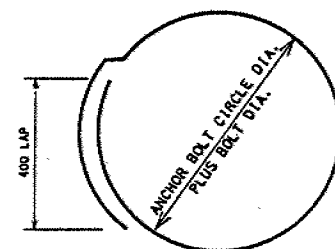
TOP VIEW
N.T.S.



SECTION 1
N.T.S.



SECTION 2
N.T.S.



DETAIL OF 15M RINGS
PLACED AT THE TOP.
N.T.S.



FOOTING DATA

POLE No.	POLE LENGTH (m)	FOOTING DIA. (m)	FOOTING DEPTH (m)	REINF. BARS "A"			SPIRAL		No. OF BOLTS	TOTAL MASS OF STEEL (+)	VOLUME OF CONCRETE (m³)	T/FTG ELEVATION
				LENGTH (m)	SIZE (M)	No. REQ'D	HEIGHT (m)	DIA. (m)				
P1	35	1.37	9.000	8.625	30	12	8.525	1.210	8	0.72	13.27	142.20
P2	35	1.37	10.000	9.625	30	12	9.525	1.210	8	0.79	14.74	142.78
P3	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	145.39
P4	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	150.42
P5	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	153.45
P6	40	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	154.90
P7	40	1.52	11.500	11.125	30	14	11.025	1.360	8	1.06	20.87	156.10
P8	40	1.52	12.000	11.625	30	14	11.525	1.360	8	1.10	21.78	157.25
P9	40	1.52	11.000	10.625	30	14	10.525	1.360	8	1.01	19.96	161.20
P10	40	1.52	10.000	9.625	30	14	9.525	1.360	8	0.92	18.15	164.10
P13	40	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	163.20
P14	40	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	159.55
P15	40	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	166.05
P16	40	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	162.65
P17	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	165.45
P18	35	1.37	9.000	8.625	30	12	8.525	1.210	8	0.72	13.27	168.47
P19	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	170.86
P20	35	1.37	9.000	8.625	30	12	8.525	1.210	8	0.72	13.27	172.71
P21	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	174.1
P22	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	176.10
P23	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	177.41
P24	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	179.85
P25	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	179.45
P26	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	185.40
P27	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	187.48
P28	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	188.20
P29	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	183.00
P30	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	191.20

METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

PART A
CONT No 94-37
WP No 144-87-01

SHEET
328

- NOTES:
1. REINFORCING STEEL SHALL BE GRADE 400.
 2. BAR MARKS WITH SUFFIX "C" DENOTE COATED BARS.
 3. EACH ANCHORAGE ASSEMBLY SHALL BE PROVIDED WITH A WOODEN TEMPLATE.
 4. ANCHOR RODS ARE ROUND BAR, QUENCHED AND TEMPERED MEDIUM CARBON STEEL WITH MIN. YIELD OF 517 MPa. (MIN TENSILE STRENGTH OF 725 MPa.) AND SHALL SATISFY CHARTER V-NOTCH REQUIREMENTS OF 20 JOULES AT MINUS 30° C.
 5. ANCHOR BOLTS SHALL BE INSTALLED VERTICALLY. NO ADJUSTMENTS SHALL BE ALLOWED AFTER CONCRETE IS PLACED IN FOOTING.
 6. CLASS OF CONCRETE SHALL BE 30 MPa.
 7. FOR FINISHED GRADE ELEV., REFER TO GRADING DRAWINGS.
 8. CLEAR COVER TO REINFORCING STEEL SHALL BE 80 ± 20 mm.

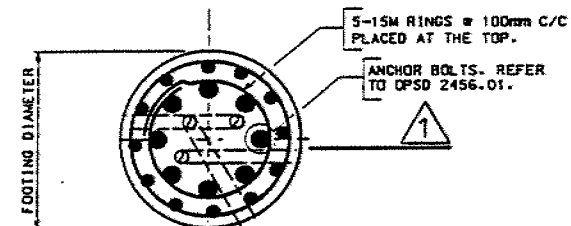
APPLICABLE OPSO DRAWINGS
OPSO 2456.01

QUANTITIES:

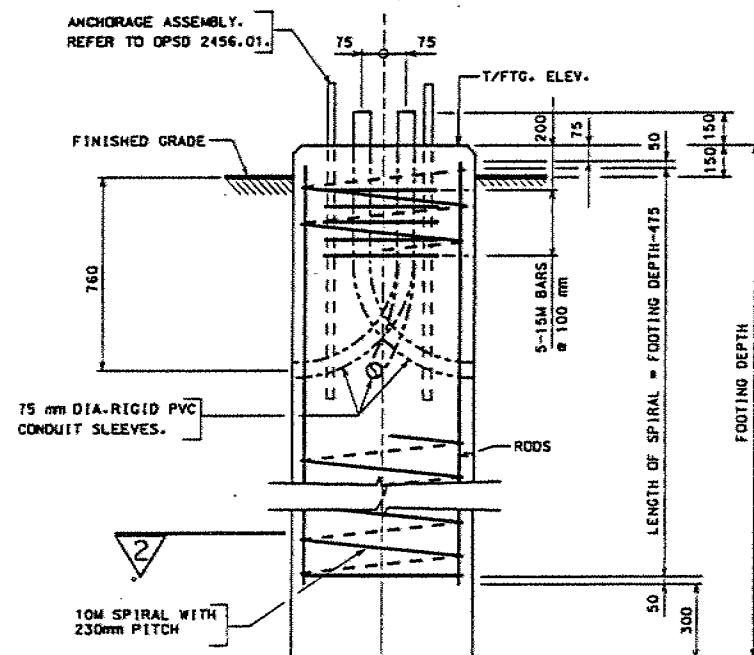
TOTAL MASS OF REINF. STEEL = 20.79 (tonne)
TOTAL VOLUME OF CONCRETE = 393.81 (m³)

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

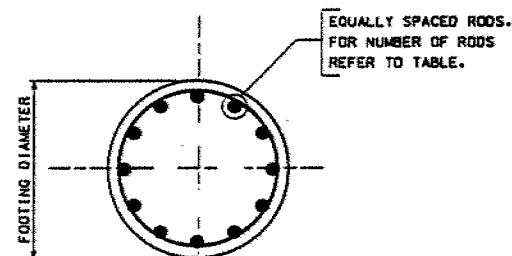
REVISIONS	DESCRIPTION	DATE	JUN. '93
DESIGN J.M. CHK	CODE QHBC 93 LOAD	DATE	JUN. '93
DRAWN G.Y. CHK J.M. SITE	STRUCT	SCHEME	DWG 1



TOP VIEW
N.T.S.



SECTION 1
N.T.S.



SECTION 2
N.T.S.

FOOTING DATA

POLE NO.	POLE LENGTH (m)	FOOTING DIA. (m)	FOOTING DEPTH (m)	REINF. BARS "A"			SPIRAL		NO. OF BOLTS	TOTAL MASS OF STEEL (t)	VOLUME OF CONCRETE (m³)	T/FTG ELEVATION
				LENGTH (m)	SIZE (M)	NO. REQ'D	HEIGHT (m)	DIA. (m)				
P31	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	188.00
P32	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	184.40
P33	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	192.40
P34	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	185.8
P35	35	1.37	9.500	9.125	30	12	9.025	1.210	8	0.75	14.00	193.56
P36	35	1.37	9.000	8.625	30	12	8.525	1.210	8	0.72	13.27	190.44
P37	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	194.40
P38	35	1.37	9.000	8.625	30	12	8.525	1.210	8	0.72	13.27	193.79
P39	35	1.37	10.000	9.625	30	12	9.525	1.210	8	0.79	14.14	193.90
P40	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	193.82
P41	35	1.37	10.000	9.625	30	12	9.525	1.210	8	0.79	14.14	199.25
P42	40	1.52	13.500	13.125	30	14	13.025	1.360	8	1.24	24.50	201.80
P43	45	1.52	10.000	9.625	30	14	9.525	1.360	8	0.92	18.15	193.00
P44	45	1.52	12.000	11.625	30	14	11.525	1.360	8	1.10	21.78	200.00
P45	45	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	191.58
P46	45	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	190.70
P47	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	190.80
P48	45	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	189.67
P49	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	192.30
P50	45	1.52	9.300	9.125	30	14	9.025	1.360	8	0.87	17.24	191.50
P51	35	1.37	8.500	8.125	30	12	8.025	1.210	8	0.68	12.53	194.20
P52	35	1.37	9.000	8.625	30	12	8.525	1.210	8	0.72	13.27	19400
P53	40	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	194.70
P54	40	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	192.81
P55	45	1.52	9.000	8.625	30	14	8.525	1.360	8	0.83	16.33	195.50
P56	35	1.37	9.000	8.625	30	12	8.525	1.210	8	0.72	13.27	193.60
P57	35	1.37	8.000	7.625	30	12	7.525	1.210	8	0.64	11.79	195.40
P58	35	1.37	9.500	9.125	30	12	9.025	1.210	8	0.75	14.00	197.00
P59	35	1.37	8.500	8.125	30	12	8.025	1.210	8	0.68	12.53	192.75
P60	35	1.37	8.500	8.125	30	12	8.025	1.210	8	0.68	12.53	197.5
P61	35	1.37	8.500	8.125	30	12	8.025	1.210	8	0.68	12.53	197.7
P62	35	1.37	8.500	8.125	30	12	8.025	1.210	8	0.68	12.53	195.5



DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

PART A
CONT No 94-37
WP No 144-87-01

SHEET
329

HIGH MAST LIGHTING
POLE FOOTINGS

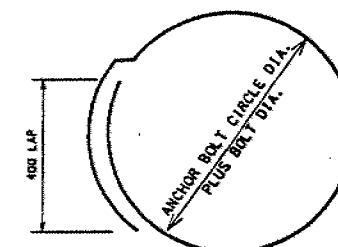
NOTES:

1. REINFORCING STEEL SHALL BE GRADE 400.
2. BAR MARKS WITH SUFFIX "C" DENOTE COATED BARS.
3. EACH ANCHORAGE ASSEMBLY SHALL BE PROVIDED WITH A WOODEN TEMPLATE.
4. ANCHOR RODS ARE ROUND BAR, QUENCHED AND TEMPERED MEDIUM CARBON STEEL WITH MIN. YIELD OF 517 MPa. (MIN TENSILE STRENGTH OF 725 MPa.) AND SHALL SATISFY CHARPY V-NOTCH REQUIREMENTS OF 20 JOULES AT MINUS 30° C.
5. ANCHOR BOLTS SHALL BE INSTALLED VERTICALLY. NO ADJUSTMENTS SHALL BE ALLOWED AFTER CONCRETE IS PLACED IN FOOTING.
6. CLASS OF CONCRETE SHALL BE 30 MPa.
7. FOR FINISHED GRADE ELEV., REFER TO GRADING DRAWINGS.
8. CLEAR COVER TO REINFORCING STEEL SHALL BE 80 ± 20 mm.

APPLICABLE OPSD DRAWINGS
OPSD 2456.01.

QUANTITIES:

TOTAL MASS OF REINF. STEEL = 23.02 (tonne)
TOTAL VOLUME OF CONCRETE = 437.71 (m³)



DETAIL OF 15M RINGS
PLACED AT THE TOP.
N.T.S.

REVISIONS	DESCRIPTION	DATE
DESIGN J.M. CHK	CODE QHDC 83 LOAD	DATE JUN. '93
DRAWN G.Y. CHK J.M. SITE	STRUCT SCHEME	DWG 2

MEMORANDUM

23-68-26.
W.P. 699-64.

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Division.

Attention: Mr. S. McCombie

FROM: Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

DATE: February 1, 1966

OUR FILE REF.

IN REPLY TO **FEB 15 1966**

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Proposed Finch Avenue Overpass at
Hwy. #400, Township of North York,
Co. of York, District #6 (Toronto).
W.J. 65-F-130 -- W.P. 699-64

Attached, we are forwarding to you, our detailed foundation investigation report on the subsoil conditions existing at the above structure site.

We believe that you will find the factual data and recommendations contained therein, adequate for your design requirements.

Should additional information be required, please feel free to contact our Office.

AGS/MdeP
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
J. C. Thatcher
T. J. Kovich
A. Watt

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

Foundations Office
Gen. Files

FOUNDATION INVESTIGATION REPORT
For
Proposed Finch Avenue Overpass at
Hwy. #400, Township of North York,
Co. of York, District #6 (Toronto).
W.F. 65-F-130 -- W.F. 699-64

A request to carry out a foundation investigation at the crossing of Hwy. #400 and Finch Avenue, was received from the Bridge Location Section, in a memo dated December 6, 1965. At this location the existing overpass will be demolished and replaced by a wider and longer structure which will accommodate future 4-lane traffic on Finch Avenue. Subsequently, an investigation consisting of five sampled boreholes, supplemented by dynamic cone penetration tests, was carried out by the Foundation Section.

Presented in this report are the results of this investigation, together with our recommendations for the foundation design of the proposed structure and approaches.

The natural ground surface at the site is level to very gently undulating. An existing interchange at the site has earthfill embankments built up to about 8 ft. above natural ground level. According to available geological information, the site is underlain by a glacio-fluvial deposit containing minor amounts of modified till.

The significant stratum at the site is a deep deposit of brown to grey clayey silt to silty clay with some sand and occasional traces of gravel, which was encountered in all the borings carried out at the above-mentioned interchange. This deposit was proved for a maximum depth of 30 ft. below natural ground. The lower portion

of the deposit contained some silt textured inclusions of maximum thickness less than about 1/2 inch. Grain size distribution curves obtained from typical samples, are included in the Appendix of this report. Standard penetration values ranged from 10 blows/ft. to 100 blows/3", generally increasing with depth. From these values, it is estimated that the consistency of the deposit is stiff to hard.

Physical properties of this material as determined from laboratory tests, are summarized as follows:

Natural Moisture Content (W %)	:	11% - 32%
Liquid Limit (W _L %)	:	23% - 47%
Plastic Limit (W _P %)	:	14% - 22%

Observations carried out during the time of the field investigation, indicated the water level in the boreholes was approximately between elev. 546 and elev. 540.

Discussion & Recommendations:

It is proposed to construct a new interchange at the crossing of Finch Avenue and Hwy. #400. At present, a four-span (50'-62'-50') structure having a total width of 252 ft. is contemplated. The new structure will replace the existing overpass at this location.

The subsoil consists mainly of stiff to hard clayey silt to silty clay with sand and occasional gravel (glacial till). In view of this, it is considered that the most satisfactory method of supporting the structure would be on spread footing foundations.

cont'd. /3

Specific recommendations pertaining to the footing elevations are as follows:

South Abutment	elev. 554.0 or below.
Piers	elev. 540.0 or below.
North Abutment	elev. 558.0 or below.

A safe bearing capacity of 3 t.s.f. may be assumed for design purposes. Care should be taken to prevent softening of the foundation material by surface water during construction.

No major dewatering problems can be anticipated during construction of the structure footings in view of the relatively impermeable nature of the subsoil.

Stability problems are not anticipated for the proposed approach cuts and embankments of the future interchange, provided standard 2:1 slopes are adopted.

The field work, performed during the period December 20 to 22, 1965, was undertaken by Mr. V. Korlu, Project Foundation Engineer. The investigation was carried out under the general supervision of Mr. M. Devata, Senior Foundation Engineer, who also prepared this report.

Equipment used was owned and operated by Johnston Drilling Co. Ltd.

February 1966

APPENDIX I

CHECKED BY M.D.

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 65-F-130

LOCATION 123' Lt. Sta. 142/66 (Rev. C)

ORIGINATED BY V.K.

W. P. 699-64

BORING DATE Dec. 21, 1965.

COMPILED BY R.M.

DATUM

BOREHOLE TYPE Penndrill & Cone Penetration

CHECKED BY _____ M.D.

FOUNDATION SECTION

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 65-F-130

LOCATION 125' Rt. Sta. 143/58 (Rev. E)

ORIGINATED BY V.K.

W. P. 699-64

BORING DATE Dec. 20, 1965.

COMPILED BY _____ R.M.

DATUM

BOREHOLE TYPE Penndrill & Cone Penetration

CHECKED BY _____ M.D.

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 65-F-130

LOCATION 125' Lt. Sta. 143490 (Rev. E)

W. P. 699-64

BORING DATE Dec. 20, 1965.

DATUM

BOREHOLE TYPE Penndrill & Cone Penetration.

FOUNDATION SECTION

ORIGINATED BY V.K.

COMPILED BY R.M.

CHECKED BY _____ M.D.

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 5

FOUNDATION SECTION

JOB 65-F-130

LOCATION 123' Rt. Sta. 144/77 (Rev. C)

ORIGINATED BY V.K.

W. P. 699-64

BORING DATE Dec. 21, 1965.

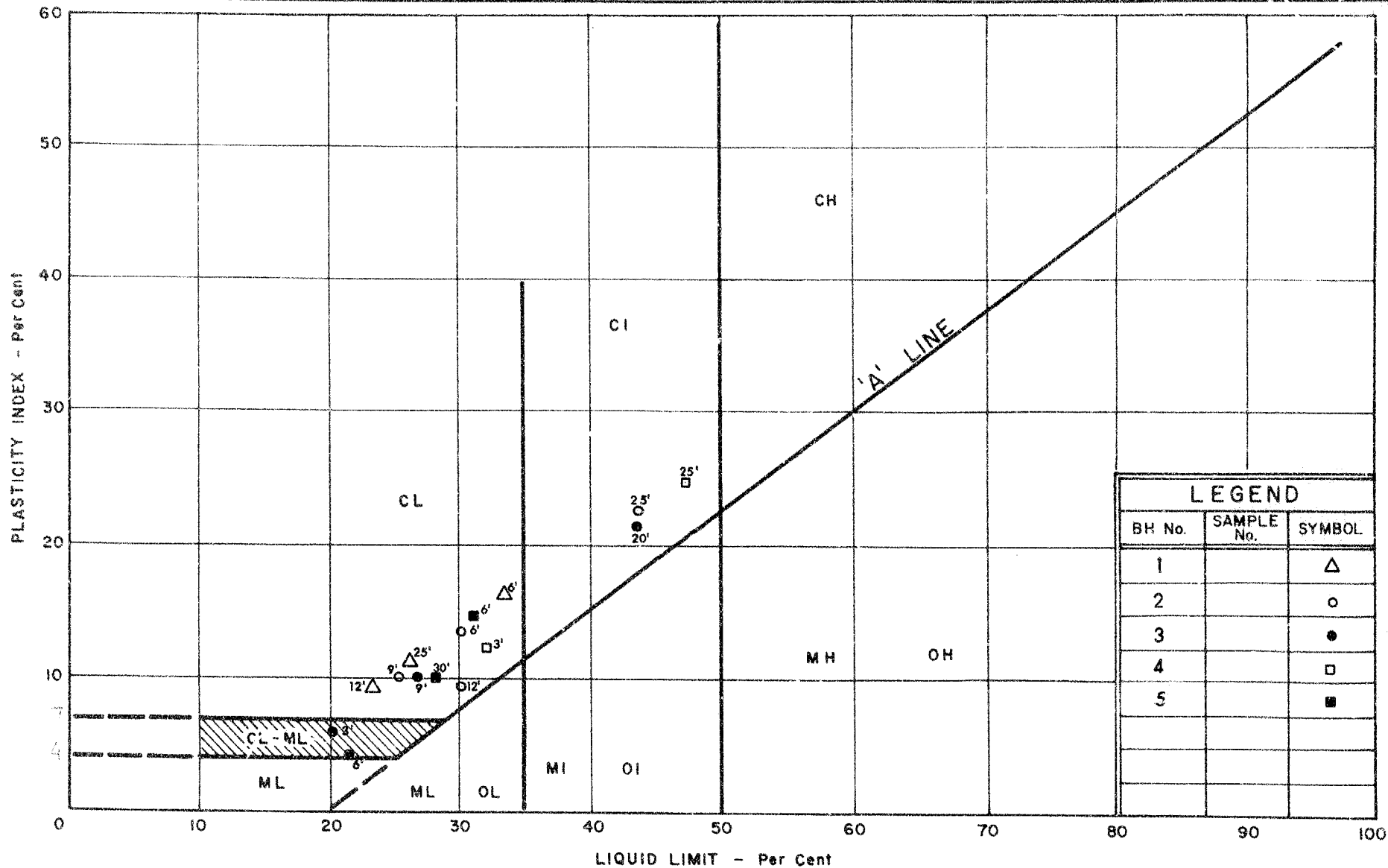
COMPILED BY _____ R.M.

DATUM

BOREHOLE TYPE Penndrill & Cone Penetration.

CHECKED BY M.D. *AK*

[illegible]



LEGEND		
BH No.	SAMPLE No.	SYMBOL
1		△
2		○
3		●
4		□
5		■



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

W.P. No. 699-64

JOB No. 65-F-130

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS :-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_P	PLASTIC LIMIT
I_P	PLASTICITY INDEX
s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX = $\frac{w - w_P}{I_P}$
I_C	CONSISTENCY INDEX = $\frac{w_L - w}{I_P}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
C_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX = $\frac{\Delta e}{\Delta \log_{10} \sigma'}$
T_v	TIME FACTOR = $\frac{C_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL

Telephone: 248-3446

Mr. T. Edvian,
Reg. Materials Engineer,
Lab Building,

J.H. Blevins,
Toronto Regional Road Design.

February 22, 1966.

Re: W.P. 699-64, Highway 400 - Finch Avenue Interchange,
Foundation Report No. WJ 65-F-130.

This is to acknowledge receipt of the Foundation Report for the proposed structure at the above interchange. On reviewing the report, it is noted that the highest ground water encountered was in bore hole No. 4 at elevation 540'. During the recent construction of the existing interchange, we believe that free water was found in the north ditch line east of the structure and that the material adjacent to the north footing was found to be saturated when the sewers were installed. We are not sure as to the source of the water in that there is a Township watermain located within the roadbed and there may be a leak, however, this appears to be discounted as there is also a considerable discharge through the weeper tiles in the north abutment.

In any event, it would be very much appreciated if you would give this matter your consideration when the Soils investigation is conducted for the project.

J.H. Blevins
Sr. Expressway Design Engineer
For:
G.K. Hunter
Regional Road Design Engineer

JHB/UB

c.c. G.A. Metcalfe
A. Sternack

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac, Principal Foundation Engineer,
Room 107, Lab. Building

Mr. W. Melnychyn,
Reg. Bridge Location Engineer,
Central Region,
Administration Building

Bridge Division,
Downsview, Ontario

June 15, 1967

Finch Avenue Overpass
W.P. 699-64, Site No. 37-199
Highway 400, District No. 6

Attached herewith are prints of the Preliminary Bridge
Plan Drawing D-5899-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$385,000.
This cost includes tender, materials, engineering and sundry
construction.

Any comments or revisions you may have should be submitted
within three weeks.

CSG:rd

C.S. Grebski,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac
R. Forrest
E. Cross

alp

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

June 19, 1967

Finch Avenue Overpass,
W.P. 699-64, Site No. 37-199, W.J. 65-F-130,
Hwy. 400, District #6 (Toronto).

We have reviewed the Preliminary Bridge Plan
Drawing D 5899-P1 for the above mentioned structure, and
submit the following comments:

It appears that 3:1 forward slopes have been adopted
near the abutments and, from the stability point of view, 2:1
slopes will be quite adequate. We presume that you have some
other reasons for adopting 3:1 slopes in the forward direction.

MD/MdeF

M. Devata

M. Devata,
SUPERVISING FOUNDATION ENGR.

For:

A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie
W. S. Melinyshyn

Foundations Files ✓
General Files

Hwy. 401 & Keele St.,
Downsview, Ontario.

Tel. 248-3282
(Area Code 416)

Materials and Testing Division

August 21, 1967

Wyllie & Ufnal Limited,
Consulting Engineers,
1 Greensboro Drive,
Rexdale, Ontario.

Attention: Mr. K. N. Smith, P.Eng.

Gentlemen:

Re: Finch Avenue Overpass -- W.P. 699-64
Our Report BA 2264

With respect to your letter of August 17, 1967,
regarding the above structure, we wish to make the following
comments:

The shown change of footing elevations has no influence
on our original recommendation regarding the bearing capacity
of the soil. A safe load of 3.0 T/sq.ft. can be used.

For the check against sliding, a coefficient of friction
of 0.6 or, alternatively, a cohesion value of 3,000 lb./sq.ft.
can be used.

Should you have any other queries regarding the founda-
tions of this structure, please feel free to contact this Office.

Yours very truly,

AGS/WdeF


A. G. Stermac
Principal Foundation Engineer

cc: Mr. M. Gvildys
Foundations Files ✓
Gen. Files

WYLLIE & UFNAL LIMITED
CONSULTING ENGINEERS

Successors to Laughlin, Wyllie & Ufnal

J. F. WYLLIE, B.E., P.Eng., M.E.I.C., President
C. S. UFNAL, B.A.Sc., P.Eng., M.E.I.C., Vice-President & Sec.-Treas.

1 Greensboro Drive
Rexdale, Ontario
Telephone: 248-6105

1305 Richmond Road
Ottawa 14, Ontario
Telephone: 829-1372

August 17, 1967.

Department of Highways, Ontario,
Downsview, Ontario.

Attention: Mr. Tony Stermac

Gentlemen:

Re: Finch Avenue Overpass - WP 699-64
Your Report BA 2264

We are enclosing herewith the following drawings showing the abutment footings for the above project:

D 5899 - 1
D 5899 - 4
D 5899 - 5
D 5899 - 6

The structure configuration has been changed since your foundation investigation report was published and would you therefore verify that the footing elevations shown on the enclosed drawings are suitable for an allowable bearing pressure of three tons per square foot.

In addition would you please provide us with a cohesion value or a coefficient of friction to be used in designing against sliding of the footing on the soil.

Yours very truly,

WYLLIE & UFNAL LIMITED


K. N. Smith
K. N. Smith, P.Eng.

KNS/ot
encl.

c.c. Mr. M. Gvildys.

August 17, 1967.

Department of Highways, Ontario,
Downsview, Ontario.

Attention: Mr. Tony Stermac

Gentlemen:

Re: Finch Avenue Overpass - WP 699-64
Your Report BA-2264

We are enclosing herewith the following drawings showing the abutment footings for the above project:

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D 5899 - 5
D 5899 - 6

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In addition would you please provide us with a cohesion value or a coefficient of friction to be used in designing against sliding of the footing on the soil.

Yours very truly,

WYLLIE & UFNAL LIMITED

K.N.S.

K. N. Smith, P. Eng.

KNS/ot
encl.

c.c. Mr. M. Gvildys.

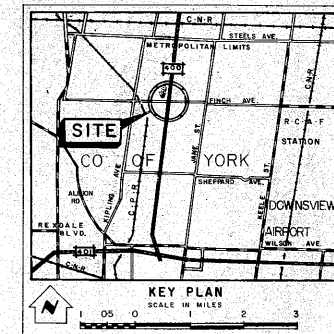
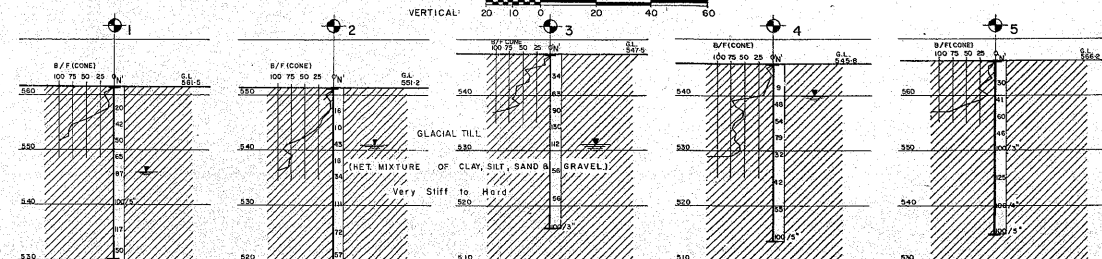
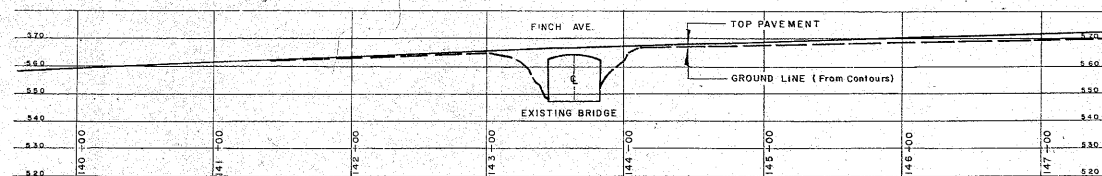
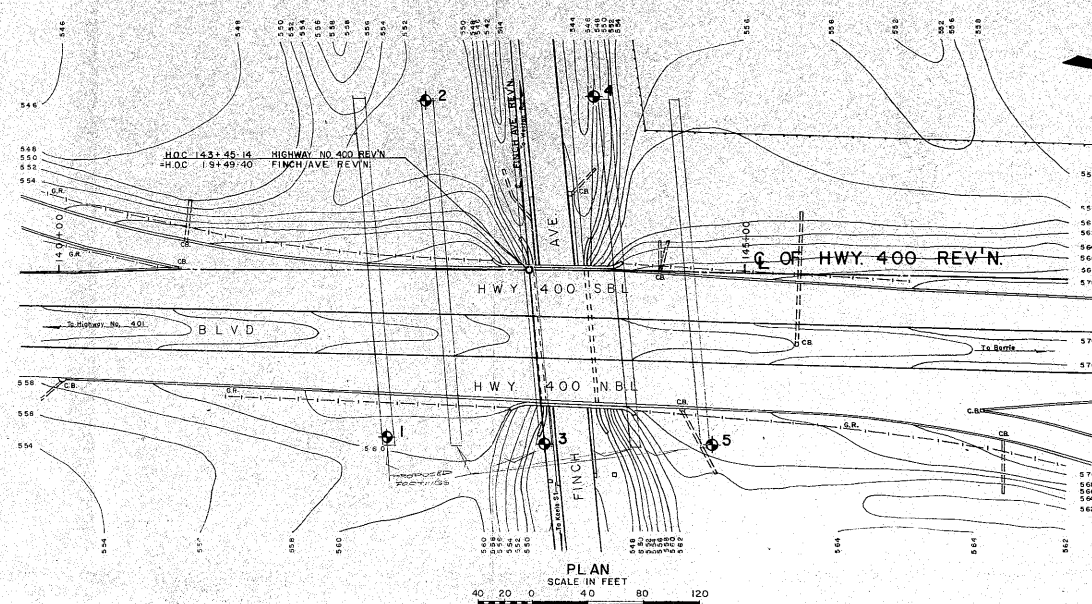
65-F-130

W.P. # 699-64

Hwy # 400

FINCH AVE.

OVERPASS



- LEGEND**
- Bore Hole
 - ⊕ Cone Penetration Hole
 - ⊕ Bore & Cone Penetration Hole
 - Water Levels established at time of field investigation. 22 DEC 1965

NO.	ELEVATION	STATION	OFFSET
1	561.5	142+41	12.0' RT
2	551.2	142+66	12.3' LT
3	547.5	143+58	12.5' RT
4	545.8	143+90	12.5' LT
5	566.2	144+77	12.3' RT

NOTE
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

REVISIONS	DATE	BY	DESCRIPTION

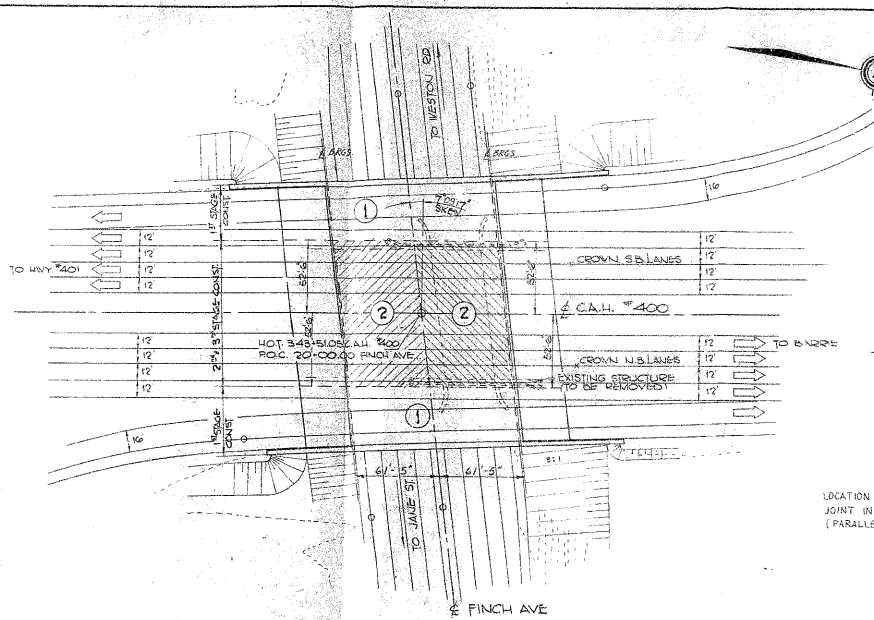
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

FINCH AVE

KING'S HIGHWAY NO. 400 PROP REVN DIST NO. 6
CO. OF YORK METROPOLITAN TORONTO
TWP. OF NORTH YORK LOTS 20 & 21 CON. V

BORE HOLE LOCATIONS & SOIL STRATA

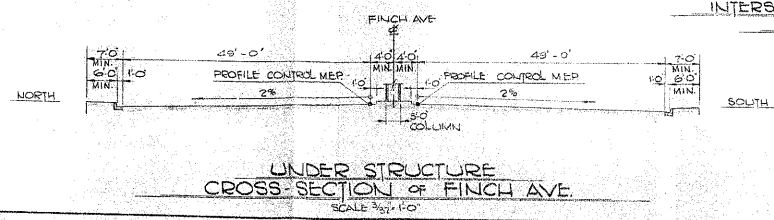
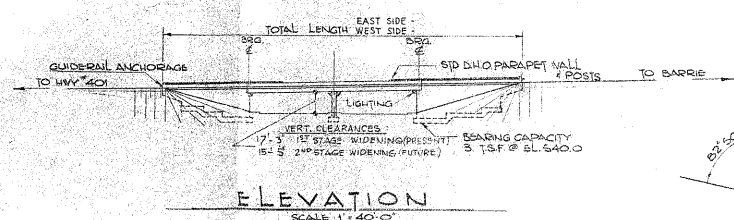
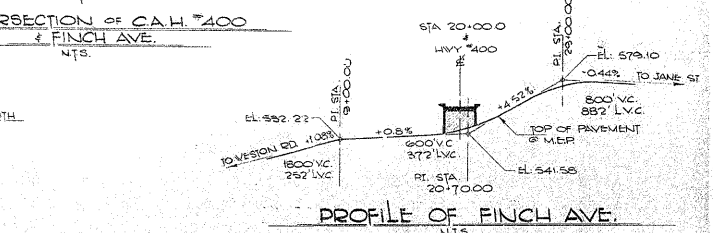
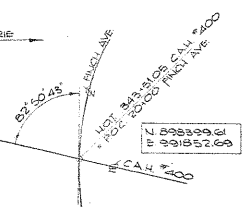
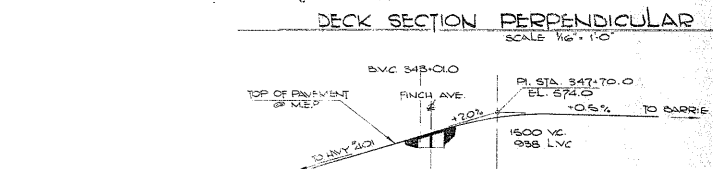
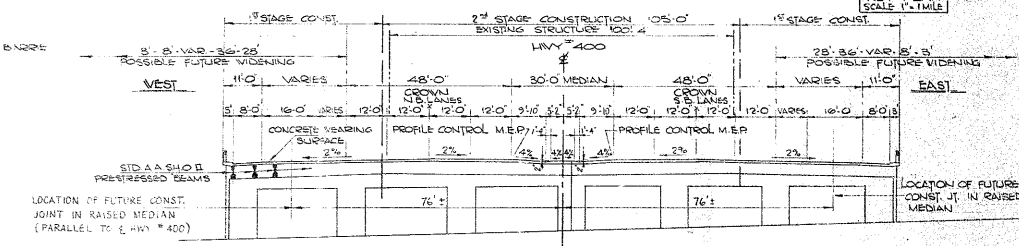
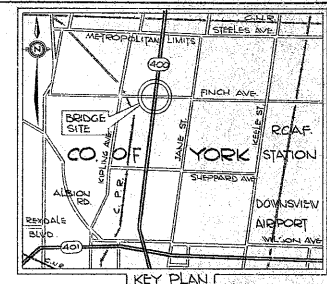
SUBMIT V.R. CHECKED: M.P.R. 6-9-64 M.B.T. DRAWING NO. 65-F-130 A
DRAWN J.N. CHECKED: JOB NO. 65-F-130 BRIDGE DRAWING NO.
DATE - FEB. 1, 1966 SITE NO.
APPROVED: [Signature] CONT. NO.



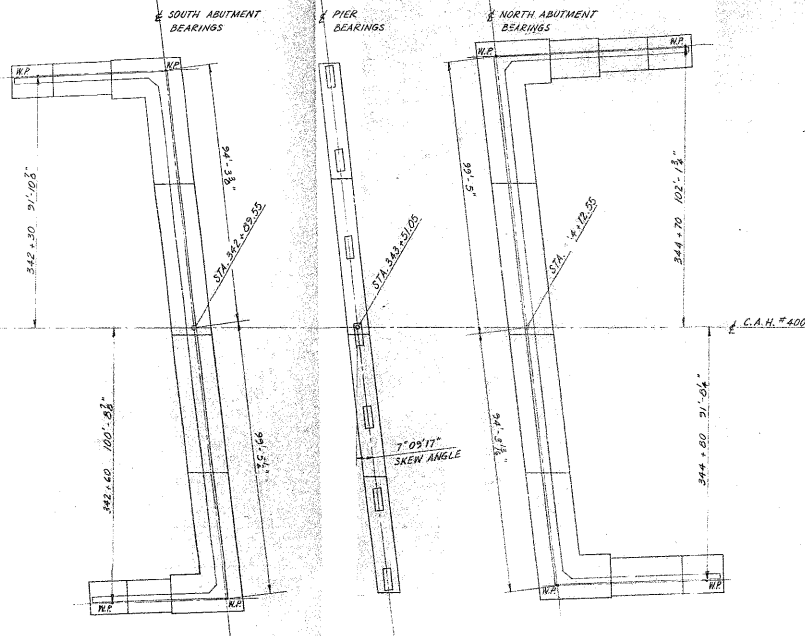
SKREW ANGLE - 7° 08' 17"
 SAL 12452932
 COS 99.922134
 TAN 1255267

RECOMMENDED SEQUENCE OF CONSTRUCTION

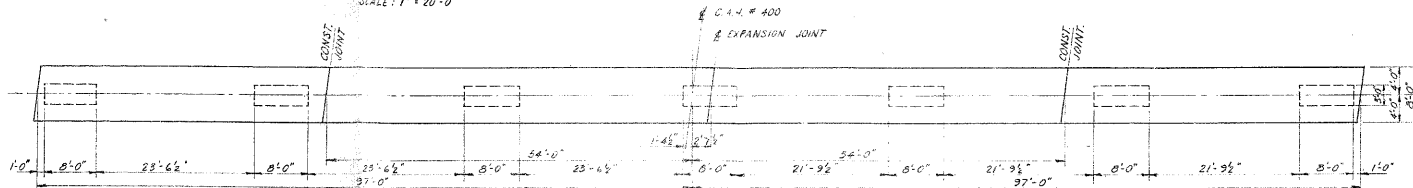
1. DRIVE TEMPORARY SHEETING TO PROTECT TRAFFIC
2. REMOVE RETAINING WALLS, & PART OF VINOWALLS
3. PROCEED WITH 1ST STAGE CONSTRUCTION (ERECTOR OF BEAMS OVER FINCH AVE. TO BE RESTRICTED TO OFF PEAK HOURS)
4. DIVERT TRAFFIC ON HWY. 400 OVER NEW OUTER STRUCTURES.
5. BUILD SOUTH CENTRAL PORTION (2ND STAGE)
6. DIVERT TRAFFIC ON FINCH AVE. UNDER SOUTH SPAN OF COMPLETED STRUCTURE.
7. REMOVE REMAINDER OF EXISTING STRUCTURE
8. COMPLETE NORTH CENTRAL PORTION



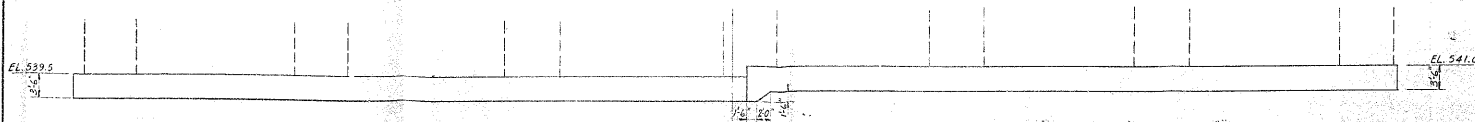
REVISIONS	
DATE	DESCRIPTION
DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION WYLLIE & UPFAL LIMITED CONSULTING ENGINEERS TORONTO	
FINCH AVE. OVERPASS KING'S HIGHWAY No. 400 CO. YORK BOROUGH OF YORK DIST. No. 6 METROPOLITAN TORONTO LOT 20121 CON. Y	
GENERAL LAYOUT APPROVED: [Signature] DATE: 31-1-99 DESIGN: A.R. CHECK: A.R. DRAWING: G.C.T. ROADWAY: No. 1 DATE: MAY 67 LOADING: HS20-44 D-5899-1	



FOUNDATION LAYOUT
SCALE: 1" = 20'-0"



PLAN - PIER FOOTING
SCALE: 1" = 8'-0"



ELEVATION - PIER FOOTING
SCALE: 1" = 6'-0"

RECORD
DATE

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

WYLLIE & WYLLIE LIMITED
CONSULTING ENGINEERS TORONTO

FINCH AVE. OVERPASS

KING'S HIGHWAY No. 400 DIST. No. 6
CO. YORK METROPOLITAN TORONTO
BOROUGH OF YORK LOT 20 & 21 CON. 5

FOUNDATIONS - GENERAL LAYOUT & PIER FOOTING

APPROVED	DESIGN	CHECK	CONTRACT	NO.
DATE	SEPT '67	LOADING	NO. 20-41	

D-5899-4

