

*Check # 51*

Mr. A. M. Tove,  
Bridge Engineer,  
Materials & Research Section.

September 22, 1960.

D.H.O. FOUNDATION INVESTIGATION

M.J. 60-F-78 -- W.P. 39-61.

Attention: Mr. R. McCombie.

Re: Field Investigation for the Proposed Dyke  
at Cootes Paradise, Hamilton, Ontario.

Accompanying this memo, is our report on the  
subsoil conditions existing at the above site.

We believe that the conclusions and recommendations  
contained in this report are self-explanatory and should  
prove adequate for your future design work.

If we can be of further assistance with regard to  
this project, please feel free to contact our Office.

AB/MSF

Attach.

L. G. Pedersen,  
PRINCIPAL FOUNDATIONS ENGR.,  
Per:

cc: Messrs. A. M. Tove (2)  
D. A. Tregaskes  
D. C. Pansay  
I. C. Campbell  
H. E. Richardson

T. J. Kovich

A. Watt

C. C. Parker & Assoc. (b)

Foundations Office  
Gen. Files.

*Astermacy*  
(L. G. Pedersen,  
FOUNDATIONS (OFFICE ENGR.))

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## FOUNDATION INVESTIGATION

For

Field Investigation for the Proposed Dyke  
at Cootes Paradise, Hamilton, Ontario.

W.J.60-F-78 -- W.P.39-61

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### 1. INTRODUCTION:

At the location shown on the accompanying Plan, Drawing # 60-F-78A, it is proposed to construct a dyke, the purpose of which is to retain garbage material which is to be dumped in the South East Corner of Cootes Paradise. In order to determine the most suitable method of constructing this dyke, a field investigation was carried out by this office. A total of two borings, six penetration tests and two soundings was carried out. The locations and elevations of these are shown on Drawing # 60-F-78A. All elevations are relative to the water level which remained fairly constant during the period of the investigation September 1st - 13th, 1960. Water level was assumed to be at El. 245.0.

### 2. SOIL TYPES AND CONDITIONS:

The proposed dyke is about 1150' in length. At present all but 200' in the middle of the proposed alignment is covered by water varying in depth from 6" to 4.0'. Subsoil in this area consists of a soft organic clay silt, which varies in depth from seven to sixteen feet, containing varying amounts of silt and

Cont'd. /2....

2. SOIL TYPES AND CONDITIONS: (Cont'd.)....

fine sand and in some locations, fine gravel. This material is underlain by sand, which is loose at the surface but its density increases with depth and in general at twenty feet below waterlevel, the material can be classified as very dense.

3. DISCUSSION AND RECOMMENDATIONS:

The soft organic clay silt which is present along the line of the proposed dyke has a shear strength which is far too low to support the proposed dyke. In view of this fact it is suggested that the dyke be constructed of rock fill which would displace this soft material during construction. This can be achieved by end dumping of the fill. In order to attain maximum displacement it is suggested that the fill be advanced with a centre V front.

It is estimated than an average depth of ten to twelve feet of the soft material would be displaced if the above procedure is followed. In those locations where the soft organic material has a high sand content it is very difficult to estimate how much would be displaced, and it is therefore possible that in places less material will be displaced than mentioned above. At the East end of the proposed dyke the soft organic material has a high silt or fine sand content for a distance of about three hundred feet. It is to this section that the latter comments are particularly applicable.

4. SUMMARY:

It is recommended that the dyke be constructed of rock fill which should be end dumped into the soft organic clay silt. Construction should be carried out from either end, advancing the fill with a centre V front. It is estimated that an aver-

4. SUMMARY: (Cont'd.)....

age of ten to twelve feet of the soft material will be displaced.

5. MISCELLANEOUS:

This investigation was carried out during the period September 1st - 13th, 1960 under the supervision of Mr. K. Selby of this section. Equipment used was owned and operated by the Department of Highways.

September 1960.

REPORT PREPARED BY

*M. Devata*.....

for K. G. Selby  
Project Foundation Engr.

REPORT APPROVED BY

*T. Stermac*.....

T. Stermac  
Foundations Office Engr.

APPENDIX I.

# SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-78

W.P. 39-61

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOWS/FT.	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
1	T1	0'-1.5'	Very soft organic clay silt	P	-	-	-	-	-	
	VANE	3'		-	-	-	-	60	-	Sens: 3.0
	T2	3'-4.5'	"	P	-	-	-	-	-	
	VANE	4.5'		-	-	-	-	100	-	Sens: 10.0
	S3	6'-7.5'	Very soft organic clay silt cont. about 50% sand and fine gravel	P	-	-	-	-	-	
	T4	9'-11'	Loose well graded sand with fine gravel	P	-	-	-	-	-	
	S5	12'-13.5'	"	10	-	-	-	-	-	
	S6	15'-16.5'	"	8	-	-	-	-	-	
	S7	20'-21.5'	Dense well graded sand, fine-medium	44	-	-	-	-	-	

# SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-78

W.P. 39-61

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOWS/FT.	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
2	T1	0'-1.5'	Very soft organic clay silt	P	-	-	-	-	-	
	VANE	3'		-	-	-	-	200	-	Sens: 4.0
	VANE	4.5'		-	-	-	-	160	-	Sens: 8.0
	SB2	6'-7.5'		P	-	-	-	-	-	
	VANE	9'	"	-	-	-	-	50	-	Sens: 2.5
	S3	10'-11.5'		P	-	-	-	-	-	
	S4	13'-14.5'		3	-	-	-	-	-	
	S5	15'-16.5'		6	-	-	-	-	-	
	S6	20'-21.5'	Sand, well graded, dense	33	-	-	-	-	-	
3	6	cone penetrations only								
7	Probing with A <del>rod</del>									
8	SBI	17.5'-18.5'		P						
			S denotes split spoon							
			T " shelby tube							
			SB " side samples							



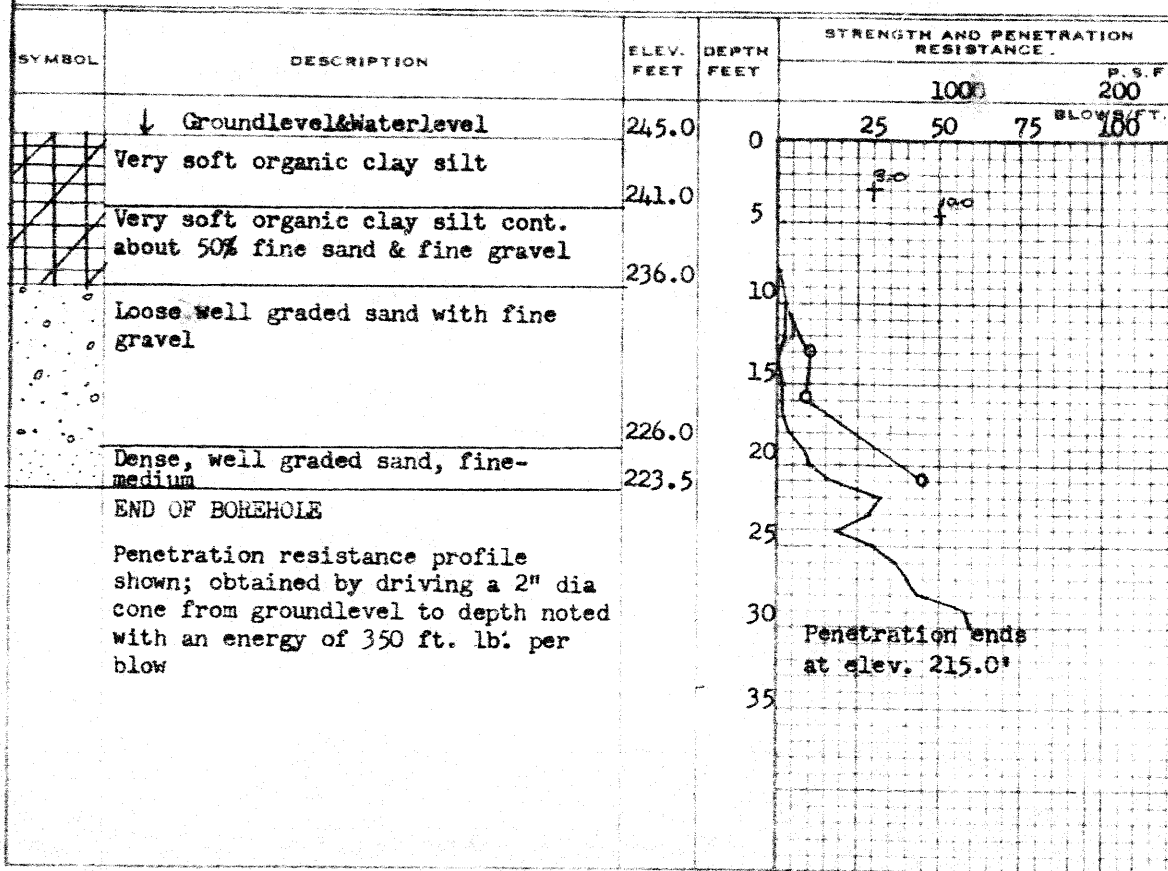
# DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 39-61 BORE HOLE NO. 1  
 JOB 60-F-78 STATION 2400 (Old Line)  
 DATUM 245.0' COMPILED BY B.K.  
 BORING DATE 2/9/60 CHECKED BY K.S.

2" DIA. SPLIT TUBE  
 2" SHELBY TUBE  
 2" SPLIT TUBE  
 2" DIA. CONE  
 2" SHELBY  
 CASING

## LEGEND

1/2 UNCONFINED COMPRESSION (Qu) — O  
 VANE TEST (C) AND SENSITIVITY (S) — +  
 NATURAL MOISTURE AND LIQUIDITY INDEX — LI  
 LIQUID LIMIT — X  
 PLASTIC LIMIT —



CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.		
	T1	-
	T2	-
	S3	-
	T4	-
	S5	-
	S6	-
	S7	-

# DEPARTMENT OF HIGHWAYS - ONTARIO

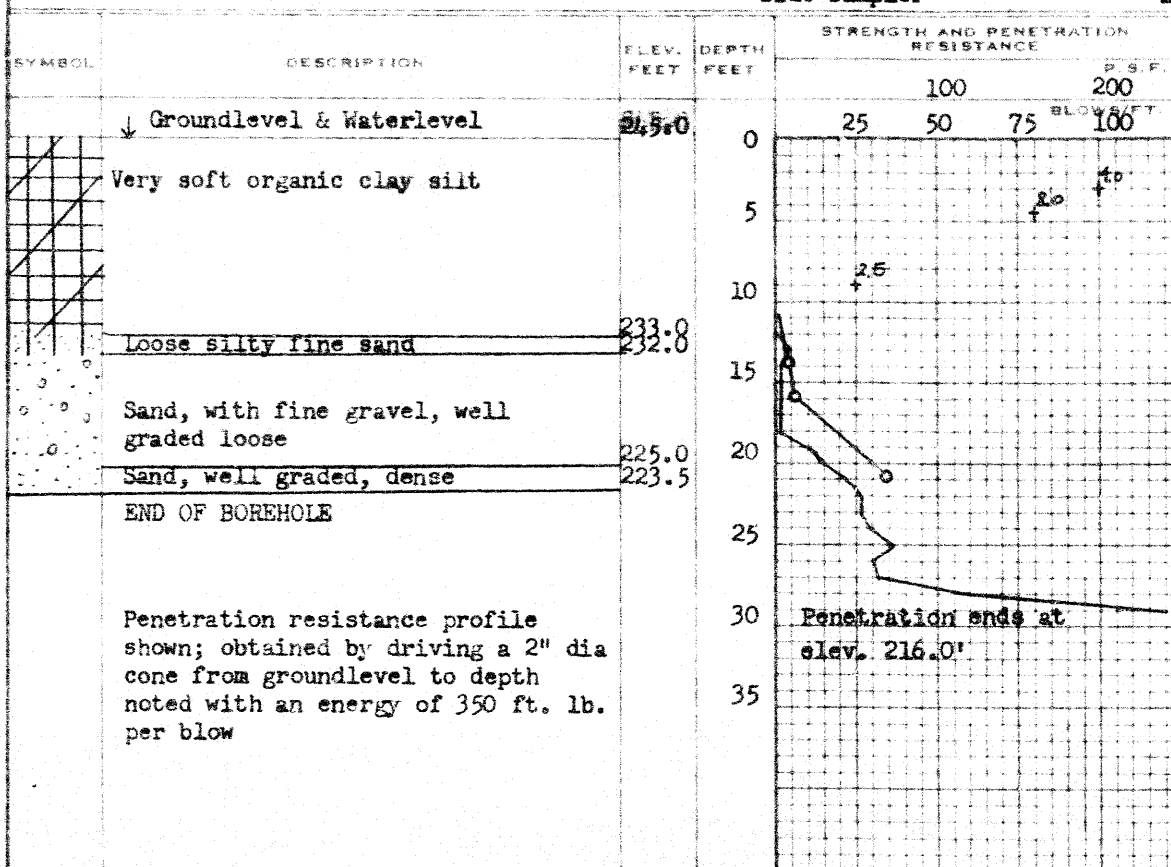
## MATERIALS AND RESEARCH SECTION

W.P. 39-61 BORE HOLE NO. 2  
 JOB 60-F-78 STATION 4+00 (Old Line)  
 DATUM 245.0' COMPILED BY B.K.  
 BORING DATE 6/9/60 CHECKED BY K.S.

2" DIA. SPLIT TUBE  
 2" SHELBY TUBE  
 2" SPLIT TUBE  
 2" DIA. CONE  
 2" SHELBY  
 CASING  
 Side Sampler

### LEGEND

1/2 UNCONFINED COMPRESSION ( $Q_u$ )  
 VANE TEST ( $C$ ) AND SENSITIVITY ( $S$ )  
 NATURAL MOISTURE AND  
 LIQUIDITY INDEX  
 LIQUID LIMIT  
 PLASTIC LIMIT



CONSISTENCY	SAMPLE	NATURAL UNIT WT. G.P.R.
MOIST. CONTENT - % DRY W.		
	T1	-
	SB2	-
	S3	-
	S4	-
	S5	-
	S6	-

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 39-61

BORE HOLE NO. 3 (Cone Test)

40B 60-F-78

STATION 10' from W. of New  
Line

DATUM 245.0°

COMPILED BY B.K.

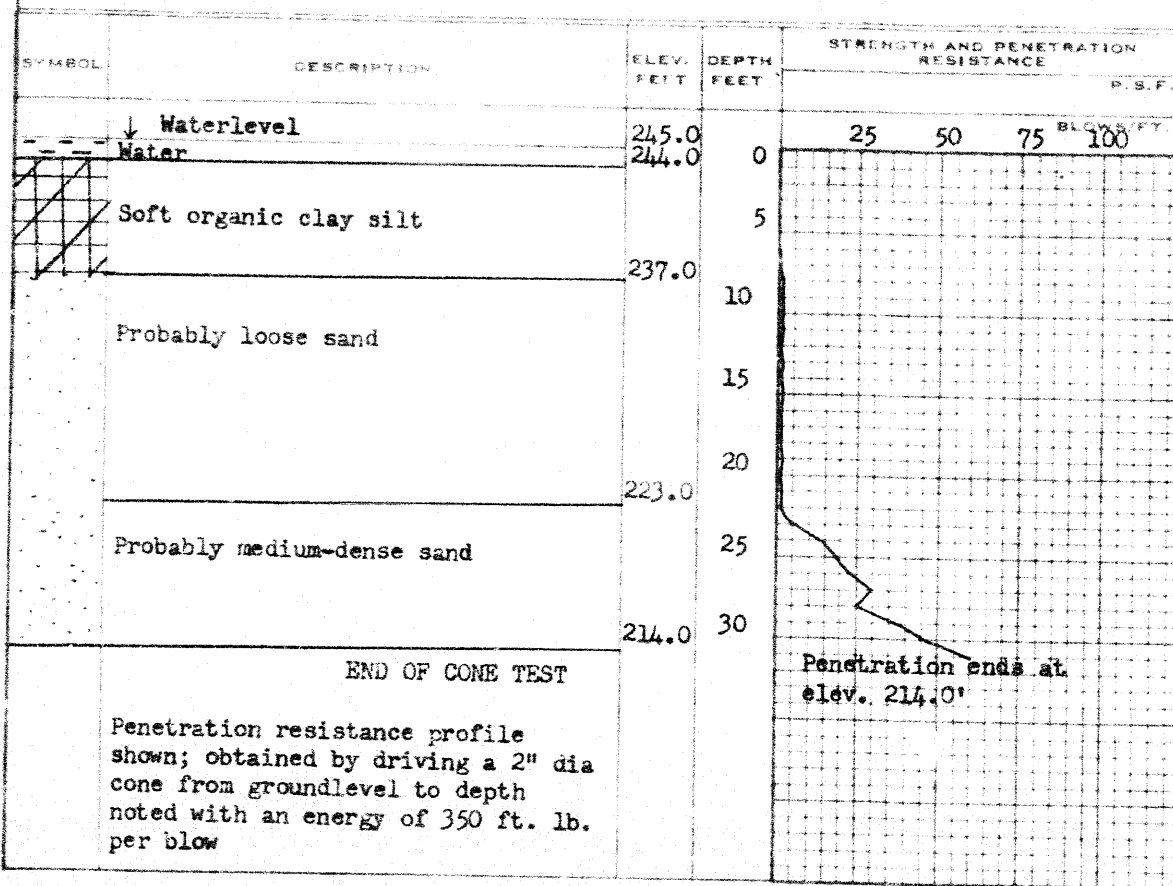
BORING DATE 9/9/60

CHECKED BY K.S.

2" DIA SPLIT TUBE  
2" SHELBY TUBE  
2" SPLIT TUBE  
2" DIA CONE  
2" SHELBY  
CASING

### LEGEND

1/2 UNCONFINED COMPRESSION (Qu)	0
VANE TEST (C) AND SENSITIVITY (S)	+7
NATURAL MOISTURE AND	
LIQUIDITY INDEX	1
LIQUID LIMIT	
PLASTIC LIMIT	

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 39-61

BORE HOLE NO. 4 (Comp Test)

JOB 60-F-78

STATION 130' from W. of New  
Line

DATUM 245.0'

COMPILED BY B.K.

BORING DATE 12/9/60

CHECKED BY K.S.

2" DIA. SPLIT TUBE

2" SHELBY TUBE

2 SPLIT TUBES

2<sup>o</sup> DIA. CONT.

2" SHELBY

CASING

Figure 1

### LEGEND

1/2 UNCONFINED COMPRESSION (Qu)

VANE TEST (G) AND SENSITIVITY (S)

NATURAL MOISTURE AND

LIQUIDITY INDEX

LIQUID LIMIT

PLASTIC UNIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				P. S. F.			
	↓ Waterlevel	245.0	0	25	50	75	100
---	Water	241.0	5				
	Soft organic clay silt		10				
			15				
		228.0	20				
	Probably sand-density increasing with depth		25				
			30				
	END OF CONE TEST	216.0					
	Penetration resistance profile shown; obtained by driving a 2" dia cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow						

Penetration ends at  
elev. 216.0'

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.F. 39-61

BORE HOLE NO. 5 (CONE TEST)

JOB 60-F-78

STATION 280' from W. of New 2" DIA. SPLIT TUBE  
Line 2" SHELBY TUBE

DATUM 245.0'

COMPILED BY B.K.


BORING DATE 18/9/60

CHECKED BY K.S.

2" DIA. SPLIT TUBE  
2" SHELBY TUBE  
2" SPLIT TUBE  
2" DIA. CONE  
2" SHELBY  
CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Qu)	.....	0
VANE TEST (C) AND SENSITIVITY (S)	.....	+8
NATURAL MOISTURE AND	.....	11
LIQUIDITY INDEX	.....	X
LIQUID LIMIT	.....	
PLASTIC LIMIT	.....	

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F.	
↓	Waterlevel	245.0			
	Water	243.5	0	25	50 75 100
	Soft organic clay silt		5		
			10		
			15		
	Probably loose sand	229.0	15		
		224.0	20		
	Probably dense sand	218.5	25		
	END OF CONE TEST		30		
Penetration resistance profile shown; obtained by driving a 2" dia cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow				Penetration ends at elev. 218.5'	

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.F. 39-61

BORE HOLE NO. 6 (CONE TEST)

JOB 60-F-78

STATION 430' from W. of New  
Line

DATUM 245.0'

COMPILED BY B.K.

BOHRING DATE 12/9/60

CHECKED BY K.S.

2" DIA. SPLIT TUBE  
2" SHELBY TUBE  
2" SPLIT TUBE  
2" DIA. CONE  
2" SHELBY  
CASING

### LEGEND

1/2 UNCONFINED COMPRESSION (QU) _____	O
VANE TEST (C) AND SENSITIVITY (S) _____	+ <sup>s</sup>
NATURAL MOISTURE AND	
LIQUIDITY INDEX _____	LI
LIQUID LIMIT _____	X
PLASTIC LIMIT _____	-o

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F.	
	↓ Waterlevel Water	245.0 244.0	0	25	50 75 100 BLOW FEET
	Soft organic clay silt		5		
		232.0	10		
	Probably sand-density increasing with depth		15		
			20		
			25		
		214.0	30		
	END OF CONE TEST				
	Penetration resistance profile shown; obtained by driving a 2" dia cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow				

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 39-61

BORE HOLE NO. 7 (SOUNDING)

JOE 60-F-78

STATION 150' from E. of New 2" DIA. SPLIT TUBE

DATUM 245.0'

COMPILED BY        B.K.

BORING DATE 13/9/60

CHECKED BY K.S.

2" DIA. SPLIT TUBE  
2" SHELBY TUBE  
2" SPLIT TUBE  
2" DIA. CONE  
2" SHELBY  
CASING

### LEGEND

1/2 UNCONFINED COMPRESSION (QU)	0
VANE TEST (C) AND SENSITIVITY (S)	+5
NATURAL MOISTURE AND	LI
LIQUIDITY INDEX	X
LIQUID LIMIT	
PLASTIC LIMIT	

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION	
				RESISTANCE	P.S.F.
	Waterlevel	245.0			
	Water	244.0	0		
	Organic clay or silt containing a high percentage of silt or fine sand		5		
			10		
			15		
			20		
	END OF SOUNDING	229.0			
	- Not possible to push rods further				

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 39-61 \_\_\_\_\_ BORE HOLE NO. 8 (SOUNDING)

JOB 60-F-78 STATION 285' from E. of New Line

DATUM 245.0' \_\_\_\_\_ COMPILED BY B.K. \_\_\_\_\_

BORING DATE 13/9/60 CHECKED BY K.S.

2" DIA. SPLIT TUBE  
2" SHELBY TUBE  
2" SPLIT TUBE  
2" DIA. CONE  
2" SHELBY  
CASING

### LEGEND

1/2 UNCONFINED COMPRESSION (QU)	0
VANE TEST (C) AND SENSITIVITY (S)	+9
NATURAL MOISTURE AND LIQUIDITY INDEX	LI
LIQUID LIMIT	100
PLASTIC LIMIT	100

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F. BLOWS/FT	
	↓ Waterlevel Water	245.0 244.5	0		
	Organic clay or silt containing a high percentage of silt or fine sand		5		
			10		
		226.5	15		
	END OF SOUNDING		20		
	- NOT POSSIBLE TO PUSH RODS FURTHER		25		

[illegible]



