

# 57-F-3

W.P.# 549-56

Hwy.# 51

CREDIT RIVER

CROSSING

CALEDON

EDITED  
FOR MICROFILMING  
BY MB DATE 2/10/52



Mr. A. Tove.  
Bridge Engineer.

May 27th, 1957.

Mr. F.C. Brownridge.

Re. Foundation Report.  
Hwy #51, Credit River Crossing,  
approx. 2 miles South West of  
Caledon. P. 549- 56. S.J.-F.57-3

Attached herewith are two copies of the above mentioned  
Report. The Report and Recommendations are self-  
explanatory.

F. C. Brownridge.  
Materials & Research Engineer.

Per:



A. Rutka.  
Principal Soils Engineer.

enc.  
copies to:  
Mr. H. Hrygashko.  
Mr. S. J. Gandy.  
Mr. F. J. Hiteley.  
Foundation Section.  
File.

WJL

FOUNDATION REPORT

on

New Bridge at Highway No. 51  
and Credit River crossing about  
two miles south west of Caledon.

Site plan No. E-3211-1

Station: 168+30

Distribution:

Mr. A. Toie  
Bridge Engineer (2)

Mr. H. Tregaskes  
Construction Engineer (1)

Mr. C.C. Mansay  
Design Engineer (1)

Mr. F.H. Whiteley, Dist.Eng.,  
Queen's Road, Ontario. (1)

Foundation Section (1)

Field (1)

C.P. 549-56

H.D. E-97-3

## INTRODUCTION

A subsoil investigation was carried out to determine the bearing values of layers to support the foundations of the proposed new bridge.

The location is some two miles south west of Caledon where the proposed revision of highway No. 51 crosses the Credit River.

The work started on March 1, 1957 and was completed on March 31, 1957.

## PROCEDURE

The subsoil investigation was carried out by means of a skid mounted core drill machine. Five boreholes were made for foundations investigation and two boreholes for the approach fill stability investigation.

The locations and elevations of the boreholes are shown in Drawing No. F-57-3-A, and their logs under Appendix I.

## SPECIAL FINDINGS AND ANALYSIS

The terrain is moraine spillway. The site is at the end of a bend where the river has rather a swift flow. At times of flood the water level has risen some 6 ft. The indications are that there is considerable scouring action going on presently.

The investigations revealed the following subsoil conditions. The soil is primarily alluvial material composed of sand, gravel, silt, and clay.

The stratigraphy is fairly well defined, although differing in depths. On the western side (boreholes No. 1, 2, 3), underneath the topsoil of muck there are alternating layers of gravel and sand, silt loam, gravelly sand, and medium to coarse sand. Underlying these layers is the silty loam layer which contains considerable amount of stratified clay and sand. Underlying this layer down to bedrock is a layer of red bouldery clay till.

The bedrock in boreholes No. 1 and 2 is sandstone underlain by red shales. On the eastern side (boreholes 4 and 5) the topsoil of muck is underlain by a layer of gravelly sand, becoming medium to coarse sand further below.

Underneath this layer is the sandy, silty loam, changing to red bouldery clay till. Underlying this layer is the bedrock shale.

Due to the nature of the subsoil down to silty loam layer, only disturbed samples could be obtained. Accordingly laboratory tests for unconfined compression, plastic limit and liquid limit could not be performed. The field standard penetration results, within the effective pressure depth, give an average of 19 blows per foot in boreholes No. 1 and 2, 11 blows per foot in borehole No. 3, 12 blows per foot in borehole No. 4, and 20 blows per foot in borehole No. 5. Also, from the observations the subsoil is well saturated but not submerged. For supporting spread footing foundations the layer, down to elevation 1230 ft., can provide only about 1 T.s.f. bearing value. Below this down to the bedrock the soil values are not of any practical significance.

For higher bearing values the foundations should be supported on end bearing piles driven to the bedrock at elevations indicated in the log sheets.

#### CONCLUSIONS AND RECOMMENDATIONS

From the above discussion it will be concluded that:

1. The subsoil is alluvial material typical of a spillway, deposited on shale bedrock.
2. If spread footing foundations are placed at about elevation 1244 ft. the layer can provide a bearing value of 1 T.s.f., with a safety factor of 3.
3. On the other hand, for higher bearing values the foundations should be supported by end bearing piles driven down to the bedrock at elevations indicated in the log sheets.
4. From observations a scouring action is going on at the site. To prevent its hazards in connection with the new structure the footings should be well protected by means of sheet piles.

CONCLUSIONS AND RECOMMENDATIONS (continued)

5. The approach fill stability does not present any problem. The following should be given due consideration:

- a) The topsoil muck should be removed before placing the fill.
- b) Side slopes of the fill should be 2:1.
- c) A granular soil (  $\phi = 30^\circ$  ) should be used as fill material.

V. Korlu  
Foundation Engineer

APPENDIX I



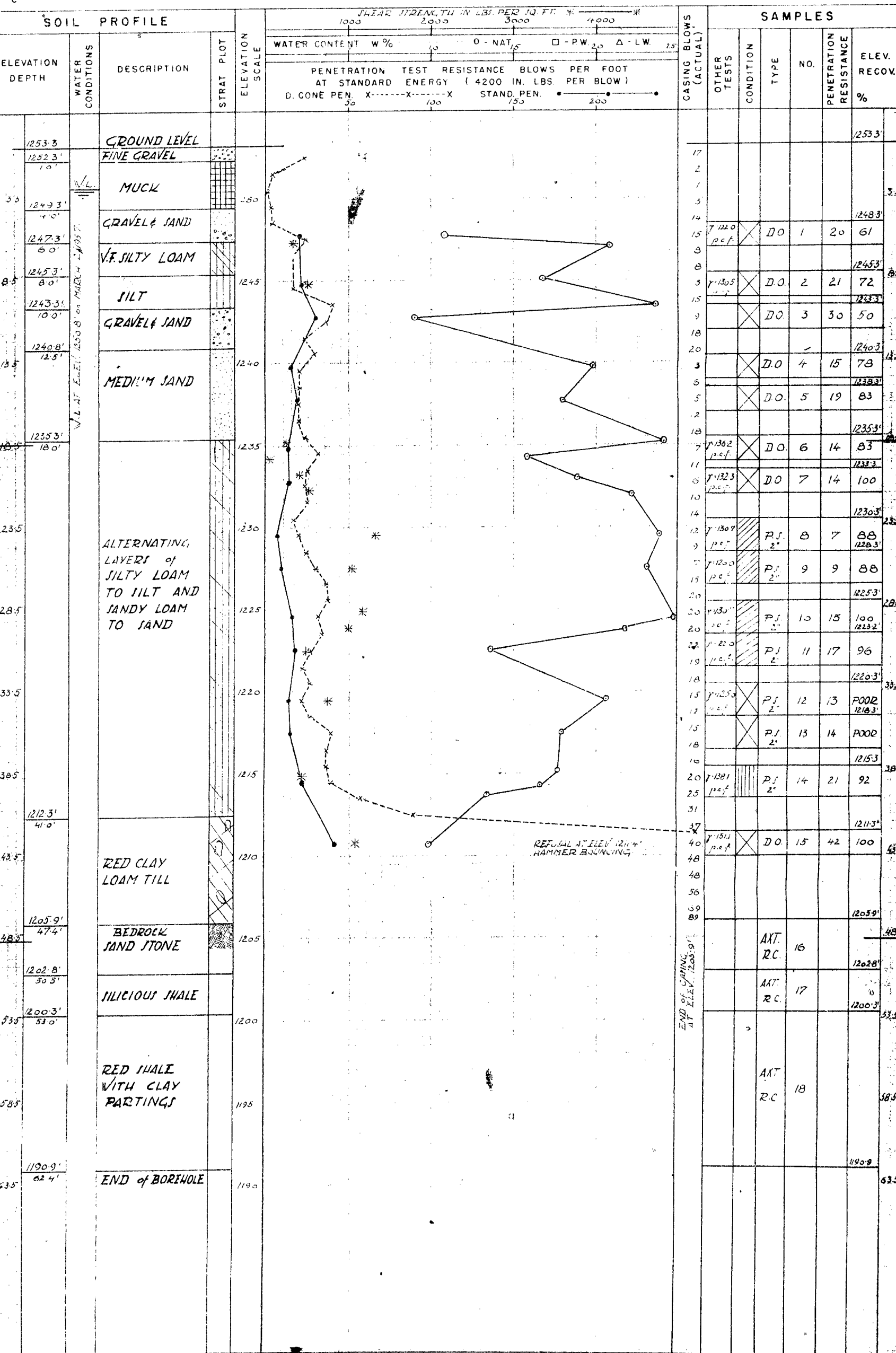
DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW  
**OFFICE REPORT ON SOIL EXPLORATION**

DRILL RIG 54-2 OPERATION BORE & PENETN JOB F-57-3 WP 549-56 BORING 1 STA. 167+60 (20' LT.)  
CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT APRIL 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 24 INCHES COMPILED BY H.J. CHECKED BY A.L. DATE BORING 1 MARCH 1957

**ABBREVIATIONS**  
V - INSITU VANE SHEAR TEST Q - TRIAXIAL QUICK K - PERMIABILITY CS - CHUNK  
M - MECHANICAL ANALYSIS S - TRIAXIAL SLOW C - CONSOLIDATION DO - DRIVE OPEN  
U - UNCONFINED COMPRESSION WL - WATER LEVEL IN CASING CA - CASING DF - DRIVE FOOT VALVE PS - PISTON SAMPLE  
QC - TRIAXIAL CONSOLIDATED QUICK WT - WATER TABLE IN SOIL γ - UNIT WEIGHT T.O. - THIN WALLED OPEN RC - ROCK CORE

**SAMPLE TYPES**  
SS - SLEEVE SAMPLE  
PS - PISTON SAMPLE  
WS - WASHED SAMPLE  
RC - ROCK CORE

**SAMPLE CONDITION**  
- DISTURBED  
- FAIR  
- GOOD  
- LOST



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MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW  
**OFFICE REPORT ON SOIL EXPLORATION**

DRILL RIG 54-2 OPERATION BORING & PENET'N JOB F-57-3 WP. 549-56 BORING 2 STA. 167+86 (1527)  
CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT APRIL 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 24 INCHES COMPILED BY H.J. CHECKED BY A.L. DATE BORING 6 MARCH 1957

**ABBREVIATIONS**

V - INSITU VANE SHEAR TEST Q - TRIAXIAL QUICK K - PERMEABILITY  
M - MECHANICAL ANALYSIS S - TRIAXIAL SLOW C - CONSOLIDATION  
U - UNCONFINED COMPRESSION WL - WATER LEVEL IN CASING CA - CASING  
Qc - TRIAXIAL CONSOLIDATED QUICK WT - WATER TABLE IN SOIL γ - UNIT WEIGHT

**SAMPLE TYPES**

CS - CHUNK SS - SLEEVE SAMPLE  
DO - DRIVE OPEN PS - PISTON SAMPLE  
DF - DRIVE FOOT VALVE WS - WASHED SAMPLE  
TO - THIN WALLED OPEN RC - ROCK CORE

**SAMPLE CONDITION**

 - DISTURBED  
- FAIR  
- GOOD  
- LOST

**SOIL PROFILE**

**SAMPLES**

SOIL PROFILE				ELEVATION SCALE				SAMPLES							
ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	WATER CONTENT W %	0 - NAT. %	0 - PW. %	Δ - LW	CASING BLOWS (ACTUAL)	OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
								PENETRATION TEST RESISTANCE BLOWS PER FOOT AT STANDARD ENERGY (4200 IN. LBS PER BLOW)							
								D. CONE PEN. X-----X-----X STAND. PEN. •-----•-----•							
1253.27'		GROUND LEVEL													1253.2
1251.7'		MUCK													
1247.5'		GRAVEL										DO	35	50	
1244.2'		SILTY LOAM										DO	2	12	78
1240.7'		GRAVEL & SAND										DO	3	23	67
1230.2'		MEDIUM TO COARSE SAND													
1228.2'		GRAVEL										DO	4	13	17
1220.2'		SILTY LOAM STRATIFIED WITH LAYERS OF CLAY & SAND													
1210.2'		RED GRAVELLY SANDY LOAM (TILL)										DO	10	15	67
1203.4'		BEDROCK													
1198.7'		SANDSTONE										ART RC			
1192.7'		RED SHALE										ART RC	12		
1190'		END of BOREHOLE													

NOTE: WATER INFILTRATION PHENOMENON IN AREA OF TILL TO COARSE SAND FORCED UP CASING BEFORE SAMPLING

REFUSE AT 1190' HAMMER BLOWING

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW  
**OFFICE REPORT ON SOIL EXPLORATION**

DRILL RIG 54-2 OPERATION BORE & PENET'N JOB F-57-3 WP 549-56 BORING 3 STA 168+07.9' LT.  
CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT APRIL 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 24 INCHES COMPILED BY H.J. CHECKED BY AL DATE BORING 11 MARCH 1957

**ABBREVIATIONS**

V - INSITU VANE SHEAR TEST Q - TRIAXIAL QUICK K - PERMIABILITY  
M - MECHANICAL ANALYSIS S - TRIAXIAL SLOW C - CONSOLIDATION  
U - UNCONFINED COMPRESSION WL - WATER LEVEL IN CASING CA - CASING  
QC - TRIAXIAL CONSOLIDATED QUICK WT - WATER TABLE IN SOIL  $\gamma$  - UNIT WEIGHT

**SAMPLE TYPES**

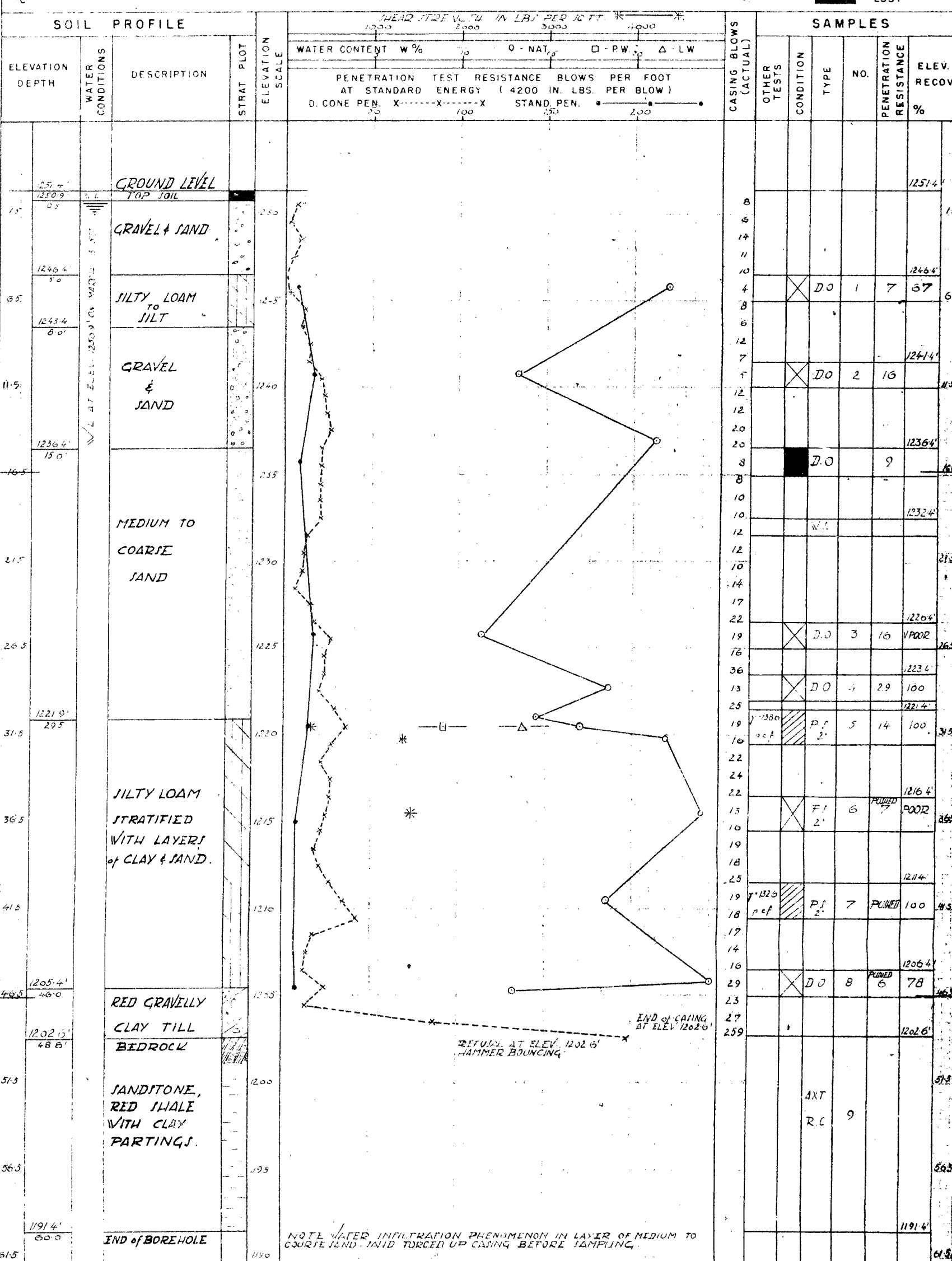
CS - CHUNK SS - SLEEVE SAMPLE  
DO - DRIVE OPEN PS - PISTON SAMPLE  
DF - DRIVE FOOT VALVE WS - WASHED SAMPLE  
TO - THIN WALLED OPEN RC - ROCK CORE

**SAMPLE CONDITION**

 - DISTURBED  
- FAIR  
- GOOD  
- LOST

**SOIL PROFILE**

**SAMPLES**



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**OFFICE REPORT ON SOIL EXPLORATION**

DRILL RIG 54-2 OPERATION BORE & PENET'N JOB F-57-3 WP 549-56 BORING 4 STA. 168+60 (19 1/2' LT.)  
 CASING BA (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT APRIL 1957  
 SAMPLER HAMMER WT. 250 LBS. DROP 24 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 21 MARCH 1957

## ABBREVIATIONS

V - INSITU VANE SHEAR TEST Q - TRIAXIAL QUICK K - PERMIABILITY  
 M - MECHANICAL ANALYSIS S - TRIAXIAL SLOW C - CONSOLIDATION  
 U - UNCONFINED COMPRESSION WL - WATER LEVEL IN CASING CA - CASING  
 QC - TRIAXIAL CONSOLIDATED QUICK WT - WATER TABLE IN SOIL  $\gamma$  - UNIT WEIGHT

## SAMPLE TYPES

CS - CHUNK SS - SLEEVE SAMPLE  
 DO - DRIVE OPEN PS - PISTON SAMPLE  
 DF - DRIVE FOOT VALVE WS - WASHED SAMPLE  
 TO - THIN WALLED OPEN RC - ROCK CORE

## SAMPLE CONDITION

 - DISTURBED  
 - FAIR  
 - GOOD  
 - LOST

## SOIL PROFILE

ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE
1251.8'		GROUND LEVEL		1250
1250.8'		TOP SOIL		
1234.8'		GRAVEL & SAND		1240
1220.8'		MEDIUM TO COARSE SAND		1230
1212.8'		SILTY LOAM WITH SOME SAND		1210
1195.8'		RED CLAY LOAM (TILL)		1200
1184.8'		BEDROCK		1190
1174.8'		SHALE		1180
		END OF BOREHOLE		1170

WATER CONTENT W% 0 - NAT.  $\square$  - PW.  $\Delta$  - LW  
 PENETRATION TEST RESISTANCE BLOWS PER FOOT  
 AT STANDARD ENERGY (4200 IN. LBS. PER BLOW)  
 D. CONE PEN. X-----X STAND. PEN. •


## SAMPLES

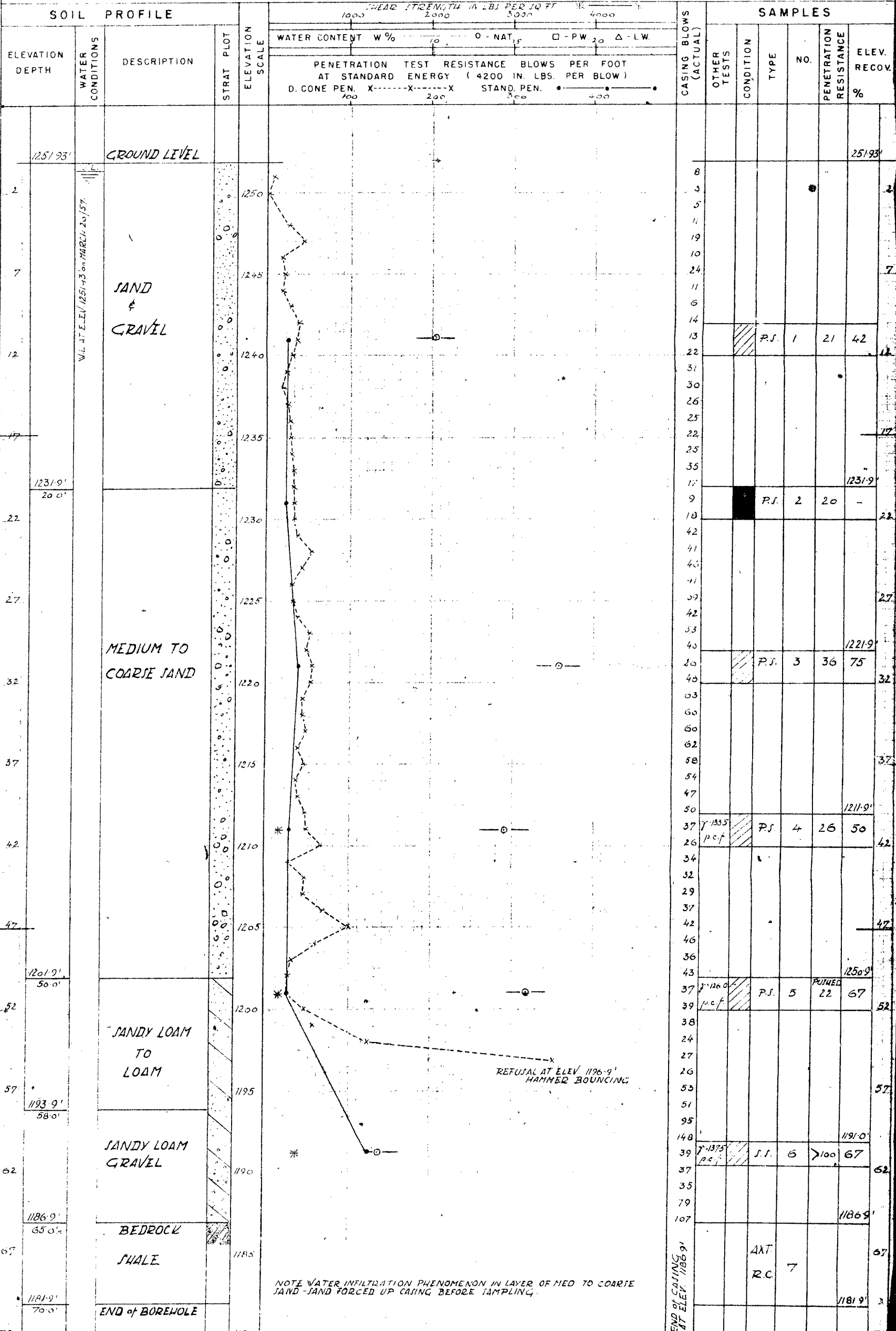
OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
					2518
					12468
		TO	1	75	
					12418
		TO	2	11	54
					12368
		TO	3	18	71
					12318
		SS	4	14	75
					2268
		SS	5	28	75
					12218
		TO	6	-	-
					12168
		P.S.	7	63	100
					12118
		TO	8	10	100
					12068
		P.S.	9	14	79
					12018
		P.S.	10	16	100
					11918
		P.S.	11	23	50
					11898
		SS	12	>100	33
					11848
		AXT. R.C.	13		
					11748

NOTE WATER INFILTRATION PHENOMENON IN LAYER OF MED. TO COARSE SAND. SAND FORCED UP CASING BEFORE SAMPLING.

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW  
**OFFICE REPORT ON SOIL EXPLORATION**

DRILL RIG 54-2 OPERATION BORE & PENET N JOB F-57-3 WP 549-56 BORING 5 STA. 168+62 (22' 27")  
CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT APRIL 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 23 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 25 MARCH 1957

ABBREVIATIONS			SAMPLE TYPES		SAMPLE CONDITION
V - INSITU VANE SHEAR TEST	Q - TRIAXIAL QUICK	K - PERMIABILITY	CS - CHUNK	SS - SLEEVE SAMPLE	 - DISTURBED - FAIR - GOOD - LOST
M - MECHANICAL ANALYSIS	S - TRIAXIAL SLOW	C - CONSOLIDATION	DO - DRIVE OPEN	PS - PISTON SAMPLE	
U - UNCONFINED COMPRESSION	WL - WATER LEVEL IN CASING	CA - CASING	DF - DRIVE FOOT VALVE	WS - WASHED SAMPLE	
QC - TRIAXIAL CONSOLIDATED QUICK	WT - WATER TABLE IN SOIL	γ - UNIT WEIGHT	TO - THIN WALLED OPEN	RC - ROCK CORE	





DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW  
**OFFICE REPORT ON SOIL EXPLORATION**

DRILL RIG 54-2 OPERATION BORE & PENET'N JOB F-57-3 W.P. 549-56 BORING 7 STA. 165+11 ±  
CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT APRIL 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 24 INCHES COMPILED BY U.S. CHECKED BY AL DATE BORING FEB. 22, 1957

**ABBREVIATIONS**

V - INSITU VANE SHEAR TEST Q - TRIAXIAL QUICK K - PERMIABILITY  
M - MECHANICAL ANALYSIS S - TRIAXIAL SLOW C - CONSOLIDATION  
U - UNCONFINED COMPRESSION WL - WATER LEVEL IN CASING CA - CASING  
QC - TRIAXIAL CONSOLIDATED QUICK WT - WATER TABLE IN SOIL γ - UNIT WEIGHT

**SAMPLE TYPES**

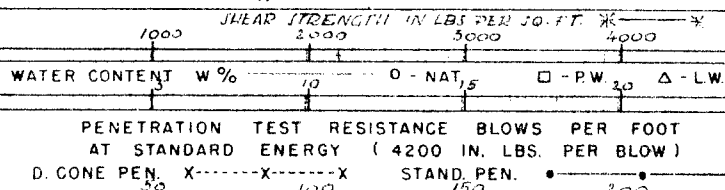
CS - CHUNK SS - SLEEVE SAMPLE  
DO - DRIVE OPEN PS - PISTON SAMPLE  
DF - DRIVE FOOT VALVE WS - WASHED SAMPLE  
TO - THIN WALLED OPEN RC - ROCK CORE

**SAMPLE CONDITION**

 - DISTURBED  
- FAIR  
- GOOD  
- LOST

**SOIL PROFILE**

ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE
1253.04'		GROUND LEVEL		
1249.54'		MUCK		1250
1248.04'		GRAVEL		1245
1240.04'		SILTY LOAM TO SILT		1240
1233.04'		VERY FINE SANDY LOAM TO SAND		1235
1228.04'		SANDY LOAM GRAVEL		1230
1226.54'		GRAVELLY CLAY LOAM BEDROCK		1225
1217.54'		IMPURE LIMESTONE WITH SHALE. PARTING AND OCCASIONAL LAYERS OF CLAY		1220
		END OF BOREHOLE		1215
				1210



CASING BLOWS  
(ACTUAL)

**SAMPLES**

OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
					1253.04'
					1248.04'
		DO	1	7	1245.04'
					1243.04'
		PS	1A	PURVED	1240.04'
		SS	2	8	1240.05'
					1238.04'
		PS	2A	11	1236.54'
		SS	3	10	1233.04'
		PS	3A	13	1233.04'
		SS	4	17	1230.04'
		SS	5	34	1228.04'
		DO	6	25 100 40	1226.54'
		DO	7	18 100 60	1226.54'
		AXT. RC	8		1222.54'
		AXT. RC	9		1217.54'

REFUSAL AT ELEV. 1229.0' HAMMER BOUNCING

END OF CASING AT ELEV. 1226.54'