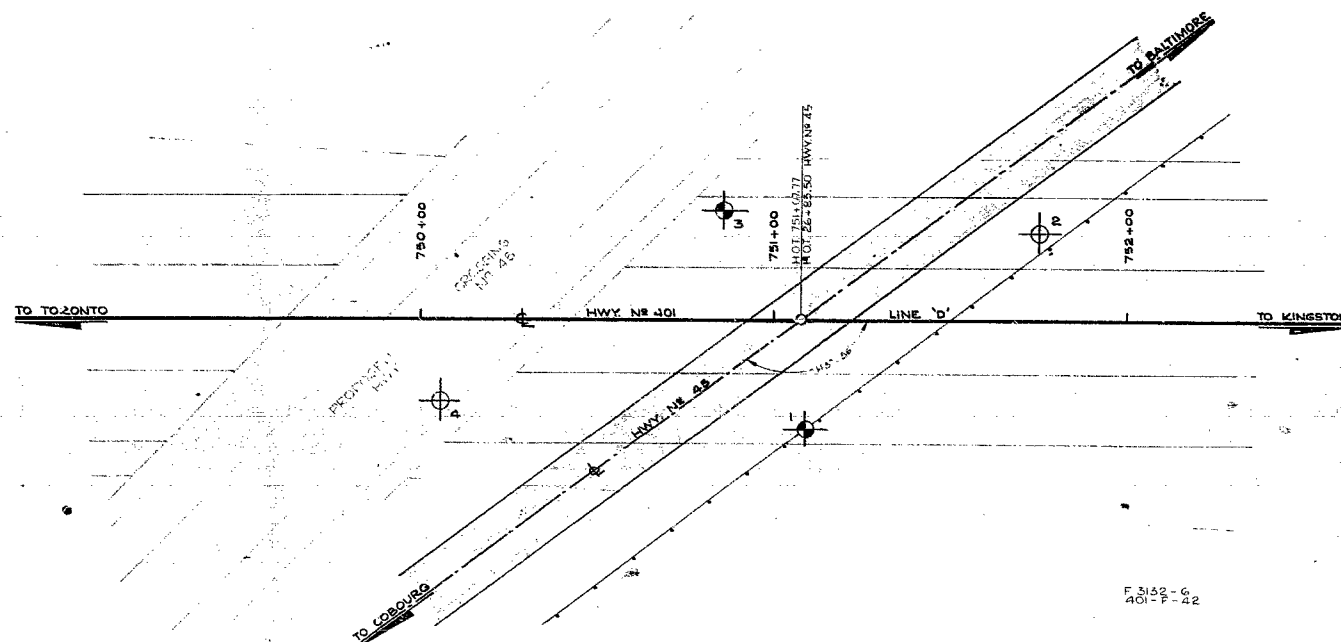
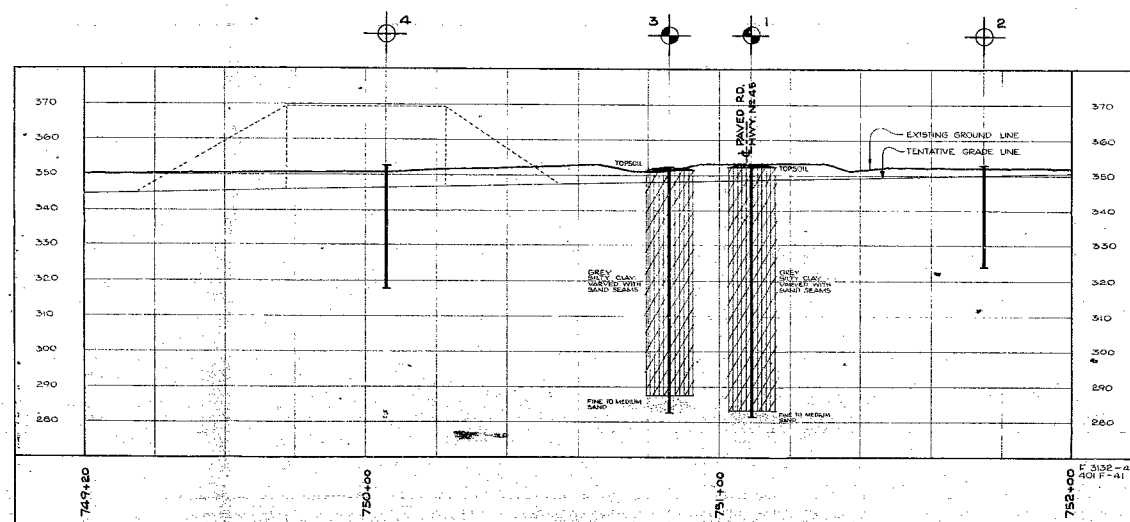


# 57-F-39  
W.P. # 57-58  
Hwy. # 401  
; Hwy. # 45  
INTERSECTION  
1.5 MILES N. OF  
COBOURG

EDITED  
FOR MICROFILMING  
BY *MB* DATE *1/1/72*



PLAN



PROFILE

LEGEND			
BORE HOLE			
PENETRATION HOLE			
BORE & PENETRATION HOLE			
HOLE NO.	ELEVATION	STATION	DISTANCE FROM C.L.
1	353.5'	751+09'	31' RT
2	353.0'	751+75'	25' LT
3	352.5'	750+86'	31' LT
4	352.5'	750+06'	23' 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.

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH SECTION - DOWNSVIEW

**HWY. NO. 45  
PROPOSED CROSSING  
IN THE TOWN OF COBOURG**  
SHOWING POSITION & ELEVATION OF HOLES

HWY. NO. 401	W.P. 57 - 58	DIV. NO. 7
CO. NORTHUMBERLAND	LOT 16	CON. 1
TWP. HAMILTON		
SCALE 1 IN. = 20 FT.	SUBMITTED BY	DATE 2 APRIL 1958
DRAWN BY R.E.F.	APPROVED BY	DRAWING NO. E-57-39A

BA  
843

FOUNDATION REPORT

ON

New Hwy 401 and Hwy 45 intersection about  
1.5 miles north of Cobourg, lot 16 (Conc. I)  
Twp. of Hamilton.

Station: 751/08

Plan No: F 3132-6

Distribution:

Mr. A. Toye (2)  
Bridge Engineer

Mr. H. Tregaskes (1)  
Construction Engineer

Mr. D. G. Ramsay (1)  
Design Engineer

Mr. H. D. Duff (1)  
Dist. Eng. Port Hope

Mr. A. Watt (1)  
Water Resources Commission

Dr. P. Karrow (1)  
Dept. of Mines

Foundation Section (1)

File (1)

W. F. 57-58

W. J. F-57-39

## INTRODUCTION:

A subsoil investigation was carried out to determine the bearing value of the layers for supporting the foundations of the proposed bridge.

The location is just north of Cobourg where the new Hwy 401 underpasses the existing Hwy 45 in lot 45 (Conc. I), Station 751+08, profile no. F-3132-4, Twp. of Hamilton.

## DESCRIPTION OF SITE AND FIELD WORK:

The site is located four hundred yards east of Cobourg Creek and is within the shoreline of late Iroquois lake. The terrain presents stratified silty clays with sand varvings, characteristic of lacustrine formation.

The explorations were carried out by means of a skid mounted core drill machine. In the course of investigations two boreholes with adjacent dynamic cone penetration and two separate dynamic cone penetrations were made. The boring was done by conventional wash and drive method. Undisturbed samples were extracted at regular intervals and tested in the laboratory. During sampling standard penetration resistance was recorded.

The location of the boreholes is shown on drawing F-57-39A and their elevations on log sheets under Appendix I.

## DISCUSSION OF FIELD AND LABORATORY FINDINGS:

The subsoil investigations revealed the following stratigraphy.

Under the topsoil the soil is one layer of grey silty clay with sand seams at irregular depth intervals. This layer extends down to elevation 287.5 ft. in borehole No. 3

which is on the north side and elevation 283.5 in borehole No. 1, which is on the south side of the existing Hwy No. 45. At this elevation the subsoil changes to fine to medium dense sand layer. The boreings were carried down some 70 - 72 ft. below the ground level and stopped in the dense sand layer.

From the laboratory tests it was found that the silty clay layer has average liquid limit of 23%, plastic limit 15%, moisture content 23% and density of 125 p.c.f. The unconfined compression tests indicated an average shear value of 950 p.s.f. The average standard penetration resistance in the layer was recorded to be about 13 blows per foot.

#### SUPPORT OF FOUNDATIONS:

From the profile the proposed grade line indicates about five ft. of cut at this crossing. The silty clay layer is some 70 ft. thick starting from the ground level. The soil in this layer is made up of cohesive and granular material and at intervals varved with seams of fine sand. The soil is well saturated all through the layer and has a uniform density of 125 p.c.f. The average shear value recorded in the layer is about 950 p.s.f., and the average standard penetration resistance 13 blows per foot. It would appear that this layer cannot provide a bearing value more than about one T.s.f. without envisaging hazards from excessive differential settlement.

The support of the foundations by means of end bearing piles appears to be more convenient. Judging from the number of blows registered during standard penetration tests and while driving the casing down, the driven piles will probably meet refusal at about elevation 280 ft. Some tubular piles which

will make use of both the friction and end-bearing support will very probably stop at higher elevations.

CONCLUSIONS AND RECOMMENDATIONS:

From the above discussion it will follow that:

1. The subsoil stratigraphy at this site is one layer of silty clay reaching down to elevation 284 ft. Below this elevation the underlying layer is dense fine to medium sand.
2. The silty clay layer, judging from laboratory shear tests and field Standard penetration tests, could provide a bearing value about one T.s.f. However, placing spread footings in this layer would envisage hazards from possible excessive differential settlement.
3. The support of the foundations by end-bearing piles appears to be more convenient. These piles driven into the layer are believed to meet refusal at about elevation 280 ft. The use of tubular type piles will provide both frictional and end bearing support and will stop at higher elevations.
4. The approach fills to the new structure do not present any stability problem.

V. Korlu  
Foundations Engineer.

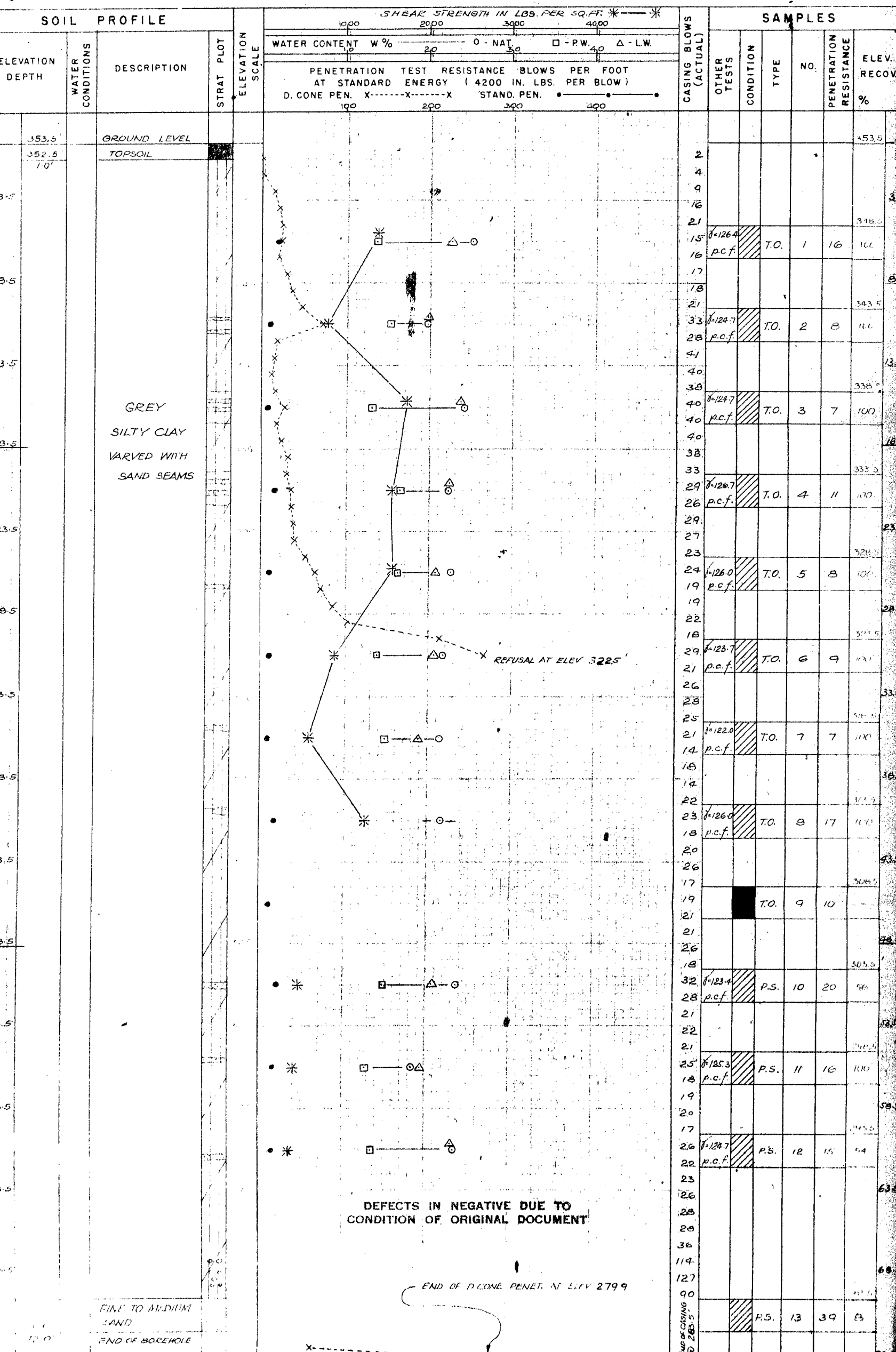
APPENDIX I.

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

DRILL RIG 54-1 OPERATION BORE & PENET'N JOB F-57-39 WP 57-58 BORING 1 STA. 751+09(3) RL  
CASING Bx (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT NOV. 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 7 OCT. 1957

**ABBREVIATIONS**  
V - INSITU VANE SHEAR TEST Q - TRIAXIAL QUICK K - PERMIABILITY C.S. - CHUNK S.S. - SLEEVE SAMPLE  
M - MECHANICAL ANALYSIS S - TRIAXIAL SLOW C - CONSOLIDATION D.O. - DRIVE OPEN P.S. - PISTON SAMPLE  
U - UNCONFINED COMPRESSION WL - WATER LEVEL IN CASING CA - CASING D.F. - DRIVE FOOT VALVE W.S. - WASHED SAMPLE  
Qc - TRIAXIAL CONSOLIDATED QUICK WT - WATER TABLE IN SOIL γ - UNIT WEIGHT T.O. - THIN WALLED OPEN R.C. - ROCK CORE

**SAMPLE CONDITION**  
[Symbol] - DISTURBED  
[Symbol] - FAIR  
[Symbol] - GOOD  
[Symbol] - LOST





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

DRILL RIG 54-1 OPERATION PENETRATION JOB F-57-39 W.P. 57-58 BORING 2 STA. 751+75 (25' LT.)  
 CASING BX (standard samplers to fit unless noted) DATUM GEODETTIC DATE REPORT DEC. 1957  
 SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 3 OCT. 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

C.S. - CHUNK SS - SLEEVE SAMPLE  
 D.O. - DRIVE OPEN P.S. - PISTON SAMPLE  
 D.F. - DRIVE FOOT VALVE W.S. - WASHED SAMPLE  
 T.O. - THIN WALLED OPEN R.C. - ROCK CORE

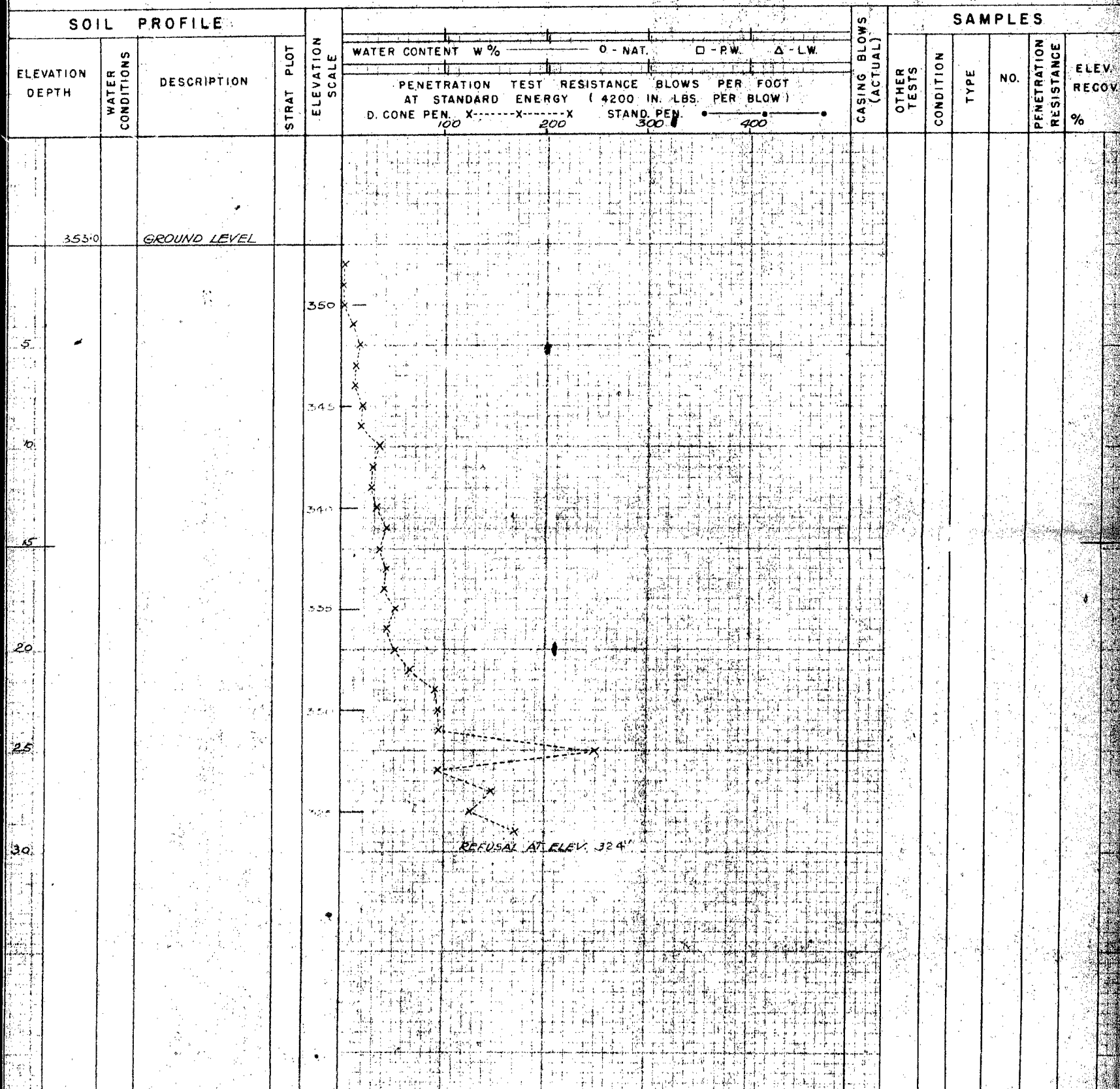
## SAMPLE CONDITION



- DISTURBED  
 - FAIR  
 - GOOD  
 - LOST

## SOIL PROFILE

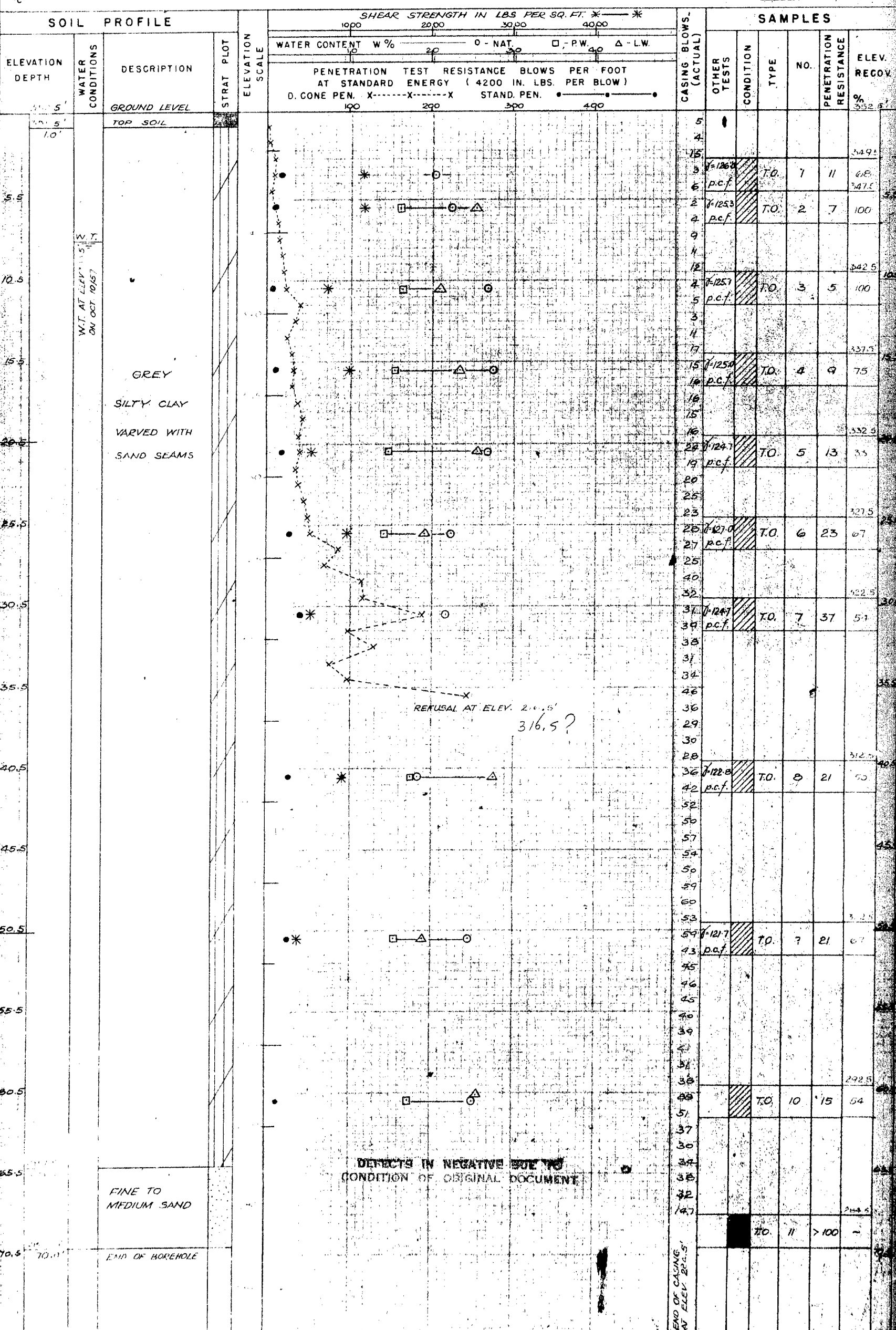
## SAMPLES



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

DRILL RIG 54-1 OPERATION BORE & PENET N JOB F-57-39 WP 57-58 BORING 3 STA. 760+86(31' LT)  
CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT NOV. 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 9 OCT. 1957

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



DRILL RIG 54-1 OPERATION PENETRATION JOB F-57-39 WP. 57-58 BORING 4 STA. 50+06 (23' RT.)  
CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT NOV 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 8 OCT. 1957

## SAMPLE TYPES

### SAMPLE CONDITION

C.S. - CHUNK	S.S. - SLEEVE SAMPLE
D.O. - DRIVE OPEN	P.S. - PISTON SAMPLE
D.F. - DRIVE FOOT VALVE	W.S. - WASHED SAMPLE
T.O. - THIN WALLED OPEN	R.C. - ROCK CORE

- DISTURBED
- FAIR
- GOOD
- LOST

## SAMPLES

[illegible]