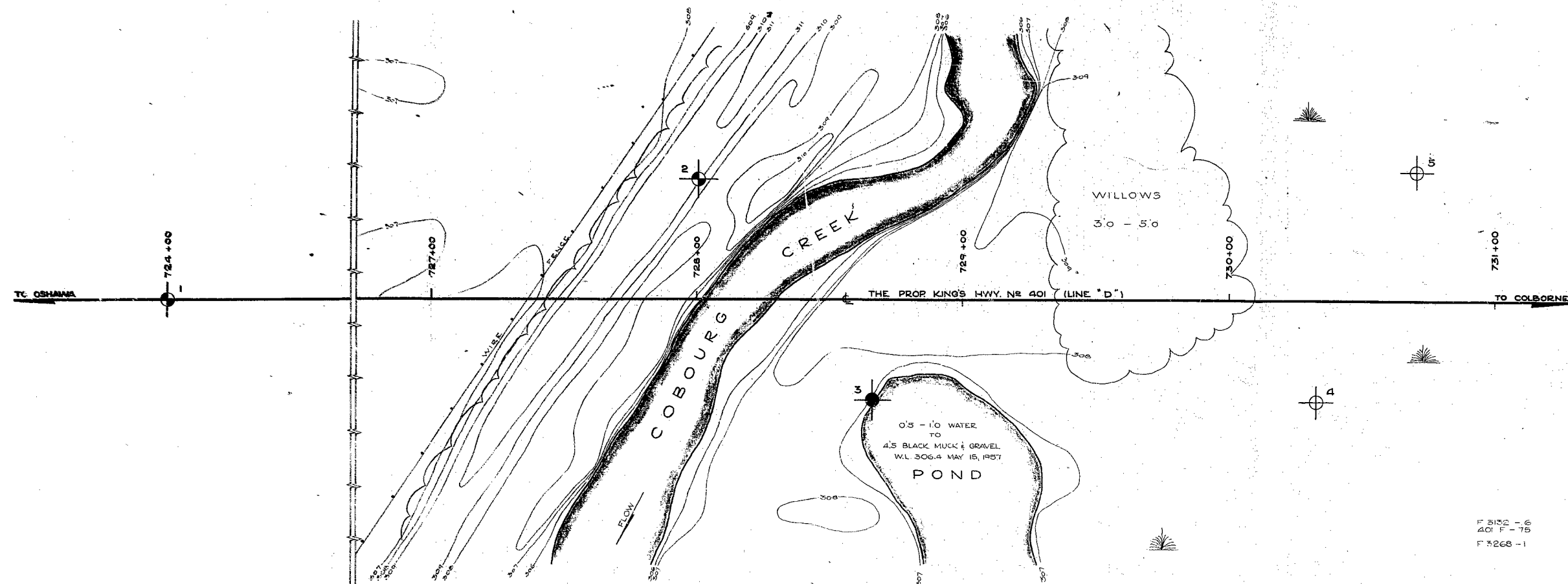
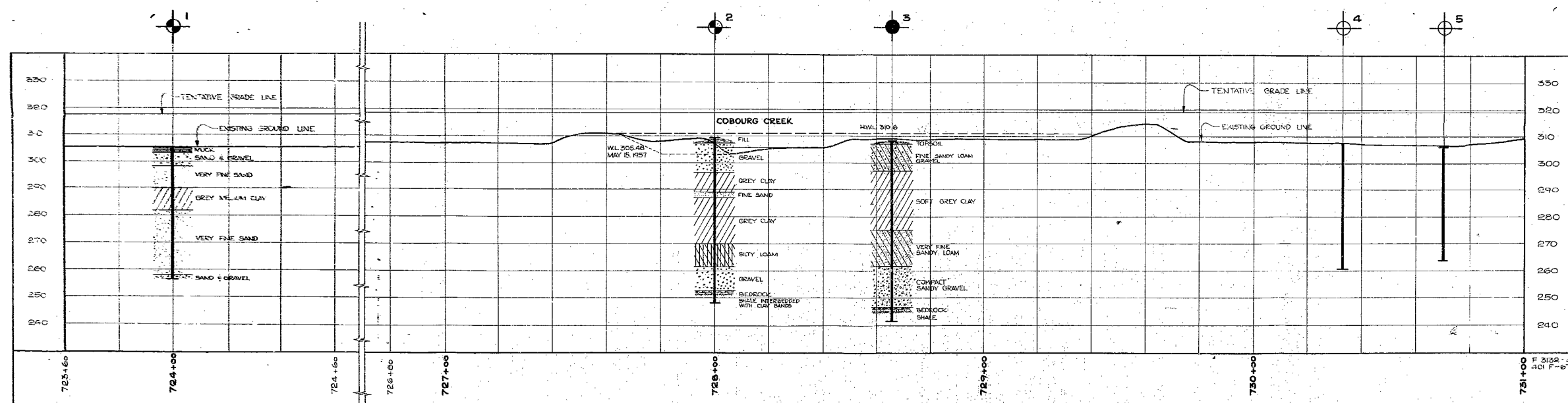


#57-F-21  
W.P.#51-57  
COBOURG  
CREEK  
1 MILE N. OF  
COBOURG

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



PLAN SCALE 1 IN. = 20 FT.



PROFILE SCALE 1 IN. = 20 FT.

LEGEND			
BORE HOLES			
PENETRATION HOLE			
BORE & PENETRATION HOLE			
HOLE NO.	ELEVATION	STATION	DISTANCE FROM 1
1	305.0'	724+00'	0
2	309.20'	728+00'	45' LT
3	308.15'	728+66'	38' RT
4	307.35'	730+33'	38' RT
5	305.95'	730+70'	48' LT

**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			
<b>COBOURG CREEK PROPOSED CROSSING 1 MILE N. OF COBOURG</b>			
THE KING'S HIGHWAY No. 401 (REV. LINE 'D')		DIV. No. 7	
NORTHUMBERLAND			
TWP. HAMILTON	LOT	CON	
POSITION & ELEVATION OF HOLES			
APPROVED			
ENGINEER		CHIEF ENGINEER	
DESIGN	CHECK	CONTRACT NUMBER	W.P.
DRAWING	D.F.	CHECK	51-57
TRACING	CHECK	LOGGING	
DATE AUGUST 15, 1957		DRAWING NUMBER F-57-21A	

cc: Foundation Section

Mr. A. Teye,  
Bridge Engineer.

September 5, 1957.

Materials & Research Section.

Re: Foundation Report -  
Cobourg Creek Crossing on Hwy. 401  
W.P. 51-57 - E.C. 10/21

---

We are forwarding herewith two copies of the above mentioned report. It is pointed out that the Cobourg Creek is quite meandering at this point and that some minor stream diversion will be required. It is believed that Mr. Wilkie from your office, has already looked into this factor. The subsoil, while primarily consisting of granular type material ranging from loose to a dense state of compaction, there is a clay layer up to 20 feet in depth and this makes the use of spread footings undesirable. It is, therefore, suggested that consideration be given to the use of a pile foundation. Piles should be driven to refusal.

AM/MdsP  
Attach.

cc: Messrs. H. Fregaskes  
D. G. Ramsay  
H. Duff

F. C. Brownridge,  
MATERIALS & RESEARCH ENGR.  
Per:

*A. Rutka*

(A. Rutka,  
Principal Soils Engr.)

Foundation Section ✓  
File

# FOUNDATION REPORT

on

New Bridge at Highway 401 crossing Cobourg Creek,  
about one mile North of Cobourg, Twp. of Hamilton.

Plan No. F-3132-6

Station: 728+20

## DISTRIBUTION:

Mr. A. Toye Bridge Engineer	(2)
Mr. H. Tregaskes Construction Engineer	(1)
Mr. D. G. Ramsay Design Engineer	(1)
Mr. H. D. Duff Dist. Eng. Port Hope	(1)
Foundation Section	(1)
FILE	(1)

W.P. 51-57

W.J. F-57-21

## INTRODUCTION

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

The location is at new Highway 401 crossing the Cobourg Creek, about one mile north of Cobourg, Township of Hamilton, (Profile No. F-3132-4, Sta. 728+20).

The work was started on June 17, 1957 and was completed on June 28, 1957.

## PROCEDURE

The investigation was carried out by means of skid mounted coredrill machine.

In the course of investigations three boreholes with dynamic cone penetrations and two separate dynamic cone penetration tests were made.

The location of the boreholes is shown on plan F-57-21A, and their elevations on log sheets under Appendix I.

## SUBSOIL FINDINGS AND ANALYSIS

At the site of the crossing the waters of the creek are meandering and have formed a wide swampy area, which ~~was~~ during flood seasons is all covered with water. It is also evident that in the course of time the creek waters have shifted about their bed in the area. To correct the situation the site was investigated by Bridge Office staff and necessary revisions proposed.

The subsoil investigations revealed the following stratigraphy:

Borehole No. 1 was made on centre line some 400 ft. west of the creek. Here the land is a depression and evidently is covered with flood water at times. Here, under topsoil (muck) there is a layer of sand and gravel which by depth becomes very fine sand and extends down to elevation 258 ft.

Interbedded in this sand layer is a layer of grey medium clay some 8 ft. thick, between elevations 290 - 282 ft. At elevation 258 ft. the layer changes into compact sand and gravel, and at elevation 256.6 ft. the borehole was stopped. This borehole was made for approach fill stability investigations. From the findings the calculations indicate that the layers are capable to support about 18 ft. of fill.

The boreholes No. 2 and 3 were made on both sides of the creek in order to investigate the support of the subsoil for the foundations of the proposed bridge. From the borings it was found that under the topsoil down to elevation about 297 ft. the layer is gravel mixed with loamy sand. Below the elevation 297 down to elevation about 270 ft. the layer is soft grey clay. From elevation 270 ft. down to 262 ft. the layer is silty, sandy loam. From elevation 262 ft. down to the bedrock (elevations 253 ft. in borehole No. 2, and 247 ft. in borehole No. 3) the layer is very dense sandy gravel.

If spread footings were considered, because of scouring hazard, it would be impractical to place them at a depth less than some 10 ft. below the ground level. At this depth they will be mainly supported by the underlying soft clay layer. The samples taken from this clay layer were tested in the laboratories. The results show that the soil here is inorganic clay of low plasticity. Its moisture content is about 25% and density 125 p.c.f. Unconfined compression tests performed in the laboratory gave values between 500-900 p.s.f. From these results this clay layer can not be considered competent to provide sufficient bearing value for supporting the spread footing foundations.

The sand and gravel layer which extends from elevation 262 ft. down to bedrock is very compact. Attempts to extract samples with all available means failed and more than 100 blows per foot penetration were registered on the sampler.

The casing was mostly drilled through this layer.

The bedrock was drilled with AXT bit and core samples extracted which proved to be shale.

#### CONCLUSIONS AND RECOMMENDATIONS

From the above discussion it follows that:

1. This site is undefined river bed due to the creek waters shifting their course continuously. A revision line for the final course of the creek waters was established by the Bridge Office staff.
2. This area is swampy and the subsoil material consists entirely of alluvial material. If spread footing type foundations were contemplated, due to scouring hazards a depth of at least 10 ft. from the ground level would be considered. This would put the burden of supporting these foundations on the underlying clay layer which extends from elevation about 297 ft. down to 270 ft. The results of both the field and laboratory test results indicate that this clay layer is soft, has high natural water content and the maximum unconfined compression test result obtained was 900 p.s.f. As such it can not be considered competent to provide desired supporting value for the foundations.
3. For practical bearing values it will be convenient to support the foundations on end bearing piles. Where it would be desirable to drive the piles to bedrock (elevation  $\pm$  250), it is expected that pile refusal will be met in the compact sand and gravel layer somewhere about elevation 260.
4. The tentative grade line at this crossing indicates an approach fill of some 10-15 ft. From the above observations this amount of approach fill to the structure will not present any stability problem. It is assumed that the fill will be mostly of granular material, and placed after removing the organic matter, and with 2:1 side slopes.

V. Korlu

Foundation Engineer

APPENDIX I



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

DRILL RIG 54-1 OPERATION BORI + PINET/N JOB F-57-21 WP 51-57 BORING 1 STA. 724+00 1/2  
CASING BA (standard samplers to fit unless noted) DATUM CEODITIC DATE REPORT AUG 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY AL CHECKED BY --- DATE BORING JUNE 19 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

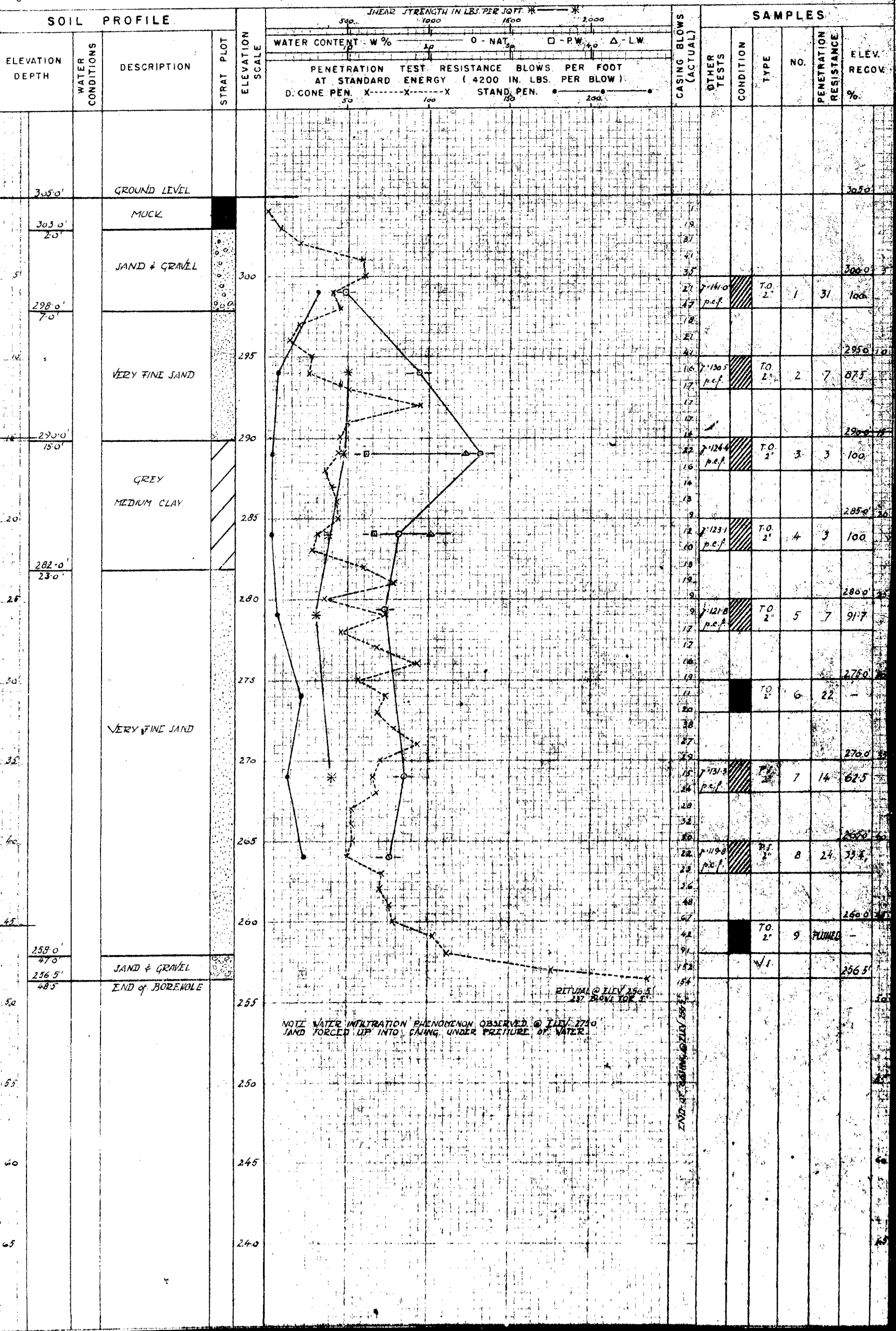
**SAMPLE TYPES**

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



DRILL RIG 54-1 OPERATION BORI + PINITIN JOB F-57-21 W.P. 51-57 BORING 2 STA. 728+00 (45' LT)  
CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT AUG 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY AL CHECKED BY     DATE BORING JUNE 21, 1957

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

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

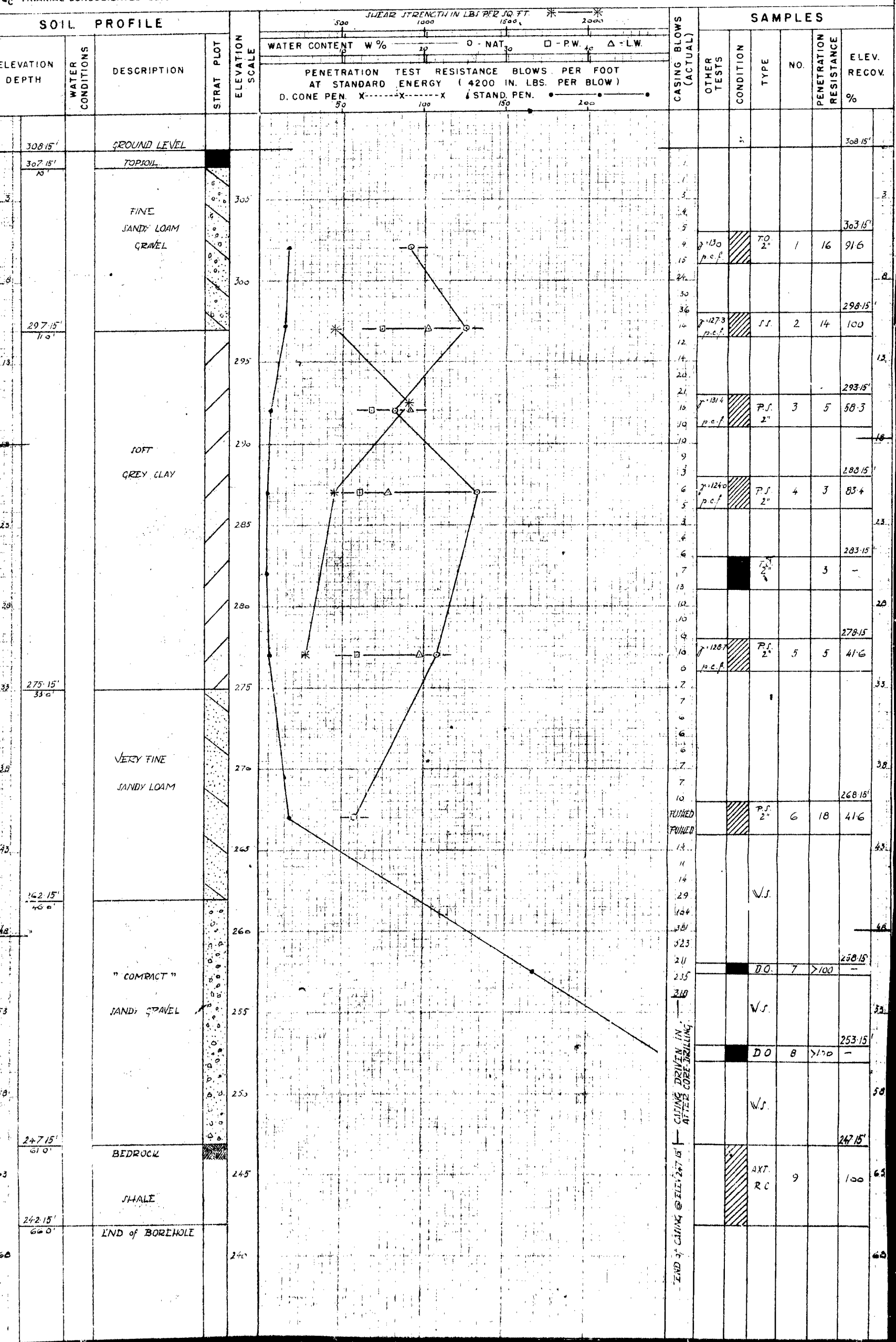
- DISTURBED
- FAIR
- GOOD
- LOST

[illegible]

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

DRILL RIG 54-1 OPERATION BORE JOB F-57-21 WP 51-57 BORING 3 STA. 728+60 (38' 27")  
CASING BX (standard samplers to fit unless noted) DATUM GEODITIC DATE REPORT AUG 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY AL CHECKED BY     DATE BORING JUNE 27 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  
C.S. - CHUNK  
D.O. - DRIVE OPEN  
D.F. - DRIVE FOOT VALVE  
T.O. - THIN WALLED OPEN  
S.S. - SLEEVE SAMPLE  
P.S. - PISTON SAMPLE  
W.S. - WASHED SAMPLE  
R.C. - ROCK CORE

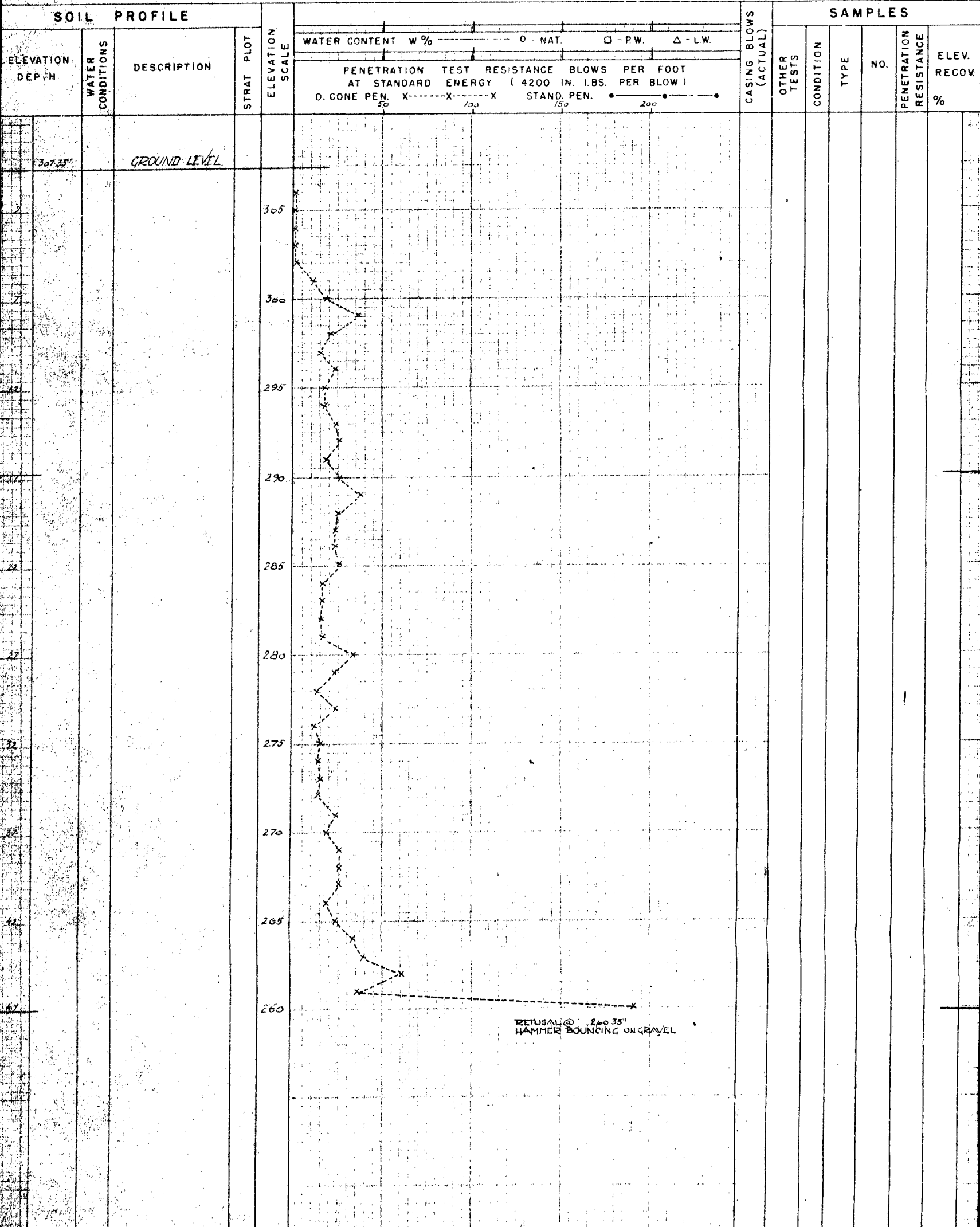


DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW  
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-1 OPERATION PINET'N JOB T-57-21 WP 51-57 BORING 4 STA. 730+33 (30 FT.)  
CASING 3X (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT AUG. 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY AL CHECKED BY DATE BORING JUNE 26 1957

ABBREVIATIONS SAMPLE TYPES SAMPLE CONDITION

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



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

DRILL RIG 54-1 OPERATION PININ JOB F-57-21 WP 51-57 BORING 5 STA 72+57.48(11)  
CASING 3X (standard samplers to fit unless noted.) DATUM GEODEIC DATE REPORT Aug 1957  
SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY AL CHECKED BY     DATE BORING JUNE 26, 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**

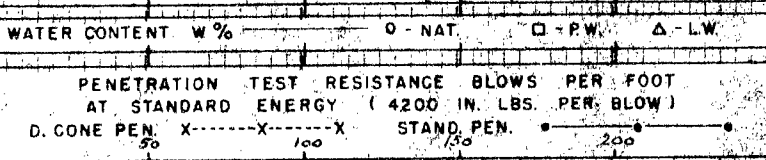


DISTURBED  
FAIR  
GOOD  
EQUI

**SOIL PROFILE**

ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT
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ELEVATION  
SCALE



**SAMPLES**

OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECON.
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