

Mr. A. Toye /

June 30, 1958.

Bridge Engineer.

Re: Foundation Investigation
Bridges #1018 and #1015 at
Junctions of Hwy. #401 & #27.

F. C. Brownridge, Mat. Laboratory, Toronto.

Attached are two copies of the report for the foundation investigations of the following bridge sites:

1. For proposed Bridge #1018.

The proposed elevation of the footings will be in dense clay till with a safe bearing capacity of two tons per square foot.

2. For proposed Bridge #1015.

The proposed footing elevation of 452.00 will be at the approximate top of a shallow layer of soft clay. The foundation of the bridge should therefore be carried to the firm clay till shown at approximate elevation 456.00.

FCH:NI


(F. C. Brownridge)
Materials & Research Engineer.

A.T:

Copies to: Mr. H. Tzagarakos, Construction Engineer,
Mr. F. Fowles, Civ. Engineer, Toronto.
Mr. C. Perantatos.

Reports on the
Foundation Investigations
for Bridges #101C & #101D at
the Interchange between
Highways 27 & 401.

Copies to:

Mr. A. Toye
Bridge Engineer (2)

Mr. J. Walter
Construction Engineer (1)

Project 54-P-32.

Mr. F. Fowles
Division Engineer, Toronto (1)

Mr. G. Parantatos (1)

File (1)

Index

Bridge #101C

	<u>Page</u>
Introduction	1
Procedure	1
Soil Stratigraphy & Tests	1
Recommendation	2
Conclusion	2

Bridge #101D

Introduction	3
Procedure	3
Soil Stratigraphy	3
Recommendation	3
Conclusion	4
Description of Auger holes	5

Index

Bridge # 101C

	<u>Page</u>
Introduction	1
Procedure	1
Soil Stratigraphy & Tests	1
Recommendation	1
Conclusion	2

Bridge # 101D

Introduction	2
Procedure	2
Soil Stratigraphy	2
Recommendation	2
Conclusion	3
Description of Power Auger holes	4

Introduction

A soils investigation has now been completed at the site of the proposed overpass bridge # 101C crossing leg 3 of the interchange between Highway 27 & Highway 401.

The exploration was made to determine the soil properties and recommend a suitable foundation.

Procedure

The investigation was carried out between March 31st & April 15, totalling four boreholes and six penetration tests. Records of these may be seen in Appendix I and their positions are shown on the attached plan # 54-F-32E.

Soil Stratigraphy & Tests

The first strata encountered was a medium to dense till varying in depth between 9 & 12'. This is underlain by a strata of sand, becoming gravel immediately above very dense clay till found at a depth of between 12.3 & 15'. Samples of each strata were obtained for strength and classification tests.

Recommendation

The proposed position of the foundation was found to lie in the bed of medium to dense till which has a minimum bearing capacity of 2.00 Tons per square foot.

It is therefore recommended that the proposed foundation level of 469.00 be adopted.

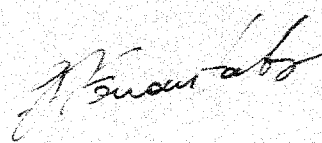
Conclusion

It is concluded that a foundation level of 469.00 is satisfactory.

The bearing capacity of the medium to dense clay till is 2 tons per square foot.

F. C. Brownridge
Materials & Research Engineer

Per:



GMF:GD

(G. H. Parantatos)

Report on a
Foundation Investigation
for the proposed Hwy. 27 overpass
bridge # 101 D.

Introduction

The following report is concerned with a soils investigation for the proposed Hwy. 27 overpass bridge # 101B, at the interchange between Hwy. 401 & 27.

The exploration was made to determine the soil properties and recommend a suitable foundation.

Procedure

The investigation was begun on March 17 and completed on March 29, it comprised four boreholes each with a preliminary penetration test and two power auger holes.

A record of each borehole and penetration is shown in Appendix II together with a description of the power auger holes.

Soil Stratigraphy & Tests

A bed of firm clay extends to between 5' & 8' depth becoming soft from 8 to 12', immediately below this is a layer of sand and gravel approximately 2' thick lying on very hard clay till, which, in two boreholes, was explored for 14'.

Samples of the clay layer were obtained to determine the bearing capacity.

Recommendation

As may be seen from the attached drawing, the proposed foundation level of the spread footing, at 462.00 occurs just above and partially in the boundary between a firm clay and a soft clay, the latter having a bearing capacity of approximately .1 ton per square foot.

It is therefore recommended that the footings be supported on short piles bearing on the clay till, found at an approximate elevation of 456.00.

Recommendation (cont.)

The greatest depth at which it occurs is $13\frac{1}{2}$ feet; it is therefore suggested that a Power auger be used to bore holes to the clay till, which could then be filled with concrete to the level of the underside of the footing, which will become a pile cap, forming cast in site piles approximately 6' long.

There is a possibility that holes drilled east of Highway 27 will flood to an elevation of 460.00 feet.

Should it be preferred to drive timber piles, it is predicted that they will reach refusal at an elevation of 456.00 in the clay till.

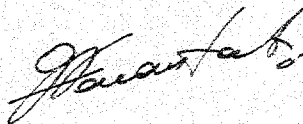
Conclusion

The proposed foundation level is unsatisfactory due to lack of bearing capacity.

The footing should be supported on cast in site piles, constructed by filling in power auger holes with concrete to an elevation of 462.00.

F. C. Brownridge
Materials & Research Engineer

Per:



(G. N. Farantatos)

GNF:OD

Description of power auger holes.

#5

0-6' Clay
6-10' Soft organic clay
10-12½ Sand and gravel
12½ Clay till

#6

0-7' Clay
7'-9' Soft organic clay
9'-12' Sand and gravel
12 Clay till.

APPENDIX I

APPENDIX II

54-F-32

Hwys. #27 & 401

BRIDGES #101C & #101D

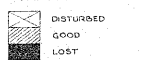
INTERCHANGE

TL 159
34-90

MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - OHIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG CORE DRILL #1
CASING D.A. (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT. 250 LBS. # DROP 22 INCHES
JOB F-54-32
DATUM 449.03 5TH 238+02.43 RT HW/12/77
COMPILED BY P.B. CHECKED BY
DATE REPORT BORING DATE 17-3-55

SAMPLE CONDITION



SAMPLE TYPES

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

ABBREVIATIONS

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

SOIL PROFILE

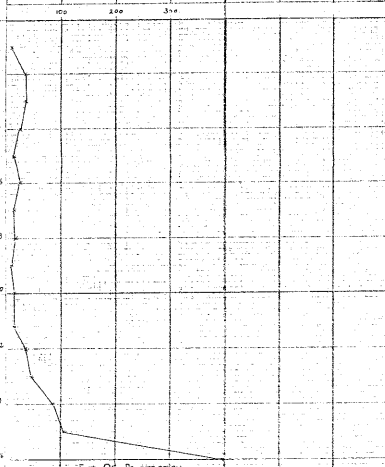
SHEAR STRENGTH
TONS/SQ FT OR Q_u/2

WATER CONTENT
W %

SAMPLES

PENETRATION TEST
RESISTANCE BLOWS PER FOOT
CORRECTED TO STANDARD ENDS OF 1200 IN LB

ELEV. DEPTH
WATER CONDITIONS
DESCRIPTION
START PLOT
ELEVATION
SCALE
449.03
W.L.
5.00
458.23
11.00
456.53
12.50
459.03
END OF BORE HOLE



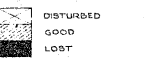
OTHER TESTS
CONDITION
TYPE
NO
PENETRATION
RESISTANCE
ELEV. RECON.
%

TL 159
34-90

MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - OHIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG CORE DRILL #1
CASING D.A. (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT. 250 LBS. # DROP 22 INCHES
JOB F-54-32
DATUM 449.03 5TH 238+02.43 RT HW/12/77
COMPILED BY P.B. CHECKED BY
DATE REPORT BORING DATE 18-3-55

SAMPLE CONDITION



SAMPLE TYPES

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

ABBREVIATIONS

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

SOIL PROFILE

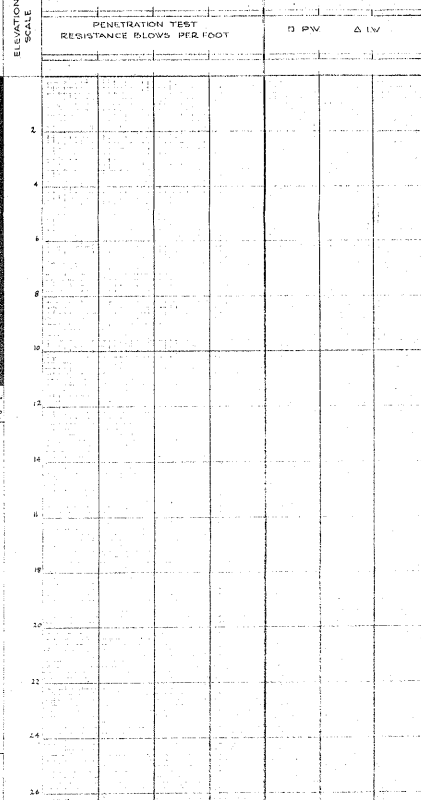
SHEAR STRENGTH
TONS/SQ FT OR Q_u/2

WATER CONTENT
W %

SAMPLES

PENETRATION TEST
RESISTANCE BLOWS PER FOOT

ELEV. DEPTH
WATER CONDITIONS
DESCRIPTION
START PLOT
ELEVATION
SCALE
449.03
W.L.
5.5
449.73
9.5
458.03
11.00
456.53
12.50
458.53
12.50
END OF BORE HOLE



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

7-109
54-90

MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG: CORE DRILL #1
CASING: Ds (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT: 450 #
JOB: F-54-32
DUM: 412.12, STN: 238+55, RT: 43 HWY: 47
DATE REPORT: BORING DATE: 22-3-55

SAMPLE CONDITION



DISTURBED
GOOD
LOST

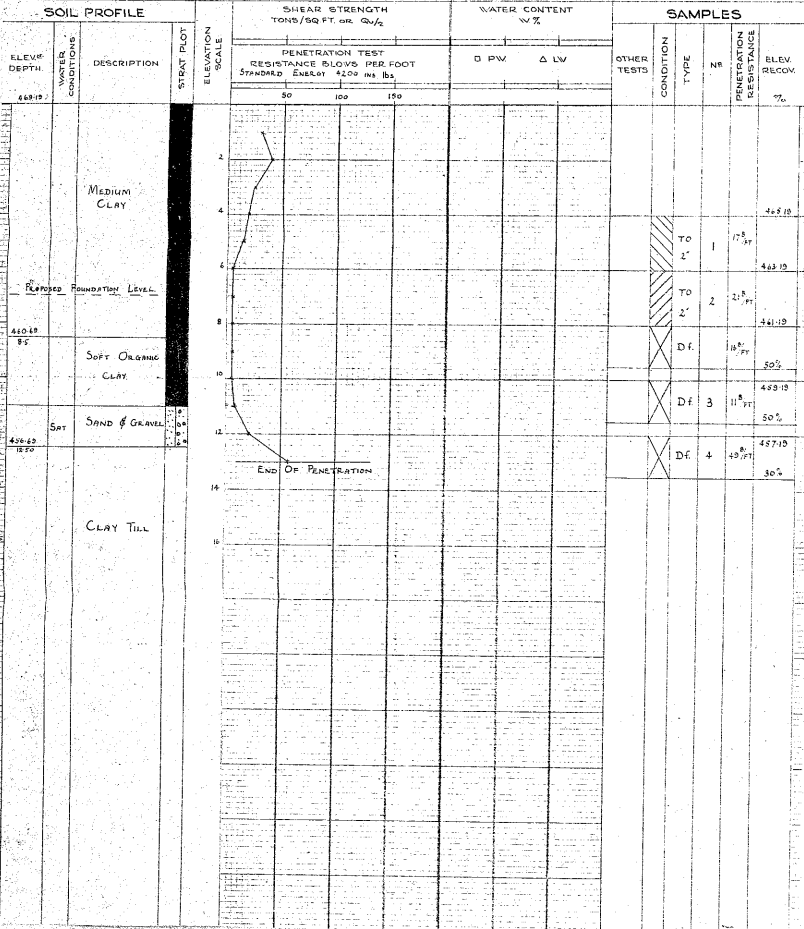
SAMPLE TYPES

C-S - CHUNK
D-O - DRIVE OPEN
D-F - DRIVE FOOT VALVE
TO - THIN WALLED OPEN
W-S - WASHED SAMPLE
RC - ROCK CORE

ABBREVIATIONS

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

SOIL PROFILE



7-109
54-90

MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG: CORE DRILL #1
CASING: Ds (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT: 450 lbs
JOB: F-54-32
DUM: 412.16, STN: 238+56, RT: 43 HWY: 47
DATE REPORT: BORING DATE: 23-3-55

SAMPLE CONDITION



DISTURBED
GOOD
LOST

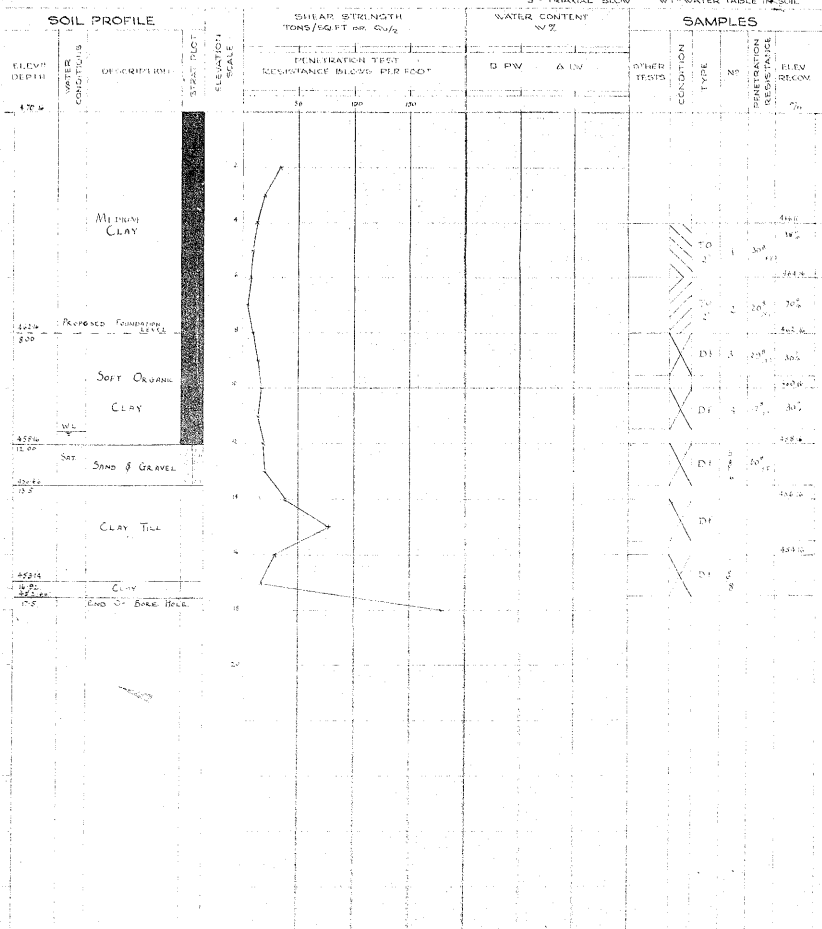
SAMPLE TYPES

C-S - CHUNK
D-O - DRIVE OPEN
D-F - DRIVE FOOT VALVE
TO - THIN WALLED OPEN
W-S - WASHED SAMPLE
RC - ROCK CORE

ABBREVIATIONS

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

SOIL PROFILE



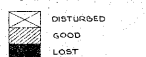
PL 119
54-90

MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS - OHIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL NO. CORE DRILL #1
CASING BA. (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT. 250 LBS. # DROP 22 INCHES

DATE REPORT 46 F-54-32
DATE BORING 24-3-58
BORING NO. 1
STATION 474.43
CHECKED BY P.B.L.

SAMPLE CONDITION



SAMPLE TYPES

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

ABBREVIATIONS

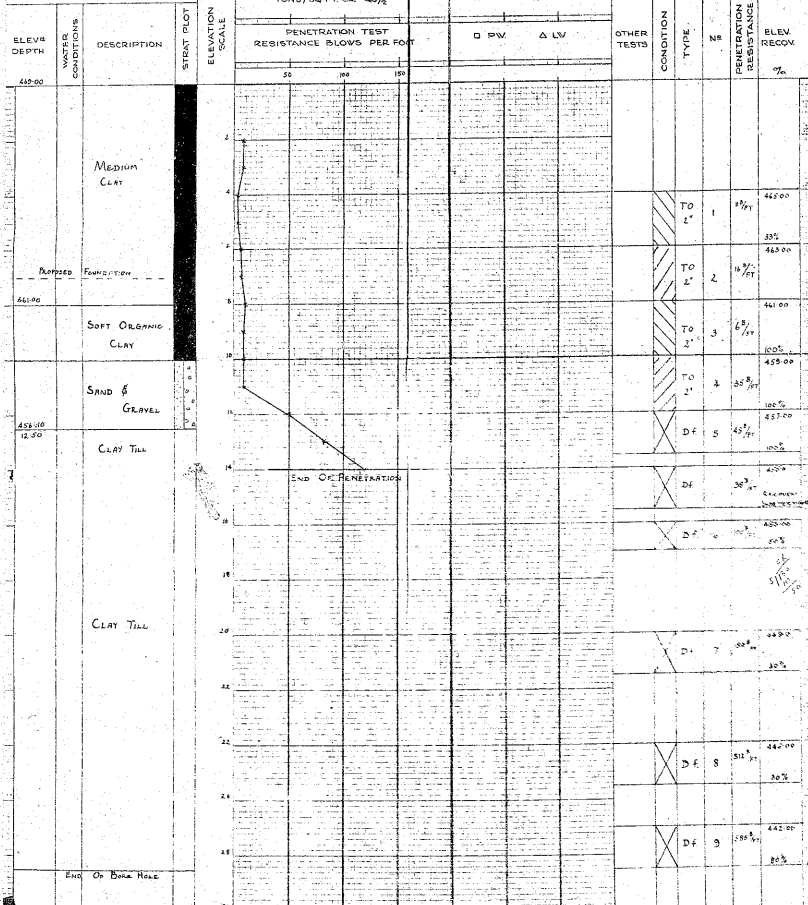
V - IN-SITU VANE SHEAR TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Q - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
K - PERMEABILITY
C - CONSOLIDATION
CA - CASING
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

SOIL PROFILE

SHEAR STRENGTH
TONS/SQ. FT. OR LB./SQ. IN.

WATER CONTENT
W %

SAMPLES



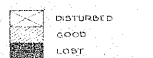
PL 119
54-90

MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS - OHIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL NO. CORE DRILL #1
CASING BA. (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT. 250 LBS. # DROP 22 INCHES

DATE REPORT 46 F-54-32
DATE BORING 24-3-58
BORING NO. 5
STATION 474.43
CHECKED BY P.B.L.

SAMPLE CONDITION



SAMPLE TYPES

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

ABBREVIATIONS

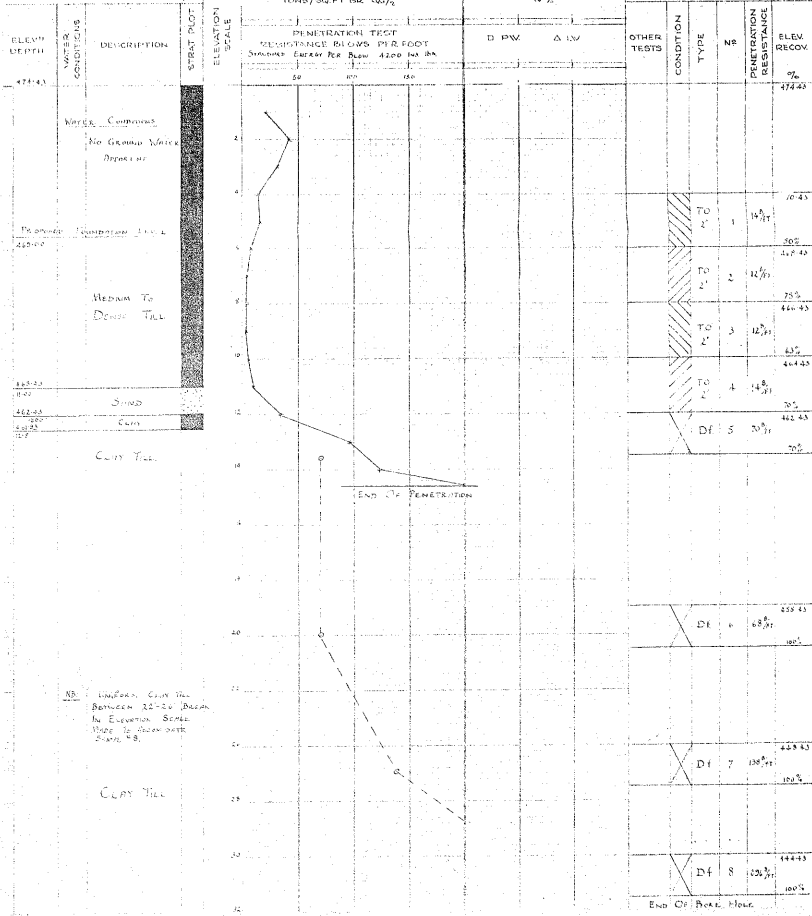
V - IN-SITU VANE SHEAR TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Q - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
K - PERMEABILITY
C - CONSOLIDATION
CA - CASING
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

SOIL PROFILE

SHEAR STRENGTH
TONS/SQ. FT. OR LB./SQ. IN.

WATER CONTENT
W %

SAMPLES



MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS-ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG CORE DRILL #4 MOBILE UNIT
CASING B. (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLED HAMMER WT 250 * DROP 22 INCHES

JOB 54-F-32. INTERCHANGE OF 40167 BORING NO. 6
DATUM EL. 4757, STA. 38+37, RT. 13. LEG. DATE REPORT
COMPILED BY P.B.L. CHECKED BY P.B.L. BORING DATE 122 APRIL 55.

SAMPLE CONDITION



DISTURBED
GOOD
LOST

SAMPLE TYPES

C.S. - CHUNK
D.O. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE
T.O. - THIN WALLED OPEN

WS - WASHED SAMPLE
RC - ROCK CORE

ABBREVIATIONS

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

SOIL PROFILE

ELEVATION DEPTH	TEST CONDITIONS	DESCRIPTION	STAIN COLOR	ELEVATION
478.70				
	WELL NO. 170	MEDIUM TO DENSE TILL		
	PROPOSED FOUNDATION LEVEL 469.0			
469.7 12.0		SAND		
459.70				
458.70 17.00		GRAVEL	0 + 200 0.0	
		CLAY TILL INTERSPERSED WITH LENTERS OF ROCK		
450.05 28.65		END OF BORE HOLE		

TEST PLOT	VARIATION SCALE	SHEAR STRENGTH TONS/SQ.FT. OR $Q_{u/2}$
		PENETRATION TEST RESISTANCE BLOWS PER FOOT

WATER CONTENT
W %

SAMPLES

[illegible]

		W.S	6	450°
		DO	7	330° 50° 30'
		DO	8	32 3/4° 5° = 75°
		DO	9	42 1/2° 50 3/4° 450° 80°

MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS - 0117210
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG - MU
CASING 3" Bx (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT - 250 DROP IN INCHES

JOB 54-F-32 BORING NO 7
 DATUM STA 38+26.23 O.R.T. EL 474.7' Loc. E DATE REPORT 16 APRIL 1955
 COMPILED BY S.T.B. CHECKED BY P.B.J. BORING DATE 14 APR 55

SAMPLE CONDITION



DISTURBED
GOOD
LOST

SAMPLE TYPES

W.S. - WASHED SAMPLE
R.C. - ROCK CORE

ABBREVIATIONS

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

SOIL PROFILE

ELEV DEPTH	WATER CONDITIONS	DESCRIPTION	SPRINT PLAT
274.7 20		SOFT CLAY FILL	
273.9 27			
270.7 40	▼ 34.7		
269.0 41.7	WATER, BOTTOM FOOTING	MEDIUM TO V. DENSE TILL	
263.1 47.8			
END OF BOKE HOLE			

• CONC. PENETRATION TEST
RESISTANCE BLOWS PER FOOT
X STD. PENETRATION TEST.

WATER CONTENT
W %

SAMPLES

OTHER TESTS	CONDITION	TYPE	NR	PENETRATION RESISTANCE	RELEV
				%	497.7
					471.5
					507.5
		Do	1	2.5	463.7
		Cd	2		443.7
					100.5
		To	3	2.85	
					43.3
					466.
		Do	4	98.8	465
					117
					51
					482.7
		Do		100% PASS	

END OF BORE HOLE.

REVENUE	At 12-31
---------	----------

MATERIALS LABORATORY DEPARTMENT OF HIGHWAYS - CHICAGO
 OFFICE REPORT ON SOIL EXPLORATION

 DRILL NO. MU JOB 54-E-32 BORING NO. 3
 CASING 3" DIA. (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATE REPORT 16 APRIL 1955
 SAMPLER HAMMER WT. 250 DROPS 1 DATUM JTB 386.66 EL. 473.1 BORING DATE 15 APR 55
 CHECKED BY JTB

SAMPLE CONDITION



SAMPLE TYPES

 CS - CHUNK
 DO - DRIVE OPEN
 DF - DRIVE FOOT VALVE
 V/S - WASHED SAMPLE
 TO - THIN WALLED OPEN
 RC - ROCK CORE

ABBREVIATIONS

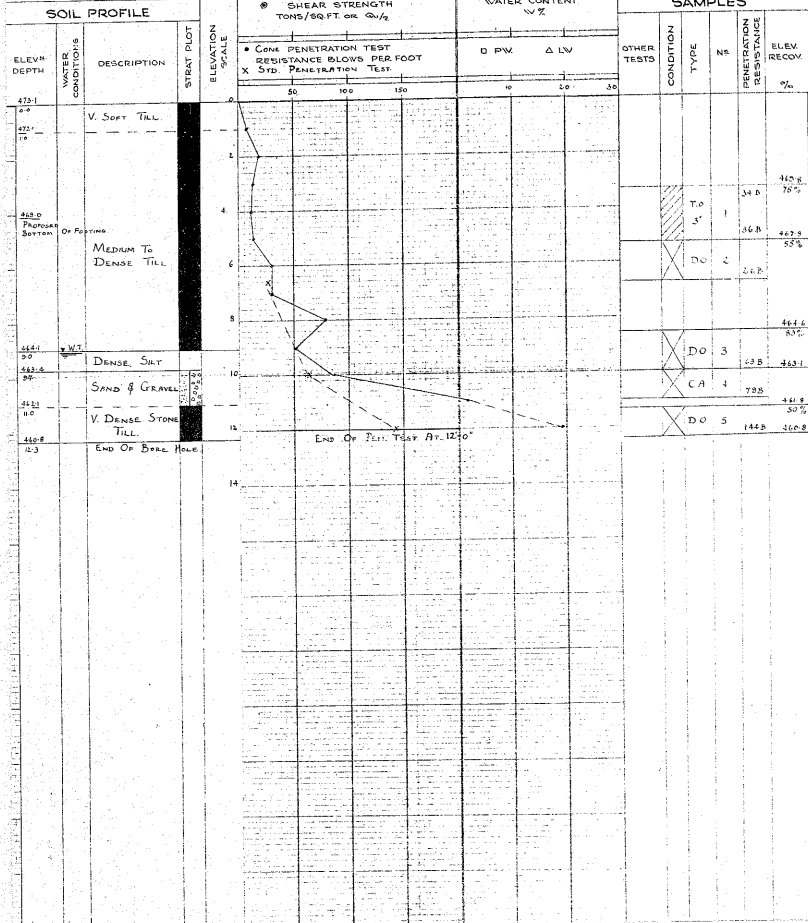
 V - INSITU VANE SHEAR TEST
 M - MECHANICAL ANALYSIS
 U - UNCONFINED COMPRESSION
 Q - TRIAXIAL CONSOLIDATED QUICK
 G - TRIAXIAL QUICK
 S - TRIAXIAL SLOW
 γ - UNIT WEIGHT
 K - PERMEABILITY
 C - CONSOLIDATION
 CA - CASING
 WL - WATER LEVEL IN CASING
 WT - WATER TABLE IN SOIL

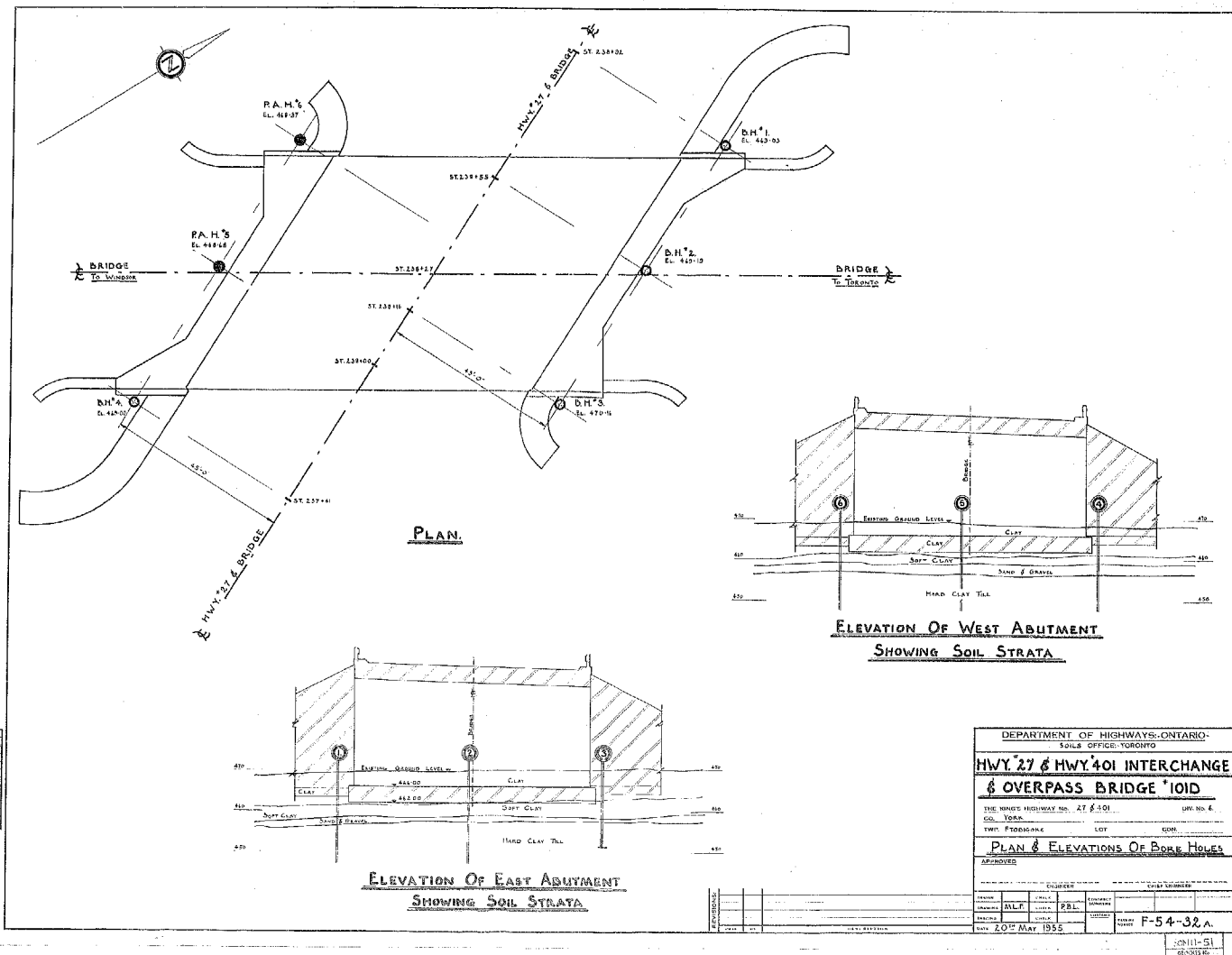
SOIL PROFILE

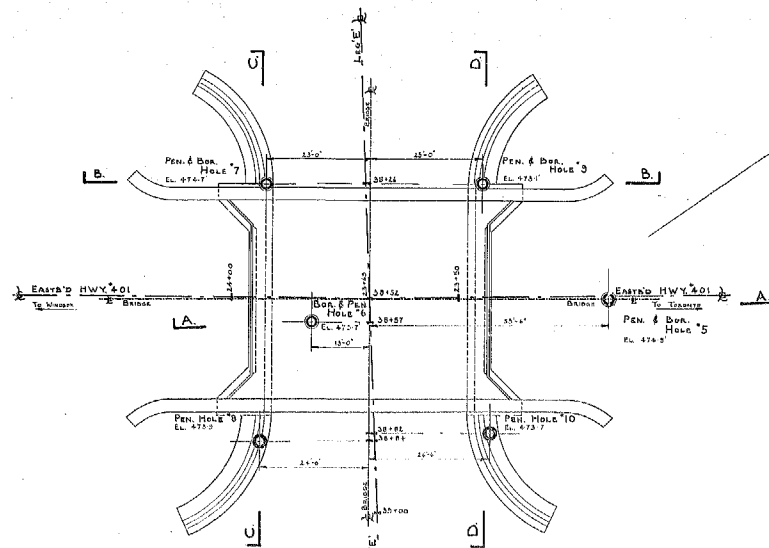
 SHEAR STRENGTH
 TONS/SQ. FT. OR LB./SQ.

 WATER CONTENT
 %

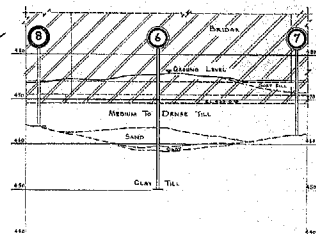
SAMPLES



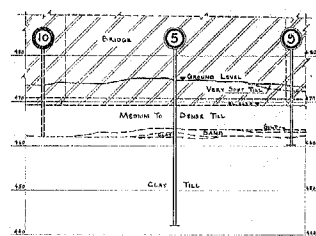




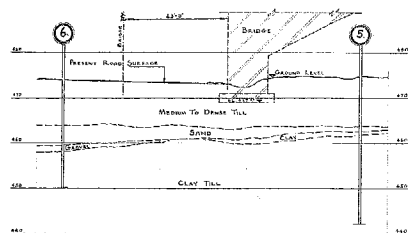
PLAN



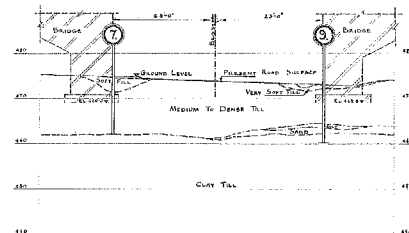
C-C



D-D



A-A



B-B

SECTIONS SHOWING EARTH STATE

LEGEND:

- PENETRATION HOLES
- ⊗ PENETRATION & BOX HOLES

SCALE: 1 inch = 10 FEET

DATE	BY	CHKD

DEPARTMENT OF HIGHWAYS, ONTARIO			
INTERCHANGE OF HWY'S 27 & 401			
LEG 'E' OVERPASS BRIDGE 101C			
THE KING'S HIGHWAY NO. 27 & 401		REV. NO. 6	
CON. YORK		CON. YORK	
TWN. ETOBICOKE		CON. ETOBICOKE	
PLAN & SECTIONS THROUGH PEN. & BOR. HOLES			
APPROVED			
DESIGNED		CHECKED	
DATE	BY	DATE	BY
3 RD JUNE 1955	F-54-32b		