

#55-F-24

HWY. #17

OVER THE

GOULAIS RIVER



DRILL RIG C-1084 (5A-2)
CASING BX (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT 250 DROP INCHES

JOB P-55-24 BORING No. 1
 DATUM STA 818+77.3 RT Elev 385.5 DATE REPORT October 1, 1955
 COMPILED BY STC CHECKED BY STC BORING DATE Sept. 29, 1955

SAMPLE CONDITION

DISTURBED
GOOD
LOST

SAMPLE TYPES

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

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 W_L-WATER LEVEL IN CASING
 S - TRIAXIAL SLOW W.T-WATER TABLE IN SOIL

JCB F 55-241 BORING NO. 2
DATUM STA 815+43 1st Elev 584.7 DATE REPORT 3 OCT 55
COMPILED BY STB CHECKED BY STB BORING DATE 1 OCT 55

SAMPLE CONDITION



DISTURBED
GOOD
LOST

SAMPLE TYPES

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

ABBREVIATIONS

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	STRAT. PLOT	ELEVATION SCALE	* STD. PENETRATION TEST RESISTANCE BLOWS PER FOOT <small>Std. Energy - 100 ft.-lb.</small>	P.W.	Δ LW	OTHER TESTS	CONDITION TYPE	Nº	PENETRATION RESISTANCE	ELEV. RECOV.
											%	
0 585.3 6.0 584.4 1-1		SANDY GRAVEL (FILL)		0	25	Do	T.D.					585.3
				5								
				10					X	W.S.	1	579.3 0%
10 579.0 10.5		VERY LOOSE, COARSE SAND WITH SOME VEGETATION		15					D.O.	4B	578.5 0%	
				20								
				25								
				30								
				35								
35 550.0 26.5 523.5 28.0		CLAY		40								
				45								
				50								
50 536.0 39.5		LOOSE, SANDY SILT		55								
				60								
				65								
				70								
				75								
				80								
				85								
				90								
				95								
				100								
				105								
				110								
				115								
				120								
				125								
				130								
				135								
				140								
				145								
				150								
				155								
				160								
				165								
				170								
				175								
				180								
				185								
				190								
				195								
				200								
				205								
				210								
				215								
				220								
				225								
				230								
				235								
				240								
				245								
				250								
				255								
				260								
				265								
				270								
				275								
				280								
				285								
				290								
				295								

DRILL RIG C-1084 (54-2)
CASING BY (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT 250 # DROP INCHES

JCB F 55-241 BORING NO. 2
DATUM STA 815+43 1st Elev 584.7 DATE REPORT 3 OCT 55
COMPILED BY STB CHECKED BY STB BORING DATE 1 OCT 55

SAMPLE CONDITION

DISTURBED
GOOD
LOST

SAMPLE TYPES

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

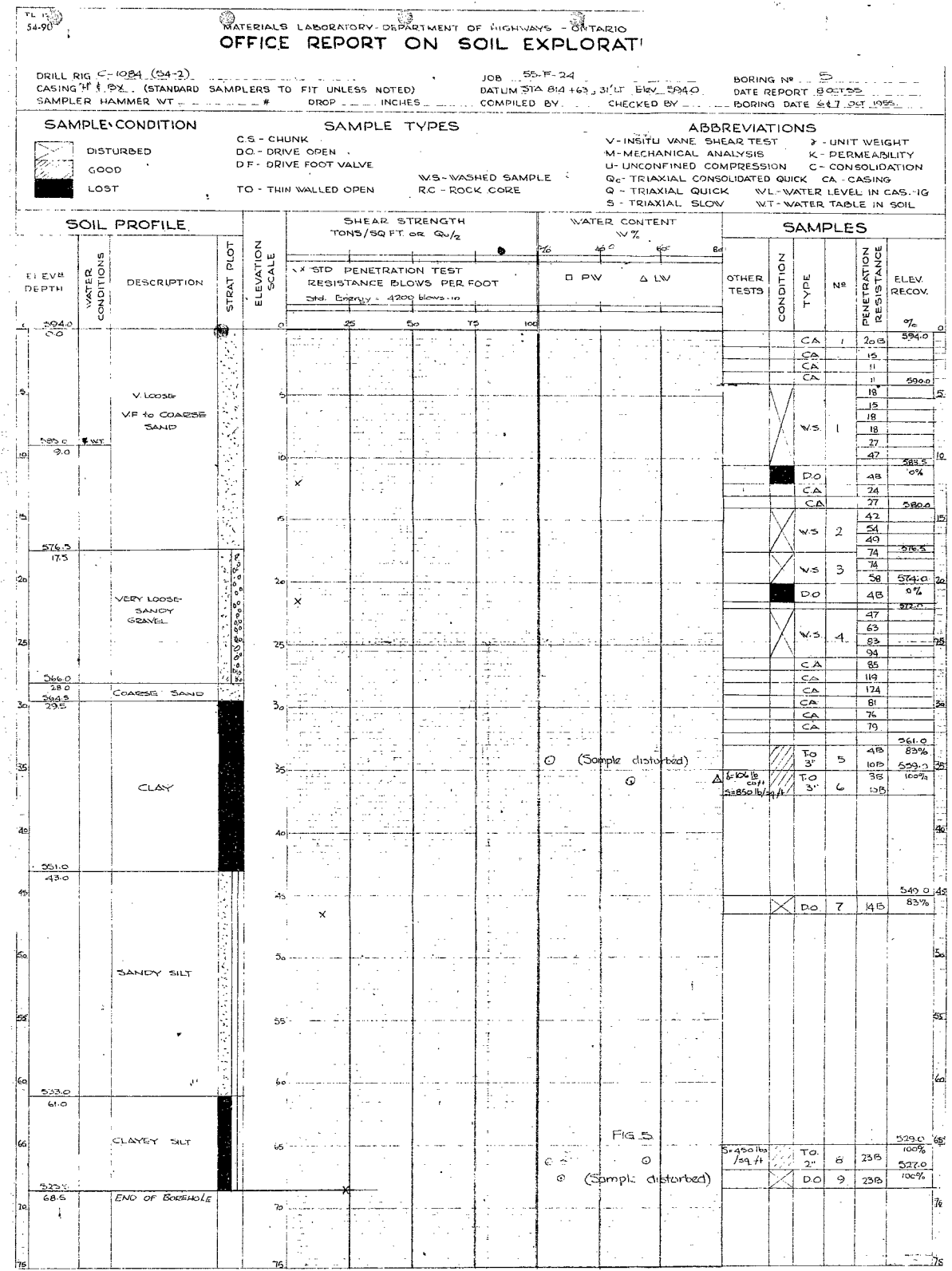
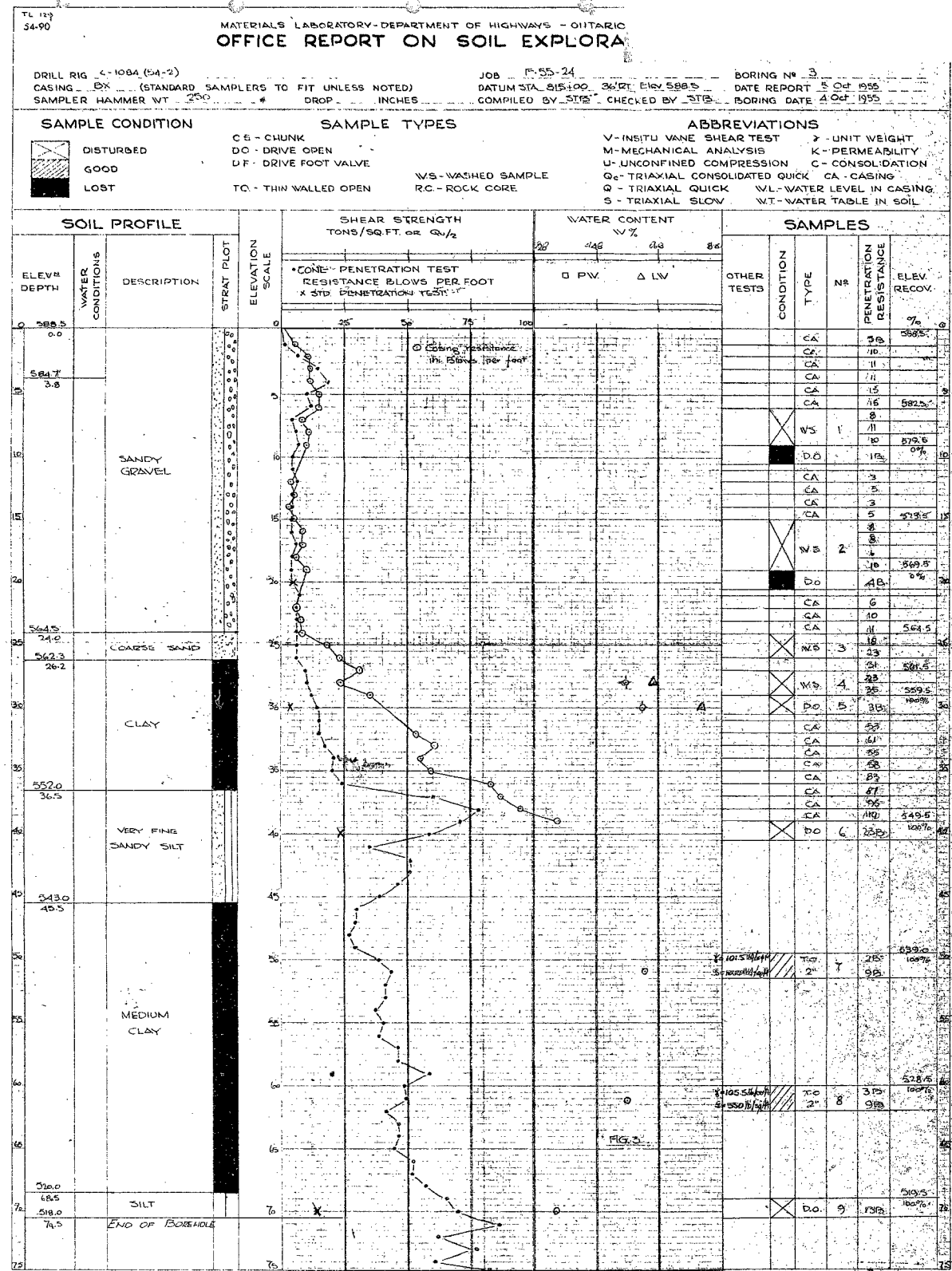
ABBREVIATIONS

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

[illegible]



BORING NO. 7
DATE REPORT 12 OCT 1955
BORING DATE 11-12 OCT 1955

SAMPLE TYPES

CS - CHUCK
DO - DRIVE OPEN
DF - DRIVE FOOT VALVE
TO - THIN WALLED OPEN

WS - 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
 Qc- TRIAXIAL CONSOLIDATED QUICK CA- CASING
 Q - TRIAXIAL QUICK WL- WATER LEVEL IN CASING
 S - TRIAXIAL SLOW WT- WATER TABLE IN SOIL

SOIL PROFILE

ELEV ² DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT
0 597.5 0.0			
5 595.0 2.5		TOPSOIL	
5 589.5 8.0		V LOOSE VF SAND	
10 581.5 16.0		SILT WITH VEGETATION (PEAT)	
20 574.5 28.0		LOOSE SANDY GRAVEL	
26		CLAY	
30 567.0 30.5			
35			
40 553.0 44.5		V LOOSE to LOOSE SANDY SILT	
45		CLAY	
50 547.5 50.0			
53 539.5 58.0		SILTY SAND	
60			
65		CLAY	
70			
72 524.5 73.0 522.5		MEDIUM SILTY SAND	

SHEAR STRENGTH
TONS/SQ.FT OR $Q_{v/c}$

WATER CONTENT
W %

SAMPLES

OTHER TESTS	CONDITION	TYPE	Nº	PENETRATION RESISTANCE	ELEV. RECOV.
		CA		5B	567.5
		CA		6	
		CA		5	
		CA		3	
		CA		3	591.5
		CA		6	
		DO	2	1B	588.0
		CA		5	74%
		CA		13	
		CA		11	
		CA		8	
		CA		3	
		WS	3	8	280.0
		DO		21	
		WS		11B	588.0
		WS		11	0%
		CA	4	13	574.5
		CA		20	
		CA		23	
		CA		51	
		CA		41	
		CA		41	568.5
		TO 2"	D	3B	54%
		CA		11B	
		CA		3B	
		CA		31	
		CA		30	
		CA		43	
		CA		46	564.5
		WS	6	50	
		DO		20	
		DO		61	558.0
		DO	9B		0%
		TO 2"			548.0
		TO 2"			0%
		DO	7	4B	588.0
		DO			100%
		TO 2"	8	3B	583.5
		TO 2"		6B	100%
		DO		20B	584.0
		DO			0%

REFUSAL AT 80' 0" with 107 Blows per foot

BORING NO. 9
DATE REPORT October 15, 55
BORING DATE October 14, 55

SAMPLE CONDITION

CS - CHUCK
DO - DRIVE OPEN
DF - DRIVE FOOT VALVE
TO - THRU WALLED OPEN

WS - WASHED SAMPLE
RC - ROCK CORE

ABBREVIATIONS

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

ELEV ⁿ DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT
0 595.3 5.0		TOPSOIL	
595.3 2.0			
5 595.3 19.5		VERY LOOSE SILTS & FINDS WITH VEGETATION (PEAT)	
20 595.3 19.5		LOOSE SILTY SAND	
25 595.3 28.5		CLAY	
30 595.3 38.0		LOOSE SANDY SILT	
35 595.3 38.0		CLAY	
40 595.3 40.2		LOOSE SILTY SAND	
45 595.3 48.5		CLAY	
50 595.3 67.0		LOOSE TO MEDIUM SILT	
55 595.3 67.0		Very Dense Silty Sand	
60 595.3 67.0		END OF BORHOLE	

SHEAR STRENGTH
TONS/SQ FT. OR Q_u/ϕ

WATER CONTENT
W. %

SAMPLES

K. STD. PENETRATION TEST
RESISTANCE BLOWS PER FOOT

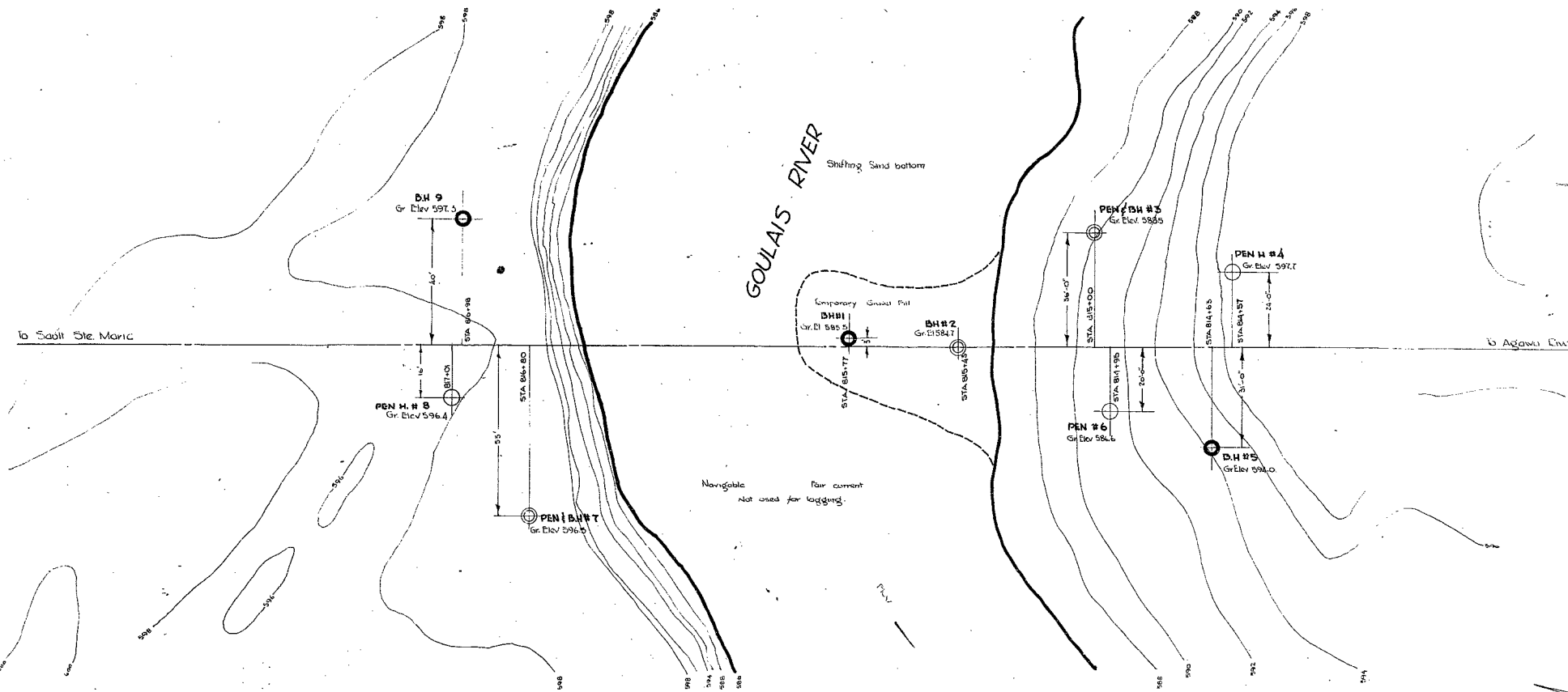
Net Energy - 1200 lbs./in

ELEVATION SCALE

O Casing Resistance

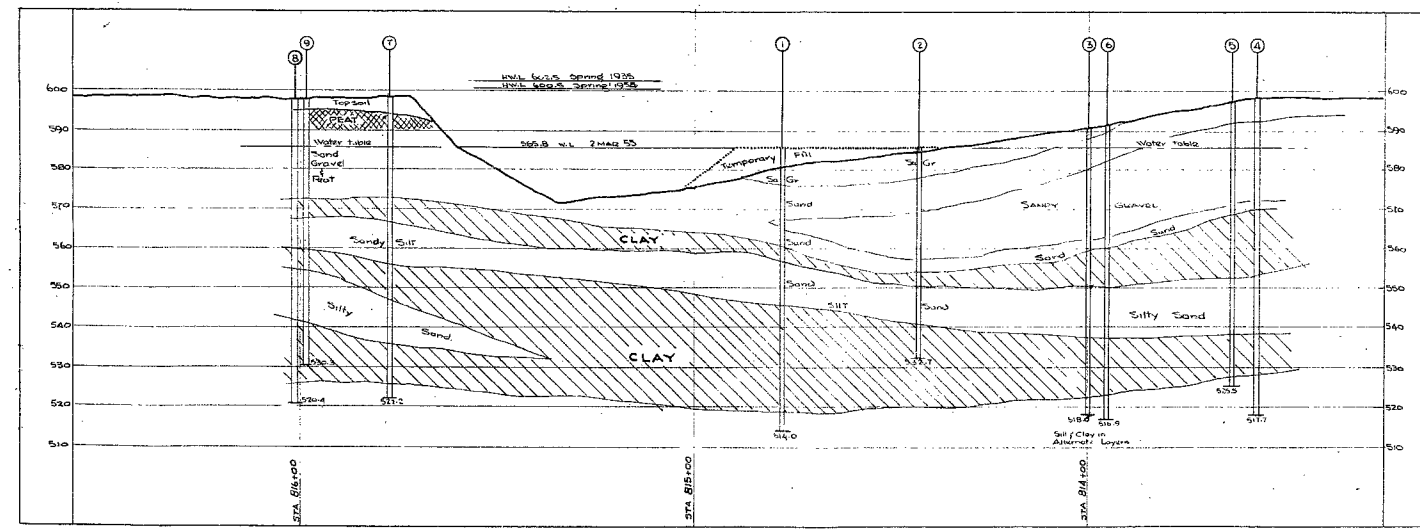
Elevation Scale	Resistance Blows per Foot
2.5	10
3.0	10
3.5	10
4.0	10
4.5	10
5.0	10
5.5	10
6.0	10
6.5	10
7.0	10
7.5	10
8.0	10
8.5	10
9.0	10
9.5	10
10.0	10
10.5	10
11.0	10
11.5	10
12.0	10
12.5	10
13.0	10
13.5	10
14.0	10
14.5	10
15.0	10
15.5	10
16.0	10
16.5	10
17.0	10
17.5	10
18.0	10
18.5	10
19.0	10
19.5	10
20.0	10
20.5	10
21.0	10
21.5	10
22.0	10
22.5	10
23.0	10
23.5	10
24.0	10
24.5	10
25.0	10
25.5	10
26.0	10
26.5	10
27.0	10
27.5	10
28.0	10
28.5	10
29.0	10
29.5	10
30.0	10
30.5	10
31.0	10
31.5	10
32.0	10
32.5	10
33.0	10
33.5	10
34.0	10
34.5	10
35.0	10
35.5	10
36.0	10
36.5	10
37.0	10
37.5	10
38.0	10
38.5	10
39.0	10
39.5	10
40.0	10
40.5	10
41.0	10
41.5	10
42.0	10
42.5	10
43.0	10
43.5	10
44.0	10
44.5	10
45.0	10
45.5	10
46.0	10
46.5	10
47.0	10
47.5	10
48.0	10
48.5	10
49.0	10
49.5	10
50.0	10
50.5	10
51.0	10
51.5	10
52.0	10
52.5	10
53.0	10
53.5	10
54.0	10
54.5	10
55.0	10
55.5	10
56.0	10
56.5	10
57.0	10
57.5	10
58.0	10
58.5	10
59.0	10
59.5	10
60.0	10
60.5	10
61.0	10
61.5	10
62.0	10
62.5	10
63.0	10
63.5	10
64.0	10
64.5	10
65.0	10
65.5	10
66.0	10
66.5	10
67.0	10
67.5	10
68.0	10
68.5	10
69.0	10
69.5	10
70.0	10
70.5	10
71.0	10
71.5	10
72.0	10
72.5	10
73.0	10
73.5	10
74.0	10
74.5	10
75.0	10
75.5	10
76.0	10
76.5	10
77.0	10
77.5	10
78.0	10
78.5	10
79.0	10
79.5	10
80.0	10
80.5	10
81.0	10
81.5	10
82.0	10
82.5	10
83.0	10
83.5	10
84.0	10
84.5	10
85.0	10
85.5	10
86.0	10
86.5	10
87.0	10
87.5	10
88.0	10
88.5	10
89.0	10
89.5	10
90.0	10
90.5	10
91.0	10
91.5	10
92.0	10
92.5	10
93.0	10
93.5	10
94.0	10
94.5	10
95.0	10
95.5	10
96.0	10
96.5	10

OTHER TESTS	CONDITION	TYPE	Nº	PENETRATION RESISTANCE	ELEV. RECOV.
		CA		35	507.5
		CA		71	
		CA		10	
		CA		10	
		CA		10	
		CA		11	
		CA		10	
		CA		11	
		DO	1	35	507.5
		CA		11	507.5
				11	
				11	
				13	
				11	
				18	
		CA		35	577.5
		DO	3	108	50%
		CA		18	
		CA		26	
		CA		41	
		CA		48	571.5
				51	
				90	
				10	
				158	567.3
		DO	5	108	50%
		CA		58	
		CA		20	
		CA		20	
		CA		26	
				108	507.5
		CA	6	108	
		CA		54	
		CA		113	507.5
		DO	7	135	100%
		CA		58	
		CA		75	
		CA		71	
		CA		73	
		CA		70	
		CA		85	
		CA		75	547.5
32° 33°		DO	8	115/2	
				23.5	
		DO	9	20.5	541.8° 64%
		DO	10	41.5	531.8° 100%



PLAN
Scale: 1 inch = 20 feet

PROBABLE PROFILE OF SOILS AT &
Scale: 1 inch = 20 feet Horizontal & Vertical



PRINT RECORD		
NO.	FOR	DATE

DEPARTMENT OF HIGHWAYS-ONTARIO			
BRIDGE OFFICE-TORONTO			
GOULAIS RIVER BRIDGE			
OVER THE			
GOULAIS RIVER			
THE KING'S HIGHWAY No. 17		DIV. No.	
CO. DIST. OF ALGOMA		LOT	
TWP. VANDERBILT		CON.	
PLAN & PROFILE OF BOREHOLES 55-F-24			
APPROVED			
CHIEF BRIDGE ENGINEER		CHIEF ENGINEER	
DESIGN	CHECK	DATE	NO.
DRAWING	CHECK	DATE	NO.
DATE	BY	DESCRIPTION	SCALE
JANUARY 1950	G. J. J.	PLAN & PROFILE OF BOREHOLES	1" = 20'

W. H. Tye
Bridge Engineer

Re: Foundation Investigation

Proposed Hwy #17 and Moulis River

E 2988-1

Project 55-F-24

We are forwarding herewith two copies of the report re the above. This structure is not listed on any preparation list. However, the site plan has been forwarded to us from Location Surveys.

It is evident from the report that piles in the order of 50 feet in length are required to carry the foundation through loose sediments and to provide protection against scour.

Copies to

A. Tye, Bridge Engineer ©

H. Tregaskes Const " ©

J. Walter Hough " ©

H. Collins Dist. Eng. Moulis River ©

L. Karantatos ©

File ©

J. T.
F. C. B.
M. M. R.

A REPORT ON THE
FOUNDATION INVESTIGATION
FOR THE PROPOSED HIGHWAY #17,
BRIDGE OVER THE
GOULAIS RIVER

Copies to:

Mr. A. Foye, Bridge Engineer (2)
Mr. H. Fragaskes, Const. Engineer (1)
Mr. J. Walter, Design Engineer (1)
Mr. E. P. Collins, Div. Engineer (1)
Blind River
Mr. G. Parentatos (1)
File (1)

Project 55-P-24

INDEX

PAGE

INTRODUCTION	1
PROCEDURE	1
SOIL CONDITIONS	1
WATER CONDITIONS	1
ANALYSIS OF TEST RESULTS & DISCUSSION	2
CONCLUSION	2

INTRODUCTION:

A subsurface investigation has been completed at the site of the proposed crossing of the Goulais River by Highway #17.

The soil conditions were explored in order to recommend the most suitable foundation for the bridge.

PROCEDURE:

Six borings and three dynamic cone tests were made at locations shown on plan F-55-24A in Appendix I, together with logs of each hole showing the soil information obtained, locations and levels.

The exploration work was done between September 29th and October 14th at a time when the water in the river was at a low level. This enabled two boreholes to be made in the middle of the river by constructing a temporary gravel fill bank out into the stream, on which the drill unit was set up.

Samples were taken for classification purposes and the standard penetration values for the sand were obtained. In the clay and silts undisturbed samples were obtained for unconfined compression tests and a consolidation test.

SOIL CONDITIONS:

The subsoil was found to consist of current bedded layers of sands, gravels, silts and clays. The top layers were sands and gravels with silt, all very loose and moist. A 5 ft. layer of clay exists between elevation 570 and 550 and a 10 ft. bed of silt separated this from the main bed of medium clay which extend to the depth of the boreholes, i.e. elevation 520.

WATER CONDITIONS:

The water table at all points of exploration was at the same level as the water in the river. There was no evidence of an artesian head.

ANALYSIS OF TEST RESULTS AND DISCUSSION:

Results of the tests indicated that the top layers of silts and sands were very loose and that the piles would have to be driven through them for support in the lower bed of medium clay.

Because of the varying nature of the soils it is difficult to calculate the exact depth to which the piles should be driven. According to calculations based on the shear strength of the clay layer and depending on skin friction, timber piles are recommended and would require to be driven to a depth of from 45 ft. to 60 ft. for full load carrying capacity.

The difference between high and low water levels in the river is 15.7 ft. so the depth of scour in the river bed would be great, though it is probable, that the scour will be checked to some extent by the bed of medium clay. Piles in the middle of the river would need to be driven to a depth of not less than 50 ft. for adequate safety against undermining by scour.

On the south bank the overlying sands and gravels are denser and may cause hard driving conditions for the piles. Also vibration of the sand during driving may compact the sand and cause driving difficulties. If such conditions are encountered the piles should be jettied down until they can be driven by normal methods to the required depth. Care must be taken however that they be jettied through the top layers only and that the skin friction in the clay material be retained. The piles should be driven by ordinary driving without jetting for at least the final 10 to 15 ft.

In order that the abutments will not be secured out in time of flood the possibility of increasing the waterway by dredging the channel should be investigated.

CONCLUSION:

Timber piles are recommended for the foundation.

The piles will be supported by skin friction in the lower layers of clay and silt, the top layers of sand being loose and giving little support.

It is not possible to determine the exact depth to which the piles should be driven because of the varying nature of the material, but it is calculated from the values of shear strength in the clay that the piles would be driven to a depth of from 45 to 60 ft.

As a precaution against undermining by scour the piles in the river bed should be driven to a depth of not less than 30 ft.

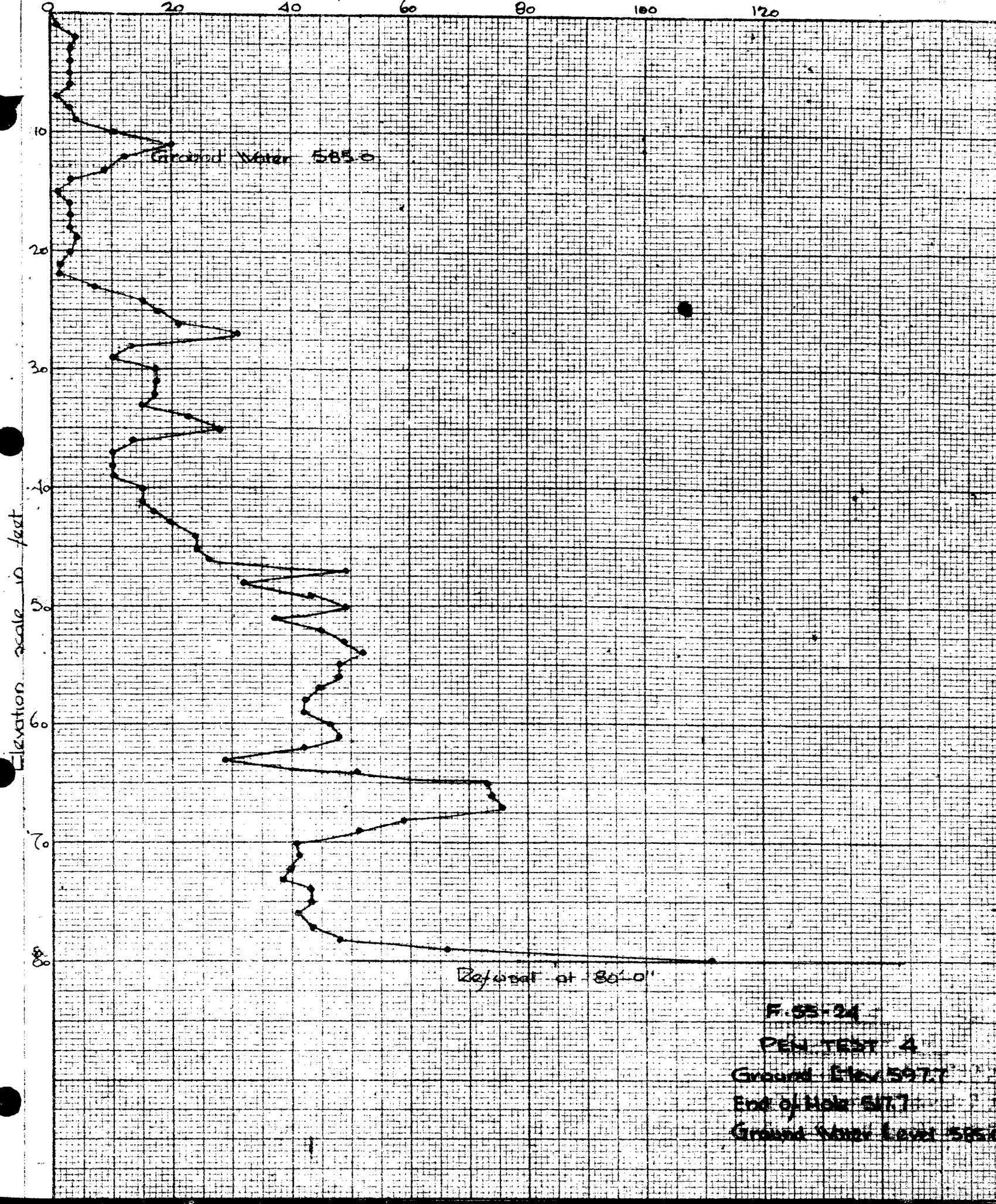
If it is difficult to drive the piles through the overlaying sand the piles should be jettied down until they can be driven by normal methods. The final 10 to 15 ft. should be driven without jetting so as not to destroy the skin friction of the clay on the piles.

As a safeguard against scouring of the banks behind the abutments the river channel can be dredged to give a greater waterway.

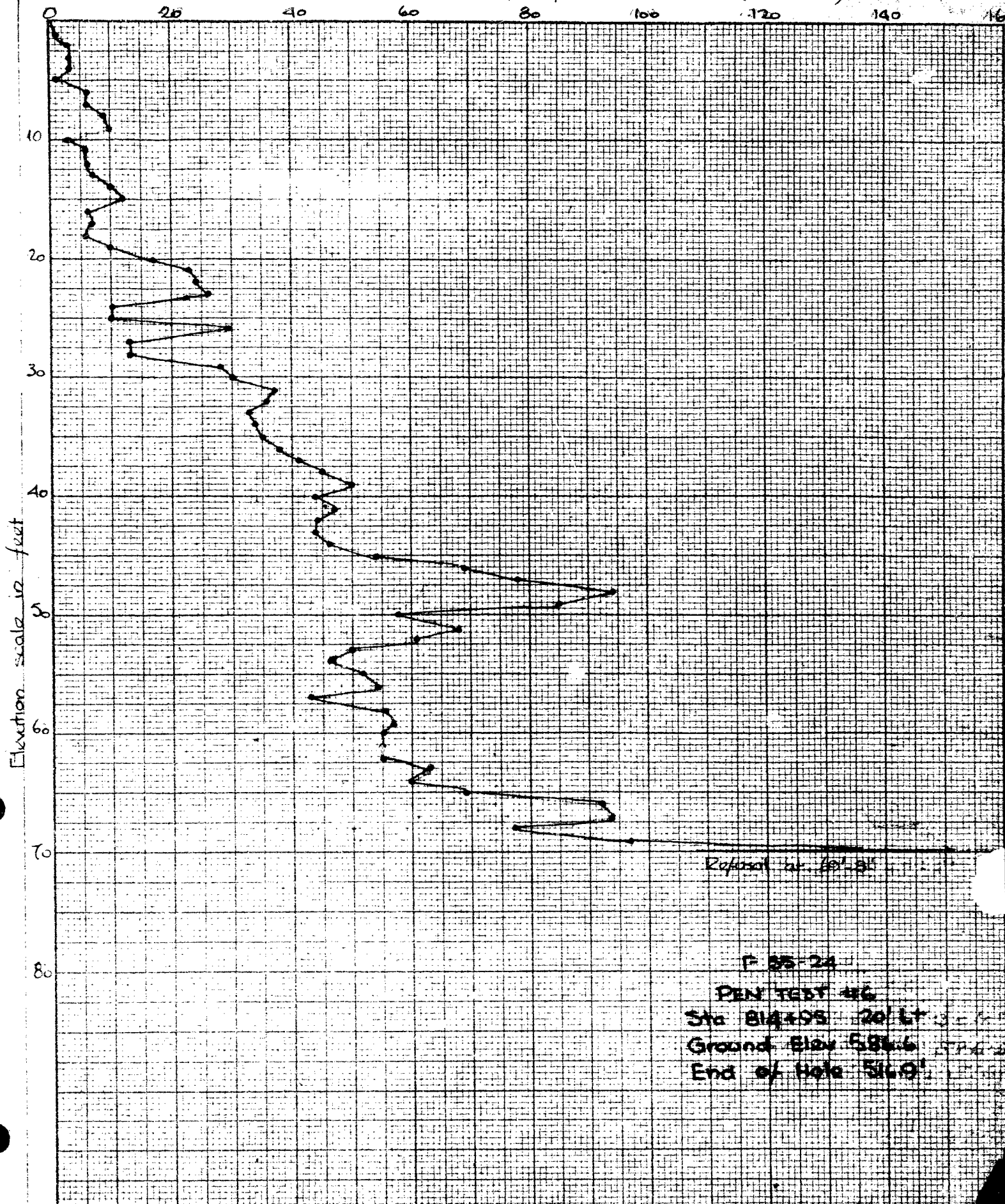
G. E. Varantatos,
Foundation Engineer.

APPENDIX I

Penetration Resistance in Blows per foot (Std. En = 4200 lbs. in.)



Penetration Resistance in Blows per foot (Std. En - 4200 lb-in)



Refined at 60' 30"

P-35-24

PEN TEST 46

Sta 814+05 20' Lt

Ground Elev 58.6

End of Hole 516.9'

Penetration Resistance in Blows per foot

Std. En = 4200 lb.

