

#62-F-112

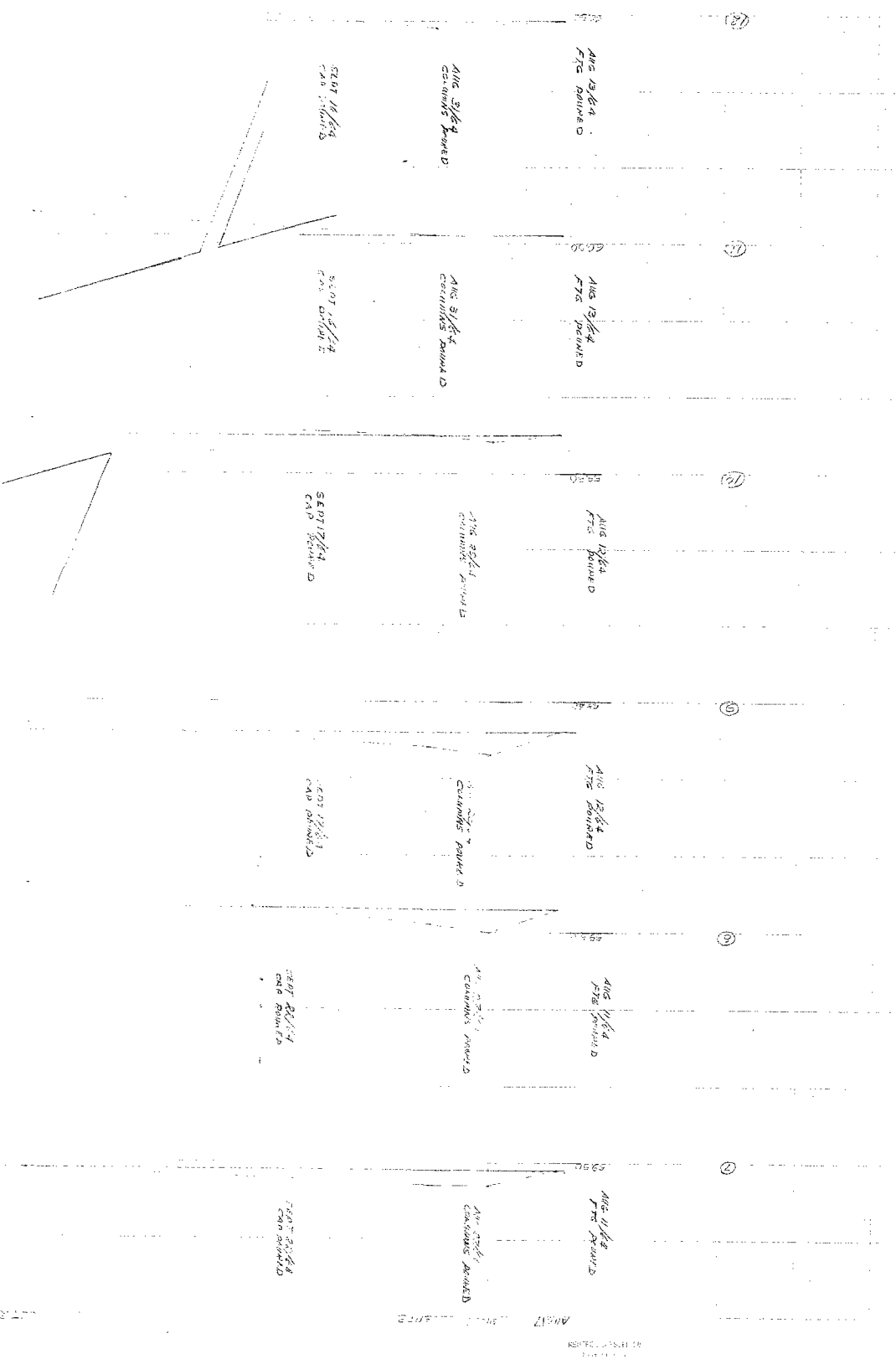
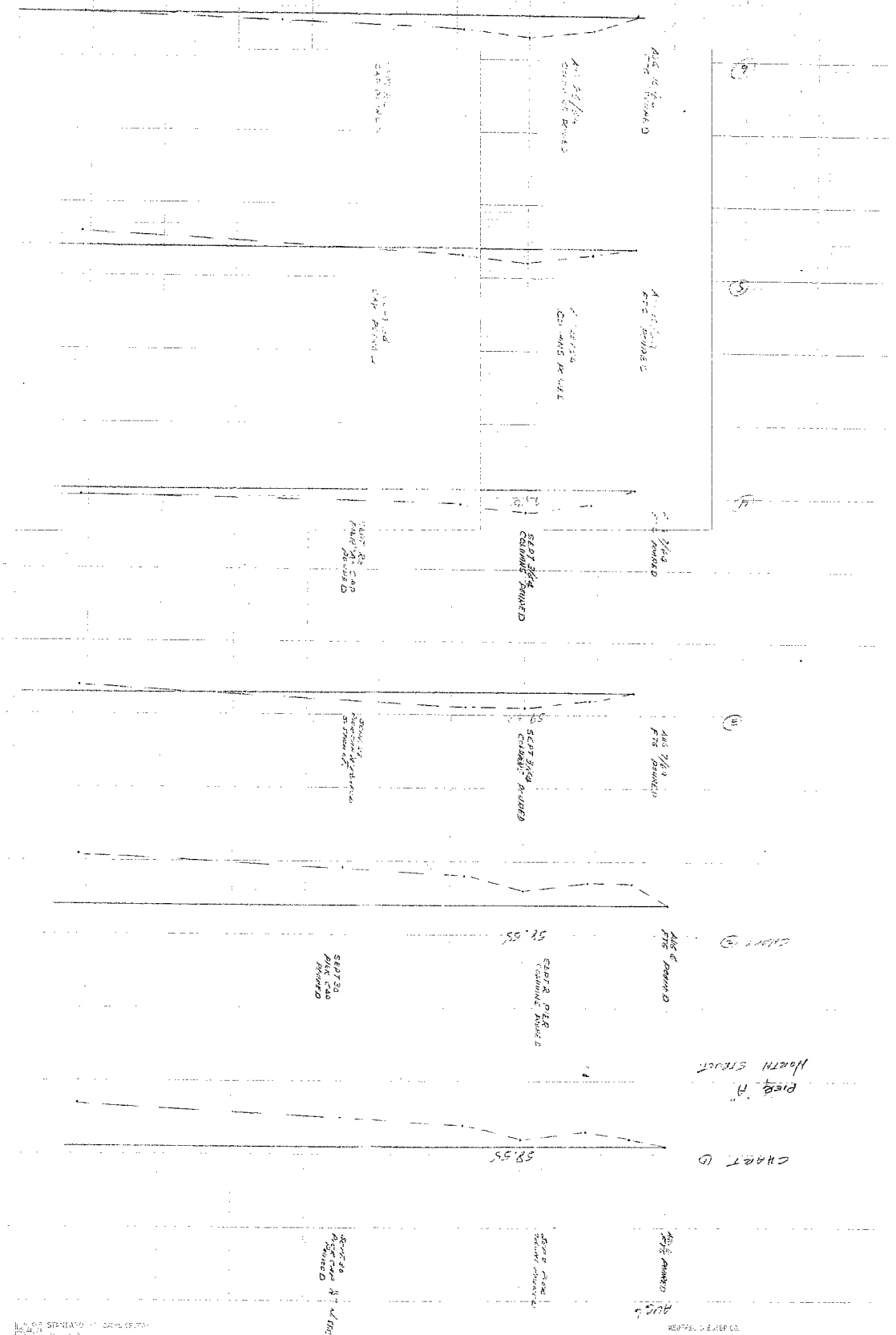
W.P. #153-60

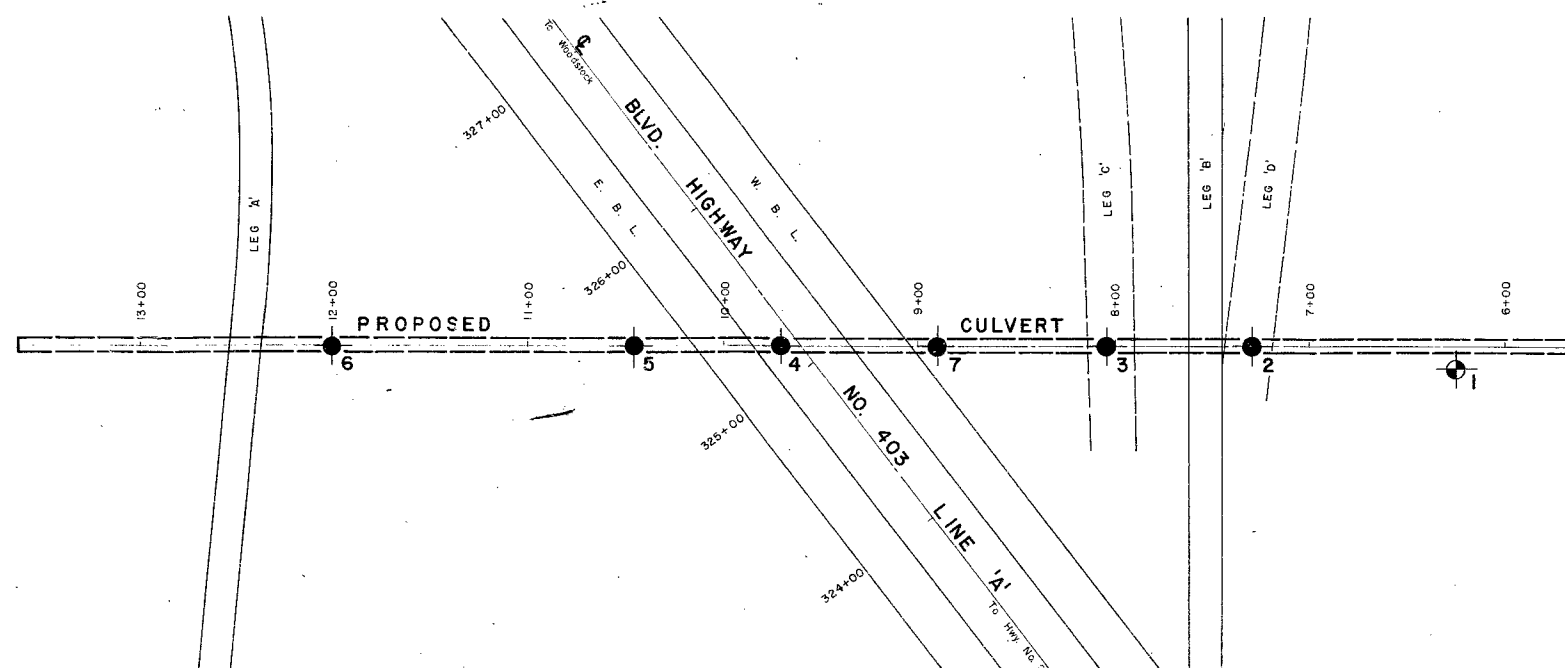
Hwy #2 E

Hwy. #403

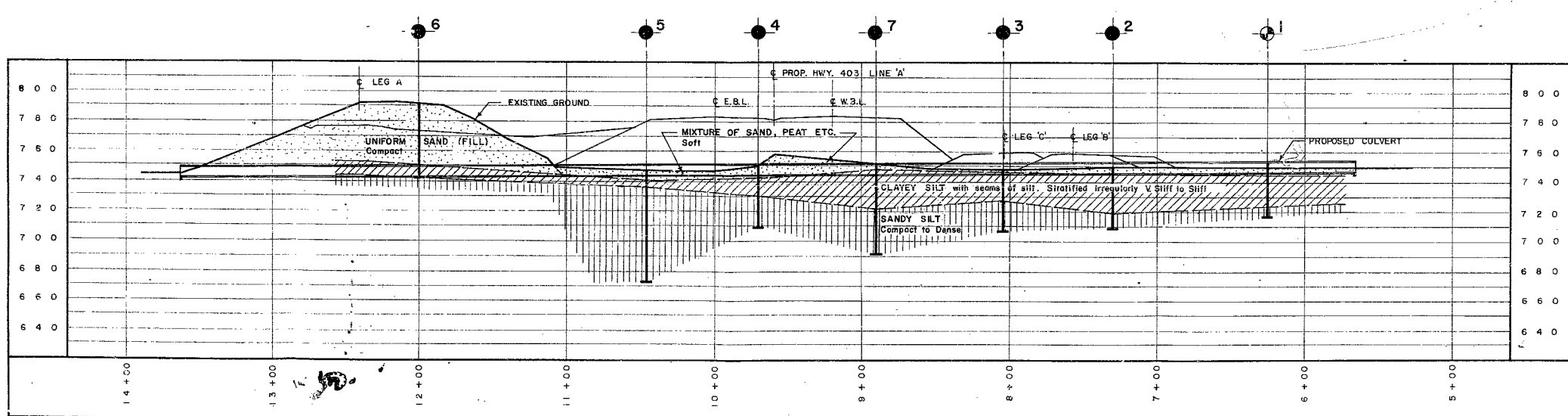
PROP. CULVERT

DATA ON FOOTINGS
HWY 2 % HWY 403

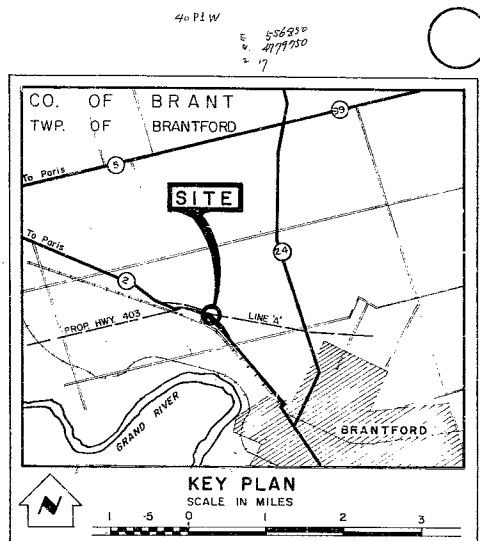




PLAN
SCALE IN FEET
40 20 0 40 80



PROFILE OF PROPOSED CULVERT
SCALE IN FEET
40 20 0 40 80



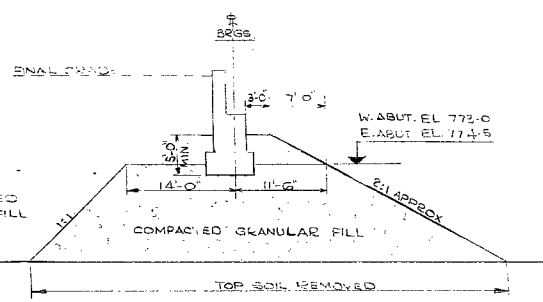
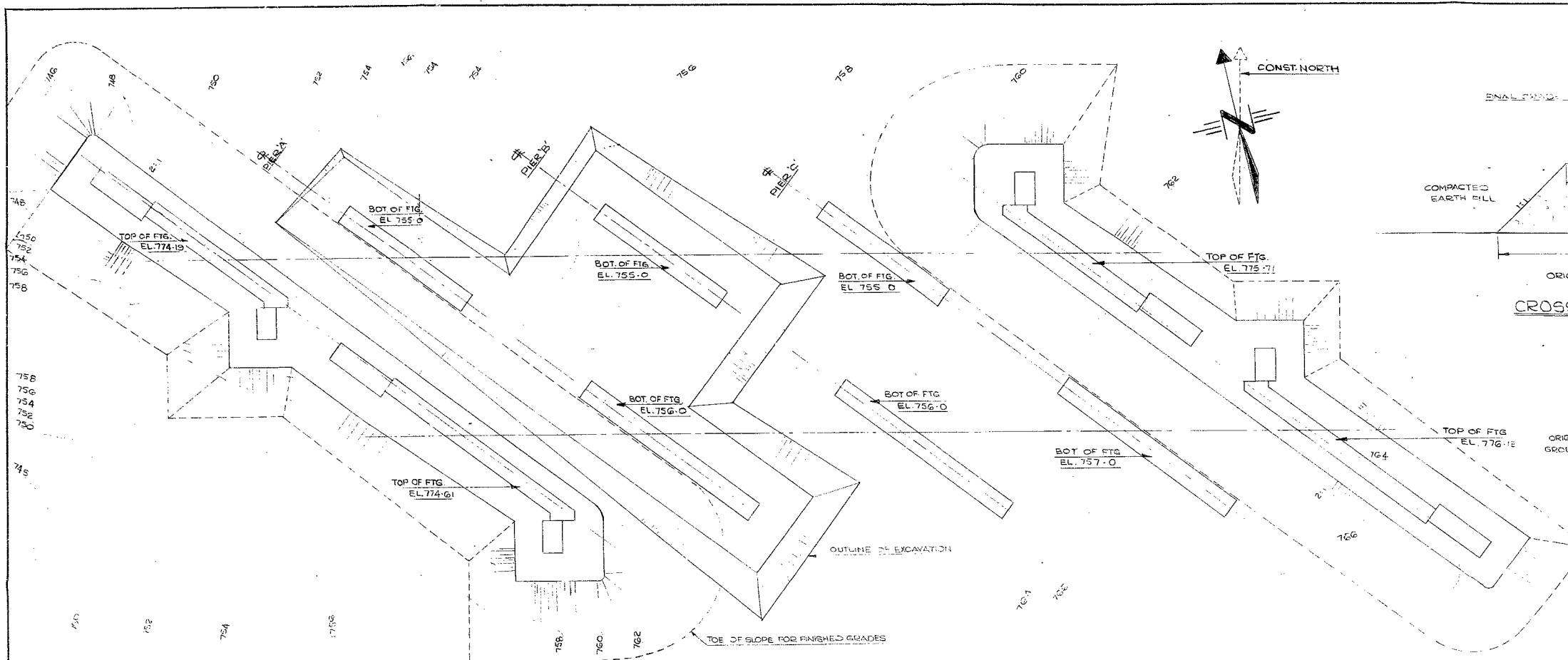
LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation		

NO.	ELEVATION	STATION	OFFSET
1	752.0	6+25	12' L.Y.
2	750.0	7+30	E
3	747.0	8+05	E
4	750.0	9+70	E
5	747.0	10+45	E
6	792.0	12+00	E
7	751.0	8+90	E

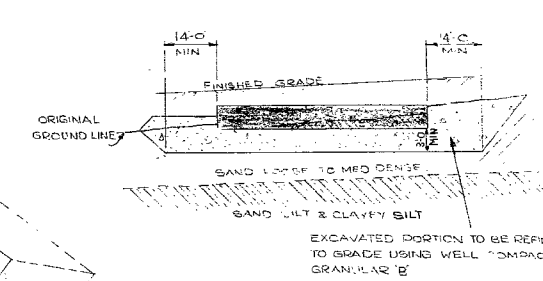
- NOTE -
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS & RESEARCH DIVISION - FOUNDATION SECTION		
PROPOSED CULVERT AND HIGHWAY NO. 403 LINE 'A' EAST OF BRANTFORD		
ORIGINATED G. MIERZYNSKI	DISTRICT NO. 2	DATE 9 OCT. 1962
DRAWN D. MUMFORD	W.P. NO. 153 - 60	JOB NO. 62 - F - 112
CHECKED <i>[Signature]</i>	CONTRACT NO.	DRAWING NO.
APPROVED <i>[Signature]</i>		62-F-112 A

SHEET No.	TOTAL SHEETS
1	1

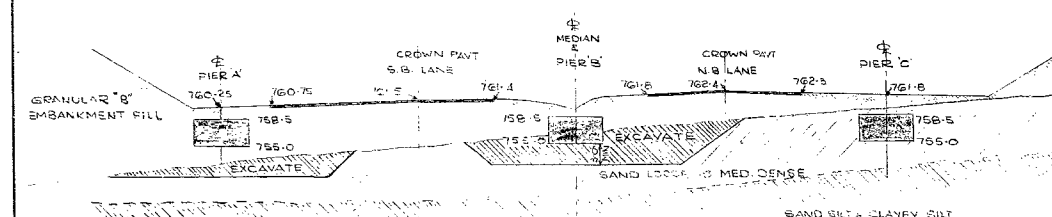


CROSS SECTION THROUGH ABUTMENT
SCALE 1" = 10'-0"

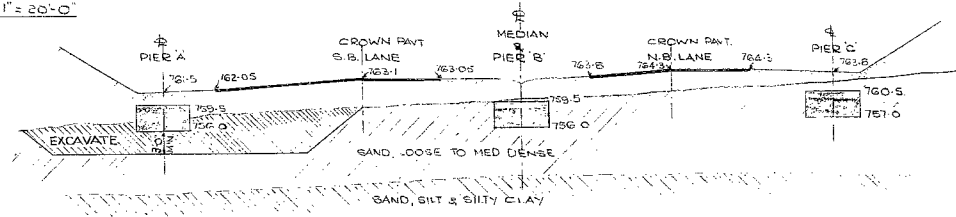


TYP. LONGITUDINAL SECTION
THROUGH PIER FOOTINGS ON FILL
SCALE: HOR. 1" = 20'-0"
VERT. 1" = 10'-0"

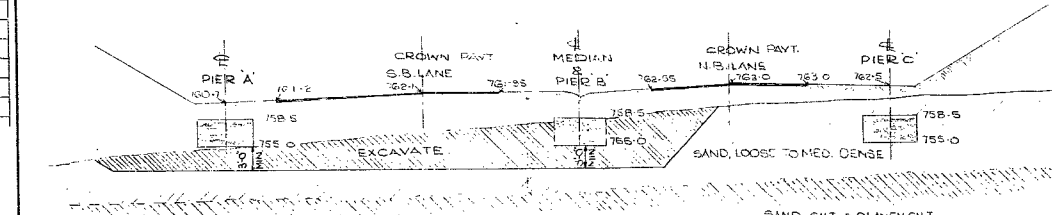
PLAN
SCALE 1" = 20'-0"



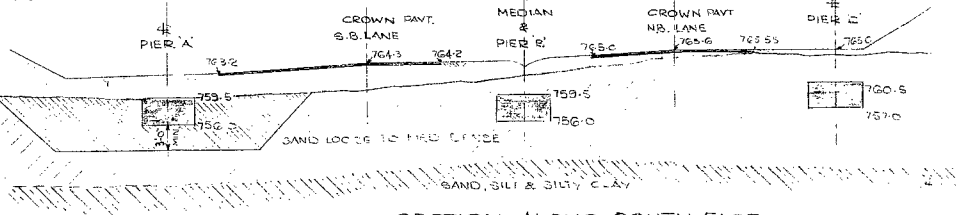
SECTION ALONG NORTH FACE
NORTH STRUCTURE



SECTION ALONG NORTH FACE
SOUTH STRUCTURE



SECTION ALONG SOUTH FACE
NORTH STRUCTURE



SECTION ALONG SOUTH FACE
SOUTH STRUCTURE

NOTE
EXCAVATED PORTION TO BE REFILLED & BROUGHT UP TO GRADE USING GRANULAR 'B'. THE GRANULAR SHALL BE WELL COMPACTED TO 100% OF THE PRESENT D.H.O. STANDARD METHOD. THE EXCAVATION SHALL BE INSPECTED BY THE FOUNDATION SECTION PRIOR TO PLACING OF ANY FILLS AND THE PLACING AND COMPACTION OF THE FILLS SHALL BE SUPERVISED BY THE FOUNDATION SECTION.

SCALE: HOR. 1" = 20'-0"
VERT. 1" = 10'-0"

NOTE
THIS PLAN TO BE REPRODUCED IN CONJUNCTION WITH PRELIMINARY PLAN D-4985-R1.

PRINT RECORD		
No.	FOR	DATE

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
HWY #2 OVERPASS			
AT WEST END OF BRANFORD BY-PASS			
KING'S HIGHWAY N. 403		DIST. No. 1	
CO. BRANT		CON.	
TWP. CITY OF BRANFORD LOT		CON.	
GRADING REQUIREMENTS			
APPROVED	BRIDGE ENGINEER	SITE No.	W.P. No. 153/20
DESIGN	BR	CHECK	
DRAWING	PT	CHECK	BR
DATE	JAN 62	LOADING	H-20 S-16
		DRAWING No.	D-4985-R1G.

62-112

Mr. H. D. McMillan,
Road Design Engineer,
Road Design Division.

73-67-167
Mr. A. G. Stermac,
Principal Foundation Engr.,
Foundation Section,
Materials & Research Division.
October 24, 1962.

Re: D.H.O. FOUNDATION INVESTIGATION REPORT -
Proposed Concrete Culvert at Jct. of
Hwy.'s. #2 and #403 in Brantford, Dist. #4.
W.J. 62-F-112 -- W.P. 153-60.

Attached, we are forwarding to you, our detailed
foundation investigation report outlining the existing subsoil
conditions at the above structure site.

We believe you will find the factual data and
recommendations contained therein, adequate for your future
design work. Should there be any queries in connection with
this project, please feel free to contact our Office.

KYL/MdeF
Attach.

cc: Messrs. H. D. McMillan (2)
H. A. Tregaskes
G. K. Hunter
J. C. Thatcher
T. J. Kovich
J. Roy
A. M. Toye
J. E. Gruspier
E. R. Saint
F. Norman
A. Watt

K. Y. Lo
K. Y. Lo,
SUPERVISING FOUNDATION ENGR.
For:

A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

Foundations Office
Gen. Files.

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-

FOUNDATION INVESTIGATION

For

Proposed Concrete Culvert
at Jct. Hwy's. #2 & #403⁴
in Brantford, District #3.
W.J. 62-F-112 -- W.P. 153-60.

1. INTRODUCTION:

A request for a foundation investigation at the above site, was received from Mr. J. Roy, Regional Soils Engineer, London, Ontario.

The requested investigation was carried out by this Section, and presented in this report are all the field and laboratory results, their interpretation and discussion, together with the necessary recommendations for the footings of the proposed new culvert.

2. DESCRIPTION OF SITE & GEOLOGY:

The site lies on the north extremity of the Norfolk Sand Plain, a large deltaic deposit laid down by glacial melt waters which drained into glacial lakes Whittlesley and Warren. Usually, silt or clay occurs within 30 feet of the surface, followed by sand and silt for great depths.

The topography consists of rolling terrain, but the proposed location of the new culvert is in a flat, swampy and poorly drained area, with the water table at or near the ground surface.

A shallow ditch, drains the swamp under existing Highway #2 and an abandoned railway embankment, by means of small concrete culverts, in a westerly direction.

3. FIELD INVESTIGATION:

A total of six sampled boreholes, supplemented by one dynamic cone penetration test, were carried out at the site, utilizing a conventional diamond drill rig adapted for soil sampling procedures.

Disturbed samples were recovered by means of a 2-inch O.D. split-spoon sampler, driven into the soil with an energy of 350 ft.-lbs. per blow. Where possible, undisturbed samples were recovered in thin-walled Shelby-tube samplers, pushed hydraulically to the required depth.

Attempts were also made to determine the in-situ shear strength of the soil by means of vane test: however, only one attempt was successful, as in most cases, the vane could not be turned in the stiff to very stiff subsoils.

Each sample of the subsoil, was visually classified in the field before transportation to the laboratory.

4. LABORATORY INVESTIGATION:

Each sample recovered in the field, was once again classified in the laboratory. In addition, Atterberg Limits were performed on all cohesive soil samples and moisture contents on all samples.

Both unconfined and triaxial shear strength determinations were done on the undisturbed samples, whenever possible.

cont'd. /3 ...

4. LABORATORY INVESTIGATION: (cont'd.) ...

Grain size distribution analyses on representative non-cohesive samples were also performed. Consolidation tests on the undisturbed samples, completed the laboratory investigation.

The results of all these tests are plotted on the borehole logs, attached as an appendix to this report.

5. GROUND WATER CONDITIONS:

A very high water table was found throughout the area investigated. In most boreholes, water was encountered at one foot below ground level, regardless of elevation. In boreholes #2 and #5, the ground surface and the water level were at the same elevation.

6. SUBSOIL CONDITIONS:

6.1) General:

The subsoil conditions at the site were found to be generally uniform, with three main strata, of varying depths and consistencies, as follows:

6.2) Sand Mixed With Peat and Other Organics:

This deposit was found in all boreholes and varied in thickness from 1'-0 in borehole #3, to 7'-0 in borehole #4. It is brown to black in color, soft and spongy with organic contents ranging from 0.34% to 6.00%.

cont'd. /1 ...

6. SUBSOIL CONDITIONS: (cont'd.) ...

6.3) Irregularly Stratified Clayey-silt & Silt:

Below the organic layer, a brown to grey clayey-silt deposit with seams of silt was encountered. This deposit was very irregularly stratified, with silt seams varying in thickness from 1/16" to 1" and spaced anywhere from 1/2" to over 6" apart. In general, the upper part of this layer was brown for the first 4 to 5 feet, becoming grey with depth.

Standard penetration resistance ranged from 8 to 24 blows per foot, indicating the relative consistency to be stiff to very stiff.

The lower limit of this stratum is not very distinct, but in general, the deposit extends to 11'-0 below ground level at B.H. #5, to 31'-0 below the ground at B.H. #2. The thickness varies from 6 to 27 feet, with an average of 20 feet.

Laboratory tests yielded the following average results:

Plastic limit 13.8%, liquid limit 28.4%, moisture content 21.8%. The average shear strength determined by laboratory tests, was in the order of 2200 p.s.f.

Results of consolidation tests show that this stratum is a normally consolidated clay, except in the upper 10 feet, where the preconsolidation pressure of 1 T/sq.ft. in excess of existing overburden pressure, is estimated. A graph of estimated total settlements, as well as the consolidation curves, are included in the appendix of this report.

6. SUBSOIL CONDITIONS: (cont'd.) ...

6.4) Sandy-Silt:

Underlying the clayey-silt, and to a depth of at least 75 feet, a grey to brown, sandy-silt deposit was encountered in all boreholes.

Standard penetration resistance ranged from 15 to 52 blows per foot with an overall average of 27, indicating a relative density of compact to dense.

The average moisture content was 18.5% and the soil was composed of the following particle sizes: sand 20%, silt 72% and clay 8%.

6.5) Uniform Fine-Sand (Fill):

This material was found in borehole #6 only, and is part of the abandoned railway embankment at the west side of the site. The fill consists of a free draining, uniform fine-sand of the following particle sizes: sand 83% and silt 17%.

Standard penetration resistance ranged from 12 to 21 blows per foot, with an average of 16, indicating the relative density to be compact.

7. DISCUSSION & RECOMMENDATIONS:

The subsoil at the site consists of sand mixed with peat and other organics, followed by stiff to very stiff, stratified clayey-silt and silt, underlain by compact sandy-silt.

An 800' long, concrete box-type culvert is proposed at the site, to provide drainage under the future ramps and embankments of Highway #403 and #2 interchange.

7. DISCUSSION & RECOMMENDATIONS: (cont'd.) ...

Between Station 5+50 (start of culvert) and Station 11+00, the soft organic deposit, extending to a depth of up to 7 feet, will have to be completely removed according to current D.H.O. standards, and replaced with suitable granular backfill to the required grade.

In places where the depth of organic material does not go down to culvert grade, excavation to 1'-0 below grade and granular backfill is also recommended: this granular pad will eliminate the danger of the seepage water softening the clayey-silt stratum as well as offer a firm and clean working base.

Differential settlements, after placement of the ramp and embankment fills, are estimated to be in the order of 2 - 3 inches. It is recommended that the culvert be constructed in stages, with construction joints so spaced, as to minimize the structural dangers due to differential settlements. Little or no settlement is expected between Station 11+00 and the west end of the culvert, and from Station 6+90 and the east end of the culvert. Maximum settlement will occur under the Hwy. #403 embankment at Station 9+70. A graph showing the estimated settlements is included in the appendix of this report.

Excavation for the culvert, at the location of the abandoned railway embankment (proposed Leg "A") should be carried out in stages. Excavation of the embankment to proposed grade of Leg "A" should be done first: this will reduce the height of the foundation excavation for the culvert by some 12 to 15 feet.

cont'd. /7 ...

7. DISCUSSION & RECOMMENDATIONS: (cont'd.) ...

The side slopes for the culvert excavation through the embankment, are recommended as 2:1. No stability problems are anticipated if this procedure is followed.

Due to the very high water table over the entire site, a dewatering scheme will be necessary. Since the clayey-silt stratum, upon which the culvert will be founded is relatively impermeable, whereas the upper layers of sand and organics are of high permeability, water will constantly seep into the excavation. Shallow ditches, running parallel to the excavation on both sides, should adequately take care of this surface water.

8. SUMMARY:

Subsoil at the site consists of sand with organics, followed by stratified clayey-silt and silt, followed by sandy-silt.

The following recommendations are made:

1) The organic layer should be completely removed and replaced with suitable granular material.

2) At the present railway embankment, excavation should be carried out at side slopes 2:1: the embankment should be excavated to ramp grade prior to culvert construction.

3) A dewatering scheme will be necessary: ditching along both sides of the excavation is suggested.

4) The culvert should have construction joints so located, as to minimize the possibility of structural damage due to differential settlements.

No embankment stability problems are anticipated.

cont'd. /^a ...

9. MISCELLANEOUS:

The field investigation was carried out during the period of September 18 to 26, 1962, and together with the preparation of this report, was performed by Mr. G. Mierzynski, under the general supervision of Mr. M. Devata of the Foundation Section.

Equipment was owned and operated by Dominion Soil Investigation, Ltd. of London, Ontario.

October 1962.

APPENDIX I.

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS :-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_P	PLASTIC LIMIT
I_P	PLASTICITY INDEX
s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX $= \frac{w - w_P}{I_P}$
I_C	CONSISTENCY INDEX $= \frac{w_L - w}{I_P}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX $= \frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE $= \frac{-\Delta e}{(1+e)\Delta\sigma}$
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX $= \frac{\Delta e}{\Delta \log_{10} \sigma}$
T_v	TIME FACTOR $= \frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	$= 3.1416$
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL

FOUNDATION SECTION

SOIL PROFILE			SAMPLES		DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— WL		BULK DENSITY P.C.F.	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV SCALE	BLOWS / FOOT				PLASTIC LIMIT ——— WP	
							20	40			60	80
							SHEAR STRENGTH P.S.F.		WATER CONTENT %			
									10 20 30			
752.0	Groundlevel											
0.0	Mixture of sand, silt peat etc.					750						
747.0	- Soft		1	SS	5							
5.0			2	SS	12							
			3	SS	16							
	Clayey-silt with seams of silt.		4	SS	20	740						
	Stratified irregularly											
	Very stiff to stiff.		5	SS	13							
	Grey.											
			6	SS	11	730						
			7	SS	11							
723.0												
29.0	Sandy-silt. Dense to very dense - Grey & brown.		8	SS	52	720						
715.5			9	SS	30							
36.5	End of borehole.					710						

RECORD OF BOREHOLE NO. 2

ORIGINATED BY G.M.

COMPILED BY _____ G.M.

CHECKED BY

Sand=2%
Silt=87%
Clay=11%

FOUNDATION SECTION

JOB 62-F-112

LOCATION Sta. 8/05

ORIGINATED BY G.M.

W P. 153-60

BORING DATE Sept. 20, 1962.

COMPILED BY G.M.

DATUM Profile

BOREHOLE TYPE Washboring - BX Casing.

CHECKED BY _____

[illegible]

FOUNDATION SECTION

SOIL PROFILE			SAMPLES		DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— % PLASTIC LIMIT ——— % WATER CONTENT ——— % WP ——— WL	BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	SHEAR STRENGTH P.S.F.		
750.0 0.0	Ground level Mixture of sand, silt, peat and organic matter. - Soft.							
743.0 7.0	Clayey-silt to silt. Very stiff - Grey.		1	SS	2			
			2	SS	12			
			3	SS	23			
			4	SS	21			
730.0 20.0	Sandy-silt Compact - Grey and brown.		5	SS	29			
			6	SS	26			
			7	SS	30			
708.5 41.5	End of borehole.		8	SS	15			

RECORD OF BOREHOLE NO. 5

FOUNDATION SECTION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

JOB 62-F-112 LOCATION Sta. 10+45 ORIGINATED BY G.M.
W.P. 153-60 BORING DATE Sept. 24, 1962. COMPILED BY G.M.
DATUM Profile BOREHOLE TYPE Washboring - NX Casing. CHECKED BY _____

SOIL PROFILE			SAMPLES		ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT _____ % PLASTIC LIMIT _____ % WATER CONTENT _____ %			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			SHEAR STRENGTH P.S.F.				
					750						W.L.=G.L.
747.0	Groundlevel										∇ 747.0
0.0	Mixture of sand, silt, peat etc. - Soft.		1	SS	3						0.0
741.5			2	SS	13	740					3.96% Organic
5.5	Clayey-silt.										
736.0	Stiff-brown.		3	SS	8						
11.0											
	Sandy-silt.		4	SS	16	730					
	Compact to dense.										
	Grey and brown.		5	SS	17	720					
			6	SS	29	710					Sand=32% Silt=63% Clay= 5%
			7	SS	23	700					
			8	SS	46	690					
			9	SS	-	680					
672.0											
75.0	End of borehole.				670						

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 6

FOUNDATION SECTION

JOB 62-F-112 LOCATION E Sta. 12+00 (Top of Rlwy. Embankment) ORIGINATED BY G.M.
W.P. 153-60 BORING DATE Sept. 26, 1962. COMPILED BY G.M.
DATUM Profile BOREHOLE TYPE Washboring - BX Casing. CHECKED BY _____

SOIL PROFILE			SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	SHEAR STRENGTH P. S. F.	LIQUID LIMIT ——— % PLASTIC LIMIT ——— % WATER CONTENT ——— % *P ——— *L ——— WATER CONTENT % 5 10 15			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT								
792.0 0.0	Groundlevel					790							
	Fill - Uniform fine sand - Compact Light brown.		1	SS	20	780							Sand=81% Silt=19%
			2	SS	12	770							Sand=83% Silt=17%
			3	SS	12								
						760							
			4	SS	16								
751.0 41.0	Clayey-silt Very-stiff - Brown.		5	SS	17	750							▽ 750.0 42.0 G.L. from observa- tion in bore hole.
			6	SS	21								
742.0 50.0	End of borehole. Probably sandy-silt.					740							

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 7

FOUNDATION SECTION

JOB 62-F-112

LOCATION Sta. 8490 - This borehole done.

ORIGINATED BY G.M.

W.P. 153-60

BORING DATE Under Job 61-F-76 as B.H. #1.

COMPILED BY G.M.

DATUM Profile

BOREHOLE TYPE Washboring - BX Casing.

CHECKED BY

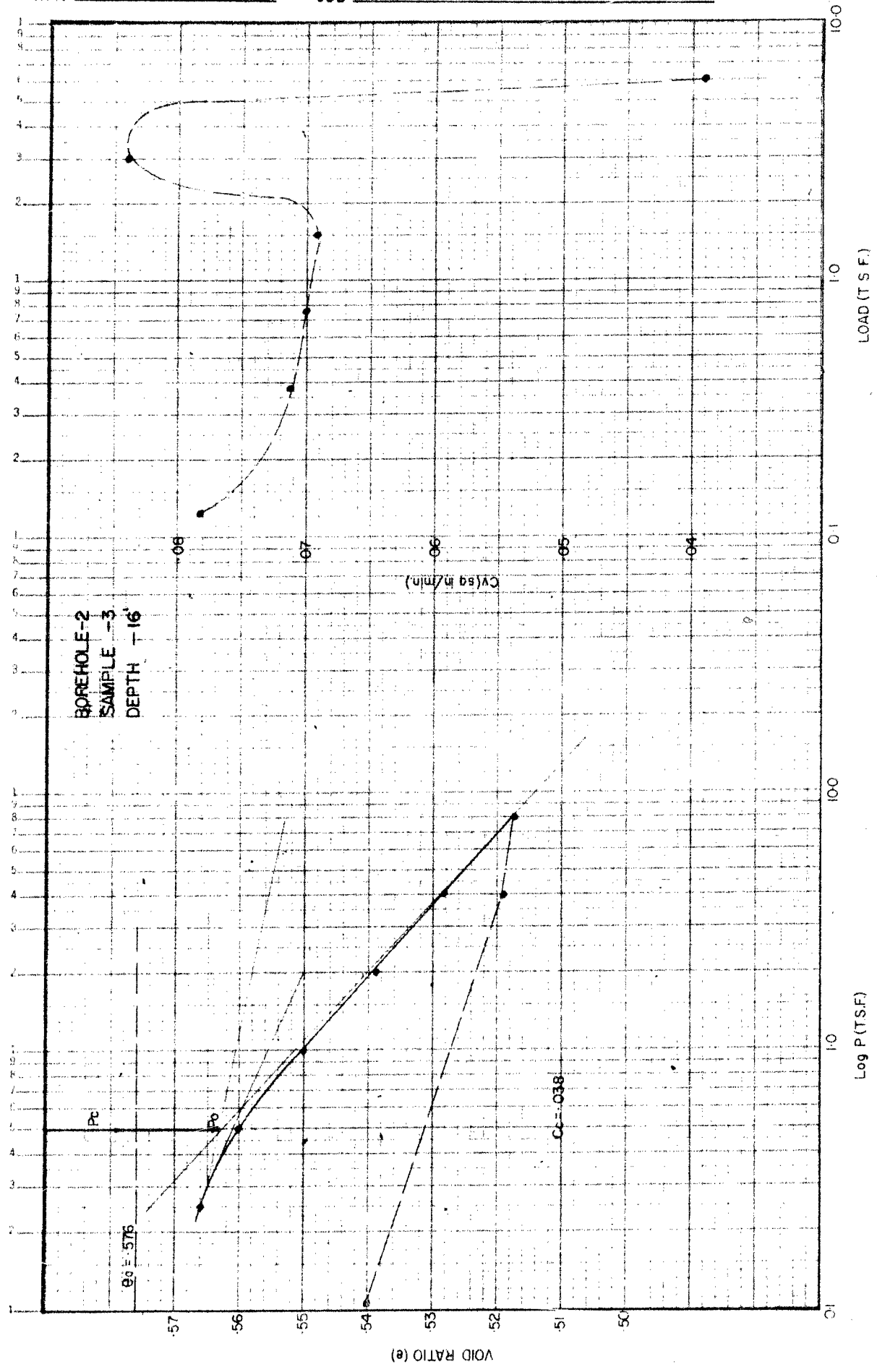
SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE			LIQUID LIMIT ——— WL			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	BLOWS / FOOT	PLASTIC LIMIT ——— WP					
								WATER CONTENT ——— W					
								WP	WL				
								SHEAR STRENGTH P.S.F.					
							WATER CONTENT %			10	20	30	

751.4	Groundlevel	~~~~~											No moisture contents available as samples are 1 year old.
0.0						750							
749.4	Topsoil												
	Clayey-silt with seams of silt. Stratified irregularly. Very stiff - Grey.		1	SS	9								
			2	SS	24								
			3	SS	21								
							740						
			4	SS	20								
			5	SS	20								
		6	SS	24	730								
		7	SS	35									
722.4													
29.0													
	Sandy-silt Compact - Grey.	8	SS	29	720								
		9	SS	19	710								
			</										

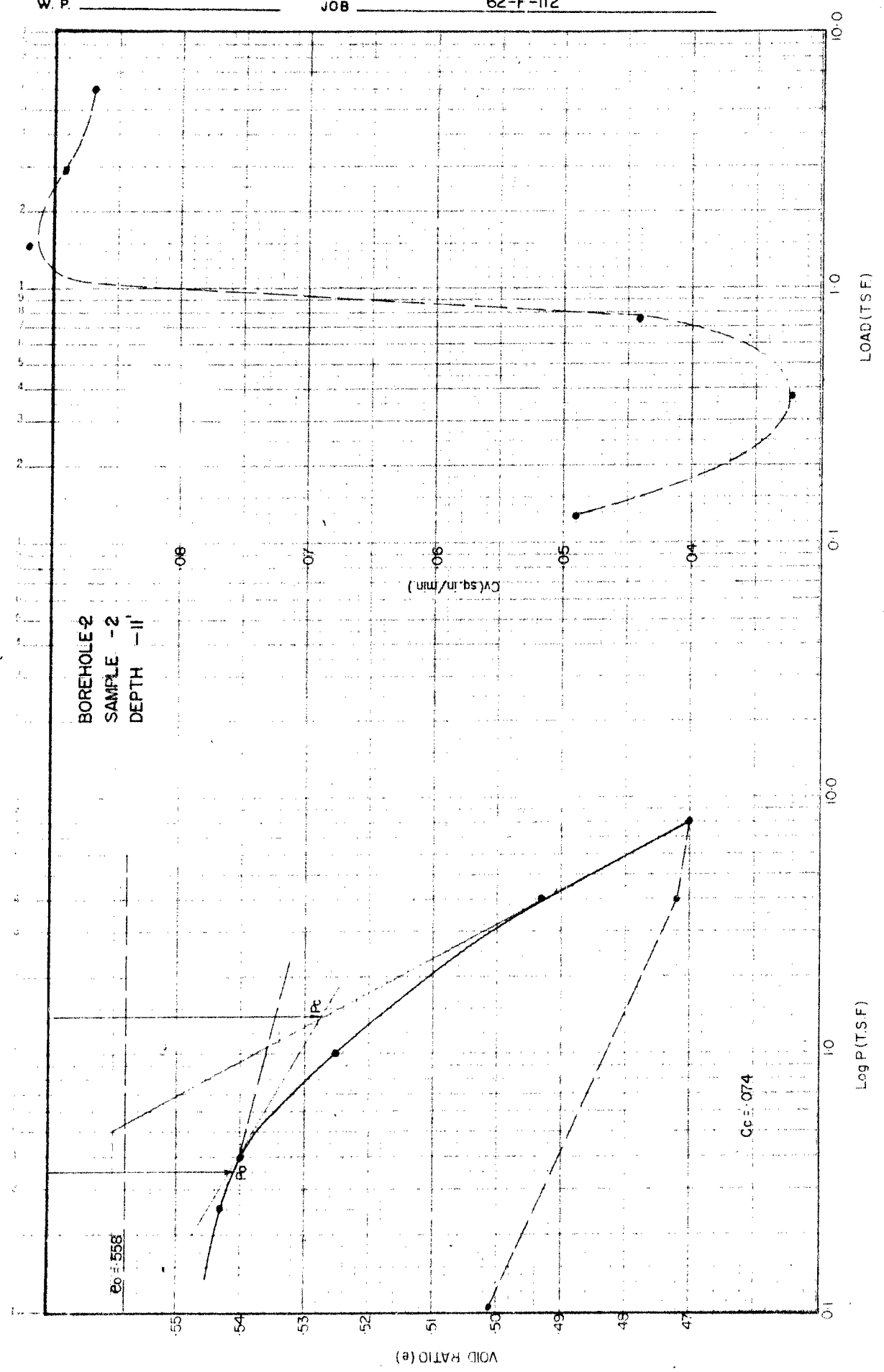
No moisture contents available as samples are 1 year old.

26
3175
24

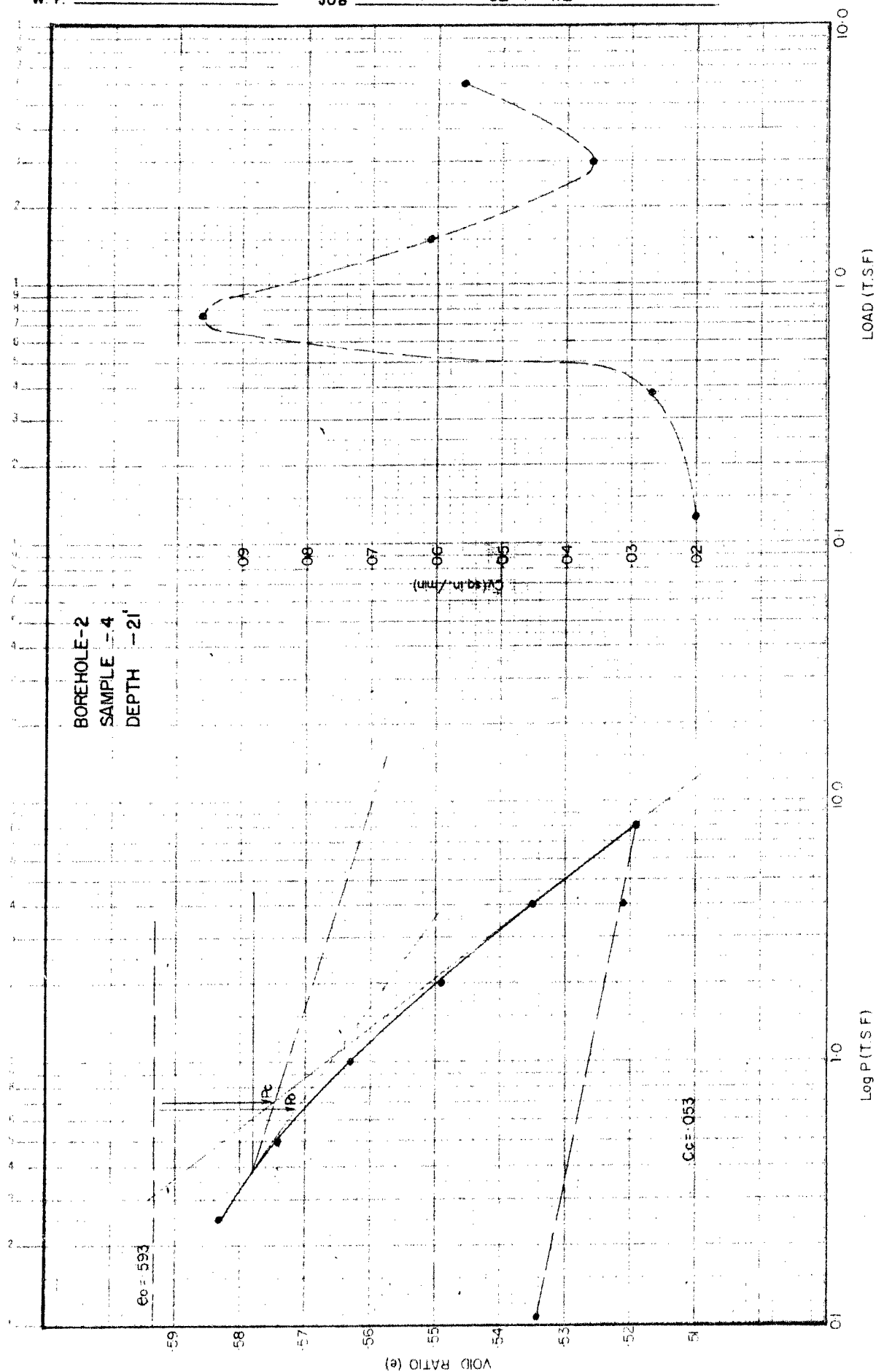
e Log P CURVES

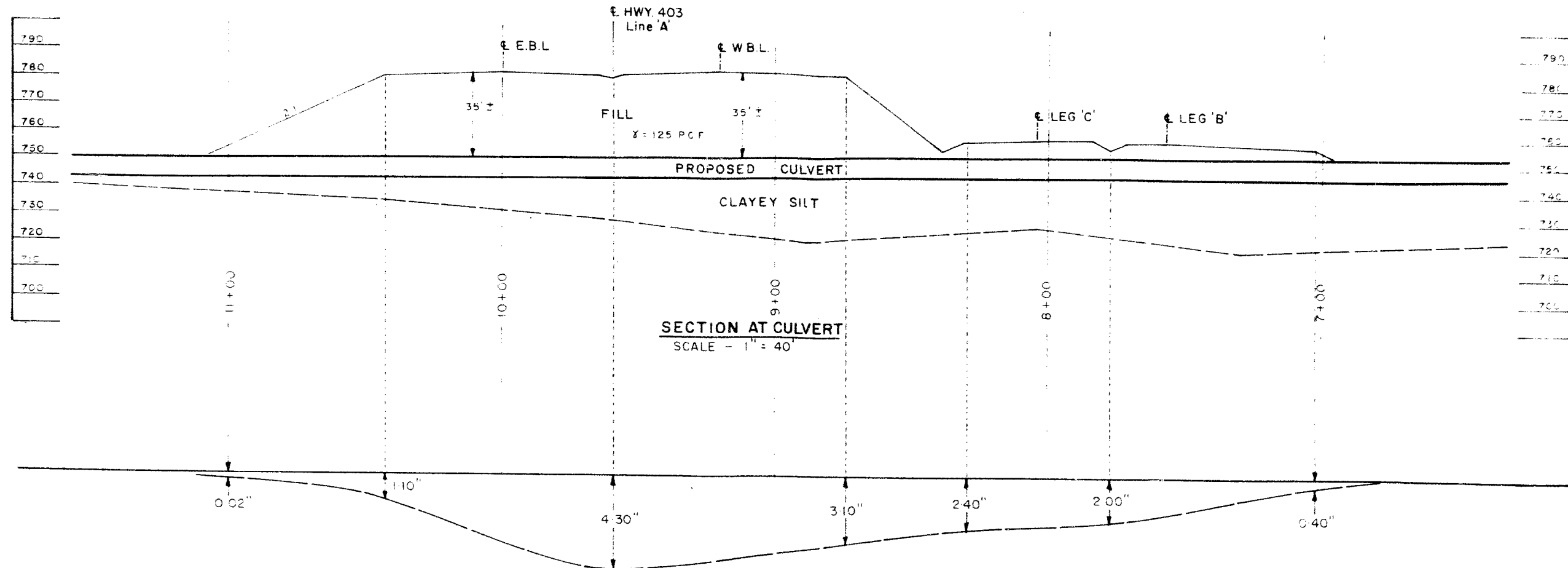


e Log P CURVES



e Log P CURVES





ORIGINATED G MIERZYNSKI	DEPARTMENT OF HIGHWAYS - ONTARIO	SCALE AS SHOWN
DRAWN H D REED	MATERIALS & RESEARCH SECTION	W. P. NO. 153 - 60
CHECKED <i>[Signature]</i>	ESTIMATED SETTLEMENT	JOB NO 62-F-112
APPROVED <i>[Signature]</i>	PROPOSED CULVERT	DWG. NO. 62-F-112 B
DATE 15 OCT. 1962		