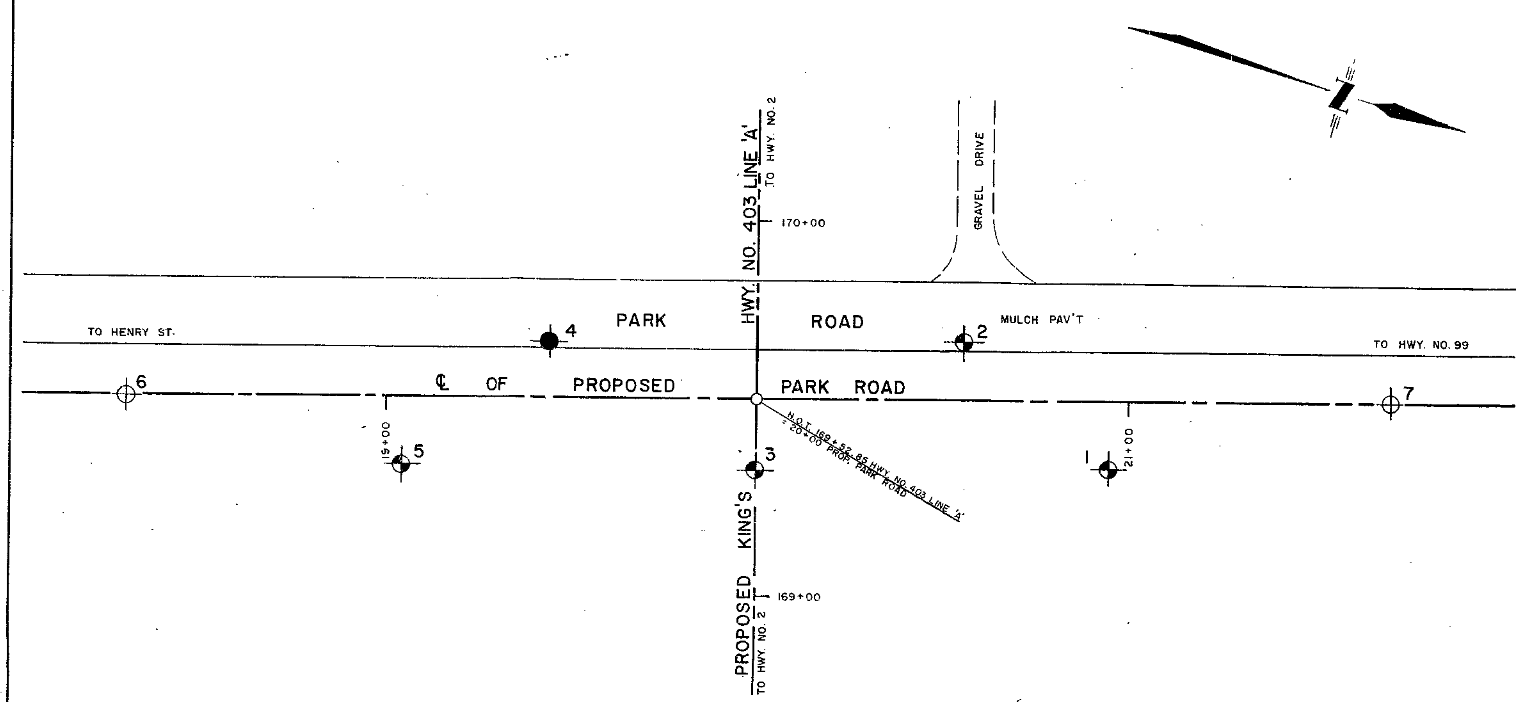
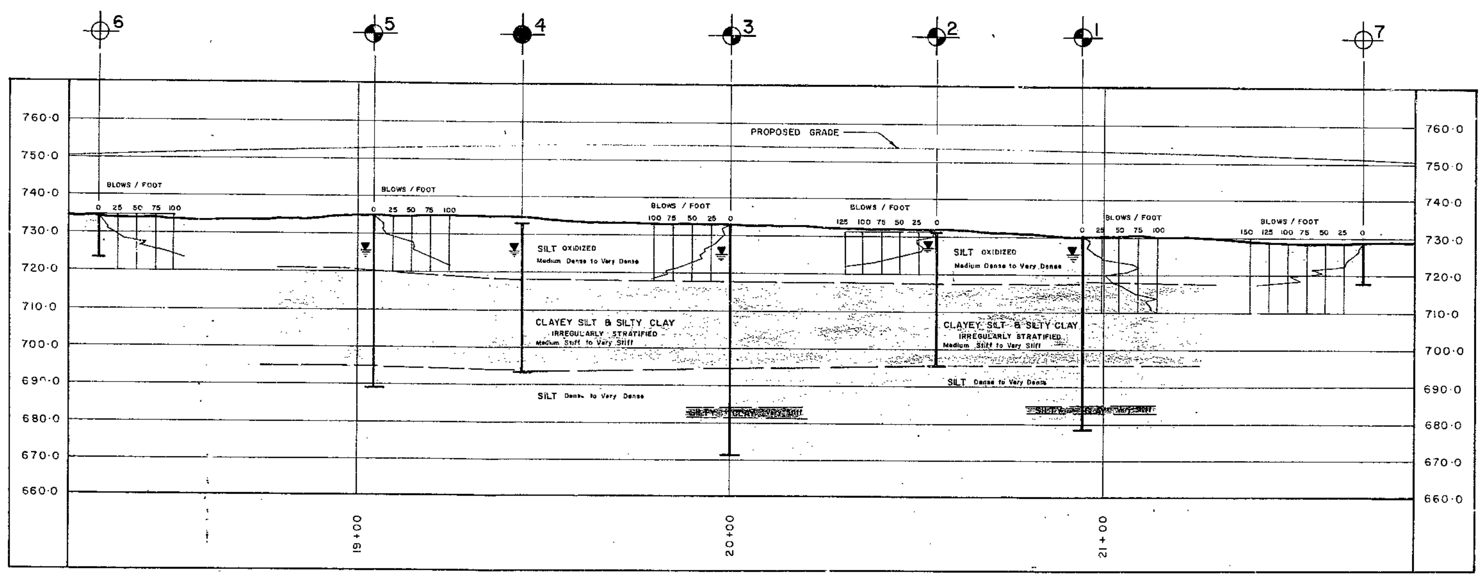
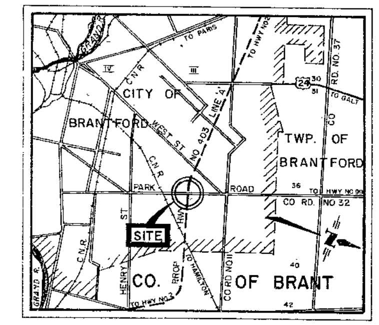
#61-F-110
W.P. #147-60
Hwy #403
PARK ROAD



PLAN
SCALE: 1 INCH = 20 FEET



PROFILE
SCALE: 1 INCH = 20 FEET



KEY PLAN
SCALE 1 INCH = 1 MILE

LEGEND

- BORE & PENETRATION HOLE
- BORE HOLE
- PENETRATION HOLE
- WATER LEVELS - Established at Time of Field Investigation NOV. 1/61

HOLE	ELEVATION	STATION	OFFSET
1	730·8	20+95	18' RT.
2	730·8	20+55	15' LT.
3	733·1	20+00	20' RT.
4	732·9	19+45	15' LT.
5	735·2	19+05	18' RT.
6	735·0	18+30	℄
7	729·0	21+70	℄

— 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.

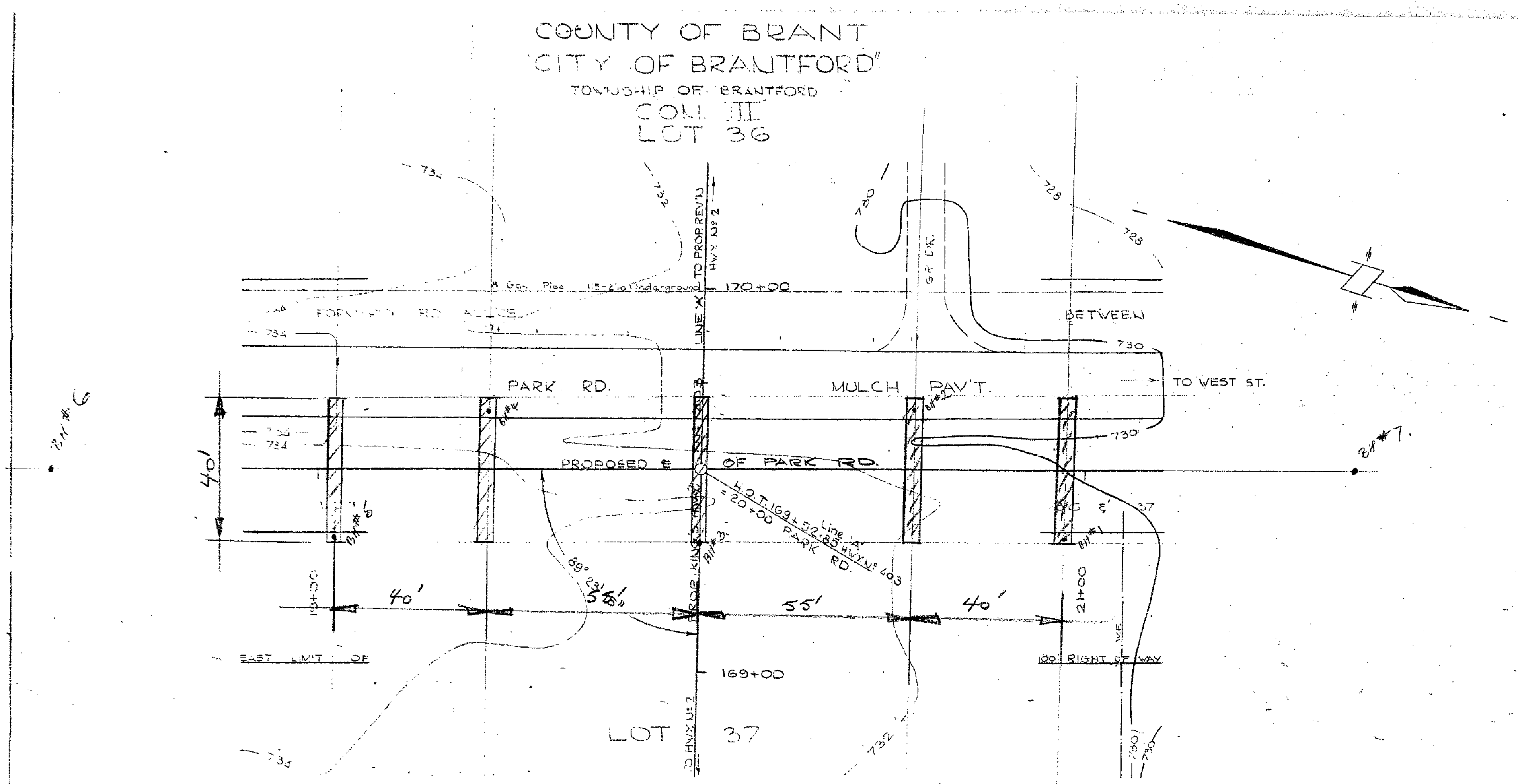
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION

PARK ROAD AND PROPOSED HIGHWAY NO. 403

LINE 'A'

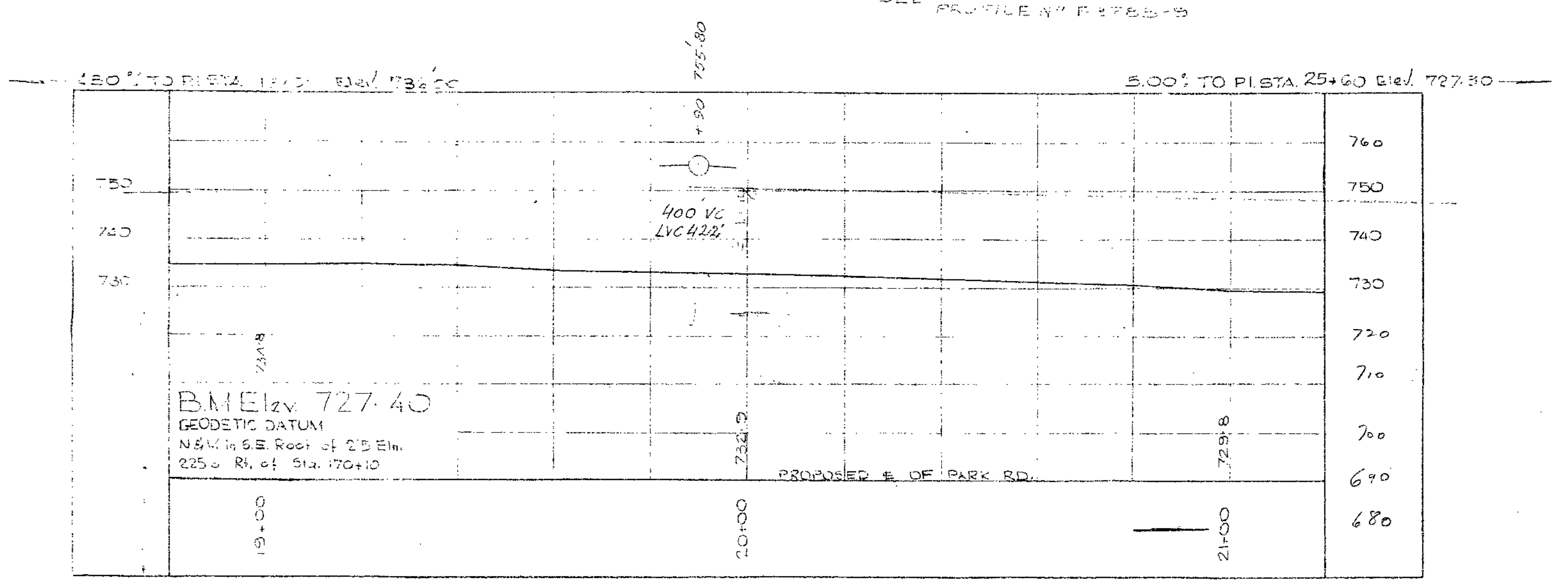
ORIGINATED I. HOLUBEC	DISTRICT NO. 4	DATE NOV. 13, 1961
DRAWN F. CLARK	W.P. NO. 147-60	JOB NO. 61-F-110
CHECKED	SCALE AS SHOWN	DRAWING NO. 61-F-110A
APPROVED M. S[illegible]		

REF. NO. E-3969-1

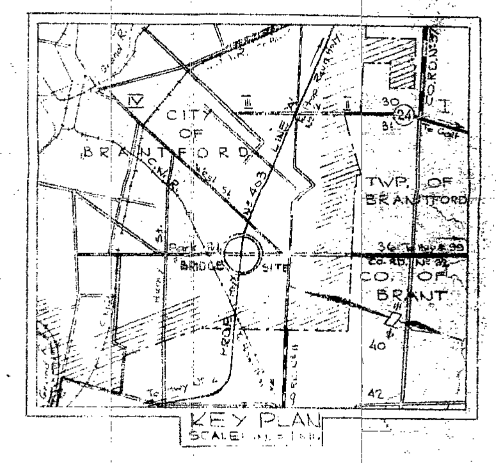


PLAN
SCALE: 1in.=20ft.

SEE PLAN Nº E-3765-8
PROFILE Nº E-3765-9



PROFILE
SCALE: HOR. VER. 1in.=20ft.



W.P. 147-60 61-F-110

ADDITIONS DATE	REMARKS	BY

DEPARTMENT OF HIGHWAYS ONTARIO
PLANNING & DESIGN BRANCH

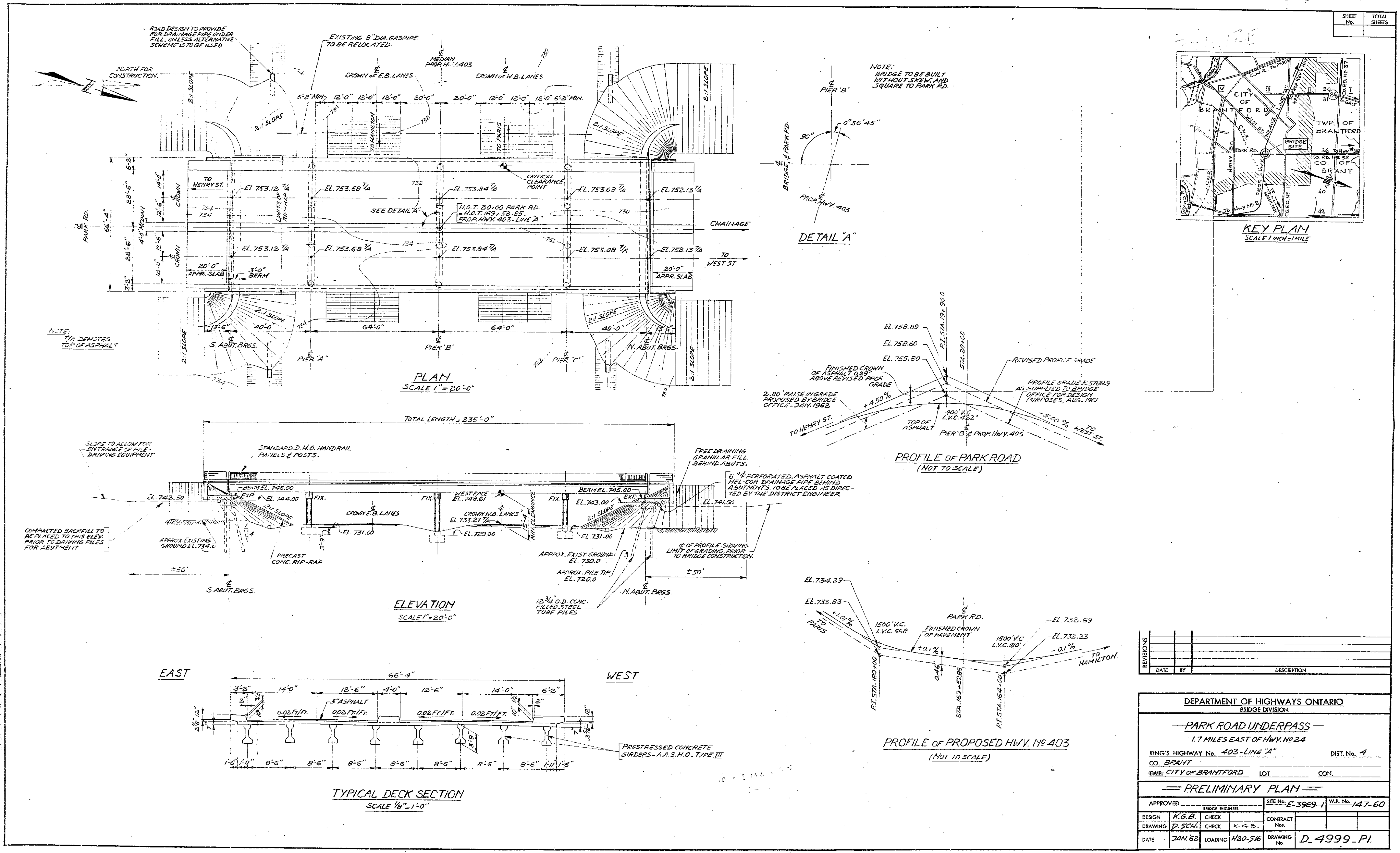
DISTRICT Nº 4

PROPOSED CROSSING
AT THE
PROPOSED KING'S HIGHWAY Nº 403
LINE 'A'
AND
PARK ROAD
IN THE CITY OF BRANTFORD

CITY OF BRANTFORD — COUNTY OF BRANT

BRIDGE SITE

SURVEY BY: Chief of Party H. Gregor; Supervisor K. Parsson	APPROVED: Director of Planning & Design
DRAWN BY: Draftsman A. Moulson; Supervisor G. Brown	SCALE AS SHOWN. Date of Survey March 1961; Date of Plan April 1961
CHECKED BY: Draftsman A. Augulis; Supervisor H. Pleasance	W.O. Nº 34-60-179; X-ING Nº
	PLAN-E-3969-1



SHEET No.	TOTAL SHEETS

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

— PARK ROAD UNDERPASS —
1.7 MILES EAST OF HWY. No 24

KING'S HIGHWAY No. 403-LINE "A" DIST. No. 4
CO. BRANT
~~TWP.~~ CITY OF BRANTFORD LOT CON.

═ PRELIMINARY PLAN ═

APPROVED	BRIDGE ENGINEER		SITE No. E-3969-1	W.P. No. 147-60	
DESIGN	K.G.B.	CHECK		CONTRACT Nos.	
DRAWING	D. SCH.	CHECK	K.G.B.		
DATE	JAN. '62	LOADING	H20-S16	DRAWING No.	D-4999-P1.

Mr. A. M. Toye,

Bridge Engineer.

Materials & Research Division.

(Foundation Section).

January 9, 1962.

D.H.O. FOUNDATION INVESTIGATION

REPORT. W.J.61-F-110-(W.P.147-6

Attention: Mr. S. McCombie.

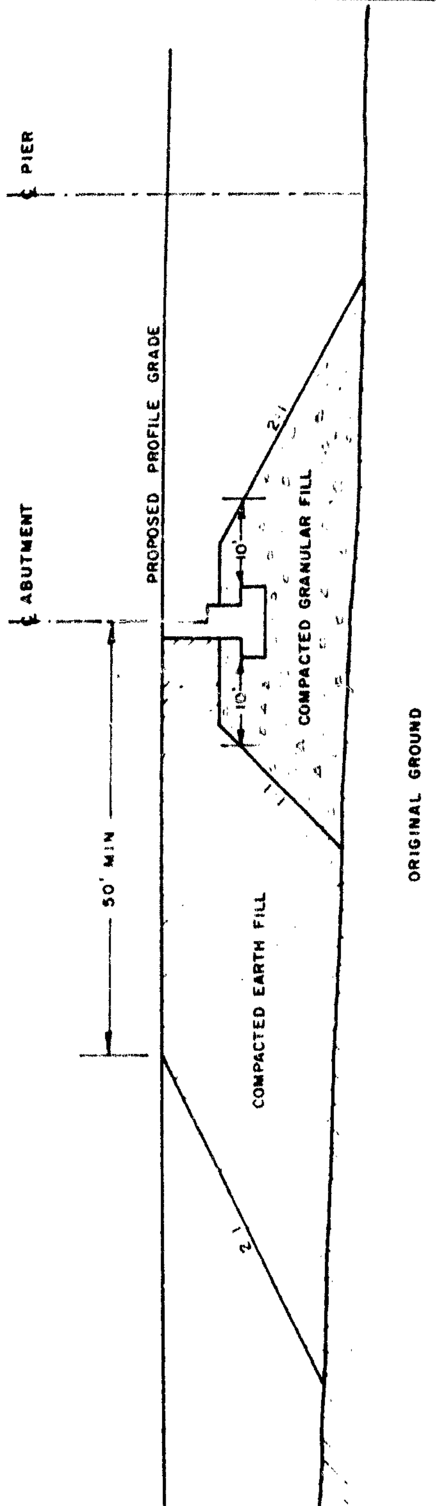
Re: Park Road and Proposed Hwy. #403
District #4.

Attached please find one print of Plan 61-F-110B for the above structure.

Would you please include this in the foundation report W.J. 61-F-110.

for I. Holubec
Project Foundation Engineer

IH/tt
Attach.
cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMillan
A. Gater (,London Region handling pre-engineering)
J. C. Thatcher
T. J. Kovich
J. Roy
J. E. Gruspier
E. R. Saint
F. Norman
A. Watt
Foundations Office
General Files



NOTES

1 - Structural details and elevation of footings should be as per Bridge Office drawings

2 - All topsoil should be removed prior to placing the granular fill.

3 - Embankment should be constructed with granular fill and earth fill material as shown on above drawing

4 - The granular fill and earth fill should be placed simultaneously and compacted as per current D.H.O methods.

ORIGINATED I Holubec	DEPARTMENT OF HIGHWAYS - ONTARIO	SCALE 1 inch = 20 feet
DRAWN H D Reed	MATERIALS & RESEARCH SECTION	W. P. NO. 147 - 60
CHECKED *T.H.*	APPROACH FILL DETAILS	JOB NO 61 - F - 110
APPROVED *M Devata*	HIGHWAY NO 403 and PARK ROAD	DWG NO 61 - F - 110 B
DATE 8 December 1961		

cc: Gen. Files

CONTR. No
63-56

P3-63-56

Mr. A. M. Toye,

Bridge Engineer.

Materials & Research Division,

(Foundation Section).

December 21, 1961.

D.H.O. FOUNDATION INVESTIGATION REPORT.

W.J. 61-F-110 -- W.P. 147-60.

Attention: Mr. S. McCombie.

Re: Park Road and Proposed Hwy. #403
District No. 4.

Attached, we are forwarding to you, our detailed foundation report on the subsoil conditions existing at the above-mentioned site.

We believe that the conclusions and recommendations contained therein, should prove adequate for your future design work. Should further information be required, please do not hesitate to contact our Office.

AGS

A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

AGS/MdeF
Attach.
cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMillan
A. Gater (London Region handling pre-engineering)
J. C. Thatcher
T. J. Kovich
J. Roy
J. E. Gruspier
E. R. Saint
F. Norman
A. Watt
Foundations Office
Gen. Files.

TABLE OF CONTENTS

FOUNDATION INVESTIGATION

at

Park Road and Proposed Hwy. #403,
W.J. 61-F-110 -- Dist. #4 -- W.P. 147-60.

1. INTRODUCTION:

It is proposed to construct an underpass at the crossing of Park Road and the proposed Hwy. #403, Line 'A' in Brantford. The bridge will be a four-span structure, about 65' wide and 190' long. Its centre line is about 30 ft. east of the present Park Road ℄.

An investigation was carried out by this section to determine the subsoil conditions existing at the above-mentioned structure location. Results and the discussions of the field investigation, together with conclusions and recommendations, are presented in this report.

2. DESCRIPTION OF SITE & GEOLOGY:

The surrounding area is generally flat and consists mostly of cultivated farm lands. The site lies in the northern extremity of the Norfolk Sand Plain. This Sand Plain is a large deltaic deposit laid down by glacial melt waters which drained into glacial lakes Whittlesey and Warren. The deposits consist of silty fine sand underlain by stratified silt, clay and fine sand.

Cont'd. /2 ...

3. <u>FIELD INVESTIGATION PROCEDURE</u>:

At the site, five sampled boreholes with dynamic cone penetration tests, and seven dynamic cone penetration were carried out. Samples were recovered at required depths by means of a 2" O.D. Split Spoon Sampler, and 2" I.D. thin-walled tubes. The denseness of the cohesionless material was measured by means of the Standard Penetration Test. Wherever possible the shear strength of the cohesive material was measured by means of a small field vane. (Constant 40).

Ground water levels were established in all boreholes during the time of the investigation.

The location and elevation of the boreholes and the estimated subsoil stratigraphy are shown on Drawing No. 61-F-110A.

4. <u>LABORATORY INVESTIGATION</u>:

Samples were visually examined and classified at the site as well as in the laboratory.

Laboratory tests were carried out on various representative samples to determine:-

(a) Natural Moisture Content

(b) Liquid and Plastic Limits

(c) Grain Size Distribution

(d) Bulk Density

(e) Undrained Shear Strength

Laboratory and field test results are summarized and

Cont'd. /3 ...

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

included in Appendix I of this report.

5. SUBSOIL CONDITION:

5.1 General.

The stratigraphy of the subsoil at the site was found to be generally uniform. Detailed descriptions of the various strata encountered are shown in Appendix I of this report. The estimated stratigraphical profile of Drawing No. 61-F-110A is based on this information.

The subsoil consists of the following strata:-

(i) Silt.

(ii) Silty Clay and Clayey Silt, Stratified.

(iii) Silt.

5.2 Silt.

This material was found below the topsoil in all the boreholes and extends for about 15 ft. to approx. elevation 720 ft. Essentially, this material may be described as non-cohesive well graded silt. The silt is oxidized and generally light brown in colour. Standard Penetration results obtained in this stratum ranged from 11 to 69 blows/ft. These 'N' values indicate the relative density of this material to vary from compact to very dense.

5.3 Silty Clay and Clayey Silt (Stratified).

This layer underlies the silt and is about 25 ft. in

Cont'd. /4 ...

5. <u>SUBSOIL CONDITION:</u> (Cont'd.)...

5.3 <u>Silty Clay and Clayey Silt (Stratified)</u>.

thickness, extending from elevation 720.0 ft. to elevation 695.0 ft. The silty clay and clayey silt is irregularly stratified, with the individual layers being about 1/8" to ¼" thick. Also the dip of the layers varies at places from the usual horizontal to a near vertical. The silty clay is predominantly reddish grey whereas the clayey silt is grey. This cohesive deposit may be described as stratified clayey silt and silty clay of low plasticity with a medium to very stiff consistency.

Various laboratory tests carried out on the bulk sampler gave the following average properties:-

Moisture Content	24%
Liquid Limit	34%
Plastic Limit	19%
Undrained Shear Strength	1500 p.s.f.

5.4 <u>Silt</u>.

A further deposit of silt was found immediately below the stratified silty clay and clayey silt and extends to an undetermined depth. Within this deposit, a thin pocket of stratified clayey silt and silty clay approx. 1.5' thick in B.H. #1 and 3.0' thick in B.H. #3 was encountered between Elev. 684.0 and elev. 681.0. This material is very similar to

Cont'd. /5 ...

5. SUBSOIL CONDITION: (Cont'd.)...

5.4 Silt.

the one described in Section 5.3.

The standard penetration results obtained in the silt ranged from 30 to over 100 blows per ft. indicating the relative density to be dense to very dense.

6. GROUND WATER CONDITIONS:

Water level observations carried out during the period of investigation indicate that the water level is at approx. elev. 725.0. The exact water levels observed at the time of investigation are shown on the borehole logs (Appendix I).

7. DISCUSSION AND RECOMMENDATIONS:

It is understood that a four-span underpass structure is to be built at the site. The upper stratum of the subsoil being medium dense silt, spread footings with a maximum load of 2 T.S.F. for 6 to 7 ft. wide footings, are recommended.

(a) Piers

It is recommended to construct the pier footings in the medium dense silt with the base at or below elevation 728.0 ft. A minimum cover of 5 ft. should be provided for frost protection. At this elevation a maximum load of 2 T.S.F. with maximum differential settlement of 1 inch can be used. The major part of this settlement will take place during construction.

The water level at the time of the investigation was

Cont'd. /6 ...

7. DISCUSSION AND RECOMMENDATIONS: (Cont'd.)...

(a) Piers

observed at elev. 725.0 ft. but this may vary, during the year with a possible high in the spring. Therefore, it is recommended to construct the footings of the piers during the fall, if possible. Also the Ground Water Level should be determined just prior to the construction and if this is found to be above the proposed base of the footings, dewatering will be necessary.

(b) Abutments

It is recommended to found the abutments on spread footings placed on well-compacted approach fill material. It is recommended that a portion of the approach fill be constructed of granular material because good compaction is more easily achieved with this kind of soil. The proposed arrangement is shown on drawing No. 61-F-100B. The additional portion of the fill should be placed in order to apply all the stresses which will influence the settlements of the abutment footing.

The material should be compacted to 100% density as per the present D.H.O. practice.

A safe load of 1.75 T/sq. ft. for the abutment footings is recommended.

It is also recommended that the approach fill be built up to grade and then excavated for the abutment footings.

Cont'd. /7 ...

7. DISCUSSION AND RECOMMENDATIONS: (Cont'd.)...

(c) Approach fills

No stability problems in connection with the construction and performance of the approach fills are anticipated.

8. SUMMARY:

The subsoil at the site is generally uniform and consists of silts and stratified silty clays and clayey silts.

Spread footings with a safe load of 2 T.S.F. are recommended for the piers and they should be placed in the medium dense silt at or below elevation 728.0 and a minimum of cover of 5 ft. for frost protection should be provided.

The abutment footings should be placed on granular fill compacted as described in Section 7 and a safe load of 1.75T/sq.ft. should be used.

At the time of the investigation the ground water was at elev. 725.0 ft. This may vary seasonally with a possible high during the Spring.

No approach fill stability problems are anticipated during or after construction.

9. MISCELLANEOUS:

The field work was carried out from October 30 to November 3, 1961, by F. E. Johnston Drilling Co. Ltd., and the work was supervised by I. Holubec for the Ontario Department of Highways.

Report prepared by: ....
I. Holubec,
Proj. Fdn. Engineer.

December 1961.

Report approved by: ....
M. Devata,
Sr. Proj. Fdn. Engr.

APPENDIX I.

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-110

W.P. 147-60

HOLE NO.	SAMP NO.	SAMPLE DEPTH FEET	MATERIAL DESCRIPTION	PENETN RESIST BLOWS/FT	MOIST CONT	PLASTIC LIMIT	LIQUID LIMIT	SHEAR STRENGTH PSF	UNIT WEIGHT PCF	REMARKS
1	S1	3'-4.5'	Silt with traces of sand, medium dense, oxidized, light brown.	11	20.1	-	-	-	-	
	S2	6'-7.5'	Silt, fissured into 1/4"-1/8" thick layers, oxidized along fissures, very dense, light brown.	69	-	-	-	-	-	
	S3	10'-11.5'	Silt, medium dense, grey.	16	-	-	-	-	-	
	S4	15'-16.5'	Silty clay of low plasticity, very stiff, grey.	21	20.3	17.4	34.2	-	-	
	S5	20'-21.5'	Clayey silt (grey) and silty clay (reddish grey), stratified, stiff.	8	-	-	-	-	-	
	VANE	23'		-	-	-	-	2240	-	Sens: 14.0
	S6	25.5'-27'	Clayey silt (grey) and silty clay (reddish grey), stratified stiff.	13	26.6	19.3	34.6	-	-	
	S7	30'-31.5'	Silt, loose, grey.	7	-	-	-	-	-	
	VANE	33'		-	-	-	-	1440	-	Sens: 36.0
	S8	35'-36.5'	Silt, dense, grey.	36	-	-	-	-	-	
	S9	40'-41.5'	Silt, very dense, grey.	98	-	-	-	-	-	
	S10	45'-46.5'	45.0-45.5 Silt, grey 45.5-46.5 Silty clay of low plasticity, stiff, grey.	13	28.4	17.4	27.9	-	-	
	S11	50'-51.5'	Clayey silt (reddish grey) and silt (grey) stratified, hard.	55	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-110
W.P. 147-60

HOLE NO.	SAMP. NO.	SAMPLE DEPTH FEET	MATERIAL DESCRIPTION	PENETN RESIST BLOWS/FT	MOIST CONT %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH psf	UNIT WEIGHT pcf	REMARKS
2	S1	5'-6.5'	Silt, fissured into 1/8" thick layers, oxidized, medium dense, light brown.	22	19.8	-	-	-	-	
	S2	10'-11.5'	Silt, dense, oxidized, light brown.	37	-	-	-	-	-	
	T3	15'-16.1'	Silty clay, very stiff, grey.	P	22.4	-	-	2340	131.1	
	VANE	17.5'		-	-	-	-	3040	-	Sens: 2.5
	T4	20'-21.3'	Clayey silt to silty clay, very stiff, grey.	P	22.6	-	-	1630	126.9	
	VANE	22.3'		-	-	-	-	2400	-	Sens: 2.1
	T5	25'-26.5'	Clayey silt, very stiff, grey.	P	19.9	-	-	-	-	
	S6	30'-31.5'	Clayey silt (reddish grey) and silt (grey) stratified, very stiff.	29	-	-	-	-	-	
	S7	35'-36.5'	35.0-35.5 - " - 35.5-36.5 silt, medium dense, grey.	28	-	-	-	-	-	
[illegible]	S1	3'-4.5'	Silt, medium dense, oxidized, light brown.	26	15.2	-	-	-	130.9	
	S2	6'-7.5'	Silt with a 6" seam of silt and clayey silt irregularly stratified, medium dense, light brown.	13	-	-	-	-	-	
	S3	10'-11.5'	Silt, medium dense, grey.	25	19.7	-	-	-	133.6	
	S4	15'-16.5'	Silt and clayey silt, irregularly stratified dense, grey.	32	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-110
W.P. 147-60

HOLE NO	SAMP NO	SAMPLE DEPTH FEET	MATERIAL DESCRIPTION	PENET'N RESIST BLOWS FT	MOIST. CONT %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
3	T5	20'-21.5'	Clayey silt to silty clay, stiff, grey.	P	24.8	19.5	33.6	-	-	
	T6	25'-26.5'	- " - very stiff, grey.	P	-	-	-	-	-	
	T7	30'-30.5'	- " -	P	-	-	-	-	-	
	S8	30.5'-32'	Silt (grey) and clayey silt (reddish grey) stratified hard.	41	-	-	-	-	-	
	S9	35'-36.5'	- " -, medium stiff.	8	-	-	-	-	-	
	T10	37'-37.2'	Clayey silt, stiff, grey.	P	-	-	-	-	-	
	S11	40'-41.5'	Silt, dense, grey.	30	-	-	-	-	-	
	S12	45'-45.8'	Silt (grey) and clayey silt (reddish grey) stratified, hard.	140-10"	18.7	-	-	-	-	
	S13A	50'-51'	Clayey silt, medium stiff, grey.	(20	-	-	-	-	-	
	S13B	51'-51.5'	Silt, dense, grey.	(						
	S14	55'-56.5'	Sandy silt with thin seams of silt, dense, grey.	32	-	-	-	-	-	
	S15	60'-61.5'	Silt and clayey silt stratified stiff, grey.	11	25.2	-	-	-	-	

FORM OB ML 222

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-110

W.P. 147-60

HOLE NO.	SAMP. NO.	SAMPLE DEPTH FEET	MATERIAL DESCRIPTION	PENET'N RESIST BLOWS/FT	MOIST CONT %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH	UNIT WEIGHT	REMARKS
4	S1	5'-6.5'	Silt, oxidized, medium dense, light brown.	16	-	-	-	-	-	
	S2	10'-11.5'	Silt, medium dense, grey.	26	-	-	-	-	-	
	T3	15'-16.5'	Clayey silt to silt, hard, grey.	P	22.6	-	-	840	131.9	
	T4	20'-21'	Clayey silt and silty clayey, stratified, stiff, grey.	P	24.5	-	-	1920	128.0	
	VANE	22.5'		-	-	-	-	3040	-	Sens: 3.6
	T5	25'-26.5'	- " -	P	-	-	-	-	-	
	VANE	28'		-	-	-	-	3520	-	Sens: 3.2
	S6	30'-31.5'	Silt (grey) and clayey silt (reddish grey), stratified, hard.	32	-	-	-	-	-	
	S7	35'-36.5'	- " -	9	27.7	18..	32.2	-	-	
	VANE	38'		-	-	-	-	2880	-	Sens: 5.1
	S8	40'-41.5'	Silt, dense, grey.	44	-	-	-	-	-	
5	S1	3'-4.5'	Silt, oxidized, medium dense, light brown.	15	-	-	-	-	-	
	S2	6'-7.5'	Silt, fissured, oxidized, dense, light brown.	28	17.4	-	-	-	-	
	S3	10'-11.5'	- " -	29	-	-	-	-	-	

FORM OB ML 222
1 M-60-4645

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-110
W.P. 147-60

HOLE NO	SAMP NO	SAMPLE DEPTH FEET	MATERIAL DESCRIPTION	PENETN RESIST BLOWS FT	MOIST. CONT %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH psf	UNIT WEIGHT pcf	REMARKS
5	S4	15'-16.5'	Silt and clayey silt, stratified, stiff, grey.	11	-	-	-	-	-	
	T5	20'-21.3'	Clayey silt of, low plasticity, very stiff, grey.	P	26.4	18.4	32.9	-	125.1	
	S6	25'-26.5'	Silt (grey) and clayey silt (reddish grey) stratified stiff.	11	-	-	-	-	-	
	T7	30'-31.5'	- " -	P	-	-	-	-	-	
	S8	35'-36.5'	- " -	12	-	-	-	-	-	
	S9	40'-41.5'	Silt, reddish grey and grey, very dense.	53	-	-	-	-	-	
	S10	45'-46'	- " -	125	-	-	-	-	-	
6-7	cone penetrations only.									

S denotes split spoon sample.
T " shelby tube "

FORM OB-ML-126 (REV. 1959.) – 59-5008

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 149-60 BORE HOLE NO. 1

JOB 61-F-110 STATION 20+95 (18' Rt.)

DATUM 730.8' COMPILED BY B.K.

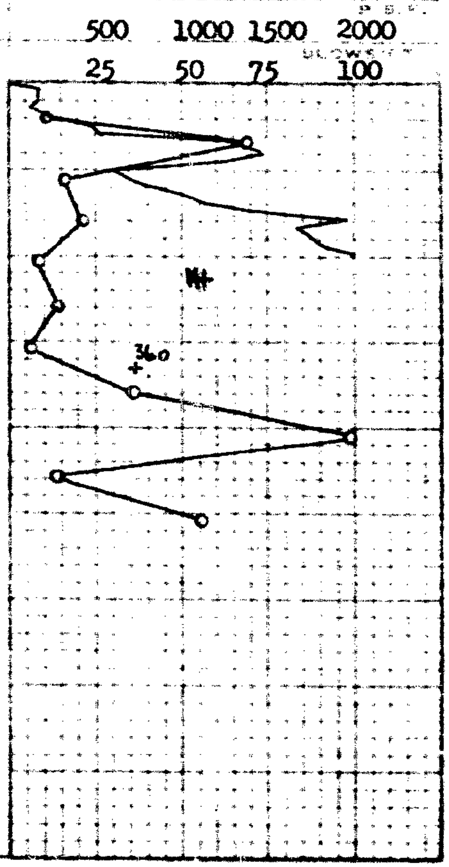
BORING DATE Nov. 1/61. CHECKED BY I.H.

LEGEND

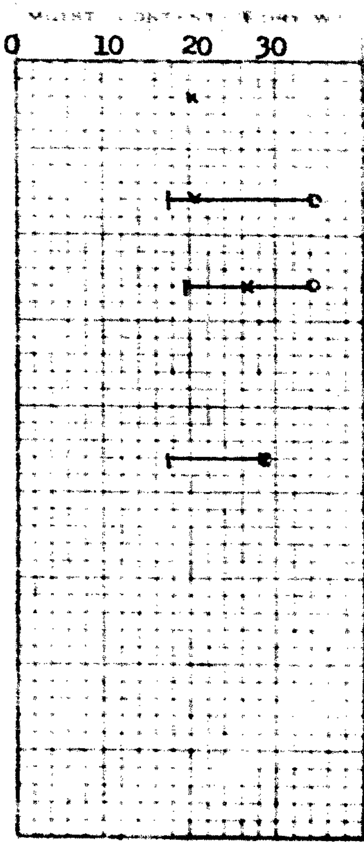
2" DIA. SPLIT TUBE	
2" SHELBY TUBE	
2" SPLIT TUBE	
2" DIA. CONE	
2" SHELBY	
CASING	
1/2 UNCONFINED COMPRESSION (Qu)	
VANE TEST (C) AND SENSITIVITY (S)	
NATURAL MOISTURE AND LIQUIDITY INDEX	
LIQUID LIMIT	
PLASTIC LIMIT	

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	Groundlevel	730.8	0
	Silt, oxidized medium dense to very dense, light brown. (w.l. ▽ 725.8)	725.8 720.8	10
	Clayey silt and silty clay irregularly stratified, medium stiff to very stiff, grey.	695.8	20 30
	Silt, loose to very dense, with a 1½ft. thick pocket of silty clay stratum at elev. 684.3', grey.	679.3	40 50
	End of borehole.		60

STRENGTH AND PENETRATION RESISTANCE



CONSISTENCY



SAMPLE	NATURAL UNIT WT. P.C.F.
S1	-
S2	-
S3	-
S4	-
S5	-
S6	-
S7	-
S8	-
S9	-
S10	-
S11	-

Penetration resistance profile shown; obtained by driving a 2" dia. cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow.

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

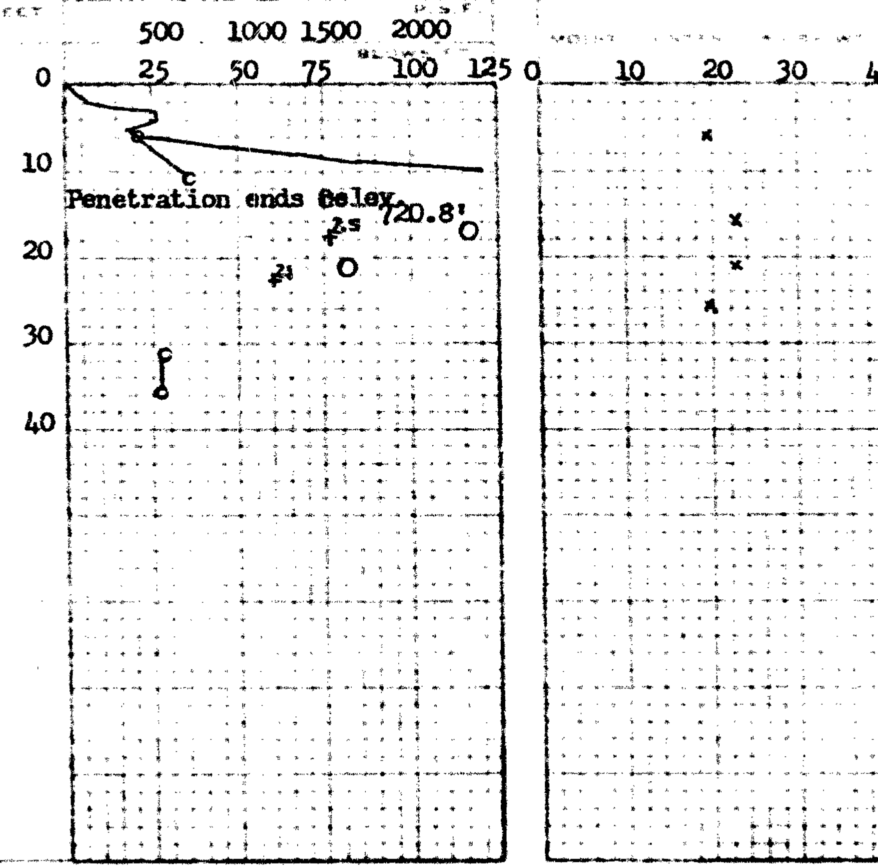
W.P. 147-60	BORE HOLE NO. 2	
JOB 61-F-110	STATION 20+55 (15' Lt.)	
DATUM 730.8'	COMPILED BY B.K.	
BORING DATE Nov. 2/61.	CHECKED BY I.H.	

LEGEND

- 2" DIA SPLIT TUBE
- 2" SHELBY TUBE
- 2" SPLIT TUBE
- 2" DIA CONE
- 2" SHELBY
- CASING
- 1/2 UNCONFINED COMPRESSION (Qu)
- VANE TEST (C) AND SENSITIVITY (S)
- NATURAL MOISTURE AND LIQUIDITY INDEX
- LIQUID LIMIT
- PLASTIC LIMIT

DESCRIPTION	ELEV. FEET
Groundlevel	730.8
Silt, oxidized, medium dense to dense, light brown. w.l.	726.3
	718.8
Clayey silt and silty clay, irregularly stratified, stiff to very stiff, predominantly grey.	
	695.3
~~Silt, medium dense, grey.~~	694.3
End of borehole.	

Penetration resistance profile shown; obtained by driving a 2" dia. cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow.



SAMPLE	NATURAL UNIT WT.
S1	-
S2	-
T3	131.1
T4	126.9
T5	-
S6	-
S7	-

FORM OB-ML-126 (REV. 1959) 59-5008

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARC ECTION

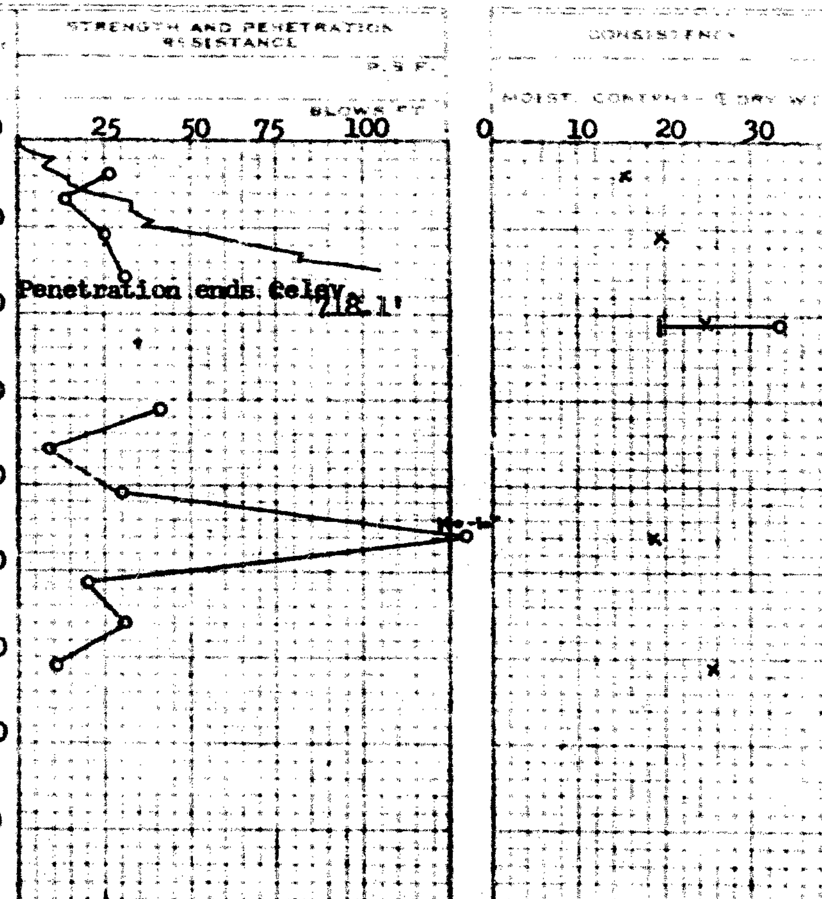
W.P. 147-60
JOB 61-F-110
DATUM 733.1'
BORING DATE Oct. 30/61

BORE HOLE NO. 3
STATION 20+00 (20' Rt.)
COMPILED BY B.K.
CHECKED BY I.H.

2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

LEGEND
1/2 UNCONFINED COMPRESSION (Qu)
VANE TEST (C) AND SENSITIVITY (S)
NATURAL MOISTURE AND LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	Groundlevel	733.1	0
	Silt, oxidized, medium dense to dense, light brown. W.L. 724.1. Colour changes to grey at elev. 723.1	724.1	10
		719.1	
	Clayey silt and silty clay irregularly stratified, medium stiff to very stiff, predominantly grey.		20, 30
		694.1	40
	Silt with occasional seams of clayey silt, med. dense, grey.	685.1	
	Clayey silt, medium stiff, grey.	682.1	50
	Silt, dense, grey.	671.6	60
	End of borehole.		70
	Penetration resistance profile shown; obtained by driving a 2" dia. cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow.		80



SAMPLE	NATURAL UNIT WT. P.C.F.
S1	130.9
S2	-
S3	133.8
S4	-
T5	-
T6	-
T7	-
S8	-
S9	-
T10	-
S11	-
S12	-
S13	-
S13A	-
S14	-
S15	-

FORM OB-ML-126 (REV. 1959.) — 59-5008

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 147-60
JOB 61-F-110
DATUM 732.9'
BORING DATE Nov. 2/61.

BORE HOLE NO. 4
STATION 19+45 (15' Lt.)
COMPILED BY B.K.
CHECKED BY I.H.

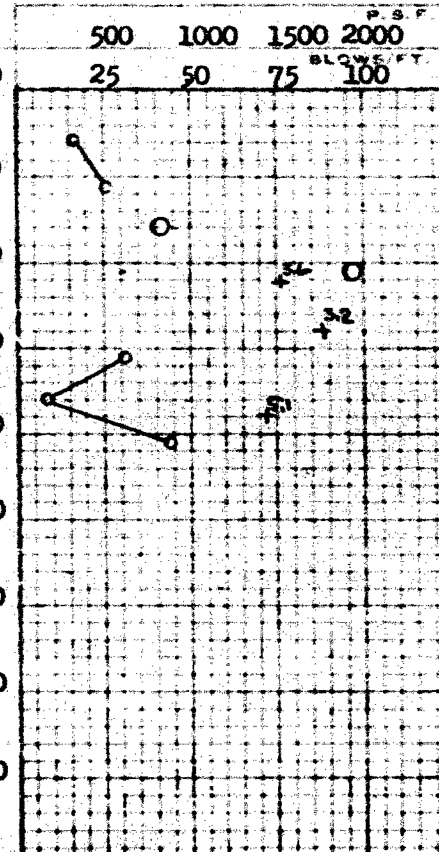
2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

LEGEND

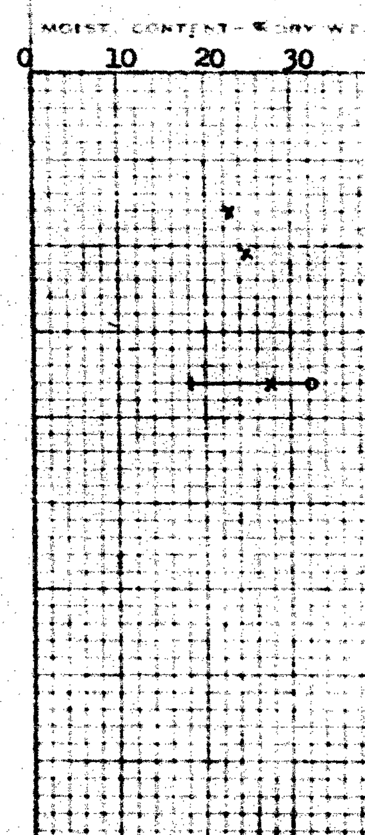
1/2 UNCONFINED COMPRESSION (Qu) O
VANE TEST (C) AND SENSITIVITY (S) +S
NATURAL MOISTURE AND LIQUIDITY INDEX X
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	SAMPLE	NATURAL UNIT WT. P.C.F.
	Groundlevel	732.9	0		
	Silt, oxidized, medium dense, light brown. w.l.	725.6		S1	-
		718.9	10	S2	-
	Clayey silt and silty clay, irregularly stratified, stiff to very stiff, predominantly grey.		20	T3	131.9
				T4	128.0
			30	T5	-
				S6	-
		693.9		S7	-
	Silt, dense, grey.	691.4	40	S8	-
	End of borehole.				

STRENGTH AND PENETRATION RESISTANCE



CONSISTENCY



FORM OB-ML-126 (REV. 1959.) -59-5008

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 147-60
BORE HOLE NO. 5

JOB 61-F-110
STATION 19+05 (18' Rt.)

DATUM 735.2'
COMPILED BY B.K.

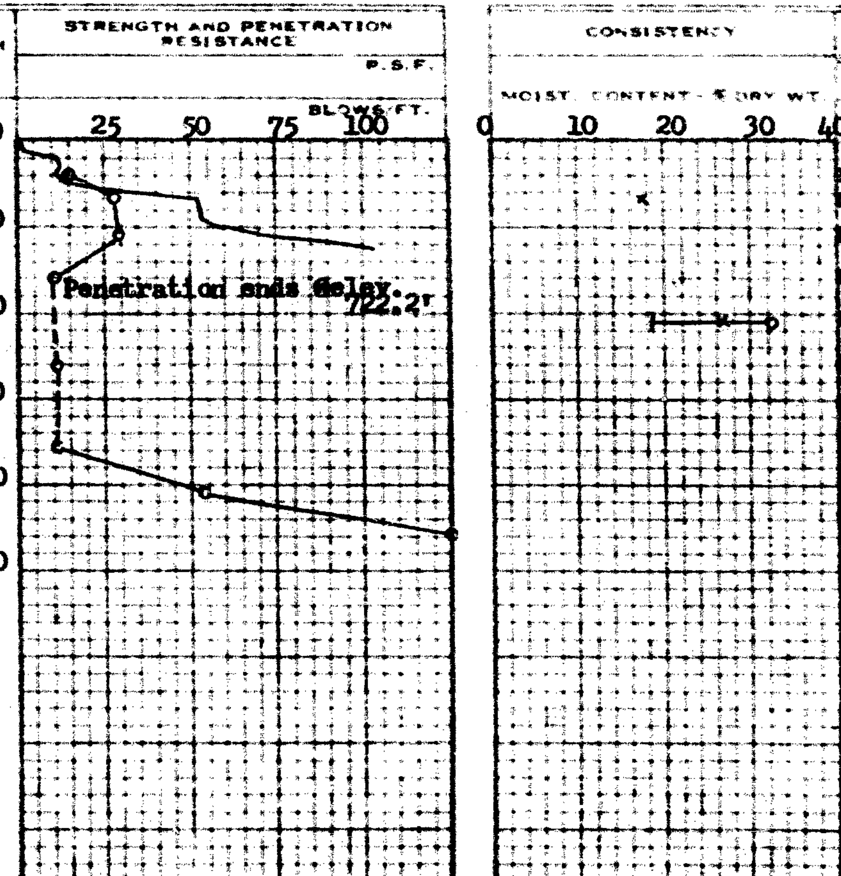
BORING DATE Oct. 31/61.
CHECKED BY I.H.

2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Qu) O
VANE TEST (C) AND SENSITIVITY (S) +S
NATURAL MOISTURE AND LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	Groundlevel	735.2	0
	Silt, oxidized, med. dense, light brown. w.l.	725.9	10
		721.2	
	Clayey silt and silty clay irregularly stratified, stiff to very stiff, predominantly grey.		20
			30
		695.7	40
	Silt, very dense, predominantly grey.	689.2	
	End of borehole.		50
	Penetration resistance profile shown; obtained by driving a 2" dia. cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow.		



SAMPLE	NATURAL UNIT WT. P.C.F.
S1	-
S2	-
S3	-
S4	-
T5	125.1
S6	-
T7	-
S8	-
S9	-
S10	-

FORM OB-ML-126 (REV. 1959) — 59-5008

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 147-60

JOB 61-F-110

DATUM 735'

BORING DATE Nov. 3/61.

BORE HOLE NO. 6

STATION 18+30 ℄

COMPILED BY B.K.

CHECKED BY I.H.

2" DIA. SPLIT TUBE

2" SHELBY TUBE

2" SPLIT TUBE

2" DIA. CONE

2" SHELBY

CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Qu)

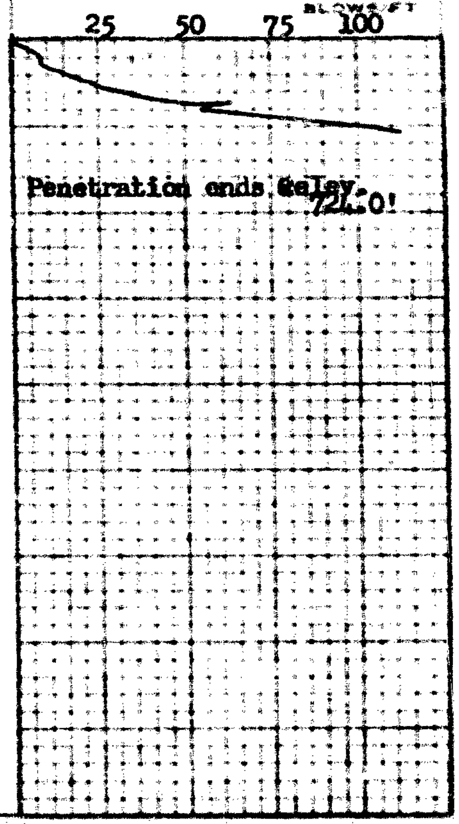
VANE TEST (C) AND SENSITIVITY (S)

NATURAL MOISTURE AND LIQUIDITY INDEX

LIQUID LIMIT

PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE P.S.F / BLOWS/FT	CONSISTENCY / MOIST. CONTENT % DRY WT.	SAMPLES	NATURAL UNIT WT. P.C.F.
	↓ Groundlevel	735.0	0				
	Penetration resistance profile shown; obtained by driving a 2" dia. cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow.		10, 20, 30	Penetration ends @elev. 724.0'			



FORM OB-ML-126 (REV. 1959) -59-5008

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 147-60 BORE HOLE NO. 7

JOB 61-F-110 STATION 21+70 ℄

DATUM 729.0' COMPILED BY B.K.

BORING DATE Nov. 3/61. CHECKED BY I.H.

LEGEND

2" DIA SPLIT TUBE

2" SHELBY TUBE

2" SPLIT TUBE

2" DIA. CONE

2" SHELBY

CASING

1/2 UNCONFINED COMPRESSION (Qu) O

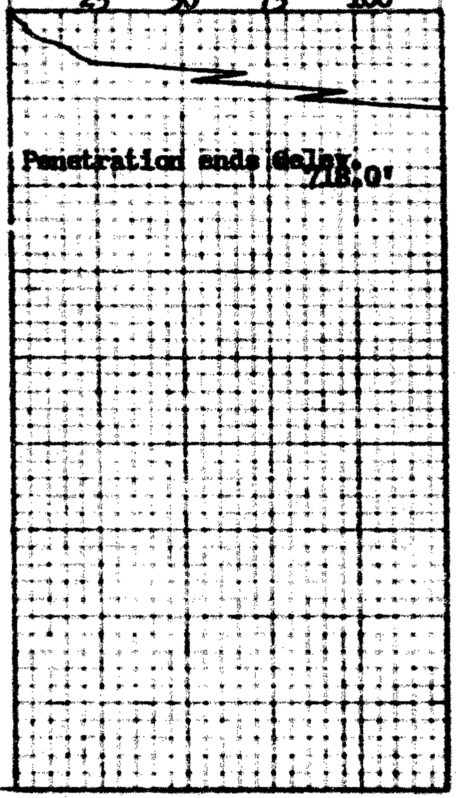
VANE TEST (C) AND SENSITIVITY (S) +S

NATURAL MOISTURE AND LIQUIDITY INDEX

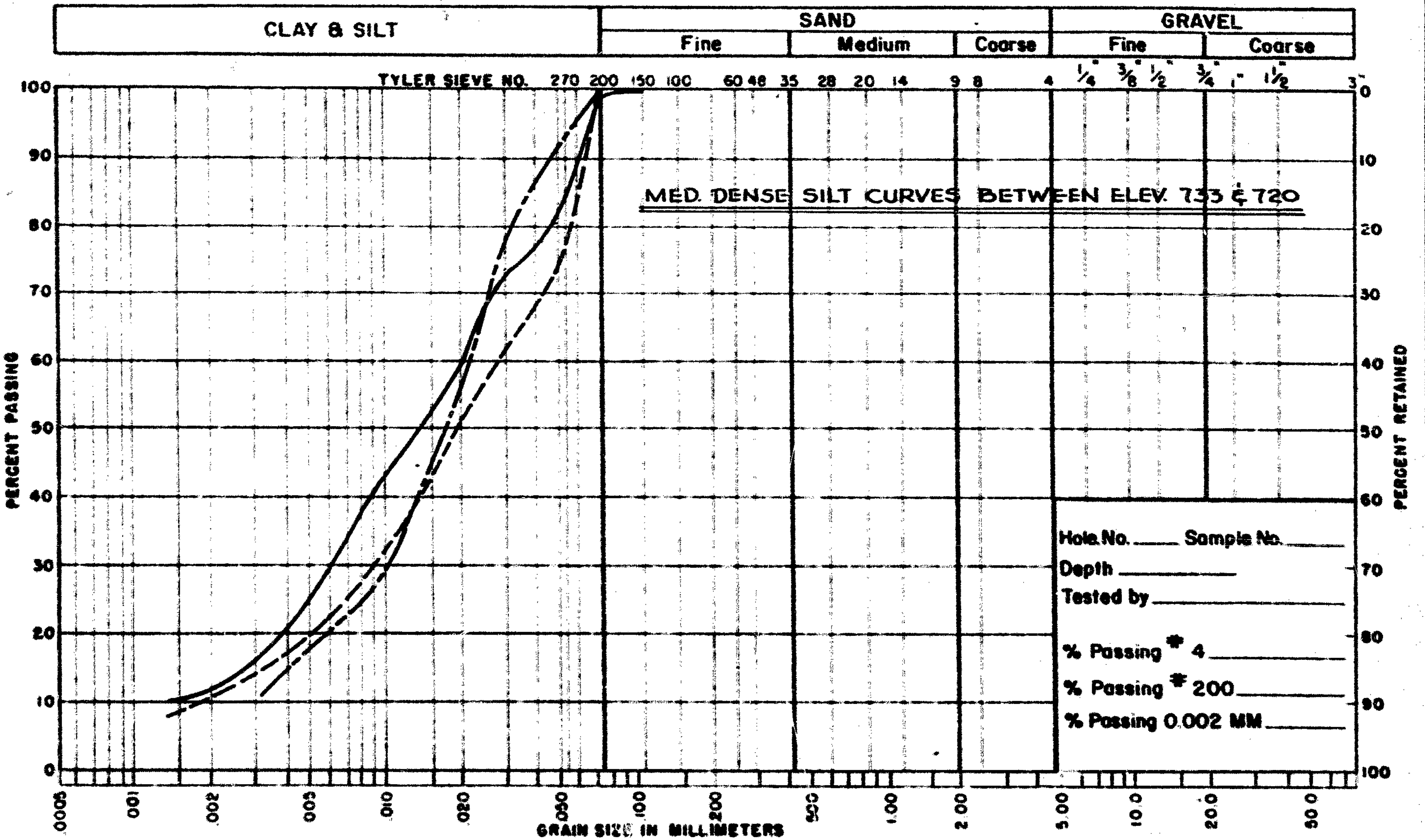
LIQUID LIMIT

PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE P.S.F. / BLOWS/FT. 25 50 75 100	CONSISTENCY / MOIST. CONTENT-% DRY WT.	SAMPLE	NATURAL UNIT WT. P.C.F.
	Groundlevel	729.0	0				
			10				
			20				
	Penetration resistance profile shown; obtained by driving a 2" dia. cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow.		30				



UNIFIED SOIL CLASSIFICATION SYSTEM



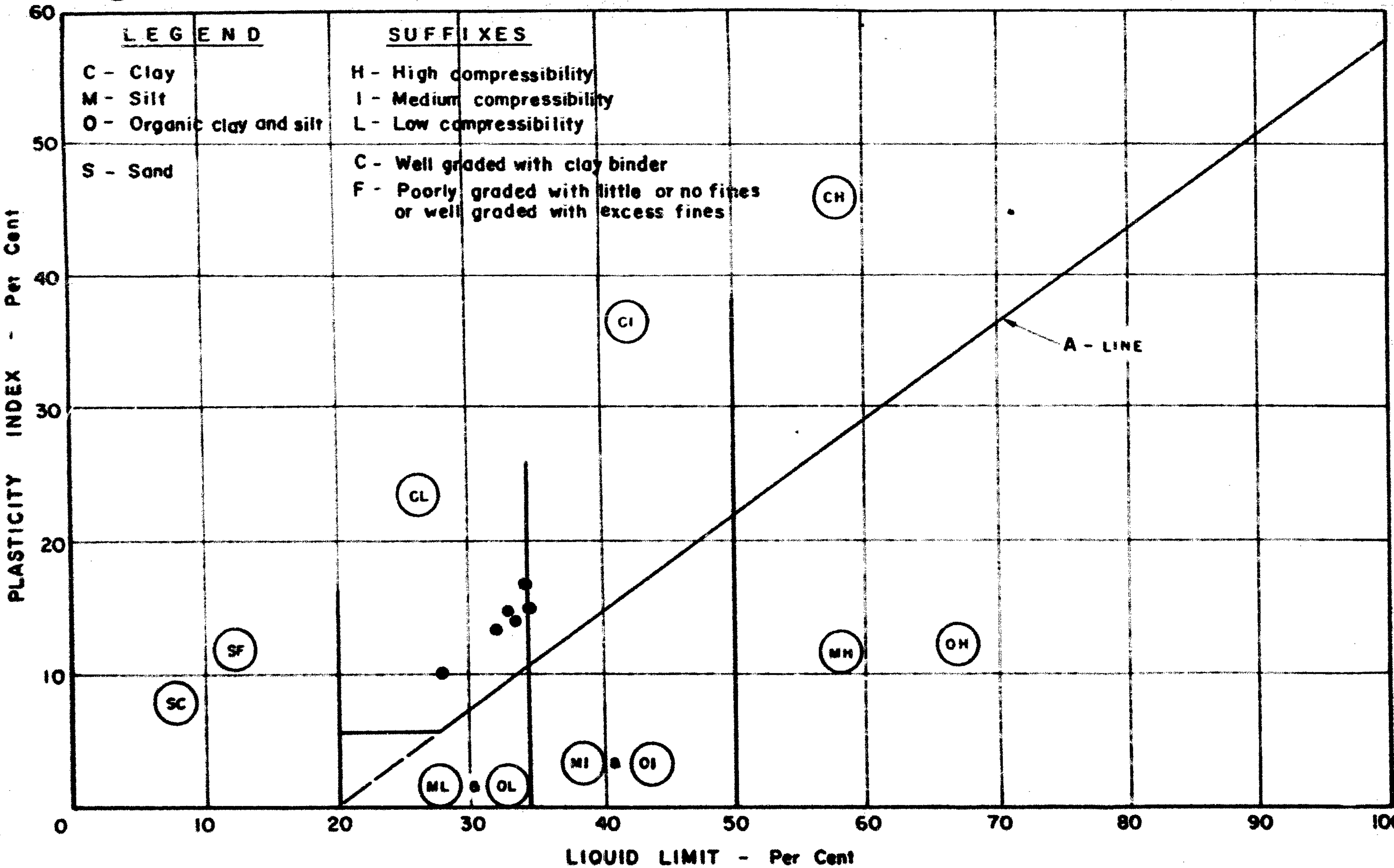
NOTES ——————— BOREHOLE Nº 1 - SAMPLE 1
- - - - - - - - " 5 " 2
—·—·—·— " 3 " 3

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
GRAIN SIZE DISTRIBUTION

Job No 61-F-110 W.P. No. 147-60

Location BRANTFORD - HWY. 403 & PARK ROAD

OB- 252



NOTES SAMPLES FROM THE STRATIFIED SILTY CLAY & CLAYEY SILT ●

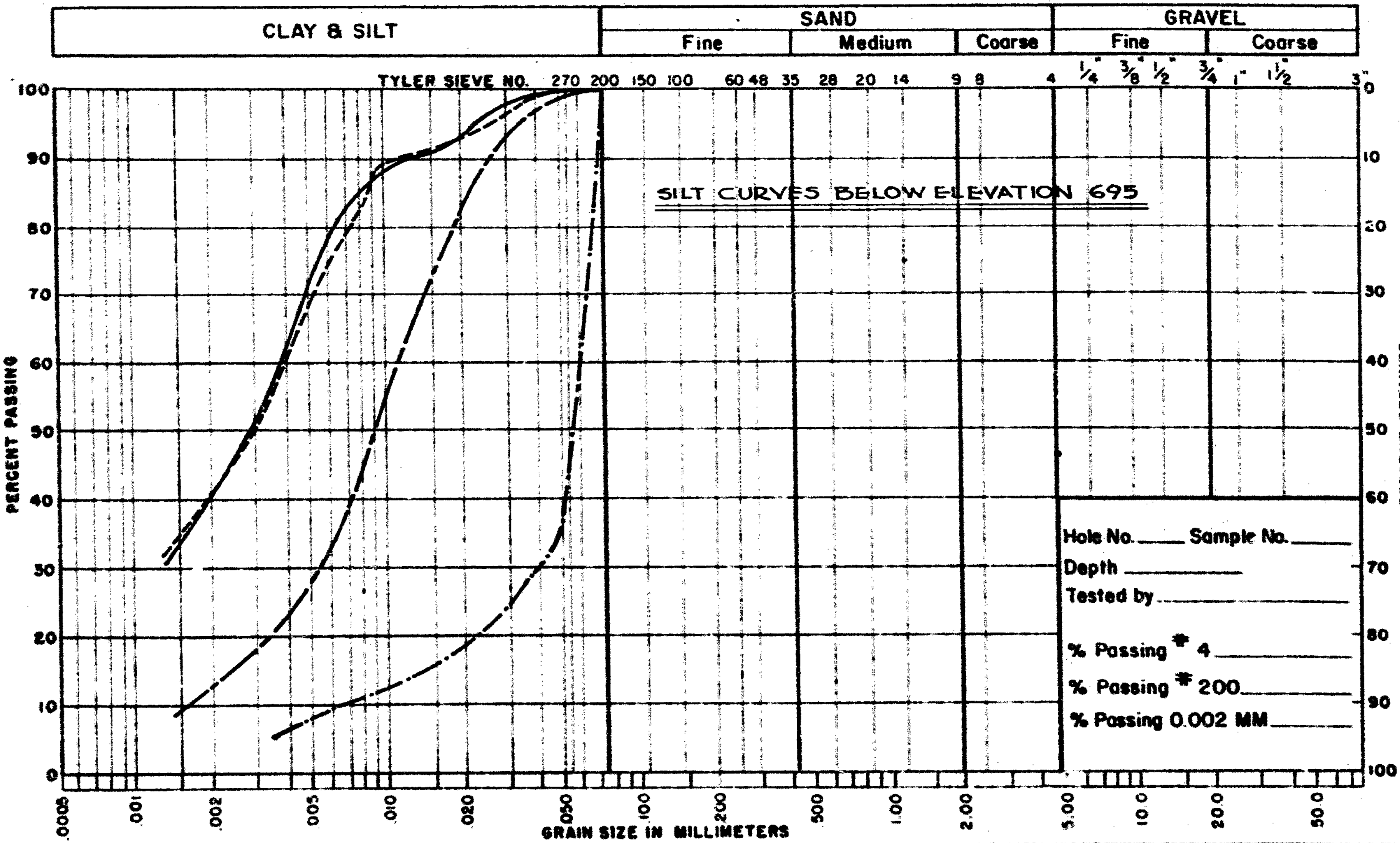
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
PLASTICITY CHART

Job No. 61-F-110 W.P. No. 147-10

Location BRANTFORD - HWY. 403 & PARK ROAD

FORM OB-ML-17
4N-59 3979

UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES
- - - - - - - BOREHOLE Nº 3 - SAMPLE 15
———————— " 3 " 5
—— - —— - —— " 4 " 6
—·—·—·—· " 3 " 12

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
GRAIN SIZE DISTRIBUTION

Job No 61-F-110 W.P. No. 147-60

Location BRANTFORD - HWY. 403 & PARK ROAD

cc: Foundations Office (RM 110)

Mr. A. M. Toye,

January 16, 1962.

Bridge Engineer.

Materials & Research Division,

(Foundation Section)

Attention: Mr. B. Davis

Re: Park Road Underpass,
1.7 Mi. E. of Hwy. #24,
Hwy. #403, City of Brantford,
County of Brant, District #4.
W.P. 147-60.

In reply to a memo dated January 4th, 1962, from Mr. K. G. Bassi concerning the above-mentioned structure, we submit the following comments:-

1) If it is desired to adopt a piled foundation for the abutments, 12" Ø tube piles should be used. A design load of 30 tons per pile is permissible in this case, provided the piles are driven to 10 ft. below the original ground surface.

2) The probable differential settlements will be in the order of 1" and, therefore the structure should be designed accordingly.

A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.
Per:

M Devata

(M. Devata,
SR. PROJECT FOUNDATION ENGR.)

MD/MdeF

cc: Mr. K. G. Bassi
Foundations Office
Gen. Files.

OFFICE LOCATION —
DOWNSVIEW AVE.,
KEELE ST. — HIGHWAY 401
TORONTO, ONTARIO.

ONTARIO
DEPARTMENT OF HIGHWAYS

POSTAL ADDRESS —
DEPARTMENT OF HIGHWAYS
PARLIAMENT BUILDINGS,
TORONTO 5, ONTARIO.

Bridge Division,
January 4, 1962.

~~[illegible]~~ Minty
Jan 10-1962
AGS

MEMORANDUM TO:

Mr. A. G. Stermac,
Principal Foundation Engineer,
Department of Highways,
Materials & Research Division,
Lab. Bldg.,
Downsview, Ontario.

Attention: Mr. M. Devata

RE: Park Road Underpass
W.P. 147-60
1.7 Mi. E. of Hwy. #24
Hwy. #403 - District #4
City of Brantford - Co. of Brant

The Foundation Investigation Report for this structure recommends that the abutment footings should be placed on compacted granular fill. We would like to consider an alternative arrangement with the abutment being supported on piles driven through the approach fill. Would you let us know the type, design capacity and approximate pile tip elevations for the alternative arrangement.

We would also like you to confirm that the expected differential settlement will be within tolerable limits (1" max.) as we are designing a semi-continuous structure for this location.

KGB/et

K. G. Bassi
K. G. Bassi,
Bridge Project Engineer,
for J. L. Keen,
Sr. Bridge Project Engineer.

cc. F. DeVisser

Replied by a letter Jan 16/62

① Assume no shear strength in fill.

② Use 12" ɸ steel tubular piles.

③ Average uncorrected N value = 30 blows/ft

Corrected = 22 blows/ft

④ Assume that piles will be driven 10 ft in the silt and there will be three ft between the tips of the piles and the clayey silt - silty clay.

Max. bearing capacity

$$Q_f = 4 N A_p + \frac{\bar{N} A_s}{50}$$

Assume $N = \bar{N} = 22$

$$A_p = \frac{\pi \times 1^2}{4} = 0.785 \text{ ft}^2$$

$$A_s = 10 \times \pi = 31.4 \text{ ft}^2$$

$$Q_f = 4 \times 22 \times 0.785 + \frac{22 \times 31.4}{50}$$

$$= 69 + 14$$

$$= 83$$

Allowable bearing capacity

$$Q_A = \frac{83}{3} = 28 \text{ Tons}$$

Say $Q_A = 30$ Tons.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
FORM OB-ML-30A
FEB. 1961

MADE BY [illegible] DATE Jan [illegible]/62 JOB No. 6[illegible]-110
CHECKED BY ______ DATE ______ SECTION Foundation
SHEET No. 2

	South - Abut.	North Abut.
Ground level	735'	730'
Pile Tip elevation	725'	720'

Pile depth 10 ft.

All Pile load 30 Tons.

ONTARIO

DEPARTMENT OF HIGHWAYS

Memo to Mr. A. M. Toye,
Bridge Engineer.

Date January 9, 1962.

Subject D.H.O. FOUNDATION INVESTIGATION REPORT. W.J.61-F-110--W.P.147-6

From Materials & Research Division.
(Foundation Section).

Attention: Mr. S. McCombie.

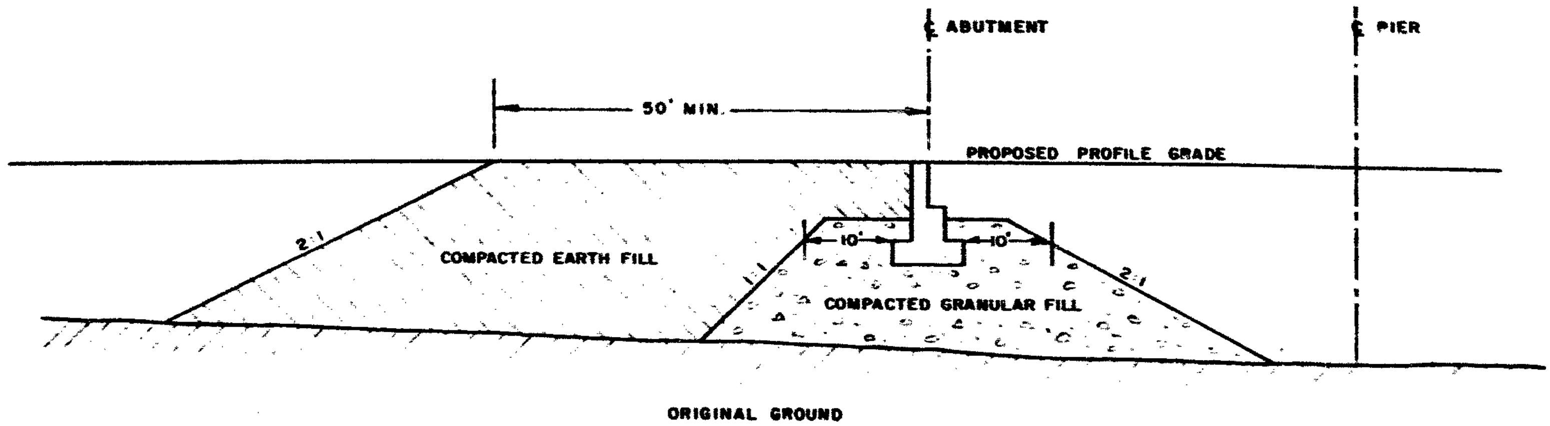
Re: Park Road and Proposed Hwy. #403
District #4.

Attached please find one print of Plan 61-F-110B for the above structure.

Would you please include this in the foundation report W.J. 61-F-110.

I. Holubec
Project Foundation Engineer

IH/tt
Attach.
cc: Messrs. A. M. Toye (2)
P. A. Treeaskes
H. D. McMillan
A. Gater (London Region handling pre-engineering)
J. C. Thatcher
T. J. Kovich
J. Roy
J. E. Gruspier
E. R. Saint
F. Norman
A. Watt
Foundations Office ✓
General Files



NOTES

1 - Structural details and elevation of footings should be as per Bridge Office drawings

2 - All topsoil should be removed prior to placing the granular fill.

3 - Embankment should be constructed with granular fill and earth fill material as shown on above drawing

4 - The granular fill and earth fill should be placed simultaneously and compacted as per current D.H.O. methods.

ORIGINATED I. Holubec	DEPARTMENT OF HIGHWAYS - ONTARIO	SCALE 1 inch = 20 feet
DRAWN H.D. Reed	MATERIALS & RESEARCH SECTION	W. P. NO. 147 - 60
CHECKED T.H.	APPROACH FILL DETAILS	JOB NO. 61 - F - 110
APPROVED M. Devata	HIGHWAY NO 403 and PARK ROAD	DWG. NO. 61 - F - 110 B
DATE 8 December 1961		