

Mr. A. Toye

Dec. 10, 1958

Bridge Engineer

Materials and Research Section

Re: Foundation Investigation at Hwy. 401 and the listed gravel road crossings in Twp. of Darlington:

N.P.	N.J.	
115-58	F-58-28	(Whitby-Pickering Twp. line)
117-58	F-58-34	(Courtice Rd.)
118-58	F-58-36	(Holt Rd.)
119-58	F-58-38	(Saverly Rd.)
120-58	F-58-39	(Bennett Rd.)

Foundation investigations were carried out at the above listed sites. The investigations revealed the subsoil, underneath the topsoil, as hard silty, sandy clay till. The borings were carried down to a depth of about 30 feet below the ground elevation.

It will be convenient to support the proposed new structures on spread footing type foundations. The observations show that at all these sites some 6 feet below the existing ground elevation the subsoil can provide a bearing value of 3 t.s.f.

VK:is
c.c. for A. Toye

H. Tregaskes
D.C. Ramsay
C. Fraser
H.D. Duff
A. Watt
Dr. P. Karrow
Foundation Section
Files

A. Rutka
Acting Materials & Research Engineer

per:

V. Korlu

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[Handwritten note]



ONTARIO

DEPARTMENT OF HIGHWAYS

Memo to Mr. J. L. Keen,

Date April 27, 1961.

Sr. Bridge Design Engr.

Subject PILE TIP ELEVATIONS -

From Materials & Research Section,

BEARING CAPACITIES.

(Foundations Office).

Attention: Mr. E. C. Cassi.

Re: piles for Structures -

W.F. 45-57 - Kingston, Dist. #8.

W.F. 118-58 - Port Hope, Dist. #7.

W.F. 119-59 - Port Hope, Dist. #7.

In answer to your verbal request for estimated pile tip elevations and safe bearing capacities for the above structures using H.P. 10 1/2 H piles, we would recommend the following:-

- (1) W.F. 45-57:- The piles should be driven to or beyond El. 330.0' to a set of 6 blows/in. for the last foot using a hammer producing 22,500 ft. lbs., or to a set of 10 blows/in. using a hammer producing 13,000 ft. lbs., ensuring that the five feet before the last, equal or are in excess of 50 blows/ft. A safe load of 30 tons per pile may be used. If driven to bedrock, 60 tons may be used.
- (2) W.F. 119-58:- The piles should be driven to or beyond El. 267.0' to a set of 6 blows/in. for the last foot using a hammer producing 22,500 ft. lbs., or to a set of 10 blows/in. using a hammer producing 13,000 ft. lbs., ensuring that the five feet before the last, equal or are in excess of 50 blows/ft. A safe load of 30 tons per pile may be used.

cont'd. /2 ...

✓ (3) W.F. 118-11:- The piles should be driven to or beyond El. 350.0' to a set of 6 blows/in. for the last foot using a hammer producing 22,500 ft. lbs., or to a set of 10 blows/in. using a hammer producing 13,000 ft. lbs., ensuring that the five feet before the last, equal or are in excess of 50 blows/ft. A safe load of 30 tons per pile may be used.

If driving conditions are such that immediately after encountering the dense till stratum the necessary number of blows is in the order of 6 blows/inch penetration, a minimum depth of 3 feet in that layer should be achieved before driving is stopped. This criterion applies to all of the above mentioned sites.

It should also be noted that the above values are only a guidance and a field check is necessary. This check should be made with the use of the Hiley formula when all the necessary data are available. If there is any doubt about any of the details involved, it is recommended that this Section be called upon and consulted.

L. G. Soderman,
PRINCIPAL FOUNDATION ENGR.
Per:

A. G. Stermac
(A. G. Stermac,
SUPERVISING FOUNDATION ENGR.)

AGS/MdeP

cc: Foundations Office
Gen. Files.

BA 851-B

Mr. A. M. Toye,
 Bridge Engineer,
 Materials & Research Section,

March 7, 1961.

ADDITIONAL FOUNDATION
 INVESTIGATION REPORT -
 W.J. 61-F-15 - W.P. 118-58.

Attention: Mr. S. McCombie.

Re: Darlington Twp. Bridge No. 3,
 Holt Road Underpass at Hwy. 401
 Intersection -- District No. 7.

An additional investigation has been carried out at the above mentioned site in order to complete the subsoil information already available. On the basis of the results of this investigation, the following recommendations are forwarded for your consideration:-

The proposed structure can be founded on spread footings. On the Preliminary Plan, Drawing D-4830-P1, a four-span continuous structure is shown. For footings of an average width of 6 - 8 feet, the following bottom footing elevations are recommended:-

North Abutment - Sta. 1+03.25 - North	355.0'
South Abutment - Sta. 1+03.25 - South	357.0'
Pier 'A' - Sta. 0+63.25 - South	359.0'
Pier 'B' - Sta. 0+00	359.0'
Pier 'C' - Sta. 0+63.25 - North	359.0'

(Chainages are for the Holt Road)

For the above elevations a safe load of 3.0 T/sq.ft. for the abutments and 4.0 T/sq.ft. for the piers, can be used.

Fill-through type abutments are shown on the above mentioned drawing. If, as an alternative, piles are considered, they should be driven through the embankment fill down into the

BA 851-2

Mr. A. M. Toye,
 Bridge Engineer.
 Materials & Research Section.

March 7, 1961.

ADDITIONAL FOUNDATION
 INVESTIGATION REPORT -
 W.J. 61-P-15 - W.P. 118-58.

Attention: Mr. E. McCosbie.

Re: Darlington Twp. Bridge No. 8,
 Holt Road Underpass at Hwy. 401
 Intersection -- District No. 7.

An additional investigation has been carried out at the above mentioned site in order to complete the subsoil information already available. On the basis of the results of this investigation, the following recommendations are forwarded for your consideration:-

The proposed structure can be founded on spread footings. On the Preliminary Plan, Drawing D-4839-P1 a four-span continuous structure is shown. For footings of an average width of 6 - 8 feet, the following bottom footing elevations are recommended:-

North Abutment - Sta. 1+03.25 - North	355.0'
South Abutment - Sta. 1+03.25 - South	357.0'
Pier 'A' - Sta. 0+63.25 - South	359.0'
Pier 'B' - Sta. 0+00	359.0'
Pier 'C' - Sta. 0+63.25 - North	359.0'

(Chainages are for the Holt Road)

For the above elevations a safe load of 3.0 T/sq.ft. for the abutments and 4.0 T/sq.ft. for the piers, can be used.

Spill-through type abutments are shown on the above mentioned drawing. If, as an alternative, piles are considered, they should be driven through the embankment fill down into the

dense till stratum. It is anticipated that the piles will meet practical refusal when they penetrate a few feet into the dense till stratum. Six blows per inch penetration for the last two feet can be considered as practical refusal. Such piles can be safely loaded with 30 tons per pile. Difficulties can be experienced during pile driving if the embankment fill is very well compacted; therefore, steel 'H'-piles are recommended. The length of the piles can be computed on the assumption that they will be driven 3 feet below the elevations given for the bottom of the abutment footings.

Subsoil conditions are such that no approach fill stability problems are anticipated. Because of these very good subsoil conditions, it is recommended that a two-span structure with retaining wall type abutments be also considered as a solution.

REPORT PREPARED BY:

V. Korla
.....
V. Korla,
Project Foundation Engr.

REPORT APPROVED BY:

A. G. Starnes
.....
A. G. Starnes,
Supervising Foundation Engr.

cc: Messrs. H. C. Toye (2)
H. A. Froggashes
G. D. McMillan
L. C. Campbell
C. E. Keithcraft
J. J. Kovish
Foundation Office
Gen. Files.

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-15W.P. 118-58

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOW/FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH (PSF)	UNIT WEIGHT (PCF)	REMARKS
1	S1	5'-6.5'	Dark brown sandy, clayey, sil. (topsoil)	17	17.6	18.6	27.3	-	-	
	T2	9'-10.5'	Light brown silty fine sand.	58	-	10.6	15.9	-	-	
	S3	10'-10.5'	Light brown gravelly silty fine sand	24-6"	-	-	-	-	-	
	S4	14'-14.7'	Grey gravelly silty sand till	90-8"	6.2	-	-	-	145.8	
	S5	19'-19.5'	" " " "	90-6"	-	-	-	-	-	
	S6	24'-24.5'	" " " "	100-6"	-	-	-	-	-	
2	S1	4'-5.5'	Dark brown sandy, clayey silt (topsoil)	15	-	-	-	-	-	
	S2	9'-10'	Light brown gravelly silty sand (till)	110	6.0	-	-	-	-	
	S3	14'-14.5'	Light brown gravelly silty sand (till)	100-6"	-	-	-	-	-	
	S4	19'-19.5'	Grey gravelly silty sand (till)	100-6"	6.7	9.5	11.1	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-P-15

W.P. 118-58

SOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENETN RESIST. BLOWS FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH P.S.F.	UNIT WEIGHT P.C.F.	REMARKS
3	S1	4'-5.5'	Dark brown sandy, clayey silt (topsoil)	-	29.3 17.9	22.1 11.2	36.9 14.8	- -	- -	
	S2	9'-9.5'	Brown gravelly, silty fine sand (till)	140-5"	-	-	-	-	-	
	S3	14'-14.5'	Brown gravelly, silty, sand (till)	105-6"	4.0	-	-	-	-	
	S4	19'-19.5'	Grey gravelly silty sand (till)	160-6"	-	-	-	-	-	
	S5	24'-24.9'	Grey gravelly silty sand (till)	165-11"	5.4	-	-	-	-	
4	T1	4'-5.5'	Dark brown sandy, clayey silt (topsoil)	P	24.1 19.5	14.0 -	26.0 -	865 1650	123.0 131.0	
	S2	5.5'-7'	Brown gravelly silty sand	71	-	-	-	-	-	
	S3	9'-10'	Brown gravelly silty sand	146	-	-	-	-	-	
	S4	14'-14.7'	Brown gravelly silty sand	100-8"	-	-	-	-	-	
	S5	19'-19.4'	Grey gravelly silty sand (till)	100-5"	6.0	-	-	-	-	
	S6	24'-24.4'	" " " "	100-5"	-	-	-	-	-	
	S7	29'-30'	" " " "	124	8.7	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-15

W.P. 118-58

PILE 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	S1	4'-5.5'	Dark brown sandy, clayey silt (Topsoil)	22	-	-	-	-	-	
	S2	9'-10'	Light brown gravelly silty sand (till)	90	6.3	-	-	-	-	
	S3	14'-14.4'	Light brown gravelly silty sand (till)	100-5"	-	-	-	-	-	
	S4	19'-19.5'	Grey gravelly silty sand (till)	95-6"	-	-	-	-	-	
6	S1	4'-5.5'	Dark brown sandy clayey silt	4	17.7 18.9	-	-	-	-	
	S2	9'-10'	Light brown gravelly silty sand (till)	100	7.1	9.2	21.8	-	-	
	S3	14'-14.3'	Grey gravelly silty sand (till)	100-3"	-	-	-	-	-	
	S4	19'-19.3'	" " " "	100-4"	6.3	-	-	-	-	
	S5	24'-24.3'	" " " "	100-3"	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-15

W.P. 118-58

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	FINENESS RESIST. FLOWS #1	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH PSI	UNIT WEIGHT PCF	REMARKS
7	S1	4'-5.5'	Light brown pebbly silty sand	26	-	-	-	-	-	
	S2	6'-7.5'	Light brown pebbly silty sand (till)	66	-	-	-	-	-	
	S3	10'-10.5'	Light brown pebbly silty sand (till)	100-6"	-	-	-	-	-	
S denotes split spoon sample T " " shelby tube sample										

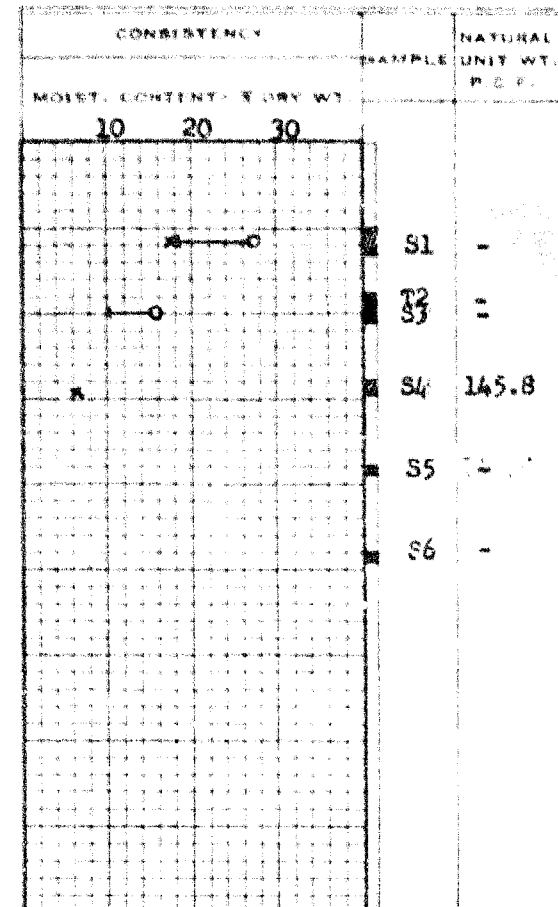
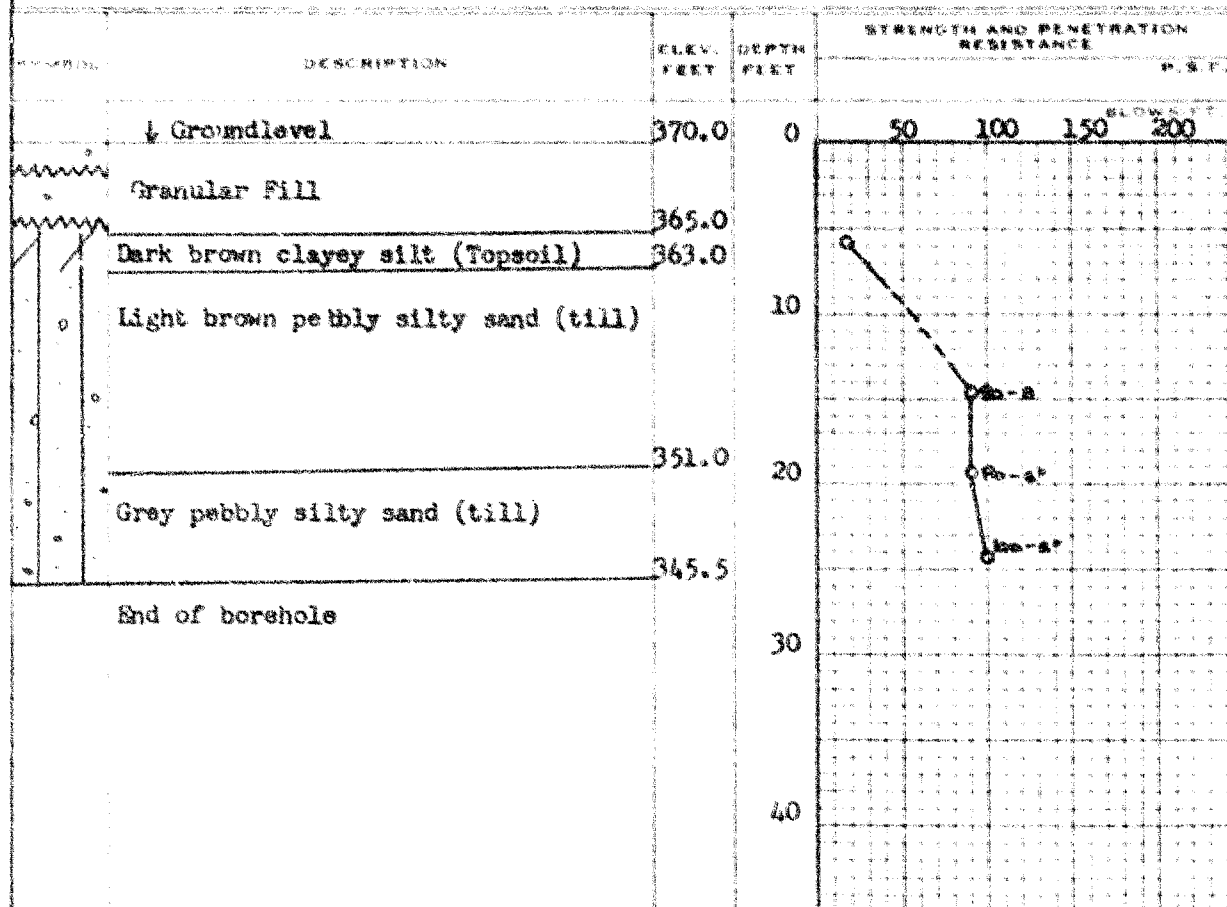
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 118-58 _____ BORE HOLE NO. 1 _____
 JOB 61-F-15 _____ STATION See drawing _____
 DATUM 270.0' _____ COMPILED BY B.K. _____
 BORING DATE Mar. 2/61 _____ CHECKED BY V.K. _____

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

LEGEND

1/2 UNCONFINED COMPRESSION (Q_u) _____ O
 VANE TEST (G) AND SENSITIVITY (S) _____ +
 NATURAL MOISTURE AND LIQUIDITY INDEX _____ LI
 LIQUID LIMIT _____ X
 PLASTIC LIMIT _____



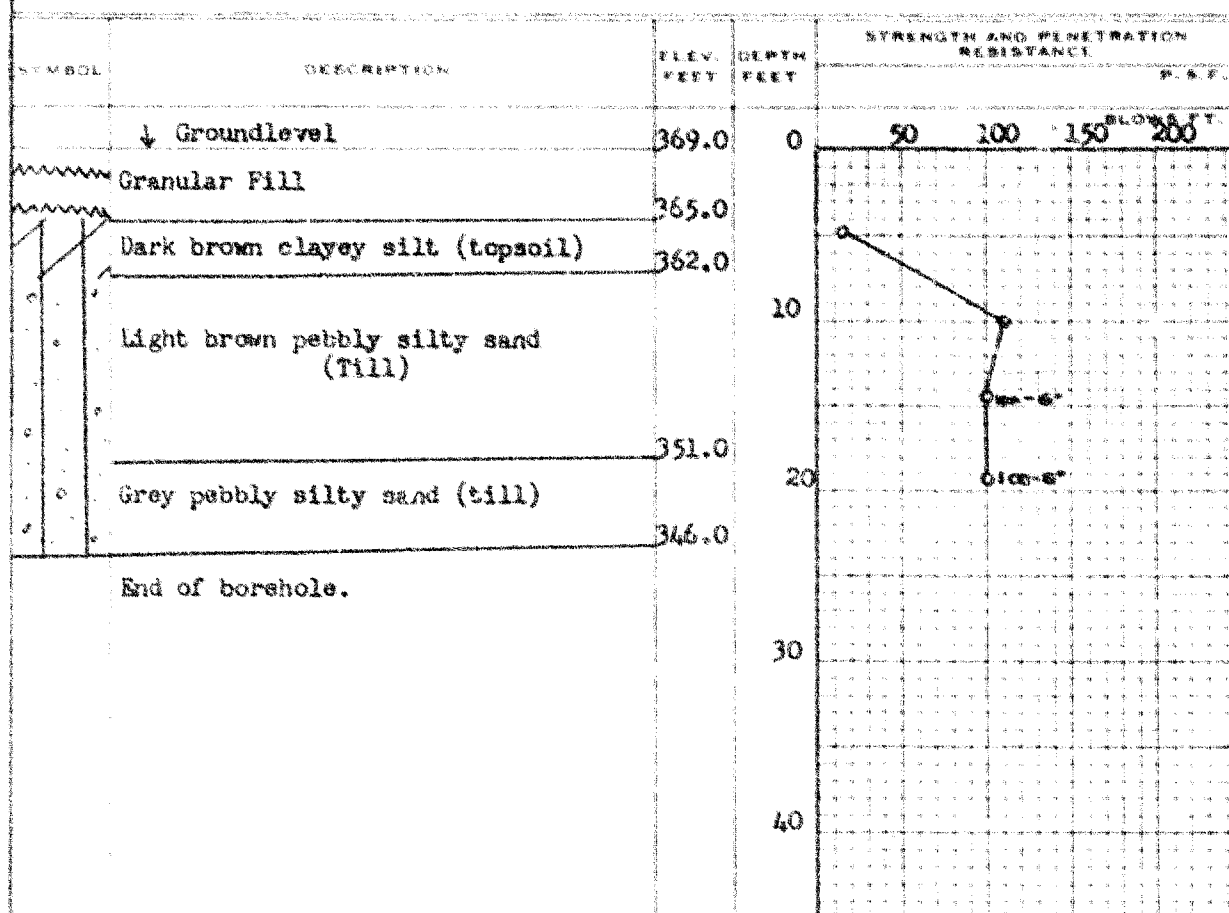
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 118-58 BORE HOLE NO. 2
JOB 61-F-15 STATION See Drawing
DATUM 369.0' COMPILED BY B.K.
BORING DATE Mar. 2/61 CHECKED BY V.K.

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LEGEND

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



CONSISTENCY			NATURAL UNIT WT. P.C.F.
MOIST. CONTENT % DRY WT.			SAMPLE
10	20	30	
			S1 -
			S2 -
			S3 -
A 10			S4 -

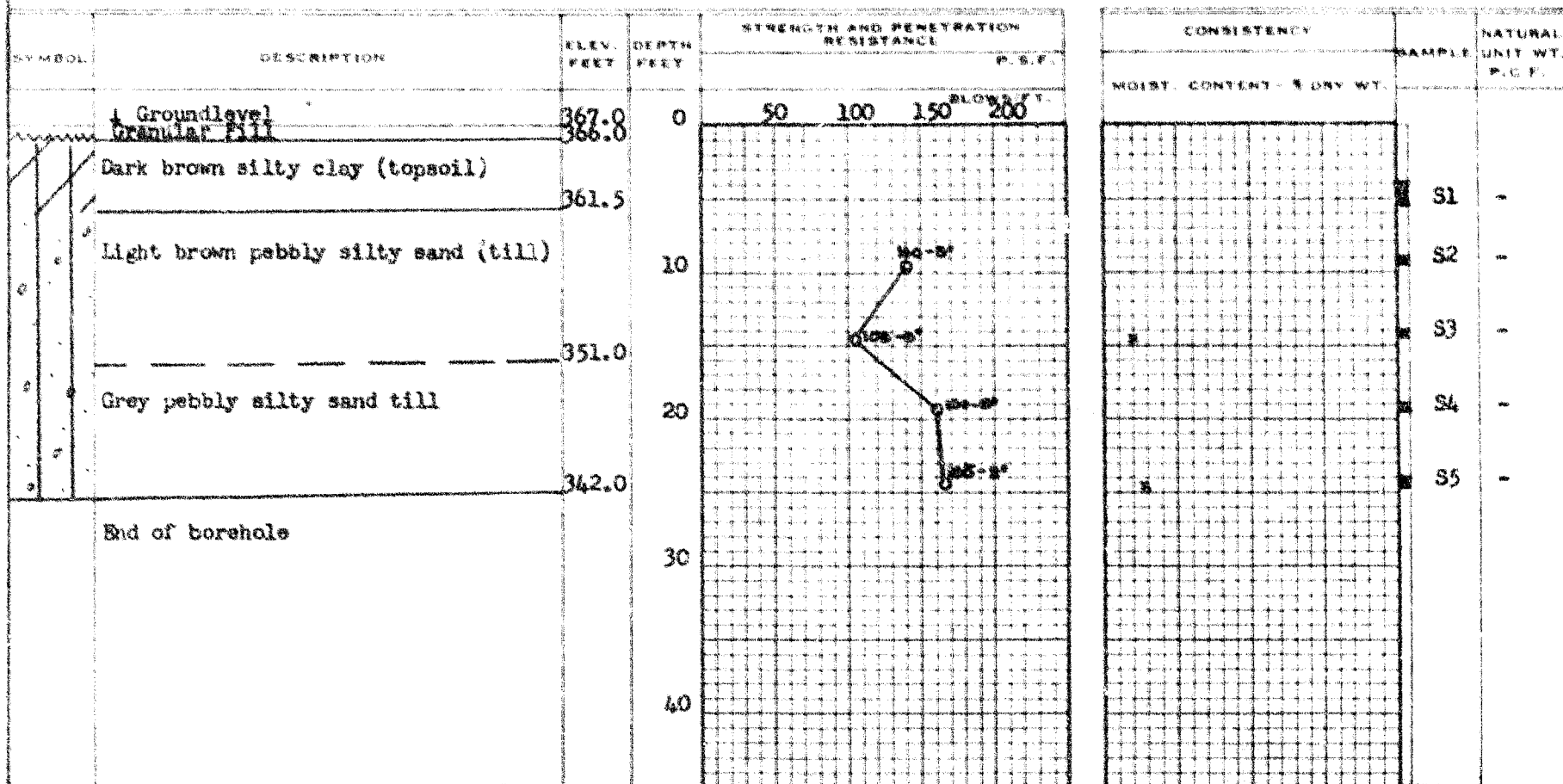
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

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JOB 61-P-15 STATION See Drawing
DATUM 367.0' COMPILED BY B.K.
BORING DATE Mar. 2/61 CHECKED BY V.K.

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

LEGEND

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



DEPARTMENT OF HIGHWAYS - ONTARIO

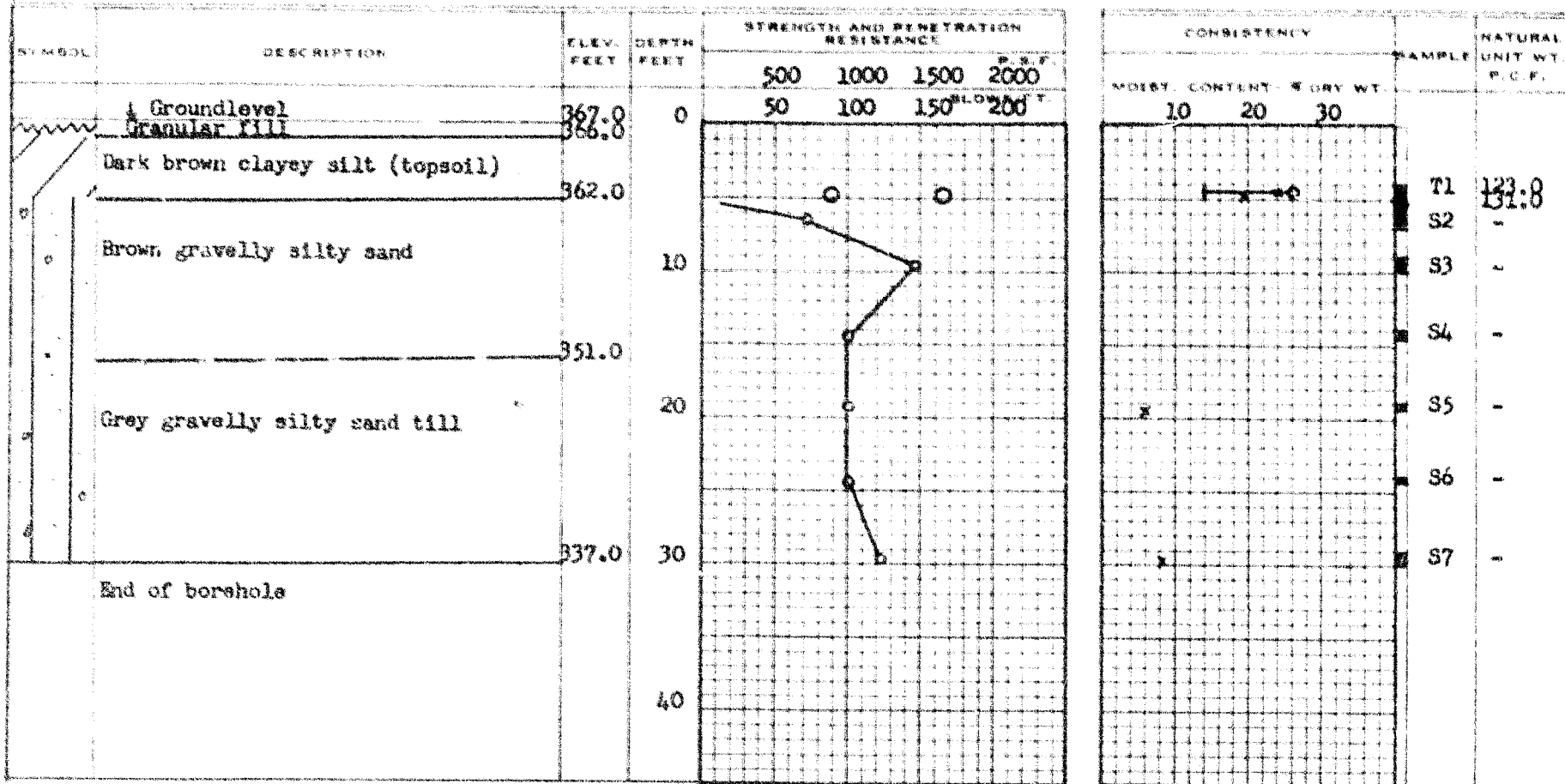
MATERIALS AND RESEARCH SECTION

W.P. 118-58 BORE HOLE NO. 4
 JOB 61-F-15 STATION See Drawing
 DATUM 367.0' COMPILED BY B.K.
 BORING DATE Mar. 2/61 CHECKED BY V.K.

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) +
 NATURAL MOISTURE AND LIQUIDITY INDEX LI
 LIQUID LIMIT X
 PLASTIC LIMIT



DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 118-58 BORE HOLE NO. 5

JOB 61-P-15 STATION See Drawing

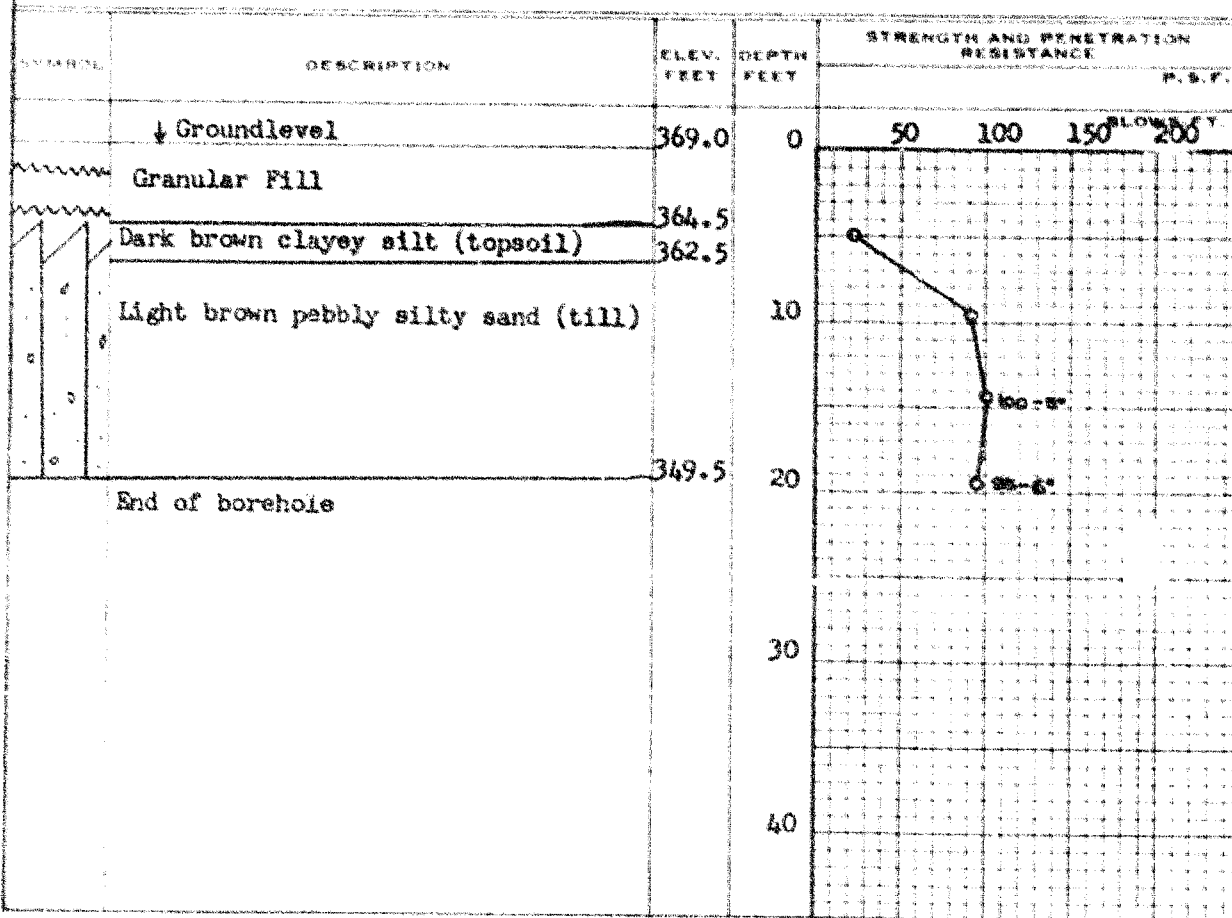
DATUM 369.0' COMPILED BY B.K.

BORING DATE Mar. 3/61 CHECKED BY V.K.

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

LEGEND

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



CONSISTENCY			SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.				
10	20	30		
			S1	-
			S2	-
			S3	-
			S4	-

DEPARTMENT OF HIGHWAYS - ONTARIO

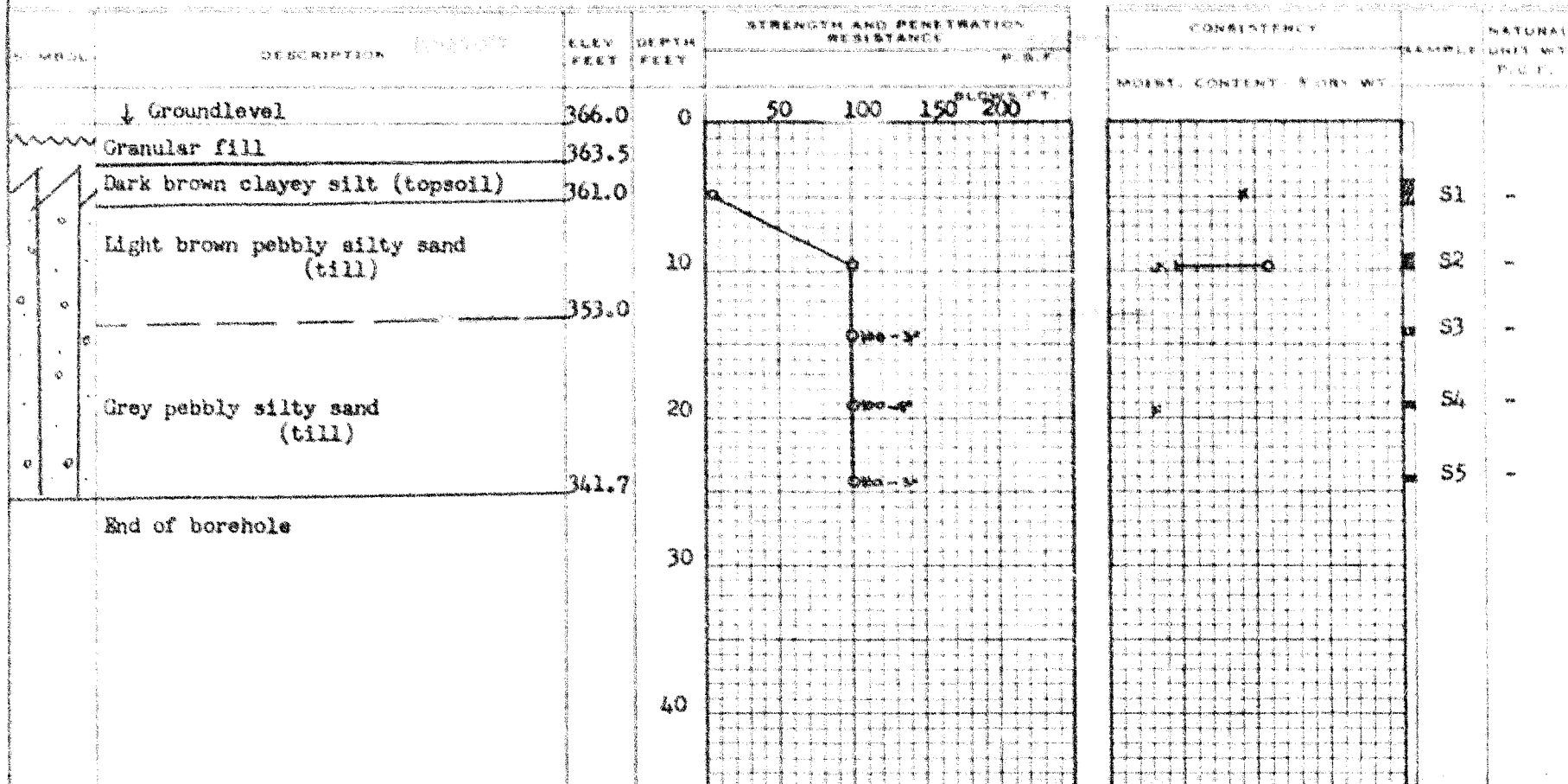
MATERIALS AND RESEARCH SECTION

W.P. 118-58 BORE HOLE NO. 6
 JOB 61-F-15 STATION See Drawing
 DATUM 366.01 COMPILED BY B.K.
 BORING DATE Mar. 3/61 CHECKED BY V.K.

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

LEGEND

UNCONFINED COMPRESSION (QU) \bigcirc
 VANE TEST (C) AND SENSITIVITY (S) \times
 NATURAL MOISTURE AND LIQUIDITY INDEX \square
 LIQUID LIMIT \square
 PLASTIC LIMIT \square



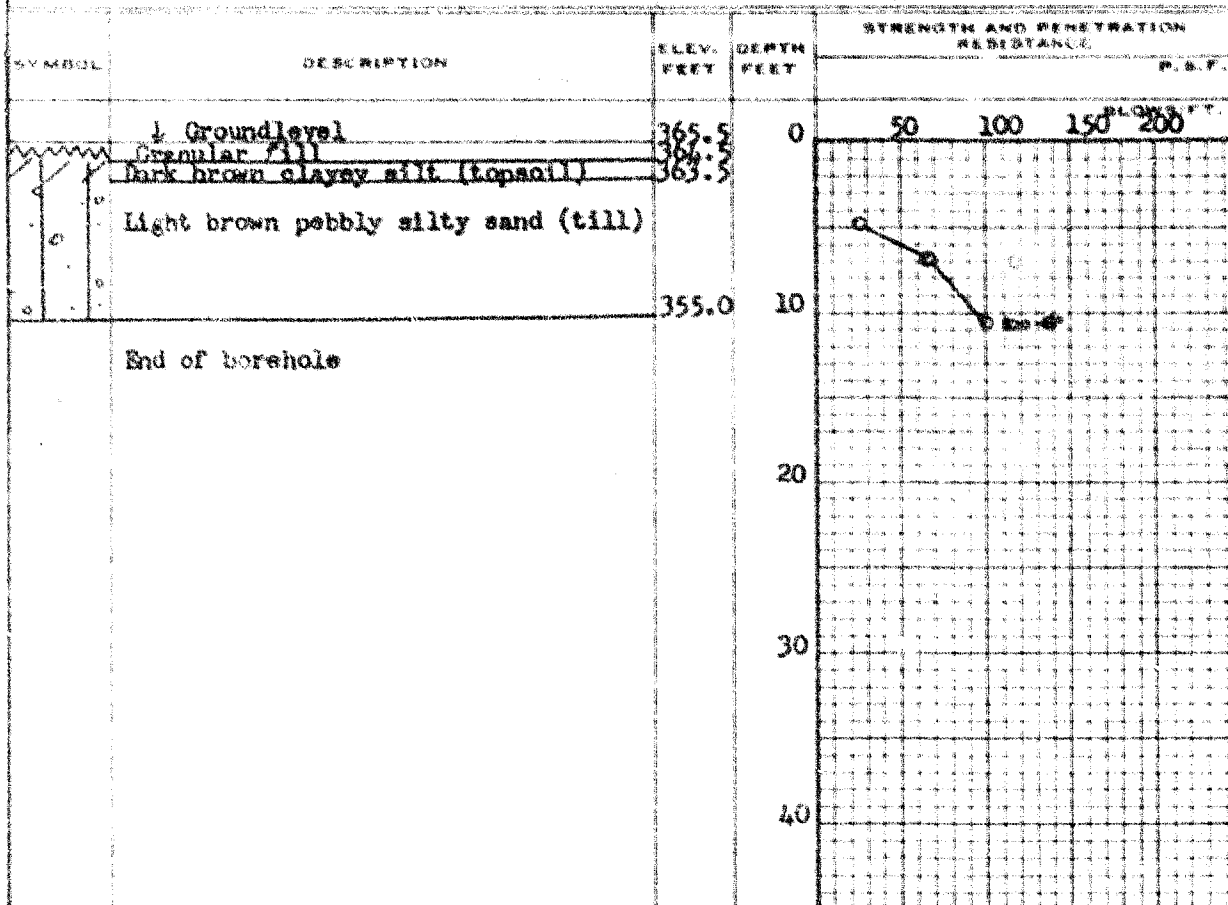
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 118-58 BORE HOLE NO. 7
JOB 61-F-15 STATION See Drawing
DATUM 365.5' COMPILED BY B.K.
BORING DATE Mar. 3/61 CHECKED BY V.K.

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

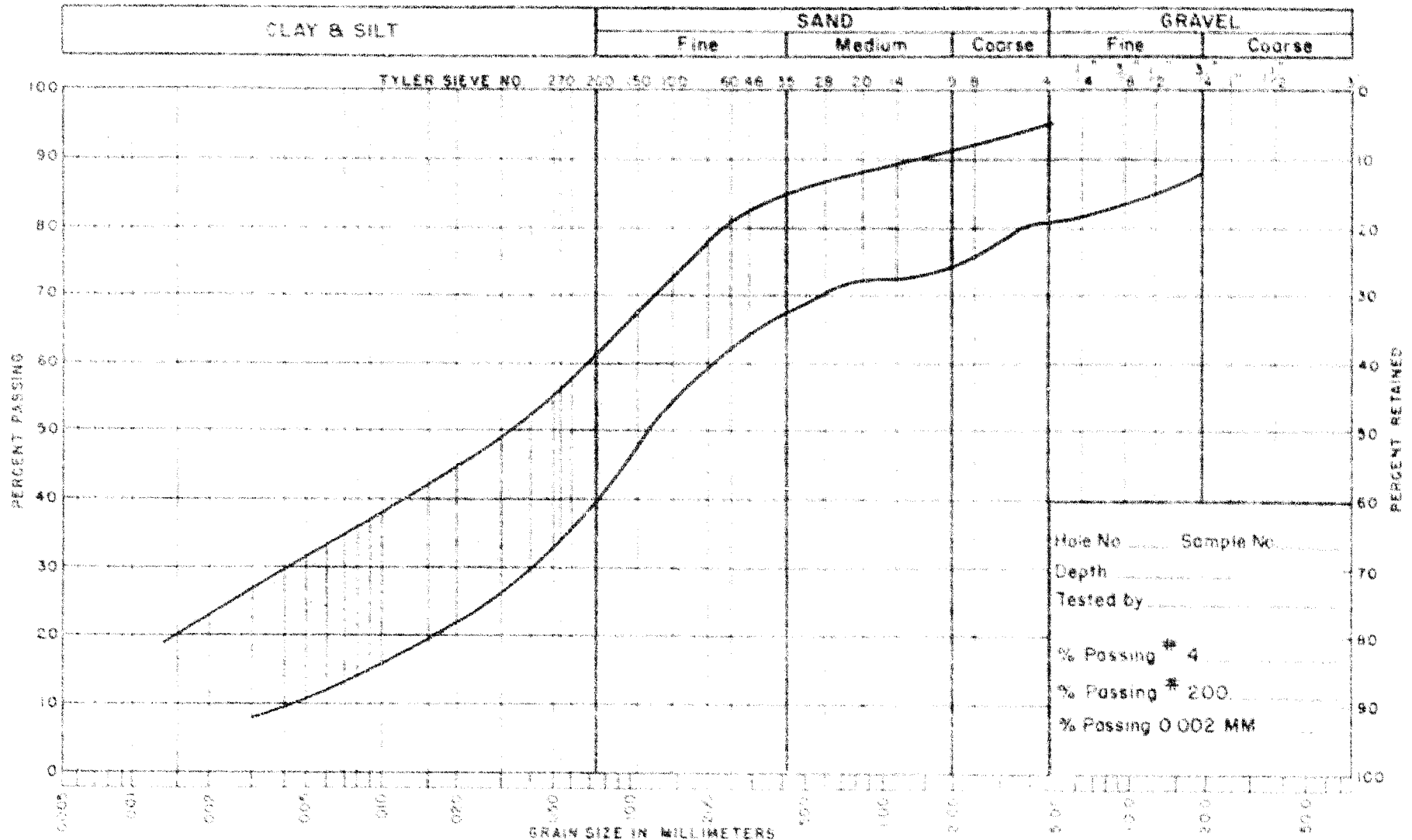
LEGEND

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



CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.		
	S1	-
	S2	-
	S3	-

UNIFIED SOIL CLASSIFICATION SYSTEM

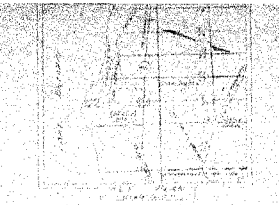
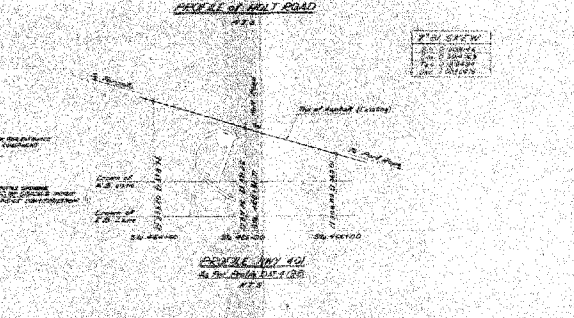
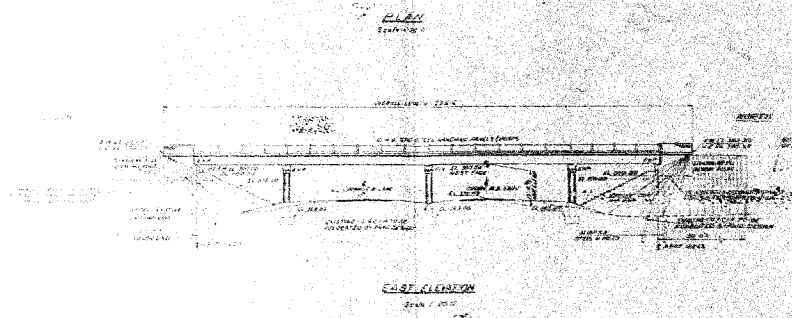
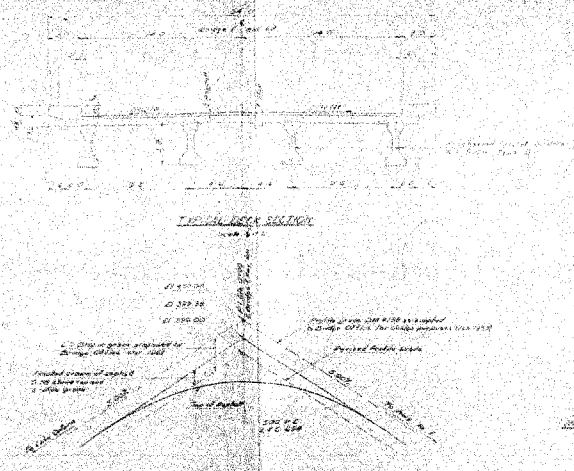
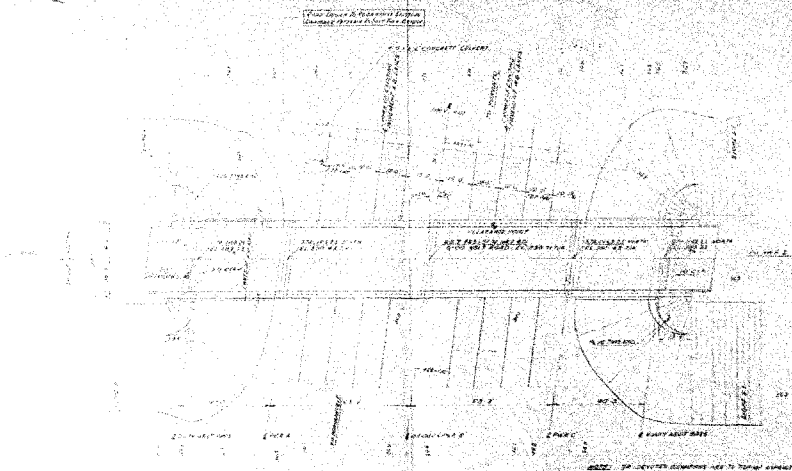


NOTES GRAVEL FINE SAND TILL

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

Job No. 61-F-15 W.P. No. 116-58

Location HOLT RD. & HWY. 401



NOTE: This plan has been issued for the purpose of showing the location of the bridge and approach roads, and is not intended to be used for any other purpose.

DEPARTMENT OF HIGHWAYS-ONTARIO
BRIDGE DIVISION - TORONTO

DARLINGTON TWP. BRIDGE
HILL ROAD OVERPASS

THIS PROJECT NUMBER: 101 DIST. NO. 1
CS. 101/101
TVE. 101/101 DIST. 101/101

GENERAL PLAN (PRELIMINARY)

APPROVED

DESIGNER		CHECKED		APPROVED	
NAME	DATE	NAME	DATE	NAME	DATE
DESIGNER	10/1/56	CHECKED	10/1/56	APPROVED	10/1/56
NAME	DATE	NAME	DATE	NAME	DATE

D-1039/P

#61-F-15

W.P. #118-58

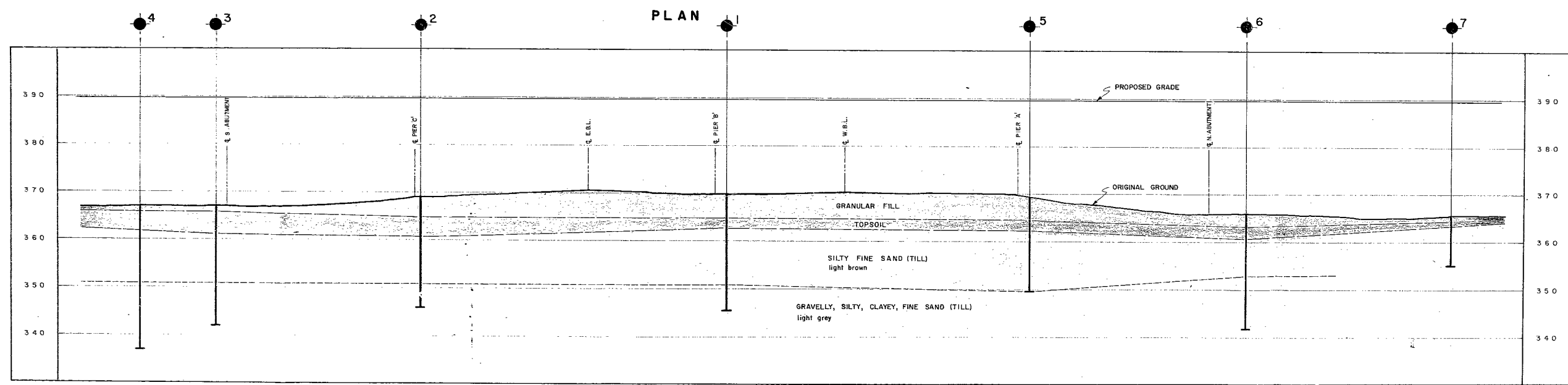
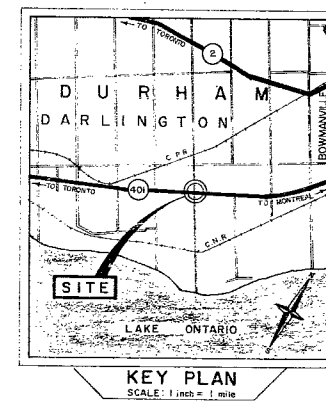
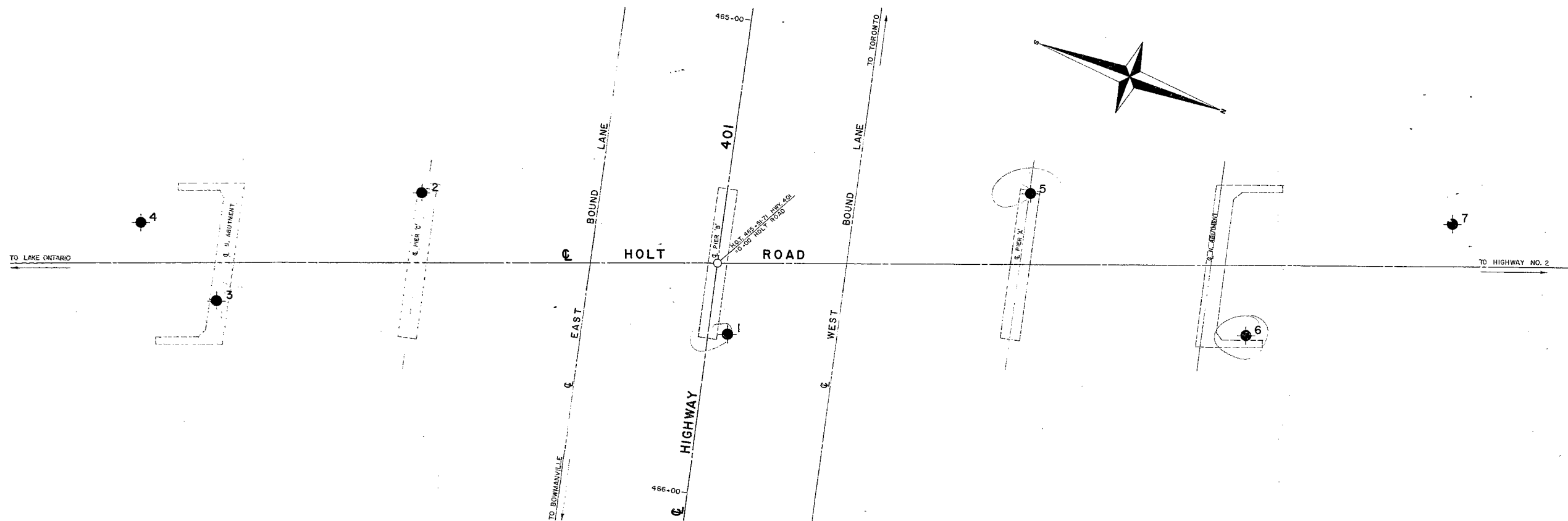
Hwy. #401

WAVERLY RD.

UNDERPASS

BR. #8

DARLINGTON TWP.



LEGEND			
● BORE HOLE			
HOLE No.	ELEVATION	STATION	DISTANCE FROM E
1	370.0	465+66	4' LT.
2	369.0	465+45	64' RT.
3	367.0	465+73	104' RT.
4	367.0	465+59	122' RT.
5	369.0	465+28	63' LT.
6	366.0	465+52	112' LT.
7	365.5	465+22	152' LT.

DEPARTMENT OF HIGHWAYS - ONTARIO			
MATERIALS & RESEARCH SECTION			
DARLINGTON TWP BRIDGE NO. 8			
AND			
HIGHWAY 401			
(HOLT ROAD UNDERPASS)			
ORIGINATED V. KORLU	DISTRICT NO. 7	DATE 5 APRIL 1961	
DRAWN D. MUMFORD	W.P. NO. 118-58	JOB NO. 61-F-15	
CHECKED	SCALE	DRAWING NO.	
APPROVED	1 inch = 10 feet	61-F-15A	