

# 60-F-83

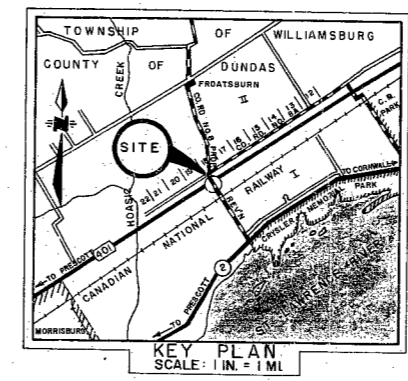
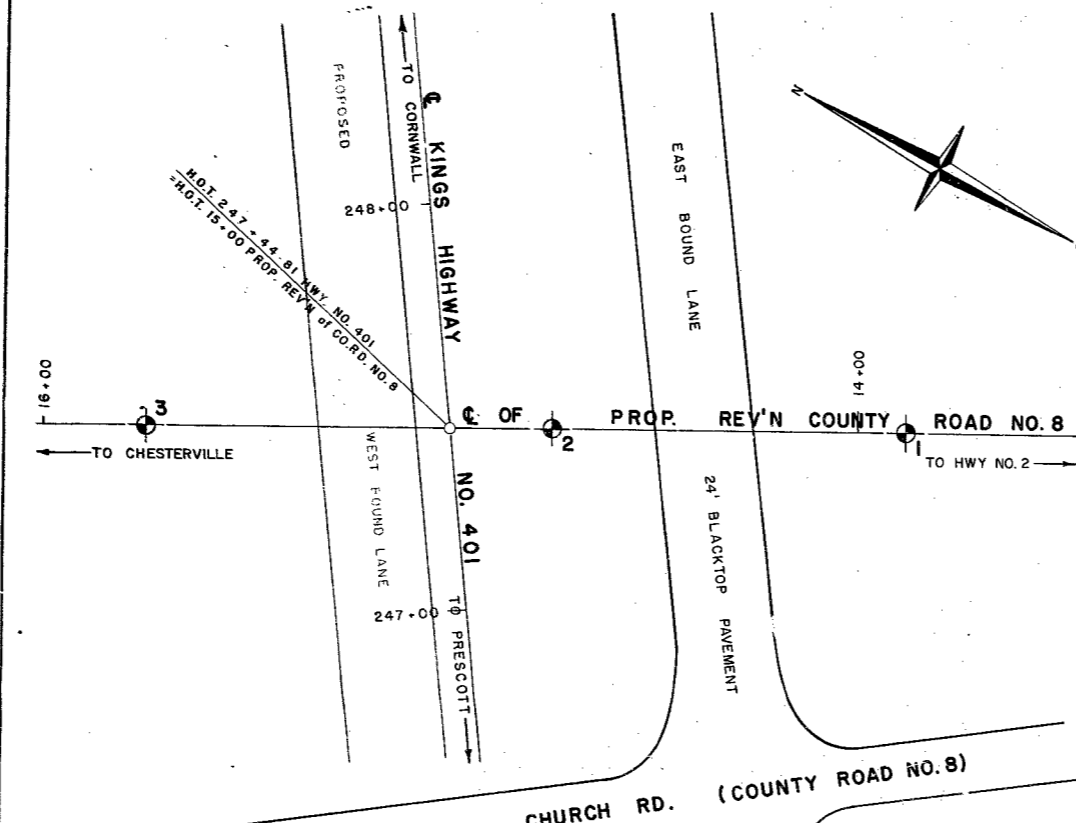
W.P. # 137-59

Hwy. # 401 E

DUNDAS CTY.

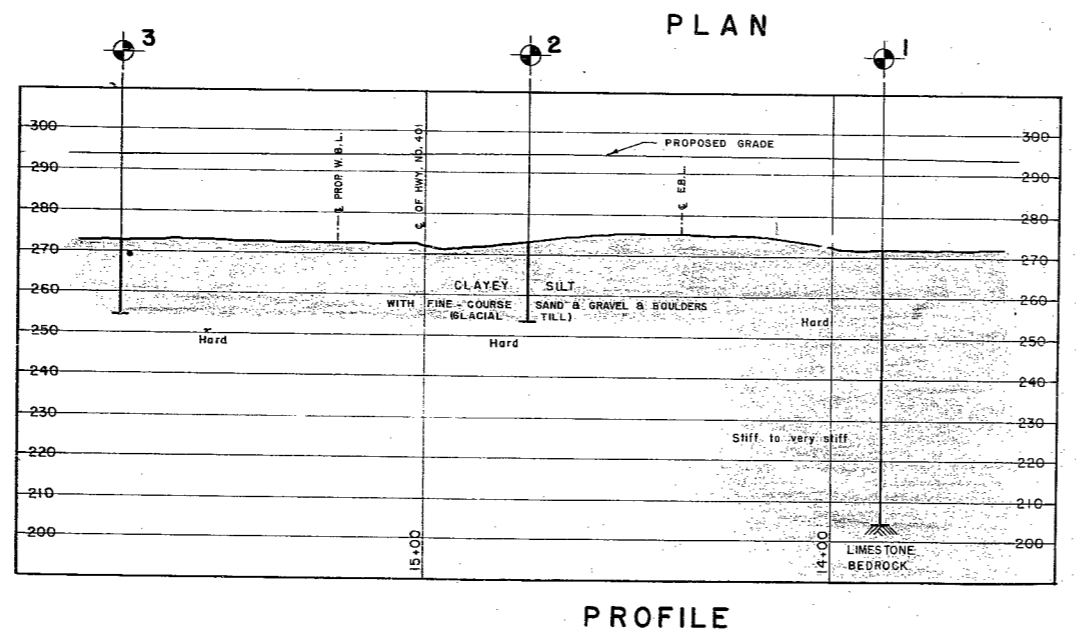
Rd. # 8

(CHURCH ST.)



LEGEND			
● BORE & PENETRATION HOLE			
HOLE	ELEVATION	STATION	DISTANCE FROM C.
1	272.0	13+88	€
2	273.5	14+75	€
3	273.0	15+75	€

- 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.



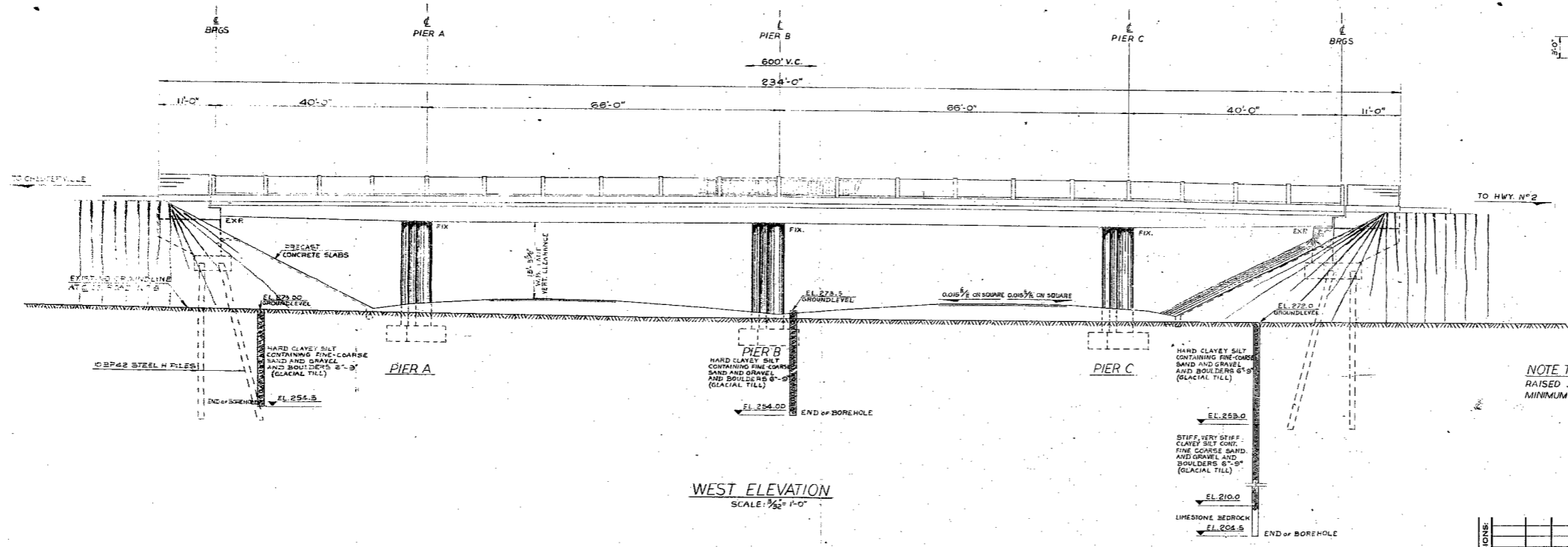
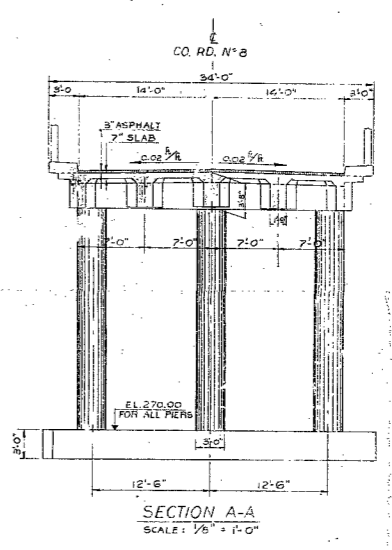
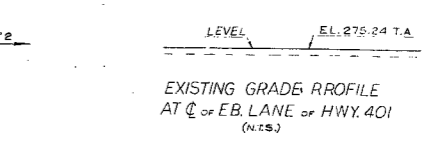
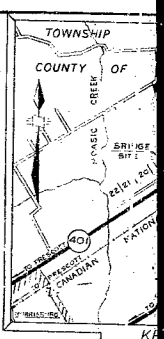
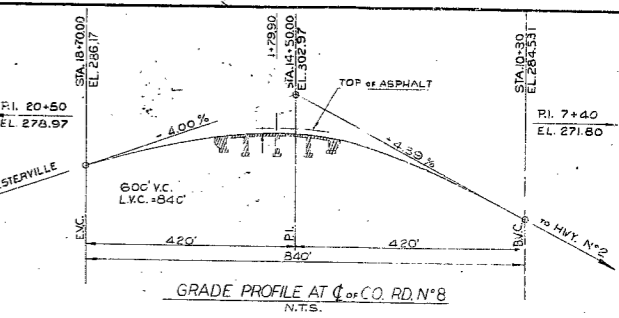
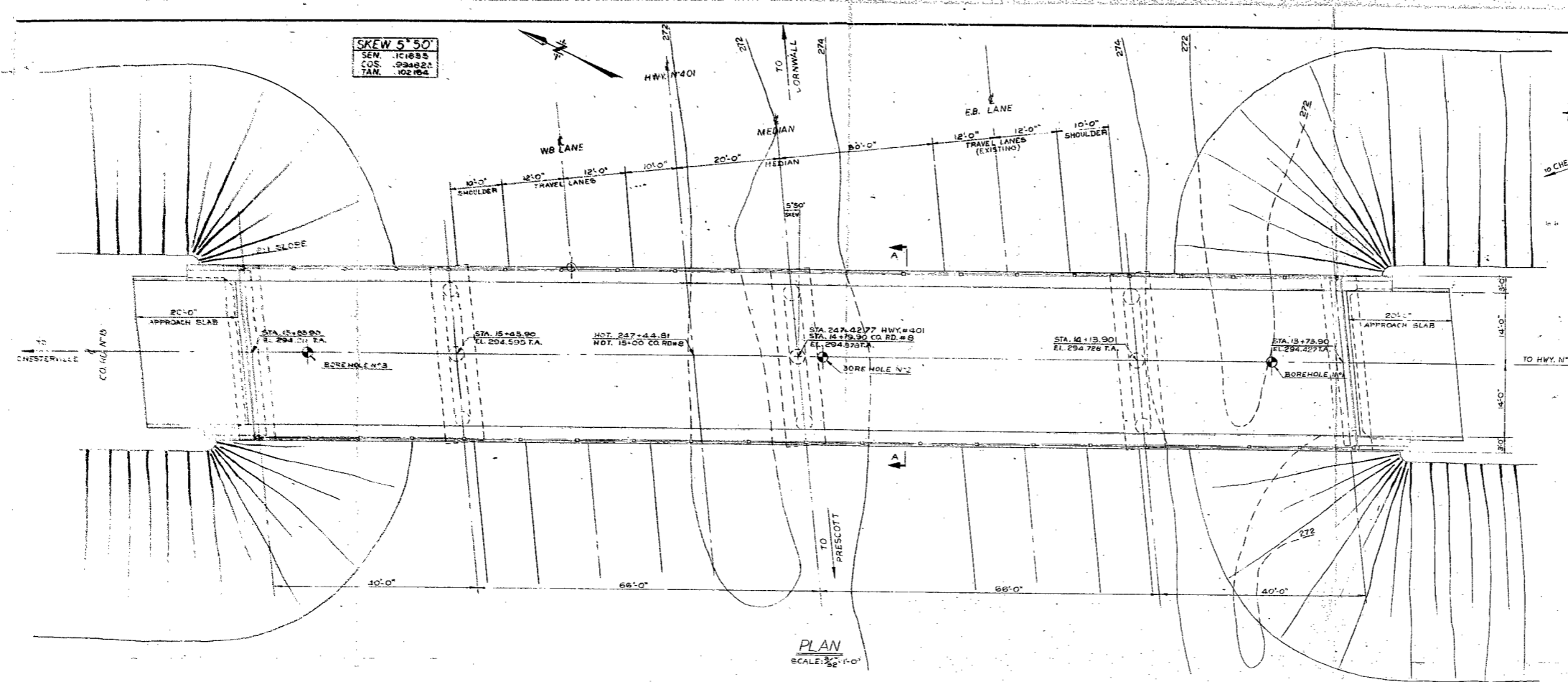
DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH SECTION

PROPOSED REVISION  
**DUNDAS COUNTY ROAD NO. 8**  
(CHURCH STREET)

SHOWING POSITIONS & ELEVATIONS OF HOLES

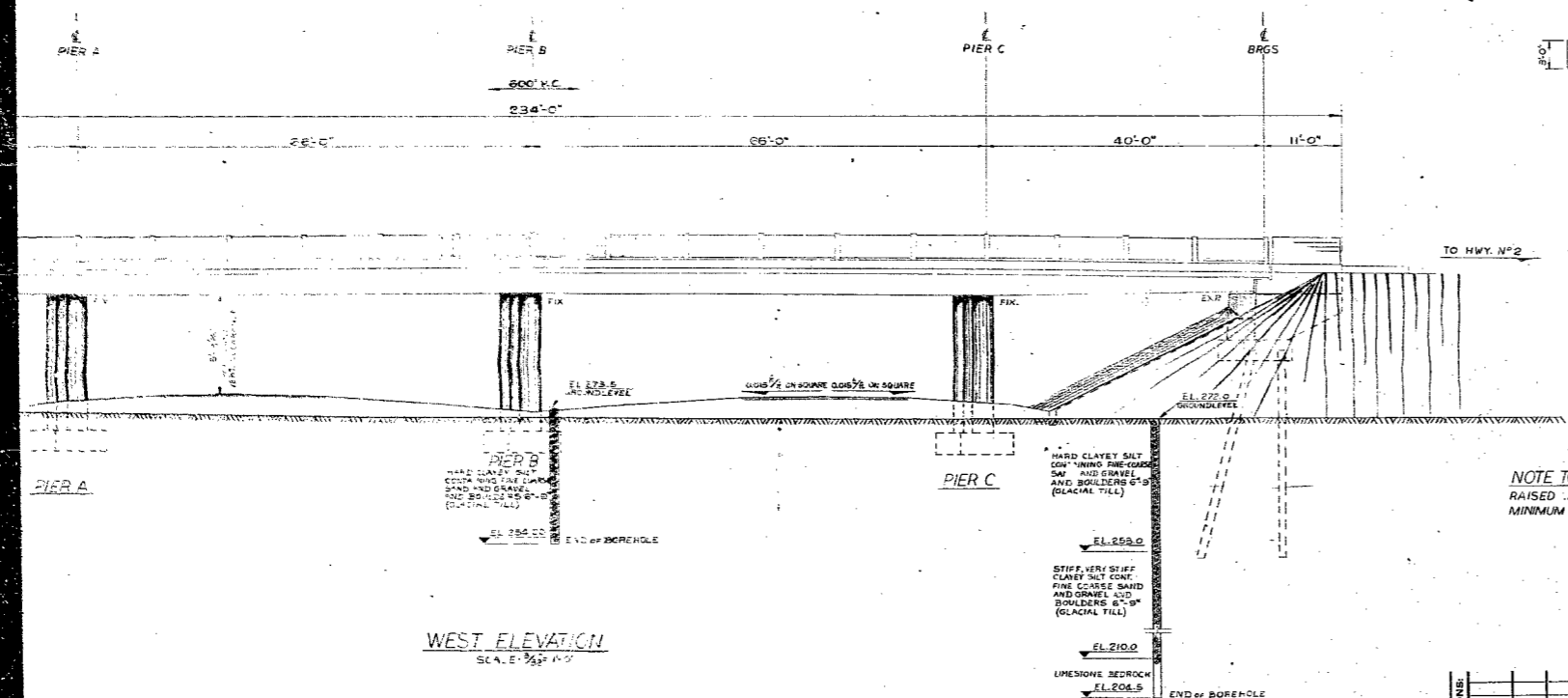
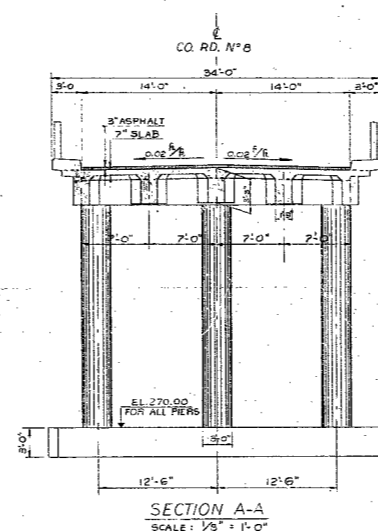
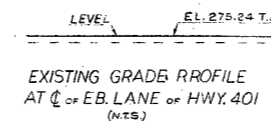
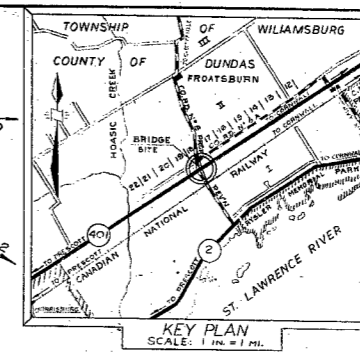
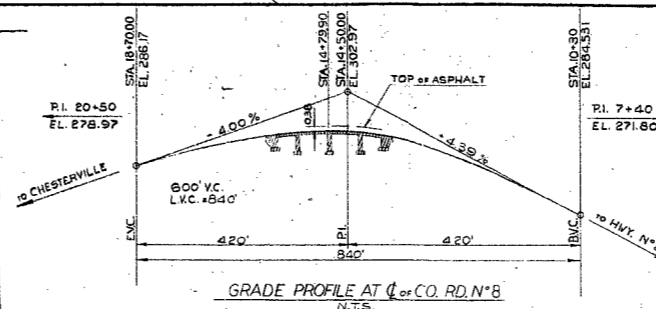
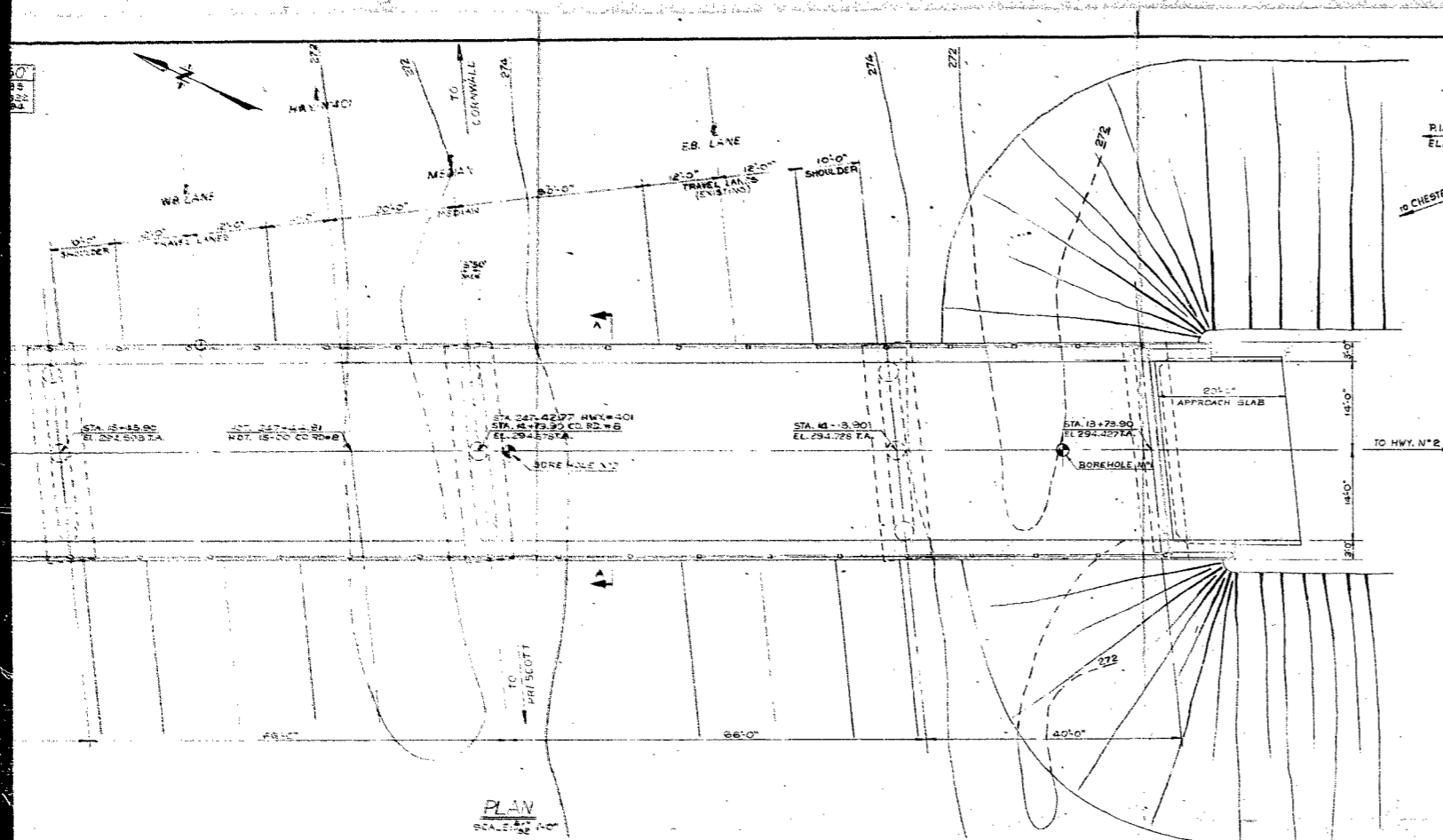
HWY. 401 DISTRICT 9 COUNTY DUNDAS  
TOWNSHIP WILLIAMSBURG LOT 16 & 19 CON. 1  
LOCATION 2 MILES EAST OF MORRISBURG

DRAWN BY: D. MUMFORD CHECKED BY: W.P. 137-59  
DATE 20 OCT. 1960 APPROVED BY: DRAWING NO.  
SCALE 1 inch = 20 feet 60-F-83A



NOTE TO ROAD DESIGN: GRADE OF CO. RD. N° 8 RAISED .34 BY BRIDGE OFFICE TO ALLOW FOR MINIMUM VERTICAL CLEARANCE.

DEPARTMENT OF HIGHWAYS BRIDGE OFFICE - TORONTO			
WILLIAMSBURG TWP. BRIDGE			
THE KING'S HIGHWAY No. 401 CO. DUNDAS TWP. WILLIAMSBURG Lot 18 & 19			
PRELIMINARY PLAN			
APPROVED			
BRIDGE ENGINEER			
DESIGN	AR	CHECK	CONTRACT NUMBERS
DRAWING	GP	CHECK	LOADING
TRACING		CHECK	DRAWN BY
DATE	DEC. 60		



NOTE TO ROAD DESIGN: GRADE OF CO. RD. N°8  
RAISED .34 BY BRIDGE OFFICE TO ALLOW FOR  
MINIMUM VERTICAL CLEARANCE.

WP 137-59

DEPARTMENT OF HIGHWAYS-ONTARIO  
BRIDGE OFFICE-TORONTO

WILLIAMSBURG TWP. BRIDGE N°5

THE KING'S HIGHWAY No. 401 DIST. No. 9  
CO. DUNDAS  
TWP. WILLIAMSBURG LOT 18 & 19 CON. 1

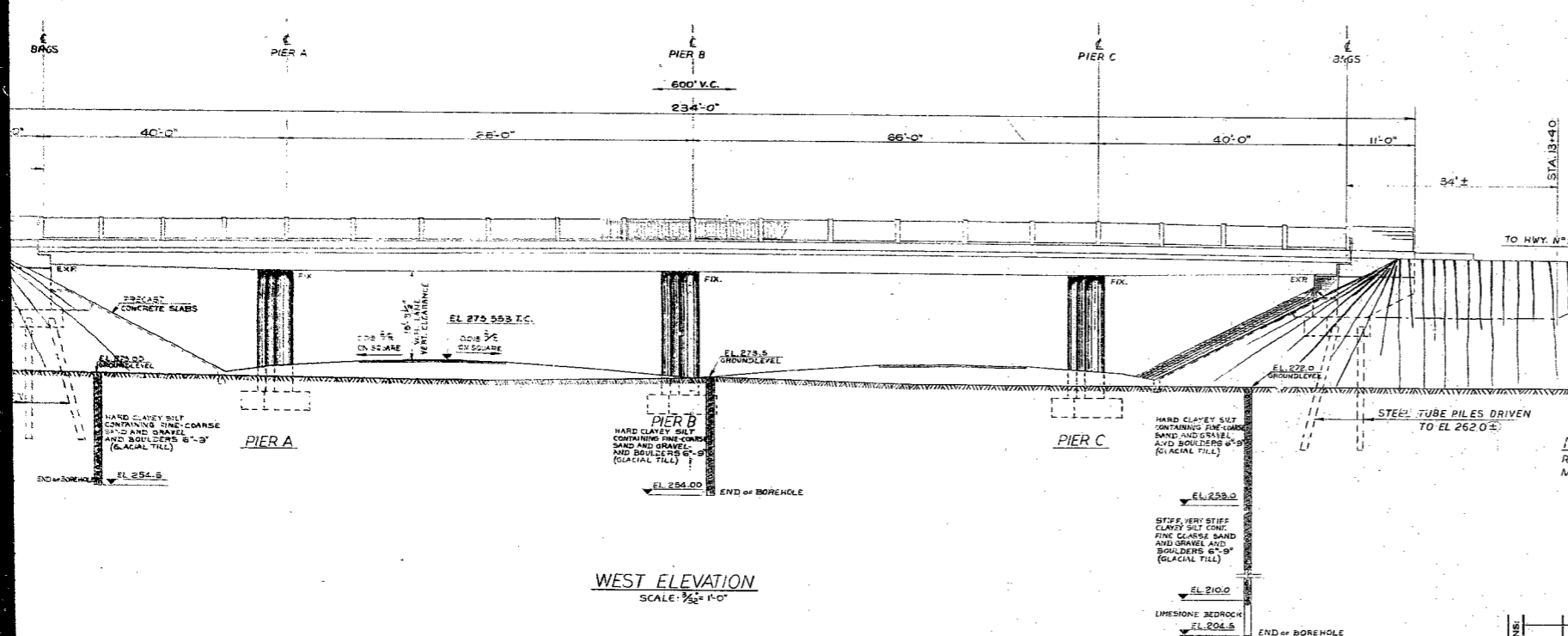
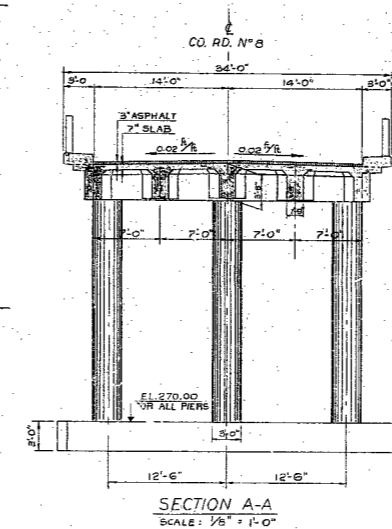
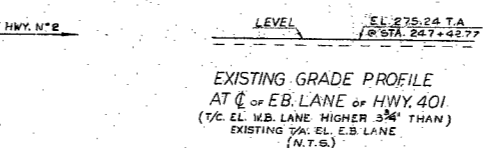
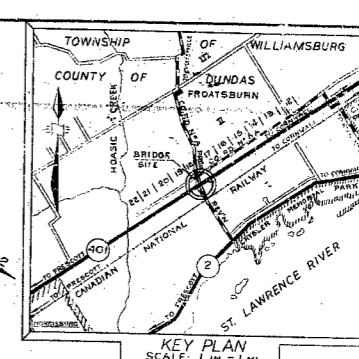
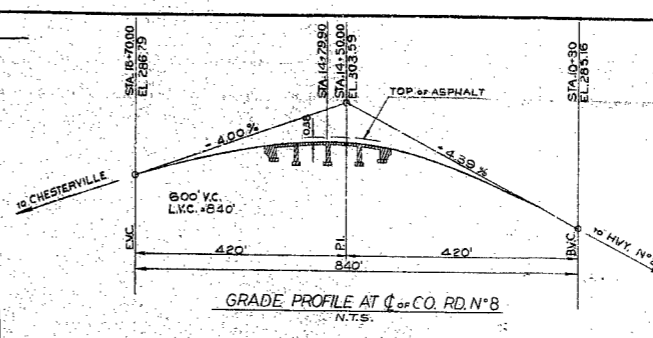
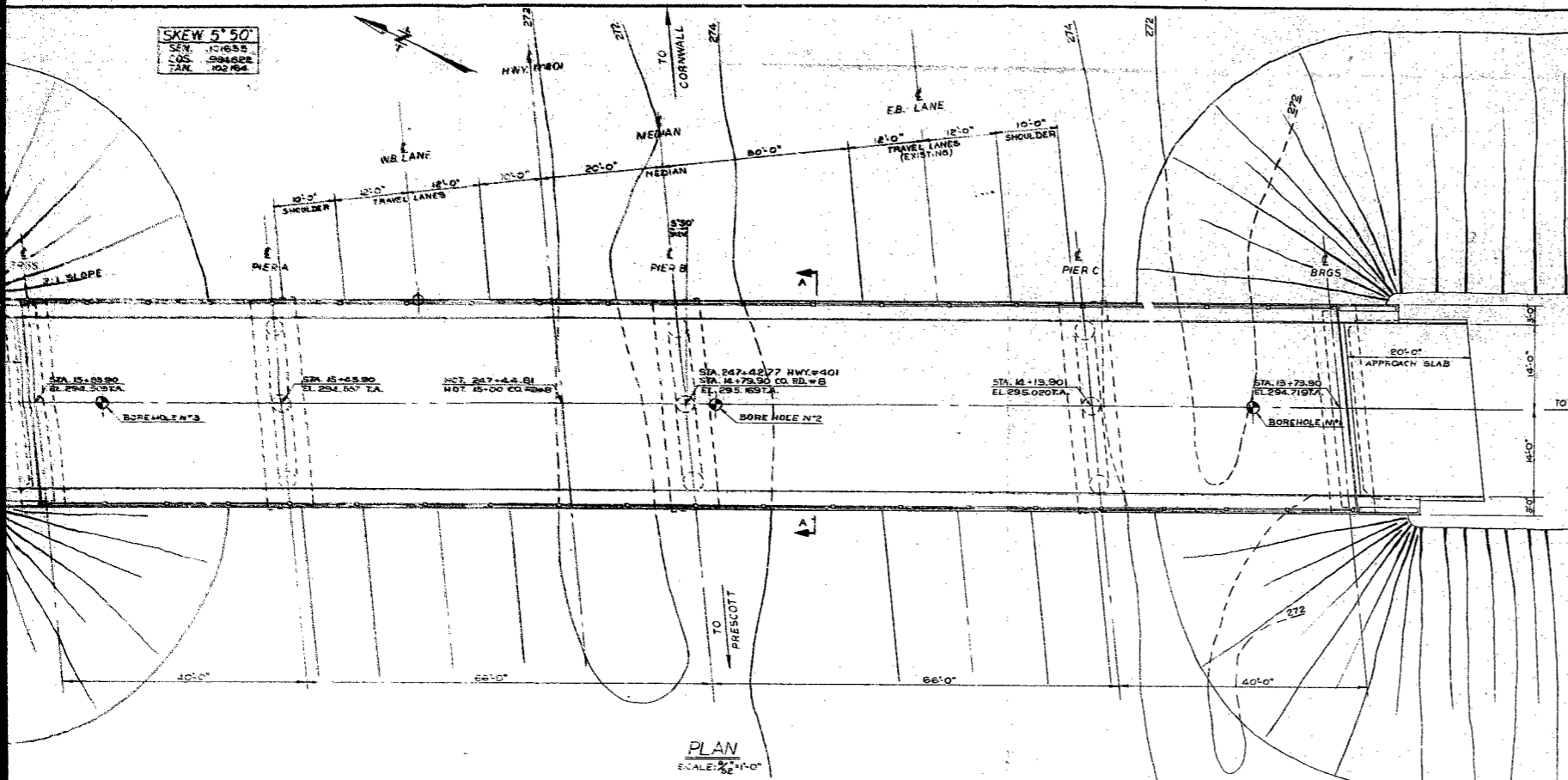
PRELIMINARY PLAN

APPROVED

BRIDGE ENGINEER DESIGN ENGINEER

DESIGN AR CHECK CONTRACT NUMBER  
DRAWING GP CHECK LOADING  
TRACING CHECK  
DATE DEC. 60 DRAWING NUMBER D-4789-P





NOTE TO ROAD DESIGN: GRADE OF CO. RD. N°8 RAISED .625 BY BRIDGE OFFICE TO ALLOW FOR MINIMUM VERTICAL CLEARANCE.

WP 137-59

DEPARTMENT OF HIGHWAYS-ONTARIO-  
BRIDGE OFFICE-TORONTO

WILLIAMSBURG TWP. BRIDGE N°5

THE KING'S HIGHWAY No. 401 DIST. NO. 9  
CO. DUNDAS  
TWP. WILLIAMSBURG LOT 18 & 19 CON. 1

PRELIMINARY PLAN

APPROVED

BRIDGE ENGINEER			DESIGN ENGINEER		
DESIGN	AR	CHECK	CONTRACT		
DRAWING	GP	CHECK	NUMBERS		
TRACING		CHECK	LOADING		
DATE	JAN. 1951		BRIDGE NUMBER	D-4789-P1	

Mr. A. M. Teye,  
Bridge Engineer.

Materials & Research Section.

January 3, 1961.

REVIEW OF PRELIMINARY PLAN

by: Foundations Office.

Attention: Mr. C. S. Grebski,  
Sr. Engr., Bridge Design Office.

Re: Williamsburg Twp. Bridge #5,  
Hwy. #401, District #9,  
W.P. 137-59.

With regard to your memo dated December 28th, 1960,  
we have the following comments to make:

If it is desired to place the abutments on piles  
as indicated on Drawing #D 4789-P, we would recommend that  
the approach fill consisting of granular material, be placed  
up to the elevation of the underside of the proposed abutment  
footings, and thoroughly compacted. Timber or tube displacement  
piles should then be driven through the fill down to elevation  
262.0'. It is emphasized that the piles should not penetrate  
beyond this elevation.

If this procedure is carried out, we would recommend  
a design load of 30 tons per pile.

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

*K. Selby*

(K. Selby,  
PROJECT FOUNDATION ENGR.)

KS/MdeF

cc: 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 2, ONTARIO.

Bridge Division,  
December 28, 1960.

MEMORANDUM TO:

Mr. L. G. Soderman,  
Principal Soils &  
Foundations Engineer,  
Department of Highways,  
Room 107,  
Downsview, Ontario.

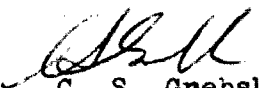
RE: Williamsburg Twp. Br. #5,  
Hwy. #401, Dist. #9,  
W.P. 137-59.

Attached herewith we are sending one print of the preliminary plan of this structure, drawing number D 4789-F.

The soil report BA 1135 calls for spread footings for this structure. We would like to place the abutments on piles as indicated,

Kindly give us your opinion as to type, length and allowable design load for these piles.

CSG:go  
c.c. S. McCombie

  
C. S. Grebski,  
Sr. Engineer,  
Bridge Design Office.

*File*

OFFICE LOCATION—

DOWNSVIEW AVE.,

KEELE ST. — HIGHWAY 401

TORONTO, ONTARIO.



ONTARIO

DEPARTMENT OF HIGHWAYS

POSTAL ADDRESS—

DEPARTMENT OF HIGHWAYS,

PARLIAMENT BUILDINGS,

TORONTO 2, ONTARIO.

Bridge Division,  
January 19, 1961.

MEMORANDUM TO:

Mr. L. G. Soderman,  
Principal Soils & Foundation Engr.,  
Department of Highways,  
Room 107, Lab. Bldg.,  
Downsview, Ontario.

RE: W.P. 137-59,  
Williamsburg Twp. Bridge #5,  
Hwy. 401 @ Dundas County Rd. #8,  
District #9.

Enclosed find one copy of the preliminary plan for the above structure.

The designer appears to have complied with the requirements of the foundation report but we would appreciate any comments you wish to make.

JBC/mg

*J. B. Curtis*  
J. B. Curtis,  
Bridge Location Engineer.

*Report checked and everything found to be O.K. No comments. J.B. Curtis advised by phone.  
Jan. 27, 1961*

*AgL*

23-64-43.

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

October 17, 1960.

D.H.C. FOUNDATION INVESTIGATION  
W.J. 60-F-83 -- W.P. 137-59.

Attention: Mr. E. McCombie.

Re: Hwy. #401 and Dundas Cty. Road #8  
District #9.

---

Accompanying this memo, is our report on the  
subsoil conditions existing at the above site.

We believe that the conclusions and recommendations  
contained in this report are self-explanatory and should  
prove adequate for your future design work.

If we can be of further assistance in connection with  
this project, please do not hesitate to contact our Office.

AL/Indef  
Attach.

cc: Messrs. A. M. Toye (2)  
B. A. Tregaskes  
D. G. Ramsay  
J. Ford  
L. E. Walker  
J. E. Graspier  
A. Watt

L. G. Soderman,  
PRINCIPAL FOUNDATIONS ENGR.

per:

*Attorney*  
(A. Soderman,  
FOUNDATIONS OFFICE (ENGR.))

Foundations Office/  
Gen. Files.

## TABLE OF CONTENTS

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  2. DESCRIPTION OF THE SITE
  3. FIELD INVESTIGATION PROCEDURE
  4. LABORATORY TESTS
  5. SOIL TYPES AND SOIL CONDITIONS
    - 5.1 Clayey Silt, Sand & Gravel Mixture.
    - 5.2 Bedrock.
    - 5.3 Groundwater Conditions.
  6. DISCUSSION & RECOMMENDATIONS
  7. SUMMARY
  8. MISCELLANEOUS
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# FOUNDATION INVESTIGATION

FOR

Hwy. #401 & Dundas Cty  
Rd. #8, W.J.60-F-83  
W.P. 137-59

## 1. INTRODUCTION:

Dundas Cty. Rd. #8 runs in the general direction north-south from Chesterville to Hwy. #2 and crosses Hwy. #401 at a location some 3 miles east of Morrisburg. At present only the south lane of Hwy. #401 is constructed and is used for two way traffic. It is proposed to construct a four span bridge to carry Cty. Rd. #8 over the existing and future lane of Hwy. #401. The proposed ~~g~~ of Cty. Rd. #8 at the proposed structure location is about 100' east of its present position. A field investigation was carried out to determine the subsoil conditions existing at the site of the approaches, and footings for the proposed structure. The results of this investigation as well as the discussion and recommendations for the footings of the structure are given in the following paragraphs.

## 2. DESCRIPTION OF THE SITE:

The site is located some three miles east of Morrisburg at the intersection of Hwy. #401 and Dundas Cty. Rd. #8. The surrounding country is very flat and covered with hardwood bush. About 1000' South of the site, the C.N.R., which runs parallel to Hwy. #401 in an east west direction is located. Dundas Cty. Rd. #8 runs from Hwy. #2 north to Chesterville. At the location of the proposed bridge this road has a pavement 12.0' in width.

2. DESCRIPTION OF THE SITE: (Cont'd.) ...

The site is located in Glengarry Till Plain physiographic region. The outstanding characteristic of this region is stoniness; the till itself is very stony.

3. FIELD INVESTIGATION PROCEDURE:

A total of three borings was carried out using conventional diamond drilling equipment adapted for soil sampling purposes. Due to the hard nature of the subsoil it was necessary to drill BX casing down to the various sampling depths. Disturbed samples were obtained by driving a 2-inch O.D. soil spoon into the soil. Driving energy to advance the cone was 350 ft. lbs. per blow. Adjacent to each borehole dynamic cone penetration tests were carried out, using an energy of 350 ft. lbs. to advance the cone. In the case of B.H. #1 it was not possible to drive the cone more than 5.0' and in B.H. #2, #3 the cone would not penetrate beyond 3.0'. At the end of boring operations, and again on completion of the investigation, water levels were measured in each boring and recorded in the field logs. Elevations of all boreholes were obtained from Profile #C-1696. Locations of boreholes were established on the site by the Field Engineer.

4. LABORATORY TESTS:

Tests were carried out in the laboratory on a selection of samples to determine, moisture content and grain size distribution. Results of these tests are given in Appendix #1 of this report.

5. SOIL TYPES & SOIL CONDITIONS:

Detailed descriptions of the various soil types encountered are given below, and also in Appendix #1 of this report. From

5. SOIL TYPES & SOIL CONDITIONS: (CONT'D.) ...

groundlevel downward the soil types are as follows:

5.1 Clayey silt, sand, gravel & boulders:

This material extends from groundlevel and is a heterogeneous mixture of clay, silt, sand, and gravel. Boulders 6"-9" are also present, and were observed in all three boreholes to be fairly numerous. The upper 15.0' of this deposit is very hard being in excess of 60 blows/ft. in Standard Penetration Tests. Below this depth the material appears to have a higher water content and is softer. At 21.0', the Standard Penetration Tests gave only 20 blows/ft. which was the average from then on to the bottom of this stratum at 60.0'. It would seem that the upper 15.0' of the material has become dessicated and therefore is much harder than the lower part. Samples taken from 35.0 feet were dried out and became very hard, similar in consistency to the in-situ material in the upper 15.0.

5.2 Bedrock:

Limestone bedrock was encountered at 62.0' in B.H. #1 and 5.0' of core was drilled of which 4.8' was recovered.

5.3 Groundwater Conditions:

Due to the nature of boring operations and the impermeability of the subsoil material it was not possible to establish the watertable at the site. However, from an examination of the samples taken it is estimated that the watertable lies between seven and ten feet below groundlevel.

In B.H. #1 a slight artesian head was encountered at 27.0'. This had a head of about six inches at groundlevel with a flow of less than one gallon in five minutes. At the end of boring operations the hole was sealed at 45.0'.

6. DISCUSSION & RECOMMENDATIONS:

At this location it is proposed to construct a four span bridge to carry Dundas Cty. Rd. #8 over the existing and future lanes at Hwy. #401. The three borings carried out indicate that subsoil conditions are uniform over the entire site. Field tests indicate that the bearing capacity of the hard upper crust of the subsoil is adequate to support the structure on shallow spread footings founded in this material. The depth of the excavation should be sufficient to provide adequate frost protection, and in this regard a depth of 5.0' is recommended. For design purposes a Safe Bearing Capacity of 3 tons/sq. ft. is recommended.

Due to the impermeable nature of the subsoil material no dewatering problems in excavations carried out for the footings are anticipated.

7. SUMMARY:

It is recommended that the structure be supported on spread footings founded at a depth of 5.0' below groundlevel. For design purposes a safe bearing capacity of 3 tons/sq. ft. may be used. No dewatering problems are anticipated with regard to excavations carried out in the subsoil. No major problems are anticipated during or after construction of the bridge approaches.

8. MISCELLANEOUS:

This investigation was carried out during the period

8. MISCELLANEOUS: (Cont'd.) ...

September 21st-26th, 1960, under the supervision of Mr. K. G. Selby of this section. Equipment used was owned and operated by Johnston Drilling Co., Ottawa.

OCTOBER, 1960.

REPORT PREPARED BY:

*K. G. Selby*  
.....  
K. G. Selby  
Project Fdn. Engineer

REPORT APPROVED BY:

*T. Stermac*  
.....  
T. Stermac  
Foundations Office Engr.

APPENDIX I

## SUMMARY OF FIELD & LABORATORY TESTS

**JOB 60-F-83**

W.P. 137-59

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
1	S1	3'-4.5'	Hard clayey silt containing fine-coarse sand & gravel and boulders 6"-9" (glacial till)	59	-	-	-	-	-	88.7 % recovery
	S2	5.5'-6.5'	"	70	-	-	-	-	-	
	S3	9'-10.5'	"	80-6"	-	-	-	-	-	
	S4	14'-15'	"	94	-	-	-	-	-	
	S5	21'-22.5'	Stiff-very stiff clayey silt cont. fine-coarse sand & gravel and boulders 6"-9" (glacial till)	20	-	-	-	-	-	
	S6	26'-27.5'	"	22	-	-	-	-	-	
	S7	30'-31.5'	"	15	-	-	-	-	-	
	S8	35'-36.5'	"	12	-	-	-	-	-	
	S9	40'-41.5'	"	17	-	-	-	-	-	
	S10	50'-51.5'	"	21	-	-	-	-	-	
	RC11	62'-67.5'	Limestone bedrock	-	-	-	-	-	-	

# SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-83

W.P. 137-59

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
2	S1	5'-5.5'	Hard clayey silt cont. fine-coarse sand & gravel and boulders 6"-9" (glacial till)	70-6"	-	-	-	-	-	
	S2	10'-10.1'	"	-	-	-	-	-	-	
	S3	15'-16.5'	"	47	-	-	-	-	-	
	S4	18'-19.5'	"	24	-	-	-	-	-	
3	S1	5'-5.5'	Hard clayey silt cont. fine to coarse sand & gravel & boulders 6"-9" (glacial till)	50-6"	-	-	-	-	-	
	S2	10'-11.5'	"	105	-	-	-	-	-	
	S3	16'-17.5'	"	31	-	-	-	-	-	
	S4	18'-19.5'	"	30	-	-	-	-	-	
			S denotes split spoon sample RC " rock core sample							

# DEPARTMENT OF HIGHWAYS - ONTARIO

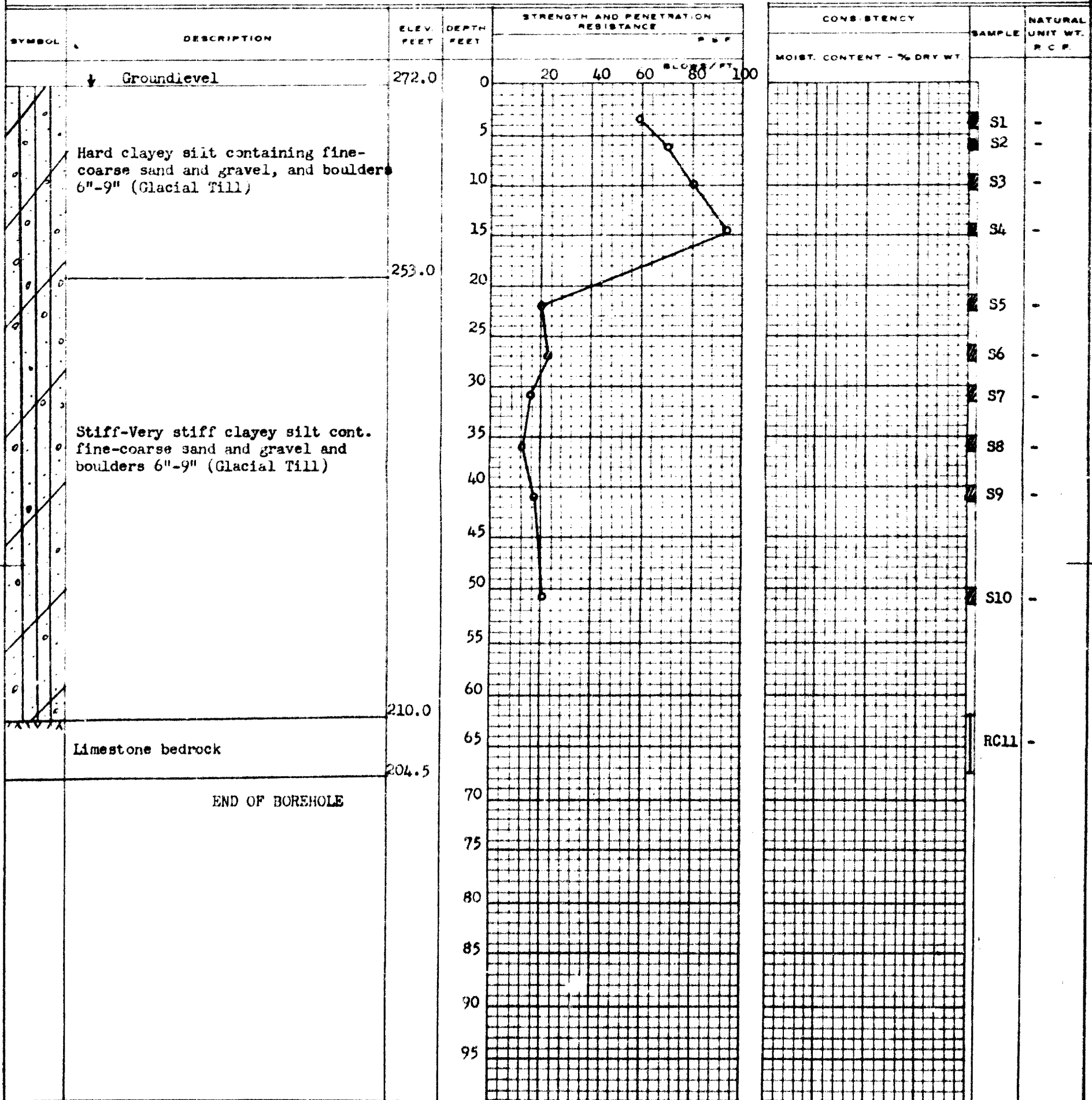
## MATERIALS AND RESEARCH SECTION

W.P. 137-59      BORE HOLE NO. 1  
 JOB 60-2-83      STATION 13+38.2  
 DATUM G.S.C.      COMPILED BY B.K.  
 BORING DATE 21/9/60      CHECKED BY A.S.

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

### LEGEND

1/2 UNCONFINED COMPRESSION (Qu)      0  
 VANE TEST (C) AND SENSITIVITY (S)      +S  
 NATURAL MOISTURE AND LIQUIDITY INDEX      LI  
 LIQUID LIMIT      X  
 PLASTIC LIMIT      -



# DEPARTMENT OF HIGHWAYS - ONTARIO

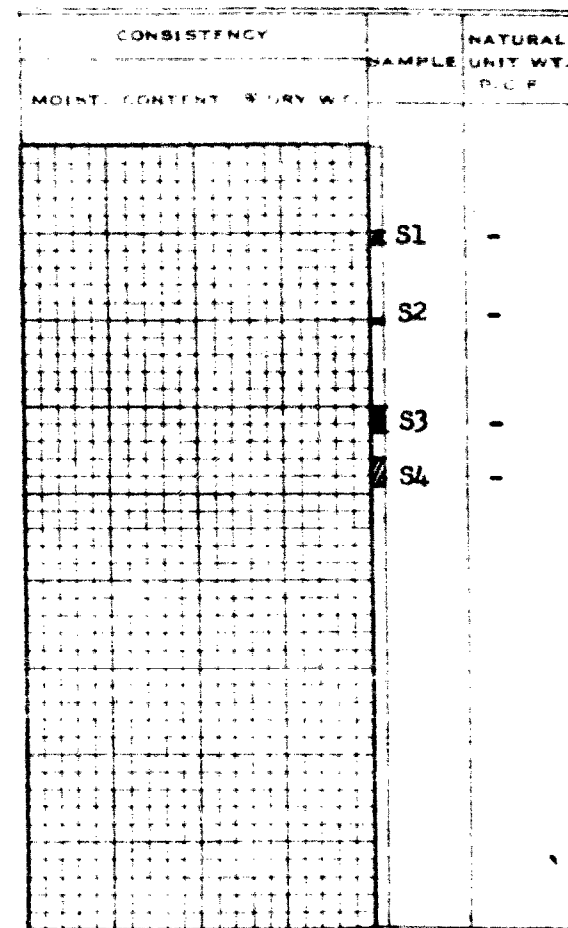
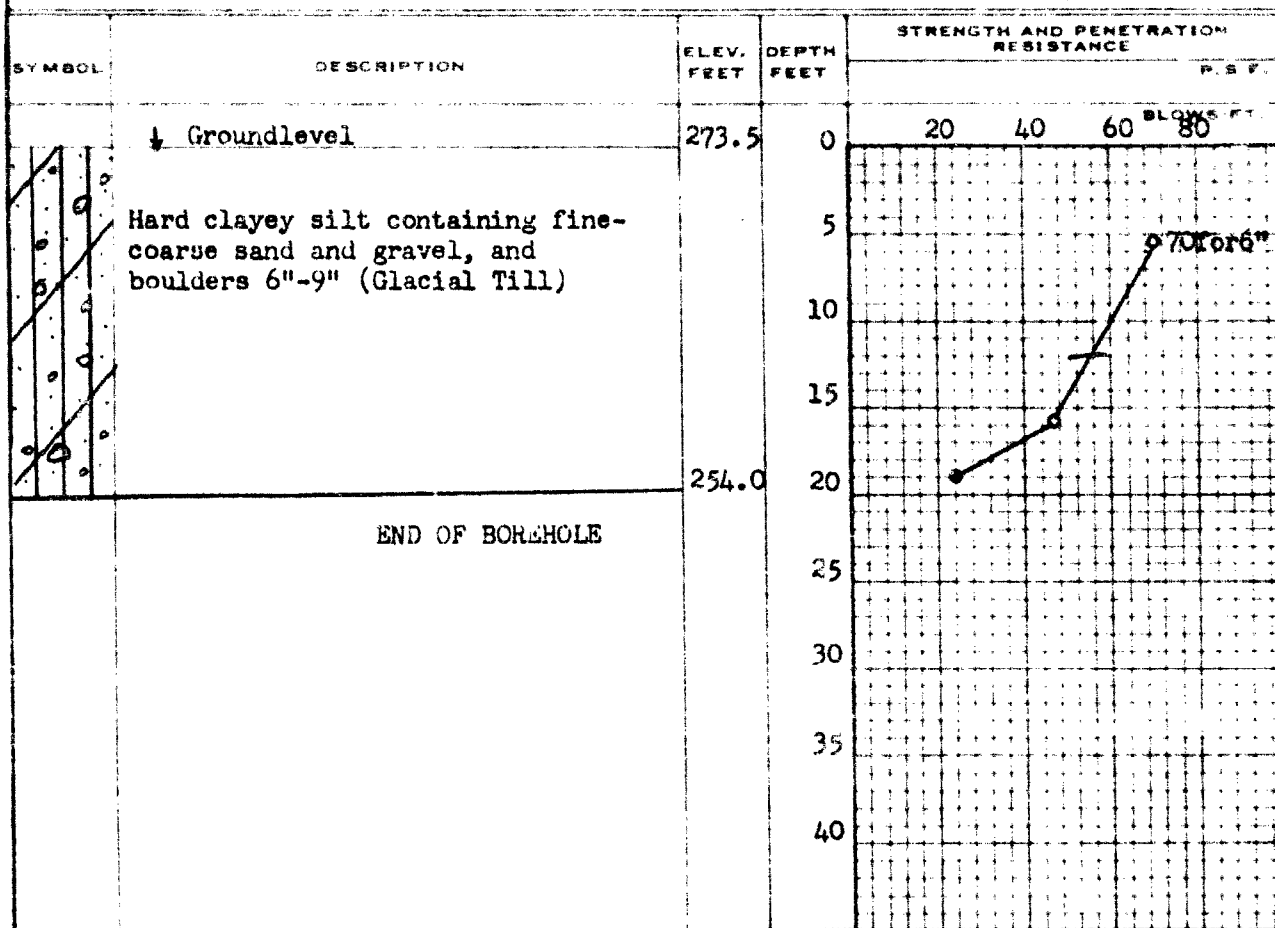
## MATERIALS AND RESEARCH SECTION

W.P. 137-59 BORE HOLE NO. 2  
 JOB 60-F-83 STATION 14+75 E  
 DATUM G.S.C. COMPILED BY B.K.  
 BORING DATE 24/9/60 CHECKED BY K.S.

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








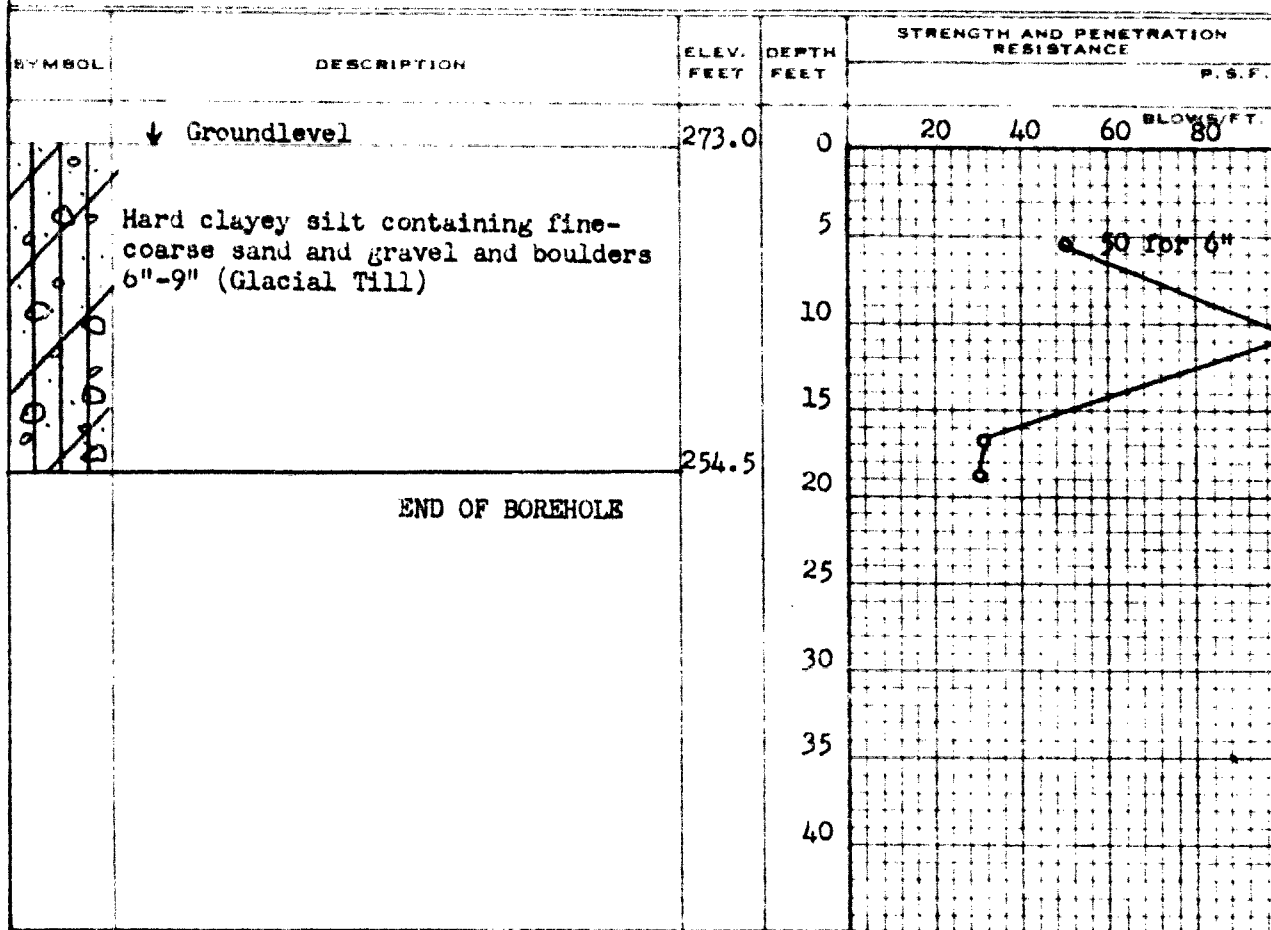
# DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 137-59 BORE HOLE NO. 3  
 JOB 60-F-83 STATION 15+75 E  
 DATUM G.S.C. COMPILED BY B.K.  
 BORING DATE 26/9/60 CHECKED BY K.S.

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 



CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % BY WT.		
	S1	-
	S2	-
	S3	-
	S4	-