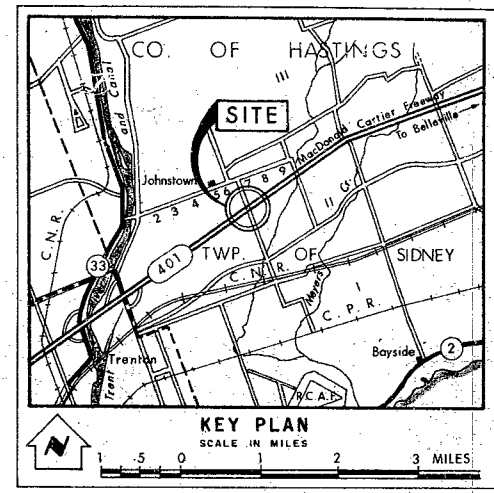
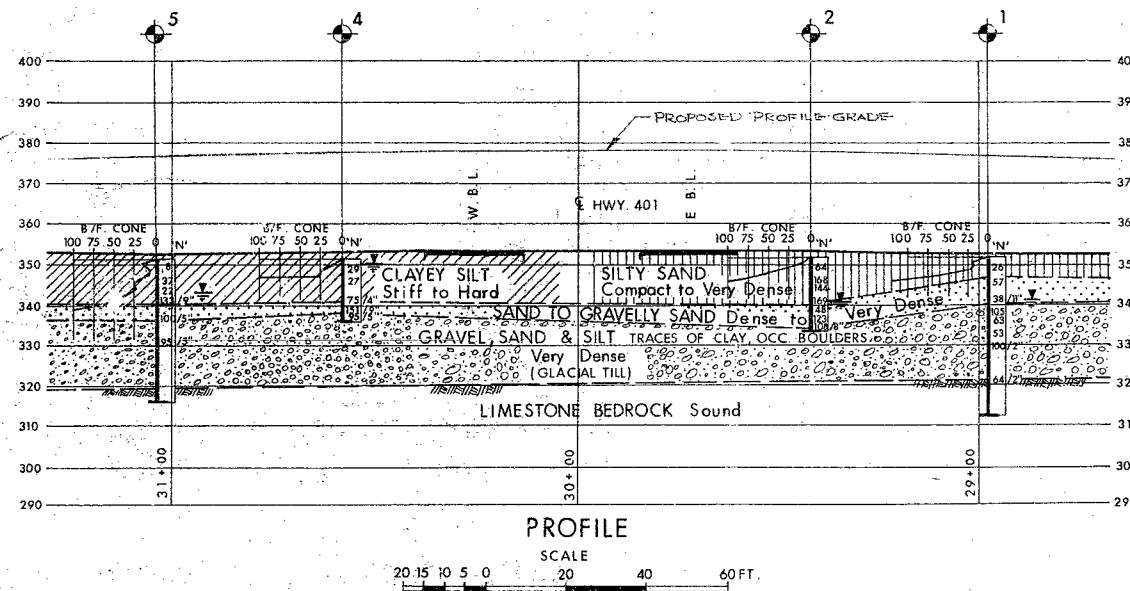
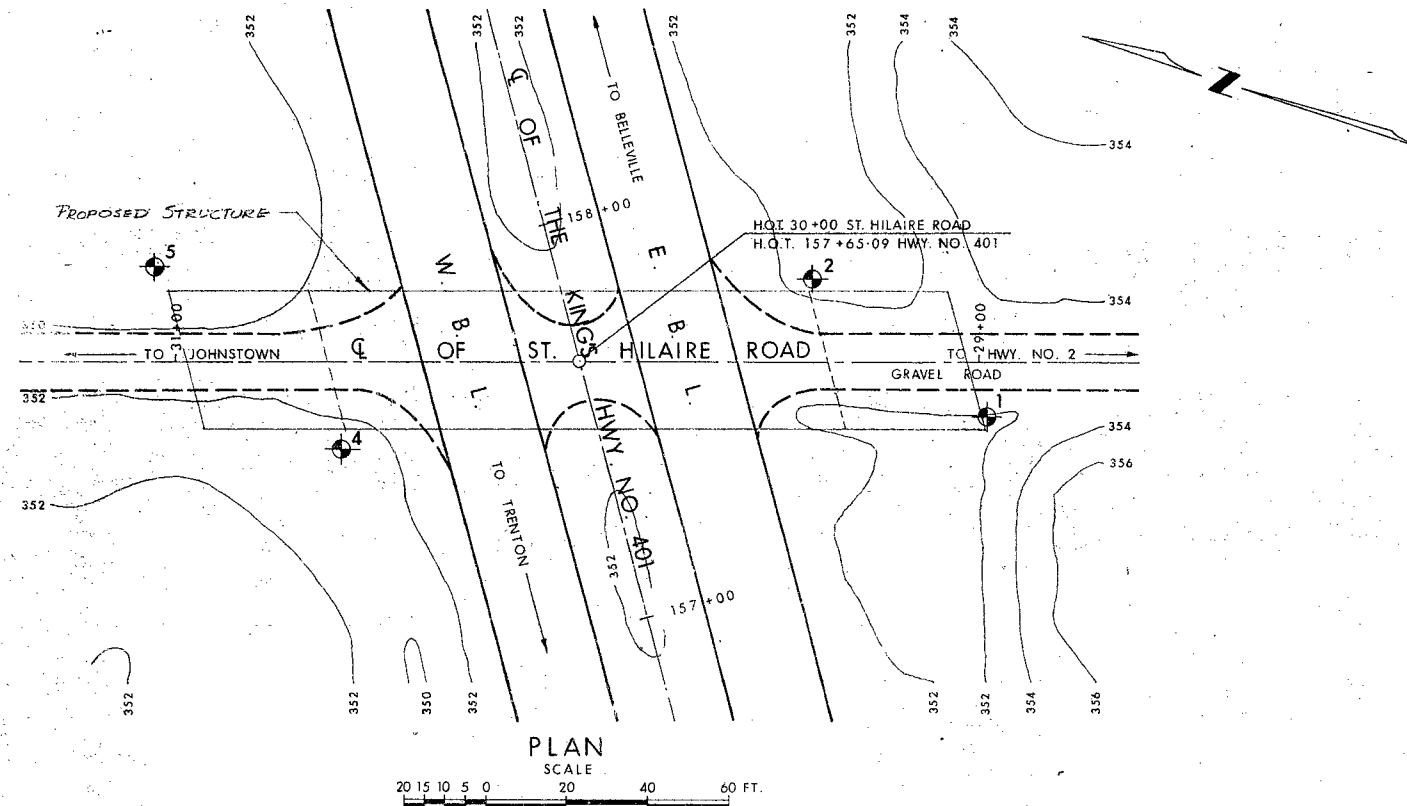


#67-F-110
W.P. # 67-59
HWY #401
ST HILAIRE
ROAD



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

NO.	ELEVATION	STATION	OFFSET
1	352.0	28+98	13.5' LT.
2	351.5	29+42	20.5' RT.
4	351.2	30+59	21.5' LT.
5	351.4	31+05	23.5' RT.

- 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.

REVISIONS			DATE	BY	DESCRIPTION
1	13 FEB 68	H.R.			STATIONS MODIFIED & TITLE CORRECTED

DEPARTMENT OF HIGHWAYS - ONTARIO			
MATERIALS & TESTING DIVISION - FOUNDATION SECTION			
ST. HILAIRE ROAD			
(ROAD ALLOWANCE BETWEEN LOTS 6 & 7)			
KING'S HIGHWAY NO. 401		DIST. NO. 8	
CO. HASTINGS			
TWP. SIDNEY		LOT 6 & 7 CON. II	
BORE HOLE LOCATIONS & SOIL STRATA			
SUBMIT W. H. CHECKED	W.P. NO. 67-59	M.&T. DRAWING NO.	
DRAWN G. P. CHECKED	JOB NO. 67-F-110	67-F-110A	
DATE 16 JAN. 1968	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <i>Al Thomas</i>	CONT. NO.		

MEMORANDUM

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Division,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

Attention: Mr. S. McComble

DATE: January 12, 1968

OUR FILE REF.

IN REPLY TO

JAN 22 1968

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For

Proposed Underpass at the Crossing of
The MacDonald-Cartier Freeway and the
Road Allowance (St. Hillaire's Rd.)
Between Lots 6 and 7, Twp. of Sidney
Co. of Hastings - Dist. 8 (Kingston)
W.J. 67-P-110 -- W.P. 67-59

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

We believe that the factual data and recommendations
contained therein, will prove adequate for your design
requirements. Should additional information be required,
please do not hesitate to contact our Office.

AGS/MdeP
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
S. J. Markiewicz
E. A. Cash
G. Scott
J. E. Gruspier
B. A. Singh

Foundations Files
Gen. Files ✓

A. G. Stermac
A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

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-

**FOUNDATION INVESTIGATION REPORT
For**

Proposed Underpass at the Crossing of
The MacDonald-Cartier Freeway and the
Road Allowance (St. Hillaire's Rd.)
Between Lots 6 and 7, Twp. of Sidney
Co. of Hastings - Dist. 8 (Kingston)
W.J. 67-F-110 -- W.P. 67-59

1. INTRODUCTION:

The Foundation Section was requested to carry out an investigation at the proposed crossing of the MacDonald-Cartier Freeway (Hwy. 401) and St. Hillaire's Rd. in the Twp. of Sidney, County of Hastings, Ontario. The request was contained in a memo from the Kingston Bridge Location Section (Mr. G. Scott, Regional Bridge Location Engineer), dated November 22, 1967. An investigation was subsequently carried out to determine the subsoil conditions at the site.

This report contains the results of the investigation, together with recommendations pertaining to the foundation design of the proposed structure.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is located on the MacDonald-Cartier Freeway about three miles east of Hwy. #33 (Trenton). At this location the freeway grade is about ground elevation on the north side of the highway, and in a shallow 6-ft. cut section on the south side. The surrounding area is generally flat to undulating. The existing gravel road approaches the freeway from the south in a shallow cut and climbs a hill to the north of the freeway.

Physiographically, the site is situated in the "Iroquois Plain". Based on available geological information, it is known that the area consists of sand plains and lacustrine clay deposited in the Trent embayment of glacial Lake Iroquois. The bedrock in the area consists of Trenton limestone.

3. FIELD AND LABORATORY WORK:

Four boreholes each with an accompanying dynamic cone penetration test, were carried out during the field investigation. The borings were advanced by means of a conventional diamond drill rig adapted for soil sampling purposes.

Samples were obtained at required depths in a 2-inch O.D. split-spoon sampler which was hammered into the soil in accordance with the specifications for the standard penetration test. In addition, one 2-inch I.D. Shelby tube sample was obtained in the cohesive subsoil. In three of the boreholes, sampling of the hard till material was attempted by drilling with a BX rock core barrel, but recovery was very low. Bedrock was proven in two of the borings by obtaining BX and AXT size rock core samples. At the other locations, the borings were terminated once the hard till-like material was encountered. During sampling and drilling operations, detailed logs of the borings were made; these logs contain a record of the drilling and sampling techniques used, together with the soil types encountered, and the groundwater elevations observed in the borings during the period of the investigation.

The locations and elevations of all the borings were surveyed in the field by personnel from the Foundation Section; this information is shown on Dwg. #67-F-110A, together with the estimated stratigraphical profile.

All samples were subjected to a careful visual inspection in the laboratory. Following this inspection, tests were carried out on certain samples to determine the following physical properties of the various soil types:

Natural Moisture Contents

Atterberg Limits

Grain-Size Analyses

cont'd. /3 ...

3. FIELD AND LABORATORY WORK: (cont'd.)

Unconfined and Triaxial shear strength tests were performed on the one Shelby tube sample.

On completion of these tests, the various soil samples were classified as to type and consistency in accordance with the Unified Soil Classification System (Oct. 1963).

The results of the laboratory tests are summarized and plotted on the Record of Borelog sheets contained in the Appendix of the report.

4. SOIL TYPES AND SOIL CONDITIONS:

4.1) General:

Subsoil at the site consists of a thin surface layer of topsoil over a 4 to 10 ft. deposit of silty sand or clayey silt. Underlying this surficial deposit is a 3 to 6 ft. layer of sand to gravelly sand followed by a 17 to 20 ft. heterogeneous mixture of sand, gravel and silt (glacial till) overlying limestone bedrock.

The boundaries between the various soil strata are shown on the Record of Borelog sheets contained in the Appendix of the report. The estimated stratigraphical profile shown on Dwg. 67-F-110A is based on this information.

A detailed description of the various soil types follows:

4.2) Silty Sand:

Underlying the topsoil to the south of the highway, a 4 to 10 foot deposit of silty sand with traces of gravel and clay was encountered. 'N' values ranged from 26 to 169 blows per foot, indicating a relative density of compact to very dense. The deposit varied in colour from a greyish-brown near the surface to grey with depth. Moisture contents ranged from 7 to 14 percent. A grain-size analysis gave the following distribution: gravel 17%, sand 36%, silt 37%, clay 10%.

cont'd. /4 ...

4. SOIL TYPES AND SOIL CONDITIONS: (cont'd.) ...

4.3) Silty Clay to Clayey Silt:

Underlying the topsoil to the north of the highway, a 9 to 10 foot deposit of silty clay to clayey silt with some sand was encountered. 'N' values ranged from 8 to 37, indicating a stiff to hard consistency. The deposit varied in colour from greyish-brown at the surface to grey with depth. Soil properties as determined through laboratory tests, are:

Moisture Content W = 24 - 32%

Liquid Limit W_L = 16 - 47%

Plastic Limit W_P = 11 - 30%

Average Undrained
Shear Strength C_u = 2750 p.s.f.

Bulk Density γ = 123 p.c.f.

Grain-Size Distribution: Gravel 3%, Sand 20%, Silt 51%,
Clay 26%.

4.4) Sand to Gravelly Sand:

Underlying the surficial silty sand or clayey silt deposits is a 3 to 6 ft. stratum of sand to gravelly sand with traces of silt and clay. 'N' values varied from 48 blows per foot to 151 blows for 9 inches, indicating a relative density of dense to very dense. Moisture contents ranged from 7 to 15%. A typical grain-size analysis of the deposit gave the following distribution: gravel 23%, sand 72%, silt & clay 5%.

4.5) Heterogeneous Mixture of Gravel, Sand and Silt -
(Glacial Till):

This deposit of gravel, sand and silt with traces of clay and occasional boulders up to 10", directly underlies the sand to gravelly sand stratum over the entire site. This deposit, some 17 to 20 ft. thick, extended down to bedrock in B.H.'s 1 and 5. No attempt was made to penetrate this till material in B.H.'s 2 and 4.

cont'd. /5 ...

4. SOIL TYPES AND SOIL CONDITIONS: (cont'd.) ...

4.5) Heterogeneous Mixture of Gravel, Sand and Silt -
(Glacial Till): (cont'd.) ...

'N' values taken whenever possible, gave values of up to 100 blows for two inches, indicating a very dense relative density. Moisture contents ranged from 4.5 to 12%. Grain-size distribution analysis gave the following range:

Gravel	33 - 52%
Sand	40 - 50%
Silt and Clay	8 - 17%

4.6) Limestone Bedrock:

Bedrock was established only in B.H.'s 1 and 5 by drilling 4 to 9 feet of rock core. The depth at which bedrock was encountered ranges from about elevation 319 to 321, or some 32 to 31 ft. below the existing ground surface.

The bedrock is composed of limestone from the Trenton formation, grey in colour and sound.

5. GROUNDWATER CONDITIONS:

Groundwater level observations were made in the open boreholes during the period of the investigation. These observations, which are recorded on the borehole logs and summarized on Dwg. No. 67-F-110A, indicate that the groundwater level ranges from about elevation 343 to 341, or some 8 to 11 feet below existing ground level except in B.H. #4. The water level in B.H. #4 was found to be at Elev. 350, but since this is the shallowest borehole and in a cohesive material, the high water level was probably the result of perched drill water which did not have sufficient time to stabilize during the period of the field observations.

During drilling operations, when the boreholes reached the more permeable granular layers, loss of drilling water was observed at approximate Elev. 338 and 327 in B.H. #1, and elevation 332 in B.H. #5.

cont'd. /6 ...

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to construct a four-span (35'-62'-62'-35') underpass structure to carry St. Hillaire's Rd. over the MacDonald-Cartier Freeway. Approach fill will have a maximum height of 24 ft. above the freeway grade.

Subsoil at the site consists of a surface layer of compact to very dense silty sand to the south of the freeway, and stiff to hard silty clay to clayey silt to the north. Underlying this is a deposit of dense to very dense sand to gravelly sand followed by a very dense heterogeneous mixture of gravel, sand and silt (glacial till). The overburden is underlain at a depth 31 to 32 ft. below the ground surface by limestone bedrock. Generally, occasional boulders were encountered below elevation 340 in the glacial till stratum.

6.2) Structure Foundations:

The abutments may be supported on spread footings placed within the approach fills. The fill material below the tops of the footings should consist of well compacted G.B.C. Class 'A' material and should extend for a horizontal distance of at least 10 ft. from the footing edges in the plane of the footing tops. This portion of the fill should be constructed with side slopes of 2:1. The remainder of the fill should be completed to above profile grade for a distance of about 50 feet behind the abutments before re-excavating for the abutment footings. A design load of 2 t.s.f. may be used for the abutment foundations.

Alternatively, the abutments may be supported on end-bearing piles driven to practical refusal in the glacial till stratum at approximate Elev. 335 for the north abutment and Elev. 329 for the south abutment. Allowable loads will depend upon the pile section chosen. For example, a safe design load of 90 tons may be used for 14 BP 73 steel H-piles. However, the pile driving in the field should be controlled by the use of the Hiley formula as per current D.H.O. Standards.

6. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

6.2) Structure Foundations: (cont'd.) ...

The piers may be founded on spread footings situated within the silty clay to clayey silt or silty sand stratum having a minimum cover of 4 ft. for frost protection. No boreholes were taken at the centre pier; however, for design purposes, the conditions are assumed to be similar to those for the north pier. A safe design load of 2.5 t.s.f. may be used for the design of the pier footings. Settlement of the pier footings will be negligible.

6.3) Dewatering:

No major dewatering problems are anticipated in view of the presence of the water table well below the proposed pier footing excavations. However, care should be taken to prevent softening or loosening of the foundation base by surface run-off. A working slab or granular pad should be placed immediately after the required excavation is completed.

6.4) Approach Embankments:

There should be no stability problems for the proposed 24-ft. approach fills, provided that standard slopes of 2 horizontal to 1 vertical are used.

7. SUMMARY:

The results of a foundation investigation for the proposed underpass structure at the crossing of St. Hillaire's Rd. and the MacDonald-Cartier Freeway, are presented.

Subsoil at the site consists of a layer of compact to very dense silty sand to the south of the freeway, and stiff to hard silty clay to clayey silt to the north. Underlying this is a deposit of dense to very dense sand to gravelly sand followed by a competent glacial till deposit which is underlain by sound limestone bedrock.

7. SUMMARY: (cont'd.) ...

The proposed abutments can be founded within the approach fills on spread footings, or on end-bearing piles driven to practical refusal in the glacial till deposit. The piers can be founded on spread footings within the silty sand or clayey silt stratum with a safe bearing pressure of 2.5 t.s.f.

No dewatering nor embankment stability problems are anticipated.

8. MISCELLANEOUS:

The field work was carried out during November 27 to December 5, 1967, by Mr. R. Domoney and Mr. W. Hutton, Project Foundation Engineer.

The preparation of this report was undertaken by Mr. R. Domoney and Mr. W. Hutton.

The investigation was carried out under the general supervision of Mr. M. Devata, Supervising Foundation Engineer, who reviewed this report.

The equipment used was owned and operated by Canadian Longyear Limited.

January, 1968.

APPENDIX I

Copy for:
Mr. A. G. Stermac, Principal Foundation Engineer,
DOWNSVIEW.

NEW FILE

W. P. 34-66
P. R. 62-377
HWY. 417
DIST. OTTAWA

FORM SB-RW-58
(FORMERLY SB-PR-45)



ONTARIO
DEPARTMENT OF HIGHWAYS

PERMISSION TO ENTER

I DONALD CAMERON BEING OWNER OF LOT 6

CON T. Q. E., TOWNSHIP OF GLoucester

IN THE COUNTY OF CARLETON DO HEREBY GRANT PERMISSION

TO THE DEPARTMENT OF HIGHWAYS, ONTARIO, TO ENTER MY PROPERTY FOR THE

PURPOSE OF SOIL TESTING

HIGHWAY NO. 417 THE GRANTING OF THE SAID PERMISSION

IN NO WAY CONSTITUTES A SETTLEMENT FOR LAND TAKEN OR DAMAGES CAUSED

BY THE SAID WIDENING OR CONSTRUCTION AND I RESERVE THE RIGHT TO FILE

CLAIM FOR COMPENSATION.

DATED AT CARLETON SPRINGS THIS 20th DAY OF JUNE 198

WITNESS

SIGNATURE Donald Cameron

ADDRESS CARLETON SPRINGS, ONT.

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

FORM SB-RW-58
(FORMERLY SB-PR-45)



ONTARIO
DEPARTMENT OF HIGHWAYS

PERMISSION TO ENTER

NEW FILE
W.P. 34-66
P.R. 67-377
HWY. 417
DIST. OTTAWA

I FERNAND MARION ^{LESSEE} BEING ~~OWNER~~ OF LOT 8

CON 6 A.F., TOWNSHIP OF GLoucester

IN THE COUNTY OF CARLETON DO HEREBY GRANT PERMISSION

TO THE DEPARTMENT OF HIGHWAYS, ONTARIO, TO ENTER MY PROPERTY FOR THE

PURPOSE OF SOIL TESTING

HIGHWAY NO. 417 THE GRANTING OF THE SAID PERMISSION

IN NO WAY CONSTITUTES A SETTLEMENT FOR LAND TAKEN OR DAMAGES CAUSED

BY THE SAID WIDENING OR CONSTRUCTION AND I RESERVE THE RIGHT TO FILE

CLAIM FOR COMPENSATION.

DATED AT RUSSELL THIS 20th DAY OF JUNE 1968

WITNESS

SIGNATURE

Fernand Marion

ADDRESS RR # 3 RUSSELL

ONT.

J. L. Blon
BK
G.L.M.
June 24/68.

NEW FILE

FORM SB-RW-58
(FORMERLY SB-PR-45)



ONTARIO
DEPARTMENT OF HIGHWAYS

PERMISSION TO ENTER

ADDRESS R.R. 4, Box 404, Ottawa.

1000
J. L. 3
for
24/6.8

Mr. A. G. Stermac, Principal Foundation Engineer.
DOWNSVIEW.

FORM SB-RW-58
(FORMERLY SB-PR-45)



ONTARIO
DEPARTMENT OF HIGHWAYS

W.P.	24-66
D.F.	67-377
HWY.	417
DIST.	OTTAWA

PERMISSION TO ENTER

I FELIX TETZLAFF BEING OWNER OF LOT 7

CON 7 D.F., TOWNSHIP OF GLoucester

IN THE COUNTY OF CARLETON DO HEREBY GRANT PERMISSION

TO THE DEPARTMENT OF HIGHWAYS, ONTARIO, TO ENTER MY PROPERTY FOR THE

PURPOSE OF SOIL TESTING

HIGHWAY NO. 417 THE GRANTING OF THE SAID PERMISSION

IN NO WAY CONSTITUTES A SETTLEMENT FOR LAND TAKEN OR DAMAGES CAUSED

BY THE SAID WIDENING OR CONSTRUCTION AND I RESERVE THE RIGHT TO FILE

CLAIM FOR COMPENSATION.

DATED AT OTTAWA THIS 19th DAY OF JUNE 1968

WITNESS

SIGNATURE Felix Tetzlaff

ADDRESS 70 SWEETLAND AVE
OTTAWA, ONT.

100K
J. L. J. [Signature]
6-2-68
June 24/68

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

JOB 67-F-110

LOCATION Sta. 28 + 98 @ St. Hillaire Rd. o/s 13.5' Lt.

ORIGINATED BY RD

W.P. 67-59

BOHRING DATE Nov. 27, 28, 29, 30, 1967

COMPILED BY _____ RD

DATUM Geodetic

BOREHOLE TYPE Washbore - NX & BX Casing

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 67-F-110 LOCATION Sta. 29+42 @ St. Hillaire Rd. o/s 20.51 Rt. ORIGINATED BY RD
W.P. 67-59 BORING DATE Nov. 30 - Dec. 1, 1967 COMPILED BY RD
DATUM Geodetic BOREHOLE TYPE Washbore - BX Casing CHECKED BY MR.

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		25	50	75	100	125	WP	WL	W		
351.5	Ground Level															
0.0	Topsoil-Grey Brown					350										
1.0	Silty sand with traces of gravel & clay.		2	SS	64							o				
	Compact to very dense.		3	SS	168							o				
	Grey		4	SS	144							o				
340.0			5	SS	169	340						o				
11.5	Sand to gravelly sand with traces of silt.		6	SS	48							o				
	Dense to very dense.															
	Grey		7	SS	123							o				
334.0																
333.3	Gravelly sand & silt.		8	SS	108	330						o				
18.2	End of Borehole															

340.5
4 31 59 6
59 35 (6)

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 5

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 67-F-110

LOCATION Sta. 31+05 @ St. Hillaire Rd o/s 23.5' Rt.

ORIGINATED BY RD

W.P. 67-59

BORING DATE Dec. 4 - 5, 1967

COMPILED BY RD

DATUM Geodetic

BOREHOLE TYPE Washbore - BX Casing

CHECKED BY *MR.*

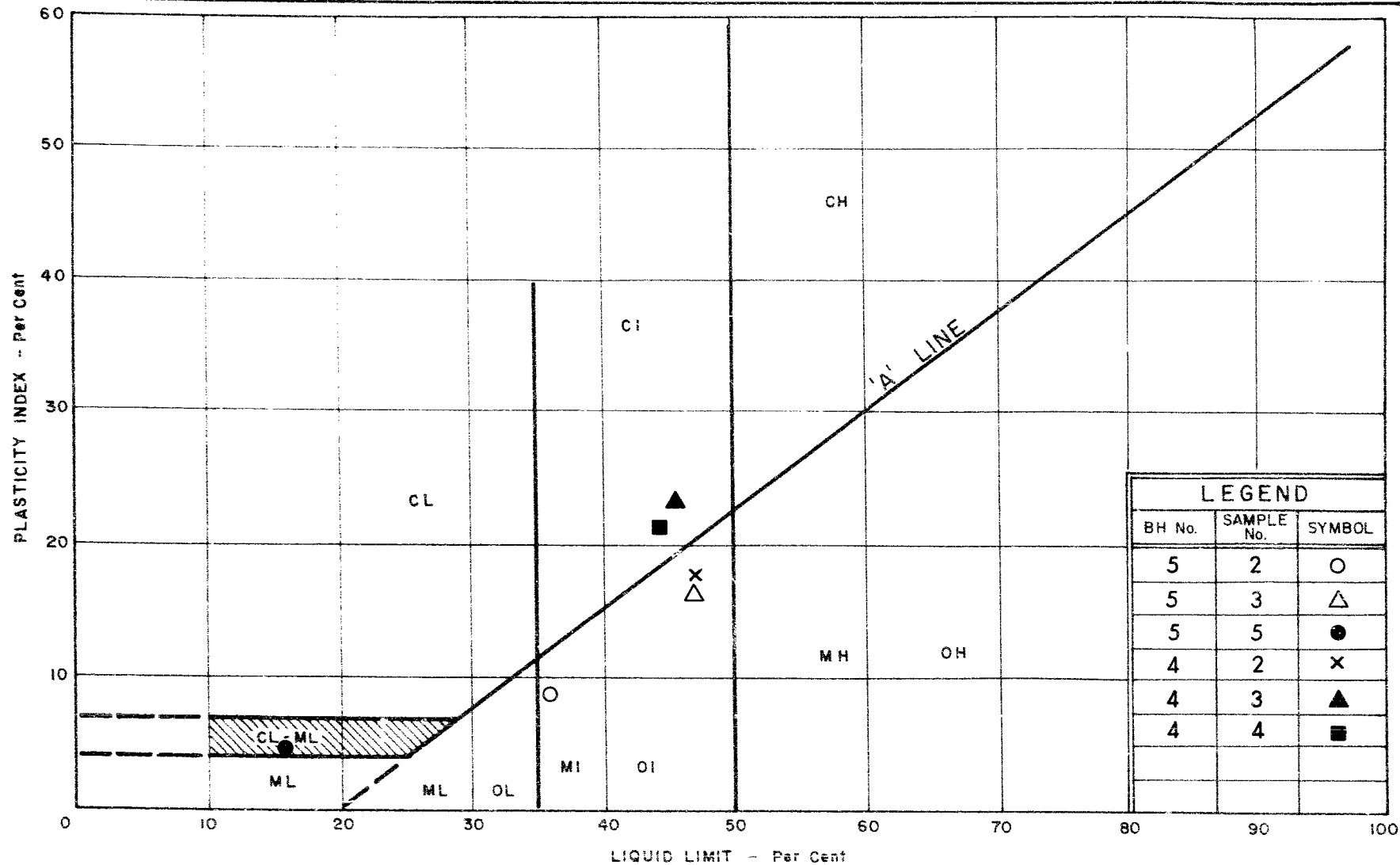
SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	25	50	75	100	125	20	40		
351.4	Ground Level															
1.0	Topsoil - Brown															
	Clayey silt with traces of sand, stiff to hard.		2	SS	8	350							10			
	Grey-brown to grey.		3	SS	37								0			
			4	SS	22											
340.4			5	SS	133/9"	340							0			
11.0	Sand & Gravel with traces of silt & clay.		6	BX RC	17% Rec											
336.4	Grey. Very dense.															
15.0	Gravel, sand & silt, with traces of clay and occasional boulders up to 10" (glacial till)		7	SS	100/5"								0			
			8	BX RC	5% Rec.											
			9	SS	95/6"								0			
	Very dense.		10	BX RC	8% Rec	330										
			11	BX RC	15% Rec											
319.4			12	BX RC	28% Rec.	320										
32.0	Limestone Bedrock, Sound, Grey		13	BX RC	91% Rec											
315.9																
35.5	End of Borehole					310										

 $\frac{\nabla 343.1}{\nabla 8.3}$

19 33 40 8

21,39 30 10

33 50 (17)



LEGEND		
BH No.	SAMPLE No.	SYMBOL
5	2	○
5	3	△
5	5	●
4	2	x
4	3	▲
4	4	■



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

W.P. No. 67 - 59

JOB No. 67 - F - 110

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

Q _u	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q _{cu}	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q _d	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_r	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
$\bar{\sigma}$	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

MEMORANDUM

To: Mr. A. G. Stermac,
Principal Foundation Engineer,
Laboratory Building,
Downsview, Ontario.

From: Bridge Division,
Kingston, Ontario.

Date: November 22, 1967.

Our File Ref.

In Reply To

Subject: W.P. 67-59, Site 11-150, St. Hillaire Rd. Underpass,
Highway 401, District 8

Job No. 67-F-110

We are sending to you herewith 2 copies of Bridge Site Plan E-3766-1 together with Preliminary Structure Site Report. The proposed location for the subject structure is marked in red on the plan.

We will be pleased to have you arrange for foundation investigation of this site and to receive your report in due course.


J. A. Fisher

For: Gavin Scott, P. Eng.
Regional Bridge Location Engineer

JAF/GS/hl

Encls.

Original letter & 1 copy of Plan E-3766-1 & Site Report to:
Bridge Office Files Section - (Mr. S. McCombie)

c.c. and 2 copies of Plan & Site Report to:
Mr. A. G. Stermac

NOV 27 PM 3:10

K

00362

MX DOWN NOV 27/67 305P VR

KIND 3 E A CASH DIST ENGR ATTN R J SIM

COPY TO

00363

KINR 4 J GRUSPIER RGN MAT ENGR

RE HILLAIRES ROAD UNDERPASS HWY 401 DIST 8 WP67-59 WJ67-F-110

THE FIELD WORK FOR THE ABOVE MENTIONED PROJECT WILL COMMENCE ON NOV 27/67

THIS IS FOR YOUR INFORMATION

R DEVATA MAT AND TEST DIV

FOR A G STERMAC

BB

401 & Keela Street
Downsview, Ontario

November 29, 1967

Canadian Longyear
35 Brydon Drive
Rexdale, Ontario

Dear Sirs:

This is to confirm our request of November 24, 1967 for the supply of a Diamond Drill together with all necessary equipment, as specified under the terms of our Contract Agreement, at Trenton, Ontario.

This project bears Job Number 67-F-110.

Yours truly,



M. Devata
Supervising Foundation Engineer
for: A. G. Stermac
Principal Foundation Engineer

MD:mt

cc: H. Konings
Foundation Files 110
General Files

MEMORANDUM

67-F-110

TO: Mr. A. G. Stermac, P. Eng.,
Principal Foundation Engineer,
Laboratory Building,
Downsview, Ontario.

FROM: Bridge Division,
Kingston, Ontario.

DATE: February 6, 1968.

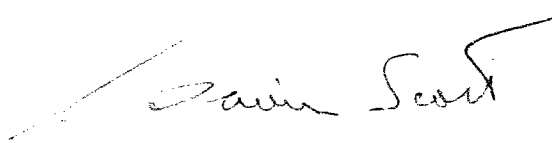
OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 67-59, Site 11-150, Proposed Crossing at
St. Hilaire Road, Highway 401, District 8

Attached herewith please find copy of Plan E-3766-1 as revised January 1968. You will please note that, whilst the physical location of the proposed structure is in accordance with our original proposal for your foundation investigation, there has been a modification to the chainage. As your Drawing No. 67-F-110A will appear in the contract documents as Bridge Drawing D-6438-2, we would be pleased if you will make the necessary revisions to the chronoflex.

Please note that there appears to be some difference of opinion as to the proper name. It is our belief that Engineering Surveys have made a reasonable research of the name and that it should be spelled with one "l", as shown in our subject heading.



Gavin Scott, P. Eng.
Regional Bridge Location Engineer

GS/hl
Encl.
c.c. (no encl.)
Mr. W. Lin
Bridge Office Files Section

2	351.5	15 + 58	20.5' LT.
4	351.2	14 + 41	21.5' RT.
5	351.4	13 + 95	23.5' LT.

- 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.

*Note Change has been
reversed by Eng. Survey*

REVISIONS			DESCRIPTION
	DATE	BY	

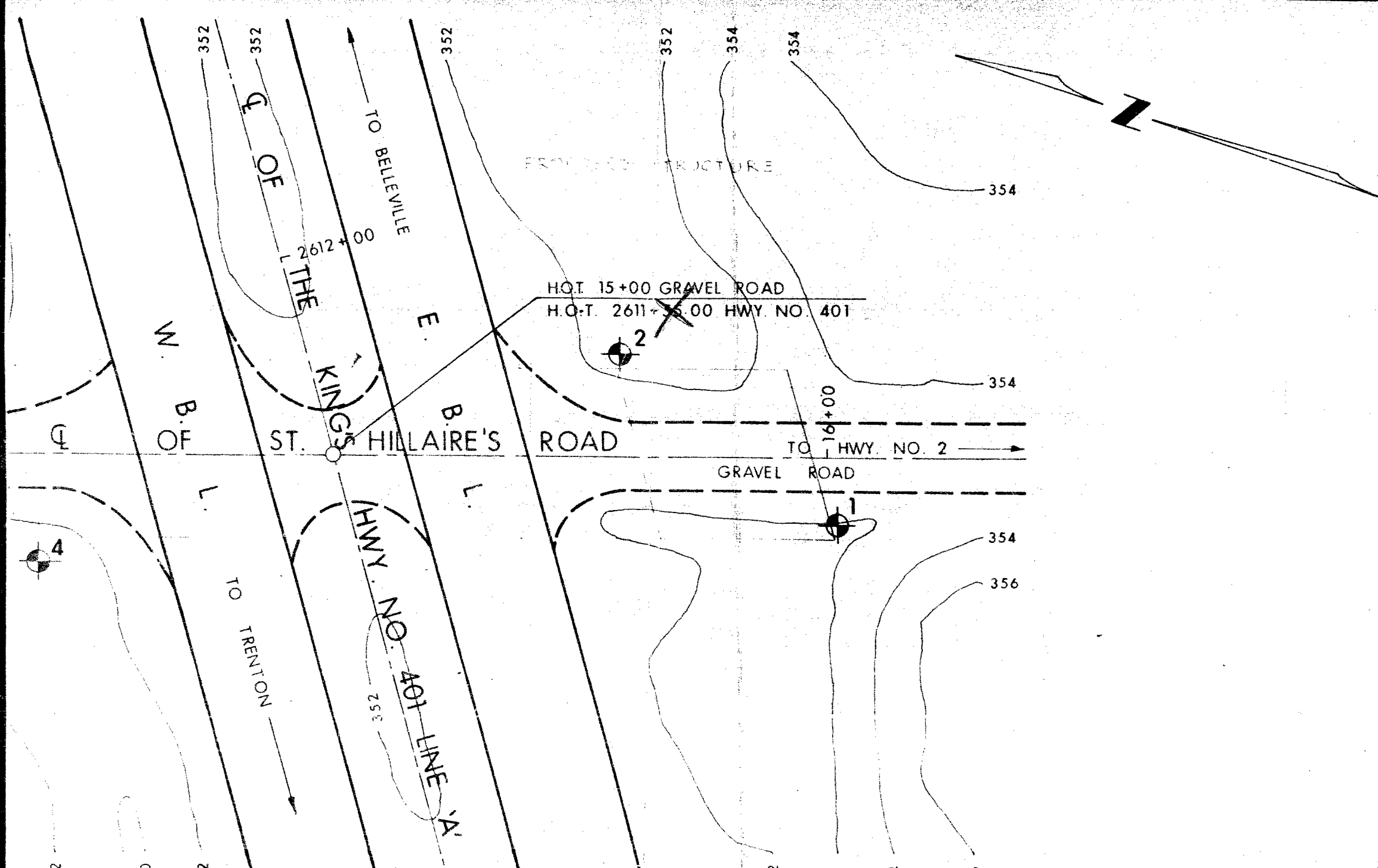
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

ST. HILAIRE'S ROAD
(ROAD ALLOWANCE BETWEEN LOTS 6 & 7)

KING'S HIGHWAY NO. 401 DIST. NO. 8
CO. HASTINGS
TWP. SIDNEY LOT 6 & 7 CON. 11

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D. W. H.	CHECKED <input checked="" type="checkbox"/>	W.P. NO. <u>67 - 59</u>	M & T. DRAWING NO.
DRAWN G. P.	CHECKED <input checked="" type="checkbox"/>	JOB NO. <u>67 - F - 110</u>	67 - F - 110A
DATE <u>16 JAN. 1968</u>	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <i>A. J. Thomas</i> PRINCIPAL FOUNDATION ENGINEER		CONT. NO.	



Mr. E. E. Davis,
Bridge Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

February 15, 1968

FOUNDATION INVESTIGATION REPORT
St. Hilaire Road
(Road Allowance Between Lots 6 & 7)
Twp. of Silney, Co. of Hastings
District No. 9 (Kingston)
N.J. 67-P-110 -- N.P. 67-59

REVISIONS -

1. Bore Log Sheets (No's 1, 2, 4, and 5)
2. Drawing No. 67-P-110A

Prior to inserting the attached, revised logs and drawing in your copy(s) of the above mentioned report, would you kindly delete and destroy the existing ones.

Thank you.

ED/nde?
Attech.

cc: Messrs. E. E. Davis (2)
E. A. Tregaskes
D. W. Warren
D. J. Markiewicz
E. A. Cash
G. Scott
J. E. Graspier
S. A. Singh

Foundations Files ✓
Gen. Files

M. Davata
M. Davata,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Sternac,
PRINCIPAL FOUNDATION ENGR.

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. G. Scott,
Reg. Bridge Location Engineer,
Kingston Regional Office,
Kingston, Ontario

Bridge Division,
Downsview, Ontario

February 27, 1968

St. Hilaire Road Underpass
2.6 Miles East of Hwy. 33
W.P. 67-59, Site 11-150
Highway 401, District No. 8

Attached herewith are prints of the Preliminary Bridge Plan
Drawing D-6438-P for the above-mentioned structure.

The estimated cost of the proposed structure is \$90,000.
This cost includes tender, materials, engineering and sundry
construction.

Any comments or revisions you may have should be submitted
within three weeks.

CSG:rd

C.S. Grabaki,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

afp

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

March 14, 1968

St. Hilaire Road Underpass
W.P. 67-~~F~~-59 - Site 11-150
Highway #401 -
District No. 8 (Kingston)

67-F-110

We have reviewed your Preliminary Bridge Plan Drawing D-6438-P for the above named structure, and submit the following comment:

The piles for the bridge abutments appear to terminate at different elevations than those indicated in our Foundation Report No. 67-F-110. The abutment piles should be driven to approximate Elev. 335 for the north abutment and Elev. 329 for the south abutment.

MD/mdeP

cc: Messrs. S. McCombie
G. Scott

M. Devata
M. Devata,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

Foundations Files
Gen. Files