DEPARTMENT OF HIGHWAYS ONTARIO

28-62-137.

MEMORANDUM

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

Attention: Mr. G. McCombie

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

Date: October 29, 1965

Our File Ref.

In reply to

NOV 24 1965

Subject:

FOUNDATION INVESTIGATION REPORT
For
Proposed New Structure at Relocated Hwy. #2 (Line 'B') and Soper Creek - West Branch, Co. of Durham, Twp. of Bowmanville, District #7 (Port Hope).
W.J. 65-F-102 -- W.P. 14-64-2

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

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

A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

AGS/MdeF
Attach.

c.c: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
D. F. Collins
T. J. Kovich
A. Watt

Foundations Office
Gen. Files

TABLE OF CONTENTS

FOUNDATION INVESTIGATION REPORT
For
Proposed New Structure at Relocated Hwy. #2 (Line 'B') and Soper Creek - West Branch, Co. of Durham, Twp. of Bowmanville, District #7 (Port Hope).
W.J. 65-F-102 -- W.P. 14-64-2

1. INTRODUCTION:

A request was received from Mr. J. B. Curtis, Regional Bridge Location Engineer, in a memo dated September 21, 1965, for a foundation investigation to be carried out at the new structure site where Hwy. #2 (Line 'B') crosses Soper Creek - West Branch.

In order to determine the soil properties and decide on the type of foundations, an investigation was carried out by this Section. Results of this investigation, together with discussion and recommendations for the foundation design, are reported herein.

2. DESCRIPTION OF SITE AND GEOLOGY:

The above site is located at the West limits of Bowmanville in the County of Durham, Township of Bowmanville. At this location the Soper Creek flows in a north to south direction. At the time of the investigation, the creek level was very low and the volume of flow was small. In general, the surrounding area is under cultivation with field crops. Physiographically, the site is located in the "Iroquois Plain".

cont'd. /2 ...

3. DESCRIPTION OF FIELD AND LABORATORY WORK:

Field work consisted of 4 sampled boreholes and 4 dynamic cone penetration tests. The borings were carried out by means of conventional diamond drilling equipment adapted for soil sampling purposes.

Samples were recovered by means of a 2" O.D. split-spoon sampler at required depths. The dimensions of the split-spoon sampler and the energy used in driving it, conform to the requirements of the Standard Penetration test. A dynamic cone penetration test was carried out adjacent to each borehole. Driving energy to advance the 2-inch cone was 350 ft.-lbs. per blow.

The locations and elevations of all boreholes are shown on Dwg. No. 65-F-102A, which accompanies this report.

Samples were visually examined and identified in the field as well as in the laboratory. Tests were carried out in the laboratory, on a selection of samples to determine:

i) Natural Moisture Contents

ii) Atterberg Limits

iii) Organic Contents

iv) Grain Size Distributions

Laboratory and field test results have been summarized and are included under Appendix I of this report.

All elevations in the report are referred to the geodetic datum and were supplied by Department Engineering Surveys (Central Region).

cont'd. /3 ...

4. SUBSOIL CONDITIONS:

4.1) General:

Subsoil at the site consists of clayey silt and glacial till overlying sound limestone bedrock. Detailed descriptions of the various soil types encountered are given on the Borelog sheets contained in the Appendix of this report. The estimated stratigraphical profile on Dwg. No. 65-F-102A, is based on this information. From ground level downward, the description of soil types are as follows:

4.2) Clayey Silt:

This deposit was observed in all the boreholes immediately below a 6" layer of topsoil, except in B.H. #4 where this deposit is overlain by a 5-ft. thick loose sand stratum with some silt and gravel. The maximum observed depth was 15 ft. in B.H. #2, the minimum being 4 ft. in B.H. #4. The deposit consists generally of clayey silt with sand and occasional gravel. 'N' values determined from Standard Penetration Tests, gave values ranging from 4 to 27 blows/ft., indicating a firm to very stiff consistency.

Physical properties of the deposit, as determined from laboratory tests, are summarized below:

Liquid Limit	(W_L %)	--	20% - 34%
Plastic Limit	(W_P %)	--	12% - 20%
Moisture Content	(W %)	--	12% - 27%

cont'd. /4 ...

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

4.3) Glacial Till (Clayey Silt, Sand and Gravel or Silt with Sand and Gravel):

This deposit underlies the clayey silt over the entire site area, and was found to extend down to limestone bedrock. The upper boundary was established between elev. 256 and elev. 258. The material consists of a heterogeneous mixture of clay, silt, sand and gravel, in varied proportions. Where the clay content is high, the mixture is generally of a cohesive nature and elsewhere, the mixture is essentially of a granular nature. 'N' values, as determined from Standard Penetration Tests, ranged from 17 to 100 blows/3", indicating the deposit to be very dense or hard.

4.4) Bedrock:

Sound limestone bedrock was established by drilling 5 ft. of rock core in B.H. #1, 3 & 4, while at B.H. #2, its surface was assumed to be at the refusal depth of the BX casing.

The bedrock was contacted between elev. 250 and elev. 246, which is some 17 to 26 ft. below ground surface.

5. GROUND WATER CONDITIONS:

Observations carried out during the time of the field investigation, indicate that the ground water level is approximately 2 to 6 ft. below ground surface, or between about elev. 264 and elev. 266. Artesian water conditions were not observed in any of the boreholes during the time of the field investigation.

The water level of Soper Creek (West Branch) was at elev. 266, which corresponds to the water levels observed in the boreholes.

cont'd. /5 ...

6. DISCUSSION AND RECOMMENDATIONS:

It is proposed to construct a 75-ft. single-span structure where the relocated Hwy. #2 (Line 'B') crosses Soper Creek - West Branch. The new structure will replace the existing structure located some 50 ft. north of the proposed one.

Subsoil at the site generally consists of 9 to 15 ft. of firm to very stiff clayey silt followed by 8 to 12 ft. of glacial deposit underlain by limestone bedrock. The bedrock was encountered between elev. 250 and elev. 246.

Recommendations for the proposals are as follows:

Structure Foundations -

The invert elevation of the realigned creek will be at approximate elev. 265.0. In order to have adequate frost protection, the footings should be located at or below elev. 260.0. Since the glacial till deposit is encountered between elev. 256 and elev. 258; the proposed footings for the single-span structure should, therefore, be founded within this deposit. An allowable bearing pressure of 3 t.s.f. may be used in the design of the footings when founded on the glacial till deposit.

A dewatering scheme will be necessary, since excavations for footings will be carried out below creek water level.

As an alternative, the structure may be supported on bored-in concrete caissons founded on limestone bedrock. For example, a 30" Ø concrete caisson could provide a design load of 200 tons.

cont'd. /6 ...

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

Approach Fills -

The proposed grade of relocated Hwy. #2 (Line 'B') will be at approximate elev. 276.0. In most cases, the fill height will be in the order of 10 ft. No stability problems are anticipated for standard 2:1 side slopes.

Precautions should be taken to protect the creek banks and the approach fills from scour action of the creek. This may be achieved by suitably placed rip-rap.

7. SUMMARY:

A single-span structure is proposed at the crossing of relocated Hwy. #2 (Line 'B') and Soper Creek - West Branch.

The subsoil at the site generally consists of deposits of clayey silt, glacial till and limestone bedrock.

The proposed structure can be supported on spread footings in the glacial till stratum with a safe bearing pressure of 3 t.s.f. As an alternative, the structure may be supported on concrete caissons. Design loads up to 200 tons may be used for 30" Ø caissons, as discussed in "Discussion and Recommendations".

No stability problems are anticipated for standard 2:1 slopes.

8. MISCELLANEOUS:

The field work, performed during the period September 22 to September 30, 1965, together with the preparation of this report, was undertaken by Mr. V. Korlu, Project Foundation Engineer. The investigation was carried out under the supervision of Mr. M. Devata, Senior Foundation Engineer, who also reviewed the report.

cont'd. /7 ...

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

Equipment used, was owned and operated by Canadian Longyear, Ltd.

Oct. 1965

APPENDIX I

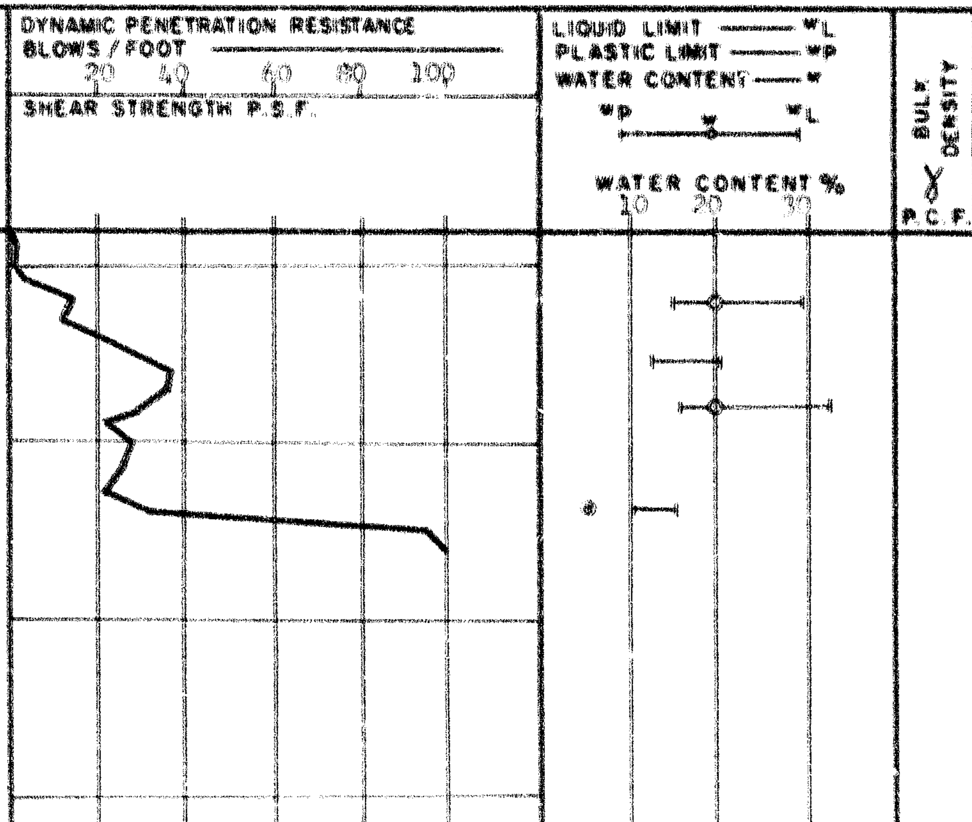
DEPARTMENT OF HIGHWAYS – ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

JOB 65-F-102 | LOCATION Hwy #2 & Soper Creek (West Branch) Sta. 393+00 (22' Rt. of ℄) | ORIGINATED BY V.K.
W.P. 16-64-2 | BORING DATE Sept. 22, 1965. | COMPILED BY L.T. & M.A.
DATUM | BOREHOLE TYPE Wash-boring | CHECKED BY K.D.

ELEV. / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	REMARKS
272.0						
0.0	Clayey silt with traces of sand and gravel - oxidized brown stiff to v. stiff.				270	
		1	SS	13		
		2	SS	29		▼ 265.5 / 6.5
		3	SS	11	260	
258.0 / 14.0	(Clayey silt with sand and gravel)	4	SS	112		
	Glacial Till (Silt with sand and gravel) V. dense.	5	SS	105/6"	250	
246.0		6	SS	100/4"		
26.0	Sound Bedrock - Limestone	7	RC	100% Recovery		
241.0	(8 x 1)				240	
31.0	End of borehole.					



FORM OB-MI-126 (FORMERLY OB-ML-126)
65-1931

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

JOB 65-F-102 LOCATION Hwy 2 & Soper Crk (West Branch) Sta. 393+00 (21' Lt. of ℄) ORIGINATED BY V.L.

W.P. 16-64-2 BORING DATE Sept. 24, 1965. COMPILED BY L.J. & N.D.

DATUM ____ BOREHOLE TYPE Wash-boring. CHECKED BY N.D. Orr

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS / FOOT	ELEV SCALE
271.5						270
0	Clayey silt with traces of sand - oxidized Brown Firm to v. stiff.		1	SS	14	
			2	SS	22	
			3	SS	5	260
256.5						
15.0	Glacial Till (Clayey silt with sand and gravel changing to silt with sand gravel at bl.		4	SS	36	
			5	SS	75	250
247.5	Dense. 24.0		6	SS	100/3"	
24.0	End of Borehole - Probable Bedrock.					240

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT 20 40 60 80 100
SHEAR STRENGTH P.S.F.

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
w_P w w_L
WATER CONTENT % 10 20 30

BULK DENSITY P.C.F.

REMARKS

Water 265.5 6.0

FORM 08-MT-126 (FORMERLY 08-ML-124)
65-1831

OFFICE REPORT ON SOIL ...

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

JOB 65-F-102
W.P. 14-64-2
DATUM

LOCATION Hwy 2 & Soper Crk (West Branch) Sta. 392+30 (16' Rt. of ℄)
BORING DATE Sept. 27, 1965.
BOREHOLE TYPE Wash-boring.

ORIGINATED BY V.K.
COMPILED BY L.T. & M.D.
CHECKED BY M.D.

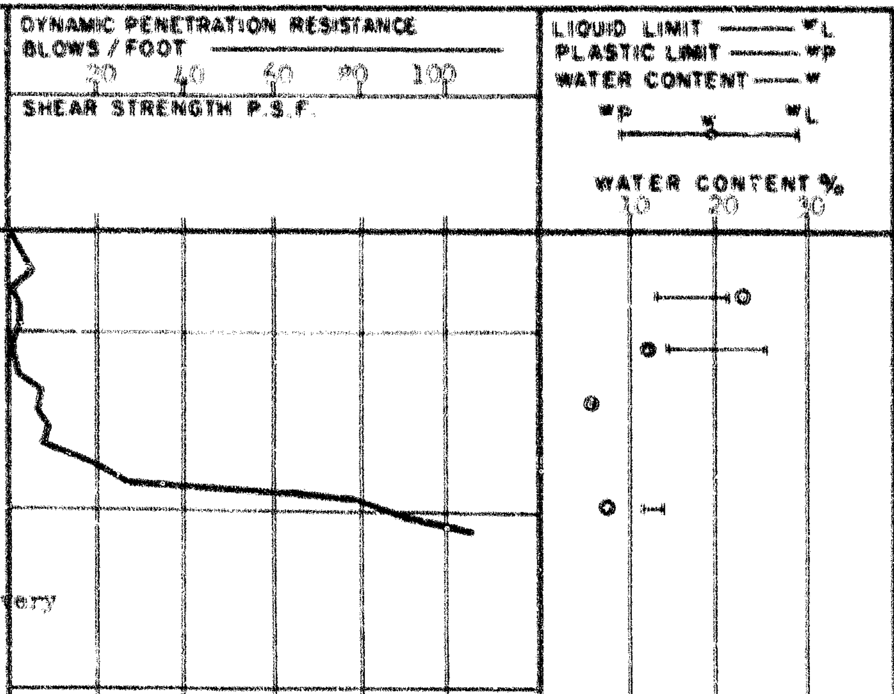
ELEV / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLE NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	REMARKS
265.7							
0.0	Clayey silt with traces of sand grey-brown. Firm to stiff.		1	SS	3	260	W.L. 264.2 1.5
			2	SS	14		
256.7 / 9.0	Glacial till (Silt with sand and gravel changing to clayey silt, sand & gravel (El 251.0)		3	SS	38		
			4	SS	55	250	
247.7 / 18.0	Sound limestone - (B x L) Bedrock		5	RC	100% Recovery		
242.7 / 23.0	End of Borehole.					240	

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT
SHEAR STRENGTH P.S.F.

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w

WATER CONTENT %

BULK DENSITY γ P.C.F.



FORM DB-MI-124 (FORMERLY DB-ML-124)
65-1831

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 65-F-102 LOCATION Hwy 2 & Soper Creek (East Branch) Sta. 392/30 (24' Lt. of ℄) ORIGINATED BY V.K.

W.P. 14-64-2 BORING DATE Sept. 29, 1965. COMPILED BY J.J. & M.D.

DATUM ____ BOREHOLE TYPE Cash-boring. CHECKED BY M.D.

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS / FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (20 40 60 80 100) / SHEAR STRENGTH P.S.F.	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w — WATER CONTENT % (10 20 30)	BULK DENSITY γ P.C.F.	REMARKS
262.2 0.0	Sand with some silt and gravel, loose		1	SS	4					W.L. 265.2 2.0
257.2 5.0	Clayey silt with sand - Brown Firm		2	SS	4	260				
9.0	Glacial Till (Clayey silt with sand and gravel - Grey)		3	SS	12					
250.2			4	SS	72	250				
17.0 245.2	Sound Limestone Bedrock (8 x 1)		5	RC	100% Recovery					
22.0	End of borehole.					240				

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 :-

CONSISTENCY	'N' BLOWS / FT.	c LB. / SQ FT.	DENSENESS	'N' BLOWS / FT.
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		

D M SAMPLE ADVANCED HYDRAULICALLY

P M SAMPLE ADVANCED MANUALLY

SOIL TESTS

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

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

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

IN TERMS OF EFFECTIVE STRESS $\tau_f = c' + \sigma' \tan\phi'$

c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION

IN TERMS OF TOTAL STRESS $\tau_f = c_a + \sigma \tan\phi$

c_a	APPARENT COHESION
ϕ_a	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION

μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

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

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ε	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNGS 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_o	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

Mr. W. S. Kellnyshyn,
Regional Bridge Location Engr.,
Central Region (Toronto),
Admin. Bldg.

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

September 1, 1966

1) Soper Creek Bridge (West Branch) -
Hwy. #2, Dist. #7, W.P. 14-64-2, W.J. 65-F-102.

2) Soper Creek Bridge (East Branch) -
Hwy. #2, Dist. #7, W.P. 14-64-1, W.J. 65-F-103.

We have reviewed the preliminary drawings (D-5866-F1 and D-5867-F1) for the above mentioned structures and submit the following comments:

1) The footing formation level appears to be somewhat higher than the upper boundary of the glacial till stratum. Our foundation report indicates that the proposed footings should be founded within the glacial till stratum.

2) Borings were put down at either end of the footing locations, and some slight variations in elevation of the upper boundary of the glacial till stratum can be anticipated during construction. In view of this, it would be advisable whenever some doubt exists, to have the footing excavations inspected by the Foundation Section prior to pouring the concrete. Provision should also be made in the contract for deepening the foundations slightly, should this prove to be necessary.

3) A dewatering scheme will be necessary since excavations for the footings will be carried out below creek water level.

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

MD/MdeF

cc: Foundations Office
Gen. Files

65-F-102

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107,
Lab. Bldg.

From: Bridge Division,
Downsview, Ontario.

Date: August 25, 1966.

Our File Ref.

In reply to

Subject: W.P. 14-64-2,
Site 21-170,
Soper Creek Bridge,
(West Branch)
Highway No. 2 District No. 7.

We are sending to you herewith one print of Preliminary Plan D-5866 P1 of the above structure.

Would you please let us have your written comments.

NZ/ax

N. Zoltay,
for W. Melinyshyn,
Regional Bridge Location Engineer.

65-F-102

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Bldg.

Atten: M. Devata

From: Bridge Division,
Downsview, Ontario.

Date: September 21, 1965.

Our File Ref.

In reply to

Subject: W.P. 14-64-2, Site 21-170,
Soper Creek West Branch,
Hwy. No. 2, District No. 7.

This will confirm having given you one print of drawing E 4715-1 showing the proposed location of the footings for the above structure.

Please arrange to have a foundation investigation carried out.

Dept J Walsh

JFW/ag
c.c. R. Forrest

J. F. Walshe,
for J. B. Curtis,
Regional Bridge Location Engineer.

Completion Dec 15 1965.

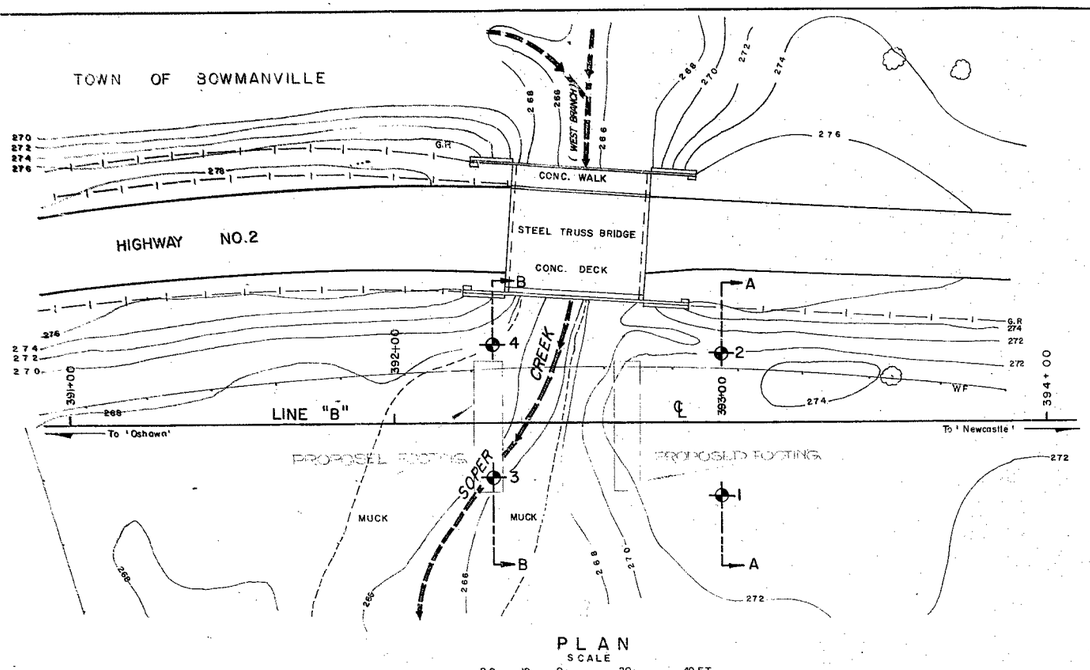
65-F-102

W.P. # 14-64-2

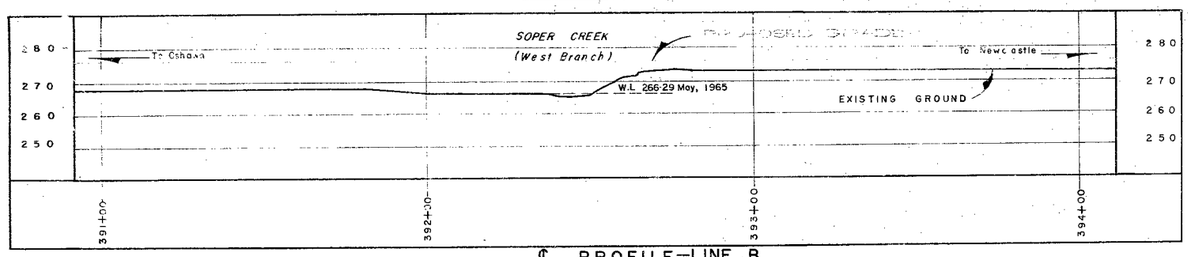
Hwy. # 2

SOPER CREEK

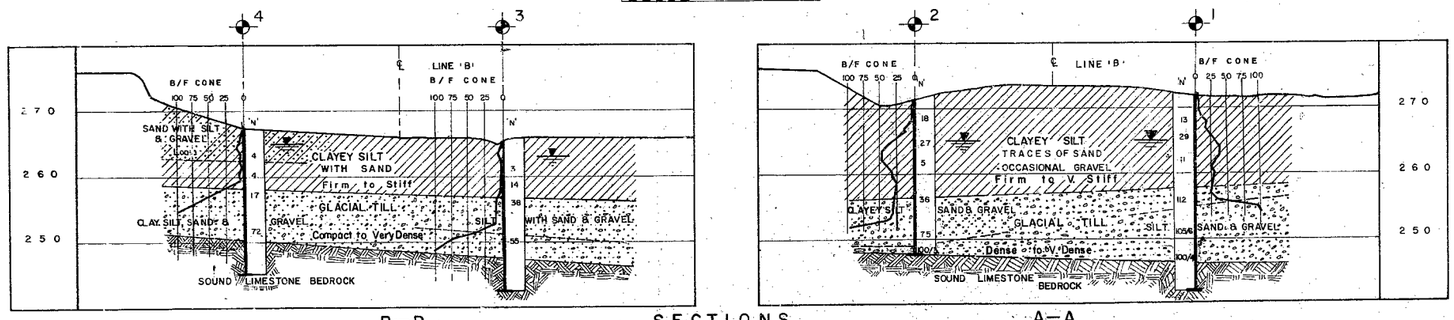
(WEST BRANCH)



PLAN
SCALE
20 10 0 20 40 FT



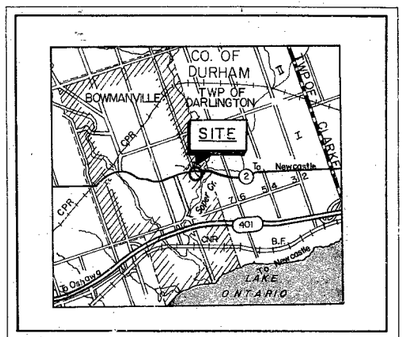
℄ PROFILE—LINE B
SCALE
20 10 0 20 40 FT



B—B A—A

SECTIONS
SCALE
10 5 0 10 20 FT

REF. No. E-4715-1



KEY PLAN
SCALE IN MILES
1 0.5 0 1 2 3

LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation. SEPT. 1965

NO.	ELEVATION	STATION	OFFSET
1	272.0	393+00	22' RT
2	271.5	393+00	21' LT
3	265.7	392+30	16' RT
4	267.2	392+30	24' 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.

PRINT RECORD		
NO	FOR	DATE

REVISIONS		
DATE	BY	DESCRIPTION

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

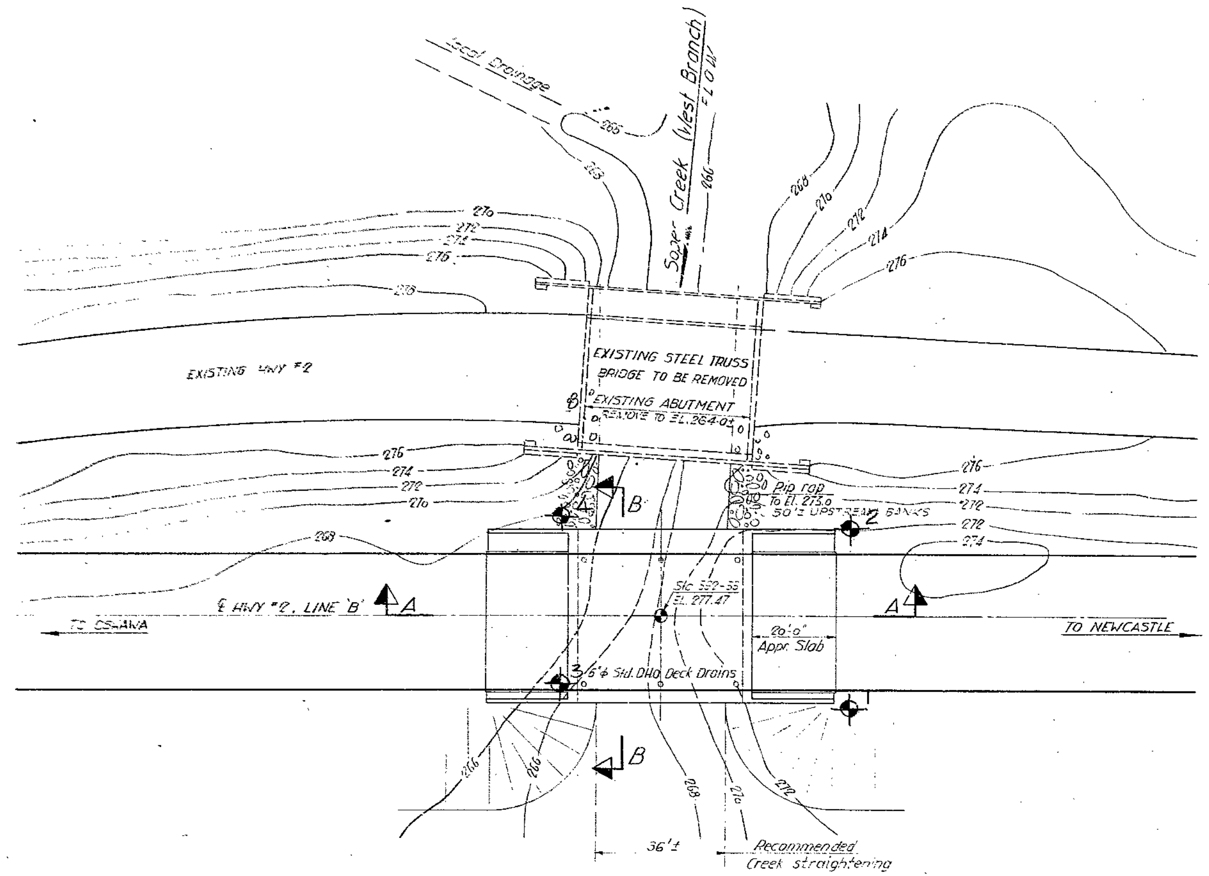
SOPER CREEK (WEST BRANCH)

KING'S HIGHWAY NO. 2 LINE 'B' DIST. NO. 7
CO. DURHAM TOWN OF BOWMANVILLE
TWP. LOT CON.

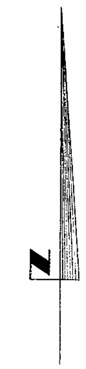
BORE HOLE LOCATIONS & SOIL STRATA

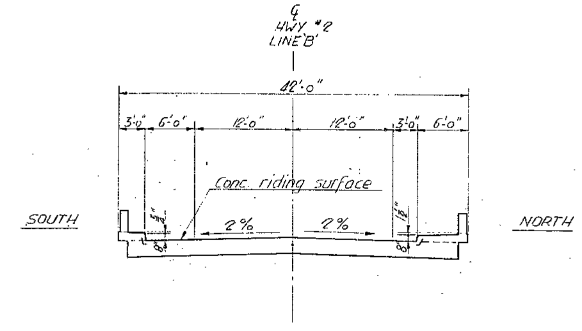
SUBM'D. V.K.	CHECKED V.K.	W.P. NO. 14-64-2	M.B.T. DRAWING NO. 65-F-102 A
DRAWN J.N.	CHECKED A.K.	JOB NO. 65-F-102	
DATE 16 NOV. 1965		SITE NO.	BRIDGE DRAWING NO.
APPROVED A.D. Crossman PRINCIPAL FOUNDATION ENGINEER		CONT. NO.	

687350 E
4864600 N
30M15

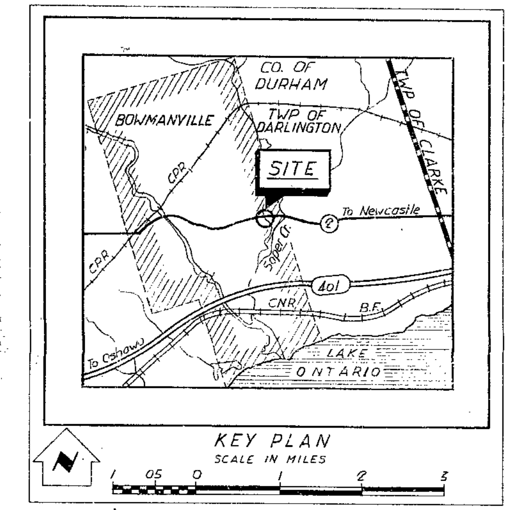


PLAN
SCALE: 1" = 20'-0"

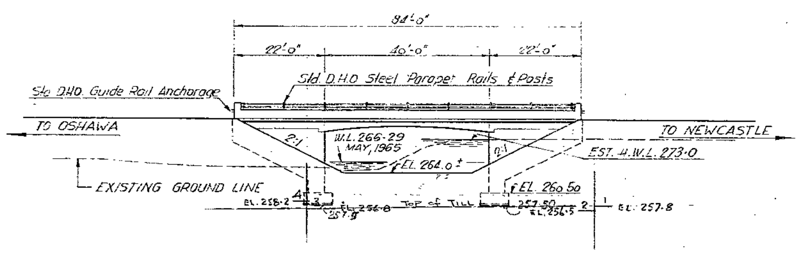




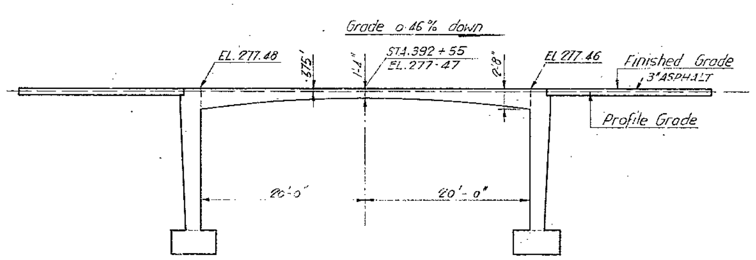
SECTION B-B
SCALE: 1" = 10'-0"



KEY PLAN
SCALE IN MILES



ELEVATION
SCALE: 1" = 20'-0"



SECTION A-A
GRADE PROFILE @ ℄ HWY #2 (LINE 'B')
SCALE 1" = 10'-0"

B.M. Elev. 270.96
Geodetic Datum
N. & W. in W. Root of 3.0 Willow
446.0 Lt. of Sta. 392+20

PRINT RECORD		
No.	FOR	DATE

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

SOPER CREEK BRIDGE (WEST BRANCH)
0.3 MI. WEST OF BOWMANVILLE EAST LIMITS

KING'S HIGHWAY — DIST. No. 7
CO. DURHAM — TOWN OF BOWMANVILLE
~~TWP.~~ — LOT — CON.

PRELIMINARY

APPROVED ______ BRIDGE ENGINEER				SITE No. 21-670	W.P. No. 14-64-2
DESIGN		CHECK		CONTRACT Nos.	
DRAWING	7K.	CHECK	A.R.	DRAWING No.	D-5866-P1
DATE	AUG./66	LOADING	HS20-44		