

66-F-99

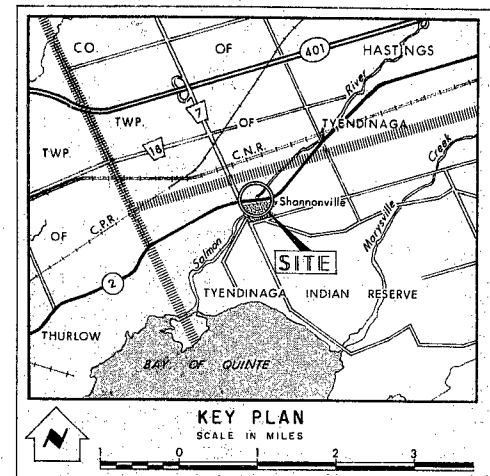
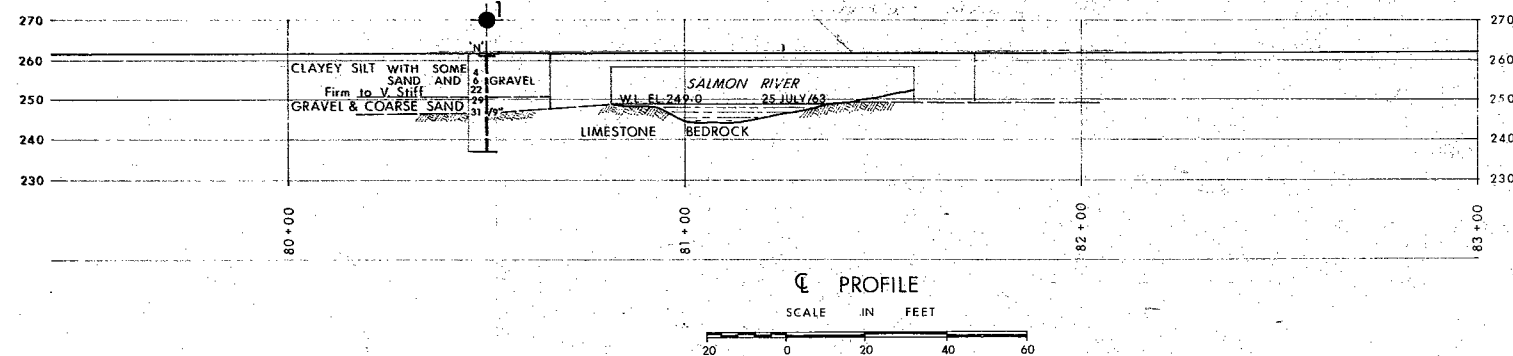
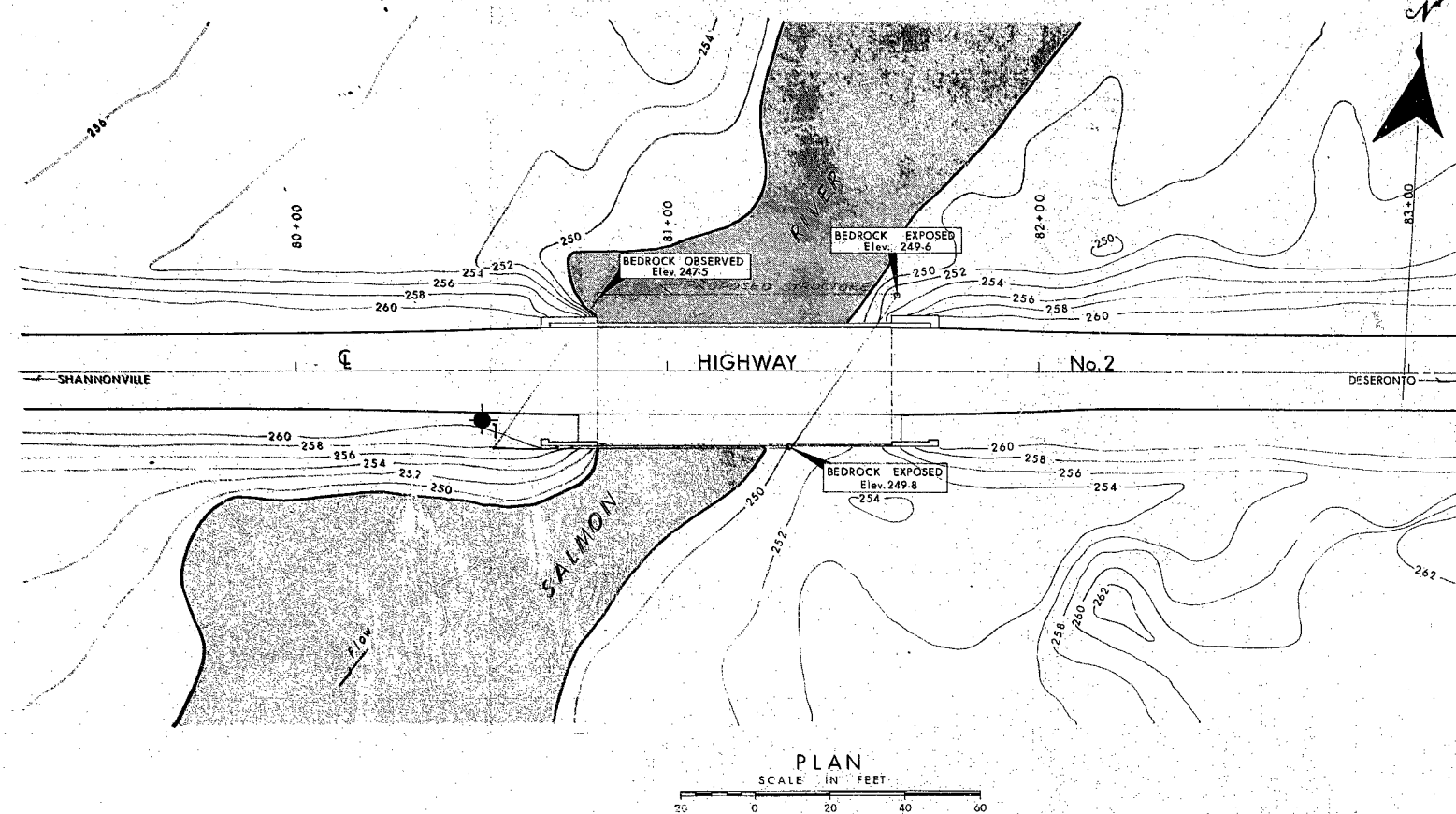
W.P. # 164-65

Hwy. # 2

CROSSING

SALMON

RIVER



LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation.		
NO.	ELEVATION	STATION	OFFSET
1	261.3'	80+50	13' 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

DEPARTMENT OF HIGHWAYS - ONTARIO			
MATERIALS & TESTING DIVISION - FOUNDATION SECTION			
SALMON RIVER			
KING'S HIGHWAY NO. 2		DIST. NO. 8	
CO. HASTINGS		TYENDINAGA IND. RES.	
TWP. TYENDINAGA		LOT 6 CON. 1S	
BOREHOLE LOCATION &		SOIL STRATA	
SUBM'D. A.M.S. CHECKED <i>[initials]</i>	W.P. NO. 164-65	M.B.T. DRAWING NO.	
DRAWN: DM CHECKED <i>[initials]</i>	JOB NO. 66-F-99	66-F-99A	
DATE: 6 DEC. 1966	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <i>[signature]</i> PRINCIPAL FOUNDATION ENGINEER		CONT. NO.	

REF. No. E-4224-1

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

23-68-55

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

Attention: Mr. S. McCombie

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

DATE: December 5, 1966

OUR FILE REF.

IN REPLY TO:

DEC 14 1966

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For

Proposed New Structure at Crossing
of Salmon River and Hwy. #2, County
of Hastings - District #8 (Kingston).

W.J. 66-F-99 -- W.P. 164-65

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

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

AGS/MdeF
Attach.

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

Foundations Office
Gen. Files ✓

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

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1. INTRODUCTION.
 2. DESCRIPTION OF SITE.
 3. FIELD WORK.
 4. DISCUSSION AND RECOMMENDATIONS.
 5. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT
For
Proposed New Structure at Crossing
of Salmon River and Hwy. #2, County
of Hastings - District #8 (Kingston).
W.J. 66-F-99 -- W.P. 164-65

1. INTRODUCTION:

The Foundation Section was requested to carry out a foundation investigation at the above site. The request was contained in a memorandum dated October 26, 1966, from Mr. J. A. Fisher for Mr. G. Scott (Regional Bridge Location Engineer). An investigation was subsequently carried out to determine the subsoil conditions at the site.

2. DESCRIPTION OF SITE:

The site is located 7 miles east of Belleville at the east limit of Shannonville on Hwy. #2. The area is flat-to-undulating with bedrock visible on both banks of the river. Physiographically, this region is referred to as the 'Napanee Plain.' This is an area of limestone from which the glacier stripped most of the overburden. Grazing is the most important land use. No residential development is in the immediate vicinity of the bridge. At present, a narrow, single-span steel girder bridge serves as a crossing.

3. FIELD WORK:

Using conventional diamond drilling equipment adapted for soil sampling purposes, only one sampled borehole was drilled. Since outcrops of bedrock were visible at various points near the proposed footing locations, elevations are given at these locations and are shown on Dwg. 66-F-99A of the Appendix. Bedrock was proven for ten feet indicating a sound limestone bedrock at the one sampled borehole. This borehole was drilled through the highway fill.

cont'd. /2 ...

4. DISCUSSION AND RECOMMENDATIONS:

It is proposed to construct a new bridge at this site to replace the existing structure. No significant change of profile grade is contemplated, and the new centre-line will be coincident with the present centre-line. The length of the new structure will be about 80 feet and the maximum height of the approach is about 18 feet above the river bed.

The investigation has shown that sound bedrock at the sampled borehole is located at approximate elev. 247. Bedrock elevations at the remaining 3 footing extremities ranged from elev. 247.5 to elev. 251. It is recommended that the new structure be supported on spread footings founded on sound bedrock keyed in at least 12 inches. During construction, some variations in rock elevation may be discovered, and it may be necessary to excavate to a slightly lower elevation than those indicated on Drawing No. 66-F-99A of the Appendix. In such a case, provision for mass concrete should be made. The footings may be designed assuming a safe pressure of up to 20 tons/sq.ft.

No stability problems are anticipated.

5. MISCELLANEOUS:

Equipment was owned and operated by George Wimpey & Sons Ltd. of Toronto. The field work, performed during November 17 and 18, 1966, together with the preparation of this report, was undertaken by Mr. A. M. Seppala, Project Foundation Engineer. The investigation was carried out under the general supervision of Mr. K. G. Selby, Supervising Foundation Engineer, who also reviewed this report.

December 1966

APPENDIX I

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

JOB 66-F-99

LOCATION Sta. 80+50 on Hwy. #2 & O/S 131 Rt.

ORIGINATED BY A.M.S.

W. P. 164-65

BORING DATE November 17 & 18, 1966

COMPILED BY A.M.S.

DATUM Geodetic

BOREHOLE TYPE BX Casing & Axt. Rock Core

CHECKED BY

[illegible]

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_i	SENSITIVITY

GENERAL

π	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e \sigma$ OR $\ln \sigma$	NATURAL LOGARITHM OF σ
$\log_{10} \sigma$ OR $\log \sigma$	LOGARITHM OF σ 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 (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

66-F-99

TO: Mr. A. Stermac,
Principal Foundation Eng.,
Lab. Bldg., DOWNSVIEW.

FROM: Mr. G. Scott,
Regional Bridge Location Eng.,
KINGSTON, Ontario.

DATE: October 26, 1966.

OUR FILE REF.

IN REPLY TO:

SUBJECT: W.P. #164-65. Salmon River. Site #11-198 Hwy. #2.
District #8, Kingston

We are sending you herewith two prints of bridge site plan #E-4224-1 on which we have marked in Red a proposed location of the subject structure.

Our investigations are not complete at the time and it may be that a 45° skew will be used instead of the 35° as drawn.

The station and span length as measured on the center line of highway would remain unchanged @ 80.0 feet.

We will be pleased if you will make the necessary foundation investigation at this site and receiving your report in due course.

J. A. Fisher

J. A. Fisher
For: G. Scott
REGIONAL BRIDGE LOCATION ENGINEER.

JAF/GS/lm
c.c. S. McCombie
R. Forest

Alan.

Tony suggests that you ~~and~~ should do this job after finishing your first project. The job number is given on your drawing.

Ministry

Department of Highways Ontario

Copy for the information of
Mr. A. Stermac, Principal Foundation Engineer,
Room 107, Lab. Building

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

Bridge Division,
Downsview, Ontario

April 24, 1967

Salmon River Bridge at Shannonville
W.P. 164-65, Site No. 11-198
Highway 2, District No. 8

66-P-29

Attached herewith are prints of the Preliminary Bridge
Plan Drawing D-6135-P for the above-mentioned structure.

The estimated cost of the proposed structure is \$60,000.
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. Grebski,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac
R. Forrest
E. Cross

4/10

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

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

May 1, 1967

Salmon River Bridge at Shannonville,
W.P. 164-65, Site #11-198, Hwy. #2,
W.J. 66-F-99, District #3 (Kingston).

We have reviewed Preliminary Plan #D-6135-P
for the above mentioned structure.

We have no comments.

RGS/MdeP

A. G. Stermac

K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie
G. Scott

Foundations Files ✓
Gen. Files

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

FROM: Bridge Division,
KINGSTON, Ontario.

DATE: April 26, 1967

OUR FILE REF.

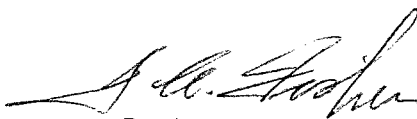
IN REPLY TO

SUBJECT:

W.P. 164-65, Site 11-198, Salmon River
Bridge (at Shannonville),
Highway 2, District 8

66-F-99

Herewith please find print of Preliminary Plan
D-6135-P. May we please have your comments.



J. A. Fisher

For: G. Scott
REGIONAL BRIDGE LOCATION ENG.

JAF/GS/hl
Enc.



Hwy. 401 & Keele St.,
Downsview, Ontario.
Tel. 248-3282
(Area Code 416)

DEPARTMENT OF HIGHWAYS
Materials and Testing Office

December 31, 1968

Birmingham Construction Ltd.,
Ft. Wellington N.,
Hamilton, Ontario.

Attention: Mr. W. Birmingham

Dear Sirs:

Please supply us with a firm quotation for carrying out the work outlined on the attached sheets.

This work will be subject to the provisions contained herein, and to the pertinent D.H.C. Standards and Specifications. Your quotation must include a time schedule.

Technical supervision of the work will be carried out by the Department's Foundation Section.

Your quotation must reach this office (Room 108, Laboratory Building) between 10:00 A.M. and 12:00 Noon on January 14, 1969.

Yours very truly,

K. G. Selby

KGS/MdeF
Attach.

K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

- Identical letter also sent to:

1. Franki (Canada) Ltd.,
Attn: A. Prior
105 Nantucket Blvd., Scarborough, Ont.
2. Western Caissons Ltd.,
Attn: P. Kozicki
46 Creditstone Rd., Maple, Ont.

PILE LOADING AND EXTRACTION TESTS AT ELGIN CO. RD. UNDERPASS
HWY. #401, TWP. ALDBOROUGH AND DUNWICH, DISTRICT #2 (LONDON)

W.P. 99-59

--

W.J. 67-P-99

GENERAL DESCRIPTION OF WORK

The work consists of the following:

(1) Supplying and fixing in position a suitable reaction beam and attaching it to four anchor piles. The four anchor piles are at present cut off at ground level and must be extended to a suitable height to obtain the necessary clearance for a hydraulic jack. The beam must be capable of withstanding a vertical load of 200 tons at the centre.

(2) Supplying and fixing in position, as required, a suitable yoke to be used in conjunction with a hydraulic jack and the reaction beam for the purpose of extraction tests on five test piles. The yoke must have a capacity of 200 tons.

(3) Preparing the tops of the five test piles which are at present cut off at ground level, so as to be suitable for application of the loads during tests. The two H-test piles must be extended to about 1 ft. above ground level and the tops ground smooth in a horizontal plane. The three tube test piles must also be extended to about 1 ft. above ground level and the extensions filled with concrete which should finally be ground smooth, together with the steel edges, in a horizontal plane.

(4) Carrying out one load and one extraction test on each of three 12-3/4-inch O.D. steel tube piles and two 12 BP @ 53 steel H-piles, as directed by the Department and, in general, according to the National Building Code of Canada.

In the case of the steel tube piles, provision must be made to measure the compression within the pile under test at the 1/4, 1/2, 3/4 and full length points during load and extraction tests, as well as the settlement of the pile. This can be achieved by placing 3/8-inch diameter rods into 3/4-inch pipes already set in the piles for this purpose. Measurements will be made between the tops of the 3/8-inch rods and the pile tops.

(4) (cont'd.) ...

The Contractor must provide a dry, heated enclosure around the entire working area whilst tests are being carried out. The Contractor must also provide sufficient personnel on site during a test to make adjustments to the testing apparatus as required by the Department, and to assist in taking readings. At least one skilled workman of the Contractor's staff must be present at all times during a test.

(5) Supplying and fixing in position all materials and equipment necessary to:

- (a) Carry out the load and extraction tests.
- (b) Extend, if necessary, the lengths of any piles in order to suitably adjust the height and level of the reaction beam and piles.
- (c) Install reference beams, gauge brackets and bearing plates for the load and extraction tests, as directed by the Department.

(6) Providing access to the site and a level, dry working area.

(7) Clearing the site at completion of work to the satisfaction of the Department.

Note: If any material or equipment supplied by the Contractor proves to be inadequate or defective, it must be replaced or modified to the satisfaction of the Department at the Contractor's expense.

MATERIALS

No materials or equipment of any kind will be supplied by the Department. All material and equipment necessary to carry out the above described work must be supplied by the Contractor.

cont'd. /3 ...

DRAWINGS

The site location and the layout of the test piles and anchor piles are shown on Drawing 67-F-99A and 67-F-99D, respectively. Subsoil stratigraphy is shown on Drawing 67-F-99C.

QUOTATION

The Contractor should submit a quotation for carrying out the work as outlined above, such quotation to include for the provision of all personnel, equipment and materials necessary to complete the work in its entirety. The quotation should be itemized as follows, and the quantities shown will be the minimum pay quantities.

1. Supply and install all equipment and materials necessary for carrying out load and extraction tests.

(Lump Sum)

2. Carry out load tests.

(Quantity - 5 ea.)

3. Carry out extraction tests.

(Quantity - 5 ea.)

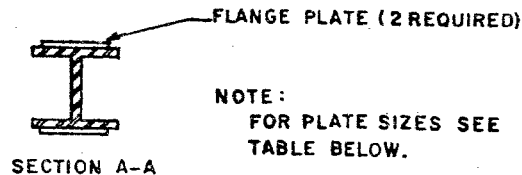
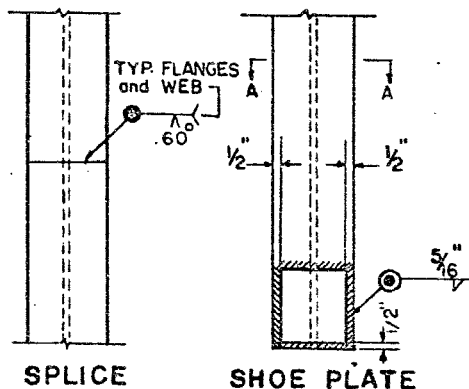
SITE

The site is located at the crossing of Elgin County Rd. #5 and Hwy. #401, some 2.5 miles east of Hwy. #76. The area is generally flat.

PILE SPLICES AND SHOES

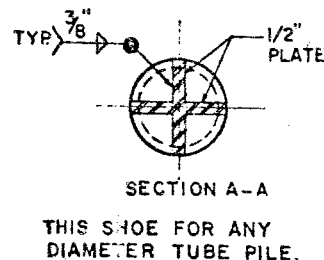
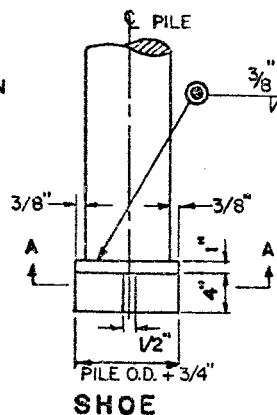
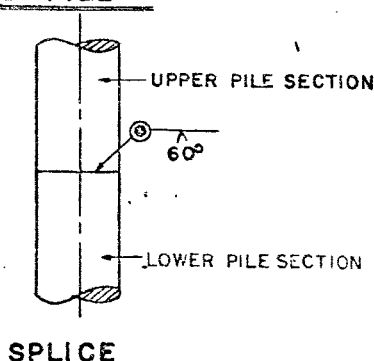
4.5.2.1.
REV. SEPT. 1963

STEEL H PILES

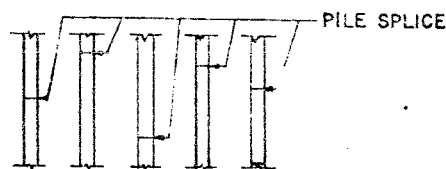
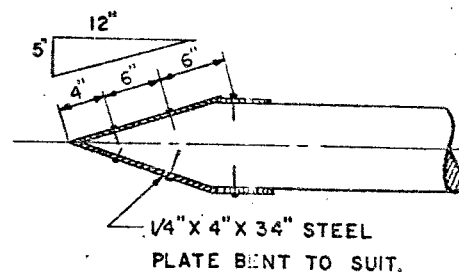
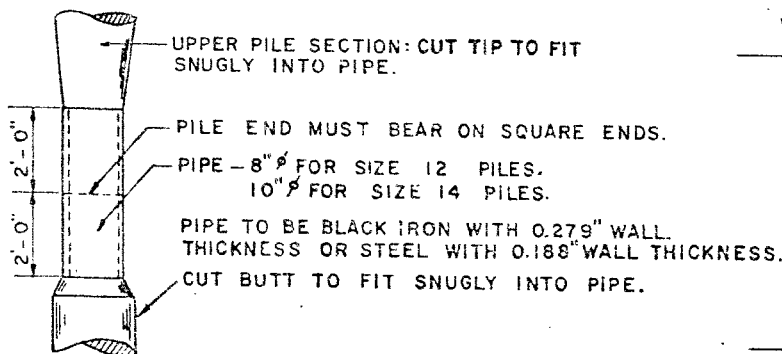


PILE	10 B.P. 42	12 B.P. 53	14 B.P. 73
FLANGE PLATES	9"X1/2"X12"	11"X1/2"X12"	13"X1/2"X12"

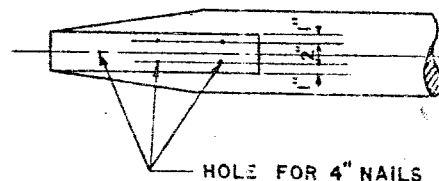
TUBE PILE

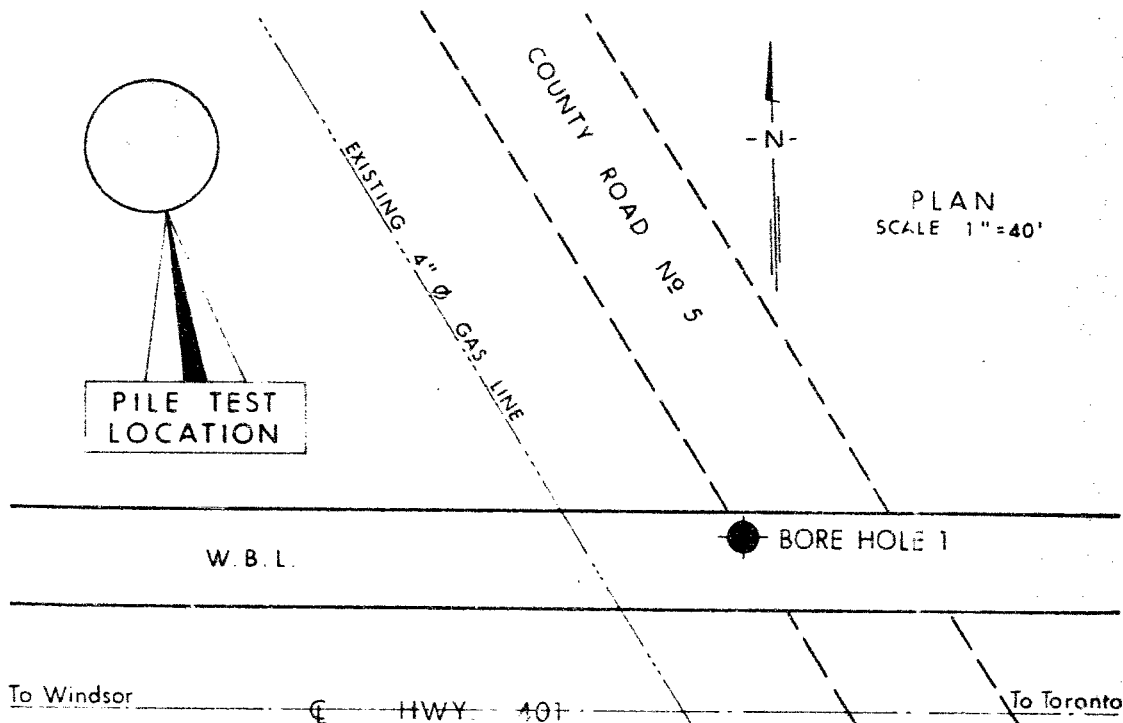
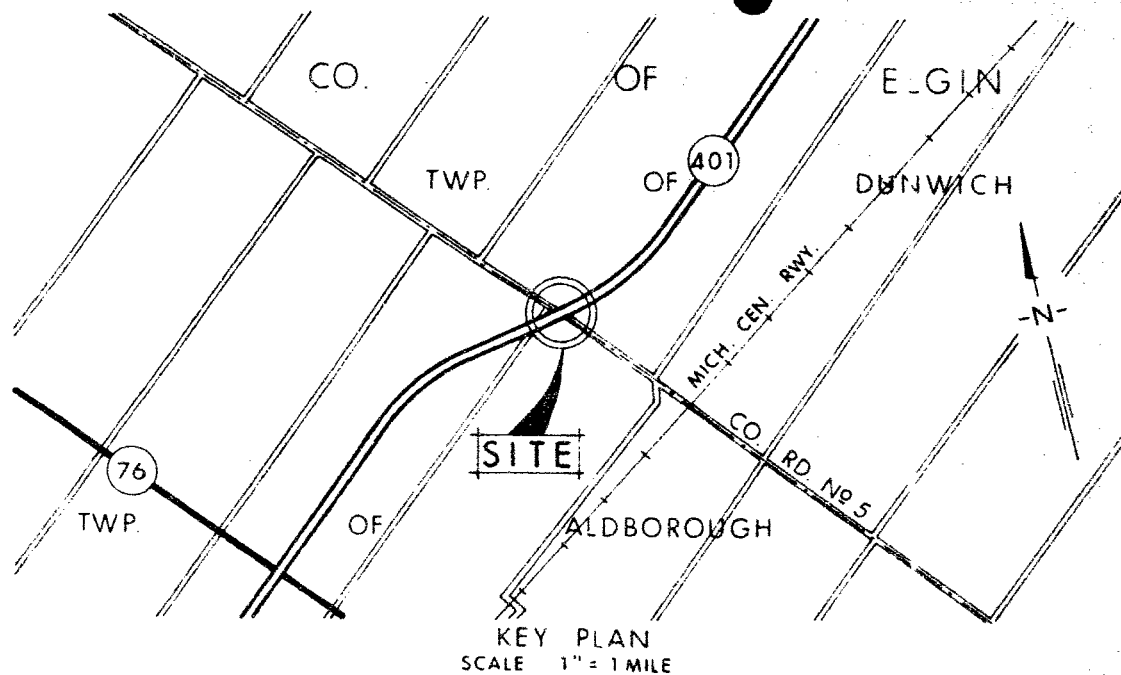


TIMBER PILES



DIAGRAMATIC SKETCH SHOWING SPLICE STAGGERING.





ONTARIO

DEPARTMENT OF HIGHWAYS
**MATERIALS and
TESTING
DIVISION**

HWY. 401 & CO. RD. No 5 **PILE TEST LOCATION**

W.P. 99-59

DIST. 2

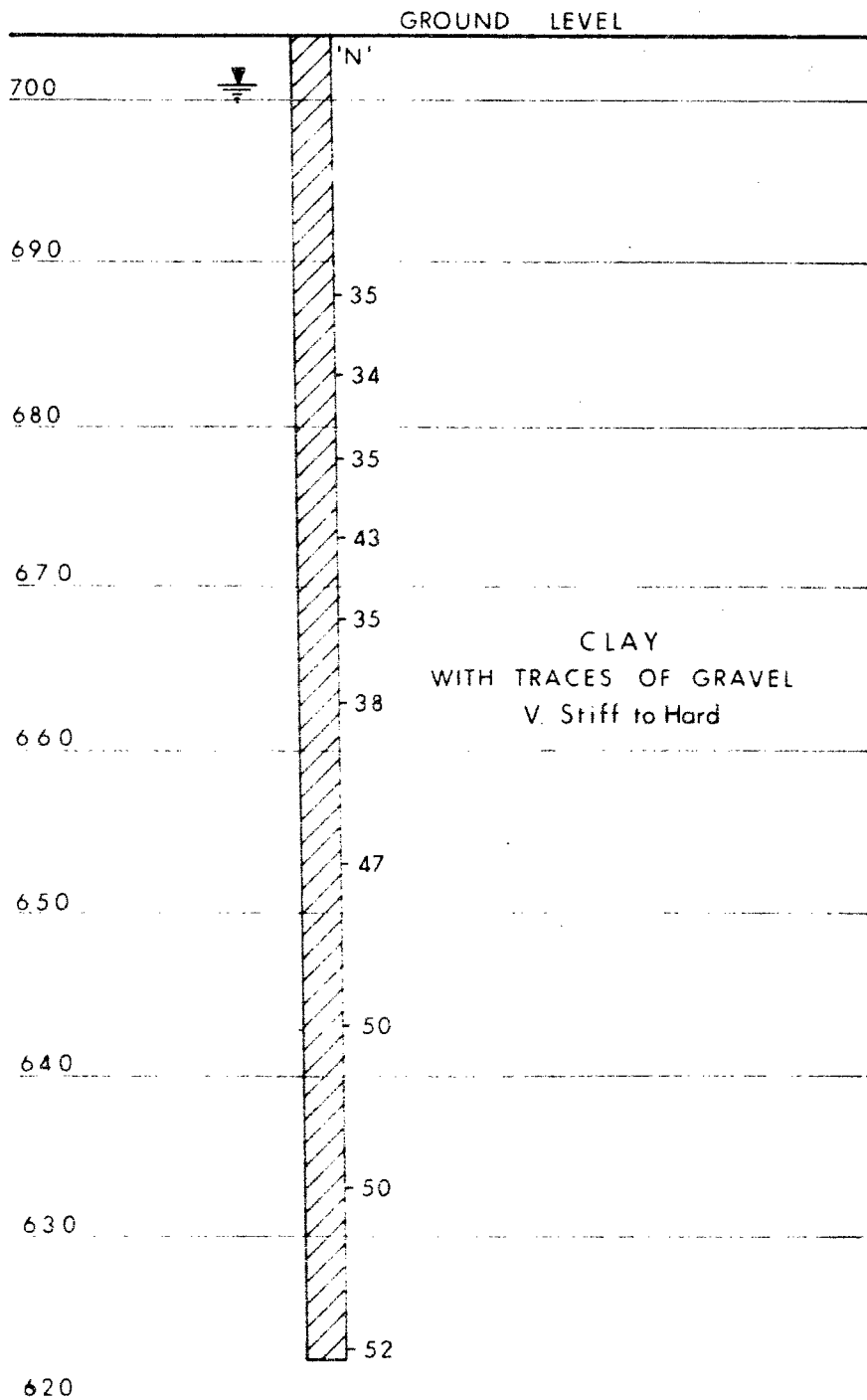
JOB 67-F-99

DATE 18 OCT. 1967

APPROVED

DRAWING NO. 67-F-99 A

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT



ONTARIO

DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

HWY. 401 & CO RD. NO. 5

SOIL STRATIGRAPHY AT B.H.1

W.P. 99-59

DIST. 2

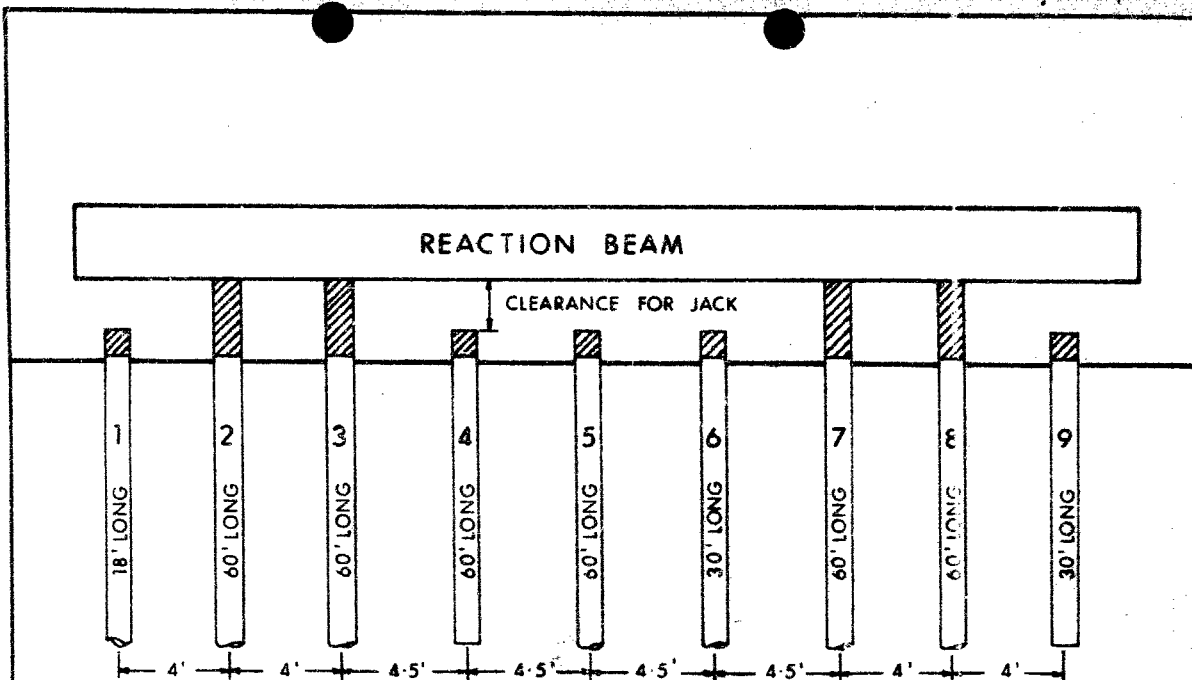
JOB. 67-F-99

DATE 18 OCT. 1967

APPROVED


[Signature]

DRAWING NO. 67-F-99C



PILE LENGTHS APPROX. ONLY

 PILE ALREADY IN PLACE

 PILE EXTENSIONS REQUIRED

TEST PILE NO. 1 - TUBULAR STEEL PILE $12\frac{3}{4}" \times 0.25"$
 " " " 4 - STEEL 'H' PILE (12 BP @ 53)
 " " " 5 - TUBULAR STEEL PILE $12\frac{3}{4}" \times 0.25"$
 " " " 6 - TUBULAR STEEL PILE $12\frac{3}{4}" \times 0.25"$
 " " " 9 - STEEL 'H' PILE (12 BP @ 53)

ANCHOR PILES 2,3,7 & 8 - TUBULAR STEEL PILES $12\frac{3}{4}" \times 0.25"$

NOTE

ORDER OF TESTING WILL BE AS DIRECTED BY THE DEPARTMENT.



DEPARTMENT OF HIGHWAYS
**MATERIALS and
 TESTING
 DIVISION**

DATE 30 DEC. 1968

W.P. 99-59

APPROVED

HWY. 401 & CO. RD. NO. 5

ARRANGEMENT OF TEST PILES ANCHOR PILES & REACTION BEAMS

DIST. 2

JOB. 67-F-99

DRAWING NO. 67-F-99 D