

#63-F-98

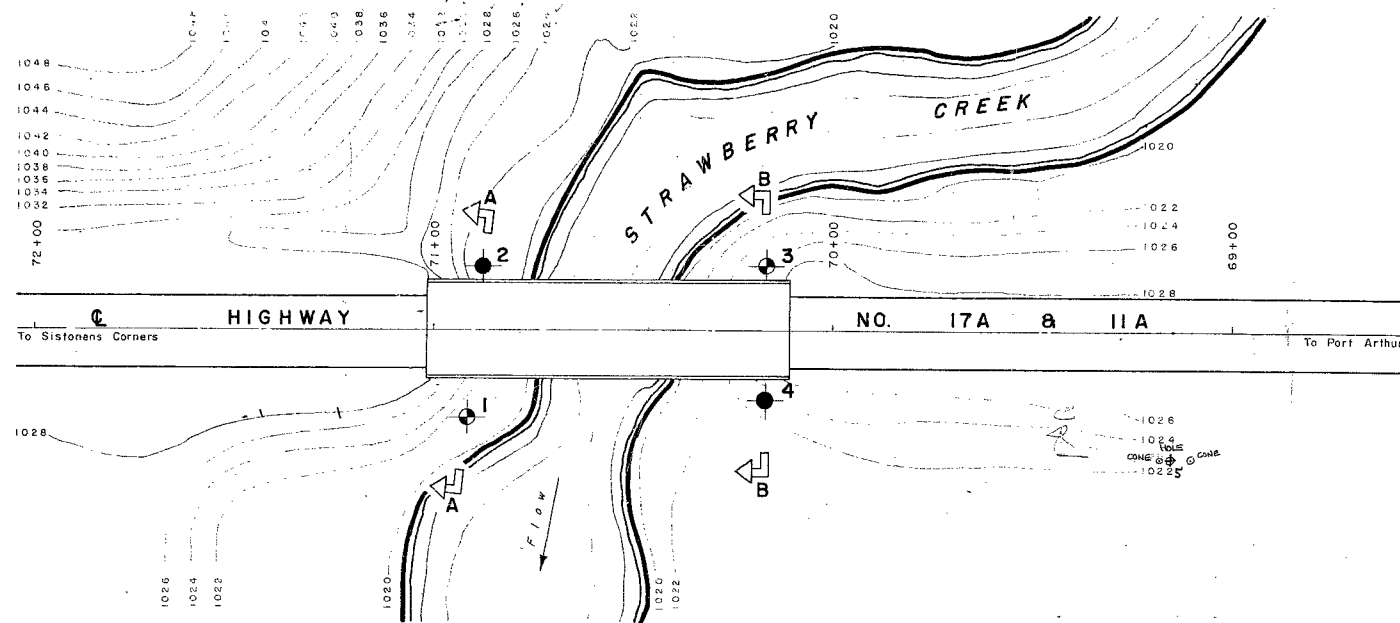
W.P. # 127-62

Hwy. # 11A & 17A

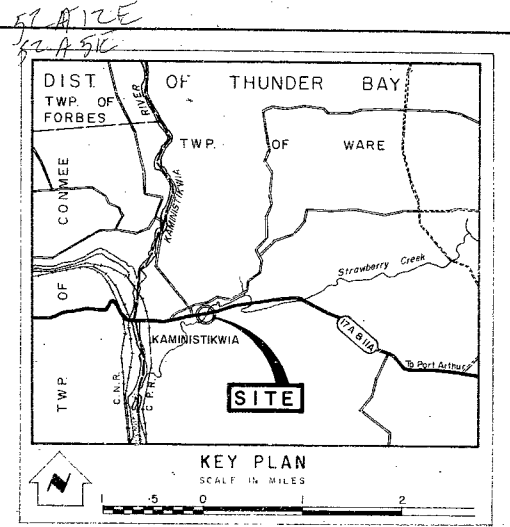
CROSSING

STRAWBERRY

CREEK



PLAN
SCALE IN FEET
20 0 20 40

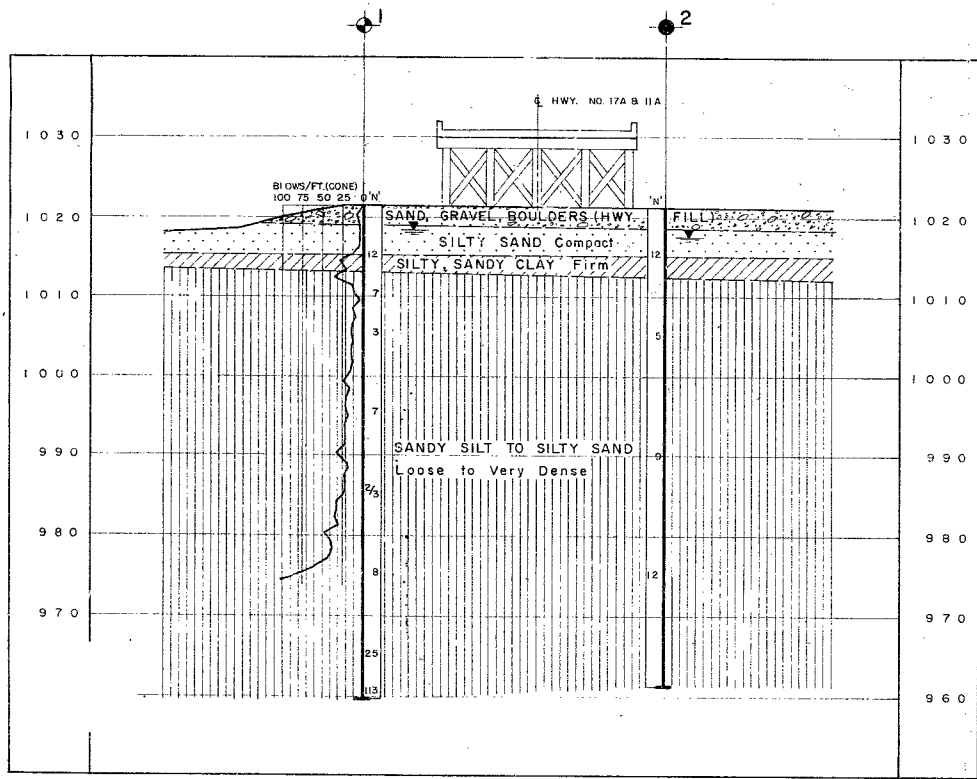


LEGEND

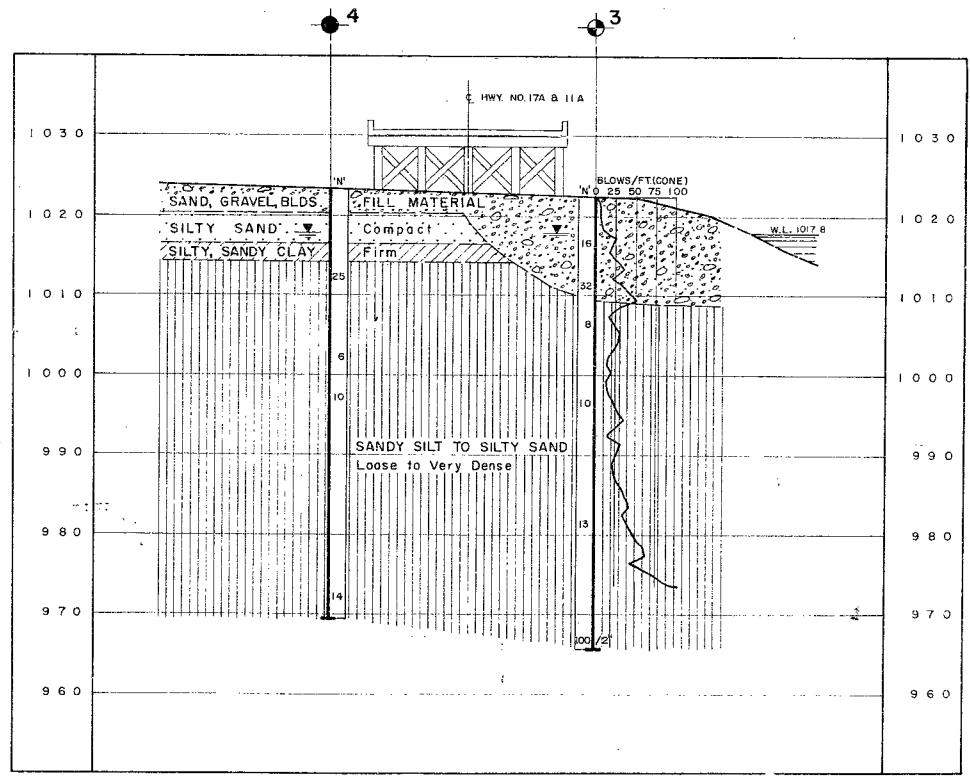
- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation (Sept. 1963)

NO.	ELEVATION	STATION	OFFSET
1	1021.3	70+92	22' LT.
2	1021.1	70+82	16' RT.
3	1022.3	70+17	16' RT.
4	1023.3	70+17	17'-3" 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.



A - A



B - B

SECTIONS
SCALE IN FEET
10 5 0 10 20

REVISIONS

NO.	DATE	BY	DESCRIPTION
1	July 68		SECTION C-C AND BORE HOLES 5 & 6 ADDED

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

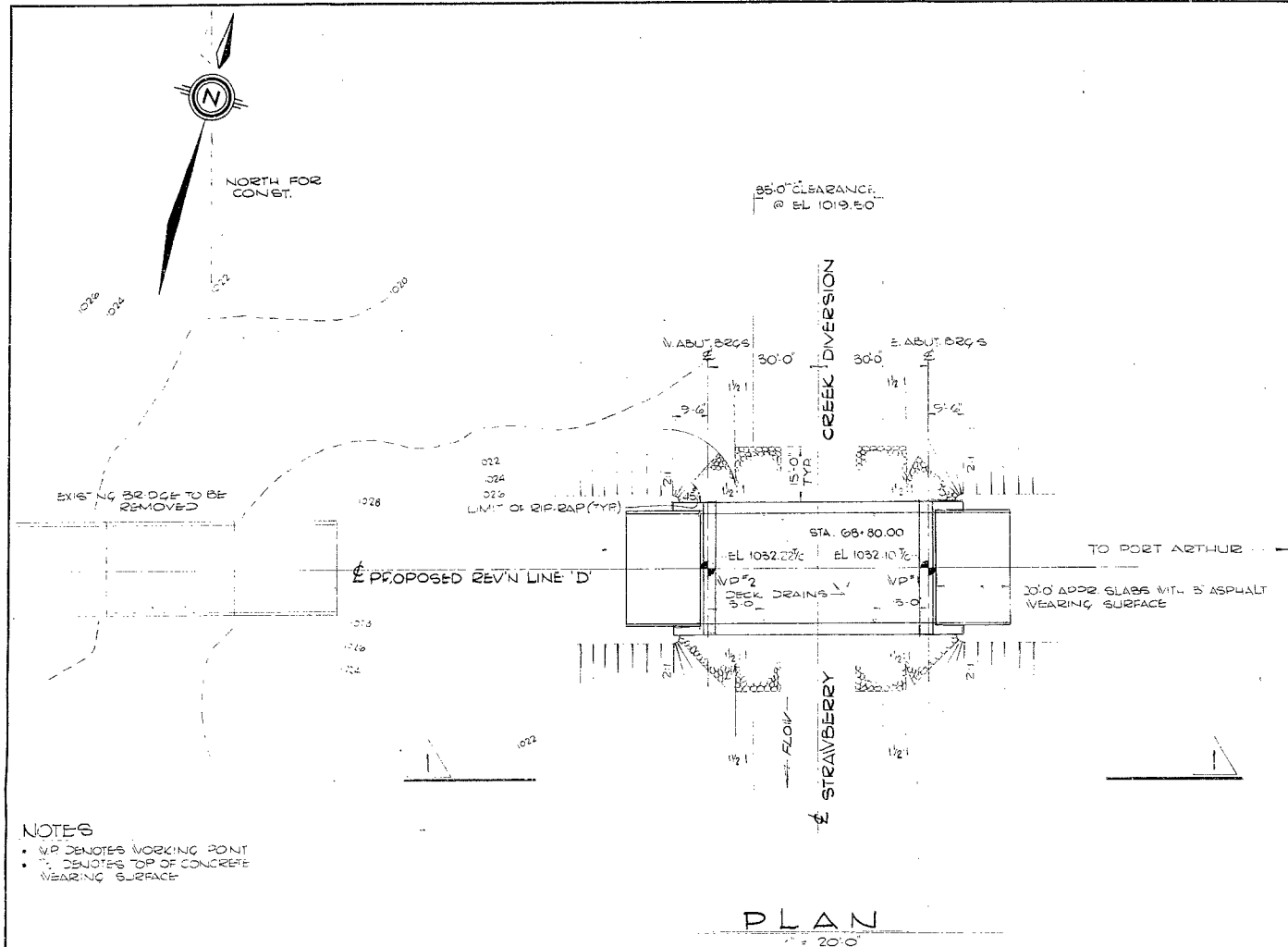
STRAWBERRY CREEK
STATION 70+45

KING'S HIGHWAY NO. 17A & 11A DIST. NO. 19
DIST. THUNDER BAY
TWP. WARE LOT 18 CON. A

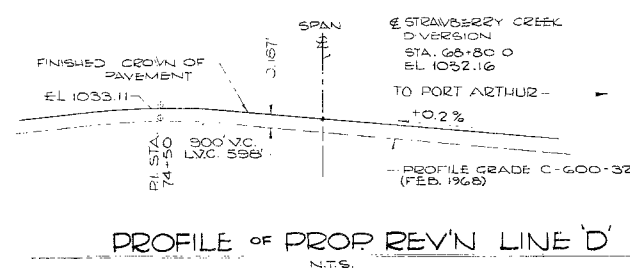
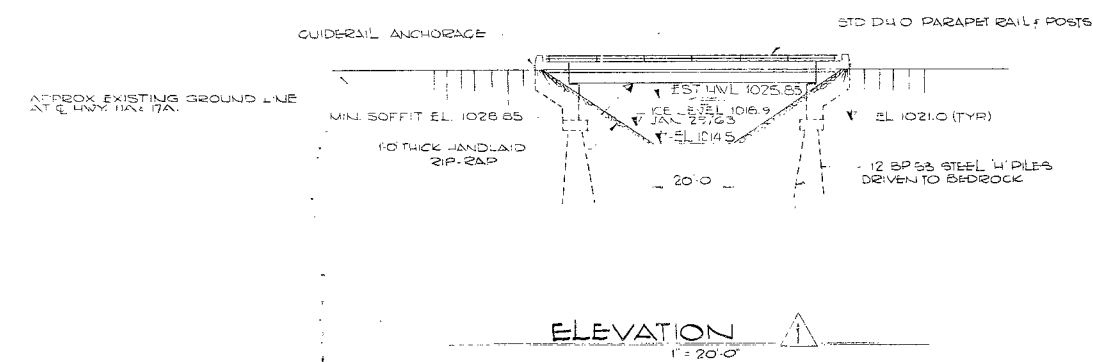
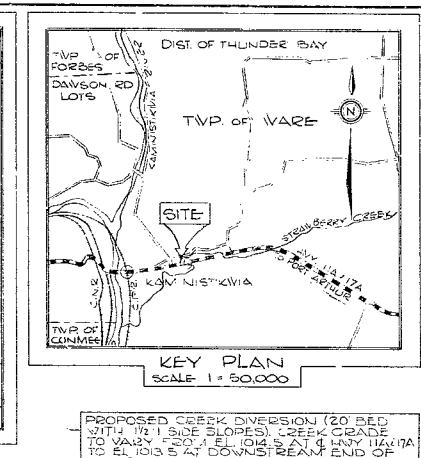
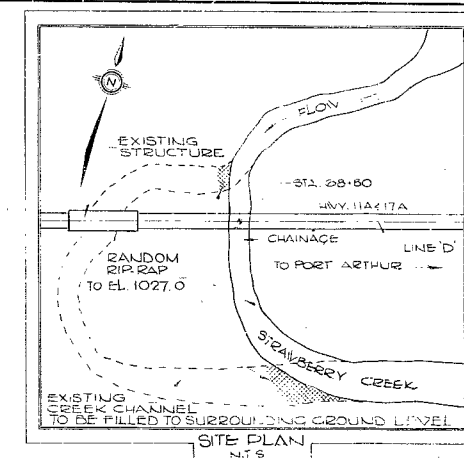
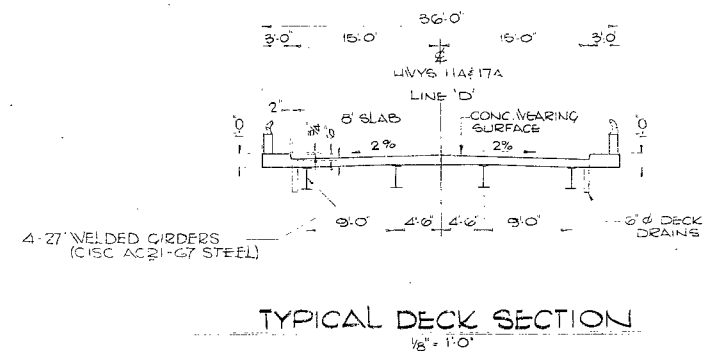
BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D W.K.	CHECKED	W.P. NO. 127-62	M.B.R. DRAWING NO.
DRAWN D.M.	CHECKED	DOB NO. 63-F-98	63-F-98A
DATE 31 OCT. 1963	SITE NO.		BRIDGE DRAWING NO.
APPROVED	CONT. NO.		

REF. NO. E-4197-1



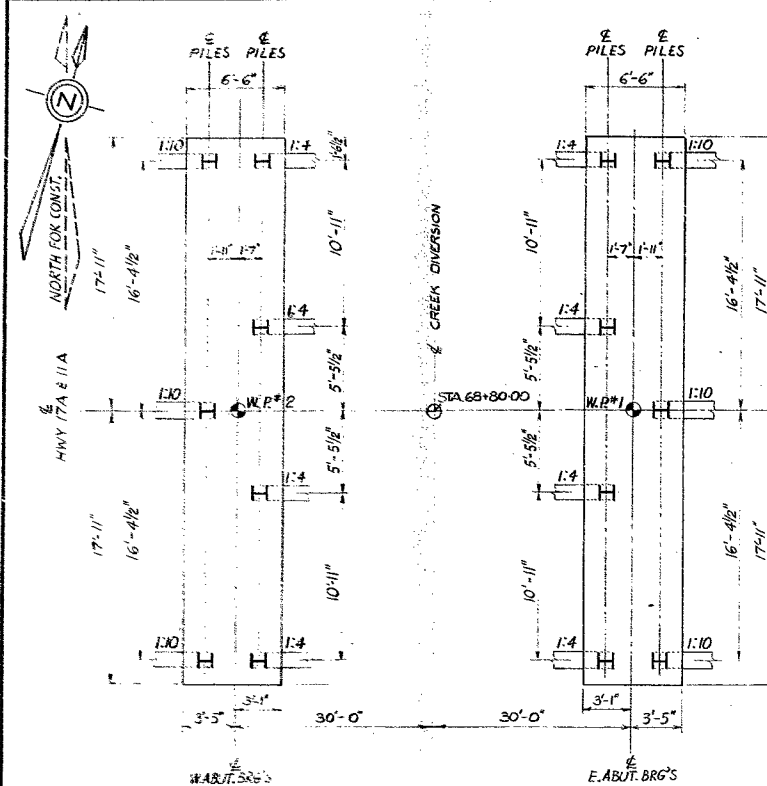
- NOTES
- W.P. DENOTES WORKING POINT
 - "T" DENOTES TOP OF CONCRETE WEARING SURFACE



B.M. ELEV. 1028.77
GEODETIC DATUM
N.T.V. IN O.G. POPLAR STR 58.0 FT. OF STA. 70+88

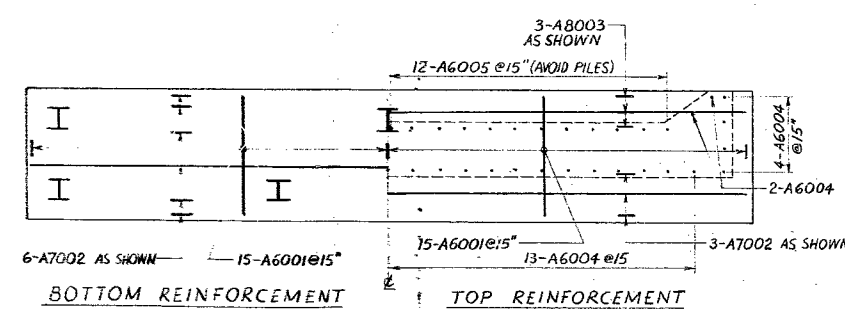
REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
STRAWBERRY CREEK BRIDGE No. 3 3.4 MI. E. OF STONEN'S CORNERS			
KING'S HIGHWAY No. 11A & 17A		DIST. No. 19	
DIST. THUNDER BAY		TWP. VARE	
LOT 18		CON. A	
PRELIMINARY PLAN			
APPROVED		SITE No. 48W. 3 W.P. No. 127-62	
DESIGN NG V S CHECK		CONTRACT No.	
DRAWING G D T CHECK		DRAWING No.	
DATE MAY '68		LOADING 14520-44	
D-5413-P1			

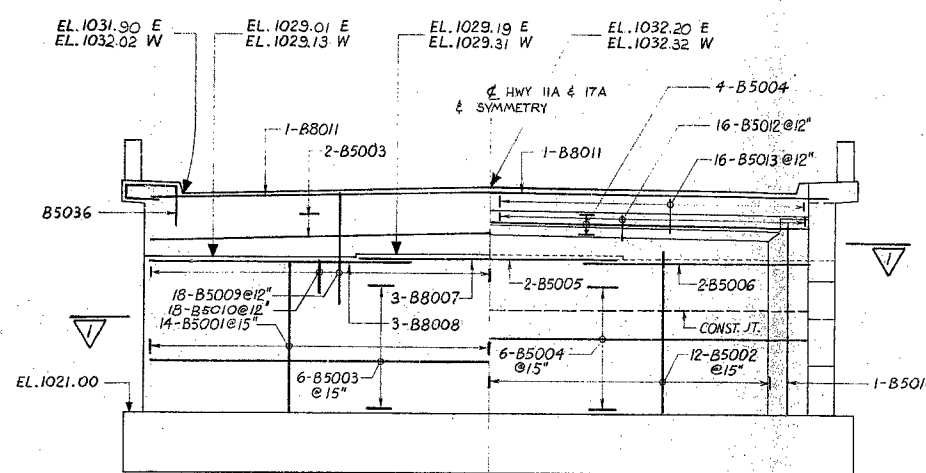


FOOTING & PILE LAYOUT
SCALE: 3/16" = 1'-0"

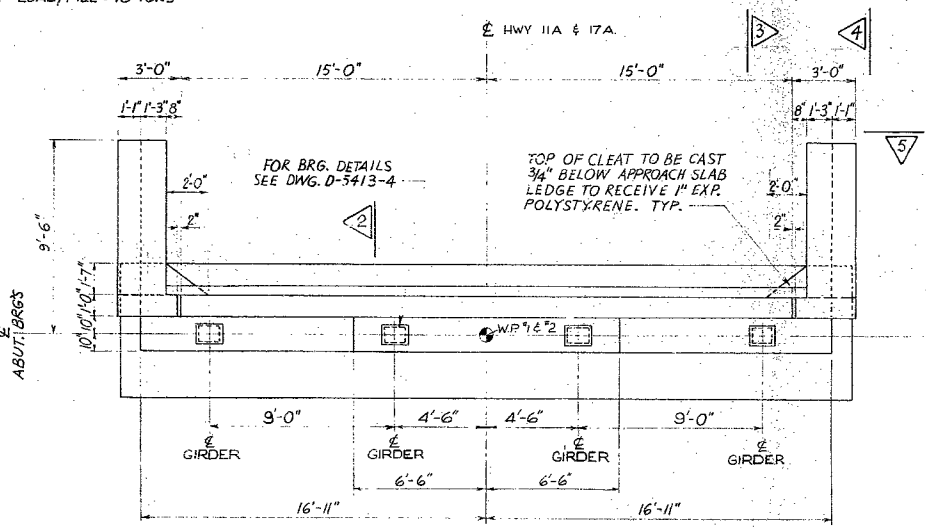
PILES				
LOCATION	SLOPE	NUMBER	LENGTH	TYPE
E & W ABT. FTGS.	1:10	6	32'-0"	12 BP53
E & W ABT. FTGS.	1:4	8	34'-0"	



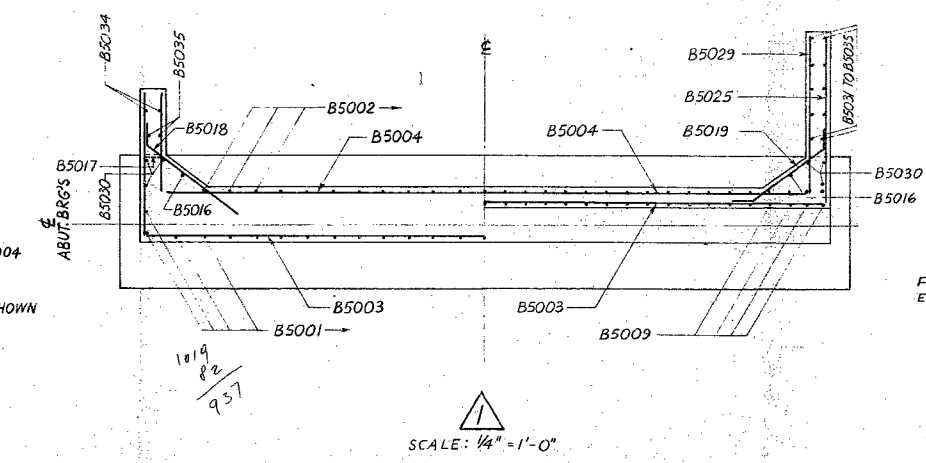
FOOTING PLAN
SCALE: 1/4" = 1'-0"



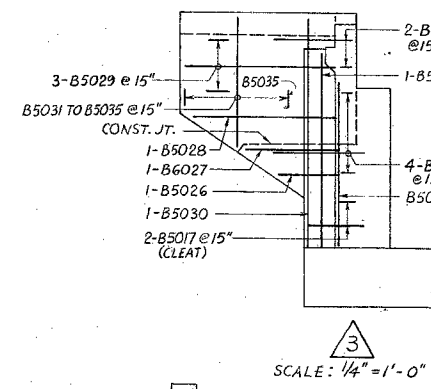
FRONT FACE ELEVATION
SCALE: 1/4" = 1'-0"



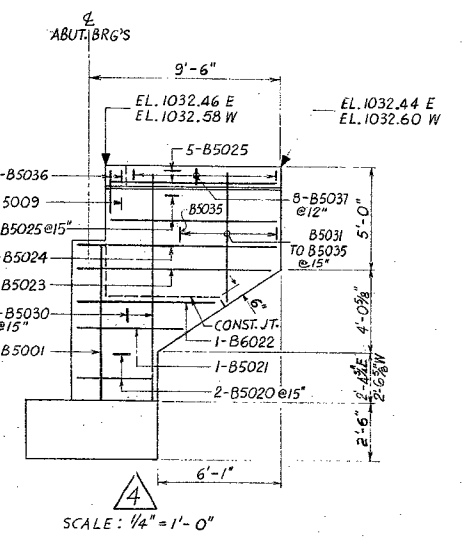
PLAN
SCALE: 1/4" = 1'-0"



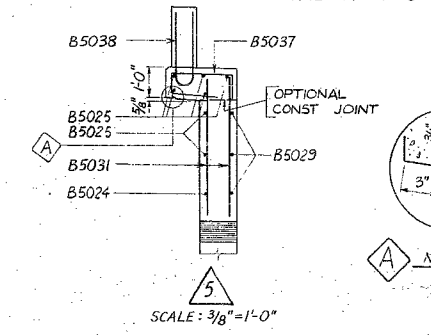
FRONT FACE ELEVATION
SCALE: 1/4" = 1'-0"



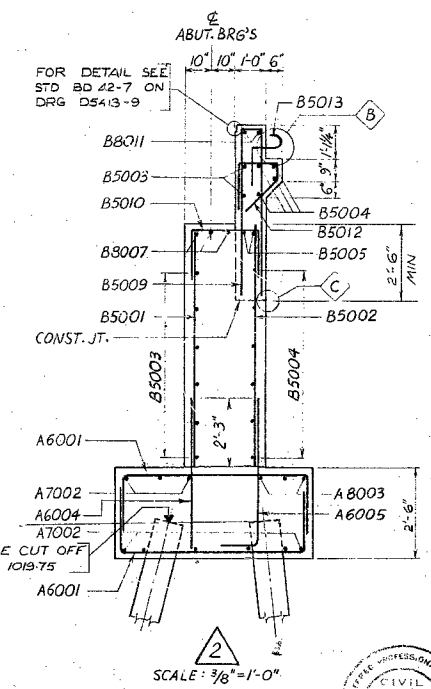
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SCALE: 1/4" = 1'-0"



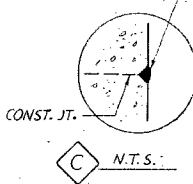
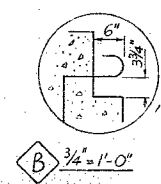
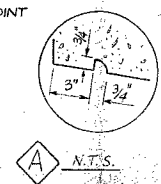
4
SCALE: 1/4" = 1'-0"



5
SCALE: 3/8" = 1'-0"



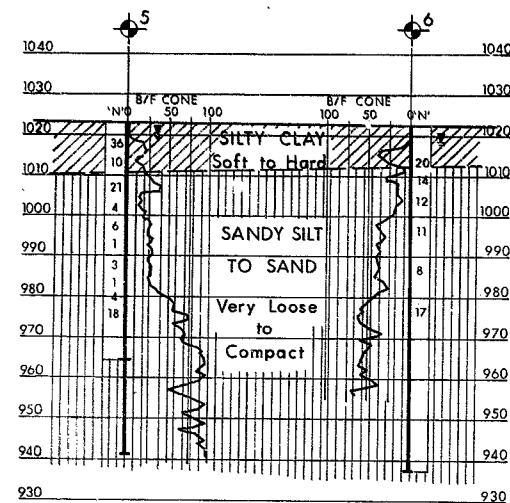
2
SCALE: 3/8" = 1'-0"



REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO			
BRIDGE DIVISION			
63-1-98			
STRAWBERRY CREEK BRIDGE No 3			
3.4 MILES EAST OF SISTONEN'S CORNERS			
KING'S HIGHWAY No. 11A & 17A		DIST. No. 19	
DIST. THUNDER BAY		TWP. WARE LOT 18 CON. A	
FOOTINGS AND ABUTMENTS			
APPROVED		SITE No. 48 W-3 W.P. No. 127-62	
DESIGN	ING. V.S. CHECK	CONTRACT	Nos.
DRAWING	J. M. CHECK	DRAWING	No.
DATE	JAN '63	LOADING	H520-44
D-5413-3			

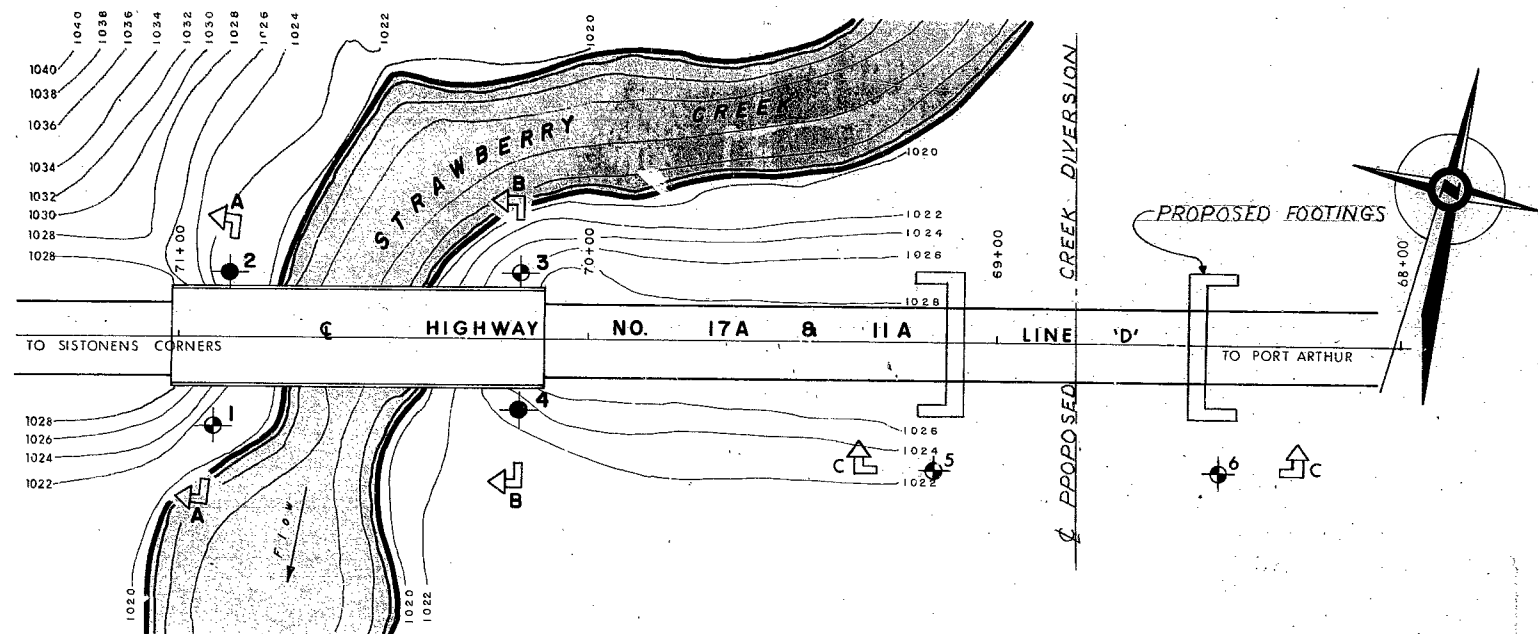




C - C

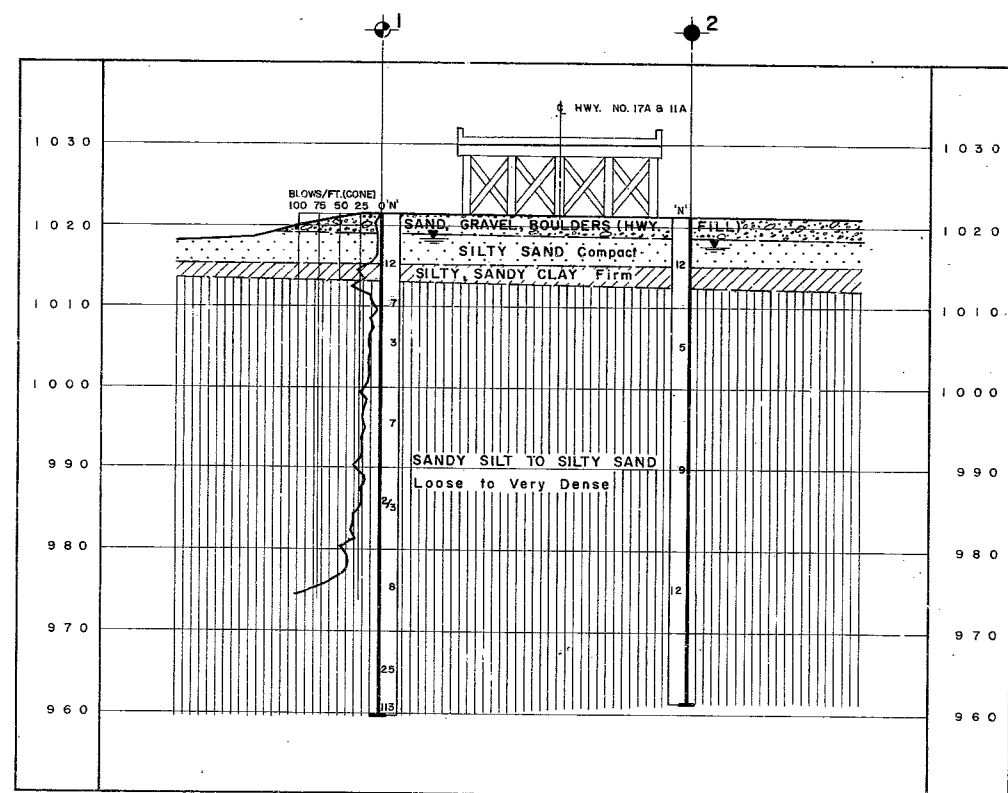
SECTION

SCALE



PLAN

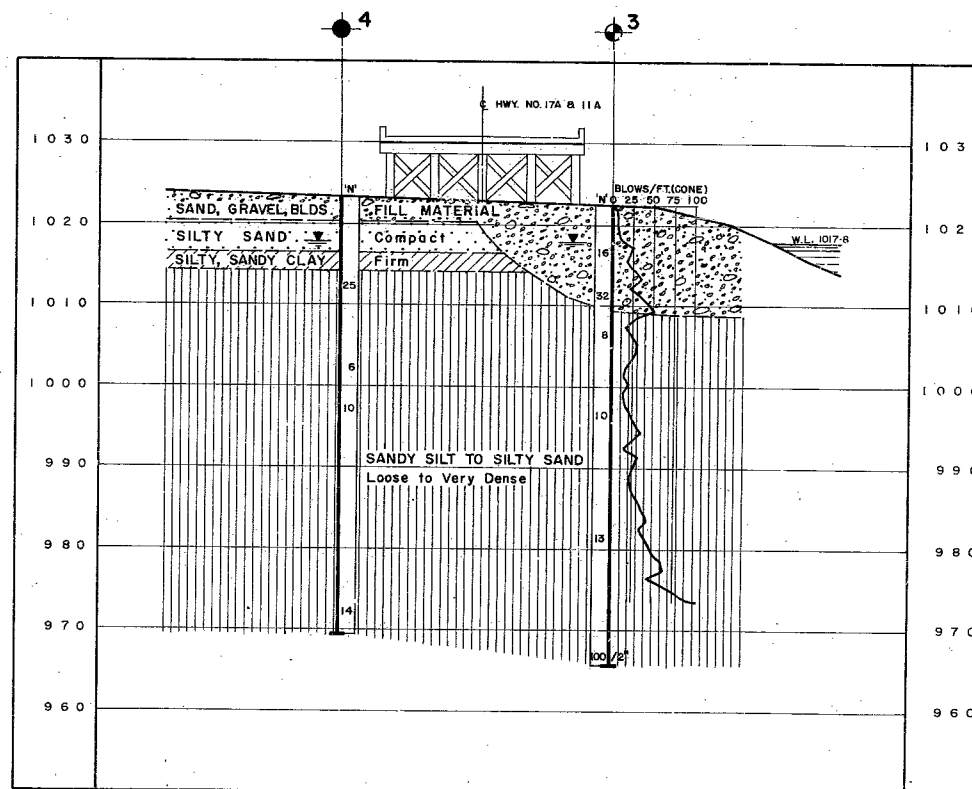
SCALE IN FEET



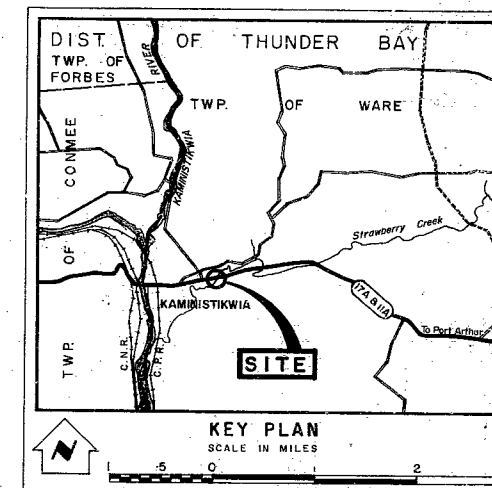
A - A

SECTIONS

SCALE IN FEET



B - B



LEGEND

- Bore Hole
- ⊕ Cone Penetration Hole
- ⊕ Bore & Cone Penetration Hole
- Water Levels established at time of field investigation. (Sept. 1963)

NO.	ELEVATION	STATION	OFFSET
1	1021.3	70+92	22' LT.
2	1021.1	70+88	16' RT.
3	1022.3	70+17	16' RT.
4	1023.3	70+17	17'-3" LT.
5	1023.0	69+15	32' LT.
6	1022.9	68+45	32' 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.

REVISIONS	DATE	BY	DESCRIPTION
1	JULY 68	D.M.	SECTION C-C AND BORE HOLES 5 & 6 ADDED

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

STRAWBERRY CREEK
STATION 70+45

KING'S HIGHWAY NO. 17A & 11A DIST. NO. 19
DIST. THUNDER BAY
TWP. WARE LOT 18 CON. A

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D. W.K.	CHECKED	W.P. NO. 127-62	M.B.R. DRAWING NO.
DRAWN D.M.	CHECKED	NO. 63-F-98	63-F-98 A
DATE 31 OCT. 1963	SITE NO.		BRIDGE DRAWING NO.
APPROVED	PRINCIPAL FOUNDATION ENGINEER	CONT. NO.	

52A-8

GEOL. NO.

REF. NO. E-4197-1

x.P. 127-62.

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. M. Toye,
Bridge Engineer,
Bridge Division.

FROM: Mr. A. G. Stermac,
Principal Foundation Engr.,
Foundation Section,
Materials & Research Division.

Attention: Mr. S. McCombie

DATE: October 31, 1963

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT

For

Hwy. #11A-17A and Strawberry Creek,
District of Thunder Bay, Dawson
Road Lots, Con. A - Lot 18, Dist.#19.
W.J. 63-F-98 -- W.P. 127-62.

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

We believe that you will find the factual data and recommendations contained therein, adequate for your future design work. Should additional information be required, please feel free to call on our Office.

KYL/MdeF
Attach.

cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMillan
H. McArthur
V. A. Snell
F. Norman
A. Watt

Foundations Office
Gen. Files



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

TABLE OF CONTENTS

1. INTRODUCTION.
 2. DESCRIPTION OF SITE.
 3. FIELD AND LABORATORY WORK.
 4. SUBSOIL CONDITIONS:
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 - 4.2) Sand, Gravel, Boulders (Hwy. Fill).
 - 4.3) Silty Sand - Compact.
 - 4.4) Silty Sandy Clay - Firm.
 - 4.5) Sandy Silt to Silty Sand - Loose to
Very Dense.
 5. GROUND WATER CONDITIONS.
 6. DISCUSSION AND RECOMMENDATIONS.
 7. SUMMARY.
 8. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT

For

Hwy. #11A-17A and Strawberry Creek,
District of Thunder Bay, Dawson
Road Lots, Con. A - Lot 18, Dist. #19.
W.J. 63-F-98 -- W.P. 127-62

1. INTRODUCTION:

A request to carry out a foundation investigation at the existing crossing of Hwy. #11A-17A and Strawberry Creek, was received from the Bridge Planning Engineer, Mr. S. McCombie, dated August 30, 1963.

It is proposed to erect a new bridge, to carry Hwy. #11A-17A over Strawberry Creek. The site of the proposed bridge is located approx. 18 miles Northwest of the Town of Port Arthur, District of Thunder Bay. At this location, the chainage of Hwy. #11A-17A is from 70+11 to 70+91.

In order to determine the soil properties and decide on the type of foundations, an investigation was carried out by this Section. Results and the discussion of the field and laboratory investigations, as well as conclusions and recommendations for the future design work, are contained in the following paragraphs of this report.

2. DESCRIPTION OF SITE:

The site of the proposed bridge is located approx. 18 miles Northwest of the Town of Port Arthur. The surrounding area is generally flat terrain. The width of the Strawberry Creek at the proposed crossing is about 22 feet, and the depth of water approx. 6'-0" to 7'-0".

cont'd. /2 ...

2. DESCRIPTION OF SITE: (cont'd.) ...

The existing bridge is constructed on 6 pile bents at 5 piles to a bent. From the information gathered at the site, it seems that the piles 12 to 14 inches in butt diameter, were driven approx. 30'-0" into the ground.

3. FIELD AND LABORATORY WORK:

In order to obtain sufficient information on the type and properties of the subsoil, four sampled boreholes, and two dynamic cone penetration tests, were carried out at this site.

Split-spoon samples were taken at various depth intervals. Samples recovered in the split-spoon sampler were used to determine the following physical properties:

1. Natural Moisture Content
2. Grain Size Distributions

Results of these laboratory tests are summarized in Appendix I of this report.

4. SUBSOIL CONDITIONS:

4.1) General:

The stratigraphy of the soil at the site was found to be generally uniform. A detailed description of various soil types encountered during the investigation, is shown in Appendix I of this report, and is also given in subsequent paragraphs. The estimated stratigraphical profile, shown on Dwg. No. 63-F-98A, is based upon this information.

cont'd. /3 ...

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

4.2) Sand, Gravel, Boulders (Hwy. Fill):

This layer was found right at the surface. In the vicinity of B.H.'s #1, 2, and 4, it extends to a depth of 2 to 3 feet. In the vicinity of B.H. #3, it extends to a depth of 13'-0". This layer should be excavated during the construction of the future bridge.

4.3) Silty Sand - Compact:

This layer, which extends to approx. El. 1015 was found below the highway fill. The sand in this layer has been subjected to oxidation and exhibits a predominantly brownish colour. The percentage of sand in this layer is 93% and silt forms the rest of 7%. Moisture content determinations for this layer averaged about 13.5%. The overall layer was found in a compact state with an average 'N' value of 12 blows/foot.

4.4) Silty Sandy Clay - Firm:

This layer, approx. 2'-0" to 2'-6" thick, was encountered below the compact silty sand in all boreholes except B.H. #3.

4.5) Sandy Silt to Silty Sand - Loose to Very Dense:

Following the layer of firm silty, sandy clay, is a stratum of loose to very dense sandy silt to silty sand. This stratum starts at approx. El. 1013 and extends to the depth investigated.

Grain size distribution curves indicated that the percentage of sand in this layer is 61%; silt forms 36%, and the rest of 3%, is gravel. Moisture content determinations for this stratum varied from about 10.0% to 22.3%. The overall stratum is in a loose to very dense condition, with an average 'N' value of approx. 22 blows/foot, ranging from 3 to 113 blows/foot. The density of this stratum increases with depth.

cont'd. /4 ...

5. GROUND WATER CONDITIONS:

The ground water level, at the time of the investigation, was found to be as follows:

In B.H. #1	at El.	1018.3
" B.H. #2	" "	1017.5
" B.H. #3	" "	1017.8
" B.H. #4	" "	1017.8

It may be assumed that the water level will vary with the seasons of the year.

No artesian water conditions were encountered.

6. DISCUSSION AND RECOMMENDATIONS:

As can be seen from the previously described soil stratigraphy, the soil at the site, consists of some highway fill, followed by compact silty sand, underlain by firm sandy, silty clay, which in turn, is followed by a stratum of loose to very dense sandy silt to silty sand.

The investigation has revealed that the properties of the upper 20 ft. are such that an adequate support for spread footings could not be obtained. It is therefore, suggested that the future bridge be founded on displacement friction piles. For this purpose, the most suitable piles would be 12 $\frac{3}{4}$ " at 33 steel tubes. It is estimated that a design load of 50 tons/pile will be achieved if the piles are driven to approx. El. 955.0. The design loads should be checked in the field by means of the Hiley Formula according to D.H.O. Standards DD-1218 and DD-1219.

The Hydrology Section of the D.H.O. indicated that a 10-foot scour may be expected in the Strawberry Creek channel.

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

Therefore, the bottom of the footings should be placed at El. 994.0. This, however, should be checked with the Hydrology Section when the study is completed.

The subsoil being basically of a granular cohesionless nature, and the ground water table being relatively high, dewatering during construction may present a problem. Because the pile caps will be formed below water level, it will be necessary to use sheet piling in a dewatering scheme. These should be driven to a depth below the footing bottom equal to the height of water above it. Footing bases should be formed either on a granular pad, or a suitable concrete working slab.

7. SUMMARY:

The stratification of the subsoil at the site is relatively uniform and consists of some highway fill, underlain by compact silty sand, followed by firm silty sandy clay, which in turn, is underlain by loose to very dense sandy silt and silty sand.

The investigation has revealed that adequate support for spread footings could not be obtained; therefore, the future bridge should be founded on displacement piles. Steel tube 12 $\frac{3}{4}$ " at 33 piles driven down to El. 955.0 would be most suitable for this purpose. A design load of 50 tons/pile could be obtained.

The bottom of the pile caps should be 5 ft. below the anticipated scour level, at approx. El. 994.0. Footing bases should be formed either on a granular pad, or a suitable concrete working slab.

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

A dewatering scheme will be necessary: recommendations contained in the body of this report should be followed.

8. MISCELLANEOUS:

The field work, performed during the period from September 6 to September 9, 1963, together with the preparation of this report, was undertaken by Mr. W. W. Kulmatickas, Project Foundation Engineer. The investigation was carried out under the supervision of Mr. K. G. Selby, Senior Foundation Engineer.

Equipment used was owned and operated by Canadian Longyear Limited.

October 1963

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

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

Attention: Mr. S. McCombie

DATE: November 30, 1967

OUR FILE REF.

IN REPLY TO

SUBJECT:

-- REVISED RECOMMENDATIONS --

Strawberry Creek Crossings -- Hwy's 11A & 17A - District #19

(1)	W.J. 63-F-98	--	W.P. 127-62
(2)	W.J. 63-F-99	--	W.P. 128-62
(3)	W.J. 63-F-100	--	W.P. 129-62

The foundation recommendations for the above mentioned structures are based on a possible scour depth of 10 feet. This information was given to us by the Bridge Hydrology Section in 1963 at the time of the field investigations.

We are now advised by Mr. F. DeVisser, Regional Bridge Location Engineer, that the maximum possible scour is only 3.0 ft. Accordingly, we are amending our recommendations regarding the proposed structure foundations, as follows:

(1) W.J. 63-F-98 -- W.P. 127-62 -

The proposed pile caps should be placed at a depth sufficient for frost protection (7.0 ft.). Steel H-piles may be used as an alternative to steel tube piles: the same design load and estimated tip elevations apply. The approach embankments may be constructed with 1½:1 side and forward slopes.

(2) W.J. 63-F-99 -- W.P. 127-62 -

The structure may be supported on spread footings assuming a net safe pressure of 2 t.s.f. at the following elevations: Abutments el. 1023, Piers el. 1025. A dewatering scheme will be necessary to prevent boiling of the pier excavation bases. If steel sheeting is used for this, it should be driven to el. 1018. Alternative methods of dewatering may be used. As an alternative, the structure may be wholly or partly supported on piled foundations. Steel H-piles or steel tube piles may be used. Recommendations given in the report as to design load and estimated tip elevations apply in both cases. Timber piles are not recommended due to the presence of boulders in the subsoil. The approach embankments may be constructed with 1½:1 side and forward slopes. All footings or pile caps require a minimum cover of 7.0 ft. for frost protection.

Mr. B. R. Davis,
Bridge Engineer,
Bridge Div., Admin. Bldg.
Attn: Mr. S. McCombie

2.

November 30, 1967

(3) W.J. 63-F-100 -- W.P. 129-62 -

File caps should be founded at a depth sufficient for frost protection (7.0 ft. minimum). The approach embankments may be constructed using $1\frac{1}{2}$:1 side and forward slopes. If a trestle type bridge is constructed, timber piles may be used bearing in mind that they will be driven to bedrock and should, therefore, be fitted with shoes to prevent 'brooming' when contact with the rock surface is made.

The foregoing recommendations are additional to and, in some cases, supersede recommendations made in the original foundation reports. They must, therefore, be read in conjunction with the latter so as to avoid ambiguity.

Please insert a copy of this memo in each of your foundation reports: W.J. 63-F-98, W.J. 63-F-99, and W.J. 63-F-100. Three copies are provided for your convenience.

KGS/MdeF

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

cc: Messrs. B. R. Davis
H. A. Tregaskes
D. W. Farren
H. Hurrell
V. A. Snell
F. DeVisser
F. Norman
B. A. Singh
Foundations Files ✓
Gen. Files

APPENDIX I.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

JOB 53-F-98

LOCATION Hwy. 11A & 17A Ch. 70/92-22'-0" Lt.

ORIGINATED BY W.W.K.

W P 127-62

BORING DATE Sept. 6 to Sept. 7, 1963.

COMPILED BY W.W.K.

DATUM 1021.3

BOREHOLE TYPE Washboring - BX Casing.

CHECKED BY K.S.

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE			LIQUID LIMIT ——— w _L			BULK DENSITY Y P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV SCALE	BLOWS / FOOT			PLASTIC LIMIT ——— w _p				
							20 40 60 80 100			WATER CONTENT ——— w				
							SHEAR STRENGTH P.S.F.			w _p ——— w ——— w _L				
										WATER CONTENT % 15 30 45				
1021.3	Ground Elevation													
1019.1	Sand, gravel, boulders (Hwy. Fill)					1020								
2.2	Silty sand.													
1015.1	Compact.		1	SS	12									
6.2	Silty, sandy clay													
1013.1	Firm													
8.2			2	SS	7	1010								
			3	SS	3									
	Sandy silt to silty sand.													
	Loose to very dense.		4	SS	7									
						1000								
			5	SS	2/3									
						990								
			6	SS	8									
						980								
			7	SS	25									
						970								
			8	SS	113									
59.8														
61.5	End of borehole.													

W.L.
El. 1018.3
Observed in casing.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

JOB 63-F-98

LOCATION Hwy. 11A & 17A Ch. 70+83 - 16'-0" Rt.

ORIGINATED BY W.W.K.

W.P. 127-62

BORING DATE Sept. 7, 1963.

COMPILED BY W.W.K.

DATUM 1021.1

BOREHOLE TYPE Washboring - BX Casing.

CHECKED BY K.S.

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		SHEAR STRENGTH P.S.F.				WP	W	WL		
1021.1	Ground Elevation														
	Sand, gravel, boulders (Hwy. Fill).					1020									
1018.6	2.5' Silty sand.														
1015.1	Compact.														
6.0	Silty, sandy clay		1	SS	12										
1012.6	Firm														
8.5															
	Sandy silt to silty sand.		2	SS	5	1010									
	Loose to very dense.														
						1000									
			3	SS	9	990									
						980									
			4	SS	12	970									
961.1						960									
60.0	End of borehole.														
						950									

▼ W.L.
El. 1017.5
Observed in Casing.

DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS & RESEARCH DIVISION			RECORD OF BOREHOLE NO. 3					FOUNDATION SECTION									
JOB <u>63-F-98</u>			LOCATION <u>Hwy. 11A & 17A Ch. 70/17 - 16'-0" Rt.</u>					ORIGINATED BY <u>W.W.K.</u>									
W.P. <u>127-62</u>			BORING DATE <u>Sept. 8, 1963.</u>					COMPILED BY <u>W.W.K.</u>									
DATUM <u>1022.3</u>			BOREHOLE TYPE <u>NK, BX Run.</u>					CHECKED BY <u>K.S.</u>									
SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE			LIQUID LIMIT — WL			BULK DENSITY P.C.F.	REMARKS				
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	BLOWS / FOOT							PLASTIC LIMIT — WP			
							20	40	60	80	100			WATER CONTENT — W			
								SHEAR STRENGTH P.S.F.					WATER CONTENT %				
													WP — W — WL				
													15 30 45				
1022.3	Ground Elevation.																
0.0	Sand, Gravel, Boulders.		1	SS	16	1020											
			2	SS	32	1010											
1009.3	(Fill Material)		3	SS	8												
13.0			4	SS	10	1000											
	Sandy silt to silty sand.																
	Loose to very dense.		5	SS	13	980											
			6	SS	>100	965.8											
56.5	End of borehole.					960											

W.L.
El. 1017.8
Observed
in Casing.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 63-F-98

LOCATION Hwy. 11A & 17A Ch. 70/17 - 17'-3" Lt.

ORIGINATED BY W.W.K.

W.P. 127-62

BORING DATE Sept. 9, 1963.

COMPILED BY W.W.K.

DATUM 1023.3

BOREHOLE TYPE Washboring BX Casing.

CHECKED BY K.S.

SOIL PROFILE			SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — % PLASTIC LIMIT — % WATER CONTENT — %			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT				W _p	W	W _L		
							SHEAR STRENGTH P.S.F.				WATER CONTENT % 15 30 45				
1023.3	Ground Elevation														
	Sand, gravel, boulders					1020									
1020.3	(Hwy. Fill).														
3.0	Silty sand.														
1016.8	Compact.														
6.3	Silty sandy clay														
1014.3	Firm														
9.0			1	SS	25	1010									
	Sandy silt to silty sand.														
	Loose to very dense.		2	SS	6	1000									
						990									
			3	SS	10										
						980									
			4	SS	14	970									
969.3															
54.0	End of borehole.														

W.L.
El. 1017.8
Observed in Casing.

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

Qu	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_e	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_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 (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

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

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

May 29, 1968

Strawberry Creek Bridge No. 3
3.4 Mi. E. of Sistonen's Corners
W.P. 127-62 -- Site No. 48W-3
Highways 11A & 17A, District 19

We have reviewed your Preliminary Bridge Plan
D-5413-P1 of the Strawberry Creek crossing, Hwy. #11A
and 17A.

Since the proposed site of the structure is some
120 - 220 ft. west of the original foundation investi-
gations, we are unable to comment on the proposed
foundations. It is felt that a new field and laboratory
study is necessary to establish soil conditions at the
new site. It is also to be mentioned that no bedrock
was encountered in the original boreholes; however, the
designer recommends footings supported on steel H-piles
driven to bedrock. Bedrock elevations are not known by
the Foundation Section.

K. G. Selby

KGS/MdeF

cc: Messrs. S. McCombie
F. De Visser

Foundations Files
Gen. Files

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

WR

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

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

Attention: Mr. V. Stare

July 3, 1968

Strawberry Creek -- Bridge #3
3.4 Mi. E. of Siston's Corners
W.P. 127-62 -- Site #48W-3
W.J. 63-F-98 -- Hwy. 11A & 17A
District #19 (Fort William)

We have recently carried out two borings (#4 and #5) at the new site for the above mentioned structure. The work was carried out under the direction of the Regional Materials Engineer, Mr. F. Norman.

Unfortunately, because of the presence of power lines, the boreholes could not be located very close to the proposed footings. However, the very best estimate for pile lengths that we can make under the circumstances is that practical refusal to penetration of steel H-piles should occur at or about el. 940. A design load of 70 tons per pile for 12 BF @ 53 sections should be achieved in this case.

We will be sending you prints of the Record of Borehole sheets and of revised Drawing 63-F-98A, as soon as they are completed.

Please attach this memo to your copy of Report #63-F-98.

KGS/ndef

cc: Messrs. S. McCombie
P. De Visser
Foundations Files
Gen. Files

K. G. Selby
SUPERVISING FOUNDATION ENGR.
For:
A. G. Sternac
PRINCIPAL FOUNDATION ENGR.

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 26

SOIL SECTION

W P 127-62

BORING LOCATION STA 68+45 32'L+R (D-S')

ORIGINATED BY

LOCATION 3.4 MILES EAST SIOUXEN S

BORING DATE JUNE 18-21, 1968

COMPILED BY CS

CORNER ON STRAWBERRY CREEK

BOREHOLE TYPE WASH BORING

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100	LIQUID LIMIT — LL PLASTIC LIMIT — PL WATER CONTENT — W PL — W — LL WATER CONTENT %	BULK DENSITY γ _p P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	BLOWS/FOOT					
1022.9 0.0										
1018.1 4.8	RED BR SILTY CLAY (SOFT)					1020				Elev. 1022.9
1011.9 11.0	VARIABLE SILTY CLAY & SANDS (Firm, SOFT @ 9.0 FT.)		1	SS	16/16/6					W.L. 1018.9
			2	SS	17/7/7	1010				
			3	SS	3/4/8					
			4	SS	5/5/6	1000				
	GRY SILTY FINE TO VERY FINE SAND AND SILTY FINE SAND SEAMS. OCCASIONAL SEAMS OF FINE TO MED SAND.		5	SS	3/4/4	990				
			6	SS	3/8/9	980				
						970				
						960				
954.9 68.0	GRY SILTY FINE SAND AND FINE TO MEDIUM SAND SEAMS (BOULDER)					950				REFUSAL AT 68.5 FT. (BOULDER)
937.7 85.0	END OF HOLE					940				

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundations Engineer,
Lab. Bldg.

FROM: J. C. McAllister

DATE: August 30, 1963.

OUR FILE REF.

IN REPLY TO

SUBJECT:

W.P. 127-62 Strawberry Ck.
W.P. 128-62 Strawberry Ck.
W.P. 129-62 Strawberry Ck.
Hwy. 11A & 17A District 19.

63-F - 98
- 99
- 100

Attached please find two prints of site plans E-4197-1, E-4196-1 and E-4199-1 for the above crossings. The probable locations of the footings for the proposed structures are marked on the plans.

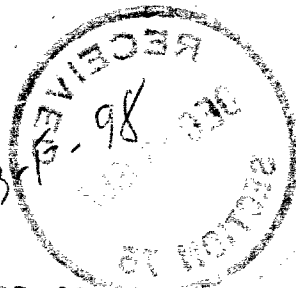
The alignments and grades are not yet approved by this office but any changes we propose will be minor.

J. C. McAllister

JCMcA:ew

J. C. McAllister,
for S. McCombie,
Bridge Planning Engineer.

DEC 8 AM 11:13



10120

DOWN FTWR 1 DEC 6/67 11106

K SELBY FOUNDATION SECTION

RE: STRAWBERRY CREEK CROSSINGS WF 127-62, 128-62, 129-62, HWY 114
DIST 19

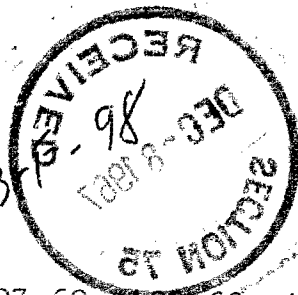
PLEASE SEND US AS SOON AS POSSIBLE THE RECOMMENDATIONS ADDITIONAL TO
THE REPORTS THAT WERE ISSUED IN 1963, AS DISCUSSED THIS WEEK BY PHONE.
WE WOULD LIKE TO SEND OUT THE STRUCTURES FOR DESIGN BUT MUST HAVE THESE
ADDITIONAL RECOMMENDATIONS BEFORE WE CAN DO SO

F DEVISSER REG ER LCC FTWR

JO

T
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17 DEC 8 AM 11:13



00126

DOWN FTWR 1 DEC 8/67 1110A

K SELBY FOUNDATION SECTION

RE: STRAWBERRY CREEK CROSSINGS WP 127-62, 128-62, 129-62, HWY 11A
DIST 19

PLEASE SEND US AS SOON AS POSSIBLE THE RECOMMENDATIONS ADDITIONAL TO
THE REPORTS THAT WERE ISSUE IN 1963, AS DISCUSSED THIS WEEK BY PHONE.
WE WOULD LIKE TO SEND OUT THE STRUCTURES FOR DESIGN BUT MUST HAVE THESE
ADDITIONAL RECOMMENDATIONS BEFORE WE CAN DO SO

F DEVISSER REG ER LOC ENGR

JO

*Ken - 4 out should
have this by now*

T
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Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. F. DeVlaser,
Reg. Bridge Location Engineer,
P.O. Box 1170,
Port Arthur, Ontario

Bridge Division,
Downsview, Ontario

May 27, 1968

Strawberry Creek Bridge No. 3
3.4 MI. E. of Siston's Corners
W.P. 127-62, Site 48M-3
Hwys. 11A & 17A, District 19

63-F-98

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-5413-F1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$61,000. 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 (2)
J. Anderson

SINCE THE ORIGINAL SOUND INVESTIGATION WAS
CARRIED OUT SOME 120-220 FT WEST OF THE NEWLY
PROPOSED STRUCTURE, ADDITIONAL BOREHOLE ARE NECESSARY.
THE BEDROCK WAS ENCOUNTERED AT THE SITE OF THE PREVIOUS
FIELD WORK, THE DESIGNER HOWEVER HAD 4 MILES DRIVEN TO
BEDROCK.

A.K.B.

29 MAY 68

als

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

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

May 29, 1968

Strawberry Creek Bridge No. 3
3.4 Mi. E. of Sistonen's Corners
W.P. 127-62 -- Site No. 48W-3
Highways 11A & 17A, District 19

63-F-98 ✓

We have reviewed your Preliminary Bridge Plan
D-5413-P1 of the Strawberry Creek crossing, Hwy. #11A
and 17A.

Since the proposed site of the structure is some
120 - 220 ft. west of the original foundation investi-
gations, we are unable to comment on the proposed
foundations. It is felt that a new field and laboratory
study is necessary to establish soil conditions at the
new site. It is also to be mentioned that no bedrock
was encountered in the original boreholes; however, the
designer recommends footings supported on steel H-piles
driven to bedrock. Bedrock elevations are not known by
the Foundation Section.

K. G. Selby

KGS/mdeP

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

cc: Messrs. S. McCombie
F. De Visser
Foundations Files
Gen. Files

MEMORANDUM

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

FROM: Bridge Division,
Downsview, Ontario

Attention: Mr. K. Selby

DATE: May 30, 1968

OUR FILE REF.

IN REPLY TO

SUBJECT: Strawberry Creek Bridge No. 3
W.P. 127-62, Site 48W-3
Highways 11A & 17A, District 19

This will confirm our telephone conversation of today that we require extra borings taken at this site due to the fact that the line has been shifted since the original borings were taken.

CSG:rd

c.c. K.G. Bassi
F. DeVisser

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

Ken:

*Would you take the
necessary steps*

Thank you

Tommy

MEMORANDUM

TO: Mr. A. Stermac,
Principal Foundation Engineer,
Materials and Testing,
Downsview, Ontario.

FROM: C. M. Smith,
Project Soils Engineer,
Materials and Testing,
Port Arthur, Ontario.

DATE: June 27, 1968.

ATTENTION: Mr. K. Selby
OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 127-62 - Site 48W-3 - 3.4 Miles
East of Sistonen's Corners on Strawberry Creek

Re: Foundation Investigation

As requested by the Foundation Division, Downsview, a foundation investigation has been carried out at the site of the proposed structure indicated on Drawing No. D-5413-Pl.

General Information

The proposed structure design location is station 68+80 approximately 175 feet east of the existing bridge. The approach fill to the existing bridge at this point is approximately 5 feet above the original ground level. Due to narrow constructed shoulders over this section as well as a power line to the north side of the highway, it was decided to set up the drilling equipment just off the south shoulder at the following locations: B.H. #1 - Station 69+15, 32' left of Centre Line, and B.H. #2 - Station 68+45, 32' left of Centre Line. The ground level elevations at the above locations are approximately 1023.0 and 1022.9 for B.H. #1 and B.H. #2 respectively.

Summary of Borehole No. 1

Dynamic penetration resistance tests taken at Stations 69+18 and 69+10, 32' left of Centre Line, were advanced to 58 feet (elevation 965.0) and 82 feet (elevation 941.0) respectively, before penetration was refused by boulders. The blow count pattern from elevation 965.0 to elevation 941.0 indicates a bouldery soil.

Two penetration tests were conducted due to the lack of experience of the operator.

The NX casing was driven and washed to elevation 975.0 at Station 69+15, 32' left of Centre Line, where the casing end split, thus preventing further advancement of the casing. The washing operation was continued to elevation 964.0. The washings at this depth indicated the same type of material previously encountered within the borehole from elevation 1011.0 to elevation 975.0.

Mr. A. Stermac

2.

June 27, 1968

The water level measured June 26, 1968, was at elevation 1020.0.

Summary of Borehole No. 2

A dynamic penetration resistance test taken at station 68+50, 32' left of Centre Line, met refusal on a boulder at elevation 957.4.

The NX casing was driven and washed to elevation 954.9 at Station 68+45, 32' left of Centre Line, where further advancement was refused by a boulder.

The AX casing was drilled to elevation 943.9 with the aid of the AXT coring equipment, where the AX casing blocked in a large boulder. The AXT was continued to elevation 937.9 where the borehole was ended in sand. The water was lost when the AXT advanced beyond elevation 940.9.

The water level measured June 26, 1968, was at elevation 1018.9.

Approximately ten boulders were encountered in B.H. #2 between elevation 954.9 and the end of the borehole. The majority of the boulders ranged in diameter from 3 to 5 inches.

No bedrock was encountered in either borehole. The boulder corings retrieved indicated a variety of rock types, none of which were of the bedrock type exposed in the immediate Strawberry Creek area.

For a more detailed summary of Boreholes 1 and 2, see attached Record of Borehole data sheets.

All split spoon and wash samples are being forwarded under separate cover.

If any further information is required, please contact this office.

C.M. Smith
C. M. SMITH,
Project Soils Supervisor,

FOR:

F. NORMAN,
REGIONAL MATERIALS ENGINEER.

cms.vm

enc.

280

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

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

July 3, 1968

Attention: Mr. V. Stare

Strawberry Creek -- Bridge #3
3.4 Mi. E. of Siston's Corners
W.P. 127-62 -- Site #48W-3
W.J. 63-F-98 -- Hwy. 11A & 17A
District #19 (Fort William)

We have recently carried out two borings (#4 and #5) at the new site for the above mentioned structure. The work was carried out under the direction of the Regional Materials Engineer, Mr. F. Norman.

Unfortunately, because of the presence of power lines, the borsholes could not be located very close to the proposed footings. However, the very best estimate for pile lengths that we can make under the circumstances is that practical refusal to penetration of steel H-piles should occur at or about el. 940. A design load of 70 tons per pile for 12 BP @ 53 sections should be achieved in this case.

We will be sending you prints of the Record of Borehole sheets and of revised Drawing 63-F-98A, as soon as they are completed.

Please attach this memo to your copy of Report #63-F-98.

KGS/MdeF

cc: Messrs. S. McCombie
F. De Visser
Foundations Files
Gen. Files

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

MEMORANDUM

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

From: C.S. Grebski,
Bridge Office

ATTENTION:

DATE: March 21, 1969

OUR FILE REF.

IN REPLY TO

SUBJECT: Strawberry Creek Bridge No. 3
3.4 Mi. E. of Sistonon's Corners
W.P. 127-62, Site 48W-3
Hwys. 11A & 17A, District 19

63-F-98


Attached herewith we are submitting the final
bridge drawings which show the foundation design for
this structure.

Kindly give us your comments at your earliest
convenience.

CSG:rd

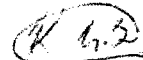
Attach.

c.c. Foundation Section


C.S. Grebski,
Bridge Design Engineer

MAR. 25. 69

NO COMMENTS

A.L.B.


MEMORANDUM

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

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

Attention: Mr. S. McCombie

DATE: November 30, 1967

OUR FILE REF.

IN REPLY TO

SUBJECT:

-- REVISED RECOMMENDATIONS --

Strawberry Creek Crossings -- Hwy's 11A & 17A - District #19

(1)	W.J. 63-F-98	--	W.P. 127-62
(2)	W.J. 63-F-99	--	W.P. 128-62
(3)	W.J. 63-F-100	--	W.P. 129-62

The foundation recommendations for the above mentioned structures are based on a possible scour depth of 10 feet. This information was given to us by the Bridge Hydrology Section in 1963 at the time of the field investigations.

We are now advised by Mr. F. DeVisser, Regional Bridge Location Engineer, that the maximum possible scour is only 3.0 ft. Accordingly, we are amending our recommendations regarding the proposed structure foundations, as follows:

(1) W.J. 63-F-98 -- W.P. 127-62 -

The proposed pile caps should be placed at a depth sufficient for frost protection (7.0 ft.). Steel H-piles may be used as an alternative to steel tube piles: the same design load and estimated tip elevations apply. The approach embankments may be constructed with $1\frac{1}{2}$:1 side and forward slopes.

(2) W.J. 63-F-99 -- W.P. 127-62 -

The structure may be supported on spread footings assuming a net safe pressure of 2 t.s.f. at the following elevations: Abutments el. 1033, Piers el. 1025. A dewatering scheme will be necessary to prevent boiling of the pier excavation bases. If steel sheeting is used for this, it should be driven to el. 1018. Alternative methods of dewatering may be used. As an alternative, the structure may be wholly or partly supported on piled foundations. Steel H-piles or steel tube piles may be used. Recommendations given in the report as to design load and estimated tip elevations apply in both cases. Timber piles are not recommended due to the presence of boulders in the subsoil. The approach embankments may be constructed with $1\frac{1}{2}$:1 side and forward slopes. All footings or pile caps require a minimum cover of 7.0 ft. for frost protection.

Mr. B. R. Davis,
Bridge Engineer,
Bridge Div., Admin. Bldg.
Attn: Mr. S. McCombie

2.

November 30, 1967

(3) W.J. 63-F-100 -- W.P. 129-62 -

File caps should be founded at a depth sufficient for frost protection (7.0 ft. minimum). The approach embankments may be constructed using $1\frac{1}{2}:1$ side and forward slopes. If a trestle type bridge is constructed, timber piles may be used bearing in mind that they will be driven to bedrock and should, therefore, be fitted with shoes to prevent 'brooming' when contact with the rock surface is made.

The foregoing recommendations are additional to and, in some cases, supersede recommendations made in the original foundation reports. They must, therefore, be read in conjunction with the latter so as to avoid ambiguity.

Please insert a copy of this memo in each of your foundation reports: W.J. 63-F-98, W.J. 63-F-99, and W.J. 63-F-100. Three copies are provided for your convenience.

KGS/MdeF

AK 1. 3-4
K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. B. R. Davis
H. A. Tregaskes
D. W. Farren
H. Hurrell
V. A. Snell
F. DeVisser
F. Norman
B. A. Singh
Foundations Files
Gen. Files