#66-F-4

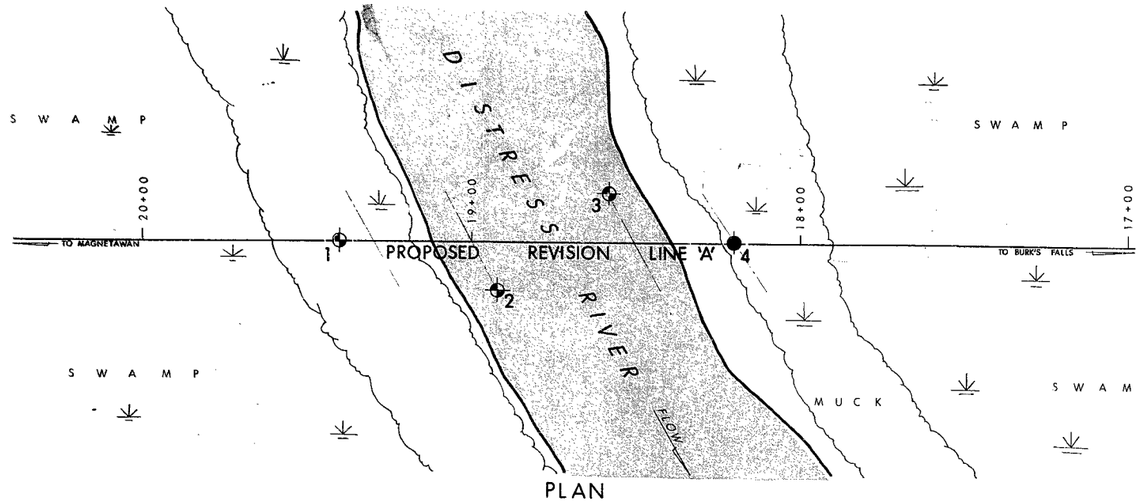
W.P. #333-63

SEC. HWY. #520

PROPOSED

CROSSING

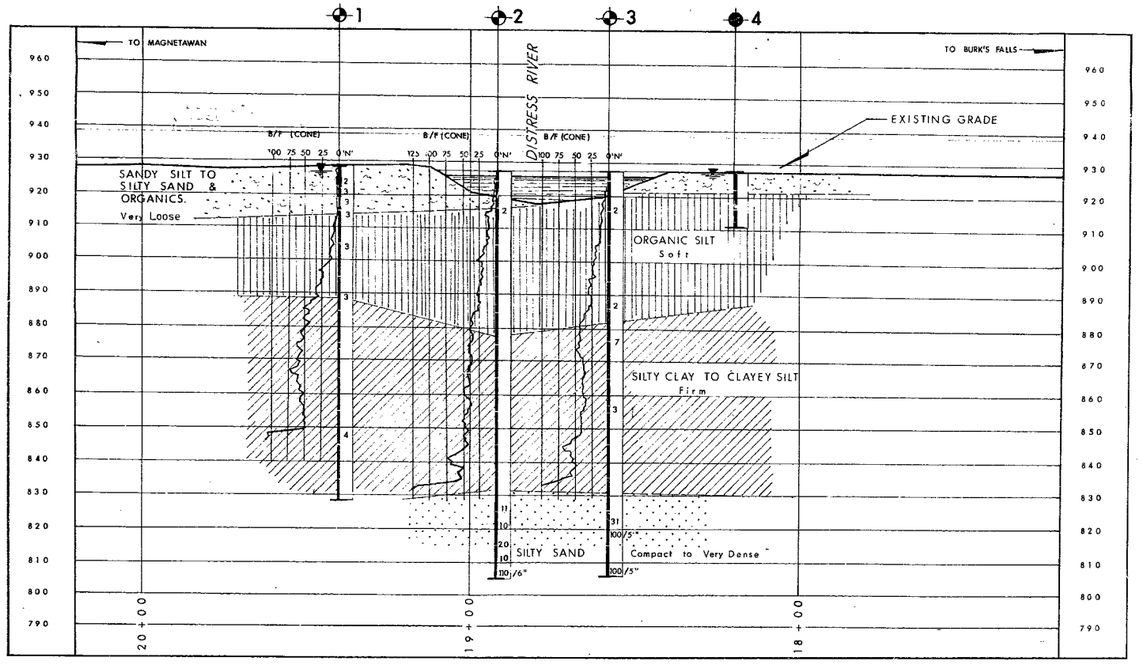
DISTRESS RIVER



PLAN

SCALE IN FEET

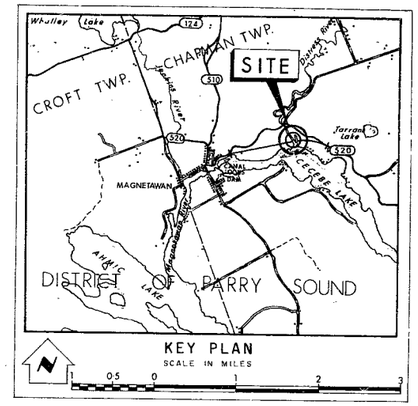
20 10 0 20 40 60



PROFILE

SCALE IN FEET

20 10 0 20 40 60



LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation. JAN. 1966

NO.	ELEVATION	STATION	OFFSET
1	928.5	19+40	ON ℄
2	927.0	18+92	15' LT
3	927.0	18+48	15' RT
4	927.5	18+20	ON ℄

– 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

DISTRESS RIVER

KING'S HIGHWAY NO. 520, PROP REV'N LINE 'A' DIST. NO. 11

DIST. OF PARRY SOUND

TWP. CHAPMAN LOT 29 & 30 CON. 5 & 6

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D V.K.	CHECKED	W.P. NO. 333 – 63	M.&T. DRAWING NO.
DRAWN J.N	CHECKED	JOB NO. 66 – F – 4	66-F-4 A
DATE 16 MARCH 1966.		SITE NO.	BRIDGE DRAWING NO.
APPROVED (PRINCIPAL FOUNDATION ENGINEER)		CONT NO.	

REF. NO. E – 4437–1

cc: GEN. FILES 23-67-111

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

~~W.P. 333-63~~

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

Attention: Mr. S. McCombie

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

Date: March 15, 1966

Our File Ref.

In reply to MAR 23 1966

Subject:

FOUNDATION INVESTIGATION REPORT
For
Proposed Crossing of Distress River,
Sec. Hwy. 520, Rev'n. Line 'A', Twp.
of Chapman, Mun. District of Parry
Sound, District #11 (Huntsville).
W.J. 66-F-4 -- ~~W.P. 333-63~~
CON. 23-67-111

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 feel free to contact our Office.

A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

AGS/MdeF
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
H. McArthur
E. H. Jones
T. J. Kovich
A. Watt

Foundations Office
Gen. Files

TABLE OF CONTENTS

FOUNDATION INVESTIGATION REPORT
For
Proposed Crossing of Distress River, Sec. Hwy. 520, Rev'n. Line 'A', Twp. of Chapman, Mun. District of Parry Sound, District #11 (Huntsville).

W.J. 66-F-4 -- W.P. 333-63

1. INTRODUCTION:

The Foundation Section were requested to carry out an investigation for the proposed crossing of Sec. Hwy. 520 and Distress River, in the Twp. of Chapman, District of Parry Sound. The request was contained in a memo from the Bridge Location Section, dated November 29, 1965. The site is located about 1.5 miles east of the village of Magnetawan, near the junction of the Distress and Magnetawan Rivers. The general area is flat and swampy and is covered with thick bush.

An investigation was subsequently carried out by this Section to determine the subsoil conditions at the site of the proposed structure. Presented in this report are the results of our investigation, together with recommendations pertaining to the foundations for the structure and the stability of the proposed approach embankments.

2. SUBSOIL CONDITIONS:

2.1) General:

Four borings were carried out during the course of the field work, revealing subsoil conditions to be generally uniform over the site area. The boundaries between different deposits together with detailed descriptions of the material in the deposits, are shown on the borelog sheets attached to this report. The estimated stratigraphical profile shown on Drawing #66-F-4A, is based on this information. From ground level downward, the different soil types encountered are as follows:

cont'd. /2 .....

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

2.2) Silty Sand to Sandy Silt:

This deposit was encountered on both banks of the Distress River for a depth of 15 feet on the west side and 7 feet on the east side. It was not encountered within the river itself. The material consists of silty sand to sandy silt and contains some traces of organics and clay. 'N' values ranged from 2 - 3 blows per foot, indicating a very loose relative density. The natural moisture content ranges from about 35% to 55%.

2.3) Organic Silt:

This deposit was encountered in all borings and ranges in thickness from 25 to 43 feet. The material consists of cohesive organic silt with some traces of sand. Physical properties of the material as determined from field and laboratory tests, are summarized below:

Bulk Density	91	-	108	p.c.f.
Liquid Limit	40%	-	78%	
Plastic Limit	30%	-	55%	
Moisture Content	30%	-	77%	
Unconfined Shear Strength	350	-	660	p.s.f.
Field Vane Shear Strength	350	-	950	p.s.f.

Based on the above results, the consistency of the overall deposit is classified as soft to firm and the undrained shear strength is estimated to range from about 400 p.s.f. at the surface of the deposit (el. 919.0 $\pm$) to about 700 p.s.f. at the bottom (el. 888.0 - 877.0).

2.4) Silty Clay to Clayey Silt:

This deposit underlies the organic silt layer and extends for a total thickness in excess of 60 feet. The material varies somewhat in plasticity and is classified as silty clay to clayey silt. Physical properties as determined from field and laboratory tests are summarized as follows:

cont'd. /3 .....

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

2.4) Silty Clay to Clayey Silt: (cont'd.) ...

Bulk Density	105 - 114	p.c.f.
Liquid Limit	37% - 59%	
Plastic Limit	23% - 33%	
Moisture Content	38% - 60%	
Unconfined Shear Strength	440 - 885	p.s.f.
Field Vane Shear Strength	625 - 1200	p.s.f.

Based on these results, the consistency of the deposit is classified as firm and the undrained shear strength is estimated to range from about 500 p.s.f. at the surface of the layer (el. 888.0 - 877.0) to about 1,000 p.s.f. at el. 830.0.

2.5) Silty Sand:

This stratum underlies the silty clay to clayey silt layer and extends for a depth of at least 25 feet to el. 805.0. The constituent material is silty sand. 'N' values range from 10 to more than 100 blows per foot, indicating a compact to very dense relative density.

3. GROUND WATER:

The water levels in the boreholes were found to closely correspond to the river water level which was el. 927.0 during the time of the investigation.

4. DISCUSSION AND RECOMMENDATIONS:

It is proposed to construct a new bridge at this site to carry Sec. Hwy. #520 over Distress River. Hydrological requirements are such that a clear opening of 50 feet in width is necessary. The proposed embankments will be about 10 feet higher than original ground on the approaches to the bridge, but the maximum height of slope in the longitudinal direction will be about 20 feet since the river bed is about 10 feet deep.

cont'd. /4 .....

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

As mentioned in the previous paragraphs, the upper subsoil deposits at this site consist of highly compressible organic silt with a relatively low shear strength. Such a soil cannot provide adequate support for spread footing type foundations, and it is therefore recommended that the proposed structure be supported on piled foundations. In considering the type of pile to be adopted, the high compressibility of the underlying organic subsoil must be taken into account, and in this case it is believed that any friction piles embedded in this material would undergo a significant amount of settlement over a longterm period. For this reason, it is recommended that the structure be supported on 12¾-inch O.D. steel tube piles end-bearing in the silty sand stratum at approximate elevation 805.0. A safe load of 60 tons per pile may be used for design purposes.

With regard to the proposed 10-foot high approach embankments, no stability problems are anticipated for the side slopes provided 2:1 standard slopes are constructed. In the longitudinal direction, however, the maximum height of the fill above the river bottom will be in the order of 20 feet, and in order to ensure stability in this direction, it is recommended that the toe of the forward slope be constructed not closer than 25 feet from the existing top edges of the river banks. The forward slope of the approach fill should also be constructed with 2:1 slopes.

Some settlements of the approach fills must be anticipated and it is expected that a maintenance problem will exist for quite some time. It will be possible to decrease some of the problems by constructing the approach embankments well in advance of the bridge construction so as to allow some consolidation to occur, but our experience with organic soils in the past has shown that significant settlements are likely to occur for many years after construction.

cont'd. /5 .....

5. MISCELLANEOUS:

The field work for this project was carried out during the period January 11 - 27, 1966.

Equipment used was owned and operated by Johnston Drilling Co. Ltd. The field work was supervised by Project Foundation Engineer, Mr. V. Korlu, under the general supervision of Mr. M. S. Devata, Senior Foundation Engineer.

This report was prepared by Messrs. K. G. Selby and M. Devata.

March 1966

APPENDIX I

FORM OB-MT-126 (FORMERLY OB-ML-126)
65-1831

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

JOB 66-F-4 LOCATION Hwy. 520 & Distress Crk., Sta. 19+40, @ ℄ ORIGINATED BY V.K.
W.P. 333-63 BORING DATE Jan. 11, 1966. COMPILED BY V.K.
DATUM Geodetic BOREHOLE TYPE Drive NX Casing and Wash. CHECKED BY HK

ELEV. / DEPTH	SOIL PROFILE: DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	BLOWS / FOOT
928.5	Groundlevel				
	W.L.				
1.5	Sandy silt to silty sand and organics.		1	SS	2
			2	SS	3
	(Trace of clay)		3	SS	3
	Very Loose				
913.5			4	SS	3
15.0			5	TW	P
	Organic silt		6	SS	3
	(Trace of sand)		7	TW	P
	Soft				
888.5			8	SS	3
40.0					
	Silty clay to clayey silt.		9	TW	P
	Firm		10	TW	P
			11	SS	4
828.5					
100.0	End of borehole.				

ELEV. SCALE: 920, 910, 900, 890, 880, 870, 860, 850, 840, 830

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT — 20 40 60 80 100
SHEAR STRENGTH P.S.F.
+ Field Vane
O Unconfined Compression
400 800 1200 1600 2000

+2.8
+5.6
+2.2
+1.5
+4.0
+3.5
+1.5

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
w_P w w_L
WATER CONTENT %
20 40 60

BULK DENSITY γ P.C.F.

REMARKS
Organics
I=4.7
Gr 0%
Sa 64%
Si36%
Cl 0%
I=2.7
I=3.9
103
I=5.7
Gr 0%
Sa 5%
Si&Cl 95%
94
111
105

FORM OB-MT-126 (FORMERLY OB-ML-126)
65-1831

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

JOB 66-F-4 LOCATION Hwy. 520 & Distress Crk., Sta. 18+92 15' to Lt. of ℄ ORIGINATED BY V.K.
W.P. 333-63 BORING DATE Jan. 17 & 26, 1966. COMPILED BY V.K.
DATUM Geodetic BOREHOLE TYPE Drive BX & NX Casing & Wash. CHECKED BY HR

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. + Field Vane O Unconfined Compression (400 800 1200 1600 2000)	LIQUID LIMIT w_L PLASTIC LIMIT w_P WATER CONTENT w WATER CONTENT % (20 40 60)	BULK DENSITY γ P.C.F.	REMARKS
927.0	Icelevel									
0.0	Ice									
1.0	Water									
919.5						920				
7.5	Organic Silt (Trace of sand) Soft		1	SS&TW	2;P				104	Gr 0% Sa 29% Si 69% Cl 2% I=4.4
			2	TW	P	910	+2.3 +3.0		93	
			3	TW	P		+2.6		102	I=4.9 Gr 0%)
			4	TW	P	900	+3.0		97	Sa1%) Si93%) I=4.9
			5	TW	P		+4.6		91	Cl 6%) I=6.7
			6	TW	P	890	+4.0		97	I=3.7
			7	TW	P		+3.3		98	I=3.0
877.0						880	+4.0			
50.0	Silty clay to clayey silt (occasional seams of silty sand) Firm		8	TW	P		+3.0 +3.0		114	
			9	TW	P	870	+2.6		111	
			10	TW	P	860	+2.0		106	
			11	TW	P	850	+1.7		108	
831.0						840				
96.0	Silty sand. Compact to Very Dense		12	SS	11	830				
			13	SS	10					
			14	SS	20	820				
			15	SS	10					
805.5			16	SS	0/6"	810				
121.5	End of borehole.					800				

FORM OB-MT-126 (FORMERLY OB-MS-126)
65-1831

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

JOB 66-F-4 LOCATION Hwy. 520 & Distress Crk., Sta 18/48, 15' to Rt. of ℄ ORIGINATED BY V.K.
W.P. 333-63 BORING DATE Jan. 20, 1966. COMPILED BY V.K.
DATUM Geodetic BOREHOLE TYPE Drive BX & NX Casing & Wash. CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE
927.0	Icelevel					
0.0	Ice					
920.5	Water					920
6.5	Organic silt (trace of sand) Soft		1	SS	2	
			1A	TW	P	
			2	TW	P	910
			3	TW	P	
			4	TW	P	900
			5	TW	P	
			6	TW	P	890
			7	SS	2	
882.0			8	TW	P	880
45.0	Silty clay to clayey silt. Firm		9	SS	7	
						870
			10	TW	P	
						860
			11	SS	3	
						850
			12	TW	P	
						840
830.0						830
97.0	Silty sand. Dense to Very Dense		13A	SS	31	820
			13	SS	100 for 5"	810
806.5			14	SS	100 for 5"	
120.5	End of borehole.					800

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT
20 40 60 80 100
SHEAR STRENGTH P.S.F.
+ Field Vane
o Unconfined Compression
400 800 1200 1600 2000

+4.5 o
+4.0 o
+3.0 o
+4.0 o
+3.0 o
+3.8 o
+5.0 o
+2.1 o
+2.3
+3.0
+2.0
+2.6

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
w_P w w_L
WATER CONTENT %
20 40 60

BULK DENSITY γ P.C.F.	REMARKS
	Gr 0% Sa 20% Si 80% Cl 0%
104	Gr 0% Sa 2% Si 92% Cl 6% I=3.1
103	I=3.9
98	Gr 0% Sa 2% Si 74% Cl 24% I=3.5
o	
95.5	
106	
107.5	

FORM DB-MT-126 (FORMERLY DB-ML-126)
65-1831

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

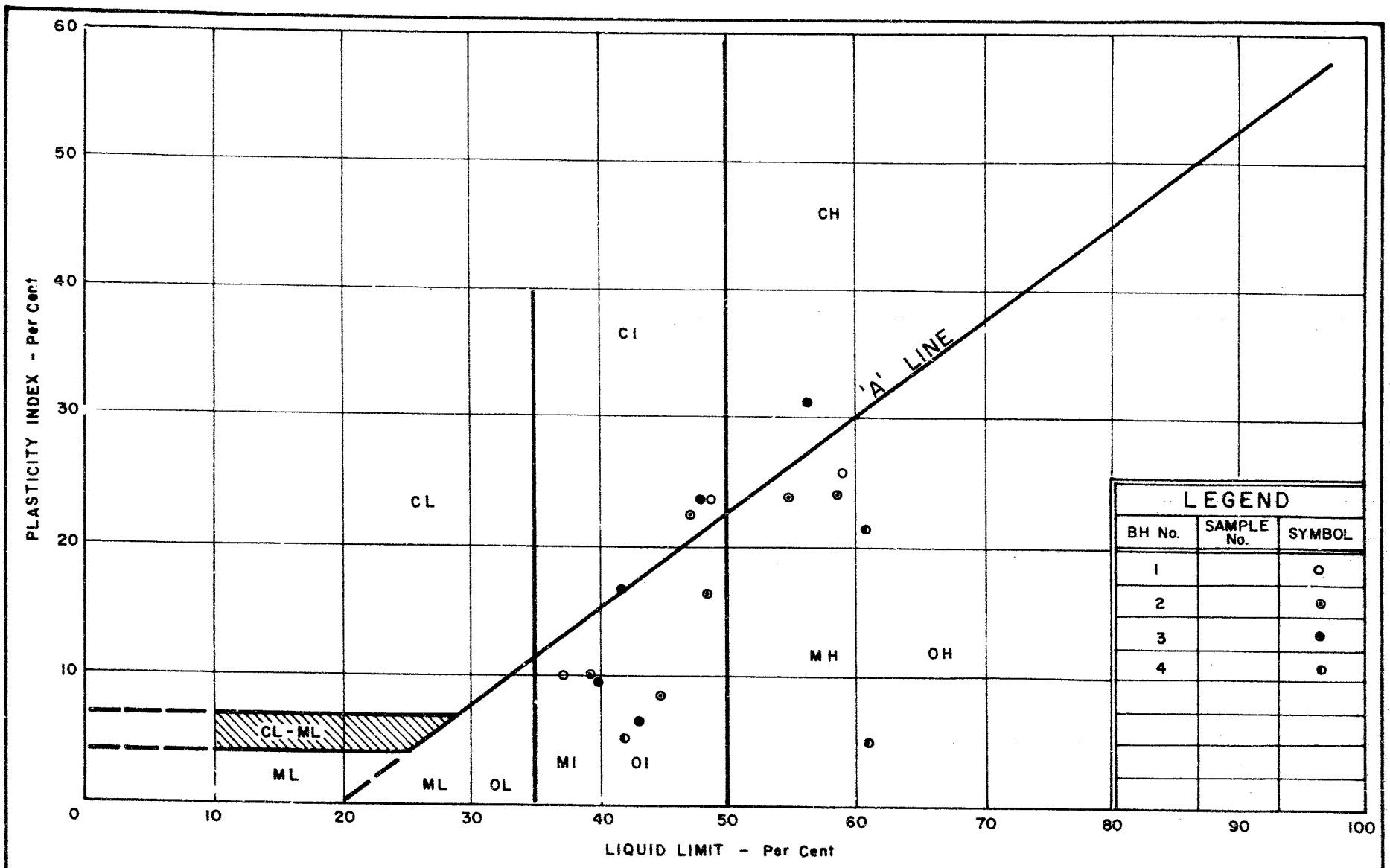
RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 66-F-4 LOCATION Hwy. 520 & Distress Crk., Sta. 18+20 @ ℄ ORIGINATED BY V.K.
W.P. 333-63 BORING DATE Jan. 27, 1966 COMPILED BY V.K.
DATU Geodetic BOREHOLE TYPE Drive NX Casing & Wash. CHECKED BY dhk

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. + Field Vane, O Unconfined Compression (400 800 1200 1600 2000)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w / WATER CONTENT % (20 40 60)	BULK DENSITY γ P.C.F.	REMARKS
▼ 927.5 Groundlevel										
W.L.	Sandy silt to silty sand and organics. (Trace of clay)		1	TW	P				113	Gr 0% Sa 19% Si 79% Cl 3%
920.5			2	TW	P	920	+2.8			
7.0							+3.6			Gr 0% Sa 76% Si 23% Cl 1%
			3	TW	P				96	
							+3.2			
	Organic Silt		4	TW	P				105	Gr 0% Sa 7% Si 79% Cl 4%
	(trace of sand)					910	+4.0		108	
	Soft		5	TW	P				99	
							+3.6			
901.0			6	TW	P					
26.5	End of borehole.					900	+3.0			
						890				

FORM 08-MT-252
(REV. JUNE 1965)
65-1624



DEPARTMENT OF HIGHWAYS
MATERIALS and TESTING DIVISION
ONTARIO

PLASTICITY CHART

W.P. No. 333 - 63
JOB No. 66-F - 4

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
	IN TERMS OF EFFECTIVE STRESS $\tau_f = c' + \sigma' \tan \phi'$
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF TOTAL STRESS $\tau_f = c_u + \sigma \tan \phi$
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

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		
	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

Department of Highways Ontario

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

Mr. J.B. Curtis,
Regional Bridge Location Engineer,
North Bay Regional Office

Bridge Division,
Downsview, Ontario

March 6, 1967

Distress River Bridge on Hwy. 520
W.P. 333-63, Site No. 44-71
District 11 - Huntsville

86-F-4

In reply to your recent memo regarding this structure, we are of the opinion that no further rip-rap is required other than that shown on the final bridge plans which you have received.

In this regard Mr. J. Harris has indicated the estimated scour for the next 25 years, a copy of which is attached herewith. Mr. Stermac was also given a copy, and it is his opinion that the approach embankments would be stable if scour occurred as indicated, hence no further rip-rap protection is required.

We have received a drawing from A.G. Kelly of the Regional Road Design Office showing the proposed muskeg excavation. The proposed scheme appears satisfactory, however we will discuss this with Mr. Stermac and give our comments on this later.

As to the number of 'B' type rails on drawing number one, this figure is correct as it refers to the pipe railing and not to the number of spaces.

C.S. Grebski,
Bridge Design Engineer

CSG:rd

Attach.

c.c. M. Stoyanoff
A.G. Stermac
A.G. Kelly

cc: Foundations Office (Rm. 110)

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

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

February 23, 1967

Distress River Bridge on Hwy. 520,
W.P. 333-63; Bridge Site 44-71
District 11 (Huntsville)

With reference to Mr. J. B. Curtis' memo of February 21, 1967, to you regarding the above structure, we would like to state that we are in agreement with Mr. Curtis' statement that the "berms" on the river banks are essential for the stability of the bridge approaches.

The suggestion or intention that the poor material be excavated and replaced with a better material is certainly a good one. However, it would appear to us that a subexcavation in the area of the abutments and in front of them in the direction of the river, such excavation is not necessary. Although the material contains organics, it is essentially a granular soil, and we are of the opinion that the replacement material would not be substantially better to warrant the expenditure. However, should replacement be undertaken, it is mandatory that all the grading be completed prior to bridge construction.

Since piles are to be used and part of the replacement will have to be carried out under water, a granular material not containing pebbles or boulders, will have to be used. Such material would have to be, in all probability, well protected against scour. It appears, therefore, that irrespective of what is finally decided upon regarding the subexcavation, the river banks will have to be rip-rapped once the piles are in place.

A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

AGS/ader

cc: Messrs. J. B. Curtis
K. Stoyanoff
A. G. Kelly

Foundations Files
Gen. Files

Department of Highways Ontario
Copy for the information of

Mr. A.G. Stermac

Mr. C.S. Grabski,
Bridge Design Engineer,
Downsview.

Bridge Planning Section,
Northern Region.

February 21, 1967.

Distress River Bridge on
Highway 520, District 11,
W.P. 333-63,
Bridge Site 44-71

I have received for my files one complete set of drawings of the above noted bridge D5917 - 1 to 9 inclusive. I would like to bring to your attention again the matter of the rip-rap as previously mentioned to you in my memorandum of November 28, 1966. As outlined in the Foundation Report, the underlying stratum in the vicinity of this crossing lends itself to sheer failure. For this reason the Foundation Report recommends the placement of the bridge abutments a distance of some 20' to 25' back from the top of the bank of the existing river. These banks will then provide the counter balance to the approach fills thus obviating the possibility of a sheer failure. The construction of the road and structure, however, will create a higher velocity than has been experienced at this location in the past. The very loose sandy silt to silty sand and organics and the soft organic silt, will undoubtedly scour out at very low velocities. I would therefore like to reiterate my earlier recommendations of the placement of the rip-rap over the entire bed of the stream in the vicinity of the crossing as indicated on the preliminary plan returned to you with the above mentioned memorandum.

There is a notedon your drawing number one to the effect that "soft organic material to be removed prior to placing fill". This note I presume applies to the approach roadway rather than to the bridge itself. Mr. A. G. Kelly of the Regional Road Design Office will likely be intouch with either yourself or Mr. M. Stoyanoff to discuss this point and that of the item for "excavation for abutmentfootings". The last word that I had from Mr. Kelly in this regard was that he intended to excavate the entire loose organic material to a depth of 1' in excess of the existing depth. As I pointed out to Mr. Kelly any material that is removed from the underside of the structure must be replaced in order to afford the counter balance as mentioned above. If it is removed, I believe we should provide a special in the contract to draw the

(Cont'd . . . . . /2)

contractors attention to the fact that this fill must be replaced to the existing elevation. I feel it would definitely be worth our while to discuss the method of construction, i.e. removal and backfilling of the berm material with Mr. Stermac in view of the dicey nature of the underlying material.

One other very small point I would like to bring up regarding your drawing number one is that of the number of "B" panels required. You have indicated nine are required, however, I believe this is a misprint and it should read nineteen.

J.E. CURTIS
REGIONAL BRIDGE LOCATION ENGINEER

JEC/et

cc: Mr. M. Stoyanoff
Mr. A.G. Stermac
Mr. A.G. Kelly

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

From: Bridge Planning Section,
Northern Region.

Date: November 23, 1966.

Our File Ref.

In reply to

Subject: Distress River Bridge,
Highway 520, District 11,
W.P. 333-63,
Br. Site 44-71

66-F-4

Enclosed find a revised print of the preliminary plan D 5917-P1 for the above noted bridge for your information. The design is as per your foundation report.

J.B. CURTIS,
REGIONAL BRIDGE LOCATION ENGINEER.

Enclosure

JBC/et

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A.G. Stermac, Principal Foundation Engineer, Lab. Build. Downsview.

From: Bridge Planning Section Northern Region.

Date: October 24, 1966.

Our File Ref.

In reply to

Subject: Distress River Bridge,
Highway 520, District 11,
Huntsville,
W.P. 333-63,
Br. Site 44-71

66-F-4

Enclosed find one copy of the Preliminary Bridge Plan for the above noted crossing. This bridge is designed within the requirements of of the Foundation Report as issued by your section.

If however, you should have any comments on our proposal, please don't hesitate to contact us.

J.B. CURTIS
REGIONAL BRIDGE LOCATION ENGINEER.

Encl:

JBC/et

Advised John Curtis pertaining to the construction of access [illegible] prior to the construction of structure. It was agreed that this matter will be discussed with the Planning Section and advise the maintenance if any construction.

M. Devata
Oct 26/1966

DEPARTMENT OF HIGHWAYS ONTARIO

66 F-9

MEMORANDUM

To: Mr. B. R. Davis
Bridge Engineer
Downsview

Att: M. Stoyanoff
Bridge Contract Engineer

From: Road Design Office
Box 67
North Bay

Date: March 1, 1967

Our File Ref.

In reply to

Subject: W.P. 333-63, Distress River Bridge, Highway #520, District #11, Huntsville, Site No. 44-71

Road Design is presently making provisions in the contract for the removal and backfilling of the muskeg under the approach fills. It is essential that the Road Design drawings show the limits of this excavation and backfill within the vicinity of the structure. For this reason, I have illustrated on the enclosed print of D5917-1, our intentions.

This proposal may not agree with the intent of the Bridge Office particularly since it requires that the piles would now have to be driven through the muskeg backfill which will be a sandy type earth borrow, and, also since the item for earth excavation for structure foundations could be reduced by 788 cu. ft. as the excavation would be performed as common earth and the footings could be formed on top of the earth backfill brought to the proper elevation.

I solicit your comments.

A. G. Kelly
Sr. Project Design Supvr.
For: H. McArthur
Reg. Road Design Engineer

AGK: les

D.H.O.
TORONTO
RECEIVED
MAR 3 1967
BRIDGE
OFFICE

We are in agreement with above proposal
March 8/67 A Stevanoff
C. Grebski approved