DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 31M-35

DIST. 14 REGION

W.P. No.

CONT. No. MUNICIPAL

W. O. No. 72-11007 (R)

STR. SITE No. 47-119

HWY. No. LOC.

LOCATION PROP. RECONSTRUCTION OF BLANCHE RIVER BRIDGE TWP. MARTER

No of PAGES - —

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. J. McAllister, (4)
Regional Bridge Planning Supervisor,
Northern Region,
North Bay, Ontario.

FROM: Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

ATTENTION:

DATE: May 12, 1972.

OUR FILE REF.

IN REPLY TO MAY 19 1972

SUBJECT:

GEOCRES# 31M-35

FOUNDATION INVESTIGATION REPORT
For
The Proposed Reconstruction of
Blanche River Bridge, Site 47-119
Chamberlain and Marter Twp. Boundary
Concession 3 and 4
District of Timiskaming
District #14 (New Liskeard, Ont.)
W.O. 72-11007 (R) -- W.P. Nil

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

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

A. G. Stermac,
PRINCIPAL FOUNDATIONS ENGINEER.

AGS/ao
Attach.

cc: Messrs. D. W. Farren
B. R. Davis
A. Rutka
H. McArthur
T. A. Sharpe
B. J. Giroux
R. Northwood
G. A. Wrong
B. A. Singh

Foundations Files
Documents

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FOUNDATION INVESTIGATION REPORT
FOR
The Proposed Reconstruction of
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District #14 (New Liskeard, Ont.)
W.O. 72-11007 (R) --- W.P. Nil

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1. INTRODUCTION:

A request for a foundation investigation for the proposed bridge reconstruction at the crossing of Township Rd. and Blanche River was received from Mr. T.A. Sharpe, District Engineer via 'Internal Request' (No. A 07265), dated December 10, 1971.

Subsequently, the Foundations Office carried out a field investigation, to determine the subsoil conditions existing at the site.

This report contains the results of this investigation and our recommendations for the proposed reconstruction and remedial measures for stabilizing the forward slopes.

2. DESCRIPTION OF SITE:

The site is located some 3.5 miles east of the junction of Hwy. #11 and Wawbewawa Rd., on the Township Road. At this location the Township Road crosses the Blanche River on a 10-span bridge of total length 228 feet.

The Blanche River flows in a general north to south direction and follows a somewhat meandering course. The surrounding area, with the exception of the deep and wide River Valley is flat and bush covered.The existing river channel is about 90' to 100' wide.

Physiographically the site is located on the New Liskeard Clay Plain. Here the subsoil consists of deep deposits of varved clay overlying glacial till and bedrock.

3. FIELD AND LABORATORY INVESTIGATION PROCEDURES:

A total of five sampled boreholes was carried out during the course of the field work. Boring was achieved by means of conventional diamond drilling equipment adapted for soil sampling purposes and a Bombardier Mounted Continuous Flight Auger.

During the field work, disturbed samples were obtained by means of a standard split-spoon; the energy used in driving it conformed to the requirements of the Standard Penetration Test. (SPT). 'Undisturbed' samples were recovered using 2 inch I.D. Shelby Tubes, which were pushed into the soil hydraulicly.

Where possible, the in-situ undrained shear strength of the cohesive deposits was determined using a standard field vane having dimensions such that the shear strength equals twenty times the applied torque at failure.

The boreholes were surveyed in the field by District Personnel, using temporary reference points for horizontal (chainage and offset) and vertical (elevation) measurements. The locations and elevations are shown on Drawing 72-11007(R) A which accompanies this report.

All samples were visually examined and classified at the site as well as in the laboratory. Following this insepction, laboratory tests were carried out on selected samples to determine the following physical properties:

Atterberg Limits (L_L, P_L)

Natural Moisture Content (W)

Undrained Shear Strength (C_u)

Bulk Density (γ)

Effective Stress Parameters (C', ϕ')

The test results are summarized on the Record of Borehole sheets contained in the Appendix of this report.

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4. SOIL TYPES AND SOIL CONDITIONS:

4.1) General:

Generally uniform subsoil conditions were found to prevail over the site area. The subsoil consists of a surficial sand fill layer followed by a deep deposit or varved clay.

The boundaries between different deposits are shown on the Record of Borehole sheets attached to the Appendix. The estimated stratigraphical profile of Drawing 72-11007 (R) A is based upon this information.

From ground level downward, the various strata are described in some detail with regard to soil types and soil properties as follows.

4.2) Silty Sand (Fill Material):

This deposit was encountered in Boreholes #1, #2, and #5. The material consists of gravel (5%), sand (61%), silt (25%) and clay (9%). The thickness ranges from 7 to 11 ft. The relative density may be described as very loose to compact.

4.3) Varved Clay with Traces of Sand:

This is the predominant subsoil deposit at the site and was encountered in each boring. It extends from the ground surface or from below the roadway fill to at least 63 ft. The thickness varies, depending on the location of the boreholes. In B.H. #4 refusal to conventional sampling methods was reached at elevation 46.5. At the other borehole locations the lower boundary was not determined since the borings were terminated in this zone.

The material in the deposit consists of layers of silty clay and clayey silt with traces of sand in random order of occurrence, and the thickness of the various layers, which are visible to the naked eye, ranges from about 1/4 to about 2 inches. The extreme upper portion of the overall deposit in B.H. #3

.....4

is desiccated through oxidation as evidenced by the brownish colour.

Atterberg limit tests and natural moisture content tests gave the following results for the various layers.

Separated Layers	Silty Clay	Clayey Silt
Liquid Limits %	42 to 50	23 to 34
Plastic Limit %	28 to 34	18 to 24
Moisture Content %	50 to 54	23 to 35

Typical grain-size distribution curves are included in the Appendix of this report (Fig. 1).

In order to determine the undrained shear strength of the soil, certain tests, as mentioned previously, were carried out in the field and in the laboratory. The results of these tests are summarized below:

Field Vane Test (p.s.f.)	720 to 2080
Triaxial Comp. Test (p.s.f.)	620 to 1910
Sensitivity	2.9 to 16.0

A plot of all undrained shear strength measurements versus elevation is shown on Figure 2.

In order to provide information for stability analyses in long term consideration, laboratory tests were performed to determine effective stress parameters C' and ϕ'. As a result of these tests the following values are recommended for design:

$C' = 0$ p.s.f.

$\phi' = 24^{\circ}$

5. GROUNDWATER CONDITIONS:

The following groundwater levels were observed during the course of the field work.

B.H. #1	Elevation 76.3
B.H. #2	Elevation 72.3
B.H. #3	Dry
B.H. #5	Elevation 80.0

An artesian condition was encountered in B.H. #4. A maximum head of 4 ft. above the river water level corresponding

to an elevation of 71.7 was recorded.

At the time of the field investigation, the water level in Blanche River was at elevation 67.7.

6. DISCUSSION AND RECOMMENDATIONS:

It is proposed to reconstruct the south end of the Blanche River bridge, and also to reshape the existing natural slope.

The existing bridge consists of 10 spans, (15' - 15' - 15' - 14' - 18' - 89' - 17' - 15' - 15' - 15'), the total length being 228 ft. The structure consists of a timber truss with laminated deck and is supported on timber piles. The maximum height of the embankment is about 44 ft. above the river bed. The water level in the river at the time of investigation was 32.3 ft. below the deck. It is evident that some lateral earth movements under the south end of the bridge have occurred.

The forward slopes of the existing bridge are about 2.5 horizontal to 1 vertical at the north end and 1.4 horizontal to 1 vertical at the south end. This indicates a probable low factor of safety at the south end of the bridge.

To correct this condition new forward slopes with acceptable factors of safety were designed using the effective stress analysis.

The forward slopes under the south abutment can be stabilized by flattening the overall slopes in the manner described on the enclosed Drawing No. 72-11007B. This would result in a longer bridge. The additional 30 ft. span may be supported on timber piles driven at least 25 ft. into the original ground. The safe load carrying capacity of the piles may be calculated using the following formula.

Safe load (per pile) = L/3 tons

where L = Embedded length in feet

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7. MISCELLANEOUS:

The boring programme was carried out during the period of January 7 to January 10, 1972.

Equipment used on the site was owned and operated by Master Soil Investigation Ltd.

The field work was supervised by Mr. P. Payer, Project Foundations Engineer who also prepared this report. This report was reviewed by Mr. K. G. Selby, Supervising Foundations Engineer.

P. Payer, P. Eng.

REGISTERED PROFESSIONAL ENGINEER
P. PAYER
PROVINCE OF ONTARIO

K. G. Selby, P. Eng.

PP/ao
May 11, 1972.

APPENDIX I

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 72-11007 (R) LOCATION Sta. 0+35; 2'LT. ORIGINATED BY P.P.
W.P. NIL BORING DATE Jan. 7, 1972 COMPILED BY P.P.
DATUM Temporary BOREHOLE TYPE Continuous Flight Auger CHECKED BY

ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FOOT	ELEV. SCALE
101.3	Ground level					100
0.0	Silty sand with some gravel and clay. Fill material. (Occasional zones of silty clay)		1	SS	8	
91.0			2	SS	4	90
10.3	Varved clay; layers of silty clay and clayey silt Soft to stiff.		3	TW	PH	
			4	TW	PH	80
			5	TW	PH	70
			6	TW	PH	60
			7	TW	PH	50
			8	SS	1	40
28.0						30
73.3	End of borehole.					20

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT
SHEAR STRENGTH P.S.F.
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE
1000 2000
+5.5 +10.6 +7.2 +8.0 +6.3 +6.7 +9.0 +8.0 +8.1 +3.9

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
WATER CONTENT %
15 30 45

BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
110	
112	W.L. El. 76.3
111.5	0 1 39 60
112	
111	0 1 31 68
	0 1 70 30

20
15 5 % STRAIN AT FAILURE
10

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 72-11007 (R) LOCATION Sta. 0+68; 4' LT. ORIGINATED BY P.P.
W.P. NIL BORING DATE Jan. 8 & 9, 1972 COMPILED BY P.P.
DATUM Temporary BOREHOLE TYPE Continuous Flight Auger CHECKED BY

ELEV. / DEPTH	SOIL PROFILE: DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT; SHEAR STRENGTH P.S.F. (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w; WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
98.3	Ground level						1000 2000	15 30 45		
0.0	Silty sand with some gravel and clay. Very loose. (Fill)		1	SS	3					5 61 25 9
91.5										
6.8	Varved clay layers of silty clay and clayey silt. Traces of sand.		2	TW	PH	90	+6.0		112.5	
			3	TW	PH		+5.3		111	0 1 54 45
			4	TW	PH		+8.0			
			5	TW	PH		+10.5		110.5	
			6	TW	PH	80			112	
							+ 9.0			0 1 37 62
	Stiff.		7	TW	PH		+ 8.8		109	W.L. El. 72.3
			8	TW	PH	70	+ 9.0		110	
							+18.0			
			9	TW	PH	60	+ 12.0		112	0 1 49 50
							+10.0			
			10	TW	PH	50	+ 11.7		112	
							+ 4.0			
33.9			11	TW	PH	40			112	
64.4	End of borehole.					30				

20
15 ⊹ 5 % STRAIN AT FAILURE
10

FORM OB-MT-126 (REV. 1971)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 72-11007 (R) LOCATION Sta. 0 + 45 44' Lt. ORIGINATED BY DP

W.P. Nil BORING DATE Jan. 9, 1972 COMPILED BY JB

DATUM Temporary BOREHOLE TYPE Continuous Flight Auger CHECKED BY [illegible]

ELEV. / DEPTH	SOIL PROFILE: DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT; SHEAR STRENGTH P.S.F. (o UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB. VANE)	LIQUID LIMIT w_L, PLASTIC LIMIT w_P, WATER CONTENT w; WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS: GR. SA. SI. CL.
102.5	Ground level						1000 2000	15 30 45		
0.0	Silty clay. Some sand. Hard.					100				
			1	TW	PH			o	121	(Dry)
91.0			2	TW	PH			o	117	0 9 10 81
11.5	End of borehole.					90				

FORM OB-MT-136 (REV. 1971)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 72-11007 (R) LOCATION Sta. 1+29; 3' RT. ORIGINATED BY P.P.

W.P. NIL BORING DATE Jan. 9 & 10, 1972 COMPILED BY P.P.

DATUM Temporary BOREHOLE TYPE Washbore - BX Casing CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT — SHEAR STRENGTH P.S.F. (o UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB. VANE)	LIQUID LIMIT w_L, PLASTIC LIMIT w_P, WATER CONTENT w — WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
67.7	Water (Ice) level Ground level						1000 2000	15 30 45		
	Varved clay Layers of silty clay and clayey silt to silt. Traces of sand.		1	SS	3	60	+3.3 +4.8 +8.7	o o ⊢ ⊣ o o ⊢ ⊣ o	114 116	0 2 60 38
46.5	Stiff.		2 3 4	TW TW TW	PH PH PH	50		o o	124	0 3 89 8
21.2	End of borehole. (Refusal)					40				

FORM OB-MT-126 (REV. 1971)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 72-11007 (R) LOCATION Sta. 3 + 09; 3' RT. ORIGINATED BY P.P.

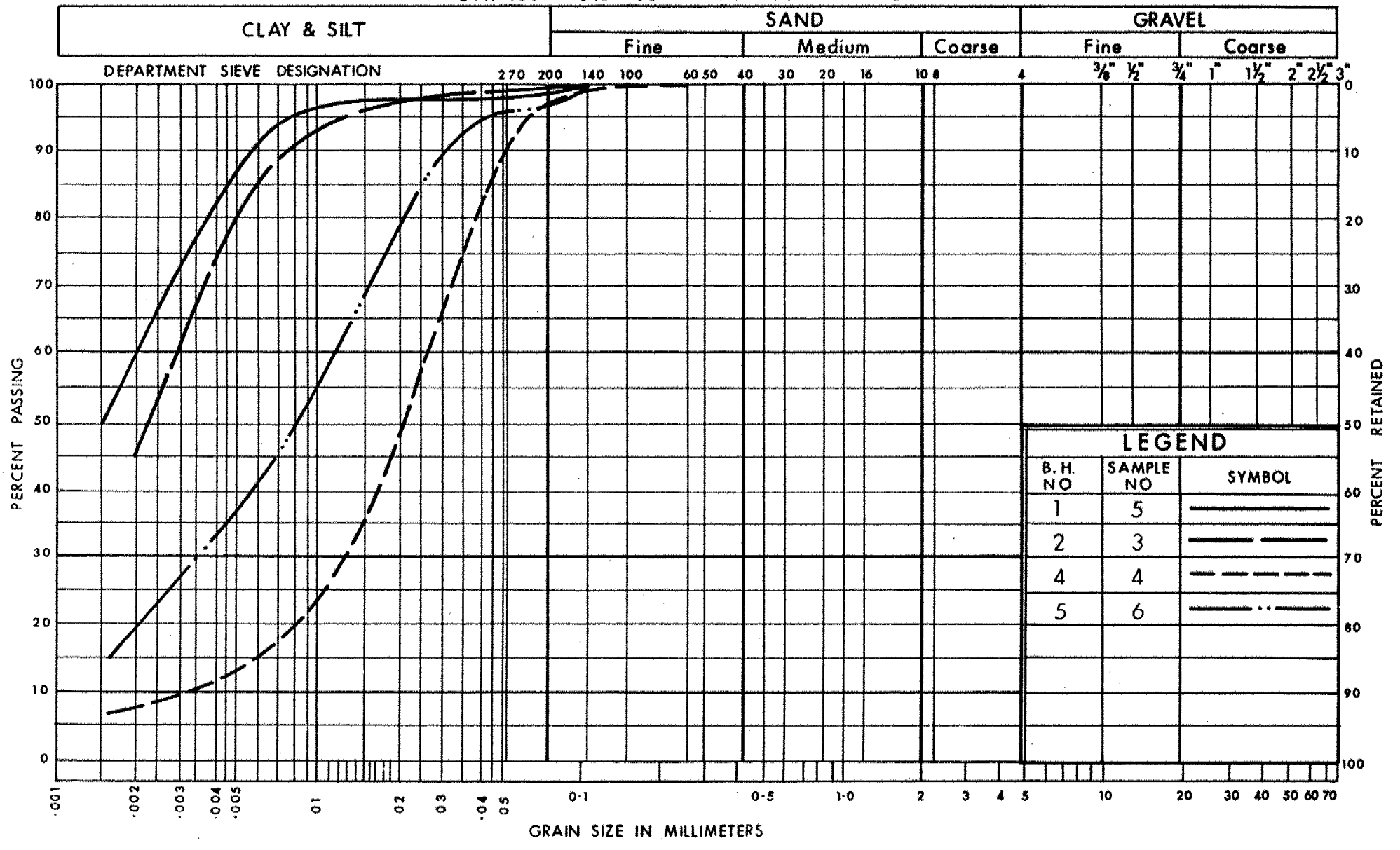
W.P. NIL BORING DATE Jan. 10, 1972 COMPILED BY P.P.

DATUM Temporary BOREHOLE TYPE Continuous Flight Auger. CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT; SHEAR STRENGTH P.S.F. (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB. VANE)	LIQUID LIMIT w_L, PLASTIC LIMIT w_P, WATER CONTENT w; WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS
100.0	Ground level.						1000 2000	15 30 45		GR. SA. SI. CL.
0.0	Silty sand with some gravel and clay. Compact to loose. (Fill material)		1	SS	13			○		
89.1			2	SS	11	90		○		0 49 35 16
10.9	Varved clay. Layers of silty clay and clayey silt. Trace of sand. Firm to stiff.		3	TW	PH		+ 3.0 ● +2.9	○	124	W.L. El. 80.0
						80	+3.1			
			5	TW	PH		● + 5.5	○	123	
						70	+ > 2000			
62.2			6	SS	10		+ 16.0	○		0 4 77 19
37,8	End of borehole.					60				

FORM OD-MT-1*
REV. AUG. 1971

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO
DESIGN SERVICES BRANCH

GRAIN SIZE DISTRIBUTION

VARVED CLAY

LAYERS OF SILTY CLAY & CLAYEY SILT, TRACES OF SAND

W.P. No.

JOB No. 72-11007(R)

FIG. NO. 1

UNDRAINED SHEAR STRENGTH VS. ELEVATION

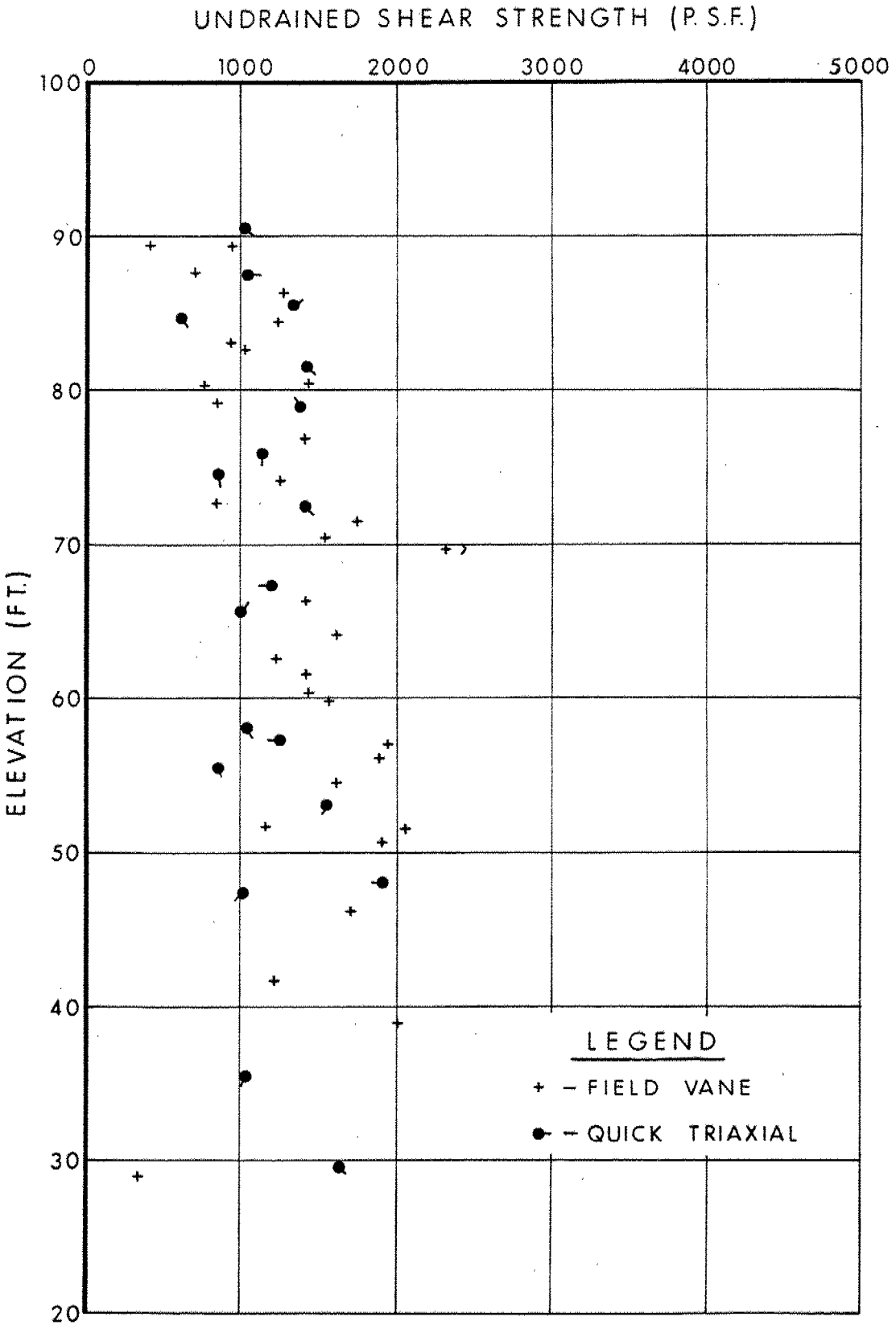


FIG. 2

JOB NO. 72-11007(R)

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

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
	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

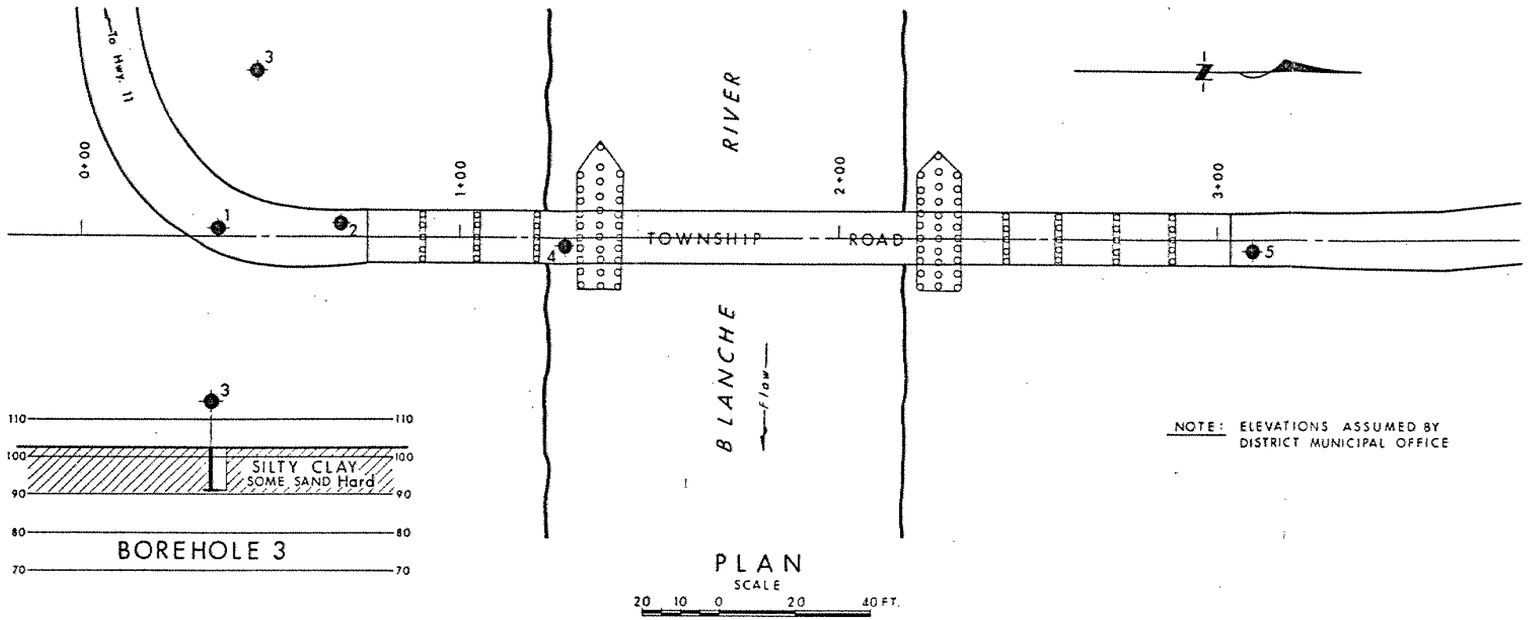
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_o	COEFFICIENT OF EARTH PRESSURE AT REST

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

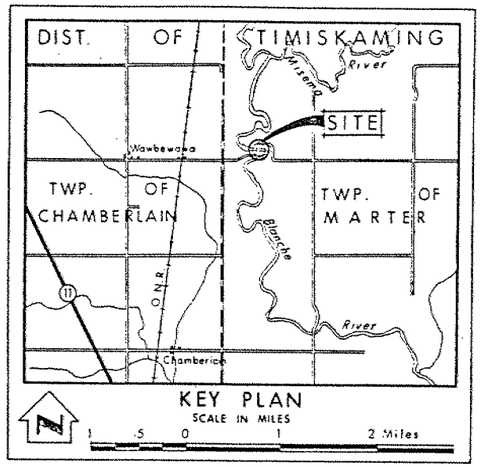
H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



PLAN
SCALE
20 10 0 20 40 FT.

BOREHOLE 3

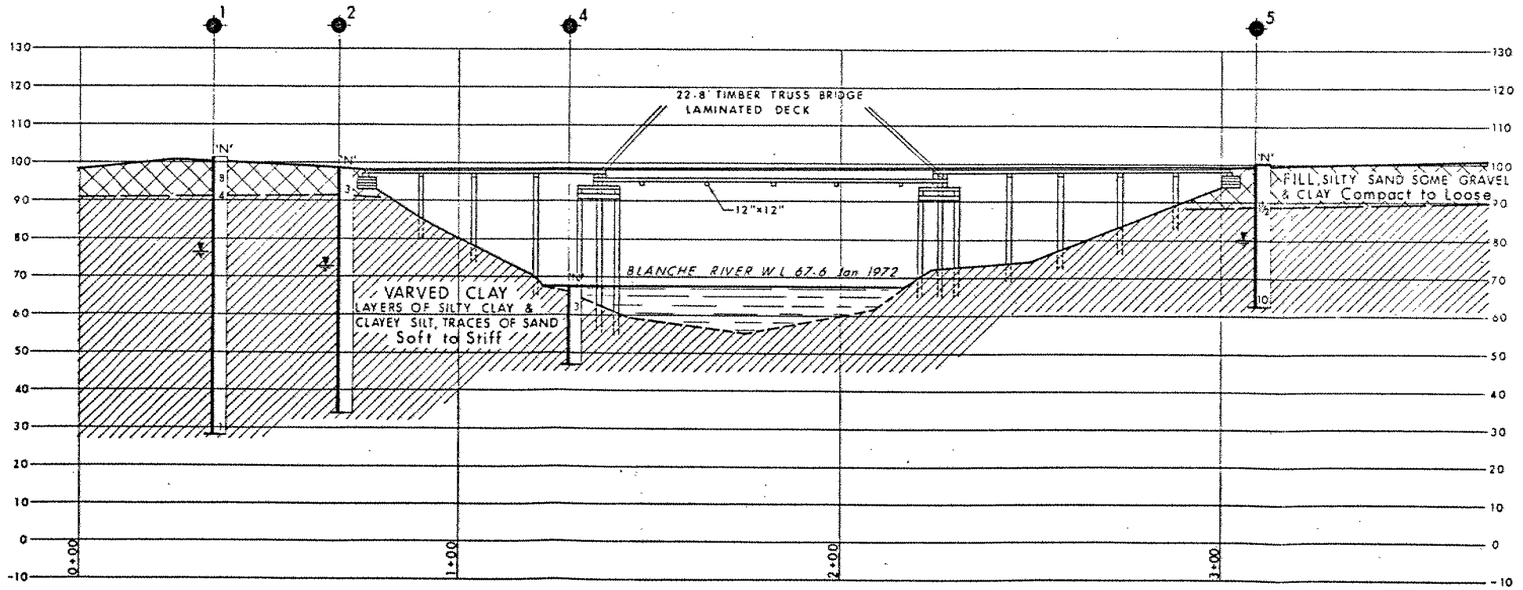
NOTE: ELEVATIONS ASSUMED BY DISTRICT MUNICIPAL OFFICE



LEGEND

- Bore Hole
- Cone Penetration Test
- Bore Hole & Cone Test
- Water Levels established at time of Field investigation. Jan 1972

NO.	ELEVATION	STATION	OFFSET
1	101.3	0+35	2' LT.
2	98.3	0+68	4' LT.
3	102.5	0+45	44' LT.
4	67.7	1+29	3' RT.
5	100.0	3+09	3' RT.



PROFILE
SCALE
20 10 0 20 40 FT.

— 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

REF. PLAN: FROM DIST. MUNICIPAL OFFICE
NEW LISKEARD ONT. Jan. 14, 1972

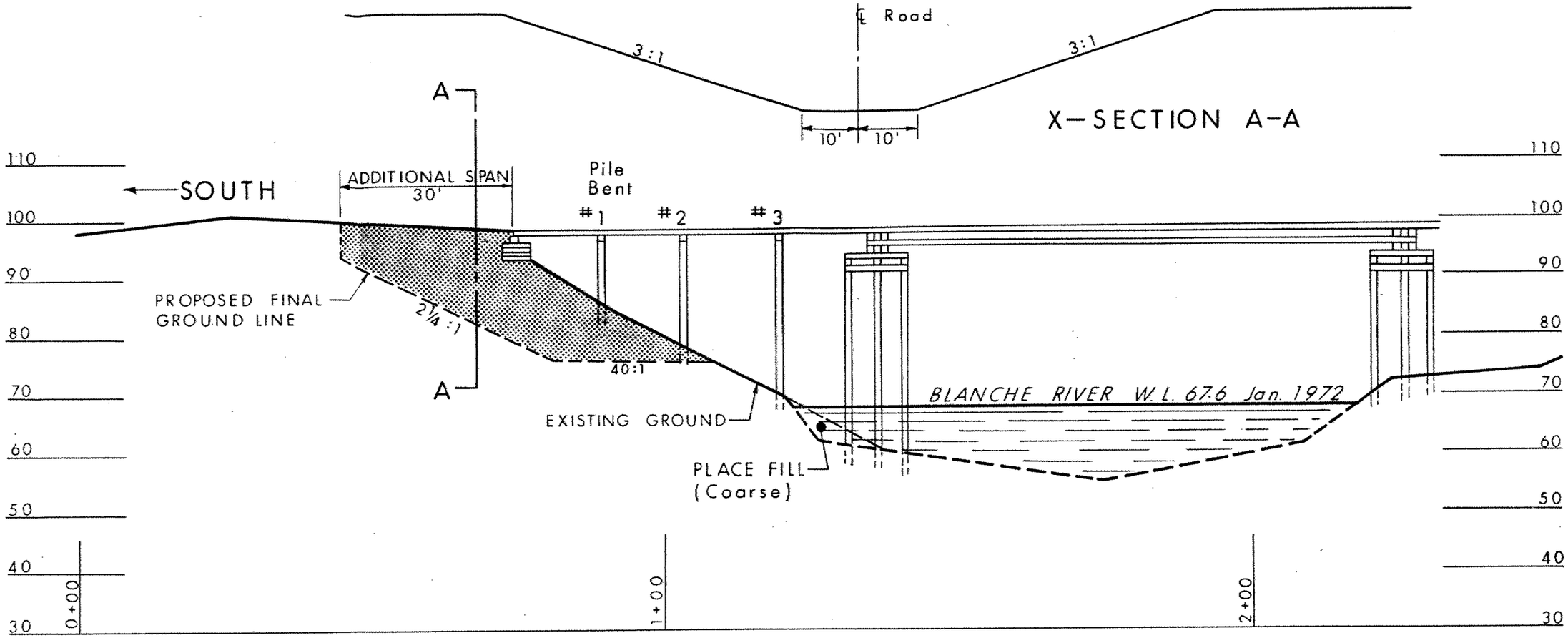
MINISTRY OF TRANSPORTATION & COMMUNICATIONS
DESIGN SERVICES BRANCH — FOUNDATION

BLANCHE RIVER

TOWNSHIP ROAD DIST. NO. 14
Dist. of TIMISKAMING
TWP. MARTER LOT 12 CON. IV

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D. P. P.	CHECKED	W.P. NO.	DRAWING NO. 72-11007A
DRAWN	CHECKED	JOB NO. 72-11007(R)	
DATE May 9, 1972		SITE NO.	BRIDGE DRAWING NO.
APPROVED PRINCIPAL FOUNDATION ENGINEER		CONT. NO.	



℄ PROFILE SCALE 1"=20'

RECOMMENDATION:

1–REMOVE THE SOUTH ABUTMENT, PILE BENTS 1,2 &3 AND BRIDGE DECK

2–REMOVE ALL GROUND ON THE LEFT SIDE OF ROADWAY BETWEEN STA. 0+00± TO STA. 0+70± WHICH IS HIGHER THAN ELEV. 100.0

3–EXCAVATE SHADED AREA (as shown on Profile) TO CONFORM WITH X–SECTION A-A PROCEED FROM HIGHER LEVEL TO LOWER LEVEL

4–DRIVE PILES SAFE LOAD (per pile) = $^{L}/_{3}$ TONS (L= EMBEDDED LENGTH IN FT.) MIN. EMBEDDED LENGTH 25 FT.

5–PLACE RIP–RAP ACCORDING TO HYDROLOGICAL REQUIREMENTS

DEPARTMENT OF HIGHWAYS
MATERIALS and TESTING OFFICE
ONTARIO

BLANCHE RIVER BRIDGE

PROPOSED REMEDIAL MEASURES TO STABILIZE SOUTH END FORWARD SLOPE

DATE Feb. 23, 1972 | W.P. NO. | DRAWING NO. 72-11007B

Form SB-S-30

ISSUING DISTRICT OR SECTION COPY

72-F007(R)

For Internal Supply of Material or Services within the Department

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

INTERNAL REQUEST

Show This Number on Branch Transfer

NIL

A 07265

Mr.A.Rutka, Material & Testing Engineer
(District or Section)

Date Dec.10/71

Att.Mr.Ken.G.Selby, DOWNSVIEW, ONTARIO
(Address)

Supply or Deliver to:	Branch Transfer charges to:
J.T.Kernaghan New Liskeard	Mr.T.A.Sharpe, District Engineer P.O.Box 1390 NEW LISKEARD, ONTARIO

QUANTITY	DESCRIPTION OR PARTICULARS
	To Foundation Investigation and tests Concession 3 and 4 on the Chamberlain and Mather Township Boundary . Site #-47-119
	NOTE: The existing alignment and profile will be retained as is, only proposed to make improvements to the West approach embankment and replace the West end cribs and first pile bent with new piles.
	(2) The field work may be done in conjunction with that to be done for the Legion Road Bridge in Otto Township, Re: Request H-29612 and Internal Transfer No. A-07262 (Copies enclosed)
	(3) Resolution from Council to follow shortly.

WORK ORDER NO. Acct.0010, Chamberlain Twp. | STOCK REQUISITION NO.

Requested by: [signature]
(Signature-Authorized Employee)

14, New Liskeard
(District or Section)