

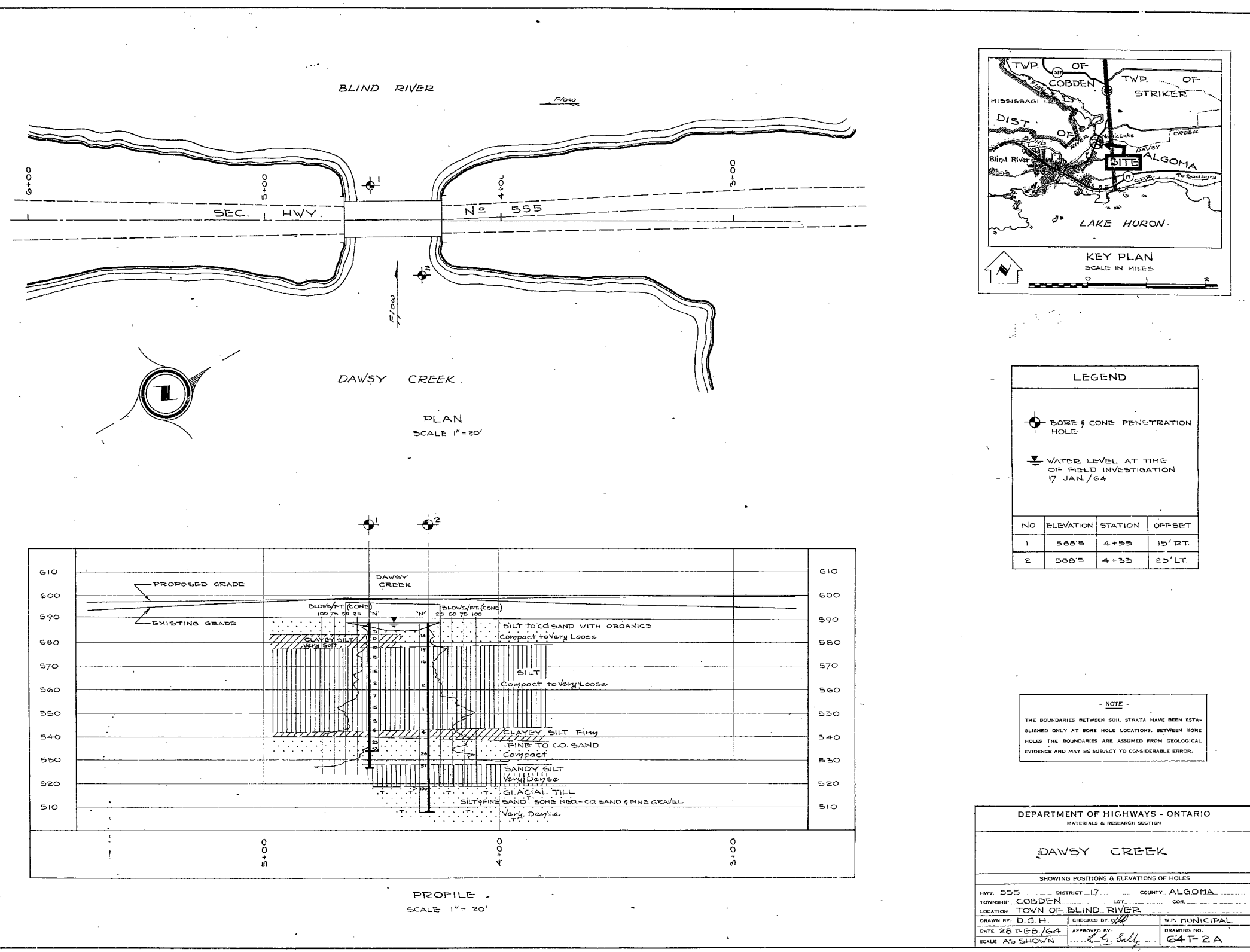
#64-F-2

W.P. MUNICIPAL

Hwy. #555

DAWSY CREEK

BLIND RIVER TOWN



DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

TO: Mr. A. M. Tove,
Bridge Engineer,
Bridge Division.

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

Attention: Mr. S. McCowbie

DATE: March 10, 1964

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT

At

Dawsey Creek, Town of Blind River,
District #18

W.J. 64-F-2 - Mun. W.O. 63-10867

As requested by Mr. E. R. Saint on October 23, 1963,
this Section has recently completed a foundation investigation
at the above-noted site.

The existing bridge is a steel truss supported on timber
piles and spans a small channel cutting through a natural sand bar.
The sand bar was formed by the Blind River across the mouth of a
backwater bay.

The natural channel opening (Dawsey Creek) has been further
narrowed by the placing of granular fill with the result that the
existing structure now spans a gap of only 40' ±.

The results of two sampled boreholes indicate that the
subsoil consists of approx. 10 ft. of very loose granular material,
organics, and clayey silt overlying 60 ft. of essentially compact
stratified fine-grained granular material which in turn, overlies a
very dense silt till. It should be noted, however, that a thin

cont'd. /2 ...

March 10, 1964

layer of clayey silt varying between 2 and 4 ft. in thickness was encountered in both boreholes between el. 539 and el. 544.

The existing soil conditions at the site give rise to three alternate designs. These are discussed in order of economy and feasibility.

1) Replacement of existing structure with flexible type culvert:

This will necessitate removing the top 10-foot thick deposit of very loose granular material and very soft clayey silt down to el. 578 \pm and then backfilling with a coarse granular material which is not scour susceptible under prevailing flow conditions or subject to segregation when dumped under water.

The selection of a culvert will also depend on hydrological considerations which will dictate the amount of cross-sectional area required for proper water flow through the structure.

2) New Structure founded on timber piles:

If it is necessary to build a conventional structure, it could be founded on 1-ft. dia. timber piles driven down to a tip elev. of 555 \pm . This could be a trestle type structure, capable of supporting a safe design load of 15 T/pile. If piles extend above the water level, they should be treated to prevent decay.

3) New Structure founded on end-bearing piles:

A structure could be built on steel end-bearing piles driven to practical refusal at el. 530 \pm . For example, a 12 $\frac{3}{4}$ " dia. steel tube pile should be capable of supporting a safe design load of 50 T/pile. In both cases, pile driving in the field should be controlled by means of the Hiley Formula and D.H.C. Standards DD 1218 & 1219.

cont'd. /3 ...

March 10, 1964

Dewatering:-

Due to the loose nature of the upper part of the subsoil, serious dewatering problems may be encountered in any excavation below the water table.

If sheet piling is used for dewatering purposes, it should be driven to a depth below the excavation base equal to the height of the prevailing water level above it.

If hydrologic conditions indicate scour is a possibility, it may be necessary to drive sheet piling at each pier as scour protection.

Miscellaneous:-

Field work was carried out between January 17 - 25, 1964, under the supervision of Mr. G. Cherrington, Project Foundation Engineer. This report was prepared by Mr. Cherrington, under the supervision of Mr. K. G. Selby, Senior Foundation Engineer.

Drilling equipment used was owned and operated by Canadian Longyear Drilling Co.

We believe that this report contains the necessary information for your design requirements. However, should there be any queries in connection with this project, please feel free to contact our office.

CCC/MdeF
Attach.

cc: Messrs. A. M. Toye (3)
J. P. Howard
W. M. Shiells
E. R. Saint

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

Foundations Office
Gen. Files

APPENDIX I.

DECLARATION SECTION

ORIGINATED BY G.C.

MP, FO dy G.C.

RECEIVED BY K.S.

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT			BULK DENSITY	REMARKS
ELEV. / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	BLOWS / FOOT	BLOWS / FOOT	BLOWS / FOOT	PLASTIC LIMIT	WATER CONTENT	WATER CONTENT		
						20	40	60	80	100	W.P.	W.L.	
						250	500	750	1000	1250	20	40	60
588.5	W.L.												
0.0	Water												
2.5	Silt to coarse sand, compact to very loose with organics.	1	SS	14									
578.5		2	SS	1	580								
10	Silt, compact to very loose.	3	SS	19									
		4	SS	16	570								
		5	SS	2	560								
		6	SS	1	550								
543.5		7	SS	4	540								
45	Clayey silt, firm. (Layered)	8	TW	PM									
539.5		9	SS	26	530								
49	Fine to coarse sand compact.	10	SS	51									
529.0		11	SS	>100									
59.5	Sandy silt, very dense some med.-coarse sand trace of fine gravel.	12	RC		510								
519.5													
69	Glacial Till V. dense.												
	Silt & fine sand. Some med.-coarse sand and fine gravel.												
507.5													
81.0	End of borehole.				500								

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE :- THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS :-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

TYPE OF SAMPLE

S.S	SPLIT SPOON	T.W.	THINWALL OPEN
W.S	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S	CHUNK SAMPLE	R.C.	ROCK CORE
S.T	SLOTTED TUBE SAMPLE		
	P.H.		SAMPLE ADVANCED HYDRAULICALLY
	P.M.		SAMPLE ADVANCED MANUALLY

SOIL TESTS

Q _u	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q _{cu}	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q _d	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

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

MEMORANDUM

To: Mr. T. J. Kovich
Soils, Mun. Rds. Liaison Eng.
Downsview, Ontario

FROM: Materials & Research
North Bay, Ontario

DATE: October 23, 1963

Our File Ref.

IN REPLY TO

SUBJECT: Re: Town of Blind River

64-F-2

Attached is correspondence just received from Sault Ste. Marie. They require an estimate on a foundation investigation at Dawsy Creek. It is proposed to replace the existing obsolete structure with structural pipe.

Could you arrange with the Foundations section to provide the cost estimate.

E.R. Saint

E.R. Saint
Reg. Mat. Eng.

ERS/ef
c.c. File.

Quote

15 00 00

*FT sent to W Shields
cc to E Saint
on Nov 5/63*

*T.T. rec'd from W Shields
Nov. 7/63 authorizing work
to proceed.*

Nov 8/63

Nov 4th 63



TOWN OF BLIND RIVER
ONTARIO

OFFICE OF THE CLERK AND TREASURER

Blind River, Ontario,
Box 640,
October 17, 1963.

Mr. W. M. Shiells,
Box 158,
SAULT STE. MARIE,
Ontario.

Dear Sir:

Enclosed is a certified copy of a resolution
made today by our council.

Yours very truly,

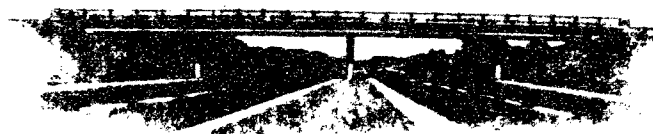
W. M. Shiells
Clerk-Treasurer,

Lesarge-Wellock: That a soil analysis of the area under
the Dawsy Bridge be made by the Ontario
Department of Highways.

CARRIED

Certified a true copy of a resolution made by the
Council of the Town of Blind River on October 17, 1963.

W. M. Shiells
Clerk-Treasurer



Department of Highways

P. O. Box 158,
Sault Ste. Marie,
October 21, 1963.

Mr. E. R. Saint,
Regional Materials Engineer,
Department of Highways,
1301 Hammond Street,
NORTH BAY, Ontario.

Dear Sir:

RE: Town of Blind River
Soils Investigation & Report
Dawsey Creek Bridge

Attached please find a copy of a Resolution of Council requesting a foundation investigation at the site of the above.

It is proposed to replace the existing obsolete structure with two structural plate pipe arches, if foundation conditions will permit.

Could you kindly provide an estimate of cost for the necessary investigation, if carried out by your forces.

McDonald, Lawson & Holder, Consulting Engineers of Blind River have been retained by the Town to prepare the plans, but they have no facilities for Soils investigation.

Yours truly,

M. Shiells,
for: A. A. Ward,
DISTRICT ENGINEER.

WMS/bt

Attach.

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NOV 15 1963

B

SAUL DOWN 1 NOV 15/63 840AM VR

A A WARD DIST ENGR

ATTN: MUN ENGR W M SHIELLS

ATTN: MICE ENGR G R ALMOND

FOR YOUR INFORMATION ONLY FOUNDATION SECTION WILL COMMENCE
FIELD WORK FOR MUN BRIDGE AT DAWSY CREEK IN BLIND RIVER
ON MONDAY NOV 18/63.

K G SELBY SR FOUNDATIONS ENGR

AH

NOV 15 1963

11004

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NBAR DOWN 1 NOV 15/63 835AM VR

E R SAINT REG MATLS ENGR

STARTING MONDAY NOVEMBER 18 FOUNDATION SECTION WILL COMMENCE
FIELD WORK FOR PROPOSED NEW BRIDGE AT DAWSY CREEK IN BLIND
RIVER THIS WILL BE FOLLOWED BY A SITE INVESTIGATION FOR D H C
PATROL YARD AT RUTTER LOT 11 CON 6 TWP OF BIGWOOD HWY 69
WE WILL REQUIRE FROM YOU RECOMMENDATIONS FOR GRADING AND
PAVING AT LATTER SITE OUR ENGINEER WILL PHONE YOU THE DAY
BEFORE HE GOES TO RUTTER .

K G SELBY SR FOUNDATIONS ENGR

1968 OCT 17 AM 9:05

DOWN NBAR 1 OCTOBER 17/68 8:52 A

A RUTKA M AND T ENG

ATTN FOUNDATION SECTION

PLEASE FORWARD ONE COPY OF FOUNDATION INVESTIGATION REPORT MARCH
1964, DAWSY CREEK, TOWN OF BLIND RIVER, W.J. 64S-2, MUNICIPAL JOB,
W.O. 63-10867, AS PER TELEPHONE CONVERSATION WITH E.R. SAINT WED.
OCT. 16/68.

E FEDELI FOR E R SAINT R M E

LS

*Report sent out
Oct 23/68*

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