

58-278C

W.P. 944-58

Hwy. #17

JACKPINE RIVER

cc: Mr. S. McCombie

Mr. H. D. McMillan,  
Assistant Road Design Engr.  
Materials & Research Section.

January 9, 1959.

Re: W.P. 944-58 - Jackpine  
River Crossing - Hwy. #17 (TCH),  
Fort William District.

Attached find the Soils Design Report for the above-mentioned crossing.

The area is gravel to considerable depth, and as such, footings can be founded directly on this stratum. Scour action and transporting activity of the stream will necessitate rip rap protection.


No soils profile is being submitted for the site, but it will be included on Soils Profile 17 L-84 to be submitted at a later date with the report for W.P. 935-58, 10 miles to 20 miles East of Nipigon.

TK/Mef  
Attach.

cc: Messrs. H. A. Tregaskes  
R. A. Panter  
J. B. Garland  
H. A. Mantle  
E. W. Hurrell  
S. McCombie ✓  
A. Gray  
W. Bidell  
F. Gill  
T. J. Kovich  
A. C. Powell

A. Rutka,  
ACTING MAT'LS. & RESEARCH ENGR.

Per:

  
(T. J. Kovich,  
Supervising Soils Engr.)

File (3)

## SOILS DESIGN REPORT

Location: Jackpine River Crossing  
W.P. No: 944-58  
Hwy. No: 17 T.C.H.  
Soils Profile: 17 L-84 (To be submitted with W.P. 935-58).  
Proposed: Structure

### GENERAL DATA:

This proposed structure, located 45' to the south and at Station 794 ± (Line "L"), will serve to replace the existing 75 foot timber truss bridge supported by timber cribbing placed directly on the gravel sub-grade. The Jackpine River crosses T.C.H. #17 approximately 16 miles east of Hhipigon. It will be located within the limits of proposed grading contract W.P. 935-58 (10 mi. to 20 mi. ± east of Hhipigon).

No design criteria is available at this time but it is expected that very little, if any, approach grading will be involved within this work project. No major change in approach fill elevation is anticipated.

### SOILS DATA & FOUNDATION CONSIDERATIONS:

The whole general area consists of a granular terrace featuring a face some 40' high, located immediately north of the structure site.

A subsoil investigation was carried out by Trow, Soderman and Associates. Their report was issued on November 21, 1958.

The soil stratigraphy is uniform and consists of a dense layer of gravel and boulders from the surface to at least 65', the maximum depth bored. As such, the stratum is considered competent to directly support the proposed footings with a safe footing pressure of at least 3 tons per sq. ft.

Because, during peak run-off periods, boulders up to 12 inches in diameter are moved down the stream bed, the Consultants advise that the footings be placed at a depth, below stream bed, equal to 3 to 4 times the known river rise with a minimum depth of 6 feet. It is also suggested that the footing excavation be backfilled with well graded boulders varying from 3 inches to 2 feet in diameter.

The new widened approach embankment should be protected with a boulder rip-rap placed randomly. These boulders are readily available at or very near the site.

No approach embankment stability problem occurs.

RECOMMENDATIONS:

- (1) It is recommended that the conclusions embodied in Trow, Soderman and Associates' report be used as a basis for the foundation design.
- (2) If any approach grading is involved with the structure contract, it should consist of granular borrow and 6" of G.B.C. "A". (All borrow available in the area is acceptable granular).
- (3) Adequate rip-rap protection should be provided for around abutments and at locations where approach embankment encroaches into the water.

T. J. Kovich

Jan. 9/59.

Bridge Design Office,  
280 Davenport Rd.,  
October 31, 1958.

Memorandum to:  
Mr. A. M. Tove  
Bridge Engineer,  
Davenport Rd.,

Atten: S. McCombie

Re: W.P. 944-58, Jackpine River,  
King's Hwy. #17 (TCH) BW 210

The relocation of the highway here is about 45' South of the existing structure. The stream has been recently bulldozed some 2 feet below the original level in order to facilitate the propulsion of logs.

The discharge is estimated at 1730 cfs, with a possible rise of flood in excess of 6 feet.

As no site plan is available at the time of writing, the positioning of the bridge or the skew, if any, cannot be determined since the 100' plan No. 1 B 464 is too sketchy and of doubtful accuracy.

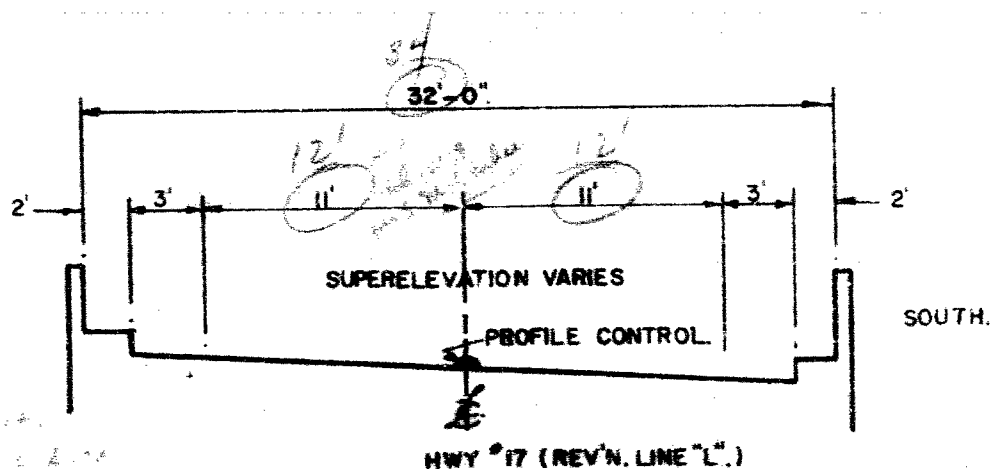
Tentatively, a 70 to 80' clear opening is recommended, with approach spans as convenient. This will be governed by side slopes, spread of flood and types of substrata which support the fill.

BW/r

  
B. Wilkie  
Bridge Hydrology Engr.

HWY #17 T.C.H. DIST #19.

ASSUMING LONG STRUCTURE (OVER 80' END TO END OF WINGWALLS.)



CROSS SECTION HWY #17 T.C.H. OVER JACKPINE R.

PROFILE GRADE ——— 0.75' BELOW FINISHED GRADE AT PROFILE CONTROL.

HANDRAIL ——— D.H.O. STANDARD STEEL.

MAX. SUPERELEVATION ——— 0.066 FT./FT. OF PAV'T. WIDTH AT DESIGN SPEED 60 M.P.H.

P.I. 94 + 18.43

S.C. = 196 + 94.53

T.C. = 194 + 94.53



BA 839

# TROW, SODERMAN AND ASSOCIATES

SITE INVESTIGATIONS  
AND  
SOIL MECHANICS CONSULTATION

58-F-278C

W. A. TROW, M.A.S.C., M.E.I.C., P.ENG.  
L. G. SODERMAN, B.S.C., D.I.C., P.ENG.

884 WILSON AVE.,  
DOWNSVIEW, ONT.  
ST. 8-5921

Project: J266

November 21, 1958

Mr. A. M. Toye,  
Bridge Engineer,  
Department of Highways of Ontario,  
280 Davenport Road,  
Toronto, Ontario.

Attention: Mr. S. McCombie

Foundation Investigation  
Jackpine River Crossing,  
T.C.H. No. 17, District No. 19

Dear Sirs:

A subsoil investigation consisting of four borings has been completed at the above noted bridge site. The factual data obtained from the field work have been presented on the borehole profiles and subsoil section appended hereto. Reference to these borehole profiles shows that the site is underlain by a dense layer of gravel and boulders to a depth of at least 60 feet. In view of the competence of the granular layer a formal detailed report has not been prepared. Our comments and recommendations arising out of the investigation are enumerated and given as follows:

- 1) At each borehole location a dense layer of gravel and boulders was found to exist from ground surface to a maximum depth of 65 feet. The stratum is considered competent to directly support the proposed abutment footings. A safe footing pressure of at least 3 tons/sq.ft. can be applied directly to the granular layer.
- 2) The transporting capacity of the river is such that during peak run-off periods boulders up to 12 inches in diameter are moved along the streambed. Because of this the abutment footings must be founded well below the streambed elevation. A footing depth below streambed equal to 3 to 4 times the known river rise is recommended with a minimum depth of at least 6 feet.
- 3) The existing approach embankments and abutments are protected by boulders which have been bulldozed into place. No records of the performance of this type of protection were available locally but observations indicate that this has provided adequate protection to



the existing structure. If this is known to be the case a similar procedure could be followed for the new structure. It is suggested that the footing excavation be backfilled with a selection of well graded boulders varying in size from 3 inches to 2 feet.

We believe that the information contained in this letter is sufficient for you to proceed with the design of foundation members for this structure. If additional information should be required please contact our office.

We consider it a pleasure to have been of service to you on this occasion.

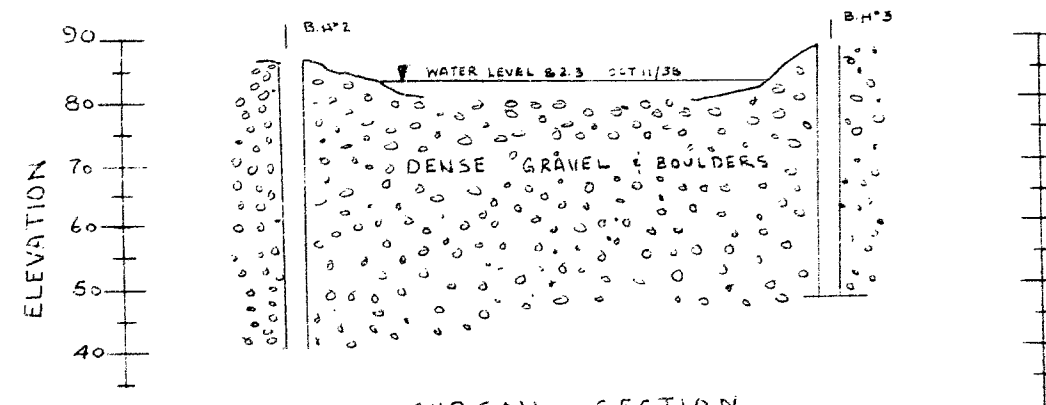
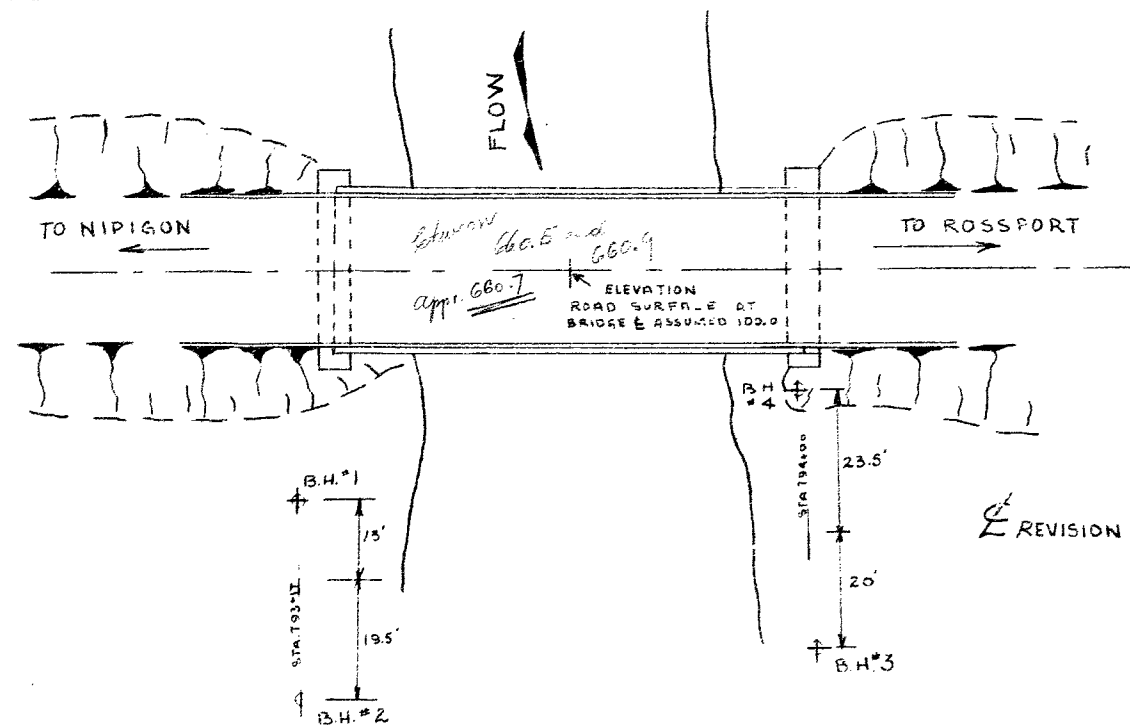
Yours very truly,

*H. T. Trow*  
*for*

Lawrence G. Soderman (P. Eng.)

LGS/kb  
ENC.





SUBSOIL SECTION  
SCALE: 1 inch = 20 ft

# JACKPINE RIVER

## BORHOLE LOCATION PLAN AND SUBSOIL PROFILE

5266

## TROW, SODERMAN AND ASSOCIATES

## SITE INVESTIGATIONS AND SOIL MECHANICS CONSULTATION

PROJECT Jackpine River Crossing  
LOCATION T.C.H. #17, District 19  
HOLE LOCATION As on plan

HOLE ELEVATION AND DATUM 83.1 Road surface at centre of existing bridge assumed el. 100.0 PREP

BOREHOLE NO. 1  
FIELD SUPERVISOR K.P.  
DRILLER H.J.  
PREP. L.S.

DRAWING NO.

2

LEGEND

2 1/2" DIA. SPLIT TUBE  
2 1/2" SHELBY TUBE  
2 1/2" SPLIT TUBE  
2 1/2" DIA. CONE  
CASING  
2 1/2" SHELBY  
1/2 UNCONFINED COMPRESSION [QU]  
VANE TEST [C] AND SENSITIVITY [S]  
NATURAL MOISTURE AND  
LIQUIDITY INDEX  
LIQUID LIMIT  
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION	
				RESISTANCE	P.S.F.
	Ground surface.	88.1	0		
	Closely packed medium to coarse gravel with well rounded stones and boulders up to 3 ft in diameter.	W.L.V 82.3	10		
	Unable to sample. Hole advance by diamond drilling using BX, AX and EX casing. Some sand noted below 30ft depth.		20		
			30		
			40		
	End of borehole.	34.1	50		
			60		

[illegible]

PROJECT NO. J266

## TROW SODERMAN AND ASSOCIATES

## SITE INVESTIGATIONS AND SOIL MECHANICS CONSULTATION

Project: Jackpine River Crossing

LOCATION T.C.H. #17, District 19

POLE LOCATION **As** on plan.

87.8 Road surface at  
centre of existing bridge assumed 100.0

BOREHOLE NO. 2

FIELD SUPERVISOR **K.P.**

DRILLER H.J.

PREP. L.S.

DRAWING NO.

1

LEGEND

2" DIA. SPLIT TUBE

2 SHELBY TUBE

2<sup>14</sup> SPLIT TUBE

2<sup>11</sup> DIA. CONE

## CASING

2' SHELBY

1/2 UNCONFINED COMPRESSION [QU]

VANE TEST (C) AND SENSITIVITY (S)

## NATURAL MOISTURE AND

LIQUIDITY INDEX

LIQUID LIMIT

PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P. S. F.	
	Ground surface.	37.8	0	BLOWS, FT.	
	Closely packed medium to coarse gravel with well rounded stones and boulders up to 3 ft in diameter.	<del>M.L.</del> 82.3	10		
			20		
			30		
			40		
	End of borehole.	34.1	50		

[illegible]

PROJECT NO. J266

DRAWING NO.

4

## TROW SODERMAN AND ASSOCIATES

SOIL INVESTIGATIONS AND SOIL MECHANICS CONSULTATION

PROJECT: Jackpine River Crossing  
LOCATION: T.C.R. #17, District 19

HOLE NO. 1: As on plan

HOLE DEPTH: 88.0 Road surface at  
centre of existing bridge assumed 100.0.BOREHOLE NO. 3  
FIELD SUPERVISOR R.P.  
DRILLER H.J.  
PREP. L.S.

## LEGEND

2" DIA. SPLIT TUBE  
2" SHELBY TUBE  
2" SPLIT TUBE  
2" DIA. CONE  
CASING  
2" SHELBY  
1/2 UNCONFINED COMPRESSION (QU)  
VANE TEST (C) AND SENSITIVITY (S)  
NATURAL MOISTURE AND  
LIQUIDITY INDEX  
LIQUID LIMIT  
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE		CONSISTENCY	NATURAL SAMPLE UNIT WT. P.C.F.
				P.S.F.	BLOWS FT.		
	Existing ground surface.	88.0	0				
	W.L.V. 82.3						
0000	Closely packed medium to coarse gravel with well rounded stones and boulders up to 3 ft in diameter.		10				
0000			20				
0000			30				
0000			40				
0000		42.0					
0000	Dense medium sand with fine to coarse gravel. Occasional boulder.		50				
0000			60				
0000	End of hole.	23.0	70				

PROJECT NO.

J266

## TROW SODERMAN AND ASSOCIATES

SILT INVESTIGATIONS AND SOIL MECHANICS CONSULTATION

Jackpine River Crossing

Section T.C.H. #17, District 19

As on plan

ROLL 511 ATION AND DATUM 96.8 Road surface at centre of existing bridge assumed 100.0

BOREHOLE NO.

FIELD SUPERVISOR K.P.

BRILLER H.J.

0000 L.S.

DRAWING NO.

3

### LEGEND

2" DIA. SPLIT TUBE

2<sup>71</sup> SHELBY TUBE

2<sup>11</sup> SPLIT TUBE

2<sup>18</sup> DIA. CONE

CASINO

2" SHELBY

1/2 UNCONFINED COMPRESSION (QL)

VANE TEST [C] AND SENSITIVITY [S]

NATURAL MOISTURE AND

LIQUIDITY INDEX

LIQUID LIMIT

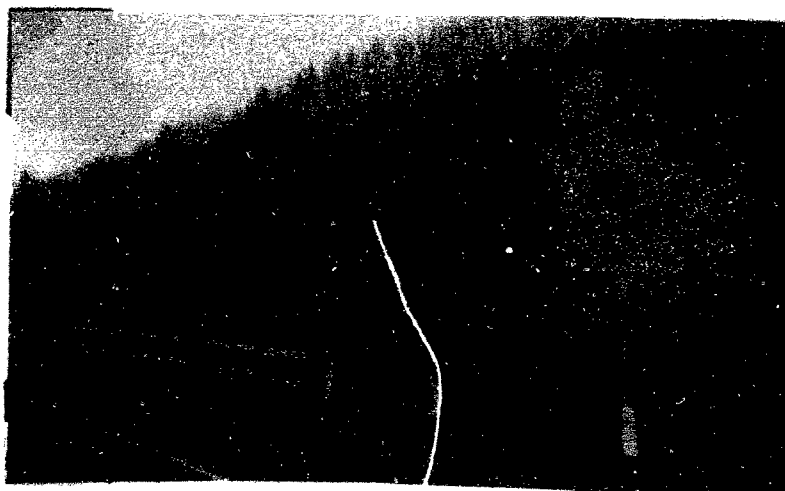
### PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
					P.S.F.
	Existing ground surface.	96.8	0		BLOWS/FT.
	Closely packed medium to coarse gravel with well rounded stones and boulders W.L. ▼ 82.3		10		
			20		
			30		
			40		
	End of Hole.	56.8			

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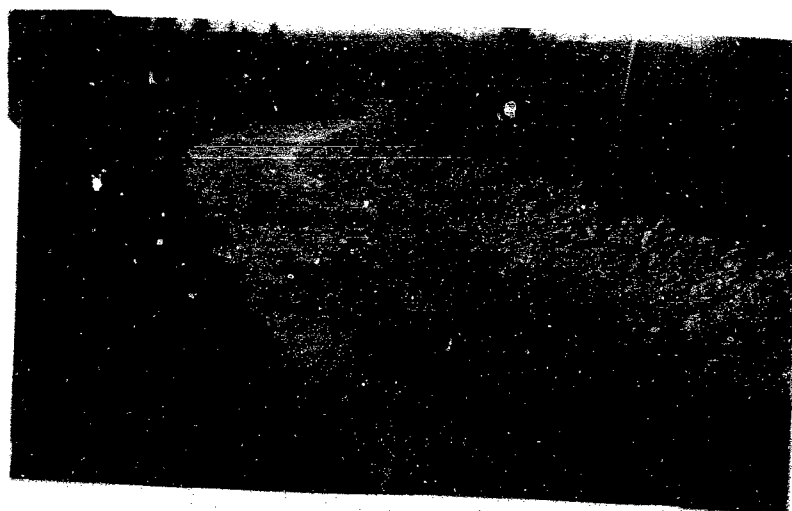
**TABLE No. 1**

**Existing Bridge  
and Gravel Ridge.  
Looking north west.**



**East Approach  
Showing Existing  
Bridge.**

**Downstream  
Looking South.**



**SUPER IMPOSED DOCUMENT MAY  
APPEAR AS MULTI-FEED ON FILM.**

TABLE No. 1

Existing Bridge  
and Gravel Ridge.  
Looking north west.



East Approach  
Showing Existing  
Bridge.

Downstream  
Looking South.



SUPER IMPOSED DOCUMENT MAY  
APPEAR AS MULTI-FEED ON FILM.