#64-F.232 C

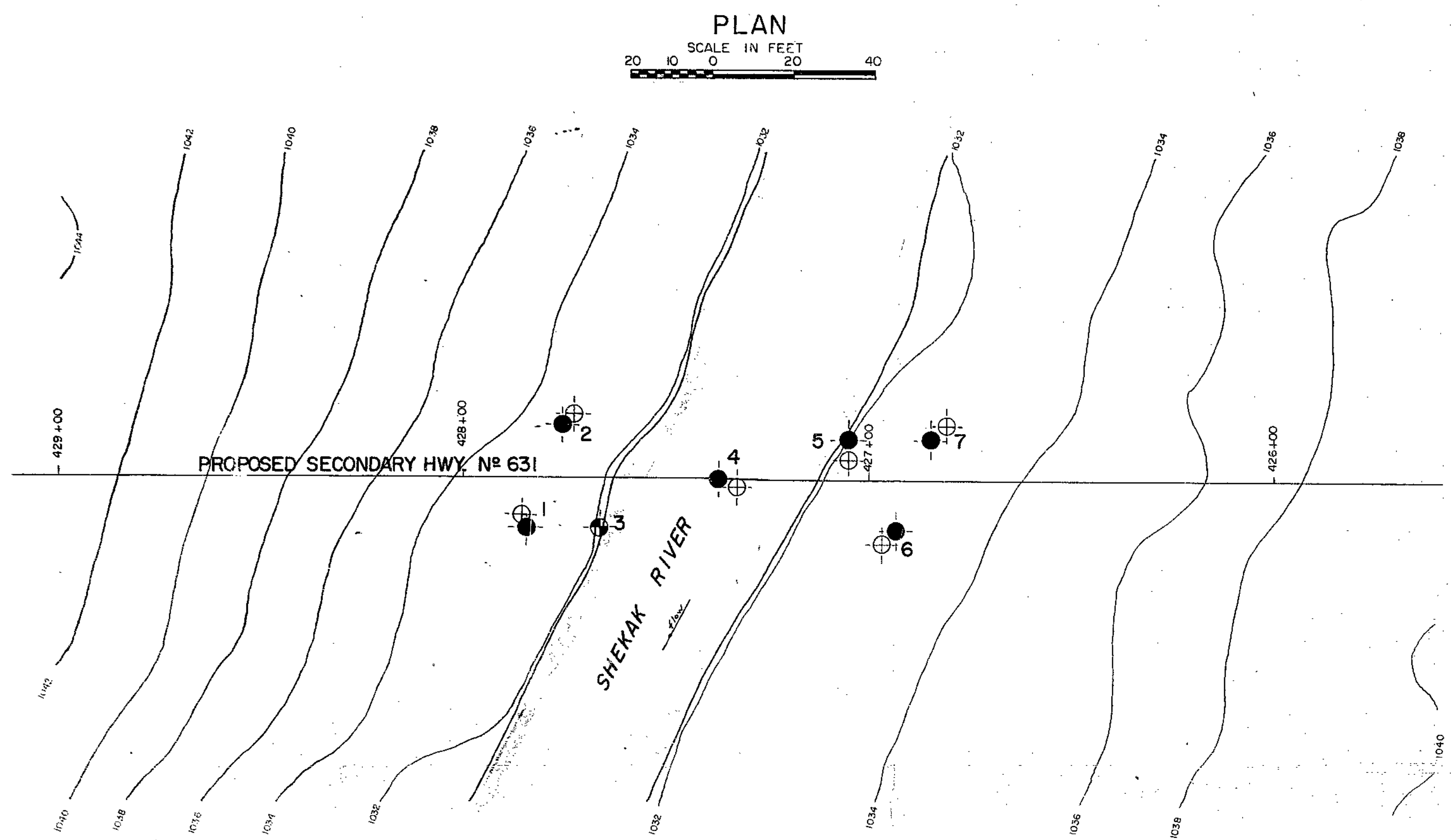
W.P. #142-64

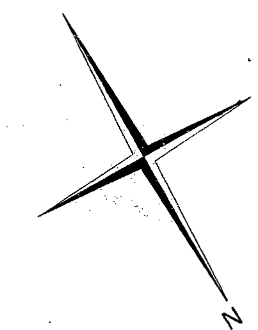
HWY. #631

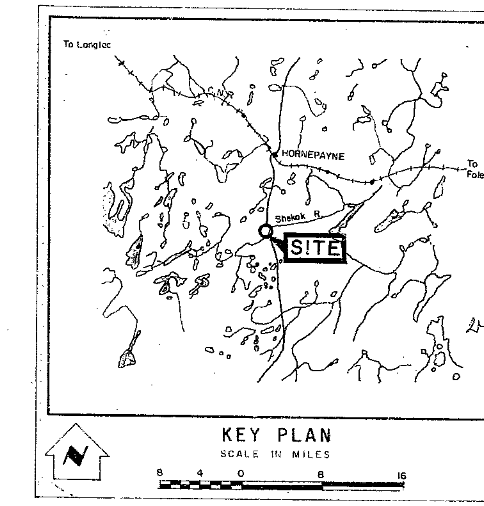
SHEKAK

RIVER

PLAN



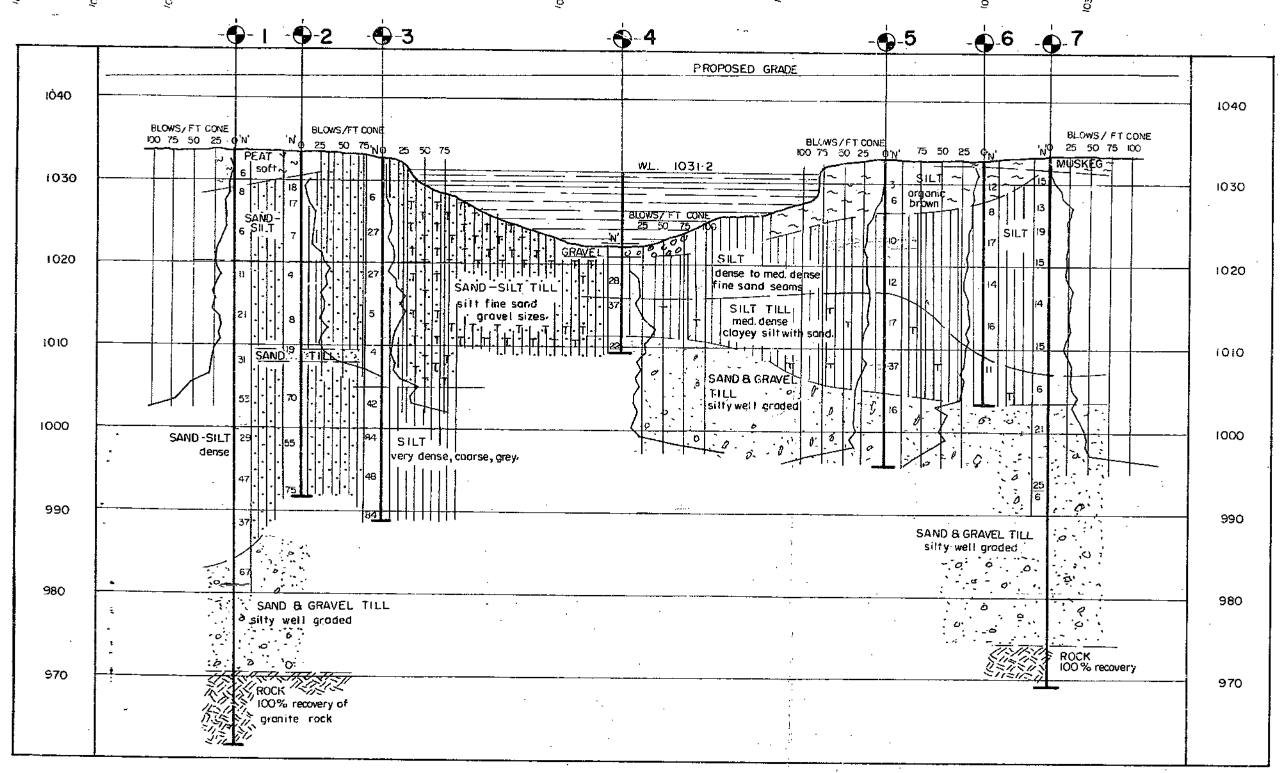




LEGEND

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

NO.	ELEVATION	STATION	OFFSET
1	1033.6	427+84	12' Lt
2	1033.2	427+76	13' Rt.
3	1032.9	427+66	12' Lt.
4	1032.1	427+37	℄
5	1032.9	427+05	10' Rt
6	1032.8	426+93	12' Lt.
7	1033.2	426+85	10' Rt.



PROFILE

SCALE IN FEET
10 5 0 10 20

– 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

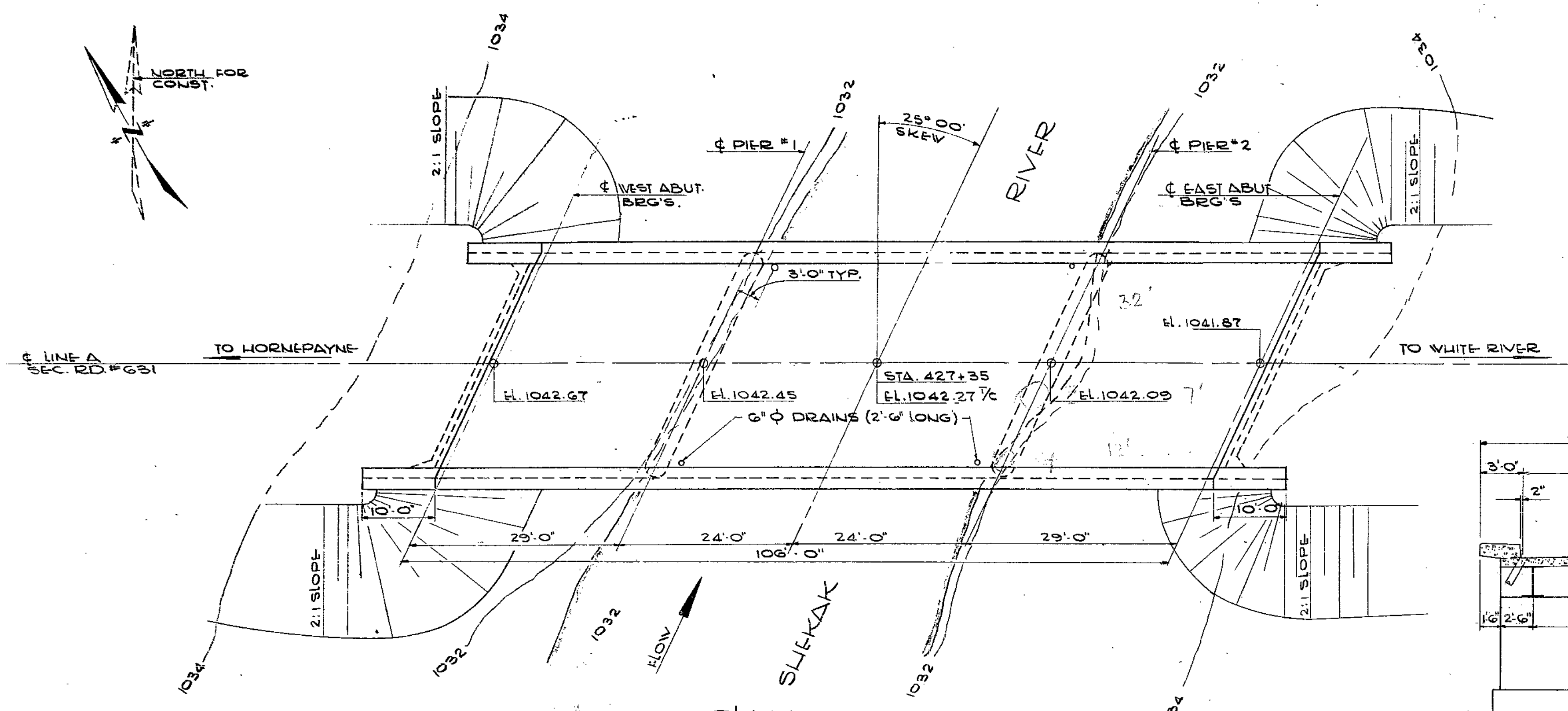
DEPARTMENT OF HIGHWAYS – ONTARIO
MATERIALS & RESEARCH DIVISION – FOUNDATION SECTION

SHEKAK RIVER

KING'S HIGHWAY NO. 631 LINE A DIST NO. 18
DIST. ALGOMA
TWP. LARKIN LOT CON.

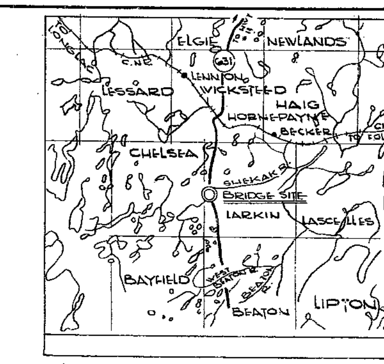
PROJ. 1410 WILLIAM A. TROW AND ASSOCIATES LIMITED

SUBM'D	CHECKED D.H.S.	W.P. NO. 142 - 64	M.B.R. DRAWING NO.
DRAWN E.F.K.	CHECKED	JOB NO.	
DATE		SITE NO.	BRIDGE DRAWING NO.
APPROVED PRINCIPAL FOUNDATION ENGINEER		CONT NO.	



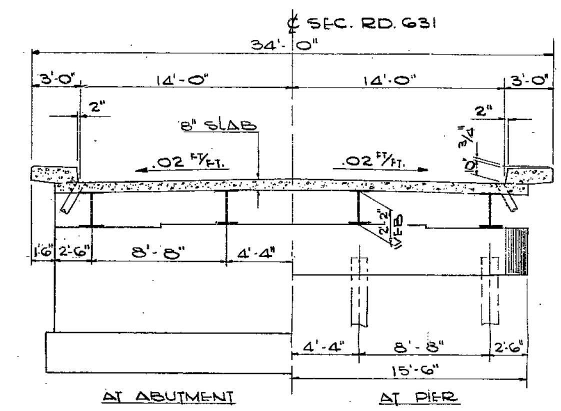
PLAN

℄ : TOP OF CONCRETE WEARING SURFACE



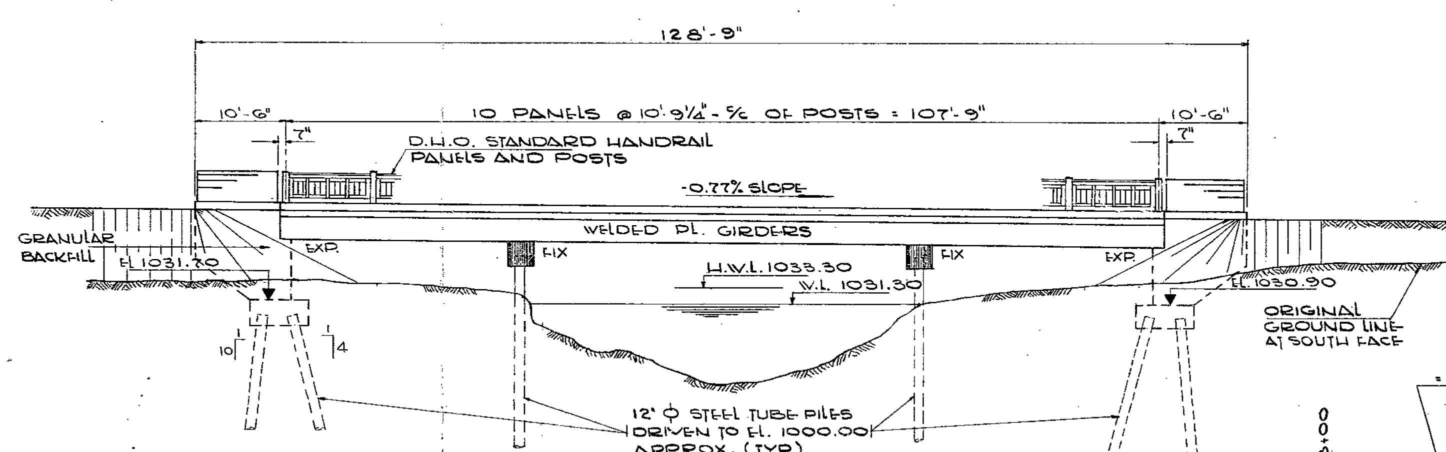
KEY PLAN

SCALE 1" = 8 MILES



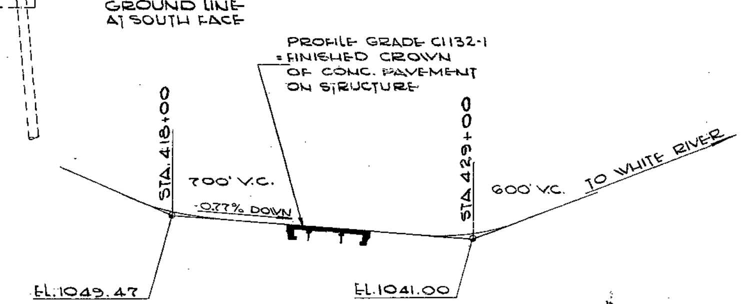
TYPICAL SECTION

SCALE 3/16" = 1'-0"



ELEVATION

SCALE : 1" = 10'-0"



PROFILE OF LINE 'A'

N.T.S.

SKEW ANGLE 25°

SIN.	0.4226183
COS.	0.9063078
TAN.	0.4663077
SEC.	1.1033779

GEODETIC DATUM
B.M. 1046.92
N ¢ W. IN STUMP OF 0.6' ⌀ SPRUCE
72' RT. OF STA. 429+10

PRINT RECORD		
No.	FOR	DATE

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

SHEKAK RIVER BR.
8.1 MILES SOUTH OF HORNEPAYNE
[redacted] SEC. RD. NO. 631
CO. DIST. OF ALGOMA
TWP. LARKIN LOT CON.

PRELIMINARY

SITE No.	38N-7	W.P. No.	142-64	
APPROVED	BRIDGE ENGINEER	CONTRACT Nos.		
DESIGN	F.G.	CHECK		
DRAWING	R.B.M	CHECK	F.G.	DRAWING No. D5531-P1
DATE	FEB.65	LOADING	H20-S16	

REGISTERED PROFESSIONAL ENGINEER
CIVIL
F. GORMEK
PROVINCE OF ONTARIO

1850 Jane Street
Weston, Ontario
241-4644

William A. Trow

23-65-319

Soil Mechanics
Consultants
W. A. Trow
MSc. MEIC. P. Eng.
K. Peaker
PhD. MEIC. P. Eng.
D. H. Shields
PhD. MEIC. P. Eng.

Associates Ltd.

Project: J1410

Mr. A. Rutka, P. Eng.,
Materials and Research Engineer,
Materials and Research Division,
Department of Highways of Ontario,
Downsview, Ontario.

Attention: Mr. A.G. Stermac, P. Eng.
Principal Foundations Engineer

Re: Foundation Investigation
Proposed Bridge
WP 142-64, Sec. Hwy. 631, Shekak River
8.1 Miles South of Hornepayne, Ontario

Dear Sirs:

In conformance with your authorization of April 2, 1964, we have carried out an investigation of the subsoil conditions at the above site. The field work consisted of 7 sampled borings at the locations shown on the Site Plan Dwg. appended to this report. This work was carried out between April 6th, and 23rd, and coincided with the spring thaw period. The results of the field program and our conclusions regarding the foundations conditions at this site are outlined below.

SOIL CONDITIONS

The soil conditions which were encountered at each hole location are shown on the logs, Dwg. 1 to 7 inclusive. The information on the logs has been used to make up the estimated subsoil profile of the Site Plan Dwg. The soil at the site is a glacial drift material which is very heterogeneous with respect to composition. At some locations, the silt and sand appear not to have been transported in glacial ice but to have been deposited in pools in the drift and subsequently loaded. Mixed and unsorted till soil was also encountered as were large cobbles and boulders. These could have been placed only by glacial activity.

The subsoil at this site is essentially granular and of low compressibility. An appreciable thickness of organic silt was noted near the river on the north-west bank. Muskeg or peat was found to a depth of a few feet below the surface at the approximate locations of the abutments for the proposed bridge. These organic soils have a relatively high compressibility.

From the information gained in borehole 4, very little material has been worked by the river. The depth of scour over the years is probably delineated by the contact of the river bed gravels with the underlying intact silt i.e. elevation 1021.

Bedrock was proven to lie at elevation 971 on the south-east and at elevation 974 on the northwest. The rock is sound. Either bedrock outcrops or the surfaces of very large boulders were noted both 150 feet south of the river and 350 feet to the north.

In general the silt, sand and gravel deposits are only medium dense to dense. However, below elevation 1005 on the south-east bank and elevation 997 on the west bank the soil is dense to very dense.

FOUNDATION CONSIDERATIONS

It is recommended that timber piles be driven to the dense to very dense soil at or below elevation 1000 (approx.) The safe capacity of piles founded in this material can be estimated from the expression:

$$Qa = \frac{\gamma . D . N.}{F} \times A$$

where: Qa = the allowable load per pile

D = the depth of the pile tip below the level of the creek bottom, i.e. elevation 1022.

γ = the submerged unit weight of the soil above the founding level, 70 pcf. approximately.

N = a bearing capacity factor estimated to be equal to at least 110 for the dense to very dense granular soil.

F = the factor of safety, 3 is suggested

A = the area of the pile tip.

This expression reduces to:

$$Qa = 1.3 \times D \times A$$

where: Qa = tons per pile

D = the depth in feet

A = tip area is square feet.

For example a pile with a 12 inch tip driven to elevation 995 i.e. 27 feet below the bottom of the river would have a safe capacity of at least,

$$Qa = 1.3 \times 27 \times \frac{\pi \times 1^2}{4} = 27 \text{ tons}$$

It is recommended that timber piles be limited to a capacity of 25 tons. If piles with a tip diameter of at least 12 inches cannot be obtained, it is recommended that the piles be driven butt first. This should increase the founding area to the required minimum for 25 tons.

If the timber piles are untreated, they must be capped below the permanent low groundwater level, probably elevation 1025. From this it appears that piles of the order of 30 feet long may be required at the site.

Because of the abrupt way refusal was met during the driving of the dynamic cone penetration tests and the driving of the casing at the borehole locations, careful watch should be kept duringg the driving of timber piles. Should virtual refusal conditions be encountered, driving must be stopped to prevent damage to the pile. When 6 blows of a 8750 ft.lb. hammer are required for one inch or less or penetration, driving should be stopped.

The settlement of piles driven to the very dense soil will be very small, certainly well within tolerable limits for the structure.

Spread foundations are a possible alternative at this site. Their capacity would be quite low and extensive digging below the water table would be required to place the footings below the depth of scour by the river. For these reasons, the piled foundation is recommended.

must be provided to carry away any water. In this way, there will be no build-up of hydrostatic pressure during rainstorms or spring thaw conditions.

Should any questions arise regarding this work we would appreciate your call. Thank you for this opportunity to be of service.

Yours very truly,

D H Shields

DHS/bs.
Encls.

D.H. Shields, P. Eng.

APPENDIX A

FIELD INVESTIGATION PROCEDURES

The field work on this project was performed with the aid of two standard diamond drilling machines which were equipped for soil sampling. Standard NX casing was driven to the required sampling depth and then washed clean. A sample of the undisturbed soil below the casing was obtained with a 2 inch O.D. split sampler or a 2 inch I.D. Shelby tube as required. The samplers were either pressed into the ground or driven in conformance with the specifications for the Standard Penetration Test. After the sample was recovered, the casing was driven to the next sampling interval. This procedure was repeated until the desired boring depth was reached or until refusal to driving the casing. Standard BX casing was drilled from the refusal depth if the boring had to go deeper.

In-situ vane tests were taken in the more cohesive materials when the undisturbed shear strength was estimated to be less than 2000 psf.

A dynamic cone penetration test was performed next to each of the borings. In this test, a 2 inch diameter 60° apex angle cone was driven from the ground surface. The number of blows per foot of penetration of the cone was recorded.

Specimens of rock encountered by the boring were recovered with AX coring equipment.

OTHER ENGINEERING ASPECTS

There should be no problems of stability of the approach embankments. It is recommended that the fibrous peat and muskeg covering be removed from the approach areas. This is the material found to a depth of 4.5 feet in hole 1, 2.5 feet in hole 2, and 1 to 1.5 feet in holes 6 and 7. The organic silt on the north bank should stabilize readily under the weight of the embankment.

The abutments must be designed to resist the earth pressure which will be exerted by the fill and intact soil. The worst condition will arise if scour takes place in front of the abutment. The earth pressure, p, at any depth, h, below the top of the abutment can be estimated from the expression:

$$P = K\ (\gamma\ (h-h_t) + \gamma'\ h_t + q)$$

where: K = 0.35 the recommended earth pressure coefficient for the condition that a normal factor of safety of 3 is used in the structural design.

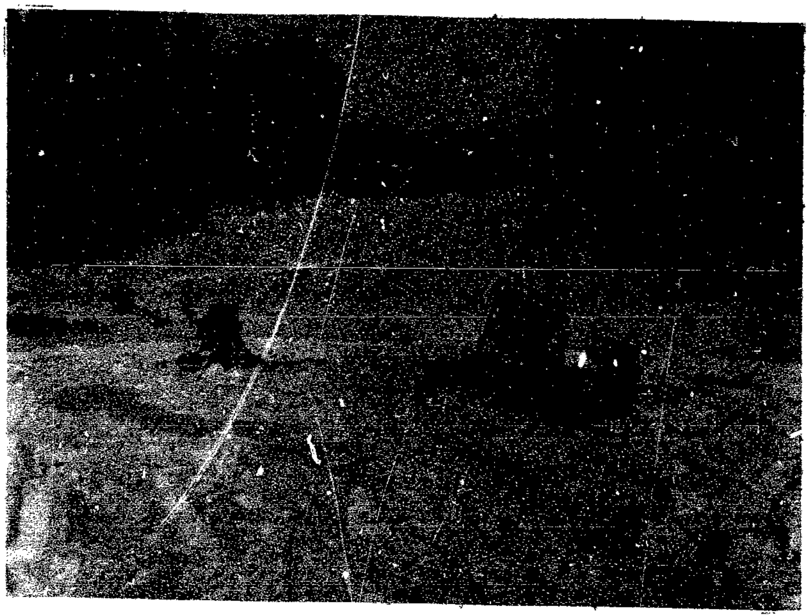
γ = 130 pcf the estimated unit weight of the retained soil

γ' = 70 pcf the estimated submerged unit weight of the retained soil

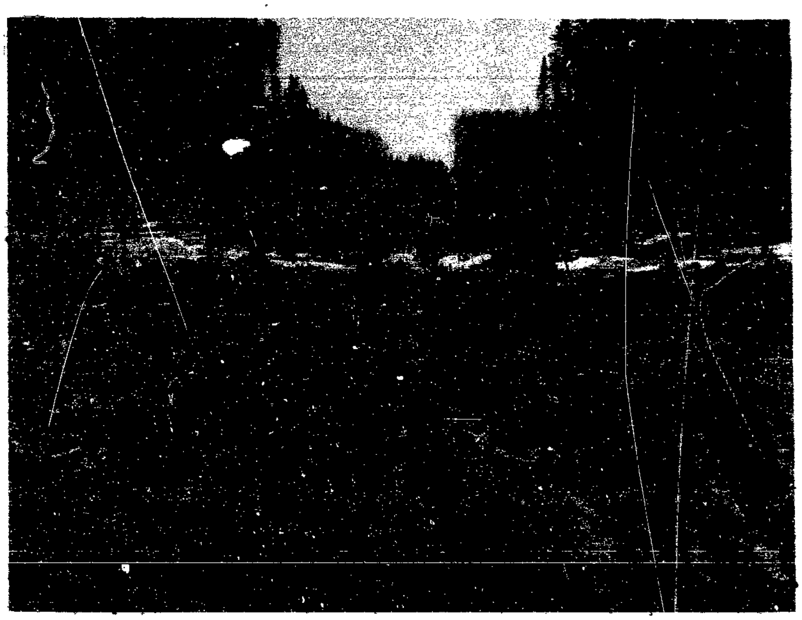
h_t = the height of watertable above the point being considered

q = the surcharge, if any, acting at the top of the wall

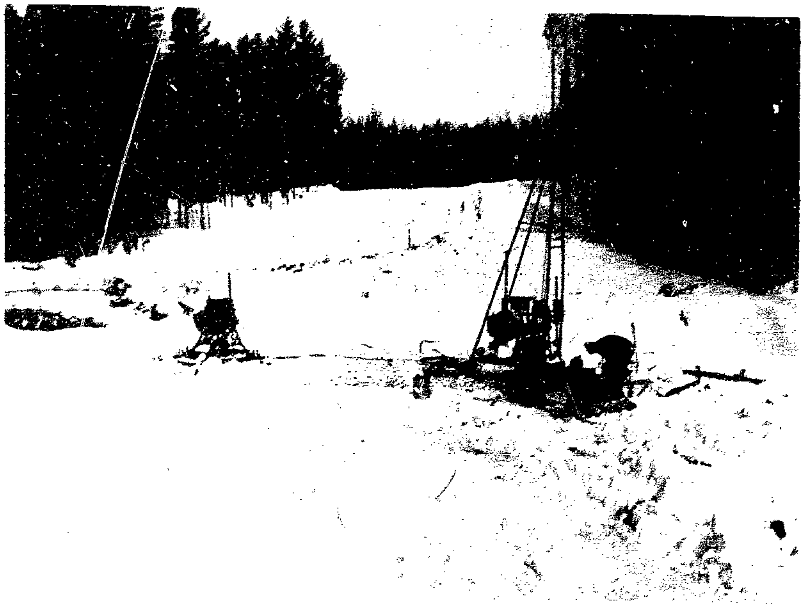
The above expression is limited to the condition that the water level behind the wall is always equal to the creek level. To ensure that this is so, free draining material must be used for the backfill and drains



Looking West
(BH 1 Right) (BH 2 Left)



Looking East
(Drills on Holes 5 & 7)



Looking West
(BH 1 Right) (BH 2 Left)

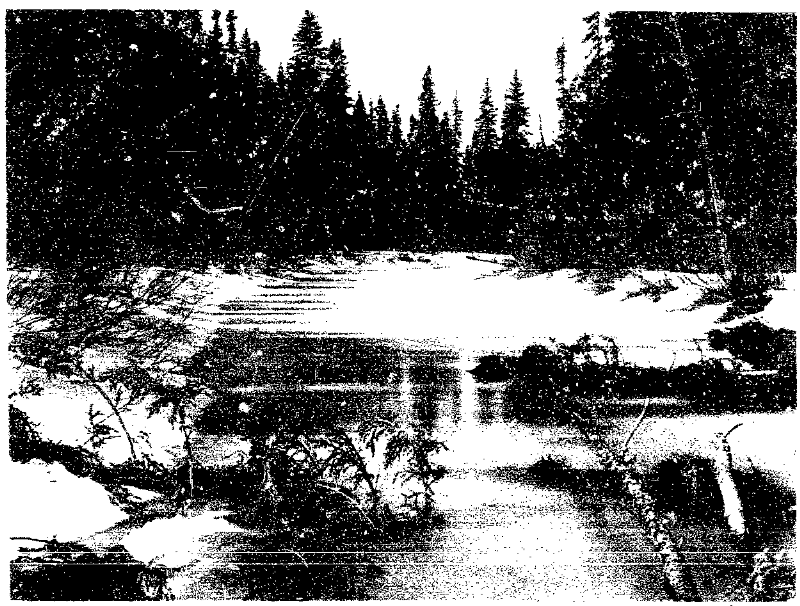
Looking East
(Drills on Holes 5 & 7)

Looking North

Drill on BH 5

Looking South

Looking North
Drill on BH 5



Looking South

WILLIAM A. TROW & ASSOCIATES LTD.

SITE INVESTIGATIONS - SOIL MECHANICS CONSULTATION

DRAWING No. 4.

PROJECT No. J1410.

LEGEND

BOREHOLE No. 4.

PROJECT Proposed Crossing Over Shekak River.

LOCATION Hornepayne, Ontario.

HOLE LOCATION See Site Plan.

HOLE ELEVATION 1031.2 ft.

DATUM Geodetic.

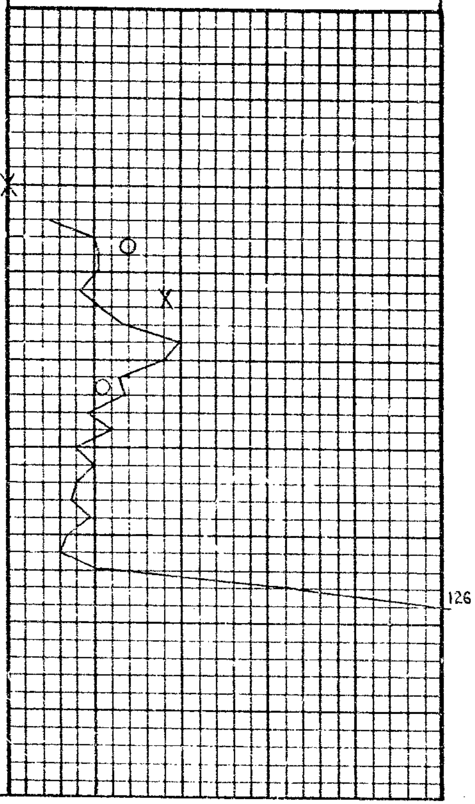
PENETRATION RESISTANCE	
2" O.D. SPLIT TUBE	—o—o—o—
2" I.D. SHELBY TUBE	—x—x—x—x—
2" DIA. CONE	———
SHEAR STRENGTH	
UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE	⊕
UNCONFINED COMPRESSION	⊗
VANE TEST AND SENSITIVITY (S)	$+^{S}$

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX	X^{LI}
ATTERBERG LIMITS	
LIQUID LIMIT	——o
PLASTIC LIMIT	⊢—
SAMPLE TYPE	
2" O.D. SPLIT TUBE	
2" I.D. SHELBY TUBE	
3" O.D. SHELBY TUBE	

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET
		1031.2	0
	WATER		
	GRAVEL	1022.3	
	SILT-dense, with seams of fine sand and a few gravel sizes.	1021.	10
	SILT TILL-clayey silt with sand and gravel sizes.	1016.	
	SAND AND GRAVEL TILL	1011.	20
	End of Bore	1009.2	
Notes:	1) Conventional wash boring, hole cased to full depth.		30
			40

PENETRATION RESISTANCE 350 FT. LB. BLOWS/FT. 20 40 60 80

SHEAR STRENGTH P.S.F.



NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT

SAMPLE TYPE AND No.

NATURAL UNIT WEIGHT P.C.F.

WILLIAM A. TROW & ASSOCIATES LTD.

SITE INVESTIGATIONS - SOIL MECHANICS CONSULTATION

DRAWING NO. 6.

PROJECT NO. J1410.

LEGEND

PENETRATION RESISTANCE
- 2" O.D. SPLIT TUBE
- 2" I.D. SHELBY TUBE
- 2" DIA. CONE

SHEAR STRENGTH
- UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE
- UNCONFINED COMPRESSION
- VANE TEST AND SENSITIVITY (S)

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX X LI

ATTERBERG LIMITS
- LIQUID LIMIT
- PLASTIC LIMIT

SAMPLE TYPE
- 2" O.D. SPLIT TUBE
- 2" I.D. SHELBY TUBE
- 3" O.D. SHELBY TUBE

BOREHOLE No. 6.

PROJECT Proposed Crossing Over Shekak River.

LOCATION Hornepayne, Ontario.

HOLE LOCATION See Site Plan.

HOLE ELEVATION 1032.8 ft.

DATUM Geodetic.

SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	SAMPLE TYPE AND No.
MUSKEG	1032.8	0	
SILT-brown, slightly cohesive and sandy dense.	1032.0		1
SAND-SILT-brown, dense to medium dense, very fine, silty sand with layers of silt.	1027.8		2, 3, 4, 5
SILT TILL-clayey silt with sand and gravel sizes.	1009.0		6
End of Bore	1003.3		

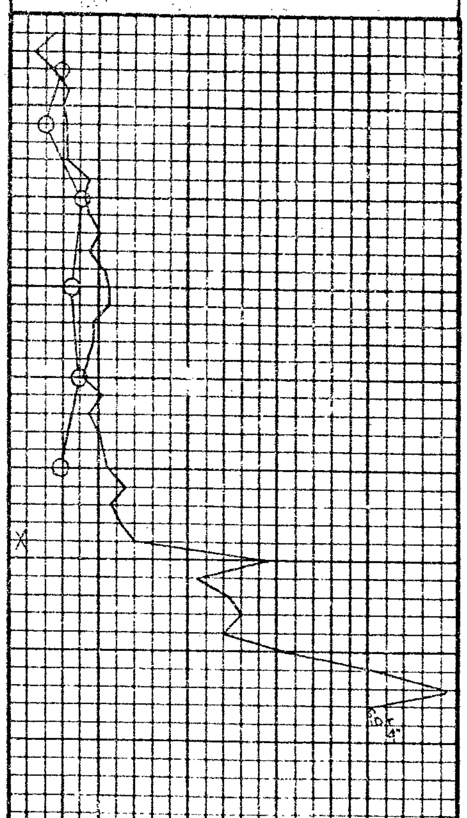
Depth scale: 0, 10, 20, 30, 40 feet.

PENETRATION RESISTANCE 350 FT. LB. BLOWS/FT. 20 40 60 80

SHEAR STRENGTH P.S.F.

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT

NATURAL UNIT WEIGHT P.C.F.



Notes:
1) Conventional wash boring, hole cased to full depth.
2) Dynamic cone penetration test carried out 5 feet NW of boring
3) Refusal to driving casing at 29.5 feet.

WILLIAM A. TROW & ASSOCIATES LTD.

SITE INVESTIGATIONS SOIL MECHANICS CONSULTATION

DRAWING No 1.

PROJECT No J1410.

BOREHOLE No 1.

PROJECT Proposed Crossing Over Shekak River.

LOCATION Hornepayne, Ontario.

HOLE LOCATION See Site Plan.

HOLE ELEVATION 1033.6 ft.

DATUM Geodetic.

LEGEND

PENETRATION RESISTANCE
- 2" O.D. SPLIT TUBE —o—o—o—
- 2" I.D. SHELBY TUBE —x—x—x—
- 2" DIA. CONE ————

SHEAR STRENGTH
- UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
- UNCONFINED COMPRESSION ⊗
- VANE TEST AND SENSITIVITY (S) +S

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX X LI

ATTERBERG LIMITS
- LIQUID LIMIT —o
- PLASTIC LIMIT |—

SAMPLE TYPE
- 2" O.D. SPLIT TUBE
- 2" I.D. SHELBY TUBE
- 3" O.D. SHELBY TUBE

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET
		1033.6	0
	PEAT-soft, dark brown to black, fiberous, mostly decomposing organic material.	1029.1	
	SILT-medium dense, brown, many horizontal seams of decomposing leaves and wood. Cobbles at bottom of layer.	1020.0	10
	SAND-SILT-medium dense, light brown to grey, alternating silt (up to 1 ft) and sand layers, in general, sand predominant, a dense silt till layer, 2.5 feet thick noted at approx. 20.5 feet, Sand-silt becoming dense below approx. 27. feet.	984.0	20, 30, 40, 50
	SAND AND GRAVEL TILL-silty well graded sand and gravel with boulders up to 2 feet in diameter-very dense.	970.6	60
	ROCK-100% recovery of granite rock.		70
	End of Bore	961.6	

Notes:
1) Conventional wash boring, hole cased to full depth.
2) Very difficult driving casing below 27 feet, refusal to driving at 53 feet.
3) BX casing drilled from 53 feet to bedrock contact.

DEPTH FEET: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110

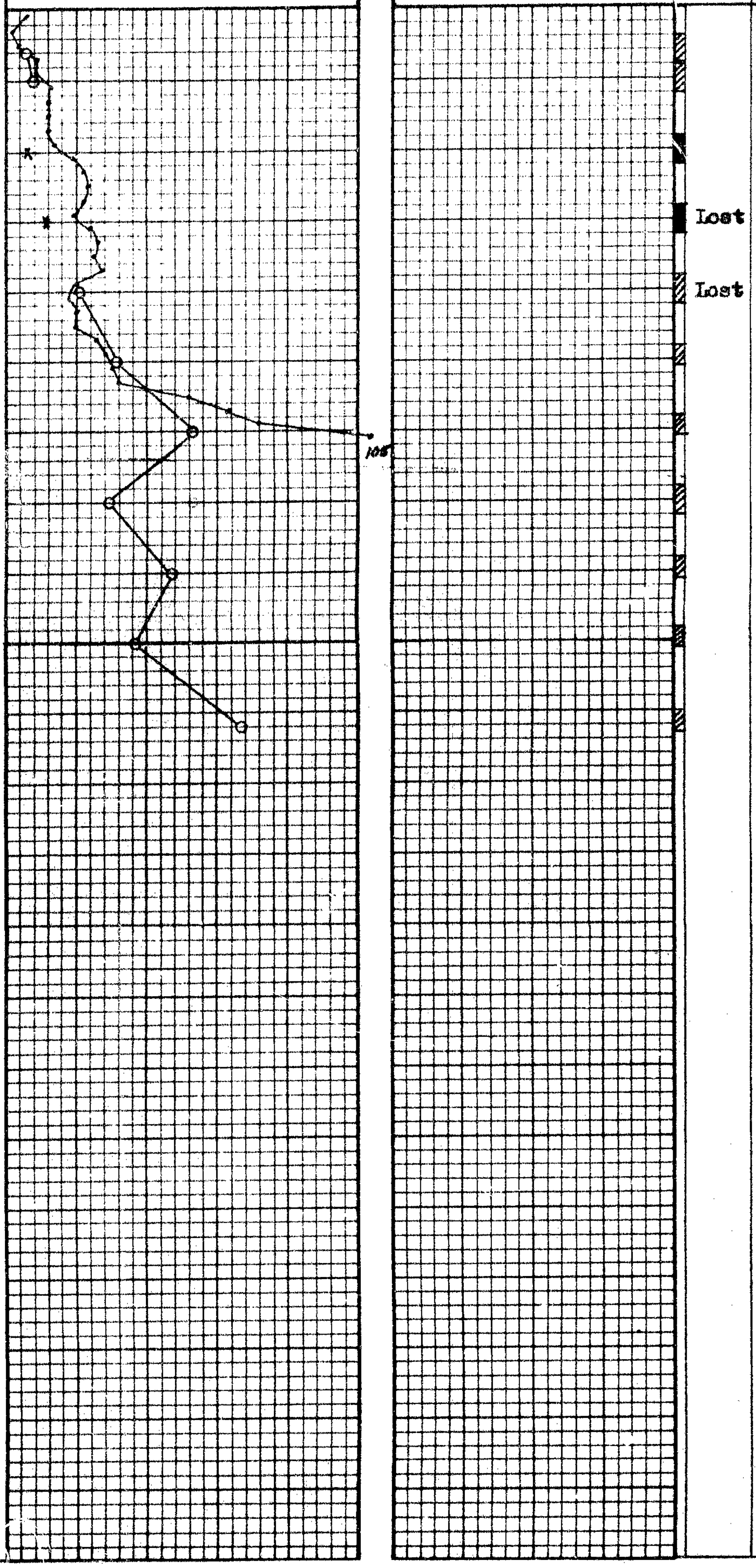
PENETRATION RESISTANCE 350 FT. LB. BLOWS/FT. 20 40 60 80

SHEAR STRENGTH P.S.F.

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT

SAMPLE TYPE AND No.

NATURAL UNIT WEIGHT P.C.F.



WILLIAM A. TROW & ASSOCIATES LTD.

SITE INVESTIGATIONS   SOIL MECHANICS CONSULTATION

DRAWING No. 2.
PROJECT No. J1410.

LEGEND

PENETRATION RESISTANCE
2" O.D. SPLIT TUBE —o—o—o—
2" I.D. SHELBY TUBE —x—x—x—
2" DIA. CONE ————

SHEAR STRENGTH
UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
UNCONFINED COMPRESSION ⊗
VANE TEST AND SENSITIVITY (S) $+^{S}$

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX X^{LI}

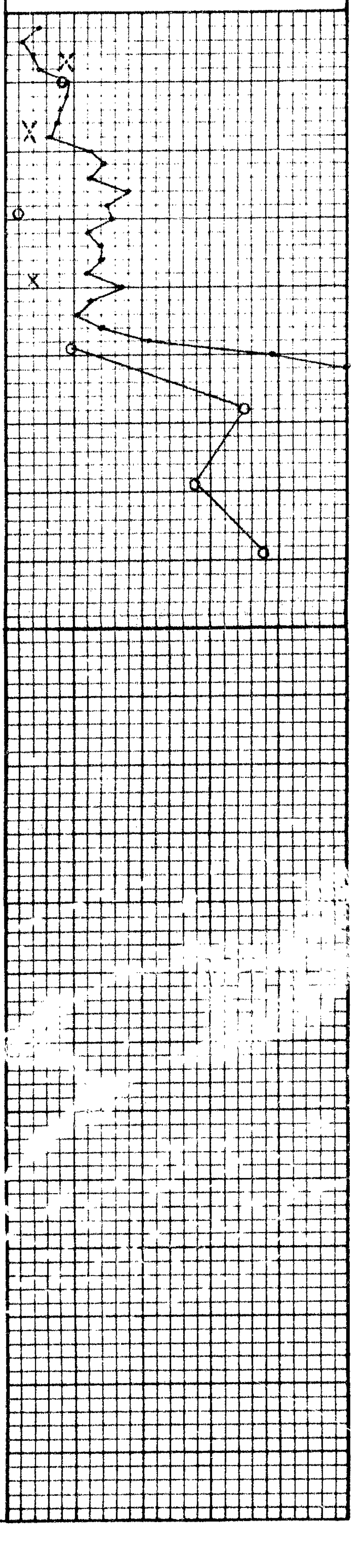
ATTERBERG LIMITS
LIQUID LIMIT —o
PLASTIC LIMIT ⊢—

SAMPLE TYPE
2" O.D. SPLIT TUBE
2" I.D. SHELBY TUBE
3" O.D. SHELBY TUBE

BOREHOLE No. 2.
PROJECT Proposed Crossing Over Shekak River.
LOCATION Hornepayne, Ontario.
HOLE LOCATION See Site Plan.
HOLE ELEVATION 1033.2 ft.
DATUM Geodetic.

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	SAMPLE TYPE AND No
		1033.2	0	
	PEAT-soft, fibrous	1030.7		
	SILT-dense to medium dense, brown organic silt with decayed wood.		10	
	SAND-SILT-mainly silty fine sand with layers of silt up to 1 foot in thickness.	1020.	20	Lost Lost.
	SAND SILT-silty sand with gravel, dense	1010. 1008.		
	-soil is very dense below 27.5 ft.		30 40	
	End of Bore	991.7		

PENETRATION RESISTANCE 350 FT. LB. BLOWS/FT.
SHEAR STRENGTH P.S.F.



NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT

NATURAL UNIT WEIGHT P.C.F.

Depth scale: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110

Notes:

1) Conventional wash boring, hole cased to full depth.

2) Difficult driving casing below 27.5 feet.

3) Dynamic cone penetration test performed 4 feet east of boring.

WILLIAM A. TROW & ASSOCIATES LTD.

SITE INVESTIGATIONS   SOIL MECHANICS CONSULTATION

DRAWING No. 3.
PROJECT No. J1410.

BOREHOLE No. 3.
PROJECT Proposed Crossing Over Shekak River.
LOCATION Hornepayne, Ontario.
HOLE LOCATION See Site Plan.
HOLE ELEVATION 1032.9 ft.
DATUM Geodetic.

LEGEND

PENETRATION RESISTANCE
2" O.D. SPLIT TUBE —o—o—o—
2" I.D. SHELBY TUBE —x—x—x—x—
2" DIA. CONE ————

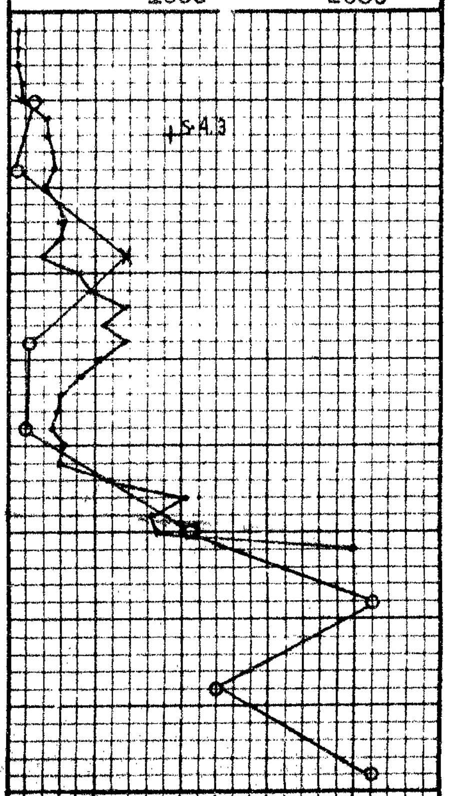
SHEAR STRENGTH
UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
UNCONFINED COMPRESSION ⊗
VANE TEST AND SENSITIVITY (S) $+^{S}$

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX X^{LI}

ATTERBERG LIMITS
LIQUID LIMIT —o
PLASTIC LIMIT |—

SAMPLE TYPE
2" O.D. SPLIT TUBE
2" I.D. SHELBY TUBE
3" O.D. SHELBY TUBE

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	PENETRATION RESISTANCE 350 FT. LB. BLOWS/FT. (20, 40, 60, 80) / SHEAR STRENGTH P.S.F. (1000, 2000)	NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT	SAMPLE TYPE AND No.	NATURAL UNIT WEIGHT P.C.F.
		1032.9	0				
	ORGANIC SILT-brown, slightly cohesive loose, contains numerous pieces of decayed wood and shells.						
			10				
		1020.0					
	SAND-SILT TILL-silt and fine sand with numerous gravel sizes, medium dense to dense.						
			20				
		1005.0					
	SILT-grey, very dense, coarse with an occasional fine sand layer.		30				
			40				
	End of Bore	987.2					



Notes:

1) Conventional wash boring, hole cased to full depth.

2) Dynamic cone penetration test carried out 4 feet SW of boring.

DEPTH FEET: 50, 60, 70, 80, 90, 100, 110

WILLIAM A. TROW & ASSOCIATES LTD.

SITE INVESTIGATIONS SOIL MECHANICS CONSULTATION

DRAWING NO 5.
PROJECT No. J1410.

LEGEND

BOREHOLE No 5.
PROJECT Proposed Crossing Over Shekak River.
LOCATION Hornepayne, Ontario.
HOLE LOCATION See Site Plan.
HOLE ELEVATION 1032.9 ft.
DATUM Geodetic.

PENETRATION RESISTANCE
2" O.D. SPLIT TUBE —o—o—o—
2" I.D. SHELBY TUBE —x—x—x—x—
2" DIA. CONE ————

SHEAR STRENGTH
UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
UNCONFINED COMPRESSION ⊗
VANE TEST AND SENSITIVITY (S) $+^{3}$

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX X^{LI}

ATTERBERG LIMITS
LIQUID LIMIT —o
PLASTIC LIMIT |—

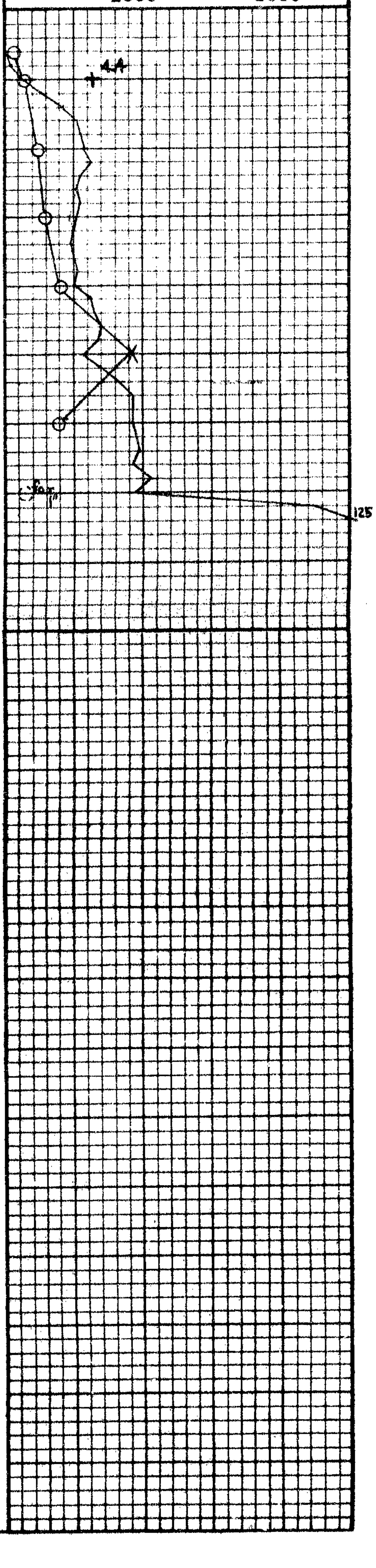
SAMPLE TYPE
2" O.D. SPLIT TUBE
2" I.D. SHELBY TUBE
3" O.D. SHELBY TUBE

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	SAMPLE TYPE AND No
	3 Inches Muskeg	1032.9	0	
	SILT-organic, brown, slightly cohesive with many pieces of wood, loose.			1, 2
	SILT-brown, coarse, dense to medium dense.	1026.4	10	3, 4
	SILT TILL-clayey silt with sand and gravel sizes, medium dense.	1016.9	20	5, 6
	SAND AND GRAVEL TILL-silty well graded sand and gravel, medium dense to dense, boulder noted at 35 feet.	1004.9	30	7, 8
	End of Bore	995.9		

PENETRATION RESISTANCE 350 FT. LB. BLOWS/FT. 20 40 60 80
SHEAR STRENGTH P.S.F 1000 2000

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT

NATURAL UNIT WEIGHT P.C.F.



DEPTH FEET: 0 10 20 30 40 50 60 70 80 90 100 110

Notes:

1) Conventional wash boring, hole cased to full depth.
2) Very difficult washing out the casing below 30 feet.
3) Very difficult to drive casing below 36.5 feet.
4) Dynamic cone penetration test performed 5 feet NE of borehole.

WILLIAM A. TROW & ASSOCIATES LTD.

SITE INVESTIGATIONS · SOIL MECHANICS CONSULTATION

DRAWING No 7.

PROJECT No J1410.

LEGEND

BOREHOLE No 7.

PROJECT Proposed Crossing Over Shekak River.

LOCATION Hornepayne, Ontario.

HOLE LOCATION See Site Plan.

HOLE ELEVATION 1033.2 ft.

DATUM Geodetic.

PENETRATION RESISTANCE
- 2" O.D. SPLIT TUBE
- 2" I.D. SHELBY TUBE
- 2" DIA. CONE

SHEAR STRENGTH
- UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
- UNCONFINED COMPRESSION ⊗
- VANE TEST AND SENSITIVITY (S) $+^{S}$

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX X^{LI}

ATTERBERG LIMITS
- LIQUID LIMIT
- PLASTIC LIMIT

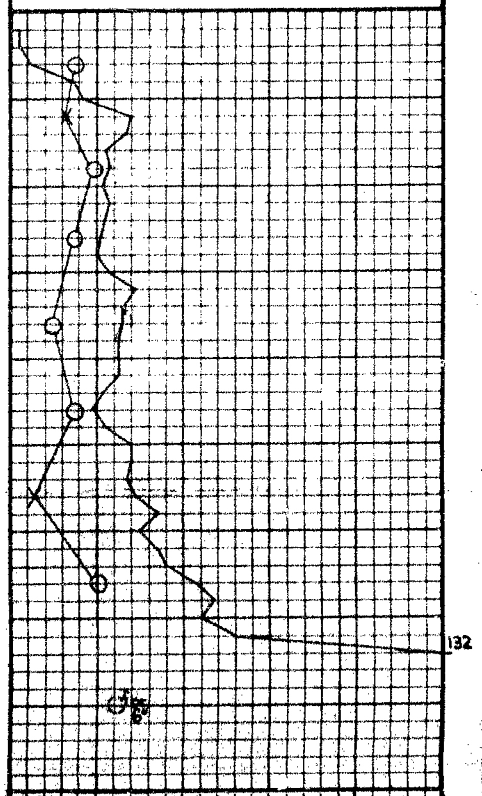
SAMPLE TYPE
- 2" O.D. SPLIT TUBE
- 2" I.D. SHELBY TUBE
- 3" O.D. SHELBY TUBE

SYMBOL	SOIL DESCRIPTION	ELEV. FEET	DEPTH FEET	SAMPLE TYPE AND No
		1033.2	0	
	MUSKEG	1031.9		
	SILT-brown slightly cohesive and sandy, with occasional fine sand seams, dense to medium dense.			1, 2, 3, 4, 5
	- thin clay seams noted below about 20 feet depth.		20	6
	SILT TILL-clayey silt with sand and gravel, medium dense.	1007.0		7
	SAND AND GRAVEL TILL-silty well graded sand and gravel	1003.7	30	8
	-boulders noted below 35 feet.		40	9
	ROCK-100% core recovery, granite.	974.2	60	
	End of Bore	969.2		

PENETRATION RESISTANCE 350 FT. LB. BLOWS/FT. 20 40 60 80 — SHEAR STRENGTH P.S.F

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT

NATURAL UNIT WEIGHT P.C.F.



Notes:
1) Conventional wash boring, hole cased to full depth.
2) Refusal to driving NX casing at 36 feet.
3) Drilled BX casing from 36 feet to bedrock contact at 59 feet.
4) 1'8" boulder drilled through @ 36'
   1'2" " " " @ 38'
   1'6" " " " @ 40'
   1'9" " " " @ 43'
   2'0" " " " @ 53'
   1'0" " " " @ 57'
   1'0" " " " @ 58'
5) Dynamic cone penetration test performed 5 ft. east of boring.

Depth scale: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110

Note Aug 18.1966 4.40 P.M.

Message from Mr. N. Zebruck.
Only two holes were drilled 2 ft apart. At the site of pile No 4. no rock could have been found (!?)
Rock blasted and attempts will be made to have it removed and the pile driven.
It appears that during blasting pile No 2 was shifted somewhat. This is going to be checked.
Advised Mr Zebruck to keep the drill for another day on the stand-by basis just in case should any more drilling be required.
Mr Zebruck will phone again on Aug 19. around 4. P.M.

AGS

Aug 19. 1966 3.50 P.M.

Mr Zebruck phoned that everything is O.K. No more problems are anticipated. Contractor wants to keep the drill till Monday P.M. O.K. with us. Mr Zebruck will only phone if more problems arise. AGS

August 17 1966

Note:

Mr R. Carter advised that the District Engineer Mr D. Foster informed him that they have problems at the site with boiling sand. Got in touch with the site and found out that along the entire project problems with boiling sand and silt were encountered in all excavations.

Advised Mr V Zebruck to pump from sumps or trenches having the bottom below the foundation bottom in order to lower the water table. Should pour a working slab and than pour the footing. Should not stop pumping before footing concrete hard enoug to sustain certain deformations.

Was also advised that first hole showed boulder 5.5' in diameter. They will put down three holes (3 ft centers) insert dynamit and blast. Told Mr Zebruck that blasting should be carried out by contractor and therefore be his responsibility.

Will be in touch with site again tomorrow

JZ

W. P. 142-64

D-H O. Representative at site
Mr Raymond Parsons
to be reached by phone
at Contractors office
(Bat Construction)
Hompayne 460

W.P. 142-64 Shekak R. Bridge S. of Hornepayne
Sec. Hay 631.

Note:
Aug 11. informed by Mr. Dick Panter that refusal to pile driving was met at an elevation much higher than expected. [illegible] construction site and call returned on Aug 12. 1966 by D.H.O. representative at site Mr. Raymond Parsons. He advised that all piles are driven except two, No 3 & 4 on pier No 2 (East pier). Pile No 4 is the south pile, pile No 3 is close to ℄. Pile No 3 refusal at 7', pile No 4 at 13'. They pulled out the piles brought in a drag line and excavated. It is their impression that there is a rock ledge with a drop between the two pile locations. (according to the foundation investigation report - W A Trow - this should not be the case.)
Asked if they could do something about it they answered that all they could do they have done. The drills they have at the site are unable to reach this depth.
It was decided to send a diamond drill from Fort William (Canadian Longyear)

to drill through that ledge and establish whether it is bedrock or boulders.
It is tentatively decided that if there are boulders they will be blasted, if it is bedrock or an extremely large piece of rock piles will be keyed-in. Final decision will depend on report from site.
Mr Parsons was instructed to keep us posted on the developments.
Advised Mr D Panter and Mr A. Mckim on arrangements made

Aug 12. 1966

A.Sterman

Note:
Telephone call by Nick Lebruck (DHO)
Q: Can concrete be poured into the tube piles of pier no 1 ~~and~~ and west abutment?
Minimum distance from possible blasting 49 ft.
A: Yes. Checked with Al Mckim and agreed that there are no objections. Concrete will be in place at least 48 hrs. before possible blasting. Advised site.
Aug 15. 1966 3-10 P.M. ags.

cc: Foundations Office (Rm. 110)

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

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

Attention: Mr. A. [illegible]

July 3, 1964

FOUNDATION INVESTIGATION REPORT BY:
William A. Trow Associates Limited,
Proposed Bridge, Sec. Hwy. 631,
Shekak River, 3.1 Miles South of
Hornepayne, Ontario, District 16,
W.P. 142-64

Attached, we are sending you the above-mentioned report submitted by Wm. A. Trow & Associates. We have reviewed the Consultant's report and find the factual information adequate and well presented. We are in agreement with the conclusions and recommendations put forward by the Consultant except for the driving of timber piles butt first. It is suggested that the allowable load per pile be reduced to 20 T and that they be driven in the normal manner.

Should you require additional information, please feel free to call on our Office.

agstermac

A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

AGS/MdeF
Attach.
cc: Messrs. A. M. Toye
R. A. Tregaskes
M. D. McMillan
S. Harrell
J. D. Foster
C. R. Saint
A. Watt

Foundations Office
Gen. Files

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

TO: A. Stermac,
Principal Foundation Engineer,
Bridge Section, Down.

FROM: F. DeVisser,
Regional Bridge Location Engineer,
Fort William.

DATE: March 3, 1965.

OUR FILE REF.

IN REPLY TO

SUBJECT: Work Project 142-64, Site 38 W - 7, Shekak River Bridge
8.1 Miles south of Hornepayne, Secondary Road 631, Dist 16

Attached is one print of preliminary plan D 5531 - P1 for the subject structure. Would you please let me have your comments.

F. De Visser

F. DEVISSER,
REGIONAL BRIDGE LOCATION
ENGINEER.

FD/bep

c.c. S. McCombie