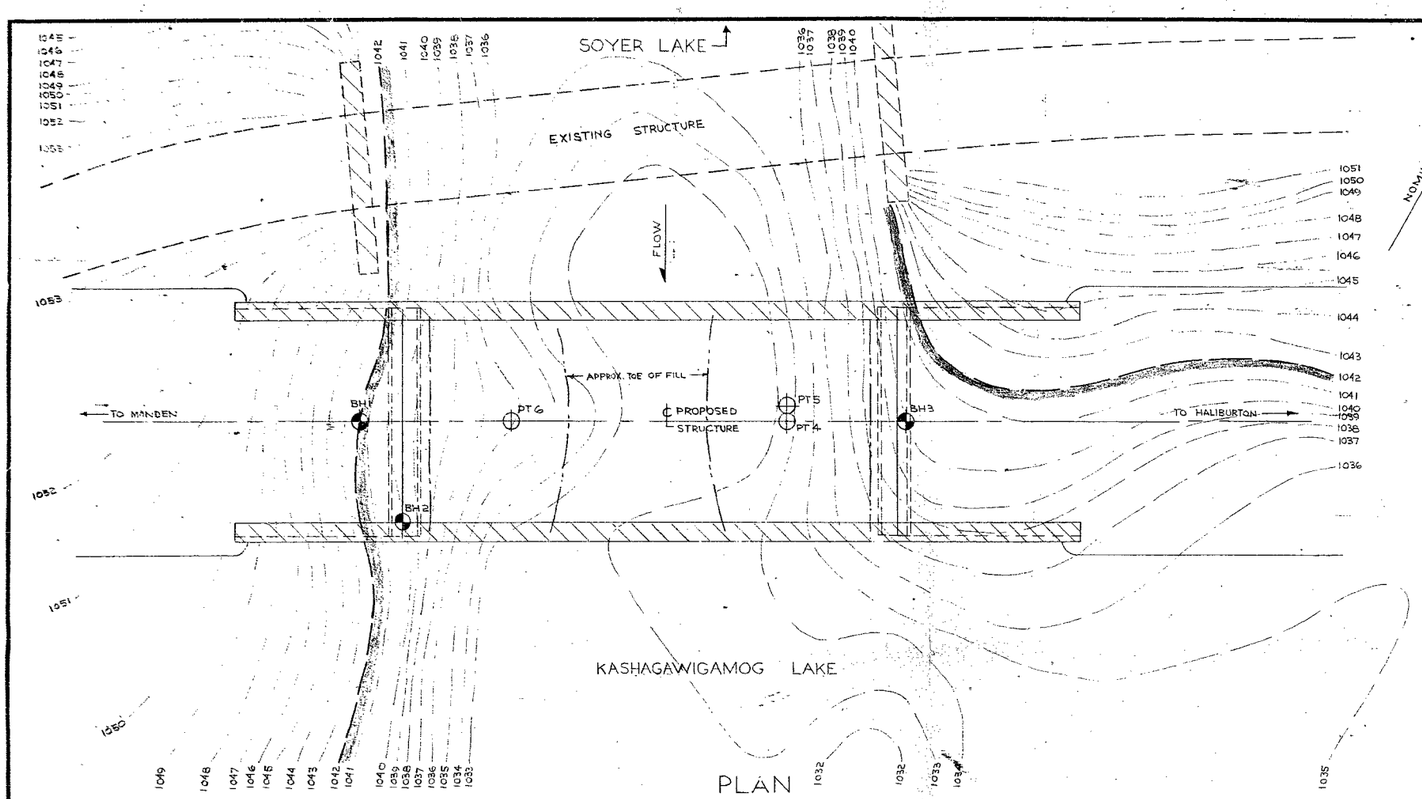
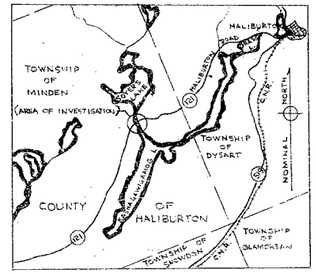
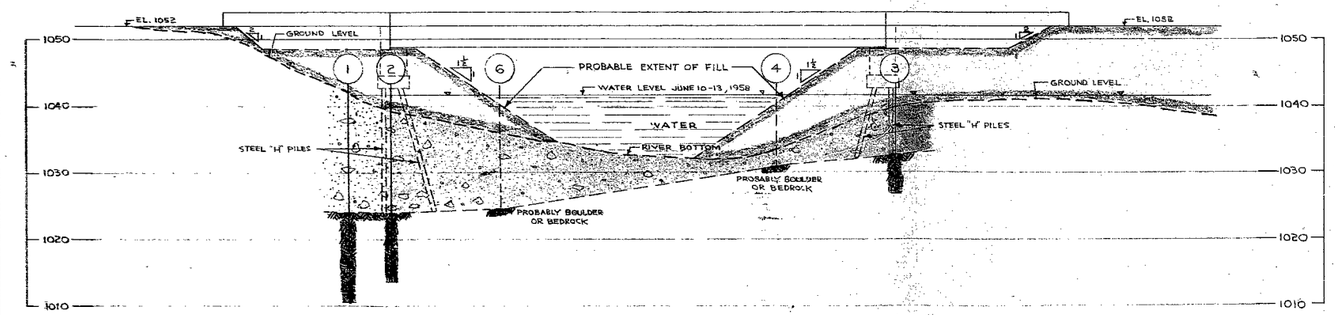
58-F-287M
Hwy #121
Allsaw Bridge
Kashagawigamog
Lake





KEY PLAN
SCALE: 1" = 2 MILES



SECTION ALONG CENTRE LINE

LEGEND

- BOREHOLE WITH PENETRATION TEST IN PLAN
- BOREHOLE IN ELEVATION
- PENETRATION TEST IN PLAN
- PENETRATION TEST IN ELEVATION

STRATIGRAPHY

- COMPACTED GRANULAR FILL (TO BE PLACED)
- LOOSE TO COMPACT GREY SAND, GRAVEL AND BOULDERS
- GRANITIC GNEISS BEDROCK

SPECIAL NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN BOREHOLES HAS BEEN INFERRED FROM GEOLOGICAL EVIDENCE AND SO MAY VARY FROM THAT SHOWN.

REVISIONS		
MARK	DATE	DESCRIPTION

REFERENCE	
DWG. NO.	DESCRIPTION

REFERENCE	
DWG. NO.	DESCRIPTION
P1	J.D.LEE AND COMPANY LTD. - PROPOSED ALLSAW BRIDGE AT KASHAGAWIGAMOG LAKE - THE KING'S HIGHWAY N°121 DISTRICT N° 11 - COUNTY OF HALIBURTON - TOWNSHIP OF MINDEN DATED MAY 16, 1958.

J. D. LEE & COMPANY LTD.
KINGSTON ONTARIO

PROPOSED ALLSAW BRIDGE
KING'S HIGHWAY N°121 AT KASHAWIGAMOG LAKE - COUNTY OF HALIBURTON, ONT.

BORING PLAN AND SOIL STRATIGRAPHY

GEOCON LTD

DATE JUNE 25, 1958 SCALE 1" = 10'-0"

MADE	CHKD.	APPD.	No.
J.A.	R.M.Q.	A.H.S.	No. 56692—1

S6692

REPORT

TO

J. D. LEE AND COMPANY

CONSULTING ENGINEERS

ON

SOIL CONDITIONS AND FOUNDATIONS

PROPOSED ALLSAW BRIDGE

KASHAGAWIGAMOG LAKE HIGHWAY 121

HALIBURTON ONTARIO

Distribution:

2 copies - J. D. Lee and Company Limited,
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3355 WEST BROADWAY AVE.
VANCOUVER 8, B.C.
TEL. CH. 5810

BA 763

Rexdale, Ontario,
June 26th, 1958.

58-F-287 M

J. D. Lee and Company Limited,
Consulting Engineers,
10 Chapman Street,
Kingston, Ontario.

Attention: Mr. J. S. Ellis, P. Eng.

Re: Site Investigation,
Proposed Allsaw Bridge,
Kashagawigamog Lake,
Highway 121,
Haliburton, Ontario.

Dear Sirs:

This letter reports the results of the above investigation carried out in accordance with our proposal dated June 2nd, 1958 and accepted on June 3rd, 1958. The object of this investigation was to determine and interpret the subsurface conditions at the above site, as they affect the design of foundations for the proposed bridge.

The site of the proposed bridge is located just south of the existing bridge structure on highway 121 at the narrow channel between Soyer and Kashagawigamog Lakes, about 7 miles southwest of Haliburton, Ontario. The ground level at the site varies from about elevation 1052 on the west bank of the channel to about elevation 1032 at the bottom of the channel.

The field work was carried out between June 9th and 13th, 1958, inclusive. Three boreholes with adjacent dynamic penetration tests and three additional dynamic penetration tests were put down to depths between 11 and 32 feet, using a skid-mounted machine drillrig. Four of the dynamic penetration tests and one of the boreholes were put down from a raft which

was assembled at the site. Bedrock was proved in each of the three borings by core drilling in AXT size.

The locations of the borings and dynamic penetration tests together with a section of the inferred soil stratigraphy along the centre line of the proposed bridge are shown on Drawing S6692-1 attached at the rear of this report. A detailed log of each boring is given on the Office Reports on Soil Exploration in Appendix I.

The soil and rock samples obtained will be stored until January 1st, 1959 and will then be destroyed unless further instructions are received.

Elevations of the borings are referred to the centre of the road at the mid-point of the existing bridge. The elevation of this reference point as provided by J. D. Lee and Company is 1052.8 feet.

SOIL CONDITIONS

The principal soil strata encountered by the borings are as follows:

Grey Sand, Gravel and Boulders

A stratum of brown to grey medium to coarse sand, gravel and boulders forms the top layer at the site. The thickness of the stratum varies from about 5 feet in borehole 3 to about 18 feet in boreholes 1 and 2. The stratum consists chiefly of layers of fine to coarse gravel and medium to coarse sand with some cobbles and boulders distributed throughout. The sand and gravel sizes are chemically unweathered and very angular in shape. The individual sand grains and gravel sizes consist primarily of feldspar, quartz and amphibole probably derived from the underlying granitic bedrock by physical weathering. The lower 3 to 4 feet of the stratum consists predominantly of coarse gravel sizes with numerous granitic cobble and boulder sizes.

SOIL CONDITIONS (continued)

Grey Sand, Gravel and Boulders (continued)

Due to the presence of the gravel, cobble and boulder sizes, it was generally impossible to drive the sampler more than a few inches in the stratum and consequently only one standard penetration resistance or "N" value of 5 blows per foot was obtained for the determination of the relative density of the stratum. However, based on the results of the dynamic penetration tests and the "N" value of 5 blows per foot, it is considered that the relative density of the stratum is loose to compact. The erratic dynamic penetration resistances obtained are due to the cobbles and boulders present in the stratum.

Bedrock

Bedrock underlies the sand, gravel and boulder stratum. It consists of a sound durable banded granitic gneiss of Precambrian, Grenville age. Bedrock was proved by core drilling for up to 12 feet in boreholes 1, 2 and 3.

WATER CONDITIONS

Groundwater level was at river water level in all borings at the time of the investigation. The river level was at elevation 1042.7.

DISCUSSION

It is understood that the proposed bridge will be a single span structure approximately 70 feet long. It is further understood that both spread footings and pier foundations have been considered in preliminary design.

DISCUSSION (continued)

It is considered that the sand, gravel and boulder stratum is not a suitable bearing stratum for spread footing foundations because of its loose and erratic relative density.

Various alternative construction methods have been considered. Spread footings could be founded on compacted fill which will be required to bring the approach roads to final grade. A high degree of compaction of the fill would be required in order to minimize settlement and vibrations of the foundations under traffic loads. It is considered that this form of construction may be impractical.

Alternatively, spread footings or piers could be carried to bedrock, but it is considered that the construction and dewatering of a sheeted cofferdam would be uneconomical in comparison with a piled foundation.

It is t efore recommended that the bridge be founded on steel H piles driven to bedrock. Resistance to driving may be encountered due to occasional boulders in the stratum, particularly near the base. Some of the piles may therefore have to be redriven or replaced if they become hung up on boulders before reaching approximate bedrock elevation. Bedrock is approximately at elevation 1024 in the area of boreholes 1 and 2, and at elevation 1033 in borehole 3. To give adequate lateral stability to the piles, the fill used for the approach roads should be placed to the required grade prior to driving of the piles. The approximate extent of the fill that will be required is shown on Drawing S6692-1. The fill should consist of a well-graded granular material and be well compacted during placing. It is further recommended that the footings capping the piles be provided with a minimum of 4 feet of earth cover for adequate frost protection.

We believe that this letter report gives all the information necessary to enable you to proceed with the design of the proposed bridge. If however, we can be of any further assistance, please do not hesitate to contact us.

Yours very truly,

GEOCON LTD

J. L. Seychuk

JLS/dw
S6692

J. L. Seychuk, P. Eng.,
Senior Soils Engineer.

APPENDIX I

OFFICE REPORTS ON SOIL EXPLORATION

EXPLANATION OF THE FORM "OFFICE REPORT ON SOIL EXPLORATION"

The object of this form is to enable a comprehensive study of the soil to be made by combining on one sheet all of the information obtained from the boring. An explanation of the various columns of the report follows.

ELEVATION AND DEPTH

This column gives the elevation and depth of boundaries between the various soil strata. The elevation is referred to the datum shown in the general heading.

WATER CONDITIONS

In this column the water level in the casing at the time of boring or the water table in the ground, determined by a series of observations in a piezometer or standpipe, is indicated to scale by a horizontal line with the symbol W.L. or W.T. above the line. A notation of any complicated groundwater conditions will be made in this column.

DESCRIPTION

A description of the soil, using standard terminology, is contained in this column. The consistency of cohesive soils and the relative density of non-cohesive soils are described by the following terms:

Consistency	U-Strength Tons/sq. ft.
Very soft	0.03 to 0.25
Soft	0.25 to 0.5
Firm	0.5 to 1.0
Stiff	1.0 to 2.0
Very stiff	2.0 to 4.0
Hard	over 4.0

Relative Density	Standard Penetration Resistance. Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

STRATIGRAPHIC PLOT

The stratigraphic plot follows the standard symbols of the National Research Council, Canada.

ELEVATION SCALE

The information in all columns is plotted to a true elevation scale which is shown in this column.

GRAPHS

The main body of the report forms a graph which is used to plot to correct elevation the important soil properties which are obtained through field and laboratory tests. The scales and symbols for the plotting are shown at the head of the column.

OTHER TESTS

In this column are shown, by symbol, the other field or laboratory tests which have been performed on the soil and for which the results have not been plotted on the above graph.

SAMPLES

The first three columns describe the condition, type and number of each sample obtained from the boring. The location and extent of each sample is plotted to scale.

In the last column is shown the penetration resistance in blows of 4200 inch-pounds required to drive one foot of the sampler into the ground. When a 2 inch Drive Sampler is used the result obtained is termed the "Standard Penetration Resistance".

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OFFICE REPORT ON SOIL EXPLORATION

APPEX I

CONTRACT 56622 BORING # 1 & 2 DATUM GEODETIC CASING BX

BORING DATE JUNE 9, 1958 REPORT DATE JUNE 26, 1958 COMPILED BY J.A. CHECKED BY R.Q.

SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

SAMPLE CONDITION

DISTURBED
FAIR
GOOD
LOST

SAMPLE TYPES

A.S. - AUGER SAMPLE
S.T. - SLOTTED TUBE
W.S. - WASHED SAMPLE
D.O. - DRIVE-OPEN
D.F. - DRIVE-FOOT VALVE
C.S. - CHUNK SAMPLE
F.S. - FOIL SAMPLE
S.O. - SLEEVE-OPEN
S.F. - SLEEVE-FOOT VALVE
T.O. - THIN WALLED OPEN
R.C. - ROCK CORE

ABBREVIATIONS

V - IN-SITU VANE TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Qc - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
γ - WET UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

SOIL PROFILE

ELEVN. / DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT
1042.2 / 0.0		GROUND LEVEL	
	W.L. @ EL. 1042 - JUNE 9, 1958	LOOSE TO COMPACT MEDIUM TO COARSE SAND, GRAVEL AND BOULDERS	
1024.2 / 18.0		GRANITIC GNEISS BEDROCK	
1010.5 / 31.7		END OF HOLE	
1042.0		WATER LEVEL	
1040.8 / 1.2		WATER	
		LOOSE TO COMPACT FINE TO COARSE SAND, GRAVEL AND BOULDERS	
1023.7 / 18.3		GRANITIC GNEISS BEDROCK	
1013.7 / 28.3		END OF HOLE	

ELEVATION SCALE

WATER CONTENT, W% ○ NAT. □ LW △ PW

DYNAMIC PENETRATION TEST BLOWS PER FOOT 20 40 60 80 100

1040 1030 1020 1010 1000 1040 1030 1020 1010

1

END OF PENETRATION TEST @ EL 1025.6
349 BLOWS FOR LAST 8 INCHES
183 BLOWS FOR LAST INCH

2

END OF PENETRATION TEST @ EL 1026.1
183 BLOWS FOR LAST 11 INCHES
61 BLOWS FOR NO ADVANCE

OTHER TESTS

R.C. RECOVERY 100%

R.C. RECOVERY 65%

SAMPLES

CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS/FT.
	C.S.	1	—
	W.S.	2	—
	2" D.O.	3	—
	A.X.T.	4	—
	R.C. A.X.T.	5	—
	W.S.	1	—
	2" D.O.	2	5
	D.O.	3	—
	R.C. A.X.T.	4	—

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OFFICE REPORT ON SOIL EXPLORATION

APPEX. I

CONTRACT S6692 BORING # 3 DATUM GEODETIC CASING BX

BORING DATE JUNE 12, 1958 REPORT DATE JUNE 26, 1958 COMPILED BY J.A. CHECKED BY R.Q.

SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

SAMPLE CONDITION

DISTURBED
FAIR
GOOD
LOST

SAMPLE TYPES

A.S. - AUGER SAMPLE
S.T. - SLOTTED TUBE
W.S. - WASHED SAMPLE
D.O. - DRIVE-OPEN
D.F. - DRIVE-FOOT VALVE
C.S. - CHUNK SAMPLE
F.S. - FOIL SAMPLE
S.O. - SLEEVE-OPEN
S.F. - SLEEVE-FOOT VALVE
T.O. - THIN WALLED OPEN
R.C. - ROCK CORE

ABBREVIATIONS

V - IN-SITU VANE TEST
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Qc - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
γ - WET UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

SOIL PROFILE								SAMPLES			
ELEVN. / DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE	WATER CONTENT W% ○ NAT. □ Lw △ Pw / DYNAMIC PENETRATION TEST BLOWS PER FOOT 20 40 60 80 100	OTHER TESTS	CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS/FT.
1042.0		WATER LEVEL								
0.0		WATER								
1037.8		LAKE BOTTOM		1040						
4.2		LOOSE TO COMPACT FINE TO COARSE SAND, GRAVEL AND BOULDERS			4 BLOWS FOR 5 INCHES			WS	1	—
1032.7										
9.3		GRANITIC GNEISS BEDROCK		1030		RC RECOVERY 100%		RC AXT	2	—
1027.0					END OF PENETRATION TEST @ EL 1031.0					
15.0		END OF HOLE			61 BLOWS FOR NO ADVANCE REFUSAL					
				1020						

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OFFICE REPORT ON SOIL EXPLORATION

APPEX I

CONTRACT 56692 PENETRATION TESTS # 4, 5 & 6 DATUM GEODETIC CASING —

BORING DATE JUNE 13, 1958 REPORT DATE JUNE 26, 1958 COMPILED BY N.A. CHECKED BY R.Q.

SAMPLER HAMMER WT. 410 LBS. DROP 12½ INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

SAMPLE CONDITION

DISTURBED
FAIR
GOOD
LOST

SAMPLE TYPES

A.S. - AUGER SAMPLE
S.T. - SLOTTED TUBE
W.S. - WASHED SAMPLE
D.O. - DRIVE-OPEN
D.F. - DRIVE-FOOT VALVE
C.S. - CHUNK SAMPLE
F.S. - FOIL SAMPLE
S.O. - SLEEVE-OPEN
S.F. - SLEEVE-FOOT VALVE
T.O. - THIN WALLED OPEN
R.C. - ROCK CORE

ABBREVIATIONS

V - IN-SITU VANE TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Qc - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
γ - WET UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION
WL - WATER LEVEL IN CASIN
WT - WATER TABLE IN SOIL

SOIL PROFILE: ELEVN. / DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE	WATER CONTENT W% ○ NAT. □ LW △ PW / DYNAMIC PENETRATION TEST BLOWS PER FOOT (20, 40, 60, 80, 100)	OTHER TESTS	SAMPLES: CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS/FT.
1042.0		WATER LEVEL								
0.0		WATER		1040	4					
					PROBABLY LOOSE COARSE SAND AND GRAVEL					
1032.0		LAKE BOTTOM								
1031.0										
11.0		END OF PEN. TEST REFUSAL PROBABLY BOULDER OR BEDROCK		1030						
				1020						
1042.0		WATER LEVEL								
		WATER		1040	5					
					PROBABLY LOOSE COARSE SAND, GRAVEL AND BOULDERS					
1033.0		LAKE BOTTOM								
9.0										
1029.0				1030						
13.0		END OF PEN. TEST REFUSAL PROBABLY BOULDER OR BEDROCK								
				1020						
1042.0		WATER LEVEL								
0.0		WATER		1040	6					
1037.3		LAKE BOTTOM								
4.7		PROBABLY LOOSE TO COMPACT COARSE SAND, GRAVEL & BOULDERS		1030	7 BLOWS FOR LAST 6 INCHES					
1024.5										
17.5		END OF PEN. TEST REFUSAL PROBABLY BOULDER OR BEDROCK		1020						