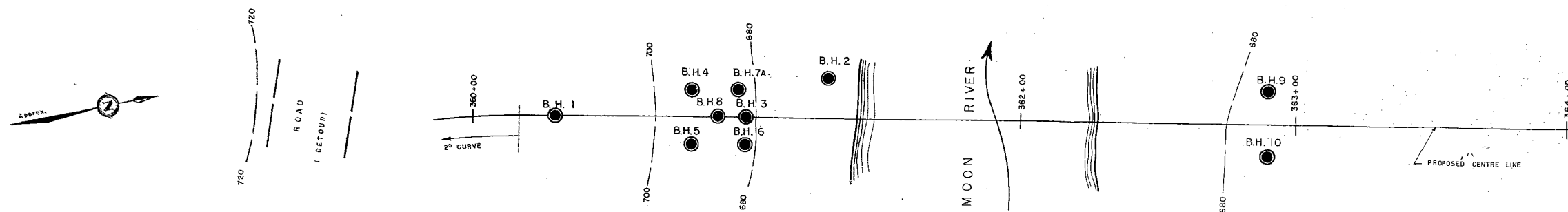


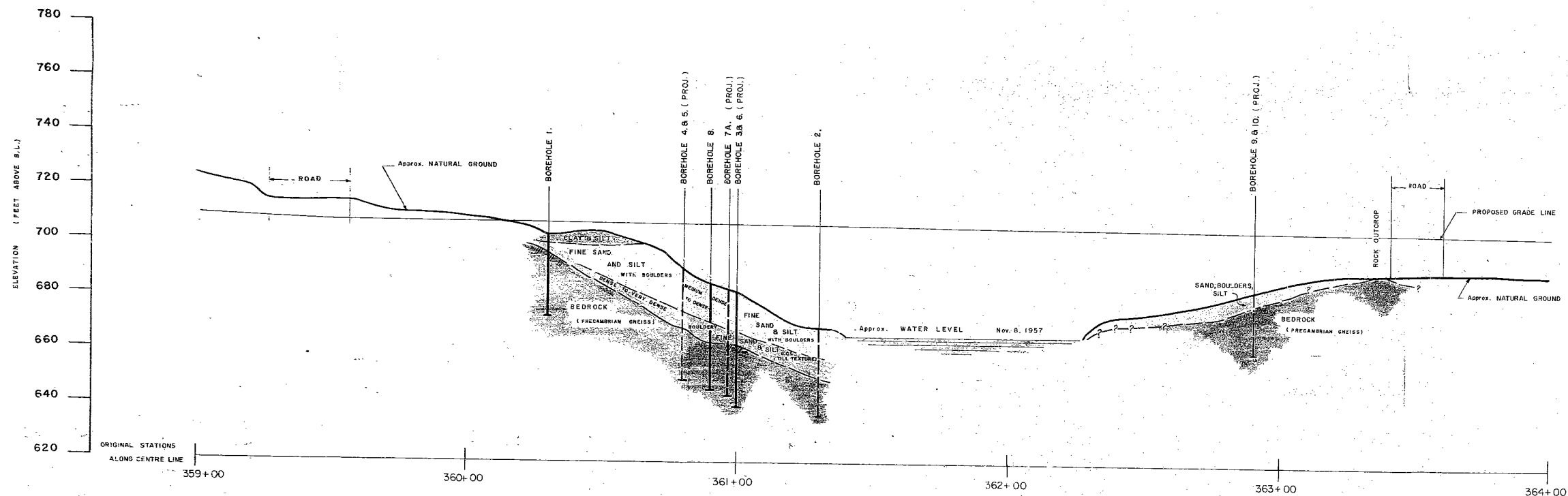
57-F-233C

Hwy. # 103

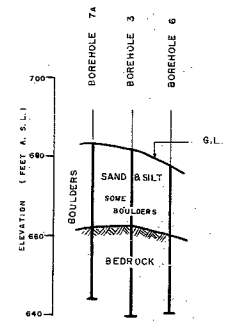
MOON RIVER



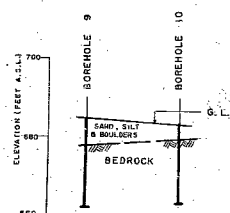
PLAN OF SITE AREA
(SHOWING BOREHOLE LOCATIONS)



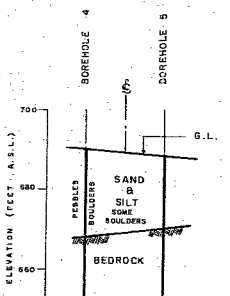
CROSS-SECTION OF BRIDGE SITE AREA
(ALONG CENTRE LINE)



CROSS-SECTION
BOREHOLE 7A, 3 & 6
STA. 361+00



CROSS-SECTION
BOREHOLE 9 & 10
STA. 362+90



CROSS-SECTION
BOREHOLE 4 & 5
STA. 360+80

DEPARTMENT OF HIGHWAYS - ONTARIO	
HUNTING TECHNICAL & EXPLORATION SERVICES	
1450 O'CONNOR DRIVE TORONTO, ONT.	
MOON RIVER BRIDGE SITE	
FOR PROPOSED HIGHWAY No. 103	
PLAN & PROFILE SHOWING	
BOREHOLE LOCATIONS	
SCALE: 1 inch = 20 feet	DRAWN: N.W.L. CHECKED: J.R.
	TRACED: C.L.B. DATE: NOV. 26, 1957

BA 446-G

57-F-233 C

PRELIMINARY SITE INVESTIGATION
for the
PROPOSED MOON RIVER BRIDGE
near
MACTIER, ONTARIO

for the
DEPARTMENT OF HIGHWAYS
ONTARIO

by the
Engineering Division

HUNTING TECHNICAL AND EXPLORATION SERVICES LIMITED

November, 1957

Toronto, Ontario

ORDER OF CONTENTS

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1.33	Overburden Geology
1.34	Soil Conditions
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1.4	PERSONNEL
1.5	APPENDICES

SECTION 1-1
PURPOSE OF REPORT

1.11 General

The purpose of this report is to present the results of a subsurface soil investigation for the proposed Moon River Bridge near MacTier, Ontario.

SECTION 1.2

DISCUSSION OF PROCEDURES

1.21 Location of Boreholes

The bore hole locations for this investigation were established by Department of Highways' surveyors. At the completion of the work, each hole was marked with a large stake denoting the hole number for future reference.

1.22 Subsurface Drilling and Sampling

A primary program, specified by the client, of 4 soil borings was initiated in the vicinity of the proposed site of the Moon River bridge. As the investigation proceeded, the initial program was enlarged to include 6 additional borings.

A skid mounted, hydraulic head Junior Longyear diamond drilling rig was used on this project. All boring and sampling operations were completed by experienced soil drillers under the supervision of a qualified geologist.

Due to the presence of large boulders in the overburden, the borings were advanced by diamond drilling techniques whereby the bottom end of the casing is fitted with a diamond shoe bit, and is fed into the ground by the diamond drill.

Water is used in this method to clean and cool the diamond drill bit during the actual drilling operations.

Split spoon samples were obtained in cohesionless materials by means of a 2 inch O.D. standard split spoon sampler. The standard penetration test using a 140 lb. hammer falling 30 inches was recorded for each foot of sample taken with the split spoon sampler. The samples were taken from the split spoon, classified and placed in airtight jars.

Each borehole was advanced at least 15 feet into bedrock by diamond core drilling.

In the interest of drilling economy, soil samples were only obtained from holes 1, 2 and 8. Soil conditions in the other holes were obtained by observation of the drill wash water.

SECTION 1.3

DISCUSSION OF SITE

1.31 Geographic Location

The proposed bridge site is located on the Moon River at the crossing of Highway No. 103. This is in the Muskoka Lakes region of central Ontario. The site is between 5 and 6 miles south of the village of MacTier.

Figure 1 shows the general geographic location.

1.32 Bedrock Geology

The bedrock in the vicinity of the bridge site is entirely pre-Cambrian in age.

A common rock which underlies the site is a hybrid gneiss of probably sedimentary and igneous origin. It commonly has a pink and grey colour and is strongly foliated. The main minerals appear to be quartz, feldspar with biotite mica or hornblende or both. These rocks are more prevalently seen on the south bank of the river near the site and are structurally very sound with high bearing capacities. From examination of the core of particularly holes 1, 4, and 5, a good proportion of the gneiss could be classed as true granite gneiss.

Although the core recovery(holes 9 and 10) on the north bank of the Moon River at the proposed site was excellent, the rock did show signs of secondary alteration. It is doubtful if this could effect any engineering structure where bearing capacity is the main consideration. The rocks here are decidedly more basic in composition and in places are almost amphibolites.

In general the core recovery in all holes drilled was excellent. Since glaciation has the effect of removing the poorer and weathered rock, the rock close to the surface appears to be fresh and sound.

The jointing is quite prominent and one main joint system has a strike of approximately $N20^{\circ}E$ and is almost vertical. There is a weaker joint system which has a trend at right angles to this system and could be termed minor. It is more shallow in its dip. The joints can be weathered and fairly open near the surface but generally are quite tight at shallow depths in the bedrock.

The regional trend of the foliation and structure is approximately $N120^{\circ}E$ and dips to the north at approximately $45^{\circ}N$. This was seen on numerous road cuts in the immediate vicinity of the site.

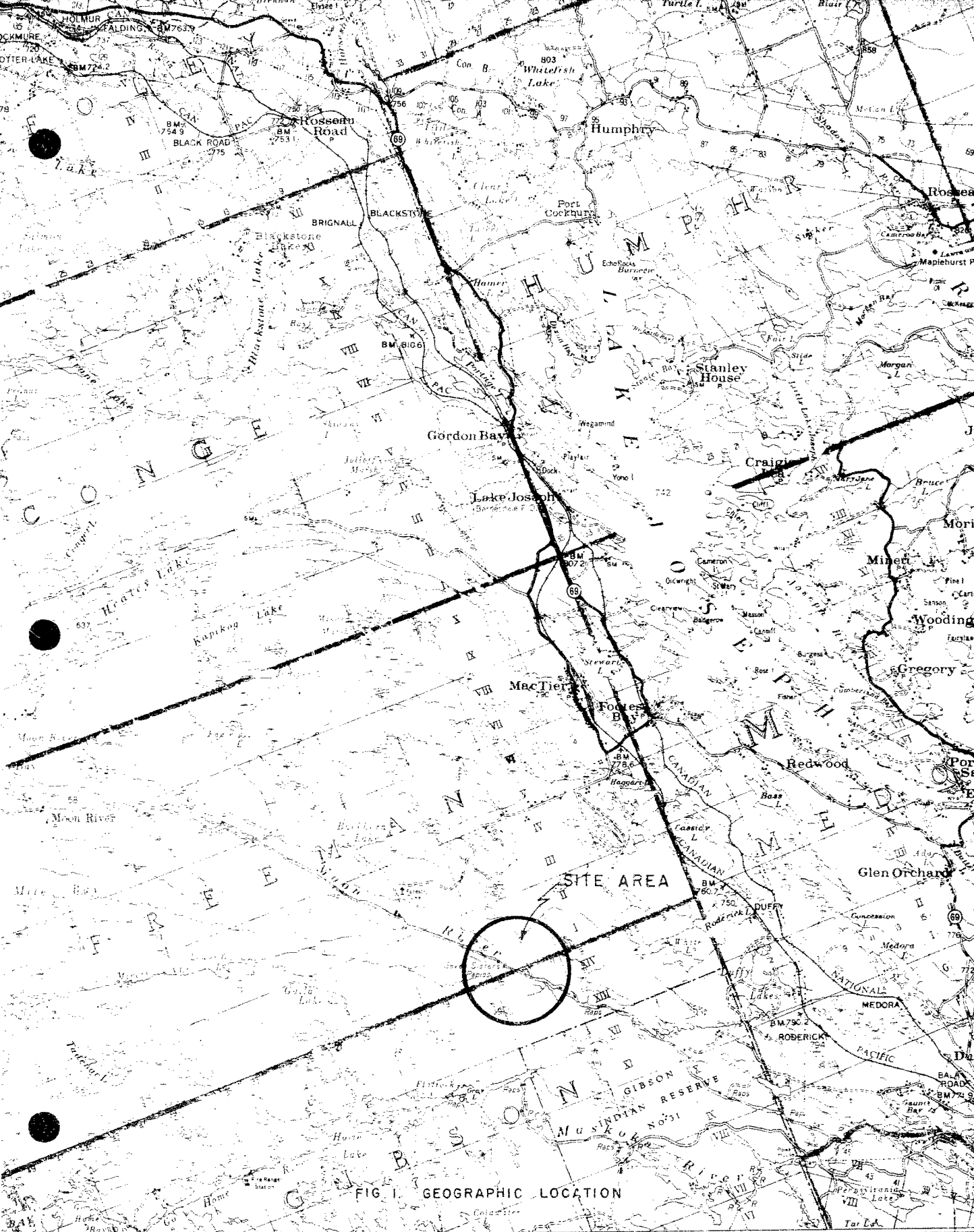


FIG. 1. GEOGRAPHIC LOCATION

The trend and inclination of the rocks forms continuous rock ridges and glacial debris (mostly sand, bouldery till) filled valleys.

1.33 Overburden Geology

The site area is located close to the north-east shore of "glacial" Lake Algonquin near where the ice sheet feeding the lake was located.

Due to post-glacial rebound of the area (hinged on a line approximately E-W through the south end of Saginaw Bay and Lake Huron) the present elevation of the glacial lake level at the site could be assumed to be between 851 feet and 1,020 feet A.S.L. Since the borehole elevations are in the vicinity of 680 feet A.S.L., this would place the area at least 170 feet under the (max. ?) water level of Lake Algonquin.

For the above reasons, lacustrine deposits both in the form of lenses and pockets of roughly sorted silts, clays and sands can be expected as well as water modified drift deposits. The drift is expected to be of Wisconsin era origin and will occur below the lacustrine deposits. Some recent alluvium may be encountered near the river.

Due to the fluctuations of the glacial and post-glacial lakes, local radical variations in overburden are likely to occur. All the unconsolidated material will be derived from the same origin (i.e. direct or indirect glacial erosion of the "shield" bedrock).

1.34 Soil Conditions

Our understanding of the initial bridge design is that abutments are contemplated at chainages 361+00 and 363+00. The approach to the bridge will be made on fill.

With reference to this proposal we would like to offer the following comments for your consideration:

1. North Abutment

Since the overburden in the vicinity of the proposed north abutment is only 3 to 7 feet deep, presumably the footings will be taken to bedrock. In this case, no difficulties are foreseen with the abutment or the approach fill.

2. South Abutment

Two choices of elevation are available for the south abutment footing, i.e. either it rests on soil at about elev. 675, or it rests on bedrock.

We would recommend taking the footing to rock for the following reasons:

a) Our preliminary calculations indicate that an abutment placed in the medium dense to dense fine sand and silt will slide due to the active pressure from the approach fill behind the abutment.

b) Although the till would probably be able to support the abutment and fill, rock is only about 5 feet below the top of the till, therefore it would appear to be much safer to found the abutment on rock.

c) Due to the possibility of scour action undermining the footing if the footing is placed on soil, it would be safer to place the footing on rock.

With reference to the excavation for the south abutment footings, the possibility exists that the medium dense sand and silt will become quick, if the excavation takes place at a time of year when the water table is high. As a result, sloughing of the bank could be expected to occur.

SECTION 1.4

PERSONNEL

The drilling program was performed under the supervision of Mr. D. G. Fraser.

This report was written by Mr. D. C. Fraser, N.W.E. Lee, P.Eng., and J. Kilgour, P.Eng.

Mr. D. R. Lueder was responsible for the general direction of the investigation and for the review of the report and interpreted results.

SECTION 1.5

APPENDICES

Office Logs of Boreholes

Air-photo with Interpreted Geology

Plan and Profile of Site
(enclosed at end of report)

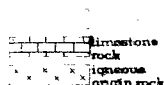
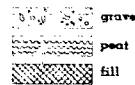
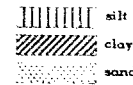
HUNTING TECHNICAL and EXPLORATION SERVICES

JOB H214/57
BOREHOLE 1
COMPILED J.K.
CHECKED D.F.

JOB NO. H214/57 LOCATION MOON RIVER BRIDGE
CLIENT DEPT. OF HIGHWAYS - ONTARIO
COORDINATES CHNG. 360 +53 - 1.0 L
ELEV. (Surface) 703.3 (Collar) Datum D.H.O.

BOREHOLE NUMBER

Date (Started) NOV 4, 1957 (Finished) NOV 6, 1957
RIG NO. 1 TYPE JR. LONGYEAR HYD.



C - Consolidation test
d_s - dry density
d_t - field density
M - mechanical analysis

Q - unconsolidated shear
Q_c - consolidated shear
S - drained shear
V - vane shear (in situ)
U - unconfined compressive strength

C - core
K - permeability
w_n - field moisture content
wp - plastic limit
wl - liquid limit
U - unconfined compressive strength

Up - approx. U as indicated
by calibrated penetrometer
P - field penetration tests
s - standard penet. 2 S.S.
c - cone penetration (60 2 1/2)
a - other

E.S. - chunk
S.S. - split spoon
S.L. - sleeve sample
S.T. - Shelby tube
B.A. - barrel auger
S.A. - spiral auger

T.W. - thin, walled, open
T.W.P. - thin walled piston
D.P. - drive piston
D.F.V. - drive foot valve
D.B. - diamond bit
R.B. - Rock bit

F.T. - fish-tail
W.O. - wash-out
undisturbed
disturbed
but represent
fair
lost

BORING			LOG	TESTS										SAMPLES										REMARKS		
SCALE DEPTH ELEV. CASING			LOG	DESCRIPTION	ELEV.	FIELD					LABORATORY					No.	COND.	DEPTH		TYPE	RECOVERY		HYD.	PENET.	SCALE	
ft ft ft					ft	1000 2000 3000 HYDRAULIC PRESSURE (P.S.I.)					DENSITY NATURAL WATER CONTENT (wt % of dry weight)					No.		From	To		Length Rec.	PRESS	RESS.	BLOWN		
						2 4 6 COMPRESSION STRENGTH (U and, Up in tons per square foot)					DENSITY NATURAL WATER CONTENT ATTERBERG LIMITS wp = wt															
						5 15 25 50 100 150 PENETRATION TEST RESULTS (P, in blows per foot)					(pcf) (pcf)															
703.3				ROOTS, HUMUS, TOPSOIL SOME THIN STRATA OF CLAY & SILT SANDY TILL (WITH SILT, PEBBLES & BOULDERS) PRECAMBRIAN GNEISS (PREDOMINANTLY GRANITIC) NO LOST CORE SOUND, COMPETENT ROCK	703.3																					
5					695.9	X																				
10																										
15																										
20																										
25																										
30 30'0 673.3					673.3																					
35																										
40																										
45																										

HUNTING TECHNICAL and EXPLORATION SERVICES

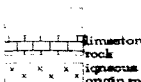
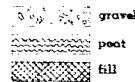
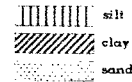
JOB H214/57
BOREHOLE 2
COMPILED J.F.
CHECKED D.E.

JOB NO. H214/57 LOCATION MOON RIVER BRIDGE
CLIENT DEPT. OF HIGHWAYS - ONTARIO
COORDINATES 361+47 - 18.0 L
ELEV. (Surface) 669.0 (Collar) Datum D.H.O.

BOREHOLE NUMBER 2

Date (Started) NOV. 7, 1957 (Finished) NOV. 8, 1957

RIG NO. 1 TYPE JR, LG, HYD.



C - Consolidation test
L_d - dry density
L_t - field density
M - mechanical analysis

Q - unconsolidated shear
Q_c - consolidated shear
S - drained shear
V - vane shear (in situ)

C - core
K - permeability
w_n - field moisture content
wp - plastic limit
wl - liquid limit
U - unconfined compressive strength

Up - approx. U as indicated by calibrated penetrometer
P - field penetration tests
x - standard penet. 2 S.S.
o - cone penetration (60 2 1/4)
s - other

E.S. - chunk
S.S. - split spoon
S.L. - sleeve sample
S.T. - Shelby tube
B.A. - barrel auger
S.A. - Spiral auger




T.W. - thin, walled, open
T.W.P. - thin walled piston
D.P. - drive piston
D.F.V. - drive foot valve
D.B. - diamond bit
R.B. - Rock bit


F.T. - fish-tail
W.O. - wash-out
undisturbed
disturbed
best represent
fair
lost

BORING			LOG		TESTS														SAMPLES							REMARKS	
SCALESDEPTH ELEV. CASING			LOG	DESCRIPTION	ELEV.	FIELD							LABORATORY														
ft ft ft					ft	1000 2000 3000 HYDRAULIC PRESSURE (P.S.I.) 2 4 COMPRESSION STRENGTH (U and Up in tons per square foot) 5 15 25 50 100 150 PENETRATION TEST RESULTS (F, in blows per foot)							DENSITY and NATURAL WATER CONTENT (wt % of dry weight) □ — DENSITY ● — NATURAL WATER CONTENT ATTERBERG LIMITS wp — wl (pd) (pd)							No. COND. DEPTH TYPE RECOVERY Length Rec. Dist. Driv. HYD. PRESS. PENET. RESIST. on SAMPLER BLOWS PER FOOT SCALE							
669.0					669.0																						
5				LOOSE TO DENSE BROWN TO GREY STRATIFIED FINE TO MEDIUM SAND, SOME SILT, TRACE GRAVEL SOME BOULDERS	659.0																						
10	10'0	659.0			659.0																						
15				DENSE GREY FINE TO MEDIUM SAND, SOME SILT, TRACE GRAVEL, FREQUENT PEBBLE - TILL TEXTURE, SOME BOULDERS	650.8																						
20	16'2	650.8			650.8																						
25				PRECAMBRIAN GNEISS WITH GRANITIC BANDS VERY FEW FRACTURES STRONG ROCK NO LOST CORE	637.7																						
30	31'3	637.7			637.7																						
35				END OF HOLE																							
40																											
45																											

JOB H214/57
BOREHOLE 3
COMPILED JK.
CHECKED D.F.

BOREHOLE NUMBER 3
Date (Started) NOV. 11, 1957 (Finished) NOV. 11, 1957
RIG NO. 1 TYPE JR. LG. HYD.

 silt
 clay
 sand



gravel

peat

fill

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
 Limestone
 rock
 igneous

C — Consolidation test
 δ_d — dry density
 δ_f — field density
 M — mechanical analysis

WEIGHT OF HAMMER 140 lb DROP 30 IN


Q -- unconsol undr. shear
Qc -- consol drained shear
S -- drained shear
V -- vane shear (in situ)

C —core
K —Permeability
wm —field moisture content
wp —plastic limit
wl —liquid limit
U —unconfined compressive strength

Up—approx. U as indicated
by calibrated penetrometer
P—field penetration tests
x—standard penet. 2 S.S.
a—cone penetration (50 2½)
o—other

E.S. --chunk
S.S. --split spoon
S.L. --sleeve sample
S.T. --shelby tube
B.A. --barrel auger
S.A. --Spiral auger

T.W. --thin, walled, open
T.W.P. --thin walled piston
D.P. --drive piston
D.F.V. --drive foot valve
D.B. --diamond bit
R.B. --Rock bit

F.T. — fish-tail
W.O. — wash-out
 — undisturbed
— disturbed —
— but represent
— fair
— best

[illegible]

HUNTING TECHNICAL and EXPLORATION SERVICES

JOB H214/57
BOREHOLE 4
COMPILED J.K.
CHECKED D.F.

JOB NO. H214/57 LOCATION MOON RIVER BRIDGE

CLIENT DEPT OF HIGHWAYS - ONTARIO

COORDINATES CHAINAGE 361+08 - 10' L

ELEV. (Surface) 690.0 (Collar)

Datum D.H.O.

BOREHOLE NUMBER

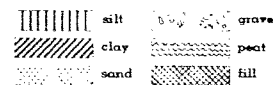
4

Date (Started) NOV. 11, 1957

(Finished) NOV. 14, 1957

RIG NO. 2

TYPE JR. LG. FD. SC.



C - Consolidation test
d_s - dry density
d_t - field density
M - mechanical analysis

O - unconsolidated undrained shear
O_c - consolidated drained shear
S - drained shear
V - vane shear (in situ)

C - core
K - permeability
w_n - field moisture content
wp - plastic limit
wl - liquid limit
U - unconfined compressive strength

Up - approx. U as indicated
by calibrated penetrometer
P - field penetration tests
s - standard penet. 2 S.S.
c - cone penetration (60 2 1/4)
a - other

E.S. - chunk
S.S. - split spoon
S.L. - sleeve sample
S.T. - Shelby tube
B.A. - barrel auger
S.A. - spiral auger

T.W. - thin, walled, open
T.W.P. - thin walled piston
D.P. - drive piston
D.F.V. - drive foot valve
D.B. - diamond bit
R.B. - Rock bit

F.T. - fish-tail
W.O. - wash-out
undisturbed
disturbed
not representative
lost

BORING			LOG		TESTS										SAMPLES							REMARKS	
SCALEDEPTH ELEV. CASING.			LOG	DESCRIPTION	ELEV.	FIELD					LABORATORY												

HUNTING TECHNICAL and EXPLORATION SERVICES

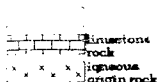
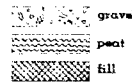
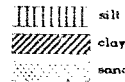
JOB H214/57
BOREHOLE 5
COMPILED J.K.
CHECKED D.F.

JOB NO. H214/57 LOCATION MOON RIVER BRIDGE
CLIENT DEPT. OF HIGHWAYS - ONTARIO
COORDINATES CHNG. 361+07 - 10' R
ELEV. (Surface) 689.5 (Collar) Datum D.H.O.

BOREHOLE NUMBER 5

Date (Started) NOV. 12, 1957 (Finished) NOV. 13, 1957

RIG NO. TYPE JR. L.G. HYD. HD.



C -- Consolidation test
Q -- unconsolidated shear
Qc -- consolidated shear
S -- drained shear
V -- vane shear (in situ)
U -- unconfined compressive strength

W -- dry density
Wt -- field density
M -- mechanical analysis
Wt -- dry density
Wt -- field density
M -- mechanical analysis


C -- core
K -- permeability
Wt -- field moisture content
wp -- plastic limit
wl -- liquid limit
U -- unconfined compressive strength

Up -- approx. U as indicated
by calibrated penetrometer
P -- field penetration tests
x -- standard penet. 2 S.S.
o -- cone penetration (90 2 1/2)
Δ -- other

E.S. -- chunk
S.S. -- split spoon
S.L. -- sleeve sample
S.T. -- Shelby tube
B.A. -- barrel auger
S.A. -- Spiral auger

T.W. -- thin, walled, open
T.W.P. -- thin walled piston
D.P. -- drive piston
D.F.V. -- drive foot valve
D.B. -- diamond bit
R.B. -- Rock bit

F.T. -- fish-tail
W.O. -- wash-out
U.D. -- undisturbed
D.R. -- disturbed
F.R. -- fair
L.R. -- lost

BORING			LOG		TESTS										SAMPLES										REMARKS				
SCALEDEPTH ELEV. CASING.			LOG.	DESCRIPTION	ELEV.	FIELD.					LABORATORY.					No.		COND.	DEPTH		TYPE	RECOVERY	HYD.	PERM.	SCALE				
WATER OBSERVATION						1000 2000 3000 HYDRAULIC PRESSURE (P.S.I.)					DENSITY and NATURAL WATER CONTENT (wt % of dry weight)					10	20	30	40	50	60	70	80	90	100				
ft ft ft					ft	COMPRESSION TEST RESULTS (U and Up in tons per square foot)					NATURAL WATER CONTENT																		
						PENETRATION TEST RESULTS (P, in blows per foot)					ATTERBERG LIMITS wp a wcl					(pl)	(pl)												
689.5				SAND & SILT FEW PEBBLES OR BOULDERS	689.5																								
5	BX																											5	
10																												10	
15																												15	
20	19'0	670.5			670.5																							20	
25																												25	
30																												30	
35																												35	
40	38'0	651.5			651.5																							40	Uncorrected coordinates
45																												45	CHNG: 360+80-10'R

Uncorrected coordinates
CHNG: 360+80 - 10' R

HUNTING TECHNICAL and EXPLORATION SERVICES

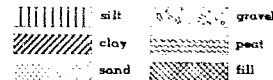
JOB H214/57
BOREHOLE 6
COMPILED J.K.
CHECKED D.F.

JOB NO. H214/57 LOCATION MOON RIVER BRIDGE
CLIENT DEPT. OF HIGHWAYS - ONTARIO
COORDINATES CHNG 361+26-10'R
ELEV. (Surface) 678.6 (Datum D.H.O.)

BOREHOLE NUMBER 6

Date (Started) NOV. 14, 1957 (Finished) NOV. 15, 1957

RIG NO. TYPE JR. LG. HYD. HD.



C - Consolidation test
lg - dry density
lg - field density
M - mechanical analysis
O - unconsol. undr. shear
Oc - consol. drained shear
S - drained shear
V - vane shear (in situ)
C - core
K - permeability
wp - field moisture content
wp - plastic limit
wl - liquid limit
U - unconfined compressive strength

WEIGHT OF HAMMER 140 lb DROP 30 IN.

Up - approx. U as indicated by calibrated penetrometer
P - field penetration tests
x - standard penet. 2 S.S.
a - cone penetration (60 2 1/2)
a - other

E.S. - chunk
S.S. - split spoon
S.L. - sleeve sample
S.T. - Shelby tube
B.A. - barrel auger
S.A. - Spiral auger

T.W. - thin, walled, open
T.W.P. - thin walled piston
D.P. - drive piston
D.F.V. - drive foot valve
D.B. - diamond bit
R.B. - Rock bit

F.T. - fish-tail
W.O. - wash-out
undisturbed
disturbed
fair represent.
fair
lost

BORING			LOG		TESTS										SAMPLES								REMARKS												
SCALEDEPTH ELEV. CASING			LOG	DESCRIPTION	ELEV.	FIELD					LABORATORY																								
WATER OBSERVATIONS						1000 2000 3000 HYDRAULIC PRESSURE (P.S.I.)					DENSITY NATURAL WATER CONTENT (wt % of dry weight)					1d	1t	O	Oc	S	C	M	Other	No.	COND.	DEPTH	TYPE	RECOVERY	HYD.	PENET.	SCALE				
ft ft ft					ft	COMPRESSION TEST RESULTS (U and Up in tons per square foot)					NATURAL WATER CONTENT (wt % of dry weight)															From	To	Length Rec.	Press	RESIS.	SAMPLER				
						PENETRATION TEST RESULTS (P. in blows per foot)					ATTERBERG LIMITS wp - wl					(pl)	(pl)																		
678.6					678.6																														
5				SAND & SILT OCCASIONAL PEBBLES AND BOULDERS																														5	
10																																			10
15																																			15
20		661.6		PRECAMBRIAN MOSTLY HORNBLENDE BIOTITE GNEISS WITH GRANITIC GNEISS	661.6																													20	
25																																			25
30																																			30
35																																			35
40		641.6		NO LOST CORE	641.6																													40	
45				END OF HOLE																														45	
																																		Uncorrected coordinates CHNG: 361 + 00 - 10'R	

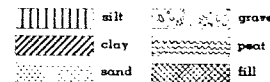
Uncorrected
coordinates
CHNG. 361+00-10'R

HUNTING TECHNICAL and EXPLORATION SERVICES

JOB H214/57
BOREHOLE 7A
COMPILED D.F.
CHECKED N.W.E.L. & J.K.

JOB NO. H214/57 LOCATION MOON RIVER BRIDGE
CLIENT DEPT OF HIGHWAYS - ONTARIO
COORDINATES CHNG. 361+27 - 11.0' L
ELEV. (Surface) 683.4 (Collar) Datum D.H.O.

BOREHOLE NUMBER 7 A
Date (Started) NOV. 18, 1957 (Finished) NOV. 19, 1957
RIG NO. TYPE JR. LG. HYD. HD.



C - Consolidation test
γ_d - dry density
γ_t - field density
M - mechanical analysis
WEIGHT OF HAMMER 140 lb
DROP 30 IN.

Q - unconsol. undr. shear
Q_c - consol. drained shear
S - drained shear
V - vane shear (A.S.T.M.)

C - core
K - permeability
w - field moisture content
wp - plastic limit
wl - liquid limit
U - unconfined compressive strength

Up - approx. U as indicated
by calibrated penetrometer
P - field penetration tests
s - standard penet. 2 S.S.
□ - cone penetration (60 2 1/2)
Δ - other

E.S. - chunk
S.S. - split spoon
S.L. - sleeve sample
S.T. - Shelby tube
B.A. - barrel auger
S.A. - Spiral auger




T.W. - thin, walled, open
T.W.P. - thin walled piston
D.P. - drive piston
D.F.V. - drive foot valve
D.B. - diamond bit
R.B. - Rock bit




F.T. - fish-tail
W.O. - wash-out
undisturbed
disturbed
but represent
fair
lost

BORING			LOG		TESTS										SAMPLES							REMARKS				
SCALED DEPTH ELEV. CASING			LOG	DESCRIPTION	ELEV	FIELD					LABORATORY					No.	COND.	DEPTH	TYPE	RECOVERY	HYD.	PENET.	SCALE			
ft ft ft					ft													From To		Length Rec. Dist. Driv.	PRESS	RESIS.				
						1000 2000 3000 HYDRAULIC PRESSURE (P.S.I.)					DENSITY NATURAL WATER CONTENT (w % of dry weight) □ --- DENSITY ● --- NATURAL WATER CONTENT ATTERBERG LIMITS wp --- wl (pl) (pl)															
						2 4 6 COMPRESSION STRENGTH (U and Up in tons per square foot)																				
						50 100 150 PENETRATION TEST RESULTS (P. in blows per foot)																				
683.4					683.4																					
5				BOULDERS - SAND - SILT WITH PEBBLES ETC.																					5	
10																									10	
15																									15	
20	21.0	662.4			662.4																				20	
25				PRECAMBRIAN ALTERNATE BANDS OF HORNBLende BIOTITE GNEISS WITH MIGMATITE (GRANITIC GNEISS?)																					25	
30																									30	
35																									35	
40	39.0	644.4		NO LOST CORE	644.4																				40	Uncorrected coordinates
45				END OF HOLE																					45	CHNG: 360 + 97 - 10' L

JOB H214 / 57
BOREHOLE 8
COMPILED D. F.
CHECKED J. K.

BOREHOLE NUMBER 8
Date (Started) NOV. 15, 1957 (Finished) NOV. 16, 1957
RIG NO. 1 TYPE JR. LG. HYD. HD.

 solid
 diagonal
 dotted

 gravel
 peat
 fill

C - Consolidation test
 γ_d - dry density
 γ_f - field density
 M - mechanical analysis
 igneous
 origin rock

WEIGHT OF HAMMER 140 lb

Q — unconsol undr. shear
Qc — consol drained shear
S — drained shear
V — vane shear (in situ)
D DROP 30 IN.

C —core
K —Permeability
w_n —field moisture content
w_p —plastic limit
w_l —liquid limit
U —unconfined compressive strength

Up—approx. U as indicated
by calibrated penetrometer
P —field penetration tests
x —standard penet. 2 S.S.
o —cone penetration (60 2½)
Δ —other

E.S. —chunk
S.S. —split spoon
S.L. —slieve sample
S.T. —shelly tube
B.A. —barrel auger
S.A. —Spiral auger

T.W. —thin, walled, open
T.W.P.—thin walled piston
D.P. —drive piston
D.F.V. —drive foot valve
D.B. —diamond bit
R.B. —Rock bit

F.T. — fish-tail
W.O. — wash-out
— undisturbed
— disturbed —
— but represent
— fair
— lost

BORING			LOG		TESTS															SAMPLES								REMARKS																
SCALE DEPTH ELEV. CASING			LOG	DESCRIPTION	ELEV.	FIELD										LABORATORY																												
ft ft ft					ft	<div>1000 2000 3000</div> <div>HYDRAULIC PRESSURE (P.S.I.)</div> <div>2 4 6</div> <div>COMPRESSION STRENGTH (U and, Up in tons per square foot)</div> <div>50 100 150</div> <div>PENETRATION TEST RESULTS (P, in blows per foot)</div>										<div>DENSITY</div> <div>NATURAL WATER CONTENT</div> <div>(wt % of dry weight)</div> <div>□ — DENSITY</div> <div>● — NATURAL WATER CONTENT</div> <div>ATTERBERG LIMITS wp — li —</div> <div>(pcf) (pcf)</div>													No.	COND.	DEPTH	TYPE	RECOVERY	HYD.	PENET.	SCALE								
684.8			8X	MEDIUM DENSE TO DENSE BROWN TO GRAY FINE SAND & SILT TR. GRAVEL OCCASIONAL PEBBLE	684.8											APPEARS TO BE AN INCREASE IN M.C. TO 14 FEET													1		6	7.5	SS	12/18	84	5	STRUCK PEBBLE							
5																													2		8	10	SS	12/24	35	10								
10																													3		10	12	SS	12/24	27									
15	14'2	670.6		DENSE TO VERY DENSE FINE SAND & SILT, SOME GRAVEL, OCCASIONAL BOULDER (TILL TEXTURE)	670.6																								4		12	14	SS	13/24	22	15	BOULDER - 15' to 16' 5"							
20	21'0	663.8			663.8																								5		14	15	SS	8/12	61									
25				PRECAMBRIAN BANDS OF HORNBLende BIOTITE WITH GRANITIC GNEISS																									6		16	16.75	SS	7/9	61/9"	20	BOULDER 16' 5"							
30				NO LOST CORE																																	25							
35				SOUND, COMPETENT ROCK																																	30							
40	39.0	645.0			645.0																																35							
45				END OF HOLE																																	40						Uncorrected coordinates	
																																					45						CHNG: 360 + 90 - 6	

HUNTING TECHNICAL and EXPLORATION SERVICES

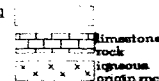
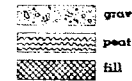
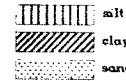
JOB H214/57
BOREHOLE 9
COMPILED D.F.
CHECKED J.K. & N.W.E.L.

JOB NO. H214/57 LOCATION MOON RIVER BRIDGE
CLIENT DEPT. OF HIGHWAYS - ONTARIO
COORDINATES CHNG.
ELEV. (Surface) 684.5 (Collar)
Datum D.H.O.

BOREHOLE NUMBER 9

Date (Started) NOV 20, 1957 (Finished) NOV 21, 1957

RIG NO. 1 TYPE J.R. L.G. HYD. HD.



C - Consolidation test
d_s - dry density
d_t - field density
M - mechanical analysis
WEIGHT OF HAMMER 140 lb
DROP 30 IN.

O - unconsol. undr. shear
Qc - consol. drained shear
S - drained shear
V - vane shear (in situ)
U - unconfined compressive strength

C - core
K - permeability
wn - field moisture content
wp - plastic limit
wl - liquid limit
U - unconfined compressive strength

Up - approx. U as indicated
by calibrated penetrometer
P - field penetration tests
* - standard penet. 2 S.S.
o - cone penetration (80-2%)
Δ - other

E.S. - chunk
S.S. - split spoon
S.L. - sleeve sample
S.T. - Shelby tube
B.A. - barrel auger
S.A. - Spiral auger

T.W. - thin, walled, open
T.W.P. - thin walled piston
D.P. - drive piston
D.F.V. - drive foot valve
D.B. - diamond bit
R.B. - Rock bit

F.T. - fish-tail
W.O. - wash-out
undisturbed
disturbed
fact represent
fair
best

BORING			LOG		TESTS														SAMPLES								REMARKS				
SCALE		DEPTH	ELEV. CASING	LOG	DESCRIPTION	ELEV.	FIELD						LABORATORY								No.		COND.	DEPTH		TYPE	RECOVERY	HYD.	PENET.	SCALE	
																								From	To		Length Rec.	PRESS	RES.		
																										Dist. Driv.		on	SAMPLER		
																												BLOWS	PER		
																												FOOT			

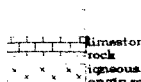
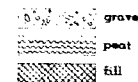
Uncorrected coordinates
CHNG: 362 + 90 - 12' L

HUNTING TECHNICAL and EXPLORATION SERVICES

JOB H214/57
BOREHOLE 10
COMPILED D.F.
CHECKED J.K. & N.W.E.L.

JOB NO. H214/57 LOCATION MOON RIVER BRIDGE
CLIENT DEPT. OF HIGHWAYS - ONTARIO
COORDINATES CHNG.
ELEV. (Surface) 683.0 (Collar) Datum D.H.O.

BOREHOLE NUMBER 10
Date (Started) NOV. 21, 1957 (Finished) NOV. 22, 1957
RIG NO. 1 TYPE JR. LG. HYD. HD.



C - Consolidation test
q_d - dry density
q_t - field density
M - mechanical analysis

O - unconsol. undr. shear
O_c - consol. drained shear
S - drained shear
V - vane shear (in situ)

C - core
K - permeability
w_n - field moisture content
w_p - plastic limit
w_L - liquid limit
U - unconfined compressive strength

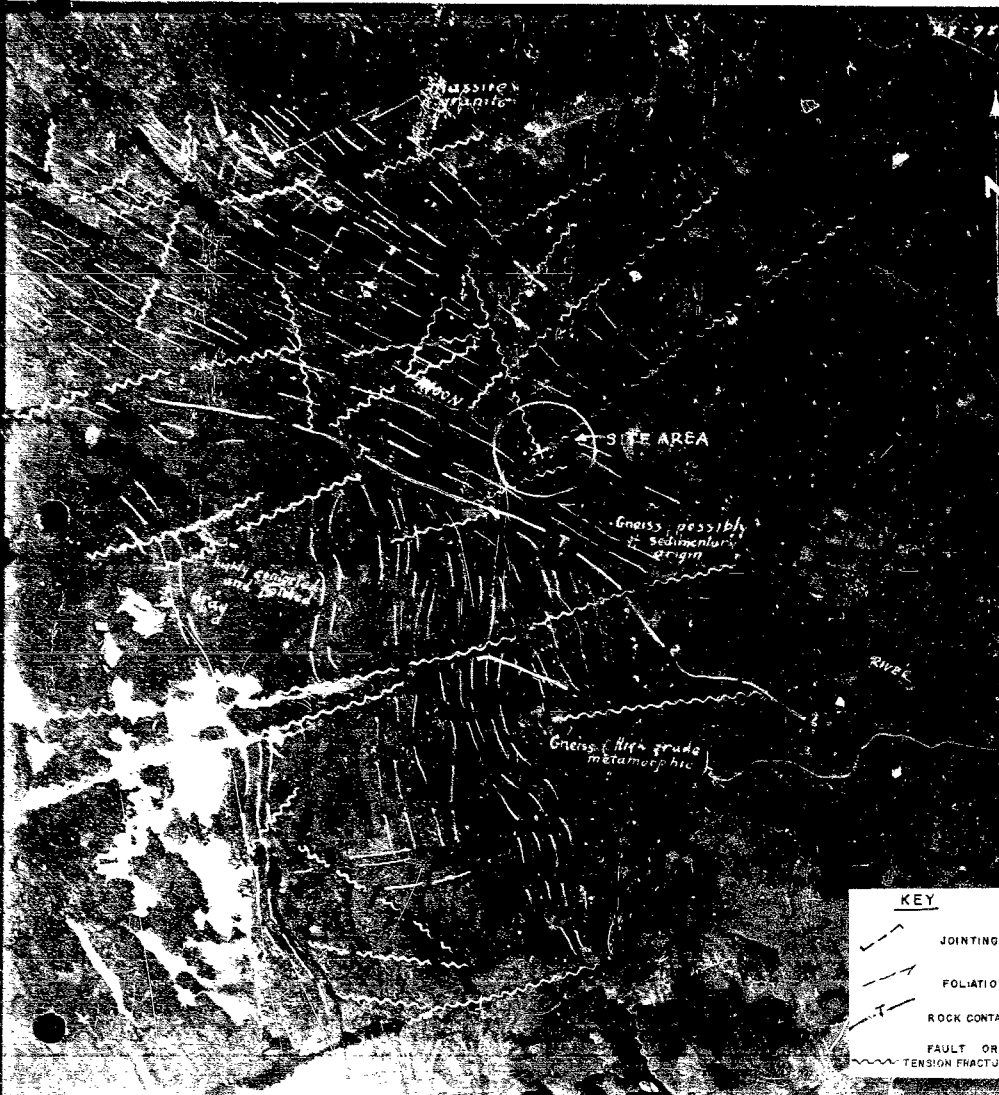
Up - approx. U as indicated
by calibrated penetrometer
P - field penetration tests
x - standard penet. 2 S.S.
u - cone penetration (60 2 1/2)
Δ - other

E.S. - chunk
S.S. - split spoon
S.L. - sleeve sample
S.T. - Shelby tube
B.A. - barrel auger
S.A. - Spiral auger

T.W. - thin, walled, open
T.W.P. - thin walled piston
D.P. - drive piston
D.F.V. - drive foot valve
D.B. - diamond bit
R.B. - Rock bit

F.T. - fish-tail
W.O. - wash-out
undisturbed
disturbed
best represent.
best

BORING			LOG		TESTS										SAMPLES										REMARKS									
SCALE DEPTH ELEV. CASING.			LOG		ELEV.		FIELD.				LABORATORY.						No.		COND.		DEPT.		TYPE		RECOVERY		HYD. PRESS.		PENET. RESIS.		SCALE			
ft ft ft					ft		1000 2000 3000				DENSITY and NATURAL WATER CONTENT (w _n % of dry weight)										From To				Length Rec. Dist. Driv.		HYD. PRESS.		PENET. RESIS. or SAMPLER BLOWS PER FOOT					
WATER OBSERVATION							HYDRAULIC PRESSURE (P.S.I.)				NATURAL WATER CONTENT (w _n % of dry weight)																							
683.0 BX					683.0		2				DENSITY																							
36 679.4					679.4		5				NATURAL WATER CONTENT (w _n % of dry weight)																							
5							PENETRATION TEST RESULTS (P, in blows per foot)				DENSITY																							
											DENSITY																							
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KEY

- JOINTING
- FOLIATION
- ROCK CONTACT
- FAULT OR TENSION FRACTURE



KEY

- JOINTING
- FOLIATION
- ROCK CONTACT
- FAULT OR TENSION FRACTURE

BOREHOLE LOGS
OF
MOON RIVER BRIDGE
FOUNDATION INVESTIGATION

PERFORMED BY
HUNTING TECHNICAL AND EXPLORATION SERVICES LIMITED
MAY TO AUGUST, 1957.

HUNTING TECHNICAL and EXPLORATION SERVICES

JOB NO. 22
BOREHOLE 1
COMPILED D.F.
CHECKED T.K.

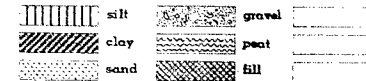
JOB NO. 22 LOCATION MOON RIVER BRIDGE, ONT.
CLIENT T.O. LAZARIDES & ASSOCIATES
COORDINATES 360 + 70 CHAINAGE
ELEV. (Surface) 6650 (Collar) 6656 Datum D.H.O.

BOREHOLE NUMBER

Date (Started) MAY 23/57 (Finished) JUNE 4/57

RIG NO. 1 TYPE JR. ST. LINE

3H #1 N-57



C — Consolidation test
d_s — dry density
d_f — field density
M — mechanical analysis
WEIGHT OF HAMMER

O — unconsol. undr. shear
Qc — consol drained shear
S — drained shear
V — vane shear (in situ)
DROP

C — core
K — Permeability
wn — field moisture content
wp — plastic limit
wl — liquid limit
U — unconfined compressive strength

Up — approx. U as indicated
by calibrated penetrometer
P — field penetration tests
x — standard penet. 2 S.S.
a — cone penetration (60 2 1/2)
Δ — other

E.S. — chunk
S.S. — split spoon
S.L. — sleeve sample
S.T. — Shelby tube
B.A. — barrel auger
S.A. — spiral auger

T.W. — thin, walled, open
T.W.P. — thin walled piston
D.P. — drive piston
D.F.V. — drive foot valve
D.B. — diamond bit
R.B. — Rock bit

F.T. — fish-tail
W.O. — wash-out
— undisturbed
— disturbed —
— but represent.
— fair
— lost

BORING			LOG		TESTS										SAMPLES							REMARKS				
SCALE	DEPTH	ELEV. CASING	WATER LEVELS	LOG	DESCRIPTION	ELEV.	FIELD					LABORATORY					No.	COND.	DEPTH	TYPE	RECOVERY	HYD.	PENET.	SCALE		
			12 24 36 96				1000 2000 3000 HYDRAULIC PRESSURE (P.S.I.)					50 100 DENSITY and NATURAL WATER CONTENT (wt % of dry weight)														
							2 4 6 SHEAR STRENGTH TONS/FT ²					50 100 PENETRATION TEST RESULTS (P, in blows per foot)														
(h)	(h)	(h)	(h)			(h)						pc pd														
TIME for WATER OBSERVATION																										
7'					ROCK FILL (Sharp, angular, all sizes, PRECAMBRIAN GNEISS) Silty sand in voids																					This rock fill was from blasted rock cuts for highway
3.5'					SOFT GREY SILTY CLAY (Some very fine sand)		Shear strength from vane test Remolded shear strength from vane test										1		8' 10'	S.T.	9/24"	150*	0			a S.S. was taken in disturbed material sample No.1 for classification
					15.6 mbarsian Water Pressure to 2.5' above Gr. Elev.												2		10' 12'	S.T.	13/24"	150*	0			
					BOULDERY SANDY GRAVELLY TILL (Some Silt & Clay)												3		13.6 15.6	SS	10/24"		56			
																	4		15.6 17'	SS	13/18"		67			
																										20
																	5		24 24.9	SS			134/9"			
																	6		26 26.9	SS			130/9"			
																	7		28 28.6	SS			106/6"			
																	8		29 30	AXT	CORE					30
																	9		31.9 32.6	SS			93/9"			
																	10		34 35.6	SS			70			35
					BEDROCK Cored to 47'																					
					End of Hole @ 47'																					

JOB	22
BOREHOLE	2
COMPILED	D. F.
CHECKED	

BOREHOLE NUMBER 2
Date (Started) JUNE 17/57 (Finished) _____ Eng. J. KILGOUR
RIG NO. _____ TYPE JR. LONGYEAR Geol. D. FRASER

B.M. 42N-57

C --Consolidation test
 γ_d --dry density
 γ_s --field density
 M --mechanical analysis
 Q --unconsol undr. shear
 Qc--consol drained shear
 S --drained shear
 V --vane shear (in situ)
 WEIGHT OF HAMMER 140 lb. DROP 30 IN.

C —core
K —Permeability
w_n —field moisture content
w_p —plastic limit
w_l —liquid limit
U —unconfined compressive strength

Up—approx. U as indicated
by calibrated penetrometer
P—field penetration tests
x—standard penet. 2 S.S.
—cone penetration (60 2½)
—other

E.S. —chunk
S.S. —split spoon
S.L. —~~slave~~ sample
S.T. —shelby tube
B.A. —barrel auger
S.A. —Spiral auger

T.W. ---thin, walled, open
T.W.P. ---thin walled piston
D.P. ---drive piston
D.F.V. ---drive foot valve
D.B. ---diamond bit
R.B. ---Rock bit





F.T. — fish-tail
W.O. — wash-out
— undisturbed
— disturbed —
— but represent.
— fair
— lost

[illegible]

JOB	22
BOREHOLE	1-S
COMPILED	J. K.
CHECKED	D. F.

B.H. H 1-57






RIG NO. 1 TYPE JR. LONGYEAR Engineer _____

F.T. — fish-tail
W.O. — wash-out
 — undisturbed
 — disturbed —
 — but represent
 — fair

[illegible]

JOB	22
BOREHOLE	I - S
COMPILED	J. K.
CHECKED	D. F.

B.H. H1-57
(contd)

F.T. — fish-trail
W.O. — wash-out
 — undisturbed
 — disturbed —
 — but represent
 — fair
 — lost

C — Consolidation test
K_d — dry density
I_d — field density
M — mechanical analysis
WEIGHT OF HAMMER 140 lb
Q — unconsol. undr. shear
Qc — consol. drained shear
S — drained shear
V — vane shear (in situ)
DROP 30 IN.
C — core
K — Permeability
m — field moisture content
wp — plastic limit
wl — liquid limit
U — unconfined compressive strength

Up—approx. U as indicated
by calibrated penetrometer
P ---field penetration tests
x ---standard penet. 2 S.S.
□ ---cone penetration (60 2½)
Δ ---other

E.S. --chunk
S.S. --split spoon
S.L. --sleeve sample
S.T. --shelby tube
B.A. --barrel auger
S.A. --Spiral auger

T.W. —thin, walled, open
T.W.P.—thin walled piston
D.P. —drive piston
D.F.V.—drive foot valve
D.B. —diamond bit
R.B. —Rock bit

BORING		LOG		TESTS												SAMPLES							REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
SCALE	DEPTH ELEV. CASING.	WATER LEVELS.	LOG.	DESCRIPTION	ELEV.	FIELD.						LABORATORY.						No.	COND.	DEPTH	TYPE	RECOVERY	HYD.	PENET.	SCALE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	12 24 36 96					1000 2000 3000 HYDRAULIC PRESSURE (P.S.I.) 2 4 6 SHEAR STRENGTH (TONS/FT²) 50 100 150 PENETRATION TEST RESULTS (P. in blows per foot)						50 100 DENSITY and NATURAL WATER CONTENT (wt % of dry weight) — DENSITY ● NATURAL WATER CONTENT ATTERBERG LIMITS w _p ——— w _L (pl) (pl)								Q	Q _c	S	C	M	Other																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													</

JOB	22
BOREHOLE	2-S
COMPILED	J. K.
CHECKED	D. E.

B.H. # 2-57

RIG NO. TYPE JR LONGYEAR Engineer

	silt		gravel
	clay		peat
	sand		fill

C - Consolidation test
Q - unconsol undr. shear
Qc - consol drained shear
Qd - dry density
Qe - drained shear
Qf - field density
Qg - vane shear (in situ)
M - mechanical analysis
S - shear (in situ)

C --core
K --Permeability
w_n --field moisture content
w_p --plastic limit
w_l --liquid limit
U --unconfined compressive strength

Up—approx. U as indicated
by calibrated penetrometer
P —field penetration tests
x —standard penet. 2 S.S.
—cone penetration (60 2½)
Δ —other

E.S. —chunk
S.S. —split spoon
S.L. —slave sample
S.T. —shelby tube
B.A. —barrel auger
S.A. —Spiral auger

T.W. —thin, walled, open
T.W.P.—thin walled piston
D.P. —drive piston
D.F.V. —drive foot valve
D.B. —diamond bit
R.B. —Rock bit

F.T. —fish-tail
W.O. —wash-out
—undisturbed
—disturbed —
—but represent
—fair
—lost

[illegible]

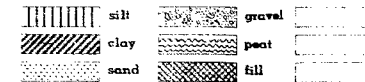
HUNTING TECHNICAL and EXPLORATION SERVICES

JOB 22
BOREHOLE 2-S
COMPILED J.K.
CHECKED D.F.

B.M. H2-57
(cont.)

JOB NO. 22 LOCATION MOON RIVER BRIDGE, ONT.
CLIENT T. O. LAZARIDES & ASSOCIATES
COORDINATES 358 95 2 CHAINAGE
ELEV. (Surface) 668.8 (Collar) 669.4 Datum D.H.O.

BOREHOLE NUMBER 2-S
Date (Started) JUNE 22/57 (Finished) JUNE 27/57 Report
RIG NO. TYPE JR. LONGYEAR Engineer



C - Consolidation test
d_s - dry density
d_t - field density
M - mechanical analysis
O - unconsol. undr. shear
Oc - consol drained shear
S - drained shear
V - vane shear (in situ)
WEIGHT OF HAMMER 140 lb. DROP 30 IN.

C - core
K - Permeability
wn - field moisture content
wp - plastic limit
wl - liquid limit
U - unconfined compressive strength

Up - approx. U as indicated
by calibrated penetrometer
P - field penetration tests
s - standard penet. 2 S.S.
a - cone penetration (60 2 1/4)
Δ - other

E.S. - chunk
S.S. - split spoon
S.L. - sleeve sample
S.T. - Shelby tube
B.A. - barrel auger
S.A. - Spiral auger

T.W. - thin, walled, open
T.W.P. - thin walled piston
D.P. - drive piston
D.F.V. - drive foot valve
D.B. - diamond bit
R.B. - Rock bit

F.T. - fish-tail
W.O. - wash-out
undisturbed
disturbed
fair
lost

BORING LOG				TESTS														SAMPLES						REMARKS						
SCALE	DEPTH	ELEV. CASING	WATER LEVELS	LOG	DESCRIPTION	ELEV.	FIELD				LABORATORY										No.	COND.	DEPTH	TYPE	RECOVERY	HYD.	PENET.	SCALE		
			12 24 36 96				1000 2000 3000				50 100												From	To	Length Rec.	Dist. Dev.	Press	Resis.	on	
							2				DENSITY																			
							SHEAR STRENGTH (TONS/FT ²)				NATURAL WATER CONTENT (wt % of dry weight)																			
							5 15 25 50 100 150				DENSITY																			
							PENETRATION TEST RESULTS (P, in blows per foot)				NATURAL WATER CONTENT																			
											ATTERBERG LIMITS wp % w _L																			

JOB 22
BOREHOLE 3 - S
COMPILED J. K.
CHECKED D. F.

BOREHOLE NUMBER 3 - S
Date (Started) JUNE 18/57 (Finished) JUNE 21/57 Report _____
RIG NO. _____ TYPE JR. LONGYEAR Engineer _____

	silt		gravel
	clay		peat
	sand		fill






C - Consolidation test
 ρ_d - dry density
 ρ_f - field density
 M - mechanical analysis
 Q - unconsolid. undr. shear
 Qc - consolidated shear
 S - drained shear
 V - vane shear (in situ)
 WEIGHT OF HAMMER 140 lb. DROP 30 IN

C —core
K —Permeability
w_n —field moisture content
w_p —plastic limit
w_l —liquid limit
U —unconfined compressive strength

Up—approx. U as indicated
by calibrated penetrometer
P—field penetration tests
x—standard penet. 2 S.S.
□—cone penetration (60 2½)
Δ—other

E.S. —chunk
S.S. —split spoon
S.L. —sleeve sample
S.T. —shelby tube
B.A. —barrel auger
S.A. —Spiral auger

T.W. —thin, walled, open
T.W.P.—thin walled piston
D.P. —drive piston
D.F.V. —drive foot valve
D.B. —diamond bit
R.B. —Rock bit

F.T. --fish-trail
W.O. --wash-out
 --undisturbed
 --disturbed --
 --but represent
 --fair
 --lost

B.H. H3-57
(catch)

[illegible]

JOB	22
BOREHOLE	3-S
COMPILED	J. K.
CHECKED	D. F.

B.H. H 3-57

C — Consolidation test
 γ_d — dry density
 γ_t — field density
 M — mechanical analysis
 Q — unconsol. undr. shear
 Qc — consol. drained shear
 S — drained shear
 V — vane shear (in situ)
 WEIGHT OF HAMMER 140 lb. DROP 30 IN.

C —core
K —Permeability
wm —field moisture content
wp —plastic limit
wl —liquid limit
U —unconfined compressive strength

Up—approx. U as indicated
by calibrated penetrometer
P —field penetration tests
x —standard penet. 2 S.S.
□ —cone penetration (60 2½)
Δ —other

E.S. —chunk
S.S. —split spoon
S.L. —~~slave~~ sample
S.T. —shelby tube
B.A. —barrel auger
S.A. —Spiral auger

T.W. —thin, walled, open
T.W.P.—thin walled piston
D.P. —drive piston
D.F.V. —drive foot valve
D.B. —diamond bit
R.B. —Rock bit

F.T. — fish-tail
W.O. — wash-out
— undisturbed
— disturbed —
— but represent
— fair
— last

BORING				LOG		TESTS																SAMPLES								REMARKS																			
DATE	DEPTH	ELEV.	CASING	WATER LEVELS	LOG.	DESCRIPTION	ELEV.	FIELD							LABORATORY									No.	COND.	DEPTH		TYPE	RECOVERY	HYD.	PENET.	SCALE																	
				10 24 36 96			(ft)																			From	To		Length Rec. Dist. Driv.	PRESS	RESIS. on SAMPLER BLOWS PER FOOT																		
				TIME for WATER OBSERVATION				PENETRATION TEST RESULTS (P, in blows per foot)							DENSITY and NATURAL WATER CONTENT (wt % of dry weight) □ — DENSITY ● — NATURAL WATER CONTENT ATTERBERG LIMITS wp — wl									(pcf)	(pcf)																								
							684.6																																										
10						FILL																																											
20						SILTY SAND																																											
25																																																	
30																																																	
35							649.6																																										
40						SOFT GREY TO BROWN SILTY CLAY																																											
45						COARSE SAND & GRAVEL																																											

