

66-F-19

W.P. # 423-64

OTTAWA

QUEENSWAY

EXTENSION

1/2 ACRES RD.

MEMORANDUM

23-67-181

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Division.

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

Attention: Mr. S. McCombie

DATE: May 30, 1966

OUR FILE REF.

IN REPLY TO

JUN 2 1966

SUBJECT:

PRELIMINARY
FOUNDATION INVESTIGATION REPORT
For

The Proposed Underpass at the Ottawa
Queensway Extension and Acres Road
Interchange - District #9 (Ottawa).
W.J. 66-F-19 -- W.P. 423-64

Attached, we are forwarding to you, our preliminary foundation investigation report the subsoil conditions existing at the above structure site.

We believe that the factual data and recommendations contained therein, will suffice for your present design requirements.

Should additional information be required, please feel free to contact our Office.

AGS/MdeF
Attach.

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
R. S. Pillar
L. E. Walker
J. E. Gruspier
P. Harvey
J. L. Forster
A. Watt

Foundations Office
Gen. Files

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PRELIMINARY
FOUNDATION INVESTIGATION REPORT
For
The Proposed Underpass at the Ottawa
Queensway Extension and Acres Road
Interchange - District #9 (Ottawa).
W.J. 66-F-19 -- W.P. 423-64

1. INTRODUCTION:

A request for a preliminary foundation investigation at the site of the proposed underpass structure where the Ottawa Queensway extension crosses Acres Road, was received from the Bridge Location Section (Mr. G. Scott, Regional Bridge Location Engineer), in a memo dated January 21, 1966. Following this request, a field investigation was carried out by this Section to determine the subsoil conditions existing at the site.

This report contains the results of our preliminary investigation, together with our recommendations.

2. SUBSOIL CONDITIONS:

2.1) General:

Subsoil at the site consisted of a deposit of clay to silty clay underlain by a layered deposit of clayey silt and silty sand, and then by a deposit of silty sand to sandy silt with traces of gravel. Between these deposits and the shale bedrock was a layer of heterogeneous mixture of sand, gravel and boulders.

2.2) Clay to Silty Clay:

This stratum extended from ground surface to about 15 ft. and was very stiff to firm in consistency with 'N' values of 11 to 16 blows/ft. in the upper portion of the deposit. Field and laboratory vane tests indicated shear strengths of 1200 to 2500 p.s.f. Unconfined and quick triaxial test results gave shear strengths from 600 to 1500 p.s.f. The lower results of undrained tests in the laboratory are attributed to sampling disturbance and handling.

cont'd. /2

2. SUBSOIL CONDITIONS: (cont'd.) ...

2.3) Layered Clayey Silt and Silty Sand:

This layered deposit extended from 15 ft. to some 38 ft. below ground surface and consisted of irregular layers of silty sand and clayey silt. Due to the irregular nature of the deposit, the field vane results of 1500 to in excess of 200 p.s.f. are not necessarily indicative of the shear strength of the clayey silt portion. Undrained shear strengths measured in the laboratory gave values from a low of 610 p.s.f. to a high of 1780 p.s.f. for the clayey silt portion. Based on the field and laboratory findings, the clayey silt was firm to stiff in consistency, whereas the silty sand portion was generally very loose in relative density.

2.4) Silty Sand to Sand:

Extending from about 38 ft. to 70 - 75 ft. is a deposit of silty sand to sand with traces of gravel. In general, the deposit has a relative density of dense to very dense with 'N' values from 40 to in excess of 100 blows/ft. The upper 6 ft. of the deposit in B.H. #1 is mainly very loose with 'N' values of 2 to 3 blows/ft.

2.5) Heterogeneous Mixture of Sand, Gravel and Boulders - (Glacial Till):

This stratum was only 6 to 11 ft. thick and was sufficiently dense to be drilled with AXT core barrel. Recovery was about 30% of assorted rock fragments not more than 6 inches in length and usually much less.

2.6) Bedrock:

Bedrock was drilled for 5 ft. and 3.6 ft. in B.H. #1 and #2, respectively. It was an argillaceous shale, presumably the chazy shale of Paleozoic age which tended to break and grind during coring operations, hence giving only 60% recovery.

cont'd. /3 ...

3. WATER LEVEL:

Water level observations were carried out during the course of the field investigation, and are as follows:

<u>Water Level</u>		
B.H. #1	Elev. 211.0
B.H. #2	Elev. 209.3

4. DISCUSSION AND RECOMMENDATIONS:

It is proposed to construct an underpass structure at the crossing of the Ottawa Queensway extension and Acres Road. The new structure may be a three-span structure having a total length of 120 ft., and some 80 ft. in width.

The subsoil generally consists of 15 ft. of firm to stiff clay to silty clay immediately below the ground surface. This deposit cannot provide an adequate bearing capacity for an economical spread footing design at a reasonable depth. The new structure should, therefore, be supported on end-bearing piles driven to practical refusal into the glacial till stratum. Allowable loads will depend upon the section chosen (e.g., 12 BP 74 steel H-piles may be designed for 90 tons per pile).

The proposed approach fills may be in the order of 23 ft. above the existing ground surface. Based on an average shear strength of 900 p.s.f. for the underlying clay deposit, no stability problems are anticipated for standard 2:1 slopes.

Since it is only the preliminary investigation, the recommendations given in this report are, therefore, to be regarded as conditional only, and as such, are subject to revision at a later date when and if new information becomes available. It may be necessary to carry out additional borings in the field when the final design details are available.

cont'd. /4

5. MISCELLANEOUS:

The field work was carried out in March 23 to 29, 1966, using equipment owned and operated by Johnston Drilling Company Ltd., under the supervision of Mr. P. L. Wang, Project Foundation Engineer, who subsequently prepared this report. Mr. M. Devata, Senior Foundation Engineer, supervised the entire project, in general, and reviewed this report.

May 1966

APPENDIX I.

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 66-F-19

LOCATION Queensway Extension and Acres Road Overpass

FOUNDATION SECTION

ORIGINATED BY P.L.W.

W D 423-64

BORING DATE March 21 to March 23, 1966

COMPILED BY P.L.W.

DATUM Geodetic

BOREHOLE TYPE Wash-boring. Diamond Drill

CHECKED BY AK

[illegible]

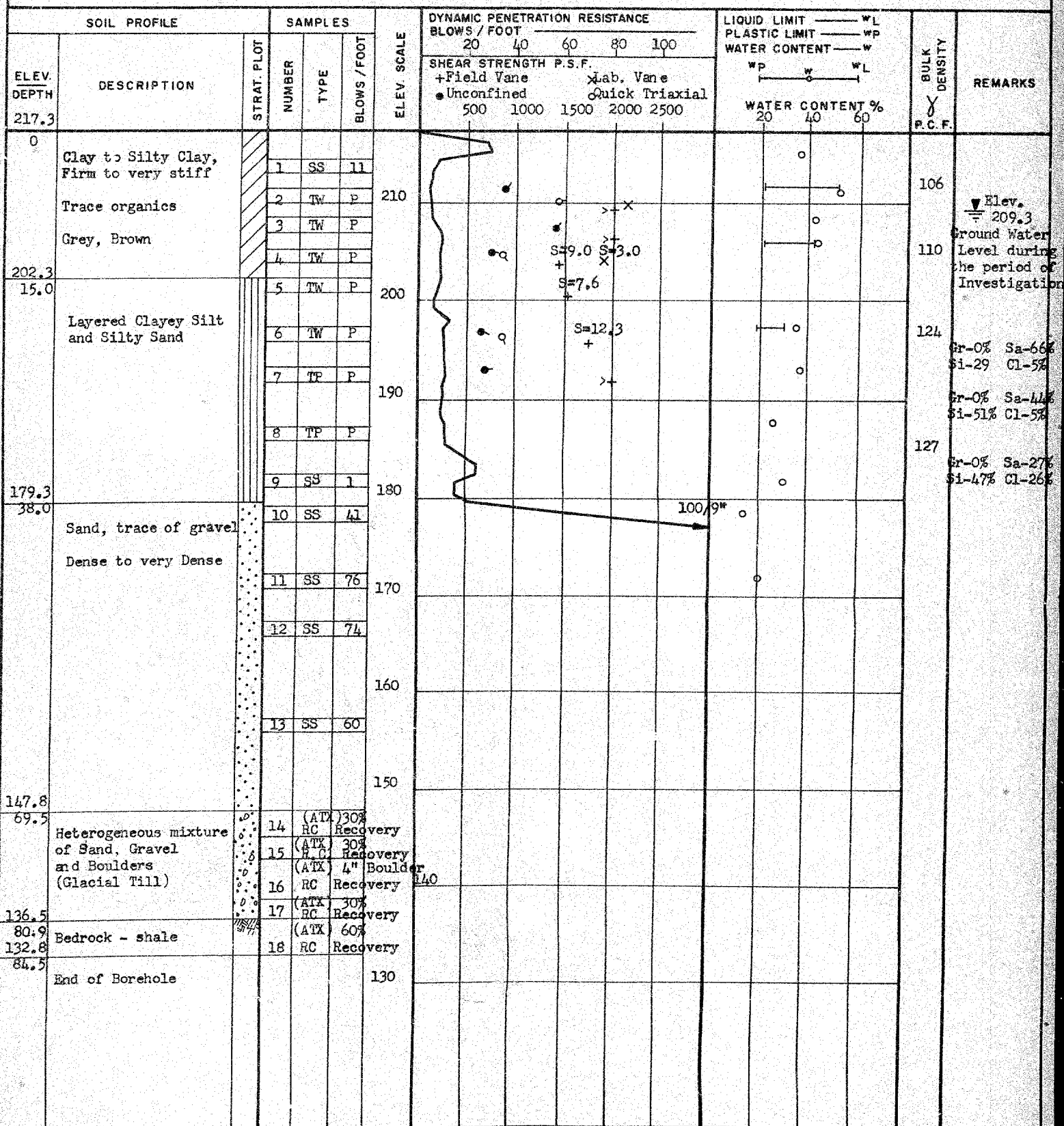
RECORD OF BOREHOLE NO. 2

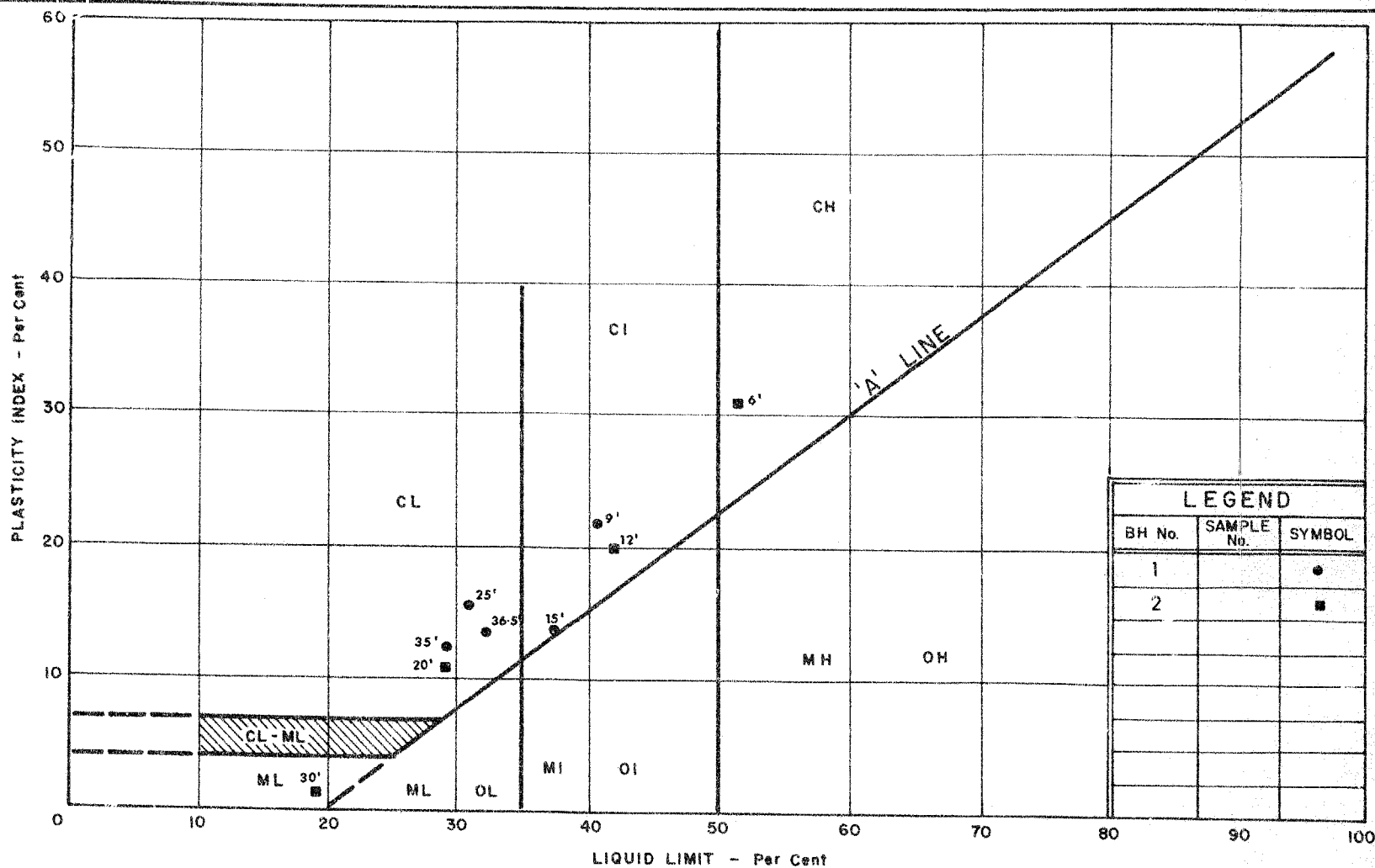
DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

FOUNDATION SECTION

JOB 66-F-19 LOCATION Queensway Extension and Acres Road Overpass ORIGINATED BY P.L.W.
 W.P. 423-64 BORING DATE March 24 to March 29, 1966 COMPILED BY P.L.W.
 DATUM Geodetic BOREHOLE TYPE Wash Boring, Diamond Drill CHECKED BY HR





LEGEND		
BH No.	SAMPLE No.	SYMBOL
1		●
2		■



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

W.P. No. 423-64

JOB No. 66-F-19

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT

SAND

GRAVEL

Fine

Medium

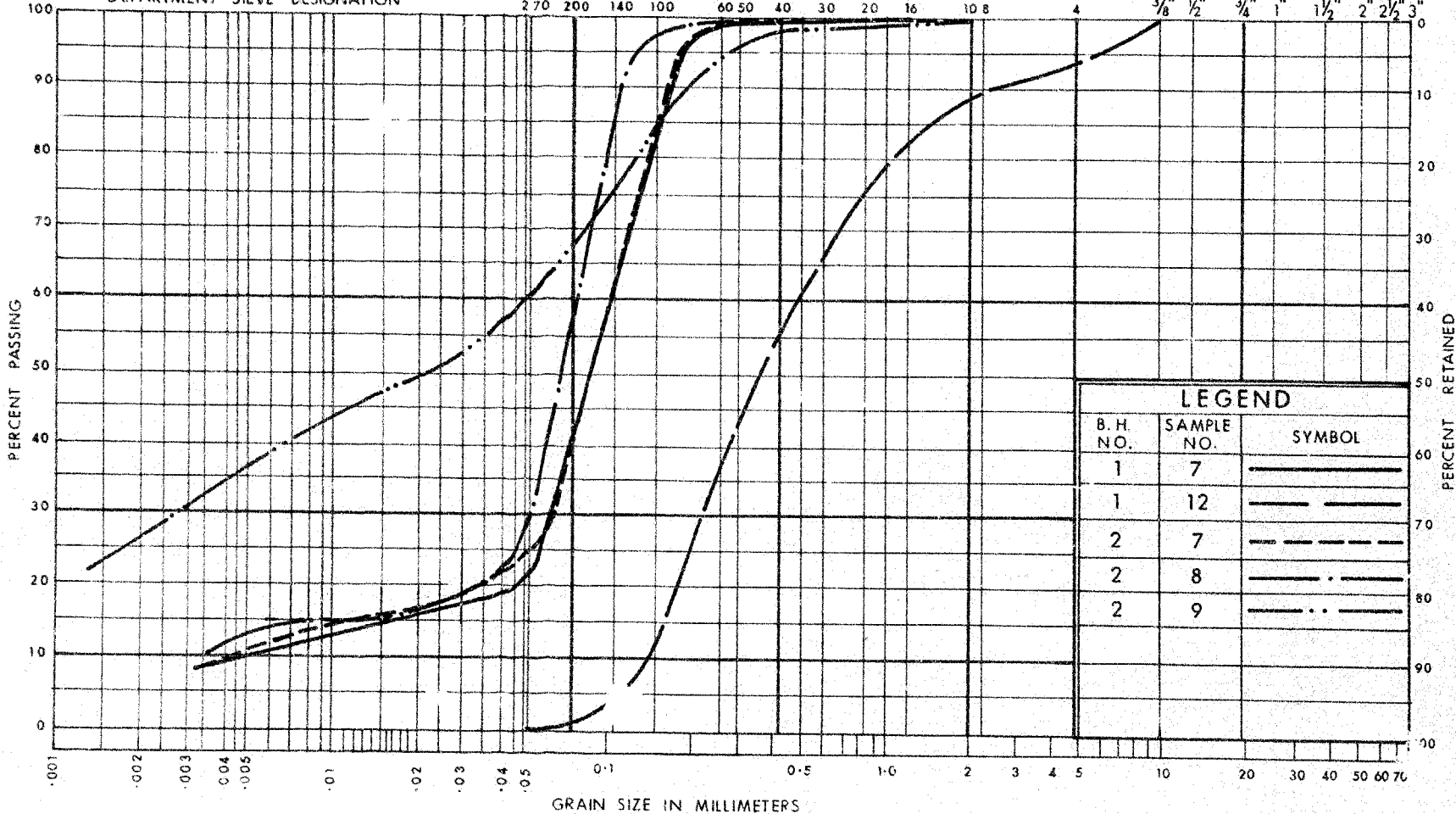
Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION

270 200 140 100 60 50 40 30 20 16 10 8 4 3/8 1/2 3/4 1 1 1/2 2 2 1/2 3"



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION
SILTY SAND TO SAND

W.P. No. 423-64
JOB No. 66-F-19

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

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

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

DESCRIPTION OF SOIL

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

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

TYPE OF SAMPLE

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

SOIL TESTS

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

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

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

GENERAL

π	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

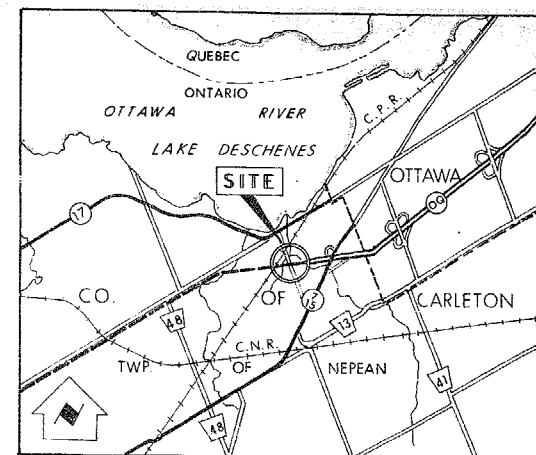
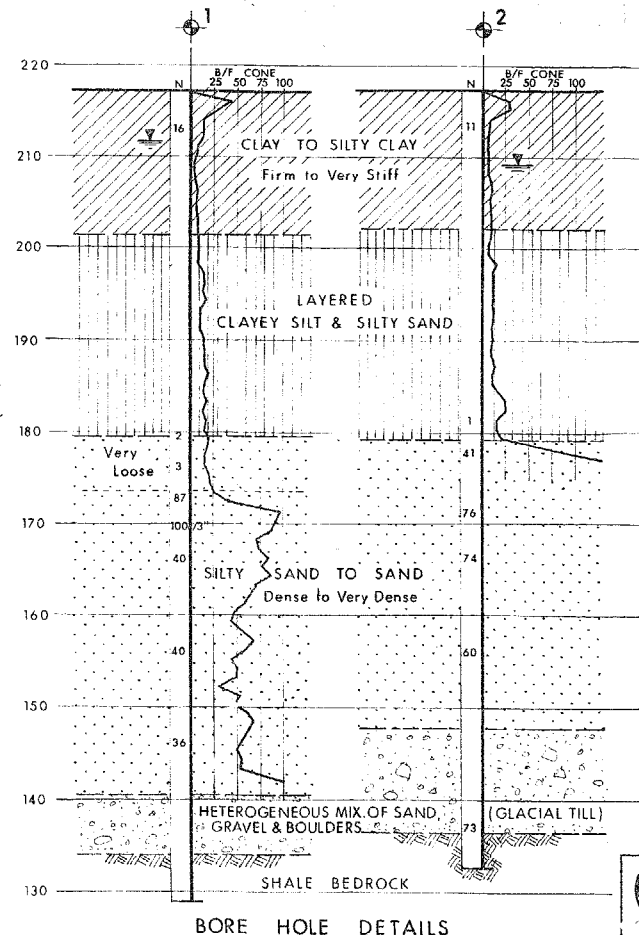
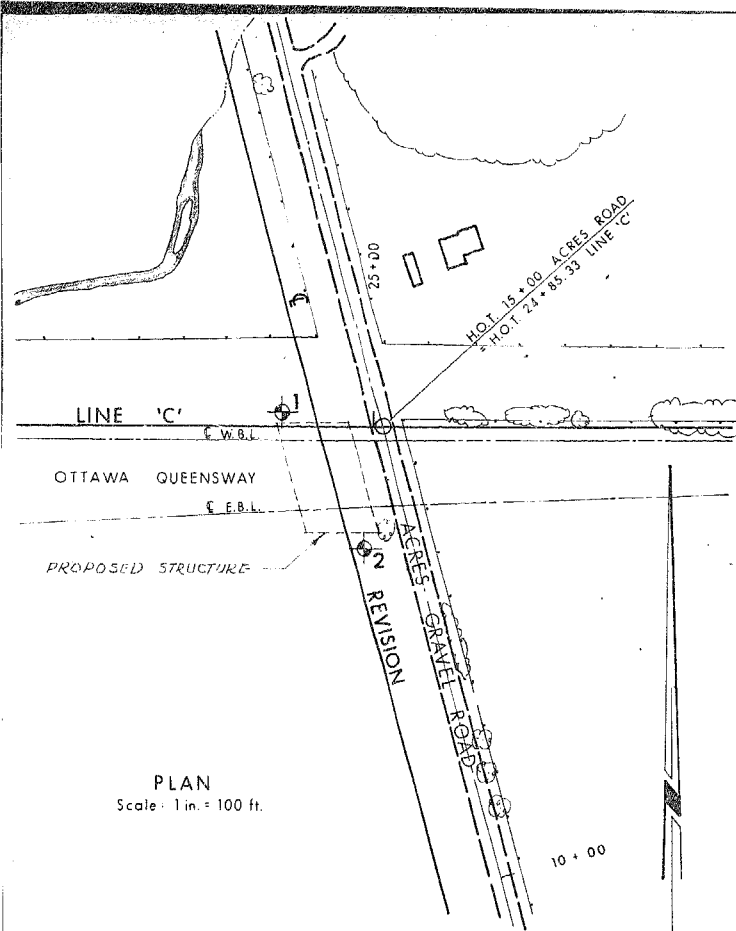
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



- BORE & CONE PENETRATION HOLE
- | Hole | Elevation | Station | Offset |
|------|-----------|------------|----------------|
| 1 | EL. 216.9 | STA. 26+00 | OFFSET 15' RT. |
| 2 | 217.3 | 25+10 | 130' LT. |
- WATER LEVELS AT TIME OF INVESTIGATION (MARCH 1966)



PRELIMINARY INVESTIGATION
ACRES RD. & OTTAWA QUEENSWAY
W.P. 423-64 DIST. 9 JOB 66-F-19
DATE 29 APR. 1966 APPROVED [Signature] DRAWING NO. 66-F-19A

Mr. H. Aron,
Regional Services Manager,
Regional Office - Kingston.

Foundation Section,
Materials & Testing Division,
Rm. 107, Lab. Bldg.

February 14, 1966

Preliminary Foundation Investigations
for Ottawa Queensway Extension.

W.P. 431-64	--	W.J. 66-F-16
W.P. 108-64	--	W.J. 66-F-17
W.P. 430-64	--	W.J. 66-F-18
W.P. 423-64	--	W.J. 66-F-19

Please arrange the necessary permission from the property owners, in order to carry out the preliminary investigations for the above mentioned Work Projects.

MD/MdeF

M. Devata
M. Devata,
SENIOR FOUNDATION ENGINEER
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Foundations Office
Gen. Files

00186

1966 FEB 22 PM 12:05

DOWN KINR 6 FEB 22/66 12:00NOON

A STERMAC PRINCIPAL FOUNDATION ENGR M AND T DIV

ATTN M DEVATA SR FOUNDATION ENGR

RE PERMISSIONS TO ENTER, QUEENSWAY EXTENSION, TWPS OF NEPEAN & MARCH
PERMISSION TO ENTER HAS BEEN OBTAINED FROM WILLIAM TERON CONSTRUCTION
IN LOT 2, CONS 3 & 4, TWP MARCH, WP 431-64.

OTHER PERMISSIONS TO ENTER HAVE BEEN OBTAINED FROM THE LESSEES, HOW-
EVER, WE ARE AWAITING PERMISSION TO ENTER FROM THE LESSOR BEFORE FULL
CLEARANCE CAN BE GIVEN.

PERMISSION TO ENTER FROM J L ORME IN LOT 15, CON 2 O.F. TWP
NEPEAN, WP 423-64, IS EXPECTED THIS WEEK.

D J FITZGERALD PROP SECT RIGHT OF WAY DIV

T
E
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P
E

Mr. J.L. Forster,
Reg. Prof. Plan. Engineer,
Functional Plan., Kingston.

N.H.F. Division, Kingston.

January 31, 1966.

66-F-19

Re: Ottawa Queensway. N.P. 429-64. Jct. Hwy. 15 Westerly to
Crummy Road 40.

The field review meeting for the abovementioned project was held on January 14/66 in the Regional Functional Planning Office in Kingston.

This project lies in the Ottawa Valley Clay plains physiographic region, an area made up of clay plains interrupted by ridges of rock or sand. Part of this project is located on a mass of stratified limestone covered by a thin layer of sandy soil.

For the rest of this project this limestone is overlain by a deeper layer of marine clays.

It appears that over 1.5 million yards of borrow material will be needed for these projects. Unfortunately the fat clays available in the area are generally unsuitable for this purpose due to the high field moisture contents. The closest suitable borrow material is located in the Stittsville area, representing a haul distance of over 7 miles.

Granular deposits suitable for crushing are located within a 6 - 9 mile haul distance. A limestone quarry suitable for G.B.C. Class 'A' is located within the project on N.C.B. property.

All weak deposits in the vicinity of Sta. 174+00 and Sta. 184+ are underlain by bedrock and are very shallow in depth. Consequently, they will pose no subgrade problems.

The alignment on this project appears satisfactory. However, the grade will probably have to be reviewed at the intersecting roads after an embankment analysis is performed by the foundation section. The higher approach fills may require the use of berms at the various interchanges. Fill settlements are anticipated at two culvert sites, at Sta. 238+ and Sta. 61+, where the creek beds are approximately 20' below the proposed grade line. Berm construction may be required at these locations for stability purposes. Due to soft clay deposits, a settlement is also anticipated at Sta. 205+00.

Continued /2

Other work project numbers in the vicinity which will be related to this project are:

W.P. 909-64 Bay. 7 & 15 Interchange Revision, Colonel
Greenway
W.P. 423-64 Acres Sideroad Overpass
W.P. 430-64 Noodle Drive Overpass
W.P. 108-63 C.W.R. Overhead
W.P. 905-64 Ottawa Westerly 1.5 Miles

All structure foundation investigations remain to be done and may affect the final grades. Further comments will have to be reserved until an approved gradeline has been set.



JFL:edr

J. F. Lapensee

for J. E. Gruspier
Regional Materials Engineer

c.c. A. Starnas/
G. A. Wong

File

FIELD BORING LOG

D.RILLING CO. Johnston DATUM ELEV. _____ B.H. NO. 2
DRILLER 1 Crinkshaw GROUND ELEV. 217.3 JOB NO. 66-F-19
ENGINEER P. L. Wane CASING SIZE Nx DATE March 24/66
SITE LOCATION Prop. Highway 2, Arvia Rd., Ottawa
HOLE LOCATION 25+10. 130 ft.
REMARKS _____

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
		Dynamic Penetration Test		
0	10	77, 28, 8, 6, 5, 4, 5, 5, 5, 8,		
10	20	9, 8, 8, 8, 8, 7, 6, 6, 14, 11,		
20	30	11, 11, 11, 11, 11, 9, 10, 10, 9, 12,		
30	40	10, 11, 18, 25, 24, 15, 15, 2, 64, 107,		
40	40'9"	100/g"		
		Refused at 40' 9"		
0	3	Drive N/A & pull out.		
		Tap test to 2.7. S.H. Clay.		
3	4.5	S.H. Clay: 4.5 ft. S.H. Clay.	S.S. 1	4.5 - 6
		CLAY Clay Grey.		71'
		March 25 66		
0	6	Drive No. 9. Wain out.		
		CLAY Clay to Clay 4.5 ft. Brown.		
6	7.5	Still 6	2.5	CL
		Shale. Sandy G.S.		
7.5	9.5	Vase Test:		
		< 2,000 lbs.		
0	9	Drive N/A & Wain out.		
		No Change		

FIELD BORING LOG

DRILLING CO. Johnston DATUM ELEV. _____ B.H. NO. 2
 DRILLER L. O'Connell GROUND ELEV. 717.3 JOB NO. 66-E-19
 ENGINEER P. L. Wane CASING SIZE Nx DATE Mar 25/68
 SITE LOCATION Prop. Bypassway & Acres Rd., Deland
 HOLE LOCATION 25-10, 130 LT.
 REMARKS Diamond Drill

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
9	10.5	Shelly No Change	T.W. 3	P.M.
10.5	12.0	Vane Test: C > 2000 PSF		
0	12.0	Drive Nx & Wash out Brown to Greyish Brown Clayey Silt		
12.0	13.5	Shelly Grey Clayey Silt	T.W. 4	P.M.
13.5	15.0	Vane Test: 26 x 40 = 1440 PSF 8 x 20 = 160 PSF S = 7		
0	15	Drive Nx & Wash out Silty, Clayey Silt with traces of very fine sand. Grey wash		
15	16.5	Shelly Sample lost about 1" Grey Clayey Silt with traces of very fine sand	T.W. 5	P.M.
16.5	18.0	Vane Test: 32 x 40 = 1280 PSF 10 x 20 = 200 PSF S = 7.6		

FIELD BORING LOG

DRILLING CO.	Johnson	DATUM ELEV.		B.H. NO.	2
DRILLER	L. Crinkshaw	GROUND ELEV.	217.3	JOB NO.	66-F-19
ENGINEER	D. L. Wang	CASING SIZE	1 1/2"	DATE	March 25/66
SITE LOCATION	Drop. Runaway to Arnes Rd., Ottawa.				
HOLE LOCATION	25+10 1/2 130 VT.				
REMARKS	Diamond Drill				

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
15.0	19.0	Wash out. Silty Very fine Sand at about 18'.		
22.0	21.5	Shelly with piston Grey silty very fine sand.	T.P. 6	P.M.
21.5	22.0	Vane Test: 4.3 x 4.2 = 172.2 psf 7 x 2.0 = 140 psf C = 12.3		
20.0	25.0	Wash out: No change.		
23.0	26.5	shelly with piston: No change.	T.P. 7	P.M.
26.5	25.0	Vane Test: C > 2,000 psf.		
25.0	20.0	Wash out: No change.		
30.0	31.5	Shelly with piston No change.	T.P. 8	P.M.
30.5	33.0	Vane Test: C > 2,000 psf.		

FIELD BORING LOG

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

DRILLING CO. Johnson DATUM ELEV. _____ B.H. NO. 2
 DRILLER L. Crankshaw GROUND ELEV. 217.3 JOB NO. 66-T-19
 ENGINEER P. L. Wang CASING SIZE NX DATE March 1966
 SITE LOCATION Prop. Greenway & Ave. Rd., Ottawa
 HOLE LOCATION 25+10, 1/4 Sec. 27
 REMARKS Diamond Drill.

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
20.0	25.0	Wash out No. 1 sand.		
25.0	26.5	Gravel & sand Very loose fine sand	S.S. 9	1/1.5
33.0	38.5	Wash out Hard wash at 38.5. Some med. sand.		
38.5	40.0	Split spoon Beginning at 39' probe hit a coarse gravel. Medium sand with pieces of gravel.	S.S. 10	21, 23, 25 41
0	45	Drive Bx & Wash out Hard drive. Sand wash.		
45	46.5	Split spoon Drop down 8" to bed without of medium to fine sand.	S.S. 11	23, 55 56
0	50	Drive Bx to 50 & Wash out The same material as above		
50	51.5	Side slip sampling The same material as above	S.S. 12	47, 34, 40 70
0	60.0	Drive Bx to 60. & Wash out Very hard wash Drive. The casing was Driven about 2' each time then Wash out		

FIELD BORING LOG

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

DILLING CO. Johnston DATUM ELEV. _____ B.H. NO. 2
DRILLER L. Crivickshaw GROUND ELEV. 217.3 JOB NO. 66-E-19
ENGINEER P. L. Wang CASING SIZE Nx DATE March 25/66
SITE LOCATION Drop. Queenway & Acres Rd. Ottawa
HOLE LOCATION 25 + 12, 130 Lt.
REMARKS Diamond Drill.

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
60	66.5	Split sp... Coarse to fine sand.	S.S. 13	21, 31, 49 60
		March 28 1966		
0	69.5	Drive BX to 69.5 + wash out. The same material as above to 69.5. Casing & log bounced at 69.5 Possibly bit boulder.		
0	70	Drill Ax		
69.5	72.5	Diamond Drill Boulder. Only about 30% recovery	RC 14	
0	73.3	Drill Ax		217.3 69.5 58
71.5	74.7	Diamond Drill Sand & Boulder. 30% recovery March 29 1966		14
0	74.7	Drill Ax Casing. Before Ax casing was drilled to 74.7 it was found sand was filled in the Ax casing about 5' from the bottom of the casing due to unbalanced hydrostatic head.	RC 15	
74.7	75.9	Diamond drill	RC 16	

FIELD BORING LOG

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

DRILLING CO. Johnston DATUM ELEV. _____ B.H. NO. 2
 DRILLER L. Cruikshank GROUND ELEV. 217.3 JOB NO. 66-E-19
 ENGINEER P. L. Wang CASING SIZE Rx, Rx, Rx DATE March 29/66
 SITE LOCATION Prop. Queenway & Acres Rd, Ottawa
 HOLE LOCATION Sta. 25+10, 0/1 130 LT
 REMARKS Diamond Drill

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
		Water lost during drilling. only 4" boulder recovery.		
0	75	Drill Ax: Ax casing ceased advance at 75' Probably a piece of gravel or a fragment of boulder blocked inside the Ax bit. Pull out all Ax casing from the hole.		
0	78.9	Drive Rx to 78.9' and wash out Gravelly sand dirt wash.		
78.9	80.5	Split spoon: 4" stick up. Grab to 79'. then drive split spoon Gravelly sand with traces of silt and clay (Gravelly Till with boulders)	S.S. 17	16, 17, 56 73
0	80.9	Drive Rx to 80'10" Casing didn't go further.		
79.0	80.9	Wash out: Bouncing at 80'10".		
0	80.9	Drill Ax to 80.9		
80.9	83.9	Diamond Drill. A boulder of 13" set on very fine sand deposit.	C.R. 18	17.3 80.9 83.9
0	84.5	Drive Rx casing. Boulder & sand Bore hole end at 84.5'		