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57-F-211C

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W.P. 751-56

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Hwy 401

GRAVEL ROAD

1 mi. S of MORRISH

## e. m. peto associates ltd.

YOUR REFERENCE:-

OUR REFERENCE:- 5750

850 roselawn avenue,  
TORONTO, ONTARIO.  
RUssell 1 - 4955.

REPORT ON  
SOIL SITE INVESTIGATION  
at  
HWY. #401 - GRAVEL ROAD CROSSING  
1 MILE SOUTH OF MORRIS  
HOPE TWP. #5 - W. P. 751-56  
for  
DEPARTMENT OF HIGHWAYS OF ONTARIO

### TERMS OF REFERENCE:

We were retained, by a letter from Mr. J. C. McAllister dated May 10th, 1957, to perform a complete soil investigation at the above mentioned site.

We were required to drive 6 test holes at locations as shown on the D.H.O. drawing E.-2865-1. Test holes were to be driven using BK casing and sampling in our standard manner to a depth of approximately 25 ft., depending upon the soil conditions. Standard penetration tests were to be recorded, and were to indicate a minimum of 15 feet of good bearing soil. Undisturbed Shelby tube samples were to be taken if cohesive soil was encountered with results of 15 blows or less.

Water table levels were to be carefully noted, both during the performance of the work and after the casing had been pulled.

### METHOD OF OPERATIONS:

The work was performed using a skid-mounted Sullivan "12" drill rig with A-frame, which was trucked to the site from a nearby Highway 401 bridge crossing site on May 16th. Work was commenced on this date and was completed on May 23rd, 1957, on which date the equipment was trucked back to our yard in Toronto.

### METHOD OF OPERATIONS: (Cont'd)

The 6 test holes were located as shown on our site plan attached at the rear of this report. Sampling was performed with a 2" O.D. split tube sampler, since soil conditions did not warrant the use of either larger sized samplers or Shelby tubes. Samples were collected at 5 ft. intervals or less, and standard penetration test results were recorded throughout, these being the number of blows of a 140 lbs. hammer falling 30" required to drive the 2" split tube a distance of one foot.

All samples obtained on the site were carefully checked in our laboratory, and complete borehole logs were drawn up. These are included at the rear of this report.

The samples will be retained for a period of at least 30 days, after which they will be discarded unless we are otherwise notified.

Since we were unable to locate the U.S.C. bench mark at the site, all elevations mentioned in this report and shown on the borehole logs are referred to an assumed bench mark. This was the top of a 1" square iron bar on the proposed Highway 401 centre-line at Station 170 + 65.51. The elevation of the top of this bar was taken to be 100.00.

### SITE AND GEOLOGY:

The topography at the site is generally level to undulating, and the gravel road leading South from Morris is heavily wooded on both sides. The site is part of the smooth limestone till plain found in the extreme Southern part of Durham County. This physiographic division is located South of the old gravelly beaches marking the borders of glacial Lake Iroquois.

The composition of the till is dominated by limestone content, but the till contains fewer large stones and boulders than is characteristic of nearby till plains. The depth of till is shallow over most of the area, but bedrock is rarely exposed. Soils in this area exhibit good surface drainage.

### SOIL CONDITIONS:

Soil conditions on the site are generally excellent from the foundation point of view and are quite uniform. Hence no profile of the soil stratigraphy was included at the rear of the report.

SOIL CONDITIONS: (Cont'd)

Organic Surficial deposits.

The site is overlain by from 2 to 4-1/2 feet of organic silty topsoil and organic silty clay, varying from black to dark brown in colour. This material is generally moist and is only of soft to firm consistency.

Silty and Sandy Till

Immediately beneath the organic deposits, and occurring very close to the surface is the glacial till. This material consists of silty fine sand with many grits and rock fragments. At about the 25 ft. depth some minor clay content was also noted in some of the test holes. The till is light brown to light grey-brown in colour, and varies in density from compact or dense near the surface to extremely dense at depth. Because of the position of the water table the material is very moist or wet.

Standard penetration test results ranged from 22 blows at 3 ft. depth over the site to far in excess of 100 blows per ft. at 20 ft. depth.

WATER CONDITIONS:

To our assumed datum the water table on the East side of the Morris Road was approximately at elevation 95; and on the West side of the gravel road it was approximately at elevation 92.5. In any case, the ground water table at the time of this investigation was found to be within 8 ft. of the ground surface. The reason for the apparent discrepancy in ground water level between the East and West sides of the road is that on the East side where the water level is slightly higher the 3 holes were located in a cultivated field, with a higher absorption for rainwater but with slow subsurface drainage. On the West side of the road the holes were located quite close to a drainage ditch, and this ditch probably carried away the water in the adjacent soil.

RECOMMENDATIONS AND CONCLUSIONS:

We understand from a letter dated June 14th, 1957 from Mr. L. Loch, Bridge Design Engineer, that it is proposed to cut down the existing gravel road considerably, allowing it to pass under the new Highway No. 401. The footings will be some 24 feet below the present road surface. At this depth the density of the till is extremely high. The safe allowable bearing capacity for your footings can be as high as 6.0 tons per sq. ft. if you so desire. It is customary however, not to load glacial till above 5.0 tons per sq. ft.

RECOMMENDATIONS AND CONCLUSIONS: (Cont'd)

Due to the position of the ground water table, there may be some problem with water seepage into the relatively deep excavation, particularly from the near-surface strata. However, we feel that any seepage will not be in amounts so excessive that the water cannot be pumped out.

F. M. PETO ASSOCIATES LTD.,

*M. Mindess*

MM:sb

*per* F. M. Peto, P. Eng.

June 21st, 1957.

SOIL ENGINEERING SERVICE - TORONTO, ONTARIO  
BOREHOLE LOG

Borehole No. 1  
Boring Date May 18th, 1957  
Checked By E. M. P.

## ABBREVIATIONS

V. T. IN SITU VANE SHEAR TEST  
Q/u UNCONFINED COMPRESSIVE STRENGTH  
W. L. WATER LEVEL IN CASING  
W. T. GROUND WATER TABLE IN SOIL

SOIL DESCRIPTION	COLOR	Density or Consistency	Depth Elevation	Legend	Sample No. and Collection	Sample Type	No. of Blows per Ft.	WATER LEVELS, SOIL MOISTURE & REMARKS
ORGANIC TOPSOIL CLAYEY SILT	BLACK BROWN		0' 0" 95.9					
SILTY VERY FINE SAND, GRITS AND GRAVEL	LT. GREY-BROWN	COMPACT	2' 0" 93.9		1 X	S.S.	12	MOIST.
			v ——— v					W.T. = 91.6
AS ABOVE	LT. BROWN	DENSE	5' 0" 90.9		2 X	S.S.	42	MOIST. POCKET OF BLACK SAND.
COARSE SAND AND PEBBLE GRAVEL SOME SILTY VERY FINE SAND	GREY-BROWN	VERY DENSE	10' 0" 85.9		3 X	S.S.	74	WET. SOME LARGE LIME-STONE FRAGMENTS.
SILTY FINE SAND, GRITS AND GRAVEL	LIGHT BROWN	EXTREMELY DENSE	15' 0" 80.9		4 X	S.S.	130	WET. STRATA OF MEDIUM SAND.
AS ABOVE	LT. GREY-BROWN	"	20' 0" 75.9		5 X	S.S.	100 1/4"	WET.
SILTY FINE TO MED. SAND, GRITS AND GRAVEL	LT. BROWN	"	25' 0" 70.1		6 X	S.S.	100 / 10'	WET. SOME HORIZONTAL STRATIFICATION.
				HOLE TERMINATED.				

SOIL ENGINEERING SERVICE - TORONTO, ONTARIO

Job Name: Hwy. 401 - Gravel Road Job No. 5750  
Client: Dept. of Highways of Ontario Crossing BX  
Date: Assumed Casing  
Compiled By: M.M.

Borehole No. 2  
Boring Date May 17th, 1957  
Checked By E.M.P.

### ABBREVIATIONS

S. S. 2" STANDARD SPLIT TUBE SAMPLE  
S. L. SPLIT BARREL WITH LINERS  
S. T. THIN-WALLED SHELBY TUBE SAMPLE  
W. S. WASH SAMPLE  
R. C. ROCK CORE

Y. T. IN SITU VANE SHEAR TEST  
Q/u UNCONFINED COMPRESSIVE STRENGTH  
W. L. WATER LEVEL IN CASING  
W. T. GROUND WATER TABLE IN SOIL

[illegible]

## BOREHOLE LOG

Checked By E.M.P.

## ABBREVIATIONS

V. T. IN SITU VANE SHEAR TEST  
Q/u UNCONFINED COMPRESSIVE STRENGTH  
W. L. WATER LEVEL IN CASING  
W. T. GROUND WATER TABLE IN SOIL

SOIL DESCRIPTION	COLOR	Density or Consistency	Depth Elevation	Legend	Sample No. & Condition	Sample Type	No. of Blows per Ft	WATER LEVELS, SOIL MOISTURE & REMARKS
ORGANIC TOPSOIL.	BLACK		0' 0" 99.7					
ORGANIC SILTY CLAY.	DARK BROWN	FIRM	4' 6" 95.2	1	S.S.	6		MOIST
SILTY FINE SAND GRITS AND GRAVEL.	LIGHT BROWN	COMPACT	10' 0" 89.7	2	S.S.	22		MOIST
								W.T. = 92.0
AS ABOVE	"	VERY DENSE	15' 0" 84.7	3	S.S.	93		QUITE MOIST.
AS ABOVE	"	"	20' 0" 79.7	4	S.S.	51		WET.
" "	LIGHT GREY-BROWN	EXTREMELY DENSE	25' 10" 73.9	5	S.S.	137		QUITE MOIST. MANY ANGULAR LIMESTONE FRAGMENTS.
" "	"	"	25' 10" 73.9	6	S.S.	120/10"		" "
LAYER OF SILTY CLAY.	"	"						
HOLE TERMINATED.								



# BOREHOLE LOG

Borehole No. 4  
Boring Date May 18th & 31st 1954  
Checked By E.M.P.

### ABBREVIATIONS

V. T. IN SITU VANE SHEAR TEST  
Q/u UNCONFINED COMPRESSIVE STRENGTH  
W. L. WATER LEVEL IN CASING  
W. T. GROUND WATER TABLE IN SOIL

SOIL DESCRIPTION	COLOUR	Density or Consistency	Depth Elevation	Legend	Sample No. and Condition	Sample Type	No. of Blows per Ft	WATER LEVELS, SOIL MOISTURE & REMARKS
ORGANIC TOPSOIL	BLACK		0' 0" 97.0					
ORGANIC SILTY CLAY	DK. BROWN	FIRM	1' 8" 95.2		1	S.S.	6	MOIST
SILTY FINE SAND GRITS AND ROCK FRAGMENTS	LT. BROWN	DENSE	4' 0" 93.0		2	S.S.	33	QUITE MOIST
AS ABOVE	LT. GREY-BROWN	VERY DENSE	10' 0" 87.0		3	S.S.	57	WET. POCKETS OF SILT.
" "	LT. BROWN	EXTREMELY DENSE	15' 0" 82.0		4	S.S.	101	WET STRATIFIED STRATA OF MEDIUM SAND.
SILTY FINE TO COARSE SAND. GRITS AND PEBBLES	LT. GREY-BROWN	" "	20' 0" 77.0		5	S.S.	98	WET.
AS ABOVE.	" "	" "	25' 0" 71.2		6	S.S.	100/g	WET
				HOLE TERMINATED				

SOIL ENGINEERING SERVICE - TORONTO, ONTARIO

# BOREHOLE LOG

Job Name Hwy. 401 - Gravel Road Job No. 5750  
Crossing  
 Client Dept. of Highways of Ontario Casing BX  
 Datum Assumed Compiled By M.M.

5

Borehole No. ....

Boring Date May 21st - 22nd, 1957

Checked By E. M. P.

**SAMPLE CONDITION**

 UNDISTURBED

 FAIR

☒ DISTURBED

LOST

SAMPLE TYPE

### 5.5. 2" STANDARD SPLIT TUBE SAMPLE

S.L. SPLIT BARREL WITH LINERS

### 3. T. THIN-WALLED SHELBY TUBE T. M. E

W. S. WASH SAMPLE

R. C. ROCK CORE

## ABBREVIATIONS

### V. T. IN SITU VANE SHEAR TEST

Q/u UNCONFINED COMPRESSIVE STRENGTH

W.L. WATER LEVEL IN CASING

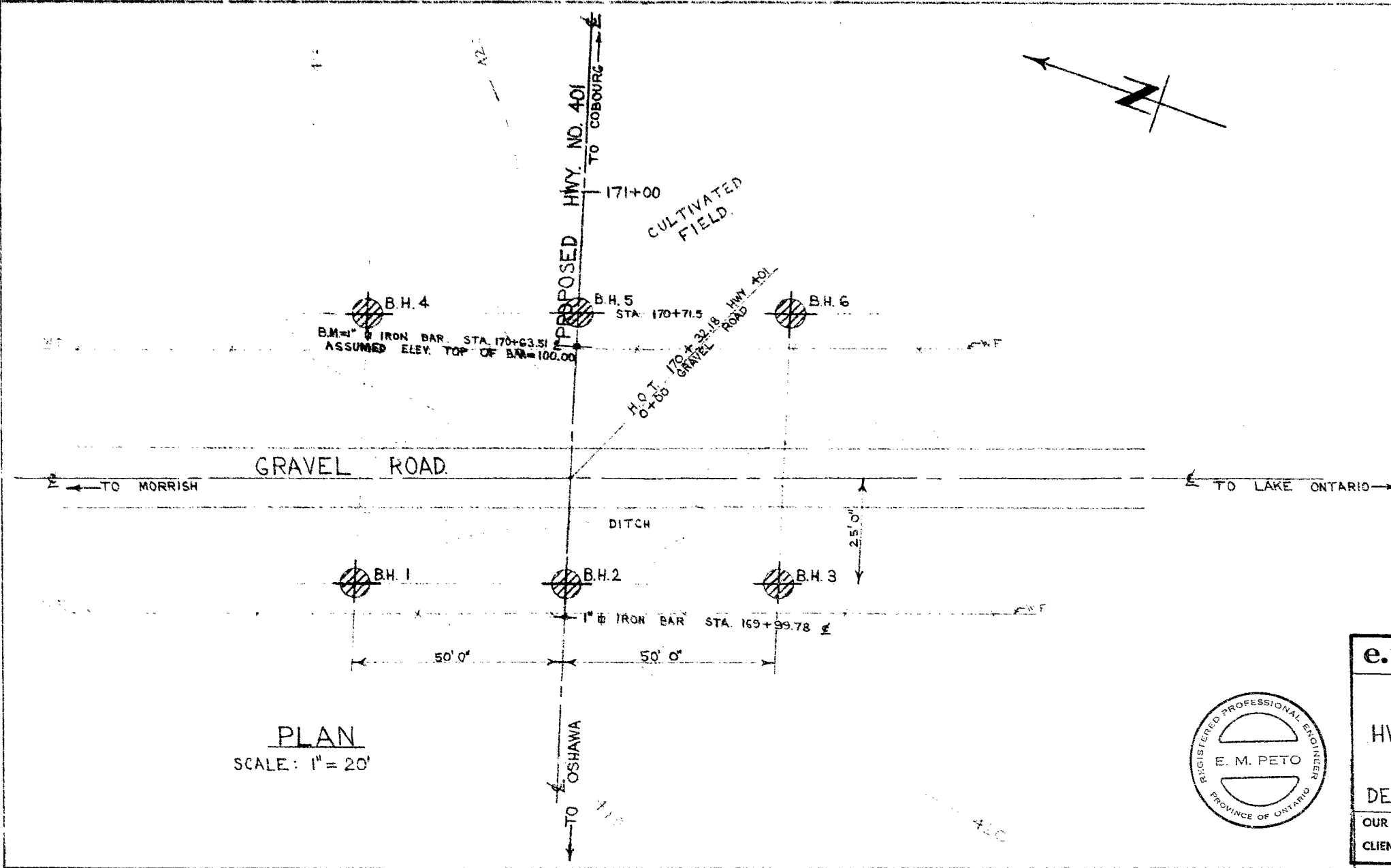
W. T. GROUND WATER TABLE IN SOIL

[illegible]

# BOREHOLE LOG

Checked By ..... E. M. P.

SOIL DESCRIPTION	COLOR	Density or Consistency	Depth Elevation	Legend	Sample No. and Condition	Sample Type	No. of Blows per Ft.	WATER LEVELS, SOIL MOISTURE & REMARKS
			0'0" 101.7		1	S.S.	4	MOIST
ORGANIC SILTY CLAY	DK. BROWN	SOFT	4'0" 97.7		2	S.S.	28	"
SILTY FINE SAND GRITS AND PEBBLES	LT. BROWN	COMPACT			3	S.S.	66	QUITE MOIST
AS ABOVE	" "	VERY DENSE	10'0" 91.7		4	S.S.	90 1/8"	WET
" "	" "	EXTREMELY DENSE	15'0" 86.7		5	S.S.	85 1/8"	WET
SILTY FINE TO COARSE SAND, GRITS AND PEBBLES	" "	" "	20'0" 81.7		6	S.S.	80 1/4"	WET. MINOR CLAY CONTENT
SILTY FINE SAND, GRITS AND GRAVEL	" "	" "	25'4" 76.4					HOLE TERMINATED



PLAN  
SCALE: 1" = 20'



<b>e.m. peto &amp; associates ltd.</b>	
SOIL SITE INVESTIGATION	
AT	
HWY. NO. 401-GRAVEL RD. CROSSING	
1 MI. SOUTH OF MORRISH.	
FOR	
DEPARTMENT OF HIGHWAYS OF ONTARIO	
OUR JOB No.- 5750	DATE- JUNE 19, 1957
CLIENTS PLAN No.- E-2865-1	PER- M.M.