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57-F-213C

W.P. 750.56

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Hwy 401 + #2

CROSSING

e. m. peto associates ltd.

YOUR REFERENCE:-

OUR REFERENCE:-

5773

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

REPORT ON SOIL SITE INVESTIGATION

at

HWY. #401 - HWY. #2 CROSSING

HOPE TWP. #11 - W. P. 750 - 56

for

DEPARTMENT OF HIGHWAYS OF ONTARIO

TERMS OF REFERENCE:

We were retained, by a letter from Mr. J. C. McAllister dated April 29th, 1957, to perform a complete soil site investigation for the above crossing. Four test holes were to be put down, located approximately as indicated on the D.H.O. site plan E.2864-1. Test holes were to be driven initially using BX casing and sampling in the standard manner to a depth of at least 25 ft., unless the extremely dense soil conditions prevailing in the area prevented this. Standard penetration tests were to prove a minimum of 15 ft. of good bearing soil with penetration test results of 30 blows or more. If early refusal was encountered bedrock was to be proven by coring for a distance of at least 10 ft. with a diamond drill bit.

Watertable 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 our number 2 unit, which is a skid-mounted Longyear Straightline Junior drill rig with A-frame, which was trucked to the site from a job at the Ganaraska River. The work was commenced on June 17th, and was completed on June 24th, 1957 on which date the equipment was trucked back to our yard in Toronto.

METHOD OF OPERATIONS:

The four test holes were located as shown on the site plan attached at the rear of this report. It was necessary to move them 10 ft. farther out from the centre line of Highway No. 2 due to the existence of a high tension power line on one side and of the Bell Telephone lines on the other side of Highway No. 2. Sampling was performed in our standard manner, using a 2" split spoon sampler and obtaining samples at 5 ft. intervals or less. Standard penetration test results were recorded throughout, these being the number of blows of a 140 lbs. hammer falling 30" required to drive 2" split spoon sampler a distance of one foot. Soil conditions did not warrant the taking of relatively undisturbed Shelby tube samples.

All samples obtained on the site were carefully checked in our laboratory and complete borehole logs drawn up. These are included at the rear of this report. All samples will be retained for a period of at least 30 days after which they will be discarded unless we are otherwise notified.

The elevations shown on the borehole logs and mentioned throughout this report are referred to Geodetic datum and were obtained from a D.H.O. bench mark on the site, which was a spike in the South side of a hydro pole left of station 325 / 05.

Water table levels were noted wherever possible during the performance of the work.

SITE AND GEOLOGY:

Although the topography immediately at the site is generally level to undulating, the site lies in a region of drumlined till plains, which constitute a portion of the old glacial Lake Iroquois shore line. The materials encountered in this region are commonly referred to till or boulder clay. The till is composed of limestone from the Trenton and Black River series with varying amounts of Precambrian rocks. Boulders and stones, some of which are a foot in diameter and of limestone or granite origin, are associated with a matrix of silt, very fine sand, some clay and numerous small rounded to sub-angular stones. The pressure created by the ice has compacted these stone and finer materials to quite an extent, but the soil water still moves freely. There is some variation in the composition and condition of the till throughout the area. In some places gravelly deposits predominate, and in other places there are fewer large boulders and stones and the till is more compact and slightly heavier. The depth of the till over the bedrock in this region is generally quite deep.

SOIL CONDITIONS:

Soil conditions on the site are quite uniform. The site is overlain by from 1 to 2 ft. of dark brown sandy organic topsoil. Beneath the topsoil and overlying the glacial till are deposits of fine sand and clayey silt.

The soil type of major importance is of course the glacial till, which in this case consists of a matrix of fine sand or silty fine sand containing grits and rock fragments, mostly of limestone origin. The till on the West side of the existing Highway No. 2 has its upper limit at an elevation of approximately 452.5, and on the East side of Highway 2 occurs approximately at elevation 456.0. The till is pale brown to pale grey-brown in colour and its density and moisture content both increase with depth. Standard penetration tests in this material were found to vary from a low of 18 blows to a high of well over 100 blows per foot.

No bedrock was encountered on this site, although the deepest hole went to a depth of 41 ft.


WATER CONDITIONS:

It was very difficult on this site to obtain a number of reliable water table readings, as the holes tended to cave in upon removal of the casing. However, the crew on site was able to ascertain that the water table is at least 12 ft. or more below existing ground surface.

RECOMMENDATIONS AND CONCLUSIONS:

1. The proposed bridge can be founded on strip footings running parallel to Highway No. 2, which on the West side can be placed at elevation 452.0 and on the East side at elevation 455.0. Footings at these elevations which have a least dimension of 5 ft. can have safe allowable bearing capacities of 4.0 tons per sq. ft.
2. If Highway No. 2 is to pass underneath the new Highway 401 at some depth, the footings will have to be at lower elevations; then the safe allowable bearing capacities can be increased to 5.0 tons per sq. ft. for footings anywhere below elevation 448.0, with no limitations on footing sizes.
3. It is our opinion that there will be very little trouble with water in any excavations made on this site.

E. M. PETO ASSOCIATES LTD.,



E. M. Peto, P. Eng.

MM:sb

July 4th, 1957.

SOIL ENGINEERING SERVICE - TORONTO, ONTARIO

Job Name Hwy. 401 - Hwy. 2 Crossing

Job No. 5773

Borehole No. 2

Client Dept. of Highways of Ontario

Casing.....BX (2 $\frac{1}{2}$ " diam.)

Boring Date June 21-22, 1957.

Datum Geodetic

Compiled By ...M...Mindess.

Checked By E. M. Peto

SAMPLE TYPE

ABBREVIATIONS

UNDISTURBED

 FAIR

☒ DISTURBED

LOST

S.S. 2" STANDARD SPLIT TUBE SAMPLE

S.L. SPLIT BARREL WITH LINERS

S. T. THIN-WALLED CHELBY TUBE SAMPLE

W.S. WASH SAMPLE

R. C. ROCK CORE

V. T. IN SITU VANE SHEAR TEST

Q/J 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 Condition	Sample Type	No. of Blows per Ft.	WATER LEVELS, SOIL MOISTURE & REMARKS
SANDY ORGANIC TOPSOIL			0' 0" 461.5					
CLAYEY AND SILTY FINE SAND	BROWN		1' 8" 458.5					MOIST
CLAYEY AND SANDY SILT	LIGHT BROWNISH-GREY	COMPACT	6' 0" 455.5		1	S.S.	30	SLIGHTLY MOIST.
SILTY FINE SAND. GRITS AND ROCK FRAGMENTS.	"	VERY DENSE	10' 0" 451.5		2	S.S.	74	MOIST.
AS ABOVE.	LIGHT GREY	EXTREMELY DENSE	15' 0" 446.5		3	S.S.	76 2/3"	
					4	W.S.		
	PALE GREY-BROWN	"	20' 0" 441.5		5	S.S.	100 2/3"	
		"			6	W.S.		
FINE SAND LAYER OF CLAYEY SILT.	"	VERY DENSE	26' 0" 435.5		7	S.S.	90	QUITE MOIST
				HOLE TERMINATED.				

BOREHOLE LOG

Borehole No. 3
Boring Date June 19-20, 1957.
Checked By L. M. Peto

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]

e. m. peto associates ltd.

SOIL ENGINEERING SERVICE - TORONTO, ONTARIO

BOREHOLE LOG

Job Name Hwy. 401 - Hwy. 2 Crossing

Job No. 5773

Borehole No. 4

Client Dept. of Highways of Ontario

Casing BX (2 1/2" diam.)





Boring Date June 21-22, 1957.

Datum Geodetic

Compiled By M. Mindess

Checked By E. M. Peto

SAMPLE CONDITION

-  UNDISTURBED
-  FAIR
-  DISTURBED
-  LOST

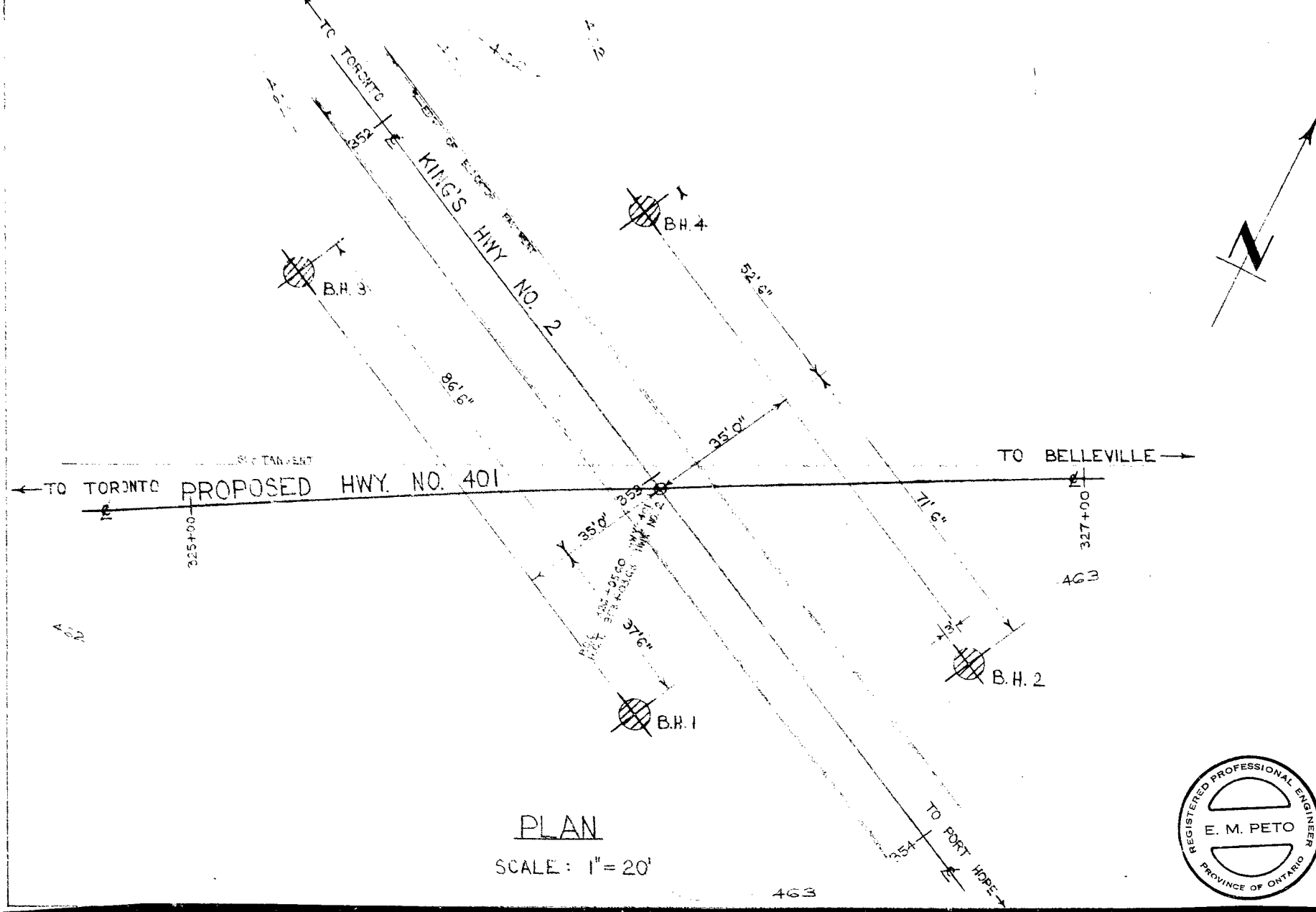
SAMPLE TYPE

- 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

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
SANDY ORGANIC TOPSOIL			0' 0"					
FINE SAND	BROWN		452.3					MOIST
			461.5					
			3' 0"					
SANDY AND CLAYEY SILT	PALE BROWN		458.8					VERY MOIST
SILTY FINE SAND	"	COMPACT	5' 0"					
GRITS AND GRAVEL	"		457.3		1	X S.S.	18	MOIST
			10' 0"					
FINE SAND	"	VERY	452.3		2	X S.S.	60	"
GRITS AND GRAVEL	"	DENSE						W.T. = 12'
			15' 0"					
			447.3		3	S.S.	68	
FINE TO MED. SAND.	GREY-BROWN				4	X W.S.		
GRITS								
			20' 0"					
SILTY FINE SAND	PALE BROWN	EXTREMELY			5	X S.S.	80/3"	MOIST
GRITS AND GRAVEL		DENSE	21' 9"					
			440.5					
								REFUSAL PROBABLY A BOULDER



e.m. peto & associates ltd.	
SOIL SITE INVESTIGATION	
AT	
HWY. NO. 401 - HWY. NO. 2 CROSSING	
N.W. OF PORT HOPE	
FOR	
DEPARTMENT OF HIGHWAYS OF ONTARIO	
OUR JOB No.- 5773	DATE- JULY 2, 1957
CLIENTS PLAN No.- E-2864-1	PER- M. M.