DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 30M16-26

W.P. No. 752-56

CONT. No. _____

W. O. No. _____

STR. SITE No. _____

HWY. No. 401

LOCATION ROAD ALLOWANCE, S-E of NEWTONVILLE

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. NONE

REMARKS: _____

G.I.-30 SEPT. 1976

BA 607

AN INDEPENDENT ORGANIZATION PROVIDING A COMPLETE SOIL ENGINEERING & INVESTIGATION SERVICE

e. m. peto associates ltd.

30M16-26

YOUR REFERENCE:-

OUR REFERENCE:- 5752

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

REPORT ON

SOIL SITE INVESTIGATION

AT

PROPOSED HWY. #401 - ROAD ALLOWANCE CROSSING

EAST BY SOUTH-EAST OF NEWTONVILLE, ONTARIO

HOPE TWP. #1 W.P. 752-56

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.

We were required to drive 4 test holes at locations as shown on the D.H.O. drawing B-3232-1. Test holes were to be driven using BX casing and sampling in the standard manner to a depth of approximately 25 feet, depending upon the soil conditions. Standard penetration test results were to be recorded throughout, and these were to prove a minimum of 15 feet of good bearing soil, with results of 30 blows or more.

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

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. This equipment was trucked to the site from a nearby bridge job due South of Newtonville on May 21st, and the work on this site was completed on May 25th on which date the equipment was trucked back to our yard in Toronto.

METHOD OF OPERATIONS: (Cont'd)

The 4 holes were located as shown on the site plan attached at the rear of this report. Since the soil conditions on the site did not warrant it, no undisturbed Shelby tube samples were taken. The 2" split tube sampler was used exclusively, with samples being taken at 5' intervals or less. The standard penetration test results were obtained, these being the number of blows of a 140 lbs. hammer falling 30 inches required to drive the sampler 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.

All elevations shown on the borehole logs and mentioned in this report are referred to Geodetic datum. The elevations were obtained from a D.H.O. bench mark on the site which was a nail in the North side of a Bell Telephone pole 88 ft. right of Station 1218 + 56. The elevation of this nail was taken to be 495.78.

Readings of ground water level in the test holes were obtained where possible.

SITE AND GEOLOGY:

There is gently rolling topography at the site, and there are very many boulders in the area. The site lies in the general physiographic area known as the Lake Iroquois till plain. The particular division of this area in which the site is located lies South of the old gravelly beaches marking the borders of glacial Lake Iroquois. In this position the limestone materials have undergone some reworking by the action of water at the time Lake Iroquois was in existence. The composition of the till is dominated by the limestone content, and there are some large stones and boulders, although fewer than is characteristic of the drumlinized till plains immediately to the North. The matrix generally consists of silt and clay and small deposits of water-laid materials. The occurrence of Precambrian type rocks is noticed in the till occasionally. Bedrock is rarely exposed, although the depth of till is relatively shallow over most of this area.

SOIL CONDITIONS:

Soil conditions at the site are relatively uniform, with the glacial till occurring almost at surface. The variations in the till are due to its heterogeneous character, and also to the fact that it has been reworked by water in past geological times.

SOIL CONDITIONS: (Cont'd)

The till is overlain by from 2 to 3 ft. of topsoil, sandy and clayey silt, and silty fine sand. This material has little engineering significance.

Immediately beneath these minor surficial deposits lies the till. The matrix consists generally of silty fine sand, and contains grits, rock fragments and small boulders. This material varies in colour from light brown to light grey brown to light brownish-grey, and is generally moist to quite moist. The till was only compact at some points where pockets of coarse sand were encountered and was extremely dense at other points where there were more stones and boulders. Standard penetration test results varied from a low of 26 blows to a high of well over 100 blows.

RECOMMENDATIONS AND CONCLUSIONS:

It is possible, if you so desire, to place the proposed bridge structure on strip footings founded only 5 ft. below the surface. If you wish to carry your footings to a greater depth below grade, this is of course permissible since the density of the till generally increases with the depth. The allowable soil bearing capacities will be increased with depth, due to the effect of the surcharge. For strip footings whose least dimensions are limited to 5 ft., we recommend a safe allowable soil bearing capacity of 4.0 tons per sq. ft. If the footings are placed at a depth of 15 ft. or more below existing grade, the above figure can be increased to 4.4 tons per sq. ft.

However, precautions must be taken to ensure that the material under the entire length of the footing is both uniform and sound, and this can only be done by visual inspection once the excavations have been made.

There should be little trouble with ground water in the excavations, since the observed water levels were more than 10 ft. below existing grade at the time of our investigation. If excavations go to a depth of 15 ft. or more, there may be some ground water seepage which will require pumping.

E. M. PETO ASSOCIATES LTD.,

F. M. Peto, P. Eng.

M:sb

June 24th, 1957.

e. m. peto associates ltd.

SOIL ENGINEERING SERVICE - TORONTO, ONTARIO

BOREHOLE LOG

Job Name Hwy. 401-Road Allowance Crossing | Job No. 5752 | Borehole No. 1

Client Dept. of Highways of Ontario | Casing BX (2½" diam.) | Boring Date May 24, 1957.

Datum Geodetic | Compiled By M. Mindess | Checked By E.M.P.

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
ORGANIC TOPSOIL AND SANDY AND CLAYEY SILT	BROWN		0' 0" 493.7 2' 6" 491.2					MOIST
VERY FINE TO FINE SAND, GRITS AND NUMEROUS LIMESTONE FRAGMENTS.	LIGHT BROWN	DENSE	5' 0" 488.7		1	S.S.	54	SLIGHTLY MOIST PARTIALLY DUE TO STONE INTERFERENCE.
AS ABOVE	"	DENSE	10' 0" 483.7		2	S.S.	78	MOIST W.L. = 11' SOME WATER SEEPAGE AT 11 FT. DEPTH.
SILTY FINE SAND GRITS AND GRAVEL	"	"	15' 0" 478.7		3	S.S.	36	MOIST
AS ABOVE	"	"	21' 0" 472.7		4	S.S.	43	QUITE MOIST
			HOLE TERMINATED.					

e. m. peto associates ltd.

SOIL ENGINEERING SERVICE – TORONTO, ONTARIO

BOREHOLE LOG

Job Name Hwy. 401-Road Allowance Crossing | Job No. 5752 | Borehole No. 2

Client Dept. of Highways of Ontario | Casing BX (2½" diam.) | Boring Date May 21 – 22, 1957.

Datum Geodetic | Compiled By M. Mindess | Checked By E.M.P.

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
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- 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			0' 0" 493.7					
SANDY AND CLAYEY SILT	BROWN		3' 0" 490.7					MOIST
SILTY FINE SAND, GRITS AND GRAVEL	LT GREY-BROWN	VERY DENSE	5' 0" 488.7		1	S.S.	100	MOIST
MEDIUM SAND AND SILTY FINE SAND	LIGHT BROWN	VERY DENSE	10' 0" 483.7		2	S.S.	80	QUITE MOIST
SILTY FINE SAND, GRITS AND GRAVEL	"	"	15' 0" 478.7		3	S.S.	60	" "
AS ABOVE	"	COMPACT	20' 0" 473.7		4	S.S.	26	" " POCKET OF
MINOR CLAY CONTENT	"							COARSE SAND.
	"	"	24' 0" 469.7		5	S.S.	28	QUITE MOIST.
			HOLE TERMINATED.					

e. m. peto associates ltd.

SOIL ENGINEERING SERVICE – TORONTO, ONTARIO

BOREHOLE LOG

Job Name Hwy. 401-Road Allowance Crossing
Job No. 5752
Borehole No. 3
Client Dept. of Highways of Ontario
Casing BX (2½" diam.)
Boring Date May 23, 1957.
Datum Geodetic
Compiled By M. Mindess
Checked By E.M.P.

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
ORGANIC TOPSOIL			0' 0" 492.5					
SANDY AND CLAYEY SILT	BROWN		2' 0" 490.5					MOIST
SILTY FINE SAND, GRITS AND GRAVEL.	LIGHT BROWN	DENSE	5' 2" 487.3		1	S.S.	36	MOIST
SILTY FINE TO MEDIUM SAND, GRITS AND GRAVEL	" "	EXTREMELY DENSE	10' 0" 482.6		2	S.S.	60/6"	WET W.L. BELOW 10'.
VERY COARSE SAND AND PEBBLE GRAVEL.	GREY	" "	15' 0" 477.6		3	S.S.	80/6"	WET.
			16' 9" 476.4		4	S.S.	50/3"	
			HOLE TERMINATED.					

e. m. peto associates ltd.

SOIL ENGINEERING SERVICE - TORONTO, ONTARIO

BOREHOLE LOG

Job Name Hwy. 401-Road Allowance crossing Job No. 5752 Borehole No. 4

Client Dept. of Highways of Ontario. Casing BX (2½" diam.) Boring Date May 22 - 23, 1957

Datum Geodetic Compiled By M. Mindess Checked By E.M.P.

SAMPLE CONDITION

- UNDISTURBED
- FAIR
- DISTURBED
- LOST

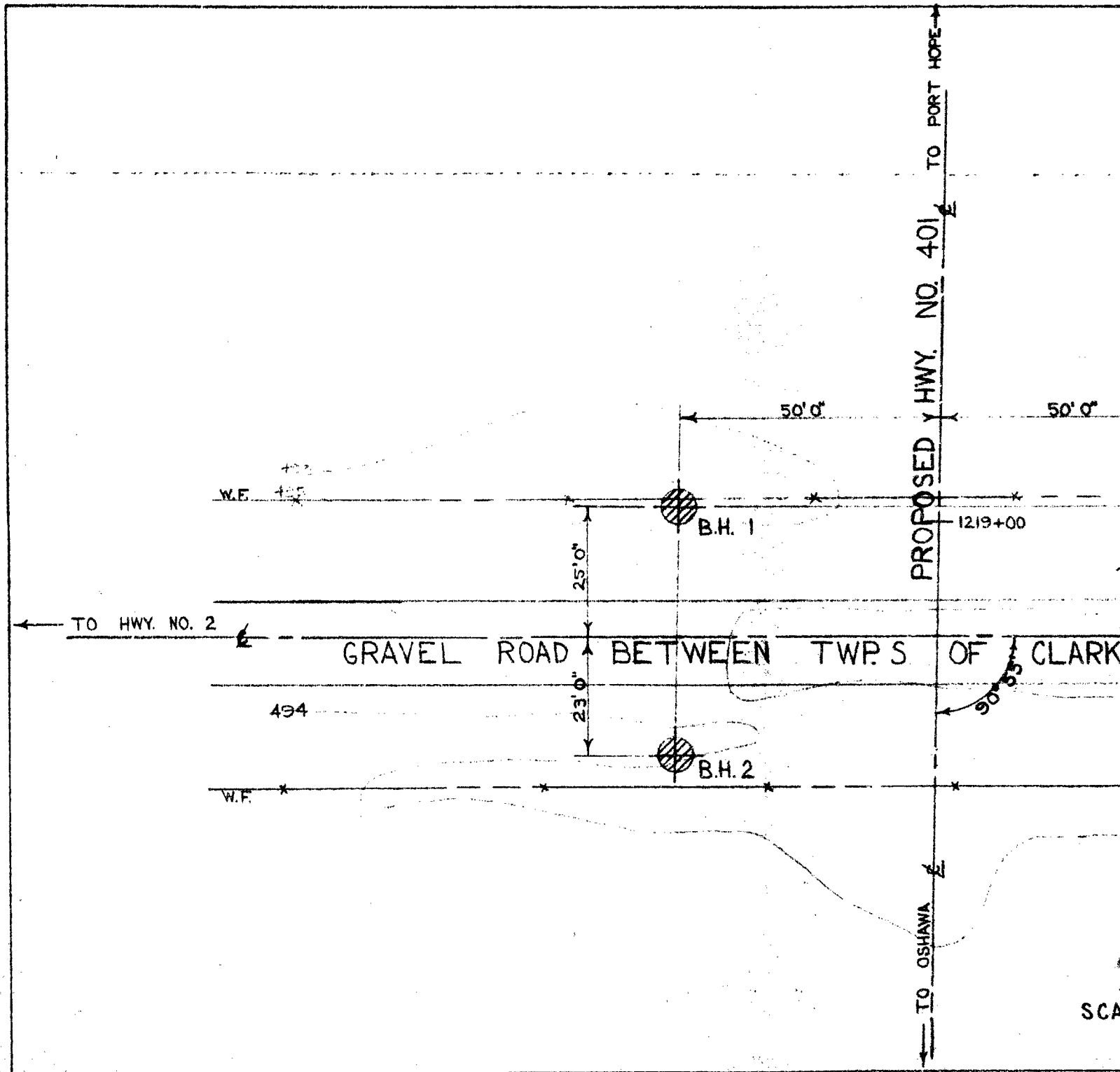
SAMPLE TYPE

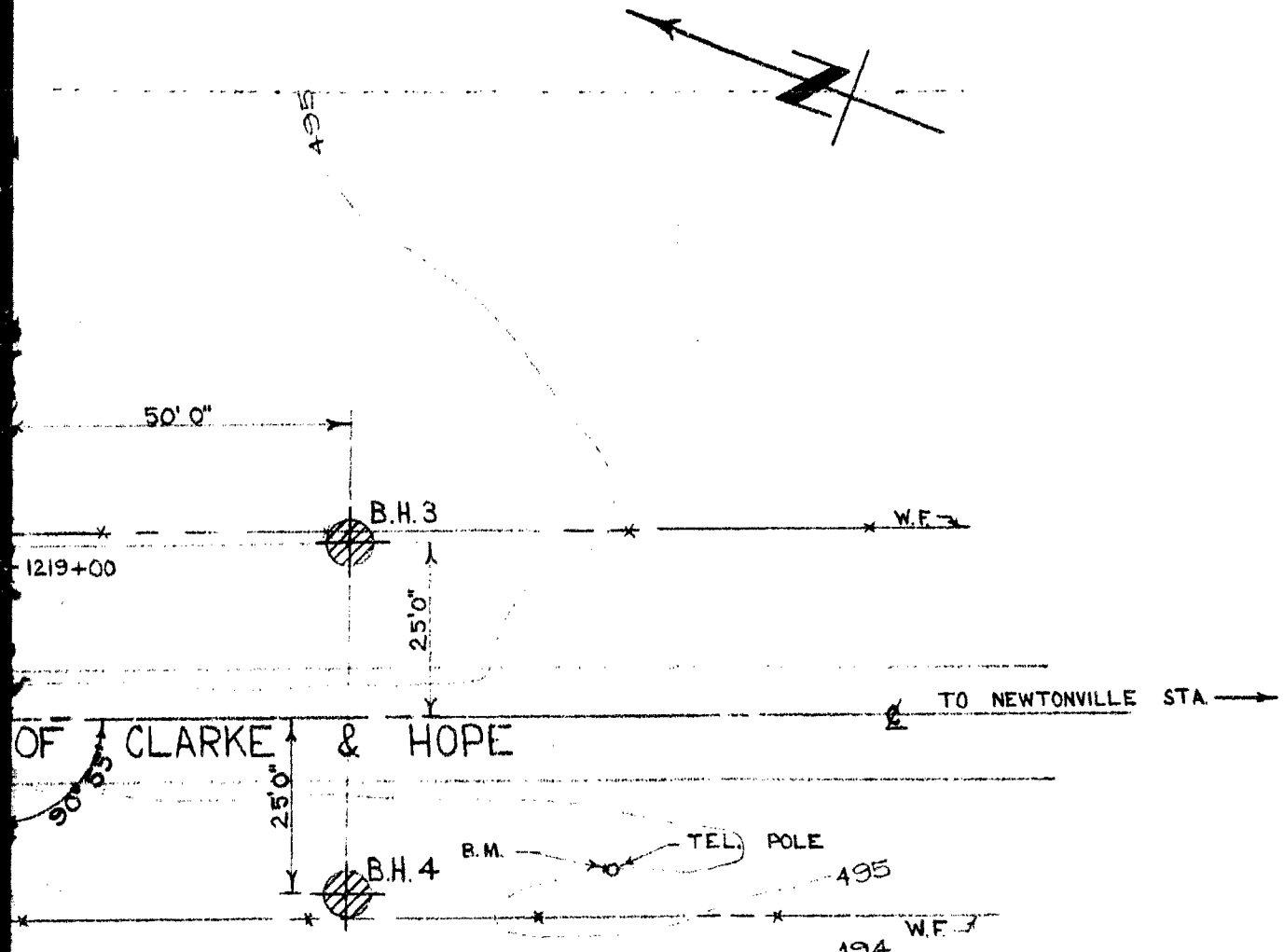
- S.S. 2" STANDARD SPLIT TUBE SAMPLE
- S.L. SPLIT BARREL WITH LINERS
- S.T. THIN-WALLED SHELBY TUBE SAMPLE
- W.S. WASH SAMPLE
- R.C. ROCK CORE

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
ORGANIC TOPSOIL			0' 0" 493.9					
SILTY FINE SAND	BROWN		2' 0" 491.9					MOIST
SILTY FINE SAND, GRITS, GRAVEL AND SMALL BOULDERS.	LT. GREY-BROWN	EXTREMELY DENSE	5' 0" 488.9		1	DRIVING AND CLEANING	BX CASING	SLIGHTLY MOIST. ATTEMPTED TO DRIVE 2" SPLIT TUBE FROM 5' TO 6', BUT UNABLE TO DRIVE DUE TO GRAVEL AND SMALL BOULDERS.
		"	10' 0" 483.9		2	S.S.	50/2"	GROUND W.L. BELOW 10'
SILTY FINE TO COARSE SAND, GRITS AND GRAVEL.	BROWNISH-GREY	"			3	W.S.		
			15' 0" 478.9		4	S.S.	50/6"	
AS ABOVE	LT. BROWNISH-GREY	"			5	W.S.		MOIST POCKETS OF MEDIUM SAND.
			18' 0" 475.9					
			VIRTUAL REFUSAL					


TO PORT HOPE
PROPOSED HWY. NO. 401
50' 0"
50' 0"
W.E.
B.H. 1
1219+00
25' 0"
TO HWY. NO. 2
GRAVEL ROAD BETWEEN TWP. S OF CLARK
494
23' 0"
90° 55'
B.H. 2
W.F.
TO OSHAWA



PLAN

SCALE: 1"= 20'

e.m. peto

SOIL SI

HWY. 401 – R

S.E. O

DEPT. OF HIG

OUR JOB No.- 575

CLIENTS PLAN No.- E-

W.F.

TO NEWTONVILLE STA.

TEL. POLE

495

494 W.F.

REGISTERED PROFESSIONAL ENGINEER
E. M. PETO
PROVINCE OF ONTARIO

e.m. peto & associates ltd.

SOIL SITE INVESTIGATION
AT
HWY. 401 – ROAD ALL'NCE CROSSING
S.E. OF NEWTONVILLE, ONT.
FOR
DEPT. OF HIGHWAYS OF ONTARIO.

OUR JOB No.- 5752 DATE- JUNE 24,1957
CLIENTS PLAN No.- E-3232-1 PER- M.M.

BH 607A

AN INDEPENDENT ORGANIZATION PROVIDING A COMPLETE SOIL ENGINEERING & INVESTIGATION SERVICE

e. m. peto associates ltd.

YOUR REFERENCE :- 30M16-26

OUR REFERENCE:- 5752

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

18th June, 1958.

Mr. Laurence Cazaly, Consulting Engineer,
669, Bayview Avenue,
TORONTO.
Ontario.

Dear Sir,

Highway 401 Underpass at Road Allowance
between Hope and Clarke Townships
W.P. 752 - 56

We refer to our visit of even date to the above site, regarding which we wish to make the following comments:-

1. Contrary to our understanding at the time of writing the original soils report, the subgrade excavation for Highway 401 is now to be some 18 feet below original ground level; this unfortunately places it below the level of the water-bearing gravel and sand seam noted in our report at about 11 feet below original grade (elevation 482.0 approximately).

2. Consequently the construction problems which have arisen, though not serious have been caused by the seepage of water into the excavations.

3. In our opinion it is essential that proper drainage channels for this seepage water be provided as soon as possible; this may be accomplished quite simply, since there is a distinct fall in grade to the West, away from the present bridge site. Accordingly, we recommend the sinking of two side ditches, parallel to the road edge and behind the piers. They should be excavated to the design depth immediately to facilitate the drying of the road subgrade, and to provide drainage from the pier and abutment excavations. It may be expedient to provide temporary sumps to the East of the piers, and to pump from these continuously in order to keep the footing excavations dry.

Alternatively it may be necessary to increase the depth of the side ditches, possibly by the use of blind drains, commencing just to the East of the bridge site. These would provide drainage for the bridge piers and abutments, and in addition the road subgrade.

A very wet area exists across the roadway, some 50 feet East of the bridge site. If the South ditch does not effectively stop the flow of water to this area within a few days, then it may be necessary to install tile drains to carry the water to the North ditch.

4. In view of the wet to saturated condition of the soils under the bridge footings, we recommend reducing the safe allowable bearing values given in our original report, from 4.0 tons per square foot to 3.0 tons per square foot, with no limitations on footing dimensions. Following upon this amendment, total settlements may reach a maximum of 1-1/2 inches, and differential settlements would be some fraction of the total settlement.

It is quite possible that the drainage provisions will lower the water table in due course to a level at least below the abutment footings.

5. The elevation of the pier footings is fixed by the highway grade, and presumably cannot be altered. The final elevation of the abutment footings is more flexible, however, we do not recommend that these footings be raised more than 3 to 4 feet above the level called for in the present design, for two reasons:-

(i) It is generally advisable to construct adjacent footings under the same structures at similar levels as this tends towards limiting differential settlement.

(ii) If the abutment footings are raised there will then be little or no soil to counteract the active soil pressure tending to move the abutments in towards the roadway.

6. Provision should be made for keeping seepage water out of all the footing excavations.

We trust this provides you with the information you require. However, we feel the water problem which has arisen on this site will be reflected in the road design, which will probably now require the provision of subgrade drainage, in addition to an increase in the subbase thickness.

Yours very truly,

E. M. PETO ASSOCIATES LTD.

MM:pf

E. M. Peto, P. Eng.

3 copies to: Dept. of Highways of Ontario,
Bridge Office,
280 Davenport Road,
TORONTO.
Ontario.