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57-F-206C

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HWY 401

C.P.R. OVERHEAD

NEWCASTLE

e. m. peto associates ltd.

YOUR REFERENCE:- 2024

OUR REFERENCE:- 5731

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

REPORT ON
SOIL SITE INVESTIGATION
at PROPOSED HWY. NO. 401 - C.P.R. OVERHEAD BRIDGE
near NEWCASTLE, ONTARIO
for
DEPARTMENT OF HIGHWAYS OF ONTARIO
c/o BABCOCK, SCRIVENER LTD.

TERMS OF REFERENCE:

We were retained, by a letter from Mr. J. C. McAllister dated April 2nd to perform a complete soil site investigation for the above named project. A subsequent letter from Mr. R. H. Scrivener advised us that the depths to which the holes were taken, and the method of sampling was left to our discretion. However, at least one test hole was to be sufficiently deep to prove continuity of soil conditions.

METHOD OF OPERATIONS:

The field work was performed using a skid-mounted Sullivan "12" drill rig with A-frame, which was trucked to the site from Toronto on April 12th, 1957. Work was commenced on this date, and was completed on April 16th.

Four test holes were driven, as shown on the site plan attached at the rear of this report. Soil conditions were found to be such that it was sufficient to drive BX casing, and no undisturbed samples were required. Sampling was performed ahead of the casing at 5 foot intervals, after it had been cleaned out with the aid of wash water. A 2" split barrel sampler was used, and standard penetration test results were recorded, these being the number of blows of a 140 lbs. hammer dropping 30 inches required to drive the sampler a distance of 1 foot.

METHOD OF OPERATIONS: (Cont'd)

All the samples obtained 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.

The water levels were checked at the first three holes after the casing had been pulled. Unfortunately, however, a boulder at 9 ft. depth in borehole 3 prevented us from obtaining reliable water level readings at that point.

All elevations mentioned in this report are referred to a D.H.O. bench mark, which is a spike in a hydro pole 60 ft. left of sta. 892 +31. The elevation of this spike was taken to be 357.22, as shown on the D.H.O. plan and profile of the site.

SITE AND GEOLOGY:

The topography at the site is undulating to gently rolling, and the site lies in a sandy limestone till plain, with fair to good drainage. The till contains limestone fragments resulting from glacial action on the Trenton and Black River limestone.

The soil matrix containing the rock fragments generally consists of 38 - 59% sand, 50 - 28% silt and 11 - 12% clay.

SOIL CONDITIONS:

Apart from minor silty and sandy deposits (partially railway fill) on the East side of the tracks, extending to no more than 3 ft. depth, there was only one soil type encountered on the site.

Grey Silty Fine Sand

This was a grey silty fine sand of generally very dense consistency and low to medium natural moisture contents. The lower extent of this material was not determined in this investigation.

Information obtained by our field engineer from local sources indicated that when the C.P.R. railway line was being constructed in the area, there was very considerable difficulty in making the railway cut, and the standard earth-moving and excavation equipment in use at that time was inadequate.

The silty sand material, which could be termed a sandy till, is heterogeneous and subject to minor variations throughout, due to its method of deposition. For this reason certain samples had more gravel content than others and were consequently more dense; other samples contained more silt and were consequently more moist.

SOIL CONDITIONS:

Grey Silty Fine Sand (Cont'd)

Standard penetration test resistances ranged from a minimum of 23 blows to a maximum of well over 100 blows, with 55 blows being a conservative mean value.

This material will provide excellent bearing with virtually no settlements.

WATER CONDITIONS:

The water table level could not be clearly defined during the course of this investigation, but the water level readings indicated that the water table is no lower than elevation 358 at the present time. Although the water table could rise, we do not feel that it would go much lower than this, except in the case of a very severe drought.

RECOMMENDATIONS AND CONCLUSIONS:

1. We recommend that the bridge structure be founded on spread footings, which should be placed at the same elevation on either side of the tracks.
2. The footings can be founded at shallow depths at an elevation of say 364. In any case we recommend that footings be placed lower than track level.
3. The allowable bearing capacity for spread footings is 4.0 tons per sq. ft. This value pertains to footings with widths in the order of 10 ft. For narrow strip footings a higher value could be used if necessary.
4. There should not be any undue difficulties on the site with water in the excavations. We feel that if there were any seepage this water could be pumped out. There is no danger of any quicking condition.

E. M. PETO ASSOCIATES LTD.,



E. M. Peto, P. Eng.

MM:sb

April 23rd, 1957.

SOIL ENGINEERING SERVICE — TORONTO, ONTARIO

JOB NAME Hwy. 401 C.B.R. Overhead DATE April 12th - 1957
 Dept. of Highways Bridge
 CLIENT c/o Sebcocks Scrivener DIAMETER 2X ceiling 2-1/2

BOREHOLE NO. 1

CLASSIFICATION	COLOR	DENSITY	LEGEND	SAMPLE NO.	DEPTH	NO OF BLOWS/FT.	WATER LEVELS & REMARKS
							Scale 1" = 5'
							● DISTURBED SAMPLE UNDISTURBED SAMPLE
							W.L. - Water level elevation
							367.8
Ground surface.					0' 0"		
Fine sand, slightly silty some grits and pebbles.	Grey	Extremely Dense		#1	5' 0"	94	(only slightly moist) Bailed hole to 19' on completion, water level at 8' 5" 9' next morning.
Silty fine sand grits and pebbles.	Grey	Extremely Dense		#2	10' 0"	100	for 5" Moist. (Some medium sand)
As above.	Grey	V. Dense		#3	15' 0"	80	Moist. (Minor clay content)
As above (A sandy till)	Grey	V. Dense		#4	20' 0"	63	Moist. (fine gravel content)
" "	"	Dense		#5	25' 0"	47	" "
" "	"	Compact		#6	30' 0"	26	quite moist.
" "	"	Extremely Dense		#7	35' 4"	100	for 4" Moist. (Fine gravel content)

HOLE PARTIAL D.

SOIL ENGINEERING SERVICE — TORONTO, ONTARIO

JOB NAME #401 C.F.R. Newcastle
Dept. of Highways
CLIENT c/o Babcock Scriveners

DATE _____

April 13th, 1957

ORDER NO. 5731

DIAMETER

100-4-60000-2-12

BOREHOLE NO. 2

HOLE LIMITED

e. m. peto associates ltd.

SOIL ENGINEERING SERVICE — TORONTO, ONTARIO

BOREHOLE LOG

JOB NAME Hwy. 401 O.P.R. Overhead Bridge DATE April 15th, 1957
CLIENT Dept. of Highways DIAMETER 2-1/2"
C/O Babcock Scriveners Ltd.

ORDER NO. 5731

BOREHOLE NO. 3

CLASSIFICATION	COLOUR	DENSITY	LEGEND	DEPTH	NO. OF BLOWS/FT	WATER LEVELS & REMARKS
			Scale 1" = 5'			<ul style="list-style-type: none"> ● DISTURBED SAMPLE UNDISTURBED SAMPLE
						Elevation 371.0
Sandy and silty fill. Sand.	Dark Brown Brown	Loose.		0'-0"		
Silty fine sand grits.	Lt. Brown	to dense		5'-0"	35	Moist. Some pebbles up to 1/2" size.
Silty fine sand. grits. pockets, of saturated coarse sand.	Lt. Greyish Brown	Very Dense		10'-0"	125	Moist.
Silty fine sand. Grits.	Lt. Grey	Very Dense		15'-0"	87	Moist. Some black pebble gravel. and rock fragments.
Silty fine sand grits and rock fragments.				20'-0" 21'-0"	75	Moist. Some stone interference with sampler. Black rock fragments up to 2" size.
						Shoulder in hole prevented obtaining reliable water levels.

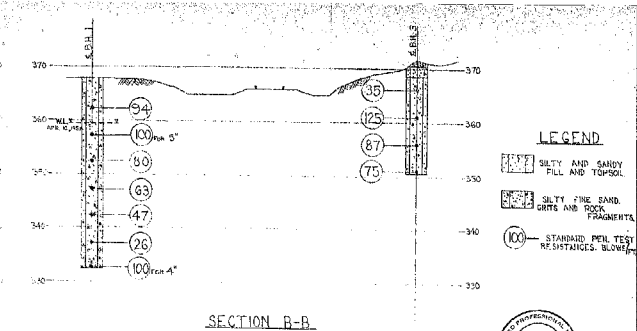
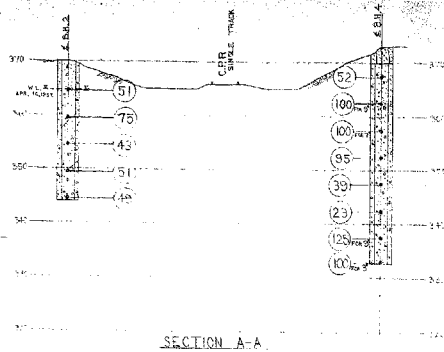
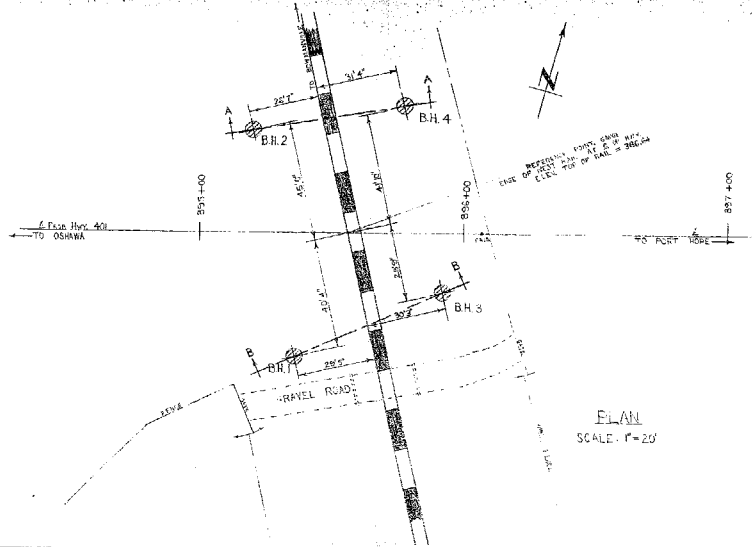
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SOIL ENGINEERING SERVICE — TORONTO, ONTARIO

BOREHOLE LOG

JOB NAME: HWY. 401 O.P.R. Overhead DATE: April 15 - 16th, 1967 ORDER NO. 5731
 CLIENT: Dept. of Highways Bridge c/o Babcock Berivener Ltd. DIAMETER: 31 Casing BOREHOLE NO. 4

CLASSIFICATION	COLOR	DENSITY	LEGEND	DEPTH	NO. OF BLOWS/FT.	WATER LEVELS & REMARKS
			Scale 1" = 5'			Flv. 372.9 ● DISTURBED SAMPLE UNDISTURBED SAMPLE
Silty sand topsoil.	Brown	Loose		0' 0"		
Silty very fine lt. brown sand. Grits.	Brown	Dense	1	3' 0"	52	Only slightly moist. Some rocks up to 1" size.
Silty fine sand lt. gray grite. rock fragments.	Brown	Very Dense	2	10' 0"	100/9	Moist. High number of blows partially due to stone interference.
Silty fine sand lt. gray considerable very coarse sand and pebble gravel.	Gray	Very Dense	3	15' 0"	100/7	Moist.
Silty fine sand grite. lt. gray	Gray	Very Dense	4	20' 0"	95	Moist.
As above.	" "	Dense	5	25' 0"	39	quite moist. Material softens up due to more silt content.
As above.	" "	Dense	6	30' 0"	23	quite moist.
" "	" "	Very Dense.	7	35' 0"	125/9	quite moist.
" "	" "	" "	8	40' 0"	100/3	" "



- LEGEND**
- SILTY AND SANDY FILL AND TOPSOIL
 - SILTY FINE SAND, GRITS AND ROCK FRAGMENTS
 - STANDARD PEN. TEST RESISTANCES, BLOWN



e.m. peto & associates ltd.

SOIL SITE INVESTIGATION
AT
HWY. NO. 401—C.P.R. OVERHEAD BRIDGE
NEAR NEWCASTLE, ONTARIO.

FOR
DEPARTMENT OF HIGHWAYS OF ONTARIO
% BABCOCK, SCRIVENER LTD.

OUR JOB No. 5731 DATE: APR. 22, 1957
CLIENTS PLAN No. E-2862-1 PER: N.Y.