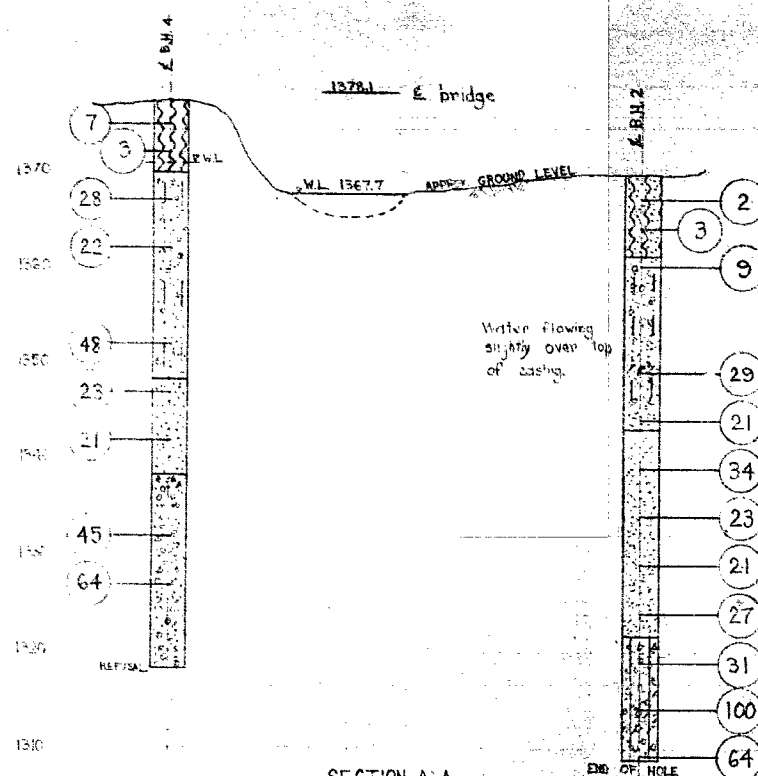
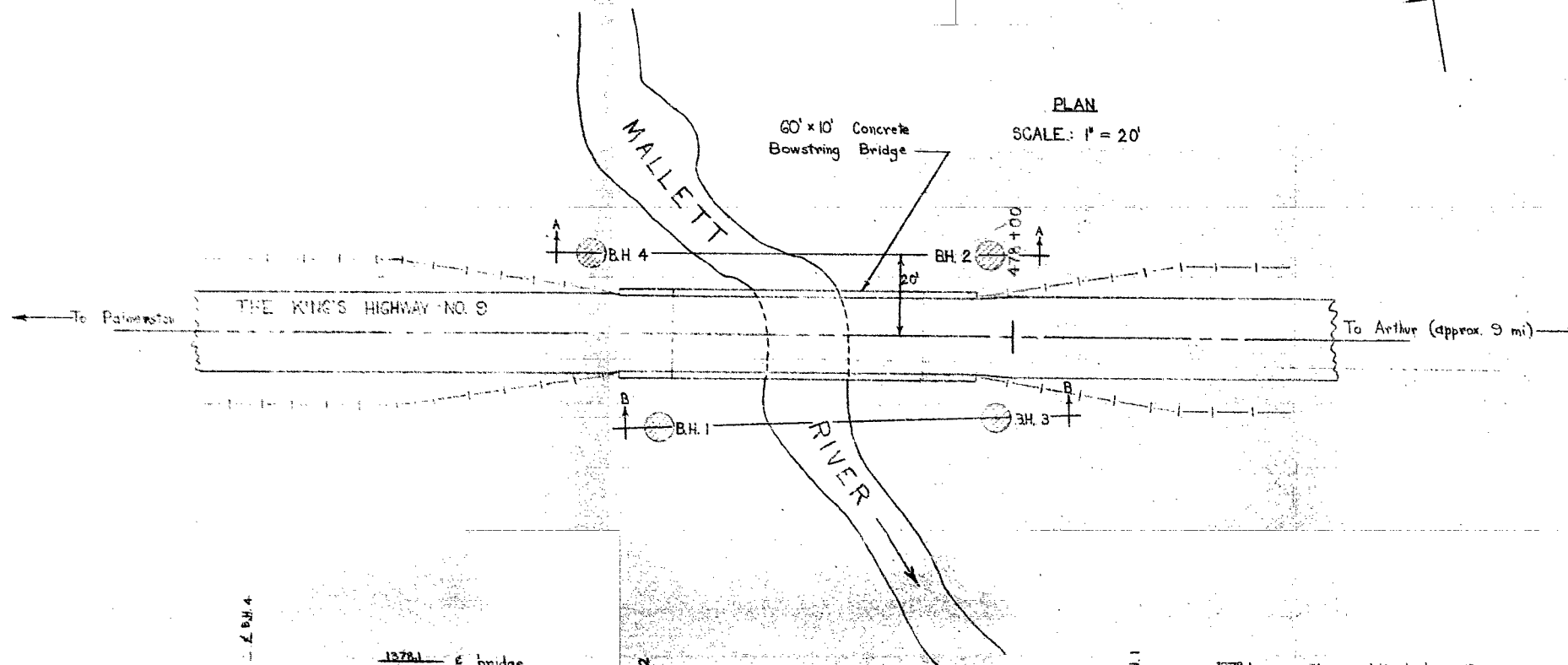


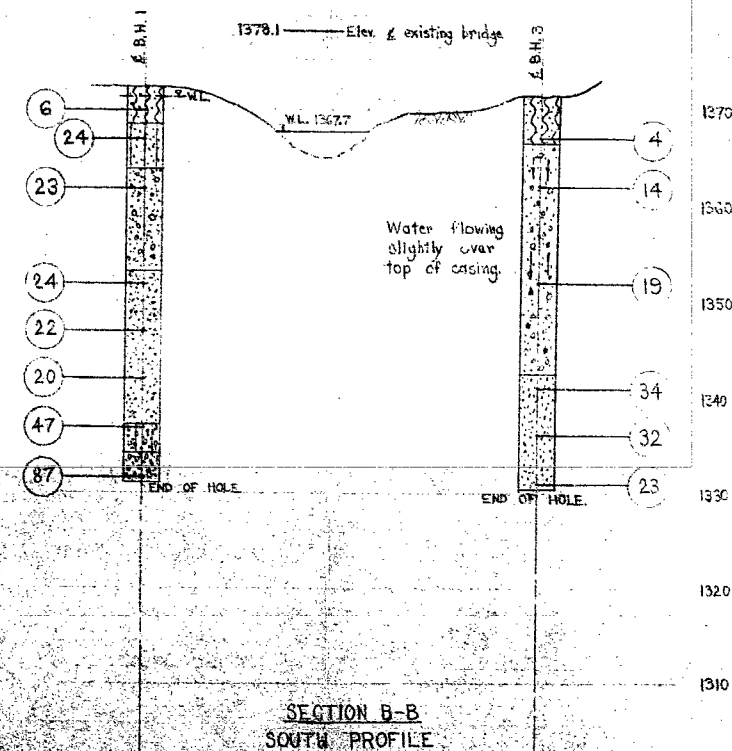
56-F-223C

Hwy. # 9

MALLET RIVER



PROFILES
SCALE: HOR. 1" = 20'
VERT. 1" = 10'



- LEGEND**
- ④ Standard Pen Test Resistance
 - Organic sandy silt.
 - Silty sand and gravel.
 - Sand.
 - Sandy gravel.



e.m. peto & associates Ltd.

SOIL SITE INVESTIGATION
AT
PROPOSED NEW MALLET RIVER
HIGHWAY NO. 9 BRIDGE
FOR
DEPT. OF HIGHWAYS OF ONTARIO

OUR JOB No. 56-51 DATE AUG. 28, 56
CLIENTS PLAN No. PER. M.M.

B.A. 545

SOIL SAMPLING & LABORATORY TESTING, ROCK & GRAVEL EXPLORATIONS, FIELD & LOAD TESTS, SUBGRADE INVESTIGATION

e. m. peto & associates ltd.

56-F-223 C
SOIL REPORT FOR PLANS

SOIL SITE INVESTIGATION

at

MALLETT RIVER - HIGHWAY NO. 9 BRIDGE SITE

for

DEPARTMENT OF HIGHWAYS OF ONTARIO

c/o MESSRS. BABCOCK, SCRIVENER LTD.

CONSULTING ENGINEERS

RUssell { 1 - 4955.
1 - 1073.

1106 eglinton avenue west,
TORONTO, ONTARIO

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

e. m. peto associates ltd.

B.A. 545

YOUR REFERENCE:-

OUR REFERENCE:-

56 - 51

1106 Eglinton Ave. West
TORONTO, ONTARIO.
BU-1-4955

SOIL SITE INVESTIGATION

at

MALLETT RIVER - HIGHWAY NO. 9 BRIDGE SITE

for

DEPARTMENT OF HIGHWAYS OF ONTARIO

c/o MESSRS. BABCOCK, SCRIVENER LTD.

CONSULTING ENGINEERS

Terms of Reference:

We were retained by Babcock, Scrivener Ltd., by a letter dated August 7th, 1956, to carry out a complete soil investigation at the site of the existing old Mallett River Bridge. The number and depth of holes were left to our discretion.

The holes were to be driven in the standard manner, with samples being recovered at 5 ft. intervals, or more often if necessary, with the 2" split spoon sampler or 2" Shelby tubes, the standard penetration results being recorded. In situ shear tests were also to be made if soil conditions warranted them.

Method of Operation:-

Four soil test holes were put down at the approximate corners of the new abutments of the proposed bridge. The locations of these holes are as shown on the site plan attached at the rear of this report. The holes were bored by driving and cleaning BX casing (2-1/2") and sampling ahead of the casing at approximately 5 ft. intervals with the 2" standard split spoon. The standard penetration results were recorded during the performance of this work, these being the number of blows of a 140 lbs. sampling hammer falling 30 inches, required to drive the split spoon sampler a distance of 1 ft.

Method of Operation (Cont'd)

The work was carried out using a skid-mounted Sullivan "12" drill rig with A-frame, which was moved to the site on August 16th, 1956. The work was commenced on August 17th and was completed on August 25th, 1956.

Borehole logs for each holes were drawn up, and are included in the report.

All samples recovered from this site will be retained by us for a period of at least 30 days. We will arrange to turn them over to you if you should so desire.

All elevations referred to in this report and on the site plan were obtained from a D.H.C. bench mark at chainage station 474 + 51 approximately 400 ft. to the East of the site.

The elevation of the road centre line at the mid-point of the existing bridge is shown on the site plan to the same datum, as requested.

Soil Conditions:

The bridge site is in a region of glacial marginal deposits, with characteristically undulating topography, and non-uniform deposits of granular material.

Due to the nature and method of deposit of the soils originally, and also to possible disturbance of surface layers in the vicinity of the old-bridge during construction of that structure, the soil conditions at the site were found to be highly irregular.

Topsoil

Over the years since deposition a layer of dark colored highly organic sandy silt topsoil has developed over the site varying in thickness from approximately 4 to 8-1/2 ft. It contains decayed vegetable matter and some slight amount of clay. The consistency is very loose to loose. This is a highly undesirable foundation material.

Mixed Silty Sand and Gravel

Beneath the organic topsoil a heterogeneous mixture of silt, sand and gravel was encountered, with variations of the predominating constituents at different elevations in all four test holes. This stratum varies in thickness from 15 ft. to 24 ft., and is generally compact to dense, although occasional very dense gravel layers were encountered. Standard penetration test resistance ranged from 14 to 98 blows per foot, with the very high results obviously due to major stone interference in the end of the sampling tube.

Compact Grey-Brown Sand.

Below the mixed silty sand and gravel mentioned immediately above, a stratum of uniform fine to medium, compact sand was encountered, in all four test holes, ranging in thickness from approximately 10 ft. to 21-1/2 ft. Standard penetration test resistance ranged from 20 to 34 blows per ft.

Silty and Sandy Gravel.

Immediately below the uniform sand stratum dense to very dense silty and sandy gravel was encountered. The gravel consists of subrounded stones up to 1-3/4 inches and 3/8 inch angular stones, and appears to be well graded between these limits. The number of blows in the standard penetration test ranged from 31 to 100, the density generally increasing with depth.

The top of this stratum varies between elevations 1321 and 1337.

Water Conditions:

The soils at the site investigated and in the general vicinity are highly permeable, and the water table is generally slightly above stream level.

However, a serious condition exists on the East side of the stream (at borholes 2 and 3) where there is an artesian effect. Local sources have indicated to us that this seriously hampered construction of the old bridge when it was built.

Conclusions:

1. The site is underlain by granular glacial deposits with variations both horizontally and vertically.
2. Spread footings could not be placed at the same elevations at the four corners of the bridge if they are to be founded on the same type of material with similar strength and density characteristics.

A continuous spread footing at the West end of the bridge could be founded at elevation 1362 feet, with an allowable bearing capacity of 1.9 tons per square foot.

However, at the East end of the bridge, where the artesian water condition exists and the material is not as dense, footings would have to be founded at an elevation of 1354 feet, which would permit an allowable bearing capacity of 1.7 tons per square foot. Footings at this depth would introduce great construction difficulties. Also, if the material were to be disturbed in making the excavations, a reduced allowable bearing value would have to be used.

Conclusions: (Cont'd)

3. Water conditions on both sides of the stream, but particularly on the East side, would make any excavations difficult. Even if sheet piling were used upward seepage through the bottom would have to be expected. On the East side of the stream an excavation to any depth with the subsequent removal of the overburden pressures would invite a quicking condition.
4. For the above reasons we are inclined to favor the use of piles as foundations for the new Mallett River Bridge. These would have to be end-bearing piles, and would encounter virtual refusal at depths of certainly no greater than 48 feet below existing ground level. Refusal would occur at different elevations at each corner of the bridge.

Because of the presence of the stratum of compact sand we feel that even if early apparent refusal is encountered the piles should still be driven to below the sand stratum, if possible. This might necessitate jetting the piles down.

Because of the nature of the materials, wooden piles are likely to suffer detrimental effects during the driving process. We feel that the type of piling most suitable would be cast-in-place concrete piles of the mono-tube or Raymond type. Trouble due to water conditions would be avoided by the use of piles.

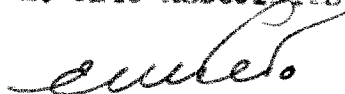
To resist any lateral thrusts on the abutments some batter piles could be driven at each end of the bridge.

The soils at the site are definitely stiff enough that piles would have adequate lateral support and would not tend to shift.

5. Settlement should not be a factor particularly if piles were used as suggested, and a rigid type structure could be used.

We trust that the information presented herein is complete. If you have any further enquiries or if we could be of any further assistance to you please do not hesitate to contact us.

E. M. PETO ASSOCIATES LTD.,



E. M. Peto, P. Eng.

e. m. peto associates ltd.

SOIL ENGINEERING SERVICE — TORONTO, ONTARIO

BOREHOLE LOG

JOB NAME **Mallet River Bridge**


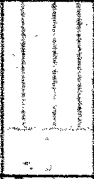



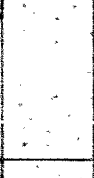



DATE **August 27th, 1956**

ORDER NO. **96 - 51**

CLIENT **Ontario Dept. of Highways**

DIAMETER **3X Casing**

BOREHOLE NO. **1**

| CLASSIFICATION | COLOUR | DENSITY | LEGEND | SAMPLE NO. | DEPTH | NO. OF BLOWS/FT. | WATER LEVELS & REMARKS |
|---|-------------|------------|---|------------|-------|------------------|--|
| | | | | | | | Elevation. • DISTURBED SAMPLE 1372.1 UNDISTURBED SAMPLE |
| | | | | | 0'0" | | |
| Organic sandy silt. | Dark Brown | Loose |  | 1 | 5'0" | 6 | 14" approx. to Water Level. Some 1/2" gravel. |
| Fine sandy Silt. | Light Brown | Compact |  | 2 | 10'0" | 24 | Some 3/4" gravel |
| Sand and gravel up to 1-1/2" | Brown | Compact |  | 3 | 15'0" | 23 | Organic content Some silt. |
| Sandy and silty Grey gravel up to 1-1/2". | | Compact |  | 4 | 20'0" | 98 | Stone in end of sampler. |
| Fine to medium sand. | Grey Brown | Compact |  | 5 | 25'0" | 24 | |
| Fine to medium sand. | Brown | Compact |  | 6 | 30'0" | 22 | |
| Fine to medium sand. | Brown | Compact |  | 7 | 35'0" | 20 | |
| Fine to med. silty sand. | Grey Brown | Dense |  | 8 | 40'0" | 47 | Some 1/2" gravel |
| Silty and sandy gravel up 1-3/4" | Grey | Very Dense |  | 9 | | 87 | |
| | | | HOLE TERMINATED. | | | | |

e. m. peto associates ltd.

SOIL ENGINEERING SERVICE — TORONTO, ONTARIO

BOREHOLE LOG

JOB NAME **Mallett River Bridge**

DATE **August 26th, 1956**

ORDER NO. **56 - 51**

CLIENT **Ontario Dept. of Highways**

DIAMETER **BL Casing**

BOREHOLE NO. **2**

| CLASSIFICATION | COLOUR | DENSITY | LEGEND | SAMPLE NO. | DEPTH | NO. OF BLOWS/FT. | WATER LEVELS & REMARKS |
|---|-------------|------------|--------|------------|-------------------------|------------------|--|
| | | | | | Scale 5 feet to 1 inch. | | Elevation • DISTURBED SAMPLE |
| | | | | | 0' 0" | | 1368.9' 1' UNDISTURBED SAMPLE |
| Highly organic silt and decayed vegetation. | Black | Very Loose | | .1 | 5' 0" | 2 | Water flowing slightly over top of casing overnight at 30 ft. depth and at 40 ft. depth, on completion of test hole. |
| Highly organic sandy silt. | Brown Black | Very Loose | | .2 | | 3 | |
| Silty sand and gravel. | Brown Grey | Loose | | .3 | 10' 0" | 9 | |
| | | | | | 15' 0" | | Water flowing over top of casing at approximately 3 quarts per minute when hole at 15 ft. depth. |
| Silty gravel from 1/8" - 1/2" | Grey | Dense | | .4 | 20' 0" | 50 | |
| Silty clay, some 3/4" gravel. | Grey Brown | Compact | | .5 | 25' 0" | 29 | |
| Medium silty sand some gravel. | Grey | Compact | | .6 | 30' 0" | 21 | |
| Fine to medium, sand. | Grey Brown | Dense | | .7 | 35' 0" | 34 | |
| Fine to medium, sand. | Grey Brown. | Compact | | .8 | 40' 0" | 23 | |
| Fine to medium sand. | Brown | Compact | | .9 | | 21 | |

e. m. peto associates ltd.

SOIL ENGINEERING SERVICE — TORONTO, ONTARIO

BOREHOLE LOG

JOB NAME **Mallott River Bridge**

DATE **August 28th, 1956**

ORDER NO. **56 - 51**

CLIENT **Ontario Dept. of Highways**

DIAMETER

8X Casing

BOREHOLE NO. **(2) (Cont'd)**

| CLASSIFICATION | COLOUR | DENSITY | LEGEND | SAMPLE NO. | DEPTH | NO. OF BLOWS/FT. | WATER LEVELS & REMARKS |
|--|------------|-------------|--------|------------|------------------|------------------|--|
| | | | | | 40' 0" | | ● DISTURBED SAMPLE UNDISTURBED SAMPLE |
| Fine to medium sand. | Brown | Compact | | .9 | | 21 | |
| | | | | | 45' 0" | | |
| Fine to medium sand. | Grey Brown | Compact | | .10 | | 27 | Wash sample. |
| | | | | | 50' 0" | | |
| Fine to coarse Grey silty sand and Brown gravel. | | Dense | | .11 | | 31 | |
| | | | | | 55' 0" | | |
| Silty 1-1/2" and coarse sand. | Grey | Very Dense | | .12 | | 100 | |
| | | | | | 60' 0" | | |
| Fine to coarse Brown silty sand. | Grey | Very Dense. | | .13 | | 64 | |
| | | | | | HOLE TERMINATED. | | |
| | | | | | 65' 0" | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

BOREHOLE LOG

BOREHOLE NO. 2

THE UNIVERSITY OF CHICAGO

BOREHOLE LOG

BOREHOLE NO.

3/8" angular
pebble gravel,
coarse sand.

e. m. peto associates ltd.

SOIL ENGINEERING SERVICE -- TORONTO, ONTARIO

BOREHOLE LOG

JOB NAME **Mallett River Bridge**

DATE August 28th, 1956

ORDER NO. 56 - 51

CLIENT **Ontario Dept. of Highways**

DIAMETER 1.0000

BOREHOLE NO. 1 (Cont'd)

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