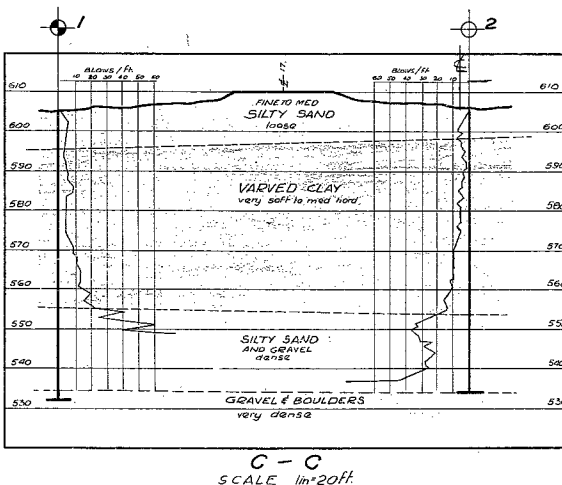
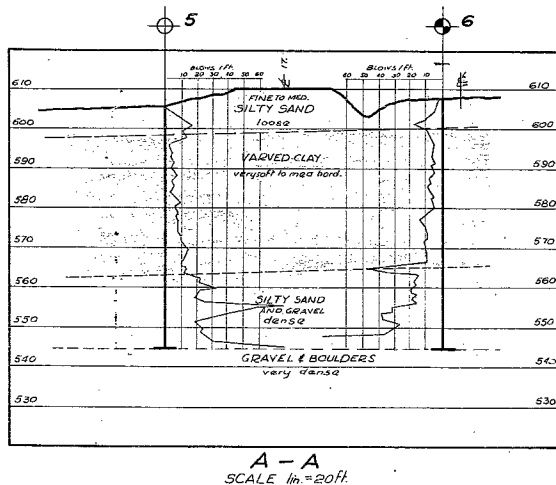
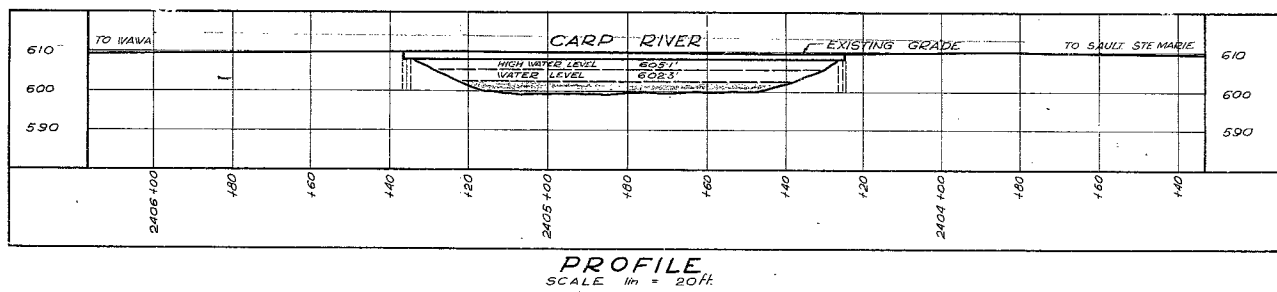
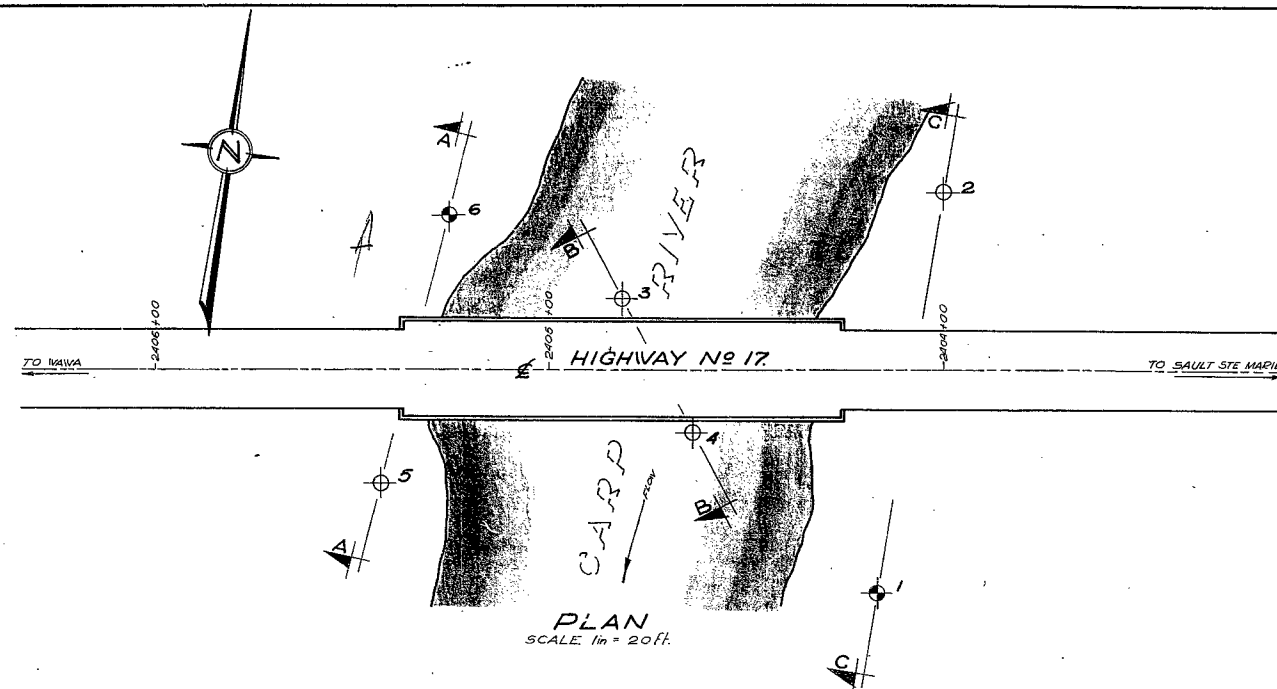
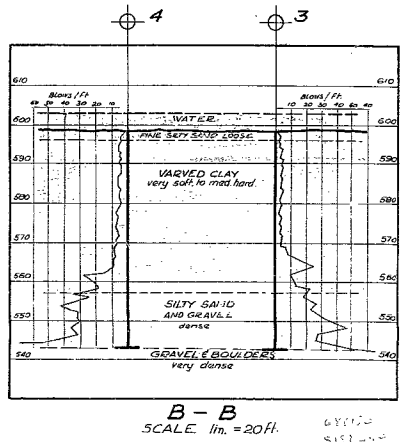
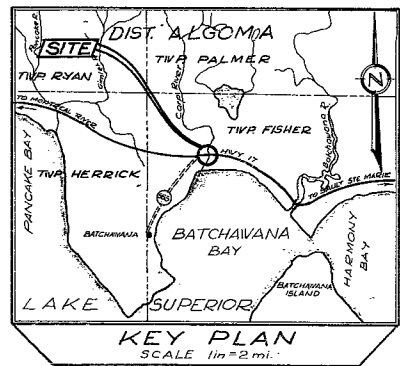


#61-F-12
W.P. * 910-60
Hwy. # 17 E
CARP RIVER
50 MILES N.W.
OF SAULT STE.
MARIE



NOTE:
AT LOCATIONS OF PENETRATION HOLES
SOIL STRATIFICATION ASSUMED ON THE
BASIS OF RESISTANCE AND OVERALL UNIFORMITY



| LEGEND | | | |
|--------|---------------------------|---------|--------------|
| | BORE AND PENETRATION HOLE | | |
| | PENETRATION HOLE | | |
| HOLE | ELEVATION | STATION | DIST. FROM # |
| 1 | 604.17 | 2404+18 | 56'-0" LT. |
| 2 | 606.25 | 2404+2 | 45'-0" RT. |
| 3 | 599.17 | 2404+83 | 18'-0" RT. |
| 4 | 599.17 | 2404+65 | 16'-0" LT. |
| 5 | 605.9 | 2405+44 | 29'-0" LT. |
| 6 | 607.7 | 2405+27 | 39'-0" RT. |

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION

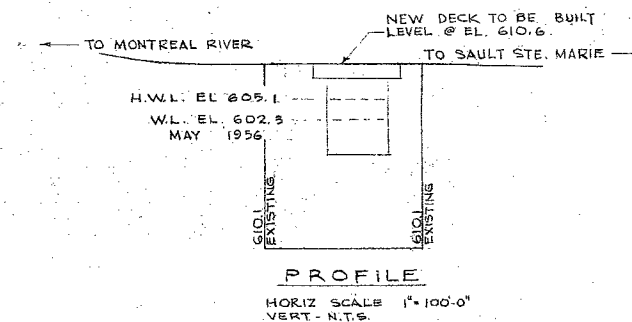
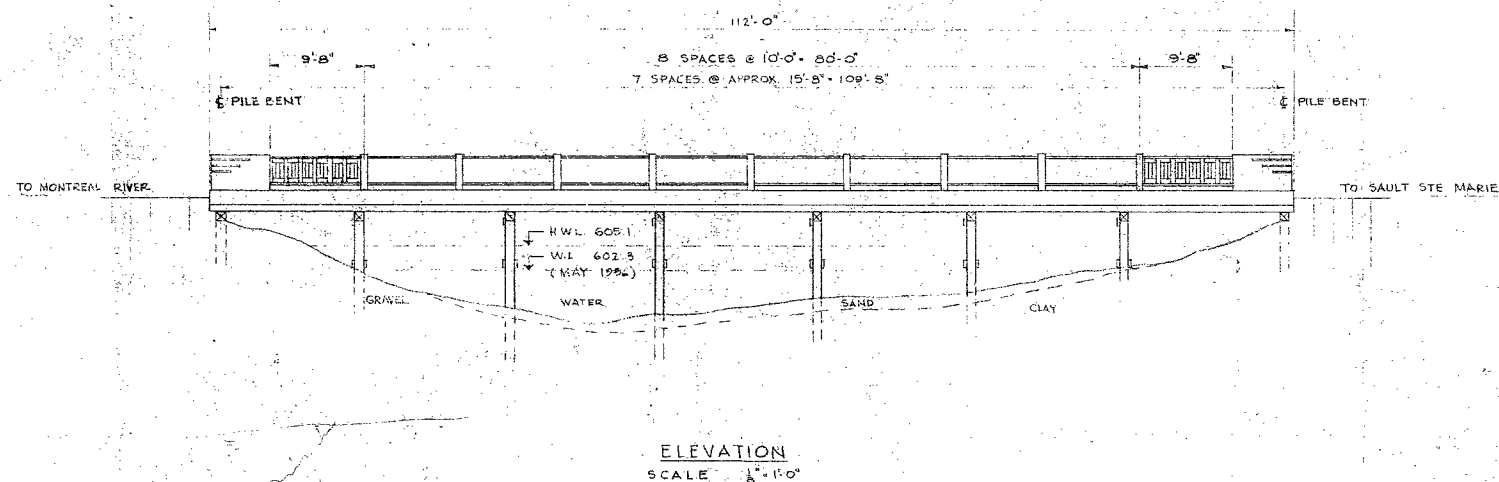
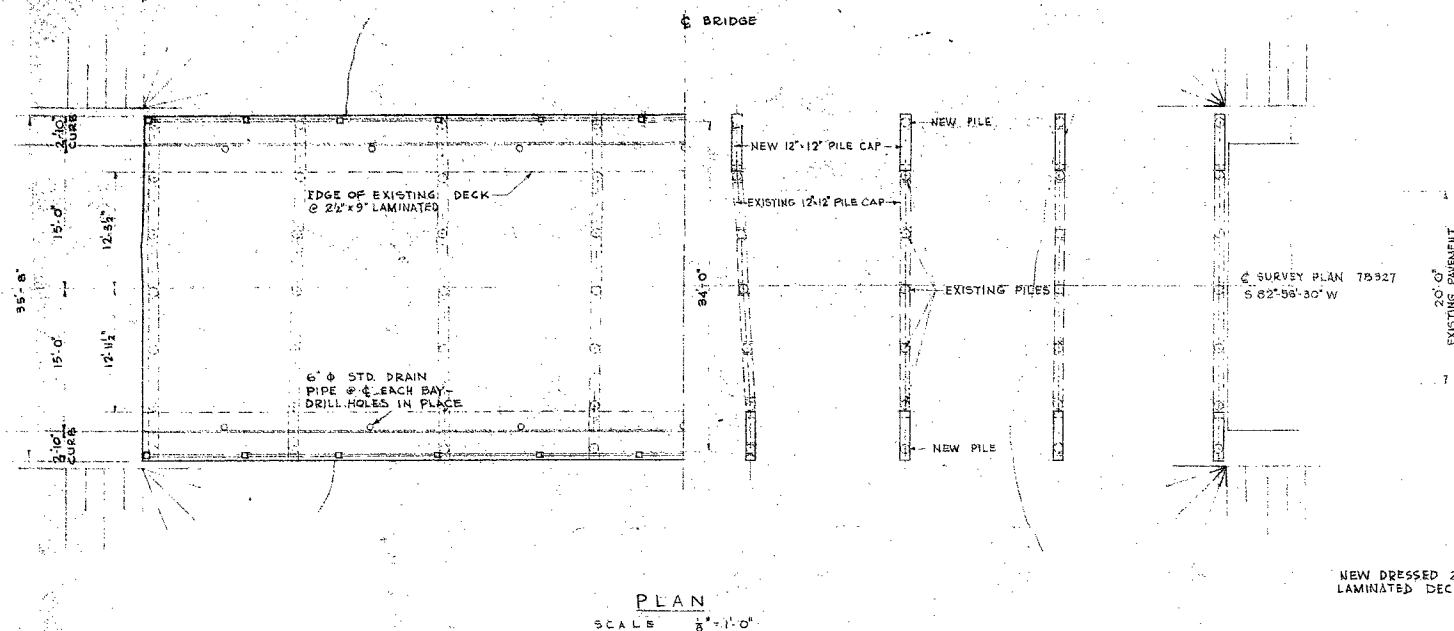
CARP RIVER AND HIGHWAY No. 17

| | | |
|---------------------------|---------------------|-----------------------|
| ORIGINATED BY: KULMATICAS | DISTRICT NO. 18 | DATE: 5 APR 1961 |
| DRAWN: J. H. G. G. G. | W.P. NO. 910-60 | JOB NO. 61-F-12 |
| CHECKED: J. H. G. G. G. | SCALE: 1in. = 20ft. | DRAWING NO. 61-F-12 A |
| APPROVED: J. H. G. G. G. | | |

NOMINAL NORTH

BRIDGE & HIGHWAY

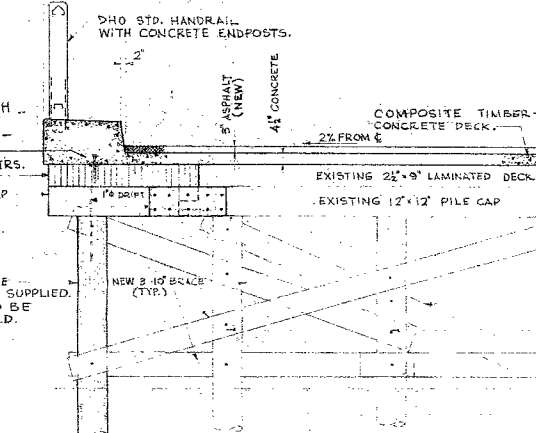
10'-0" SHOULDER
20'-0" EXISTING PAVEMENT
10'-0" SHOULDER



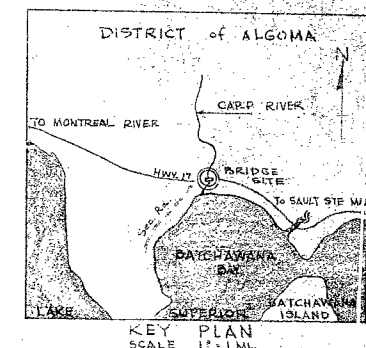
3/4" x 11" STD LAG BOLTS (3" PROJECTION) WITH 4" STEEL SPLIT RING TIMBER CONNECTORS-SHEAR DEVELOPERS @ 1'-0" AND 1'-6" x 1'-0" CTRS.

NEW 12" x 12" PILE CAP 1/2" STEEL SPLICE @ BOTH SIDES WITH 1" STD. BOLTS.

NEW WOOD PILE 50 FT. LENGTHS TO BE SUPPLIED. DRIVING LENGTHS TO BE ESTABLISHED IN FIELD.



NOTES
CONCRETE- ALL CONCRETE TO BE 3000 PSI. @ 28 DAYS (COM. R.). ADMIXTURES TO BE ADDED AS DIRECTED BY THE DEPARTMENT.
TIMBER- TIMBER TO HAVE MIN. 1200 PSI ALLOWABLE UNIT STRESS, EXT. FIBER IN BENDING TO COMPLY WITH CSA SPEC. FOR STRUCTURAL TIMBER 045-958
PILES- PILES TO BE WOOD, PEELED, TREATED, CLASS 'B', TO COMPLY WITH CSA SPEC. FOR ROUND TIMBER PILES A-56-1942
PRESERVATIVE TREATMENT- ALL TIMBER TO BE TREATED, RETENTION IN ACCORDANCE WITH CSA-080
DESIGN ACCORDING TO AASHTO.



| | | | |
|---|-------|-----------------|---------|
| FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED | | | |
| DEPARTMENT OF HIGHWAYS-ONTARIO- BRIDGE OFFICE-TORONTO | | | |
| CARP RIVER BRIDGE WIDENING | | | |
| THE KING'S HIGHWAY No. 17 TCH | | DIST. No. 18 | |
| 68. DIST. OF MICHIGICOTON | | | |
| TWP. FISHER | LOT C | CON. - | |
| GENERAL ARRANGEMENT | | | |
| APPROVED | | JAN 23 1961 | |
| BRIDGE ENGINEER | | DESIGN ENGINEER | |
| DESIGN | CHECK | CONTRACT | NUMBER |
| DRAWING | CHECK | LOADING | NUMBER |
| TRACING | CHECK | H20-SIG | DRAWING |
| DATE NOVEMBER 1960 | | NUMBER D4746-PI | |

FENCO - 2283-T-1

Here. filed.

23-62-232-1

Mr. A. M. Toye,
Bridge Engineer.
Materials & Research Section.
(Foundations Sub-Section).
Attention: Mr. S. McCombie.

March 30, 1961.

D.H.C. FOUNDATION INVESTIGATION
REPORT -
W.J. 61-P-12 -- W.P. 910-60.

Re: Carp River and the King's Highway #17.
(approx. 50 miles North-West of Sault Ste.
Marie) Twp. of Fisher, District of Algoma,
District #18.

Attached hereto, we are forwarding to you the
Soil Investigation Report for the above mentioned location.

We believe you will find the factual data and
recommendations contained in this report, self-explanatory,
and trust they will prove adequate for your future design
work.

Should you require any further assistance in
connection with this project, please do not hesitate to
contact our Office.

L. G. Soderman,
PRINCIPAL FOUNDATION ENGR.
Per:

A. G. Stermac

(A. G. Stermac,
SUPERVISING FOUNDATION ENGR.)

AGS/WdeF
attach.

cc: Messrs. A. M. Toye (2)
H. A. Treaskes
H. D. McMillan
G. K. Hunter
D. P. Collins
E. R. Saint
A. Watt

Foundations Office
Gen. Files.

TABLE OF CONTENTS

1. INTRODUCTION
2. DESCRIPTION OF SITE AND GEOLOGY
3. FIELD AND LABORATORY WORK
4. SUBSOIL CONDITIONS
 - 4.1 General
 - 4.2 Loose Fine to Med. Silty Sand
 - 4.3 Very Soft to Med. Hard Varved Clay
 - 4.4 Dense Silty Sand and Gravel
 - 4.5 Very Dense Gravel and Boulders
5. GROUND WATER CONDITIONS
6. EXISTING STRUCTURE
7. DISCUSSION AND RECOMMENDATIONS
8. SUMMARY
9. MISCELLANEOUS

Foundation Investigation
at
Carp River and the King's Highway #17
(Approx. 50 miles North-West of Sault Ste.
Marie) Twp. of Fisher, District of Algoma,
Dist. 18, W.J.61-F-12, W.P. 910-60.

1. INTRODUCTION:

It is intended to widen (or eventually to replace) the existing bridge, which carries the King's Hwy. #17 over the Carp River. The site of the bridge is located approx. 50 miles North-West of the Town of Sault Ste. Marie, Twp. of Fisher, District of Algoma. At this location the chainage of the King's Hwy. #17 is 2404+83.

In order to determine the soil properties and decide on the type of foundation, an investigation was carried out by this Section. Results and the discussion of the field and laboratory investigations, as well as conclusions and recommendations for the future design work, are contained in the following paragraphs of this report.

2. DESCRIPTION OF SITE AND GEOLOGY:

The area in which the structure is located is flat. As can be seen from the enclosed plan (Key Plan), it is located on the shore of Batchawana Bay, Lake Superior.

3. FIELD AND LABORATORY WORK:

In order to obtain sufficient information on types and

3. FIELD AND LABORATORY WORK: (Cont'd) ...

properties of the subsoil, two sampled boreholes, supplemented by six dynamic cone penetration holes, were carried out at this particular site.

Samples were taken at depth intervals of 3.5 and 10 feet. In the cohesionless upper and lower strata a 2" O.D. split spoon sampler was used. In the middle stratum of cohesive varved clay, undisturbed samples were taken by means of 2" Ø Shelby thin-walled tubes, and were used for determining liquid and plastic limits, moisture contents, triaxial shear strength, laboratory vane shear strength and grain-size curves.

Both boreholes and dynamic cone penetration tests were terminated in the underlying stratum of very dense gravel with boulders at a depth of 65-70 feet below existing ground level.

The elevations, as well as the locations (chainages) of the boreholes, are given on Drawing No. 61-F-12A, attached to this report (Appendix I).

Under Appendix I, borehole logs with penetration results, are also given.

The plasticity chart and the grain size distribution curves are given under Appendix I.

4. SUBSOIL CONDITIONS:

4.1 General

The stratigraphy of the soil at the site was found to

cont'd /3 ...

4. SUBSOIL CONDITIONS: (Cont'd.) ...

4.1 General

be quite uniform. Four main types of soil were encountered and they are:

4.2 Loose Fine to Medium Silty Sand

This material forms the top layer of the site and extends to about 9 feet below ground level. The sand percentage in this layer would be about 60%, silt forms between 30% and 35%; the rest is organic matter. This layer is in a loose state with an average "N" value of 8.

The average moisture content in this layer is about 21%.

4.3 Very Soft to Medium Hard Varved Clay

Underlying the layer of loose silty sand is a 39 foot thick layer of very soft to medium hard varved clay. The alternate layers of up to 6 inches in thickness are reddish, highly plastic clay and grey silt, respectively. These two materials are distinctly different and when analysed separately, give quite different results regarding plasticity, moisture content, etc. Typical examples are the moisture contents of a sample of B.H. #6 where the red clay had a moisture content of 73.0% while only 29.3% were registered for the grey silt portion, and of another sample from B.H. #1, where values of 67.4% and 20.2% respectively, were determined. When the

cont'd /4 ...

4.3 Very Soft to Medium Hard Varved Clay (Cont'd.) ...

separation of the two layers was not complete, the results were somewhere in between the above-mentioned values. The upper portion of the layer was so soft that satisfactory samples could not have been taken and therefore no laboratory shear strength measurements were made. Shear strength measurements of the lower portion produced values of approximately 500 to 750 p.s.f. These values should not be considered as wholly representative because they were not obtained on completely homogeneous samples. A thin seam of silt in the clay material can invalidate the test to the extent that the result can not be considered as representative for the clay material. Although the properties of the individual materials may be known, the question that is of interest and up till now still not satisfactorily answered, is how does the soil mass composed of these distinctly different layers, perform under different loading and shearing conditions. In our particular case, this question is of minor interest because of the use of piles that seem to be the best foundation solution.

The laboratory vane tests indicated that the material is very sensitive.

4.4 Dense Silty Sand and Gravel

This material was encountered below the varved clay.

cont'd /5 ...

4.4 Dense Silty Sand and Gravel (Cont'd.) ...

The sand intermixed with gravel is in a dense state. The average value of "N" for this material is about 50 blows/foot. The density of this layer increases with depth.

The sand percentage in this layer is around 63%, gravel forms 13% and silt 24%.

The average moisture content in this layer was found to be 15%.

4.5 Very Dense Gravel and Boulders

Underlying the dense silty sand and gravel is a layer of very dense gravel with boulders. It is not easy to determine the exact depth where these two materials meet because they are quite similar. It was impossible to drive the casing into this layer and a drilled-in A-X core barrel brought up pieces of boulders with some medium gravel in between them. All boreholes have been terminated at the top of this layer.

5. GROUND WATER CONDITIONS:

The water table at the time of the investigation was at about 2'-7" to 4'-1" below ground elevation.

At approx. 50 feet below ground elevation, artesian water conditions have been encountered. In both boreholes, the water rose to 5 feet above ground elevation in approx. 15 minutes, but dropped down to 1'-8" above ground elevation in B.H. #1 and

cont'd /6 ...

5. GROUND WATER CONDITIONS: (Cont'd.) ...

to 1'-1" above ground elevation in B.H. #2, during the next 14 hours. Both boreholes have been still producing water 9 days later.

6. EXISTING STRUCTURE:

The existing wooden bridge which carries the King's Highway #17 over the Carp River is founded on wooden piles approx. 10" to 12"Ø. The piles are arranged in 8 rows at 5 piles to a row.

A settlement of approx. 2" can be observed at the centre of the bridge, the asphalt pavement being in poor shape.

From the information gathered at the site, it seems that the piles are 30 feet long, and are driven only 23 feet into the ground, down to elevation 573.

As described in the earlier paragraph, the clay is sensitive and has a relatively low shear strength. Due to the varved character of the deposit any evaluation of the bearing capacity and settlement of the friction pile foundation is quite arbitrary and cannot be considered reliable. However, it can be assessed with a relatively high degree of dependability that the soil has not the properties to provide a satisfactory friction pile foundation.

The approach fills to the bridge between chainages 2403+00 and 2406+00 are very low and no marked settlements have been observed.

7. DISCUSSION AND RECOMMENDATIONS:

Because of the loose state of the silty sand layer and the relatively low, and in the upper portion very low, shear strength of the underlying varved clay, spread footings have to be ruled out. The experience with friction piles on the old structure is adequate to eliminate this alternative as well. It is therefore recommended that end bearing piles driven down into the very dense gravel layer with boulders, be used. At the east abutment approximate tip elevation 535.0 and at the west abutment approximate elevation 542.0. These piles will penetrate through the layer with artesian water, but it is believed that the clay layer will form a sufficiently tight seal around the piles and will not allow the artesian water to penetrate up to the surface. Steel H piles are recommended and because of the uncertainties regarding the artesian water conditions, a safe load of 30 tons per piles should not be surpassed.

In the design of the bridge it should be kept in mind that the ground at the site is of such inferior properties that no support could be provided for the falsework.

It is also recommended that no rise in grade be undertaken. Stability and settlement problems would result from higher approach fills.

cont'd /8 ...

7. DISCUSSION AND RECOMMENDATIONS: (Cont'd.) ...

Depending on the ground water level during construction, dewatering of the excavation may become necessary. If the amount of water is too great to be handled by normal pumping procedures, sheet piling should be driven for a few feet into the varved clay. In such a case it is believed that the quantity of water to be pumped will be greatly reduced.

8. SUMMARY:

a) The stratification of the soil is quite uniform. The upper 7-9 ft. thick layer is of loose fine to medium silty sand, followed by a layer 36-39 ft. thick of very soft to medium hard varved clay, underlain by a 17-19 ft. thick layer of dense silty sand and gravel, followed by a layer of very dense gravel and boulders.

b) Because of the loose character of the upper sand layer and the very soft state of the upper part of the varved clay layer, spread footings are not recommended. Footings should be founded on piles. The piles should be of the end-bearing type and should be driven into the layer of very dense gravel down to elevation 535.0 at the east abutment and elevation 542.0 at the west abutment. Single boulders may be encountered above this elevation.

c) In the design of the bridge it should be kept in mind that the ground of the site is of such inferior properties

cont'd /9 ...

8. SUMMARY: (Cont'd.) ...

that no support could be provided for the falsework.

d) If some problems, due to water seepage into the foundation excavations, arise, instructions given under the paragraph of "DISCUSSION AND RECOMMENDATIONS" should be followed.

e) If possible the deck of a new bridge should not be raised above the elevation of the present deck, as this would require higher approach fills and stability problems may arise.

9. MISCELLANEOUS:

The field work was carried out during the period of February 27 to March 3, 1961, by the Longyear skid mounted core drill, adapted to soil sampling, under the supervision of Mr. W. Kulmatickas, Project Engineer, Foundation Section.

March, 1961.

REPORT PREPARED BY:

W. Kulmatickas
W. Kulmatickas
Project Engineer

REPORT APPROVED BY:

A. G. Stermac
A. G. Stermac
Supervising Fdn. Engineer

APPENDIX I.

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-12

W.P. 910-60

| HOLE NO. | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENET'N RESIST. BLOWS FT | MOIST. CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH p.s.f. | UNIT WEIGHT p.c.f. | REMARKS |
|----------|----------|---------------------|--------------------------------|--------------------------|----------------|-----------------|----------------|-----------------------|--------------------|--------------|
| 1 | S1 | 3'-4.5' | Loose fine to med. silty sand. | 6 | 21.9 | - | - | - | - | No Recovery. |
| | S2 | 6'-7.5' | Loose fine to med. silty sand. | 8 | 21.0 | - | - | - | - | |
| | S3 | 10'-11.5' | Very soft varved clay. | 1 | 45.2 | 18.5 | 40.8 | - | - | |
| | T4 | 15'-16.5' | Very soft varved clay. | P | - | - | - | - | - | |
| | S5 | 16.5'-18' | Very soft varved clay. | P | 36.0 | 16.4 | 33.4 | - | - | |
| | T6 | 20'-21.7' | Soft varved clay. | P | 20.2 67.4 | - | - | - | - | |
| | S7 | 25'-26.5' | Soft varved clay. | P | 41.8 | 15.7 | 38.0 | - | - | |
| | T8 | 30'-31.5' | Medium hard varved clay. | P | 43.3 | 19.9 | 52.9 | TR=758 | 108.2 | |
| | S9 | 35'-36.5' | Medium hard varved clay. | P | 48.8 | 17.7 | 44.1 | - | - | |
| | T10 | 40'-41.5' | Medium hard varved clay. | P | 43.7 | 16.2 | 37.8 | TR=730 | 110.5 | |
| | S11 | 45'-46.5' | Medium hard varved clay. | P | 44.2 | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-12W.P. 910-60

| HOLE NO. | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENETN RESIST. BLOWS FT. | MOIST. CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH p.s.f. | UNIT WEIGHT p.c.f. | REMARKS |
|----------|------------------------|---------------------|-----------------------------------|--------------------------|----------------|-----------------|----------------|-----------------------|--------------------|---------|
| 1 | SL2 | 50'-51.5' | Dense silty sand and gravel. | 48 | 10.8 | - | - | - | - | |
| | SL3 | 55'-56.5' | Med. dense silty sand and gravel. | 27 | 22.3 | - | - | - | - | |
| | SL4 | 65'-66.5' | Very dense silty sand and gravel. | 92 | 9.7 | - | - | - | - | |
| | RC15 | 67.8'-69.8' | Very dense gravel and boulders. | - | - | - | - | - | - | |
| 2-5 | cone penetrations only | | | | | | | | | |
| 6 | S1 | 5'-6.5' | Loose fine to med. silty sand. | 9 | 19.8 | - | - | - | - | |
| | S2 | 10'-11.5' | Very soft varved clay. | 2 | 28.0 | - | - | - | - | |
| | T3 | 15'-16.7' | Very soft varved clay. | P | 73.0 29.3 | 22.6 | 73.6 | - | - | |
| | S4 | 20'-21.5' | Very soft varved clay. | 2 | 50.8 | - | - | - | - | |
| | T5 | 25'-27' | Soft varved clay. | P | 46.7 | 23.9 | 65.9 | V=517 TR=590 | 109.2 | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-12

W.P. 910-60

| HOLE NO | SAMP NO | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENET'N RESIST. BLOWS FT | MOIST. CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH p.s.f. | UNIT WEIGHT p.c.f. | REMARKS |
|---------|---------|---------------------|---|--------------------------|----------------------|-----------------|----------------|-----------------------|--------------------|---------|
| 6 | S6 | 30'-31.5' | Soft varved clay. | P | 39.4 | - | - | - | - | |
| | T7 | 35'-37' | Soft varved clay. | P | 27.3 35.6 51.3 | 16.3 | 49.8 | V=270 TR=515 | 113.6 | |
| | S8 | 40'-41.5' | Soft varved clay. | P | 49.4 | - | - | - | - | |
| | S9 | 45'-46.5' | Med. dense silty sand and gravel. | 27 | 16.2 | - | - | - | - | |
| | S10 | 50'-51.5' | Med. dense silty sand and gravel. | 48 | 16.8 | - | - | - | - | |
| | S11 | 60'-61.5' | Very dense silty sand and gravel. | 96 | 14.4 | - | - | - | - | |
| | | | S denotes split spoon sample T " shelby tube sample RC " rock core | | | | | | | |

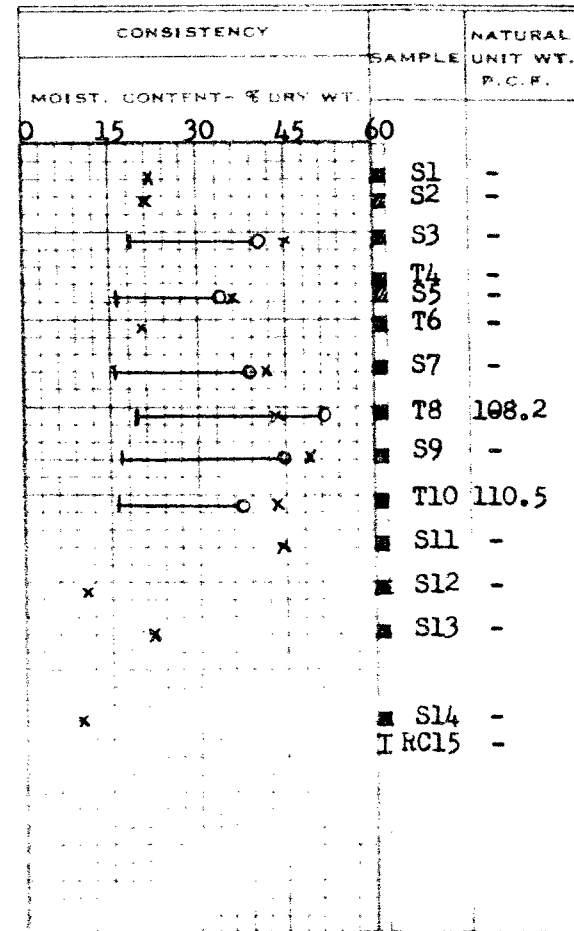
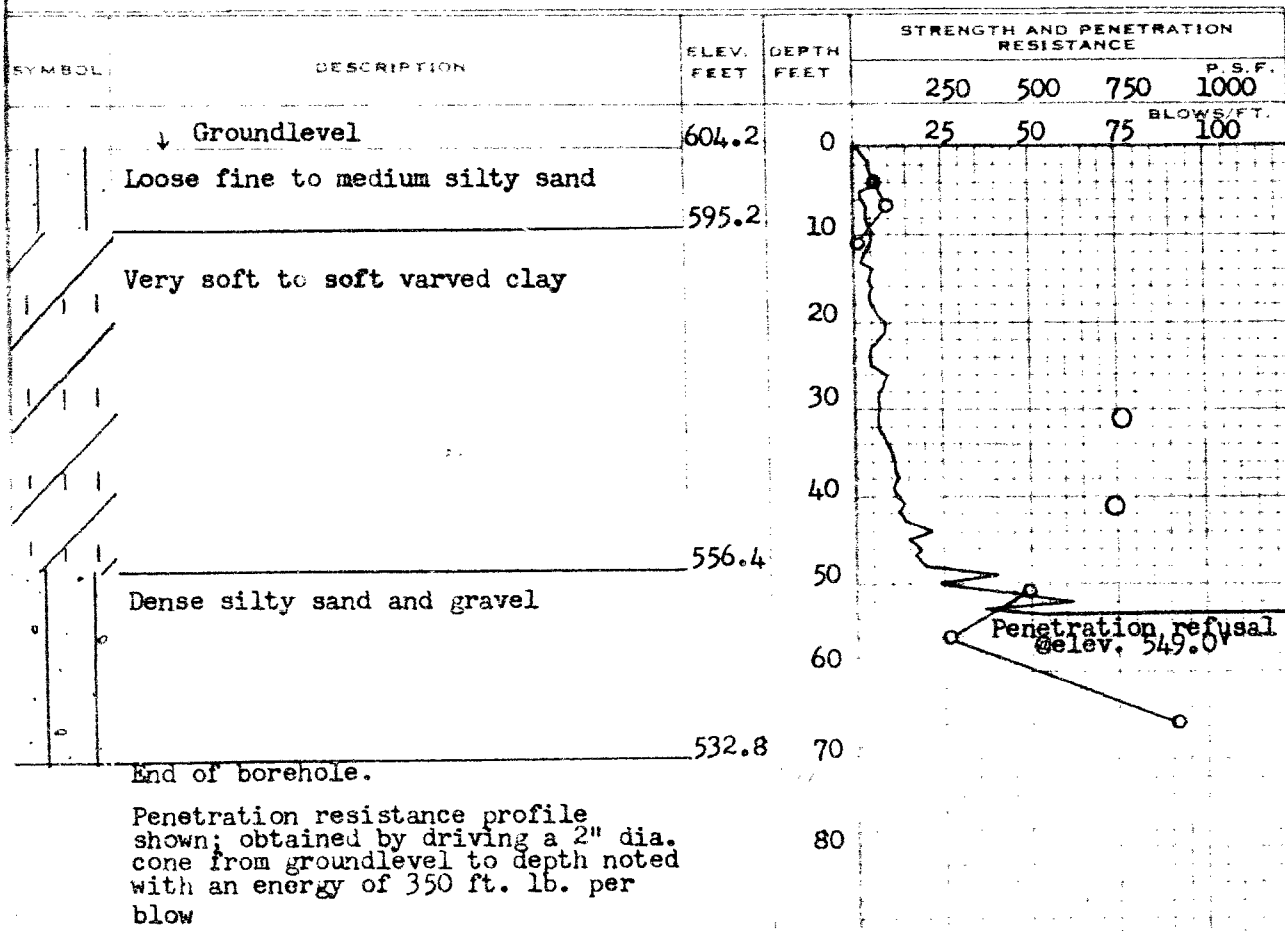
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 910-60 BORE HOLE NO. 1
JOB 61-F-12 STATION 2404/18 (56' Lt)
DATUM 604.17 COMPILED BY B.K.
BORING DATE Feb. 27/61 CHECKED BY W.W.K.

2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Q_u)
VANE TEST (C) AND SENSITIVITY (S)
NATURAL MOISTURE AND LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT



DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 910-60 _____ BORE HOLE NO. 2 _____

JOB 61-F-12 STATION 2404+02 (45'-0" Rt)

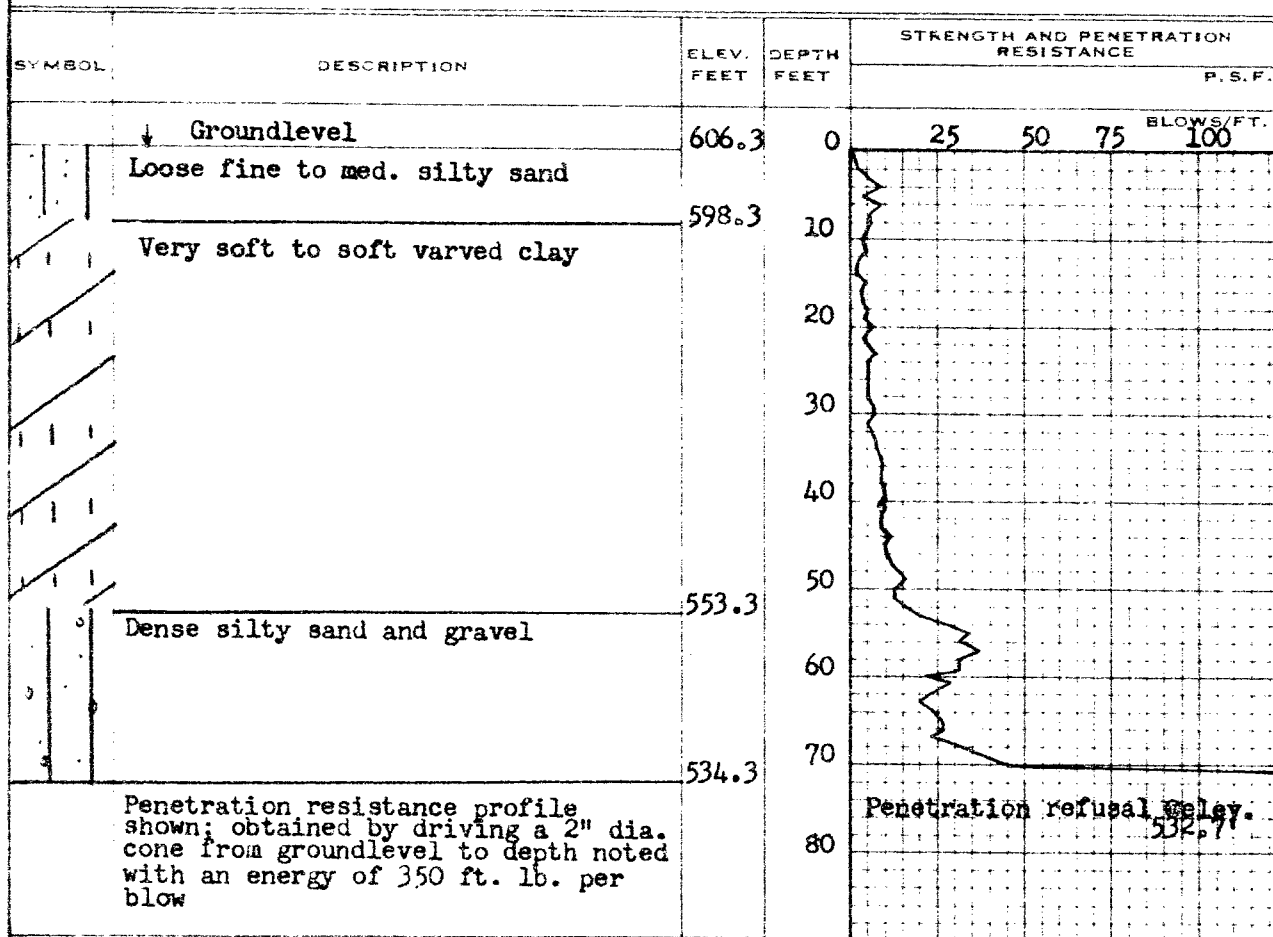
DATUM 606.25' _____ COMPILED BY B.K.

BORING DATE Mar. 1/61 CHECKED BY W.W.K.

2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

LEGEND

| | | |
|-----------------------------------|-----|----|
| 1/2 UNCONFINED COMPRESSION (Qu) | --- | 0 |
| VANE TEST (C) AND SENSITIVITY (S) | --- | +5 |
| NATURAL MOISTURE AND | | |
| LIQUIDITY INDEX | --- | X |
| LIQUID LIMIT | --- | |
| PLASTIC LIMIT | --- | |

[illegible]

W.P. 910-60 BORE HOLE NO. 3
JOB 61-F-12 STATION 2404+83 (18'-0" Rt.)
DATUM 599.17 COMPILED BY B.K.
BORING DATE Mar. 1/61 CHECKED BY W.W.K.

2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

UNCONFINED COMPRESSION (Q) _____
VANE TEST (C) AND SENSITIVITY (S) _____
NATURAL MOISTURE AND _____
LIQUIDITY INDEX _____
LIQUID LIMIT _____
PLASTIC LIMIT _____

| SYMBOL | DESCRIPTION | ELEV. FEET | DEPTH FEET | STRENGTH AND PENETRATION RESISTANCE | | | |
|--------|---|---------------|---------------|--|----------------------------------|----|-----|
| | | | | BLOW/FT. | | | |
| | ↓ Groundlevel | 599.2 | 0 | 25 | 50 | 75 | 100 |
| | Loose fine silty sand | 596.2 | | | | | |
| | Very soft to soft varved clay | | | | | | |
| | | 557.2 | | | | | |
| | Dense silty sand and gravel | | | | | | |
| | | 543.7 | | | | | |
| | Penetration resistance profile shown; obtained by driving a 2" dia. cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow | | | 60 | Penetration refusal delay, 544.8 | | |
| | | | 70 | | | | |
| | | | 80 | | | | |

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 910-60 BORE HOLE NO 4

JOS 61-F-12 STATION 2404765 (16'-6" Lt)

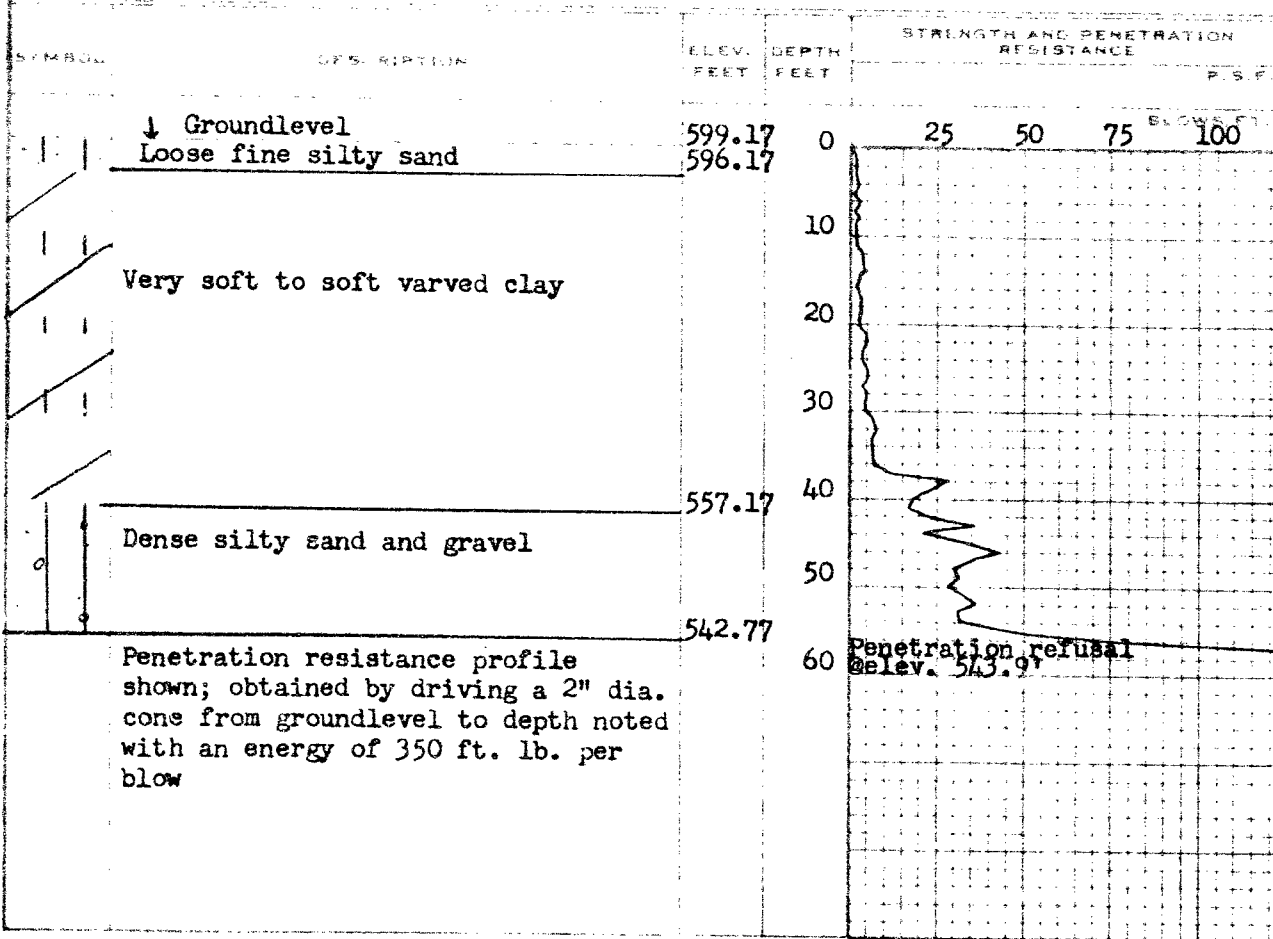
DATUM 599.17 COMPILED BY B.K.

LOGGING DATE Mar. 2/61 CHECKED BY W.W.K.

2' DIA SPLIT TUBE
2' SHELBY TUBE
2' SPLIT TUBE
2' DIA CONE
2' SHELBY
CASING

LEGEND

| | | |
|-----------------------------------|-----|----|
| 72 UNCONFINED COMPRESSION (QU) | --- | 0 |
| VANE TEST (C) AND SENSITIVITY (S) | --- | +5 |
| NATURAL MOISTURE AND | | |
| LIQUIDITY INDEX | --- | 1 |
| LIQUID LIMIT | --- | Y |
| PLASTIC LIMIT | --- | 1 |



| | | |
|---------------|--|---------|
| CONSISTENCY | | NATURAL |
| SAMPLE | | UNIT WT |
| MOIST CONTENT | | PERCENT |

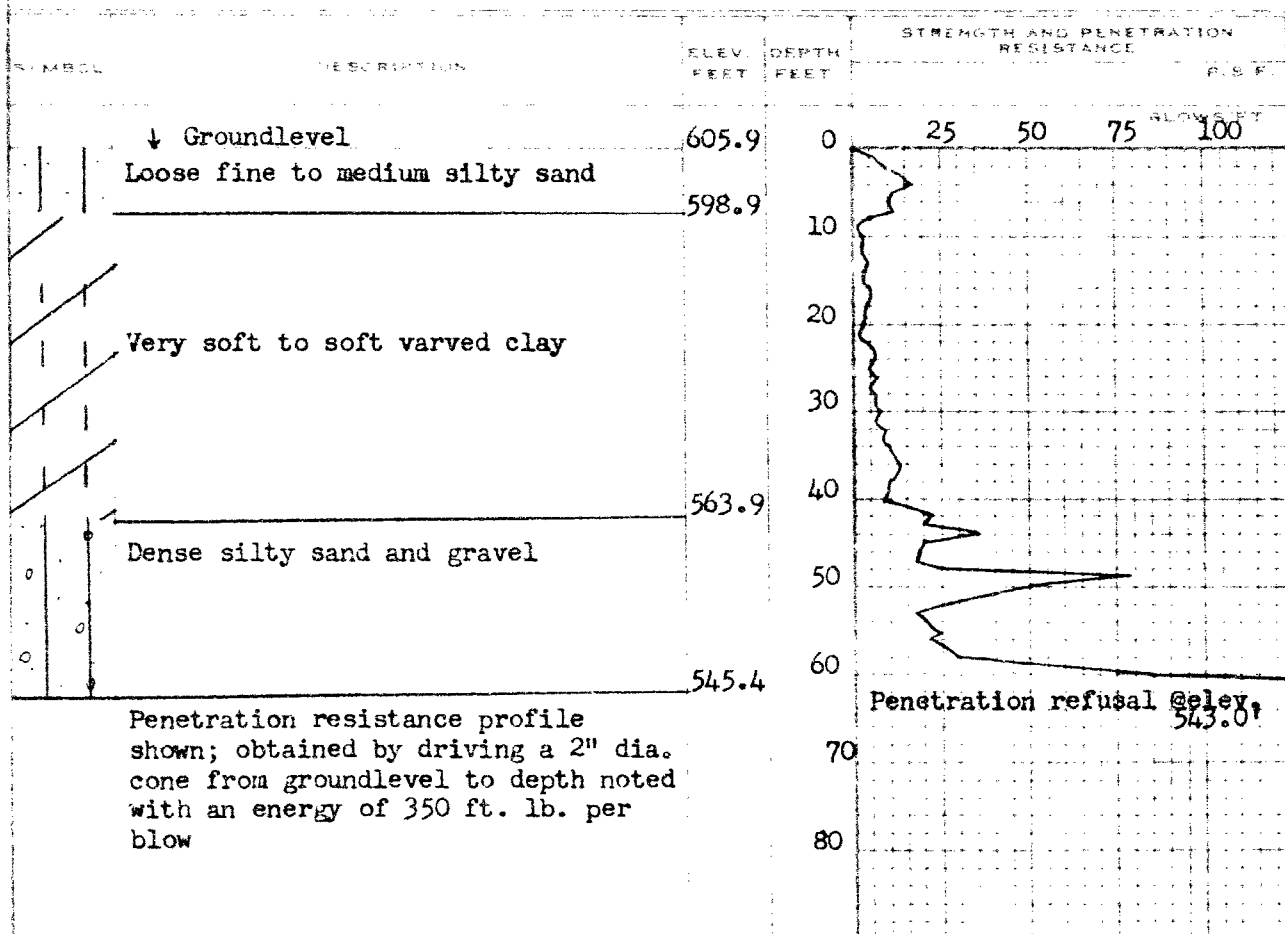
W.P. 910-60 _____ BORE HOLE NO. 5 _____

JOE 61-F-12 STATION 2405-44 (29'-0" Lt)

DATUM 605.9' COMPILED BY B.K.

LOGGING DATE Mar. 5/61 CHECKED BY W.W.K.

2" DIA SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA CONE
2" SHELBY
CASING

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 910-60

BORE HOLE NO. 6

JOB 61-F-12

STATION 2405+27 (39'-6" Rt.)

DATUM 607.7'

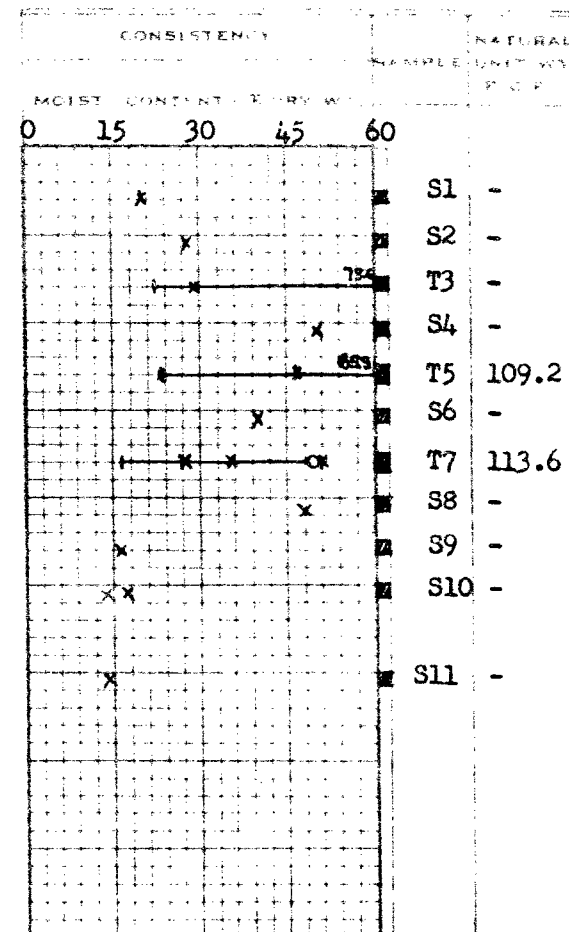
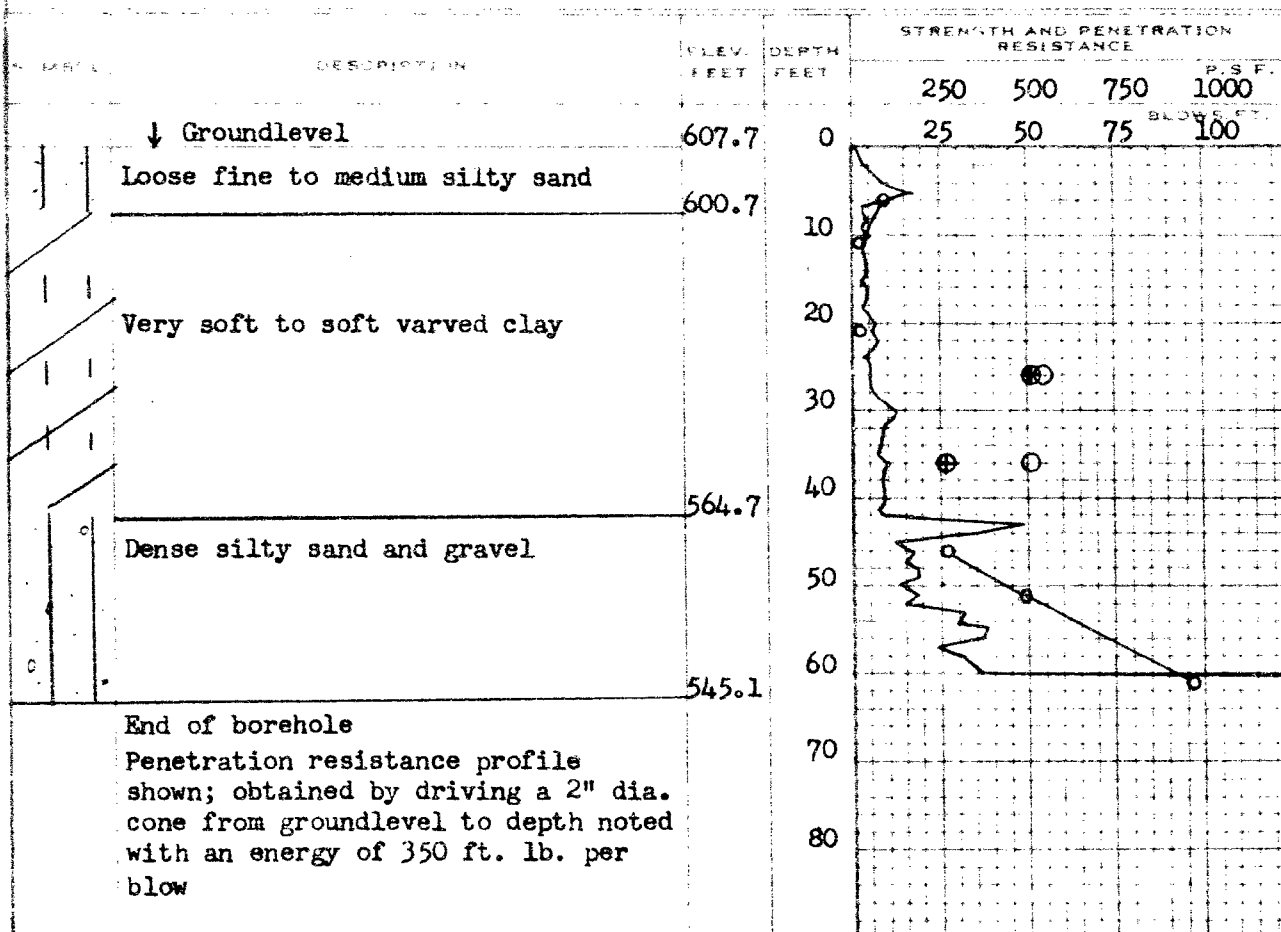
COMPILED BY B.K.

BORING DATE Mar. 2/61

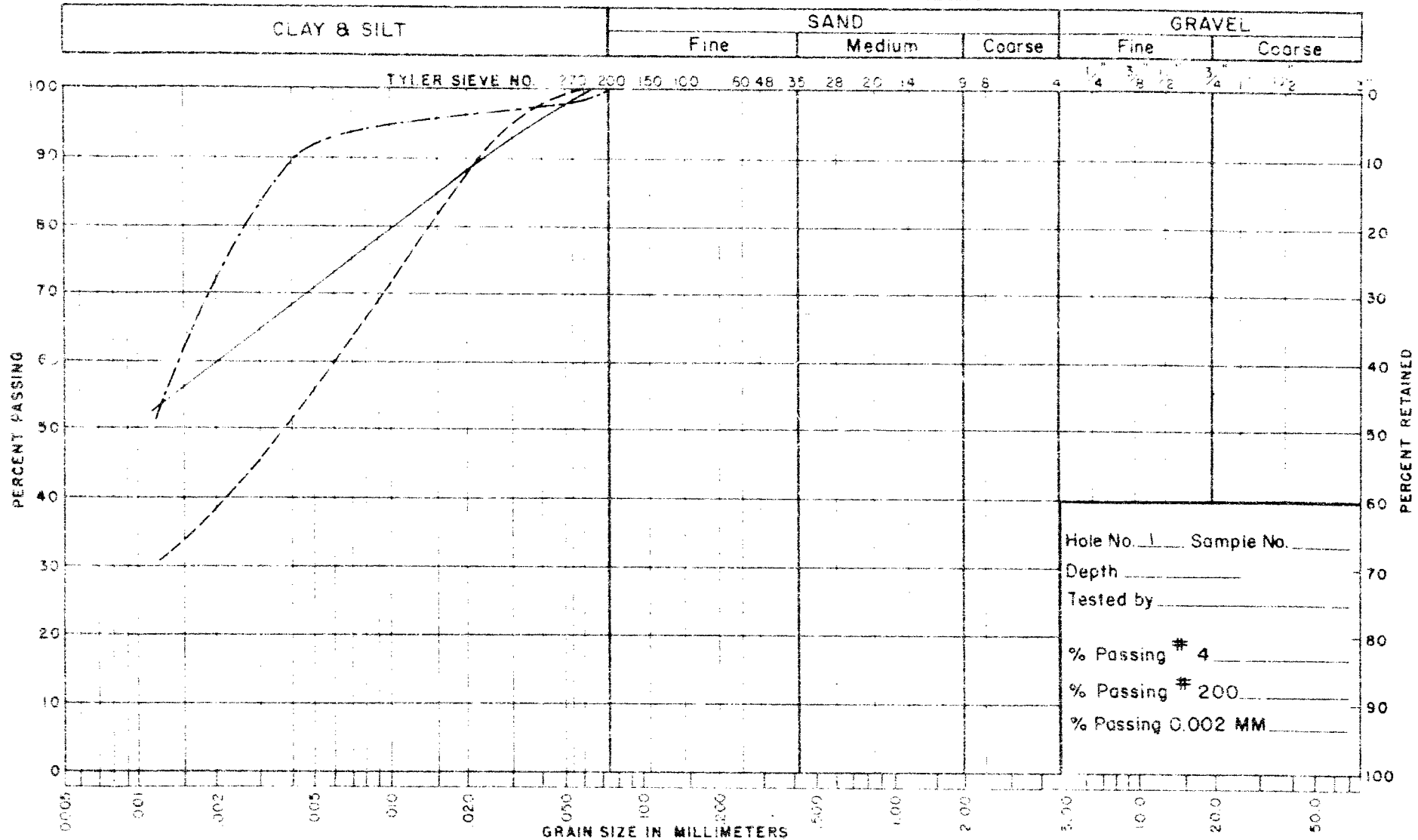
CHECKED BY W.W.K.

2" DIA SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA CONE
2" SHELBY
CASING

LEGEND

1/2 UNCONFINED COMPRESSION (QU) \bigcirc
VANE TEST (C) AND SENSITIVITY (S) \oplus
NATURAL MOISTURE AND LIQUIDITY INDEX \times
LIQUID LIMIT \bigcirc
PLASTIC LIMIT \bigcirc
Lab vane \oplus


UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES

----- SAMPLE DEPTH 30'-0" TO 31'-8"

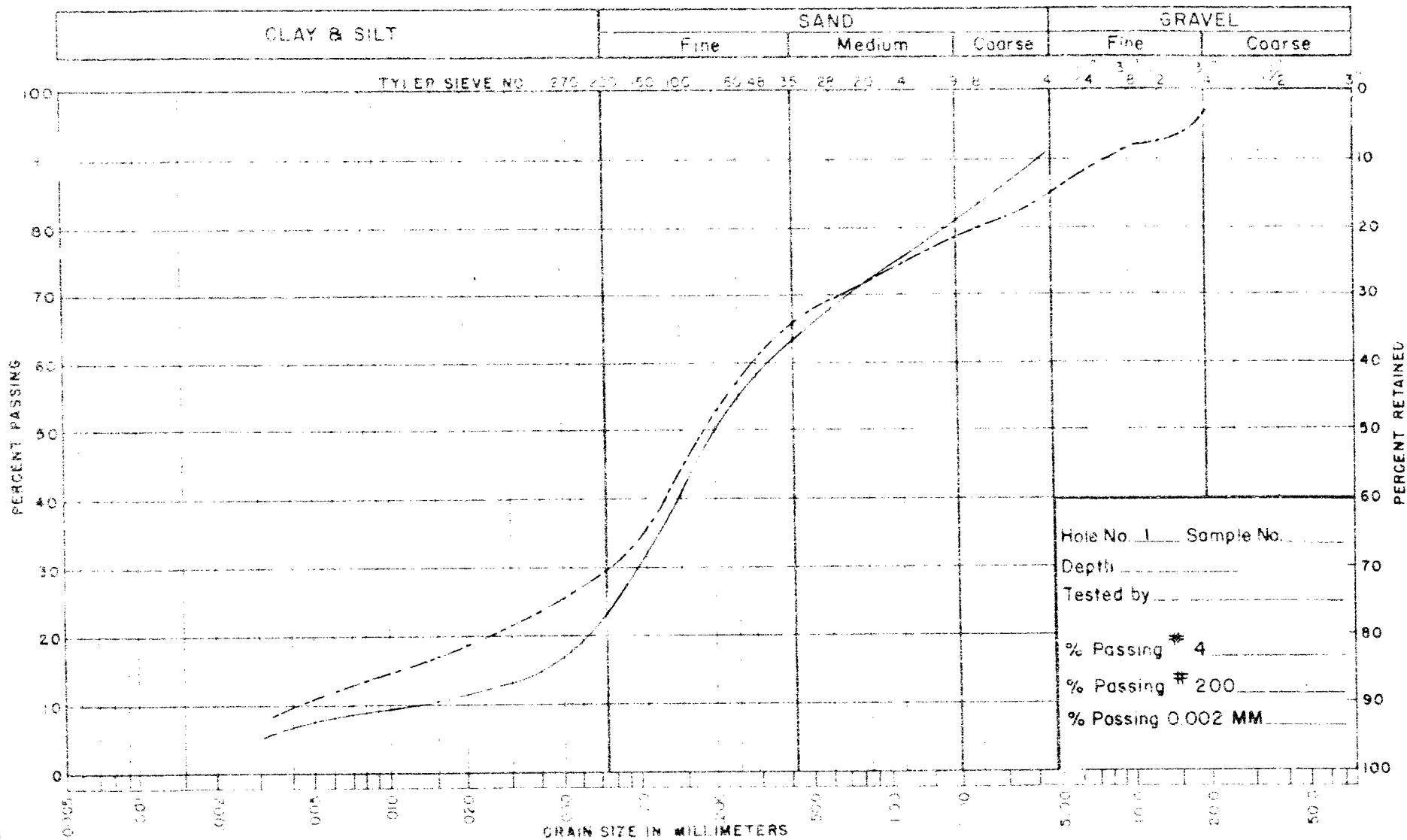
————— SAMPLE DEPTH 40'-0" TO 41'-8"

----- SAMPLE DEPTH 45'-0" TO 46'-8"

DEPARTMENT OF HIGHWAYS - ONTARIO
 MATERIALS & RESEARCH SECTION
GRAIN SIZE DISTRIBUTION

Job No. 61-F-12 W.P. No. 910-60
 Location CARP RIVER

UNIFIED SOIL CLASSIFICATION SYSTEM

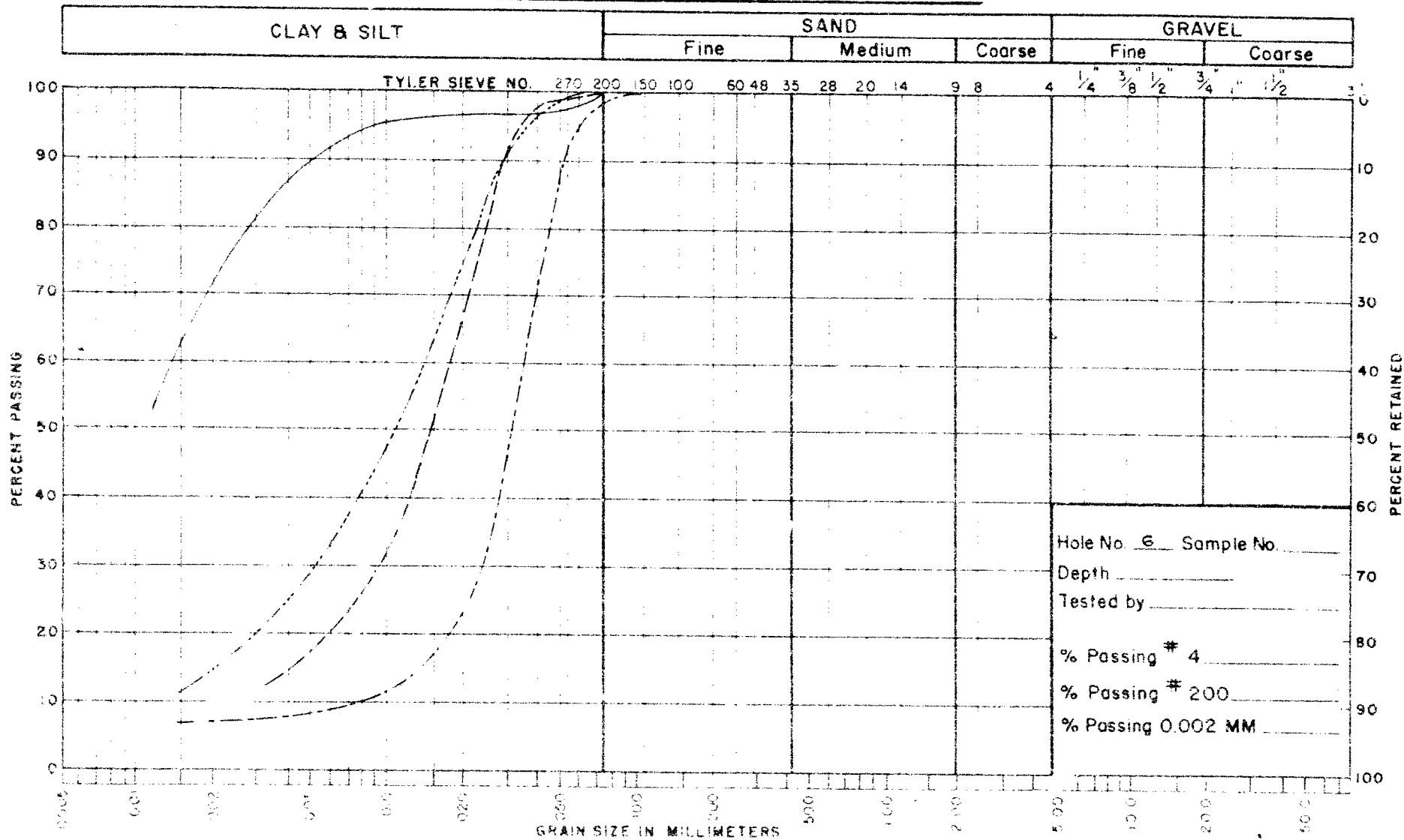


NOTES — — — — — SAMPLE DEPTH 50'-0" TO 51'-6"
 — — — — — SAMPLE DEPTH 65'-0" TO 66'-6"

DEPARTMENT OF HIGHWAYS - ONTARIO
 MATERIALS & RESEARCH SECTION
GRAIN SIZE DISTRIBUTION

Job No. 61-F-12 WP No. 910-60
 Location CARP RIVER

UNIFIED SOIL CLASSIFICATION SYSTEM

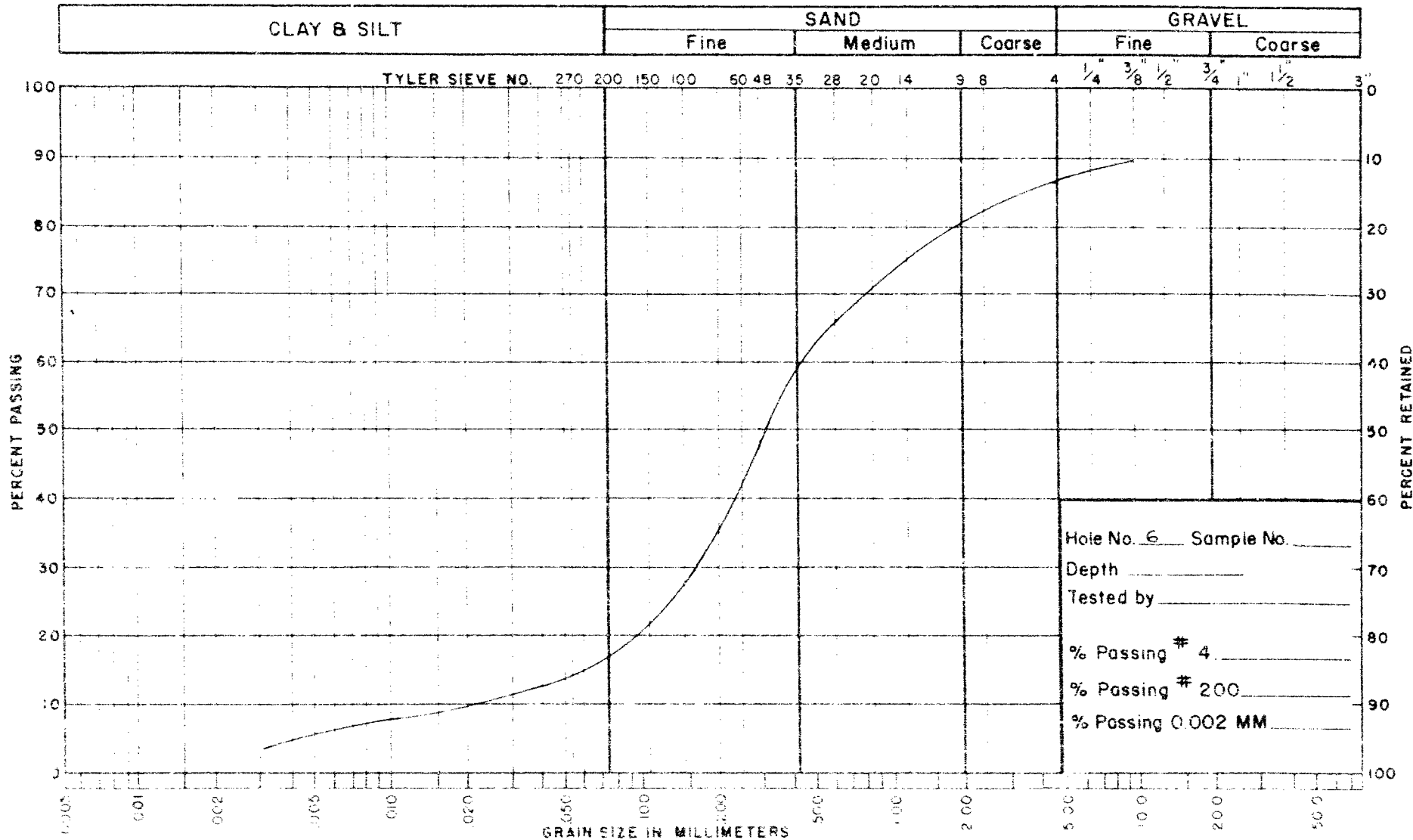


NOTES _____ SAMPLE DEPTH 10'-0" TO 11'-6"
 _____ SAMPLE DEPTH 15'-0" TO 16'-8"
 _____ SAMPLE DEPTH 25'-0" TO 27'-0"
 _____ SAMPLE DEPTH 35'-0" TO 37'-0"

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
GRAIN SIZE DISTRIBUTION

Job No. 61-F-12 WFT No. 910-60
Location CARP RIVER

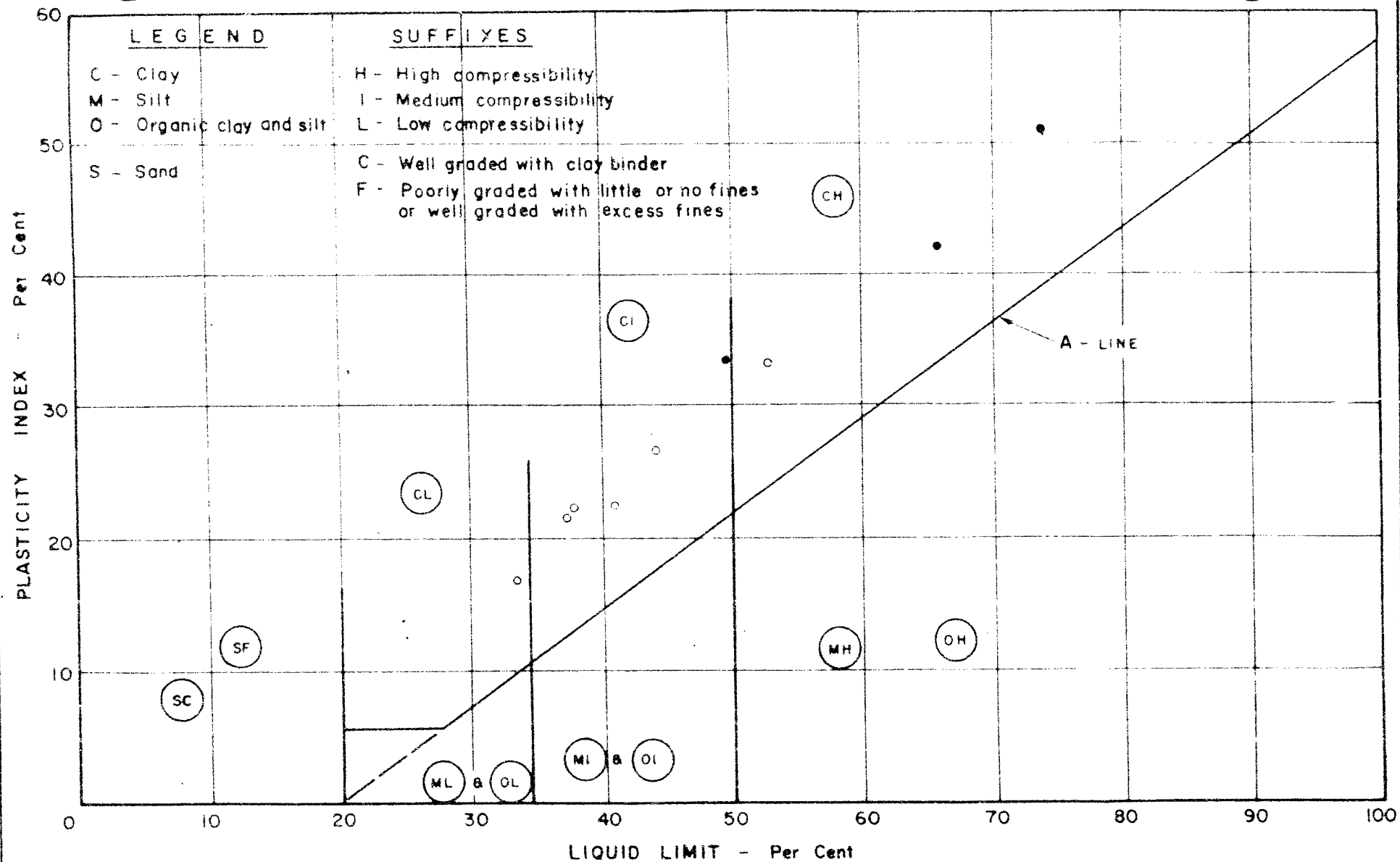
UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES: SAMPLE DEPTH 50'-0" TO 51'-6"

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
GRAIN SIZE DISTRIBUTION

Job No. 61-F-12 W.R. No. 910-60
Location CARP RIVER



NOTES

● - BOREHOLE NO. 1

○ - BOREHOLE NO. 2

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
PLASTICITY CHART

Job No. 61-E-12

W.P. No. 910-60

Location CARP RIVER

Mr. A. M. Toye,
Bridge Engineer.
Materials & Research Division,
(Foundations Section)

January 31, 1962.

Attention: Mr. C. Grebski.

Re: Carp River Bridge,
Hwy. No. 17, District #18,
W.P. 910-60.

This is to confirm the telephone conversation
of Jan. 29th, 1962.

Steel tube piles, 12 inch diameter, can be used
instead of the originally recommended 'H' piles. The tube
piles will, undoubtedly, cause more disturbance to the soil
but since the fill will be less than 10 ft. high, it is felt
that such a disturbance will have no detrimental effect.
It is also recommended that tubes of 0.250 inch wall thickness
be used.

Should there be any other questions you would like
to discuss, please feel free to call on our Office.

AGS/MdeF

cc: Foundations Office
Gen. Files.

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

Mr. A. M. Towe,
Bridge Engineer.

Materials & Research Section,
(Foundations Office)

Attention: Mr. J. C. McAllister.

October 4, 1961.

D.H.O. FOUNDATION REPORT -

W.J. 61-F-12.

Re: W.P. 910-60,
Carp River Bridge, Hwy.#17(TCH)
District #18.

With regard to your memo dated Sept. 26th, 1961, concerning the proposed relocation and grade raise of the above structure, we are of the opinion that no further investigation is necessary. Pile foundations for the structure, as recommended in our report #61-F-12, should be used.

As the varved clay deposit is overlain by about 6 to 8 feet of fine to medium sand, we believe that the proposed 10' high approach embankment will be stable. In view of the fact that the varved clay deposit is highly compressible, some settlement of the approaches will take place. Final paving should therefore, be delayed for as long a period as is practically possible, in order that future pavement maintenance be kept to a minimum.

A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.
Per:

K. G. Selby

(K. G. Selby,
SR. PROJECT FOUNDATION ENGR.)

KOE/adeF

cc: Mr. B. Davis

Foundations Office
Gen. Files.

OFFICE LOCATION -
DOWNSVIEW AVE.,
KEELE ST. - HIGHWAY 401
TORONTO, ONTARIO.



ONTARIO
DEPARTMENT OF HIGHWAYS

POSTAL ADDRESS -
DEPARTMENT OF HIGHWAYS
PARLIAMENT BUILDINGS,
TORONTO 5, ONTARIO.

Bridge Division,
September 26, 1961.

MEMORANDUM TO:

Mr. A. Stermac,
Principle Foundation Engineer,
Department of Highways,
Room 107,
Downsview, Ontario.

Attention: Mr. K. Selby

RE: W.P. 910-60 Carp River Br.
Hwy. #17 T.C.H. Dist. #18

The Foundation Section submitted a report W.J.
x61-F-12 dated March 30, 1961 for the proposed widening
of the existing Carp River Bridge. On page 7 of this
report it was recommended that no grade raise be under-
taken as stability and settlement problems might result.

north
It is now proposed to build a new structure on a
line 45' ~~east~~ of existing centre line and raise the grade
to 613.00 at sta. 244 + 00 and 615.00 at sta. 246 + 00.
This is 3'-5' higher than the existing grade.

Will you investigate this and let us know if it is
feasible?

J. C. McAllister

JCMCA/et

J. C. McAllister,
for S. McCombie,
Bridge Planning Engineer.

Mr. S. McCombie,
Bridge Planning Engr.
Materials & Research Section.

February 6, 1961.
REVIEW OF PRELIMINARY PLAN
by Foundations Office.

Attention: Mr. J.C. McAllister.

Re: W.P. 910-60,
Carp River Widening,
Hwy. #17. T.C.H.,
District #18.

It was decided not to carry out a soil investigation at the above mentioned site. This decision was arrived at after analysing the cost of such an investigation in the light of the fact that the site is very far-off and that the existing structure is in a very good condition. It was therefore decided that 50-ft. long piles be brought to the site and the driving length be established in the field. To establish this, the criteria given below, should be followed:-

- 1) A minimum penetration length of 20 feet into the ground should be achieved.
- 2) A driving energy of 10 - 12 ft. kips should be used.
- 3) For the last three feet of penetration, a minimum of 3 blows/in. should be obtained.

The above criteria should only be modified if all the evidence indicates that the pile tip has reached a hard stratum such as bedrock.

A safe load of 15 tons per pile was assumed in working out the above criteria, but because of the many uncertainties involved, no modification should be made if smaller loads are used.

AGS/MdeF

cc: Foundations Office
Gen. Files.

L. G. Soderman,
PRINCIPAL FOUNDATION ENGR.
Per:

A. G. Stermac
(A. G. Stermac,
SR. FOUNDATION ENGR.)

OFFICE LOCATION -

DOWNSVIEW AVE.,
KEELE ST. - HIGHWAY 401
TORONTO, ONTARIO.



ONTARIO
DEPARTMENT OF HIGHWAYS

POSTAL ADDRESS -

DEPARTMENT OF HIGHWAYS
PARLIAMENT BUILDINGS,
TORONTO 2, ONTARIO.

Bridge Division,
January 25, 1961.

MEMORANDUM TO:

Mr. N.D. Smith,
Materials & Research Branch,
Room 113A, Lab Bldg.,
Downsview, Ontario.

RE: W.P. 910-60,
Carp River Widening,
Hwy. # 17. T.C.H.
District # 18.

Attached please find one print of preliminary plan
D-4746-P1. for the above structure.

On the advice of the Foundation Engineer a foundation investigation was not done at this crossing. As the existing structure is in good condition it has been decided to supply 50' pile and establish the driving lengths in the field.

J.C. McAllister

JCMcA; jk

J.C. McAllister,
for; S. McCombie,
Bridge Planning Engineer.

LOADS PER PILE SHOULD BE KNOWN TO ESTABLISH
THE CRITERION FOR PRACTICAL REFUSAL WHEN USING
A CERTAIN DRIVING EFFORT

A: 15 TONS.