

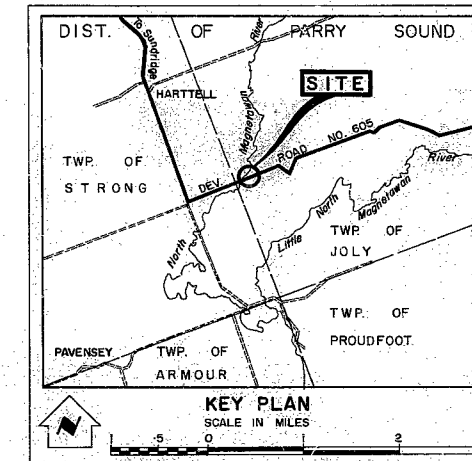
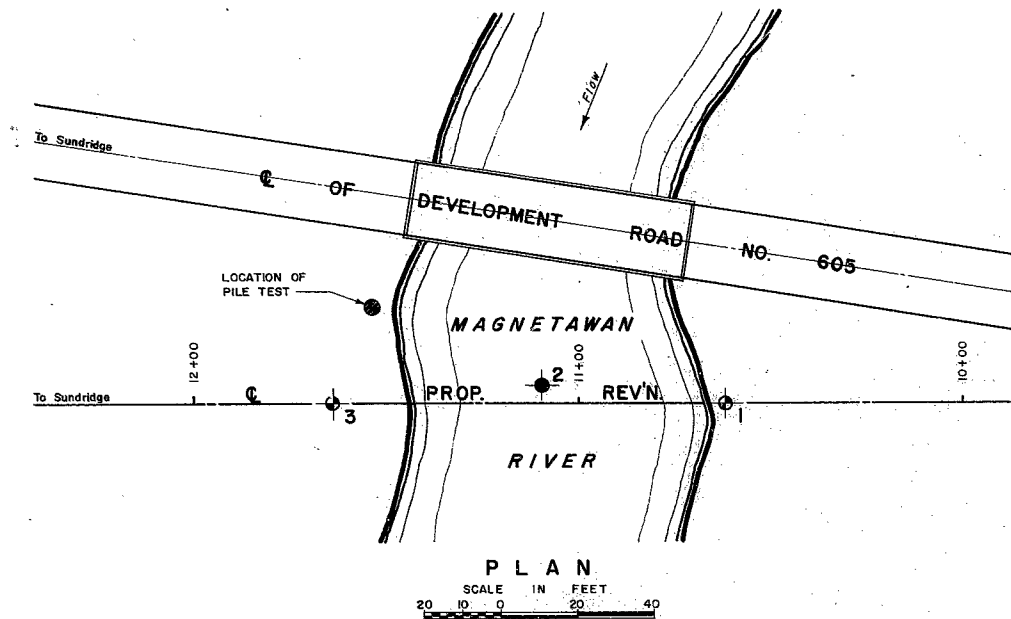
61-F-93A

DEV. ROAD 605

4 MAGNETAWAN

ROAD

31E-39



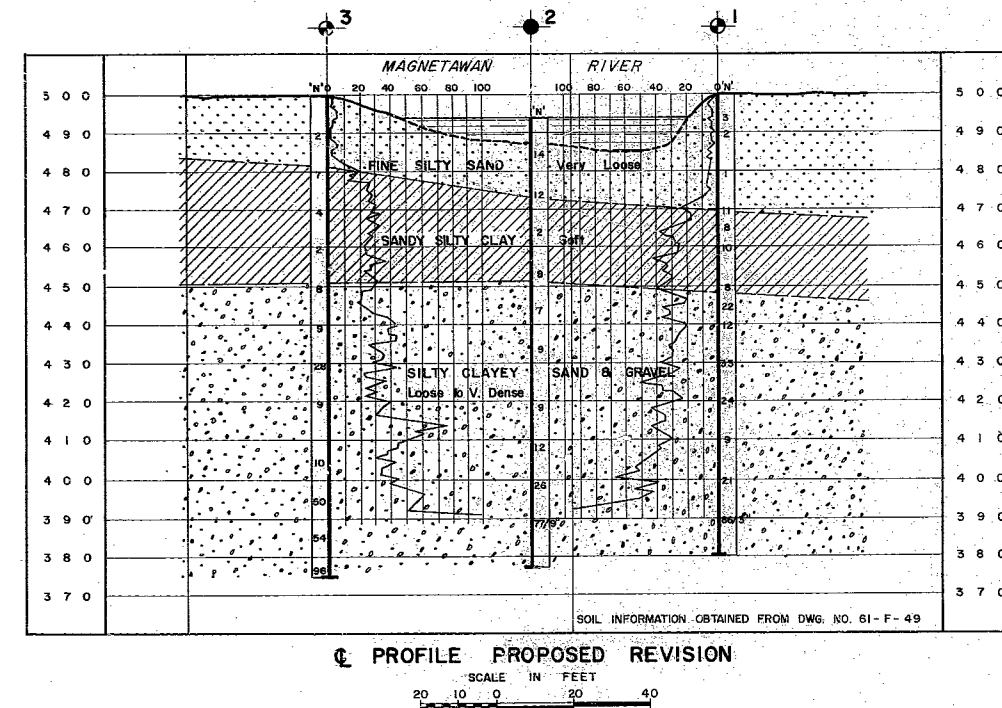
LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation		

NO.	ELEVATION	STATION	OFFSET
1	499.6	10+62	℄
2	487.9	11+10	5' RT.
3	500.0	11+64	℄

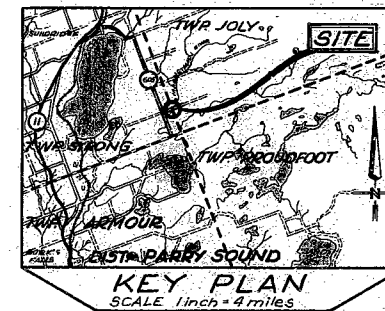
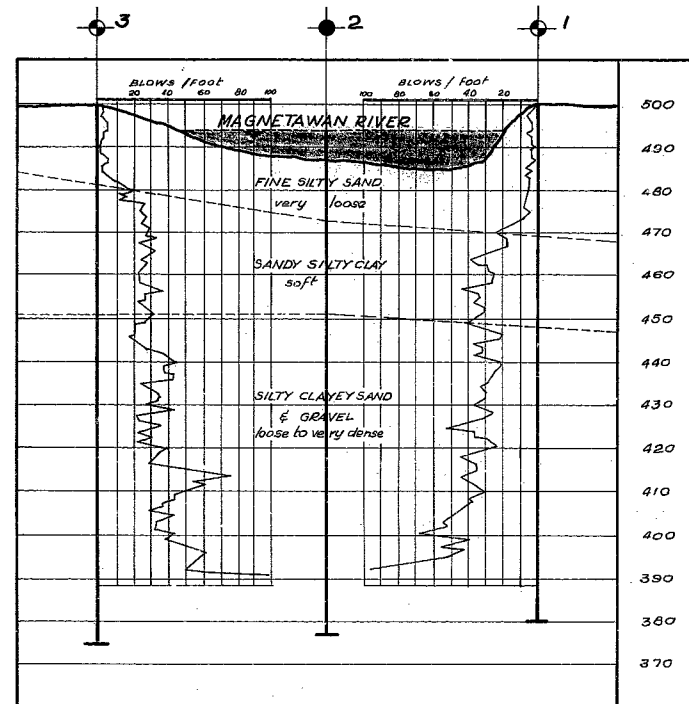
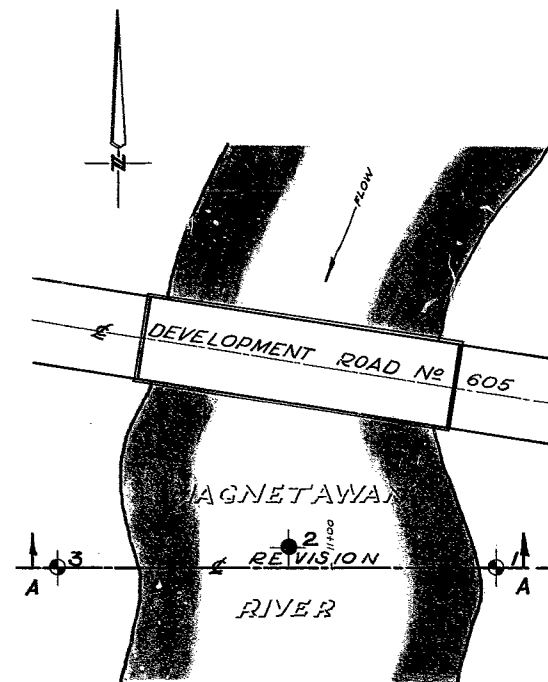
**NOTE**

THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BORE HOLE LOCATIONS. BETWEEN BORE HOLES THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE AND MAY BE SUBJECT TO CONSIDERABLE ERROR.

SUPERCEDES DRAWING 61-F-93A DATED 3 OCT 1961



DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS & RESEARCH SECTION			
PILE TEST <b>MAGNETAWAN RIVER</b>			
31E-39 GEORES No.			
SHOWING POSITIONS & ELEVATIONS OF HOLES			
HWY. DEV. RD. 605	DISTRICT 13	PARRY SOUND	
TOWNSHIP JOLY	LOT	CON.	
LOCATION 6.5 MILES SOUTH OF SUNDRIDGE			
DRAWN BY: D. M.	CHECKED BY: <i>W.P.</i>	W.P.	
DATE 25 MAR. 1964	APPROVED BY:	DRAWING NO.	
SCALE AS SHOWN		61-F-93A	



LEGEND			
●	BORE HOLE		
●	BORE & PENETRATION HOLE		
HOLE	ELEVATION	STATION	OFFSET
1	499.6	10+62	£
2	487.9	11+10	5' RT
3	500.0	11+64	£

Geocodes N<sup>o</sup> 31E-39

ORIGINATED BY KULMATICAS	DEPARTMENT OF HIGHWAYS - ONTARIO	SCALE 1 inch = 20 feet
DRAWN <i>Thompson</i>	MATERIALS & RESEARCH SECTION	W.P. NO.
CHECKED <i>SLP</i>	MAGNETAWAN RIVER	JOB NO. 61-F-49
APPROVED <i>W. Thompson</i>	AND	DWG. NO. 61-F-49A
DATE 6 JUL 1961	DEVELOPMENT ROAD No 605	

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

October 3, 1961.

PILE LOADING TEST -

W.J. 61-F-93 (Municipal Job)

Attention: Mr. S. McCombie

Re: Magnetawan River Crossing, Development  
Road 605, Approximately 6.5 Miles South  
of Sundridge, Municipal District of Parry Sound.

At your request we have recently completed a pile loading test at the above-noted structure location. The location of the pile loading test, as well as the boreholes for the foundation investigation, are shown on Drawing 61-F-86A, attached to this report.

Based on a consideration of the load settlement-time relationship obtained by the test and the Foundation report (61-F-49) dated 6 July 1961, the following points should be considered in the design of the proposed bridge footings:-

1) Because of the fluctuations of water level at this location, Class 'B' treated timber piles driven to elevation 460' are recommended. This will require the use of piles approximately 45 ft. in length.

2) The allowable load per pile is approximately twenty (20) tons.

If you require more information or wish to discuss these recommendations, please contact our Office.

RJS/MieF  
Attach.

cc: Messrs. K. L. Kleinstelber  
W. M. McFarlane  
W. Hopper  
Foundations Office  
Gen. Files.

A. G. Sternac,  
PRINCIPAL FOUNDATION ENGR.

Per:

for *M. Savata*  
(R. J. Salvas,  
PROJECT FOUNDATION ENGR.)

COPY ALSO SENT TO:-

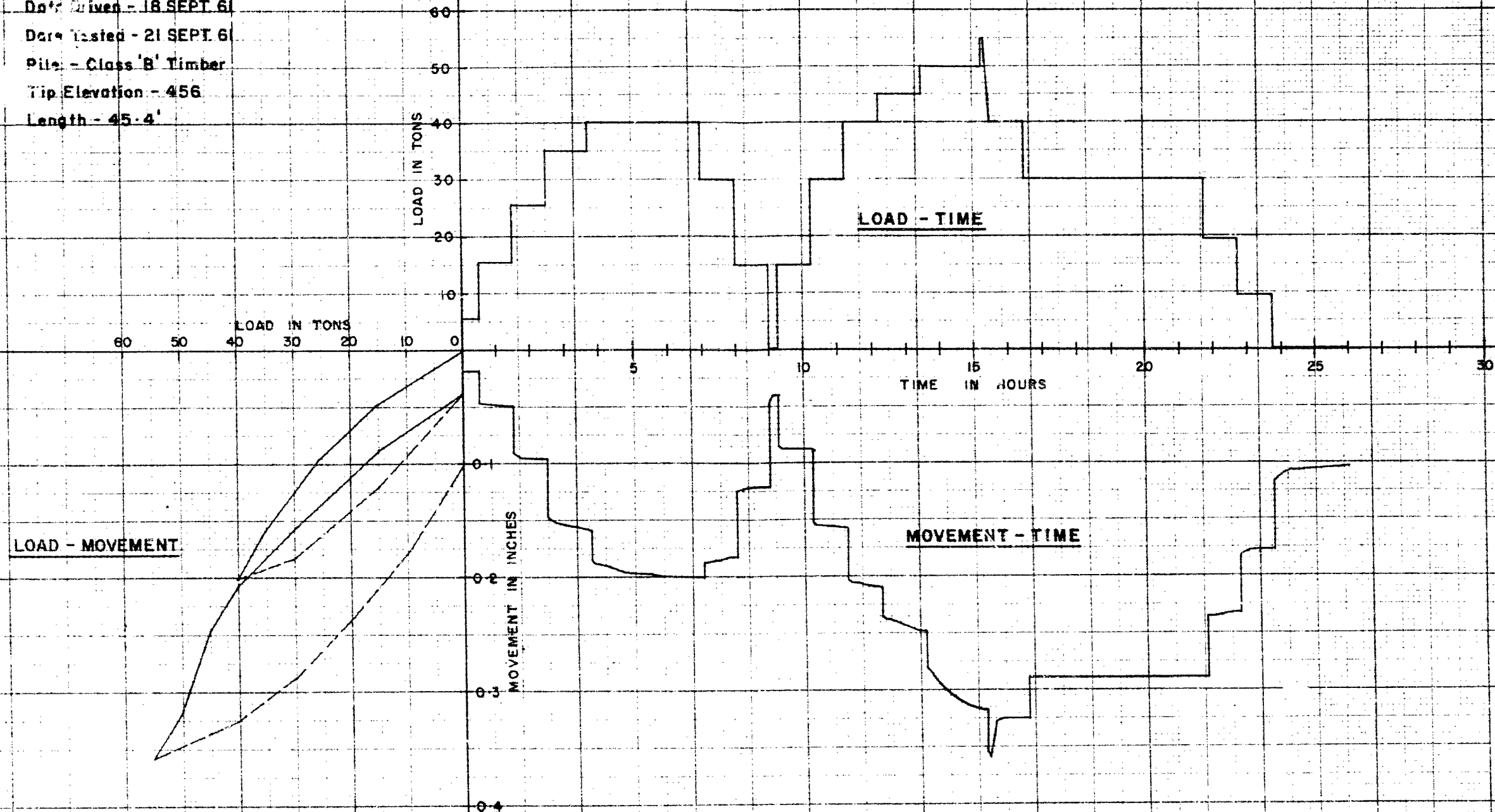
MR. R. R. MARSHALL  
DIST. MUN. ENGR.  
NORTH BAY

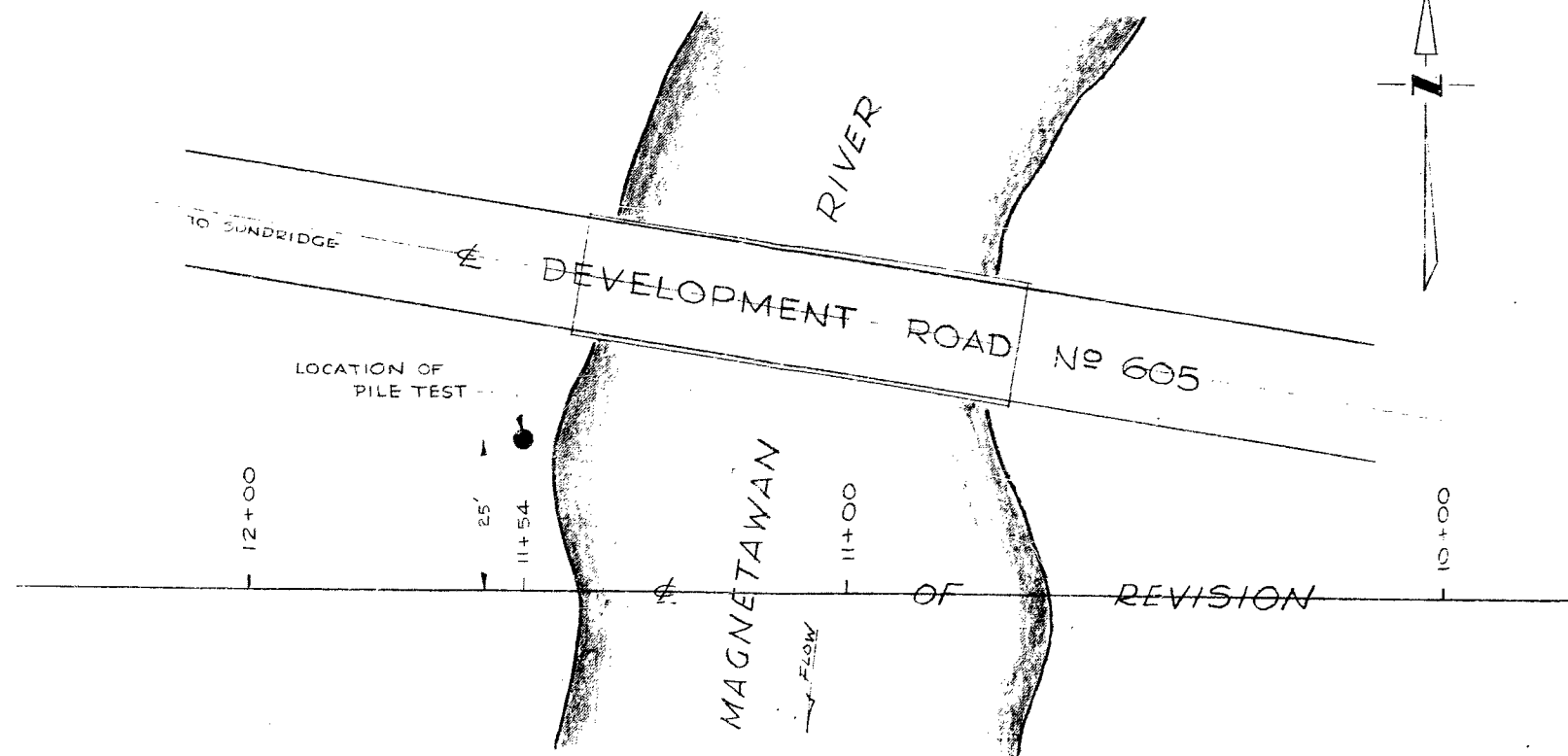
61 - F - 93

Date Tested - 21 SEPT. 61

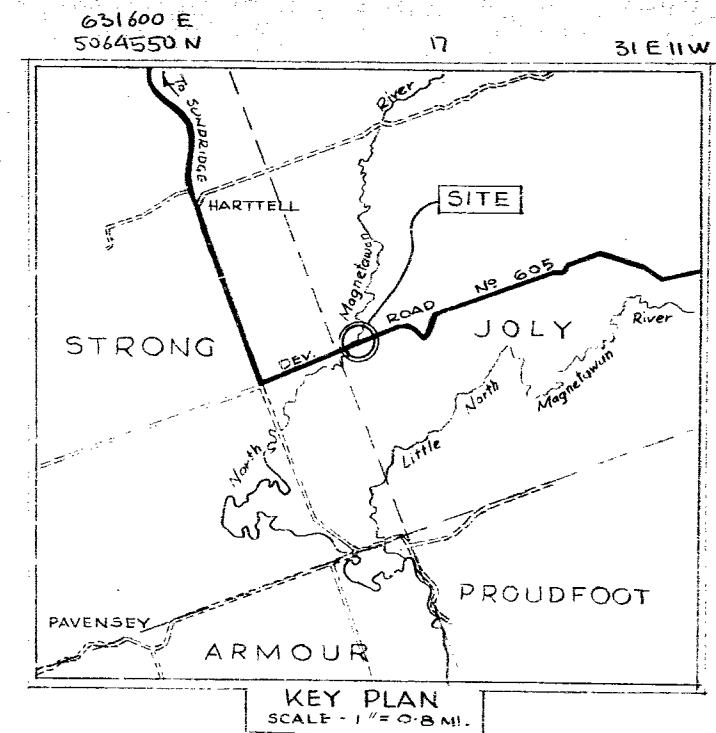
Tip Elevation - 456

Length - 45.4'





PLAN  
SCALE - 1 INCH = 20 FEET



ORIGINATED	R J SALVAS	DEPARTMENT OF HIGHWAYS - ONTARIO	SCALE AS SHOWN
DRAWN	H D REED	MATERIALS & RESEARCH SECTION	W & N
CHECKED	<i>[Signature]</i>	PILE TEST LOCATION	JOB NO 61-F-93
APPROVED	<i>[Signature]</i>	MAGNETAWAN RIVER AND	DWG NO 61-F-93A
DATE	3 OCT 1961	DEVELOPMENT ROAD NO 605	

31E-39

GEOCREs No.

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

July 6, 1961.

D.H.O. FOUNDATION INVESTIGATION  
REPORT.

W.J. 61-F-49 -- W.P. (N11).

Attention: Mr. S. McCombie.

Re: Magnetawan River and Development Road #605  
(Approx. 6.5 Miles South of Sundridge),  
Twp. of July, County of Parry Sound, Dist. #13.

Accompanying this memo, is our detailed foundation  
report on the subsoil conditions existing at the above site.

The conclusions and recommendations summarized in  
the report are, we believe, self-explanatory and should prove  
adequate for your future design work.

If we can be of further assistance in connection  
with this project, please do not hesitate to contact our Office.

AGS/MdeF  
Attach.

cc: Messrs. A. M. Toye (2)  
H. A. Tregaskes  
H. D. McMillan  
G. K. Hunter  
J. D. Foster  
E. R. Saint  
T. J. Kovich  
J. Roy  
J. E. Gruspier  
F. Norman  
A. Watt  
Foundations Office  
Gen. Files.

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

*L. G. Soderman*  
(A. G. Stermac,  
SUPERVISING FOUNDATION ENGR.)

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1. INTRODUCTION.
  2. DESCRIPTION OF SITE AND GEOLOGY.
  3. FIELD AND LABORATORY WORK.
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    - 4.2) Very Loose Fine Silty, Clayey Sand.
    - 4.3) Soft Sandy, Silty Clay.
    - 4.4) Loose to Very Dense Silty Clayey Sand and Gravel.
  5. GROUND WATER CONDITIONS.
  6. EXISTING STRUCTURE.
  7. DISCUSSION AND RECOMMENDATIONS.
  8. SUMMARY.
  9. MISCELLANEOUS.
-



## FOUNDATION INVESTIGATION

at

Magnetawan River and Development Road #605  
(Approx. 6.5 Miles South of Sundridge) Twp.  
of Joly, County of Parry Sound.  
District #13 -- W.J. 61-F-49  
W.P. (NIL).

### 1. INTRODUCTION:

It is intended to straighten Development Road No. 605 and replace the existing Wooden Bridge over the Magnetawan River, which in its present condition is unsafe for traffic. The site of the proposed bridge is located approx. 6.5 Miles South of the Town of Sundridge, Twp. of Joly, County of Parry Sound. At this location the chainage for the new line is between 10+62 and 11+78.

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, and judging from the condition of encountered soils, it could be a dried up lake bed.

The river bed is located in a depression approx. 14 feet deep.

### 3. FIELD AND LABORATORY WORK:

In order to obtain sufficient information on the types and properties of the subsoil, three sampled boreholes, supplemented by two dynamic cone penetration holes were carried out at this particular site.

Samples were taken at depth intervals of 5 and 10 feet. Samples recovered in the split spoon were used for determining the liquid and plastic limits, moisture contents, and grain-size curves.

Boreholes 1, 2 & 3 were terminated in the underlying very dense silty, clayey sand and gravel stratum at a depth of 110 ft., 110 ft., and 125 ft., respectively, below the existing ground level.

The elevations as well as the locations (chainages) of the boreholes are given on Drawing No. 61-F-49A, attached to this report (Appendix I).

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

Laboratory testing was confined to the determination of liquid limits, plastic limits, moisture contents and grain-size distribution curves.

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

cont'd. /3 ...

#### 4. SUBSOIL CONDITIONS:

##### 4.1 General.

The stratigraphy of the soil at the site was found to be quite uniform. Three main types of soil were encountered and they are:

##### 4.2 Very Loose Fine Silty Clayey Sand.

This material forms the top layer of the site and extends to about 28-31 feet below ground level. The percentage of sand in this layer is around 63%, the silt forms approx. 23%, and the rest of 14% is clay.

This layer is in a very loose condition with an average "N" value of 3. No significant increase with depth has been observed in this layer.

The average moisture content in this layer is 27.6.

##### 4.3 Soft Sandy Silty Clay.

Underlying the very loose fine, silty clayey, sand layer, is a layer of soft sandy silty clay which extends to approx. 46-52 feet below ground level.

The clay percentage in this layer is approx. 53%, silt forms around 29%, and the rest of 18% is sand.

This layer is in a soft condition with an average "N" value of about 5.

The liquid limit for this material is approx. 45.0 and the plastic limit about 23.0.

The representative value of moisture content in this layer is 31.0.

4.4 Loose to Very Dense Silty Clayey Sand and Gravel.

This material was encountered below the soft sandy silty clay stratum. This layer is in a loose to very dense condition with an average "N" value of approx. 40. An increase in density with depth is clearly distinguishable.

The representative value of moisture content in this layer is 18.5.

5. GROUND WATER CONDITIONS:

The water table at the time of investigation was found at 7'-2" in B.H.#1, and 5'-1" in B.H.#2 below existing ground elevations.

Low pressure artesian water was encountered in B.H.#2 from 95 to 101 ft. below ground elevation.

6. EXISTING STRUCTURE:

The existing wooden bridge that carries Development Road No. 605 over the Magnetawan River is erected on 25 wooden piles 8 to 10 inches in butt diameter. The piles are arranged in 5 rows at 5 piles to a row. The existing bridge is in a very bad shape. From the information gathered at the site, it seems that the piles are some 20 feet long. There is neither vertical nor horizontal bracing between the pile rows. The existing bridge was built in 1946. Remnants of a former bridge can be seen at the site selected for the new structure.

Considerable scour action and damage has been observed on the river banks, at the site of the bridge, timber cribs are the present scour protection structures.

7. DISCUSSION AND RECOMMENDATIONS:

As can be seen from the previously described soil stratigraphy, the soil consists mainly of very loose silty, clayey fine sand, soft sandy silty clay, and loose to very dense silty, clayey sand and gravel. Such a material can not provide adequate support for spread footings, neither are short displacement piles recommended because previous bridges formed on them did not stand longer than 12-15 years.

The solution we would recommend would be steel tubular piles driven down to elevation 390'-0". The load that could be attributed to such piles would be 30 tons per pile.

It should be noted that the soil at the site is of such poor quality that it can not support spread footings for the falsework.

We do not have enough hydraulic and hydrological information at our disposal to recommend scour protection measures and would advise that the hydrology section be contacted.

8. SUMMARY:

The soil stratification at the investigated site is, in general uniform. The upper layers, as described in detail in the previous paragraphs, are incompetent to support spread footings. Therefore steel tubular piles driven down to elevation 390'-0" are recommended. A safe bearing load of 30 tons per pile is suggested.

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

The ground at the structure site is of such poor quality that it can not support the spread footings of the falsework.

Scour damage was observed at the site and therefore attention is drawn to the necessity of scour protection measures.

9. MISCELLANEOUS:

The field work was carried out during the period of June 5 to June 10, 1961, by longyear skid-mounted core drills, adapted for soil sampling, under the supervision of Mr. W. Kulmatickas, Project Engineer, Foundation Subsection.

REPORT PREPARED BY:

*W. Kulmatickas*  
W. Kulmatickas,  
Project Engineer.

REPORT APPROVED BY:

*A. G. Stermac*  
A. G. Stermac,  
Supervising Foundation Eng.

**APPENDIX I.**

# SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-49

W.P. -

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	5'-6.5'	Very loose fine silty, clayey sand.	3	20.7	-	-	-	-	
	S2	10'-11.5'	Very loose fine silty clayey sand.	2	39.8	-	-	-	-	
	S3	20'-21.5'	Very loose fine silty clayey sand.	1	-	-	-	-	-	
	S4	30'-31.5'	Loose sandy clayey silt.	11	26.2	-	-	-	-	
	S5	35'-36.5'	Loose sandy clayey silt.	8	27.6	-	-	-	-	
	S6	40'-41.5'	Loose sandy clayey silt.	10	24.6	-	-	-	-	
	S7	50'-51.5'	Loose sandy clayey silt.	8	-	-	-	-	-	
	S8	55'-56.5'	Med. dense silty, clayey fine sand to fine gravel.	22	18.5	-	-	-	-	
	S9	60'-61.5'	Med. dense silty clayey fine sand to fine gravel.	12	-	-	-	-	-	
	S10	70'-71.5'	Dense silty, clayey fine sand to fine gravel.	33	20.8	-	-	-	-	
	S11	80'-81.5'	Med. dense silty, clayey fine sand to fine gravel.	24	19.6	-	-	-	-	



# SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-49

W.P. -

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	S12	90'-91.5'	Med. dense silty clayey fine sand to fine gravel.	9	19.9	-	-	-	-	
	S13	100'-101.5'	Med. dense silty clayey fine sand to fine gravel.	21	21.8	-	-	-	-	
	S14	110'-111.5'	Very dense silty clayey fine sand to fine gravel.	86-3"	-	-	-	-	-	
2	S1	10'-11.5'	Very loose silty fine sand.	14	22.8	-	-	-	-	
	S2	20'-21.5'	Loose clayey, sandy silt.	12	25.4	-	-	-	-	
	S3	30'-31.5'	Very soft silty sandy clay.	2	49.6	-	-	-	-	
	S4	40'-41.5'	Loose fine to coarse silty sand.	9	18.9	-	-	-	-	
	S5	50'-51.5'	Loose fine to coarse silty sand.	7	18.3	-	-	-	-	
	S6	60'-61.5'	Loose fine to coarse silty sand.	9	25.3	-	-	-	-	
	S7	75'-76.5'	Loose fine sand to fine silty gravel.	9	19.9	-	-	-	-	

# SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-49

W.P. -

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
2	S8	85'-86.5'	Loose fine sand to fine silty gravel.	12	15.9	-	-	-	-	
	S9	95'-96.5'	Med. dense fine sand to fine silty gravel.	26	11.0	-	-	-	-	
	S10	105'-106.5'	Very dense fine sand to fine silty gravel.	77 for 9"	14.1	-	-	-	-	
3	S1	10'-11.5'	Very loose fine silty sand.	2	28.6	-	-	-	-	
	S2	20'-21.5'	Loose fine to med. silty sand.	7	27.6	-	-	-	-	
	S3	30'-31.5'	Very soft sandy silty clay.	4	34.6	-	-	-	-	
	S4	40'-41.5'	Very soft sandy silty clay.	2	45.8	-	-	-	-	
	S5	50'-51.5'	Loose fine sand to fine silty gravel.	8	30.0	-	-	-	-	
	S6	60'-61.5'	Loose fine to med. silty sand with traces of gravel.	9	21.3	-	-	-	-	
	S7	70'-71.5'	Med. dense fine to med. silty sand and gravel.	28	29.2	-	-	-	-	

# SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-49

W.P. -

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
3	S8	80'-81.5'	Loose fine to med. silty sand and gravel.	9	20.8	-	-	-	-	
	S9	95'-96.5'	Loose fine sand to fine silty gravel.	10	16.0	-	-	-	-	
	S10	105'-106.5'	Very dense fine to coarse silty sand and gravel.	50	8.2	-	-	-	-	
	S11	115'-116.5'	Very dense fine sand to coarse silty gravel.	54	6.7	-	-	-	-	
	S12	125'-126.5'	Very dense fine sand to coarse silty gravel.	96	16.8	-,	-	-	-	
			S denotes split spoon sample.							

## OFFICE REPORT ON SOIL EXPLORATION

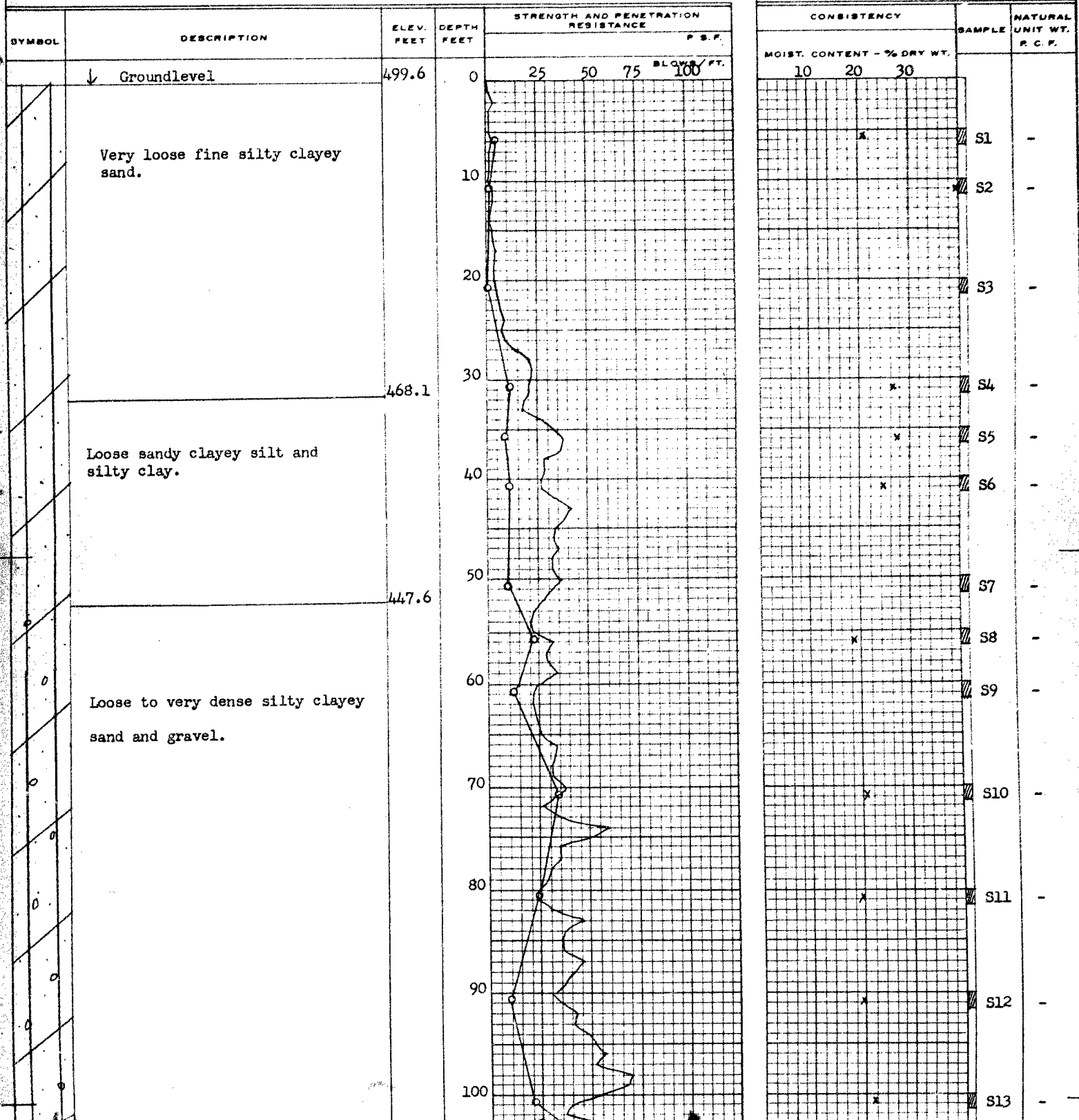
DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. \_\_\_\_\_ BORE HOLE NO. 1  
 JOB 61-F-49 STATION 10+62 (E)  
 DATUM 499.6' COMPILED BY B.K.  
 BORING DATE June 6/61 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 \_\_\_\_\_

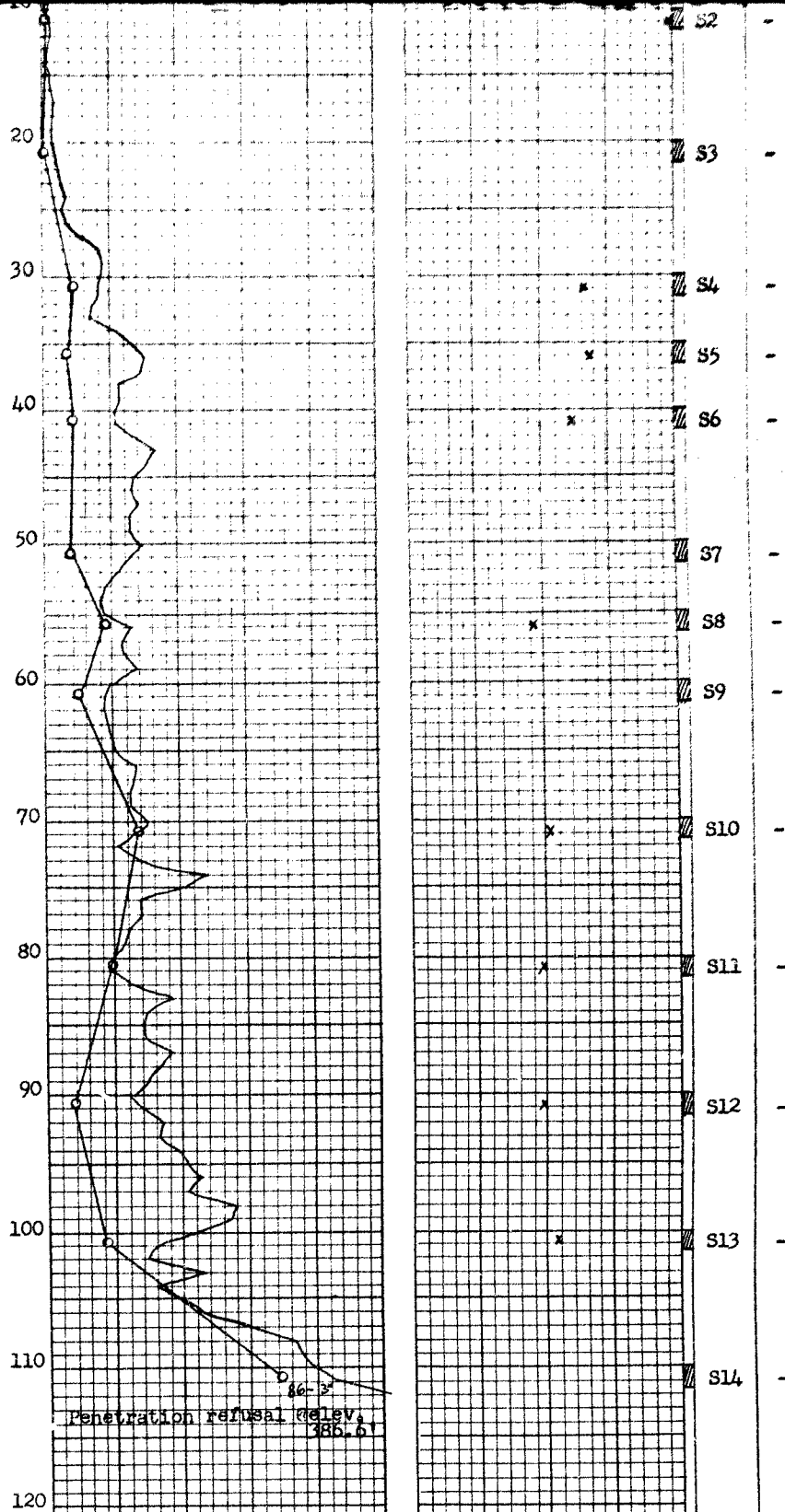


Loose sandy clayey silt and silty clay.

Loose to very dense silty clayey sand and gravel.

End of borehole.

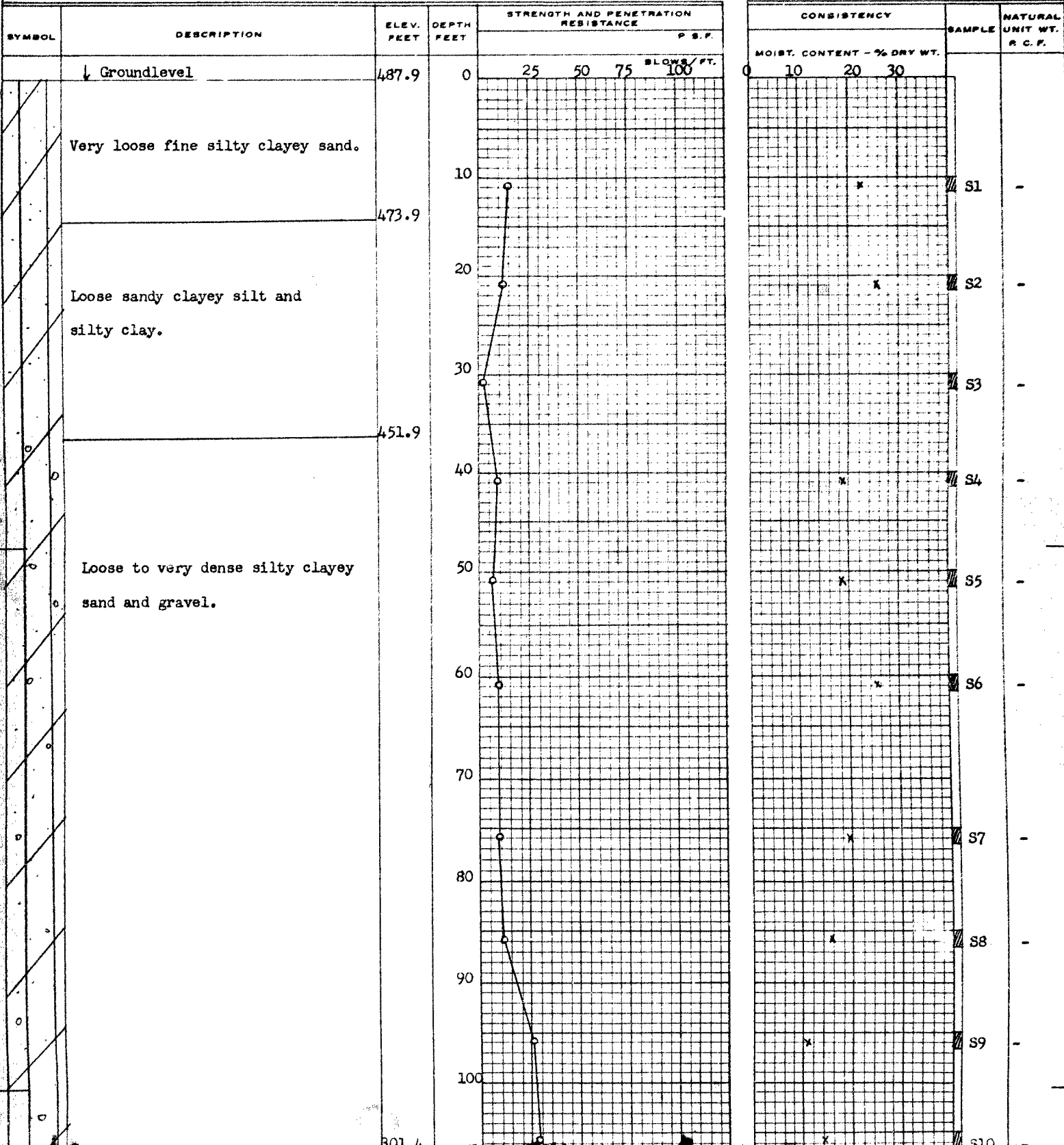
Penetration resistance profile shown; obtained by driving a 2" dia. cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow.



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. - BORE HOLE NO. 2  
JOB 61-F-49 STATION 11/10 (5' Rt.)  
DATUM 487.9' COMPILED BY B.K.  
BORING DATE June 7/61 CHECKED BY W.W.K.

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



Loose sandy clayey silt and  
silty clay.

Loose to very dense silty clayey  
sand and gravel.

End of borehole.

10

20

30

40

50

60

70

80

90

100

110

S1

S2

S3

S4

S5

S6

S7

S8

S9

S10

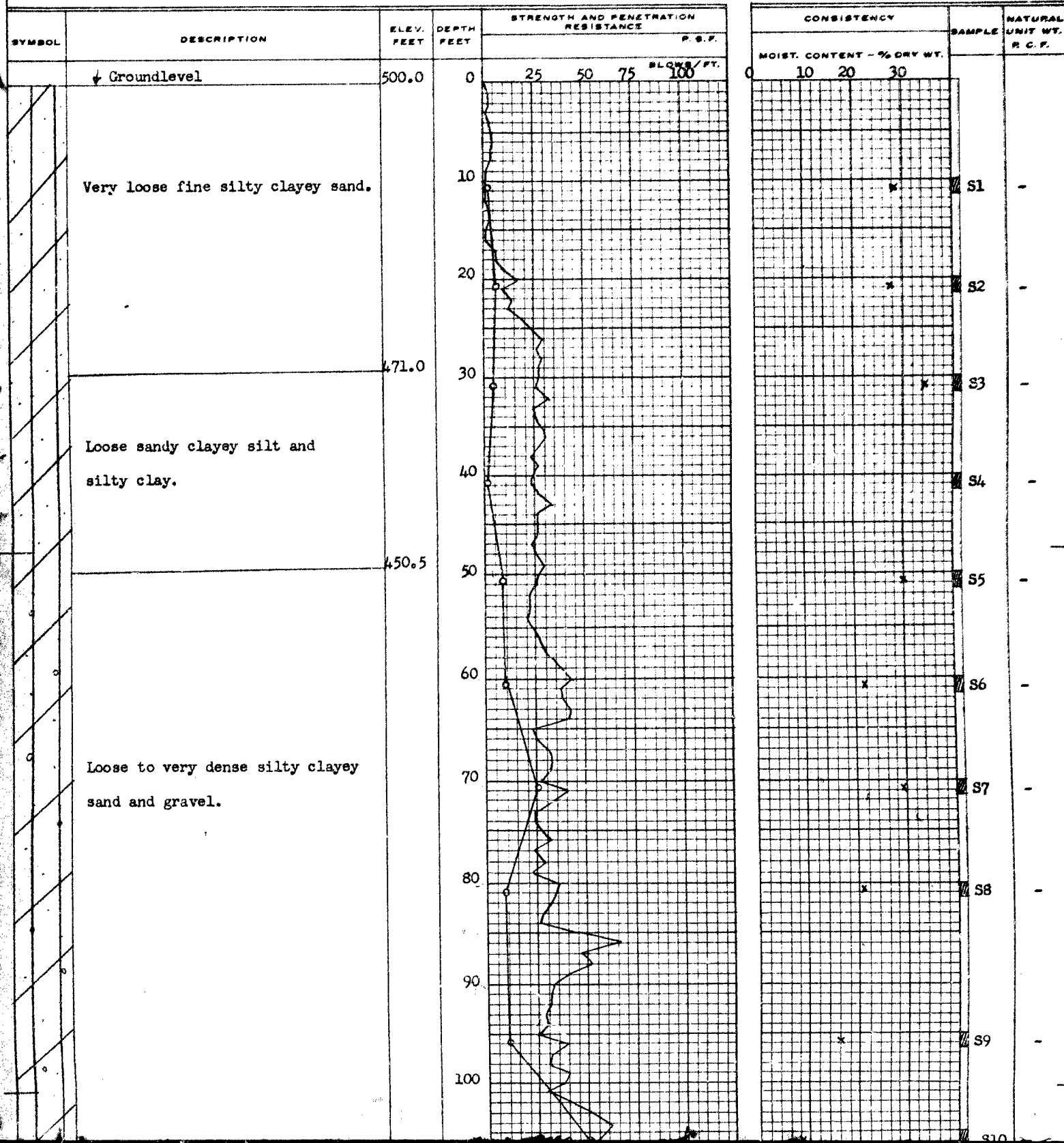
DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. - BORE HOLE NO. 3  
JOB 61-F-49 STATION 11764 E  
DATUM 500.0' COMPILED BY B.K.  
BORING DATE June 9/61 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)---	+S
NATURAL MOISTURE AND	LI
LIQUIDITY INDEX -----	X
LIQUID LIMIT -----	LO
PLASTIC LIMIT -----	LP





Very loose fine silty clayey sand.

Loose sandy clayey silt and silty clay.

Loose to very dense silty clayey sand and gravel.

End of borehole.

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.

471.0

450.5

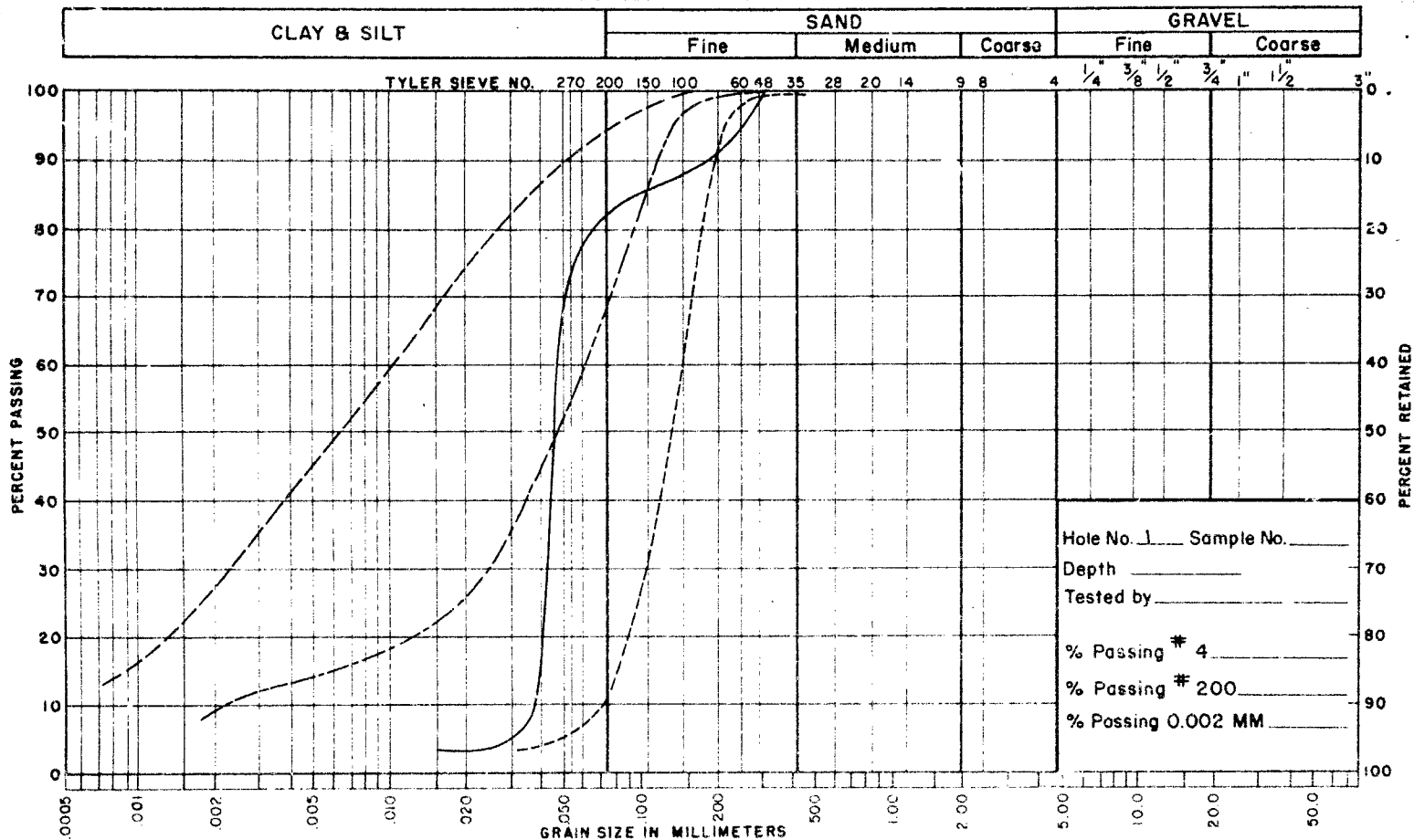
373.5

10  
20  
30  
40  
50  
60  
70  
80  
90  
100  
110  
120  
130

Penetration refusal @ elev. 374.1

S1  
S2  
S3  
S4  
S5  
S6  
S7  
S8  
S9  
S10  
S11  
S12

# UNIFIED SOIL CLASSIFICATION SYSTEM



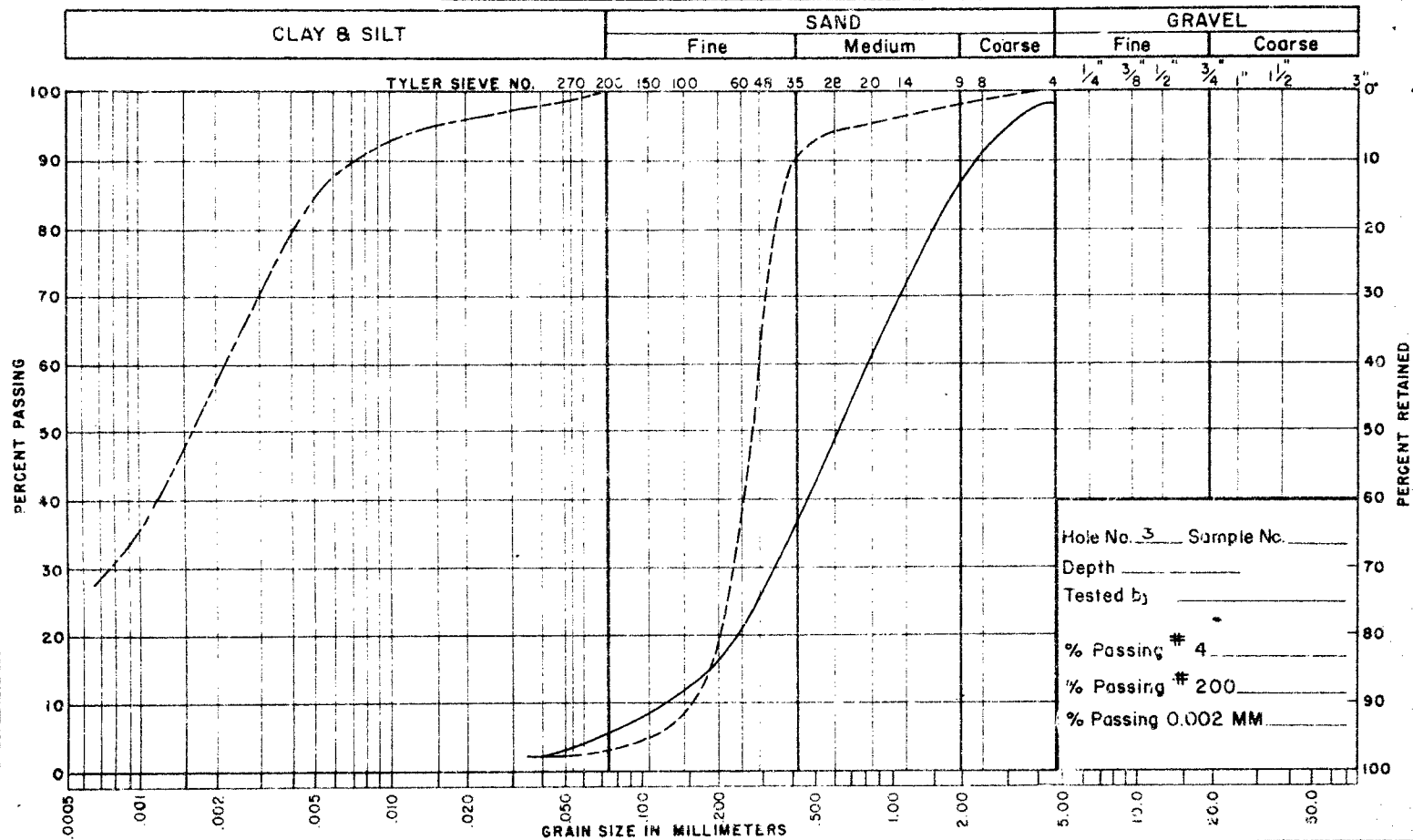
NOTES

-----	SAMPLE DEPTH	30'-0" To 31'-6"
-----	" "	40'-0" " 41'-6"
-----	" "	70'-0" " 71'-6"
-----	" "	100'-0" " 101'-6"

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

Job No. 61-E-49 W.P. No. \_\_\_\_\_  
Location DEV. ROAD #605 AND BRIDGE OVER MAGNETAWAN RIVER

# UNIFIED SOIL CLASSIFICATION SYSTEM

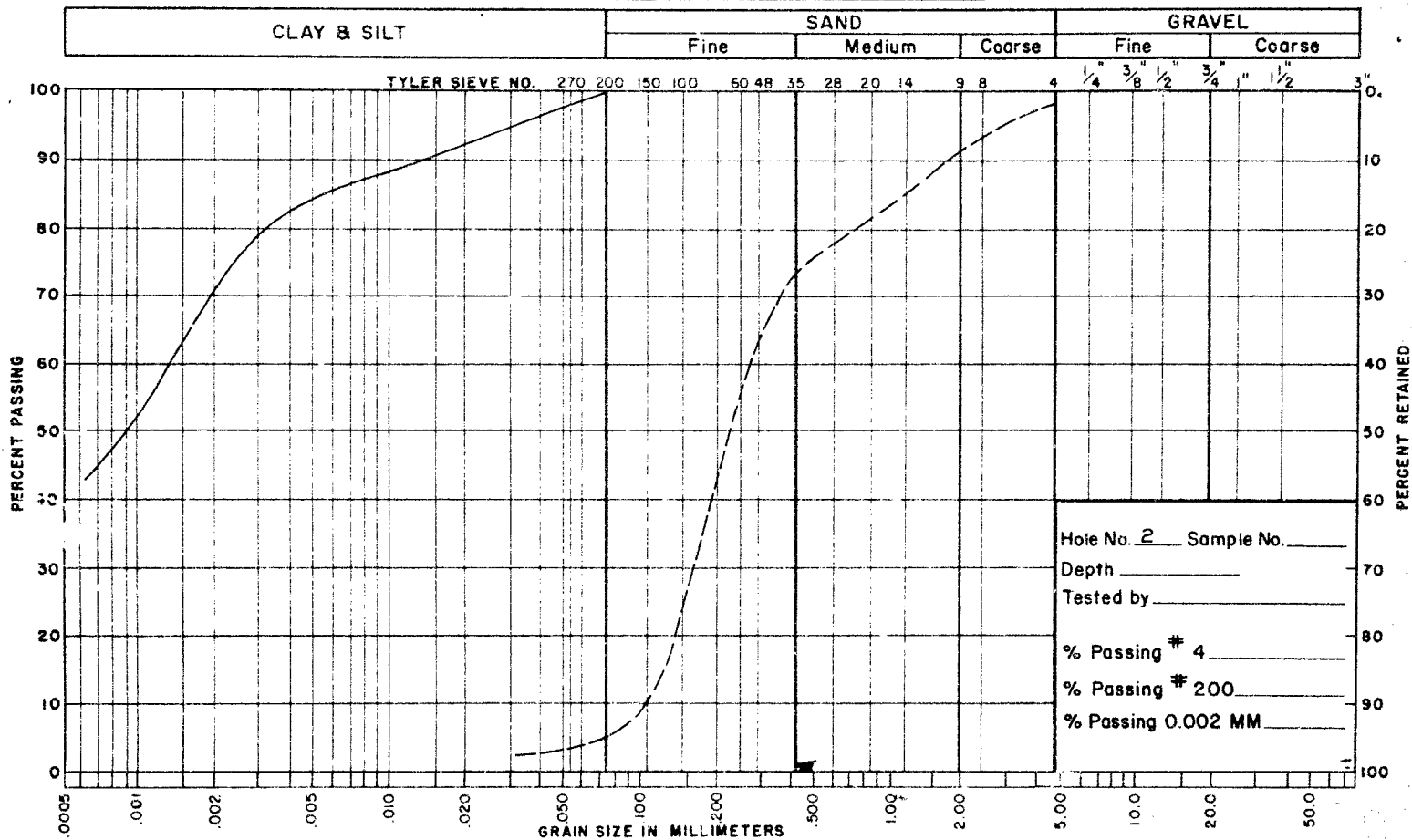


NOTES: SAMPLE DEPTH 40'-0" TO 41'-6"  
 --- " --- " 70'-0" TO 71'-6"  
 --- " --- " 125'-0" TO 126'-6"

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

Job No. 61-F-49 W.P. No. \_\_\_\_\_  
 Location DEV. ROAD #605 BRIDGE OVER MAGNETOWAN RIVER

# UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES \_\_\_\_\_ SAMPLE DEPTH 30'-0" TO 31'-6"

\_\_\_\_\_ " " " 75'-0" TO 76'-6"

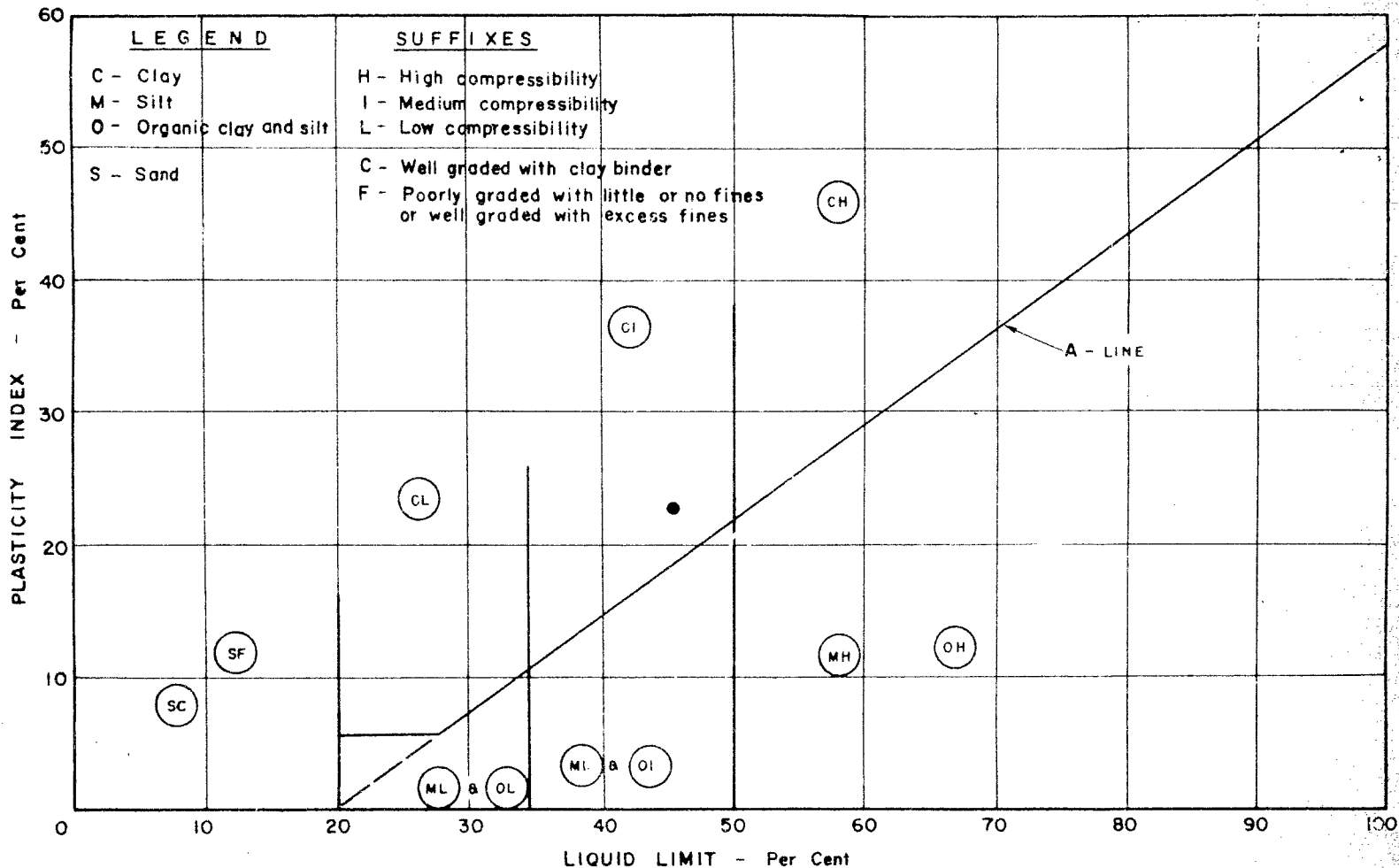
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DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH SECTION  
**GRAIN SIZE DISTRIBUTION**

Job No. 61-F-49 W.P. No. \_\_\_\_\_

Location DEY ROAD #605 BRIDGE OVER MAGNETAWAN RIVER



NOTES B.H.#3

SAMPLE #4 DEPTH 40'-0" TO 41'-6"

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH SECTION  
PLASTICITY CHART

Job No. 61-F-49

W.P. No.

Location