

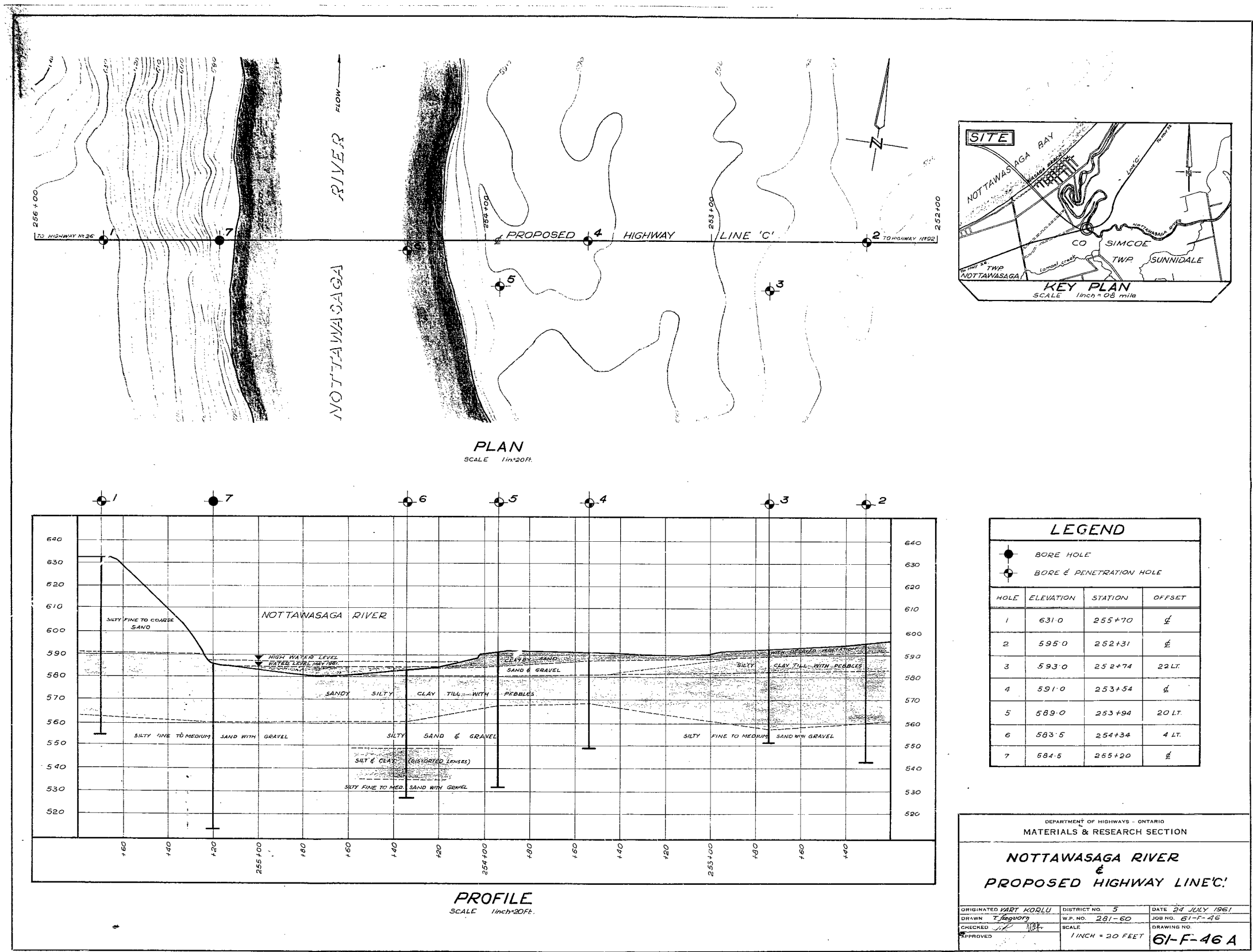
61-F-46

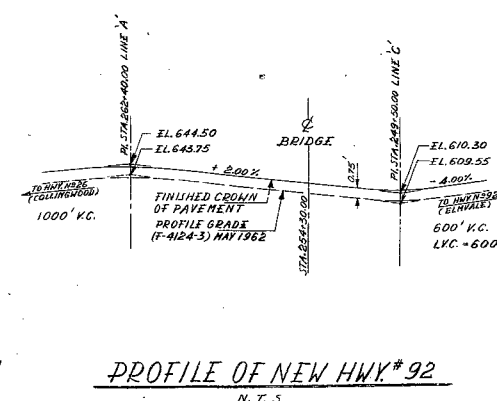
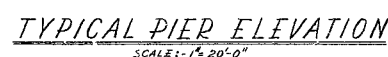
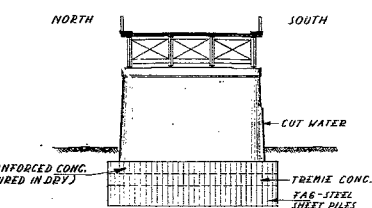
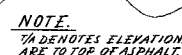
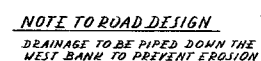
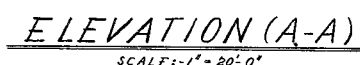
W.P. # 281-60

NOTTAWASAGA

RIVER BR. E

PROP. NEW HWY.





STAYNER
GBM Elev. 710.48 N° DCLXIII
IMMENSE BOULDER AT NORTHEAST LIMIT OF CNR, RIGHT
OF WAY 3/4 MILES SOUTHEAST OF STATION AND BETWEEN
NINTH AND TENTH POLES; NORTHWEST OF MILE POST 19
FROM ALLANDALE - 500 FEET SOUTHEAST OF ROAD
BETWEEN LOTS 4 AND 2 OF SUNNIBDALE.
DOUBT IF WORKS FOUND IN NORTHWEST FACE OF BOULDER
FOOT ABOVE GROUND.

DEPARTMENT OF HIGHWAYS ONTARIO			
BRIDGE DIVISION			
<u>NOTTAWASAGA RIVER BRIDGE</u>			
<u>APPROX. 1 MILE SOUTH OF WASAGA BEACH.</u>			
KING'S HIGHWAY No. <u>NEW 92</u>		DIST. No. <u>5</u>	
CO. <u>SIMCOE</u>			
TWP. <u>SUNNIDALE</u>	LOT <u>2 E.S.R.</u>	CON. <u>XIV.</u>	
<u>PRELIMINARY PLAN</u>			
APPROVED _____		SITE No. <u>31-413</u>	W.P. No. <u>281-60</u>
BRIDGE ENGINEER			
DESIGN <u>H. G. B.</u>	CHECK _____	CONTRACT	
DRAWING <u>J. S.Z.</u>	CHECK <u>K. G. B.</u>	No.	
DATE <u>MAY 1962</u>	LOADING <u>H20-516</u>	DRAWING No.	<u>D-5062-P1</u>

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

August 10, 1961.

D.R.C. FOUNDATION INVESTIGATION
REPORT.
M.J. 61-P-46 -- (M.F. 281-60.)

Attention: Mr. S. McGowan.

Re: Nottawasaga River Bridge,
New Highway, District #5,
Owen Sound, Ontario.

100-21

Attached herewith, we are forwarding to you, our detailed foundation report on the subsoll conditions existing at the above site.

The conclusions and recommendations summarized in the report should prove adequate for your future design work. However, should there be any queries concerning this report, please do not hesitate to contact our Office.

L. C. Stern,
Principal.

L. C. Stern,
PRINCIPAL FOUNDATION REGR.

cc: Messrs. A. M. Toys (2)
H. A. Trogaskar
H. C. Hamilton
A. Gater
H. Greenland
J. Roy
T. J. Kovich
J. C. Crispier
C. E. Saint
F. Norman
A. Watt
Foundations Office
Gen. Files.

Per:

Alfred Stern
(L. C. Stern,
SUPERVISING FOUNDATION REGR.)

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FOUNDATION INVESTIGATION

At

Nottawasaga River Bridge,
New Highway, District #5,
W.P. 281-60 - W.J. 61-F-46.

1. INTRODUCTION:

This report contains the detailed results of field soil investigation and laboratory tests, together with recommendations for the foundations for the proposed new bridge at proposed Line 'C' and Nottawasaga River crossing.

The site is located about 6 miles upstream from the mouth of the Nottawasaga River at Wasaga Beach, Conc. XIV, Lot 2, Twp. of Sunnidale, County of Simcoe.

2. DESCRIPTION OF SITE AND GEOLOGY:

At this location the Nottawasaga River is curving its course northward and has formed a steep high bank (about 50 ft.) on the West side and a low, flat bank on the East side.

This site is located in the physiographic region known as the Simcoe Lowlands. After the recession of the Wisconsin Glacier, this area was covered by glacial Lake Algonquin and later by Lake Ipiissing. During the interval period, certain sections of the glacier made re-advances. This would account for the presence of very hard reworked till material in between the two layers of sand deposit.

cont'd. /2 ...

3. FIELD AND LABORATORY WORK:

The soil investigations were carried out by means of a coredrill machine adapted for soil sampling. During the investigation 7 boreholes were made, one hole under each proposed footing. Adjacent to each borehole a dynamic cone penetration test was also made. For the two holes (B.H.'s 6 & 7) drilled in the river, the operations were carried out by mounting the coredrill on a raft.

The boreholes were advanced by conventional wash-boring methods. Samples were taken at regular 5 ft. intervals. In granular soils the samples were taken by a 2" O.D. split-barrelled spoon sampler. The dimensions of this sampler and the energy used in driving it, conform to the requirements of the Standard Penetration Test.

The split spoon samples were visually examined in the field and representative samples were brought to the laboratory for further tests.

The logs of the boreholes and their location are shown on Drawing 61-P-46A attached under Appendix I.

4. SOIL TYPES ENCOUNTERED:

The investigations at the site revealed the following subsoil conditions.

At the West side of the river the top material is brown, fine to coarse, silty sand. Underneath this sand deposit is a layer of dense gray, sandy, silty clay till. Underlying the till material is a layer of grey, silty fine to medium sand.

4. SOIL TYPES ENCOUNTERED: (cont'd.) ...

At the East side the top is covered with 3' - 4' of dark brown clayey sand and gravel with decomposed organic matter and fragments of decayed wood. Below this layer the dense till material was intersected. The upper portion of the till layer is oxidized and has a brown colour with occasional distorted lenses of grey silt material. The lower portion of this layer is grey in colour with an increased sand and gravel content. This till layer is underlain by grey silty fine to medium sand. In boreholes 4 & 5, instead of brown till, a deposit of sand and gravel was encountered and the grey till layer was intersected immediately below this deposit.

1. West Side of the River:

a) Brown Silty Fine to Coarse Sand (Borehole No. 1) -

The top layer on the West side of the river is made up of well graded fine to coarse sand. Occasional seams of silty clay and gravel particles of 1/4" to 2" in size were also encountered. The intersected layer is about 40 ft. thick. The material in the upper 13 ft. of the layer is medium dense ($N = 18$) and the lower portion is very densely compacted ($N = 100$). The material in this layer is moist to dry.

b) Grey, Sandy Silty Clay Till (Boreholes 1, 2, 3, 4, 5, 6 & 7)

Underlying the sand layer is a dense layer of grey, sandy silty clay till. The grain size distribution shows a range of particle sizes varying from clay silt to coarse sand and gravel. The matrix of the material is very hard silty clay of low compressibility. The layer contains about 25% sand particles and fine gravel of 1/2" max. size. The Standard Penetration Tests indicate that the whole layer is in a very dense state of compaction.

cont'd. /4 ...

4. SOIL TYPES ENCOUNTERED: (cont'd.) ...

1. West Side of the River: (cont'd.) ...

c) Grey, Silty Fine to Medium Sand (Boreholes 1,2,3,4,5,6 & 7)

Below the till a layer of silty, fine to medium sand was encountered. This layer is made up of fine to medium sand. It contains about 20% silt and clay and occasional gravels of $1\frac{1}{2}$ " max. size.

The Standard penetration tests indicate ($N = 45$ to 100) that the layer is in a very dense state of compaction. This layer is water bearing and the hydrostatic pressure of the water in the layer is about 5 ft.

2. East Side of the River:

a) Dark Brown Clayey Sand (Boreholes 2, 3, 4, 5) -

On the East side of the river a dark brown clayey sand layer of 3' - 4' thickness covers the top of the ground. Of this the upper 1 ft. is topsoil dark clay, and the remainder is sand with clay. The layer is recent flood deposit and contains decayed organic matter and pieces of wood.

b) Brown, Grey Silty Clay Till (Boreholes 2 & 3) -

Below the top deposit material a layer of brown silty clay till layer was intersected (boreholes 2 & 3). This brown material is about 6 ft. thick and then changes to grey till. The matrix is silty clay of low compressibility.

It contains about 15% sand and occasional gravels. The material is oxidized and has a brown colour. Some distorted lenses of grey silt were also encountered near the bottom. Its measured moisture content is about 13% and Standard Penetration tests indicate an average of 30 blows per foot penetration.

4. SOIL TYPES ENCOUNTERED: (cont'd.) ...

2. East Side of the River: (cont'd.) ...

a) Sand and Gravel (Boreholes 4, 5 & 6) -

In boreholes 4 & 5 under the topsoil a deposit of sand and gravel of about 8 ft. thickness was encountered. The layer has the appearance of old river bed deposit with gravel particles of max. 3" size.

The Standard Penetration test results (average 23 blows per foot) indicate that the material is in a medium to dense state of compaction.

c) Silt and Clay (Borehole 6) -

In borehole 6 at a depth of about 35 ft. interbedded in silty sand layer, a deposit of silt and clay about 13 ft. thick, was encountered. Laboratory test results performed on undisturbed samples showed the following average properties of the material:-

L.L. - 28%

P.L. - 16%

M.C. - 25%

Density - 125 p.c.f.

Shear strength (vane) - 1600 -- 2000 p.s.f.

From these results it follows that the material in the layer is silty clay of low compressibility and has a stiff consistency.

5. GROUND WATER:

During the subsoil investigations the following underground water situation was observed:-

B.H. #1. In the hole some infiltration water was observed at the bottom of the upper brown silty sand layer (elevation 592 ft.).

5. GROUND WATER: (cont'd.) ...

B.H. #1 - (cont'd.) ...

At the contact of the grey silty sand layer (elevation 563 ft.) the ground water overflowed the casing for a while and then subsided. A few days later the water in the hole was contacted at about 592 ft.

B.H.'s. #2, 3, 4, 5, 6 & 7: In these boreholes the soil became saturated at the river water elevation. However, at the contact of the grey silty sand layer (elevation 560 ft.) the water in the casing pushed up to the ground level and then subsided. In borehole 7 after a depth of 70 ft., the water kept flowing out of the hole continuously. The measured hydrostatic pressure was about 5 ft. above the ground level. On completion of the sampling, the hole was plugged.

6. FOUNDATION CONSIDERATIONS AND RECOMMENDATIONS:

The subsoil at the site consists of a granular deposit interbedded with a very dense sandy silty clay till layer about 12 to 30 ft. thick. This situation is favourable for the support of simple spread footing type foundations.

West Abutment (B.H. 1)

It is recommended to place the west abutment footing about 5 ft. below the proposed grade line, (i.e., elev. about 611 ft.). A safe bearing pressure of 3 T.S.F. is recommended.

cont'd. // ...

6. FOUNDATION CONSIDERATIONS AND RECOMMENDATIONS: (cont'd.) ...
East Abutment (B.H. 2)

It is recommended to found the east abutment footing in the grey till layer, at about elevation 580 ft. with a safe bearing pressure of 3 T.S.F. This will involve about 15 ft. of excavation. If this operation proves impractical, the same depth could be reached by means of short piles.

Piers on East Side (B.H.'s 3, 4, & 5)

It is recommended to place these footings in the grey till material at about elevation 580 ft. A safe bearing pressure of 3 T.S.F. is recommended.

Piers in the River (B.H.'s 6 & 7)

It is recommended to place these footings at about elevation 575 ft. in the grey till layer with a safe bearing pressure of 3 T.S.F.

It is believed that no difficulties will be encountered during the excavations for the two abutments (B.H.'s 1 & 2) and the one pier on the east side (B.H. 3).

Sheet piling and dewatering operations will be required during the excavations for the two piers in the river (B.H.'s 6 & 7) and the adjacent two piers on the east side (B.H.'s 4 & 5).

It is recommended to leave the sheet piles in place in order to provide protection to the piers.

7. SUMMARY:

1. The subsoil stratification at this site consists of granular sand and gravel deposit material at the top underlain by sandy, silty clay till which, in turn, overlies a deep layer of silty sand and gravel. The material in the layers is in a dense to very dense state of compaction; therefore, favourable for the support of spread footing type foundations.

7. SUMMARY: (cont'd.) ...

2. It is recommended to place the footings at the following elevations and use a safe bearing pressure of 3 T.S.F.

West Abutment: B.H. 1) About 5 ft. below the proposed grade line elevation.

East Abutment and Piers: (B.H.'s 2, 3, 4 & 5) At about elevation 580 ft.

Piers in the River: (B.H.'s 6 & 7) At about elevation 575 ft.

3. Sheet piling and dewatering operations will be required for placing the two piers in the water and the adjacent two piers on the east side (B.H.'s 4, 5, 6 & 7).

4. Both the approach fill on the east side and the cut on the west side do not present any stability problems.

8. MISCELLANEOUS:

The field work was carried out during May 25 to June 23, 1961, under the supervision of Project Foundation Engineer, V. Korlu. All laboratory testing was done by the Materials and Research Section.

REPORT PREPARED BY:

..... *V. Korlu*
V. Korlu,
PROJECT FOUNDATION ENGR.

August 1961.

REPORT APPROVED BY:

..... *A. G. Sternac*
A. G. Sternac,
SUPERVISING FOUNDATION ENGR.

APPENDIX I.

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-46

W.P. 281-60

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'	Brown fine to medium silty sand with gravel.	15	-	-	-	-	-	
	S2	6'-7.5'	" " " "	22	-	-	-	-	-	
	S3	9'-10.5'	" " " "	17	-	-	-	-	-	
	S4	15'-16.5'	" " " "	72	20.6	-	-	-	-	
	S5	20'-20.5'	" " " "	85-6"	-	-	-	-	-	
	S6	25'-26'	" " " "	142	-	-	-	-	-	
	S7	30'-30.5'	" " " "	157-7"	-	-	-	-	-	
	S8	35'-36.5'	" " " "	78	-	-	-	-	-	
	T9	40'-41.5'	Grey, sandy, silty clay till with pebbles.	84	11.1	12.9	23.0	>4880	145.8	
	S9A	41.5'-43'	" " " "	81						
	S10	45'-46.5'	Grey, sandy, silty clay till with pebbles.	32	-	-	-	-	-	
	S11	50'-51.5'	" " " "	96	-	-	-	-	-	
	S12	55'-56.5'	" " " "	195	-	-	-	-	-	
	S13	60'-61.5'	" " " "	208	10.5	10.7	18.6	-	-	
	S14	65'-66.5'	" " " "	88	-	-	-	-	-	
	S15	70'-71.5'	Grey silty fine to medium sand with gravel.	81	9.1	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-46

W.P. 281-60

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	S16	75'-76'	Grey silty fine to medium sand with gravel.	127	-	-	-	-	-	
2	S1	3'-4.5'	Brown clayey sand with decayed vegetation.	24	-	-	-	-	-	
	S2	9'-10.5'	Brown grey silty clay till with pebbles.	23	13.0	12.5	21.3	-	-	
	S3	14'-15.5'	Grey, sandy, silty clay till with pebbles.	157	8.4	10.7	17.3	-	-	
	S4	19'-20.5'	" " " "	124	-	-	-	-	-	
	S5	25'-26'	" " " "	128	5.6	-	-	-	-	
	S6	30'-30.6'	" " " "	100-7"	-	-	-	-	-	
	S7	35'-36.5'	Grey silty fine to medium sand with gravel.	53	-	-	-	-	-	
	S8	40'-41.3'	" " " "	155-10"	20.1	-	-	-	-	
	S9	45'-46.5'	" " " "	140	-	-	-	-	-	
	S10	50'-51.5'	" " " "	131	-	-	-	-	-	
3	S1	3'-4.5'	Brown clayey sand and gravel.	17	-	-	-	-	-	
	S2	6'-7.5'	Brown grey silty clay till with pebbles.	37	12.5	11.2	19.2	-	-	
	S3	9'-10.5'	" " " "	49	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-46

W.P. 281-60

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PFNETIN RESIST. BLOWS FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
3	S4	15'-16.5'	Grey, sandy, silty clay till with pebbles.	80	9.5	11.2	17.0	-	-	
	S5	20'-21.5'	" " " "	91	-	-	-	-	-	
	S6	25'-26.5'	" " " "	79	-	-	-	-	-	
	S7	30'-31.5'	" " " "	80	9.4	-	-	-	-	
	S8	35'-36.5'	Grey silty fine to medium sand.	71	-	-	-	-	-	
	S9	40'-41.5'	" " " "	49	18.8	-	-	-	-	
4	S1	3'-4.5'	Brown clayey sand (decayed vegetation).	21	-	-	-	-	-	
	S2	6'-7.5'	Sand and gravel.	38	-	-	-	-	-	
	S3	9.5'-11'	Grey, sandy, silty clay till with pebbles.	43	-	-	-	-	-	
	S4	15'-16.5'	" " " "	88	-	-	-	-	-	
	S5	20'-21.5'	" " " "	122	-	-	-	-	-	
	S6	25'-26.7	Grey silty fine to medium sand with gravel.	86	-	-	-	-	-	
	S7	30'-31.5'	" " " "	104	-	-	-	-	-	
	S8	35'-36.5'	" " " "	103	-	-	-	-	-	
	S9	40'-41.5'	" " " "	111	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-46

W.P. 281-60

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
5	S1	3'-4.5'	Brown clayey sand with decayed vegetation.	18	-	-	-	-	-	
	S2	6'-7.5'	Sand and gravel.	14	-	-	-	-	-	
	S3	9'-10.5'	Grey sandy, silty clay till with pebbles.	77	-	-	-	-	-	
	S4	15'-16.5'	" " " " "	99	-	-	-	-	-	
	S5	20'-21.5'	" " " " "	49	-	-	-	-	-	
	S6	25.5'-27'	Silty sand and gravel.	43	-	-	-	-	-	
	S7	30'-31.5'	" " " "	19	-	-	-	-	-	
	S8	35'-36.5'	" " " "	90	-	-	-	-	-	
	S9	40'-41.5'	Grey silty fine to medium sand with gravel.	111	-	-	-	-	-	
	S10	45'-46.5'	Grey silty fine to medium sand with gravel.	105	-	-	-	-	-	
	S11	50'-51.5'	" " " "	117	-	-	-	-	-	
	S12	55'-56.5'	" " " "	158	-	-	-	-	-	
6	S1	6.7'-7.7'	Grey, sandy, silty clay till with pebbles.	182	-	-	-	-	-	
	S2	9'-10.5'	" " " "	104	-	-	-	-	-	
	S3	14'-15.5'	" " " "	53	9.6	11.3	17.2	-	144.0	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-46

W.P. 281-60

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	S4	19'-20.5'	Grey, sandy, silty clay till with pebbles.	10	-	-	-	-	-	
	S5	24'-25.5'	Silty sand and gravel.	21	-	-	-	-	-	
	S6	29'-30.5'	" " " "	36	-	-	-	-	-	
	S7	34'-35.5'	Clay and silt.	9	-	-	-	-	-	
	T8	35.5'-37'	" " "	Pushed	23.3	14.9	21.5	1395	130.0	
	S9	39'-40.5'	" " "	7	-	-	-	-	-	
	T10	40.5'-41.5'	" " "	Pushed	27.3	16.6	34.0	1190	120.5	
	S11	45'-46.5'	" " "	39	22.2	20.8	27.3	-	-	
	S12	50'-51.5'	Grey silty fine to medium sand with gravel.	32	-	-	-	-	-	
	S13	55'-56.5'	" " " "	37	19.4	-	-	-	-	
	S14	60'-61.5'	" " " "	125	-	-	-	-	-	
	S15	65'-66.5'	" " " "	62	-	-	-	-	-	
7	S1	5'-6.5'	Grey, sandy, silty clay till with pebbles.	42	-	-	-	-	-	
	S2	10'-11.5'	" " " "	82	9.5	10.7	16.2	-	135.9	
	S3	15'-16.5'	" " " "	78	-	-	-	-	-	
	S4	20'-21.5'	" " " "	84	7.5	9.2	12.8	-	139.3	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-46

W.P. 281-60

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
7	S5	25'-26.5'	Grey silty fine to medium sand with gravel.	76	-	-	-	-	-	
	S6	30'-31.5'	" " " "	53	-	-	-	-	-	
	S7	35'-36.5'	" " " "	46	-	-	-	-	-	
	S8	40'-41.5'	" " " "	18	-	-	-	-	-	
	S9	45'-46.5'	" " " "	52	11.3	-	-	-	-	
	S10	50'-51.5'	" " " "	50	-	-	-	-	-	
	S11	55'-56.5'	" " " "	16	16.7	-	-	-	-	
	S12	60'-61.5'	" " " "	21	-	-	-	-	-	
	S13	65'-66.5'	" " " "	18	-	-	-	-	-	
	S14	69'-70.5'	" " " "	40	-	-	-	-	-	
			S denotes split spoon sample. T " shelly tube sample.							

DEPARTMENT OF HIGHWAYS - ONTARIO

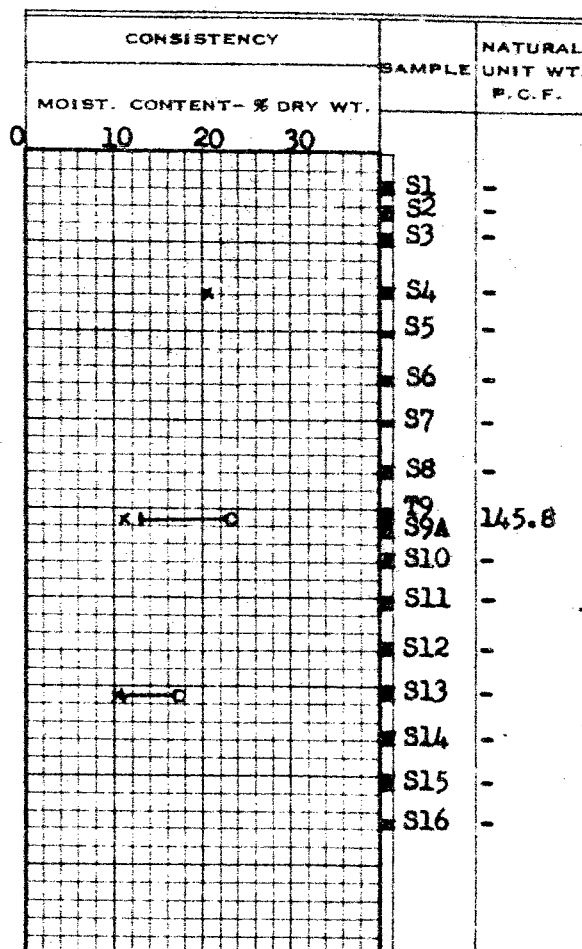
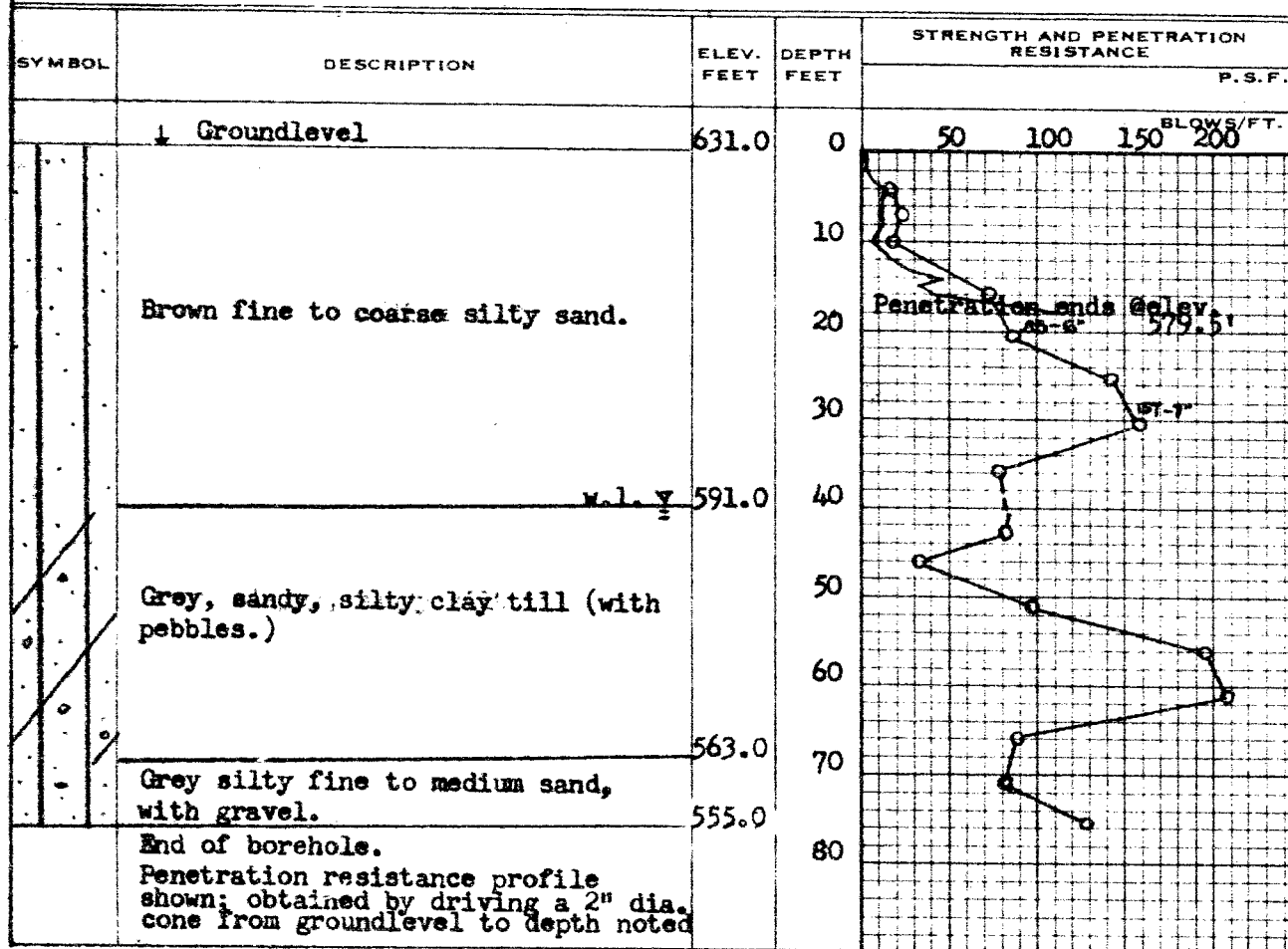
MATERIALS AND RESEARCH SECTION

W.P. 281-60 BORE HOLE NO. 1
 JOB 61-F-46 STATION 255+70 (E) Line "C"
 DATUM 631.0' COMPILED BY B.K.
 BORING DATE May 25/61. CHECKED BY V.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



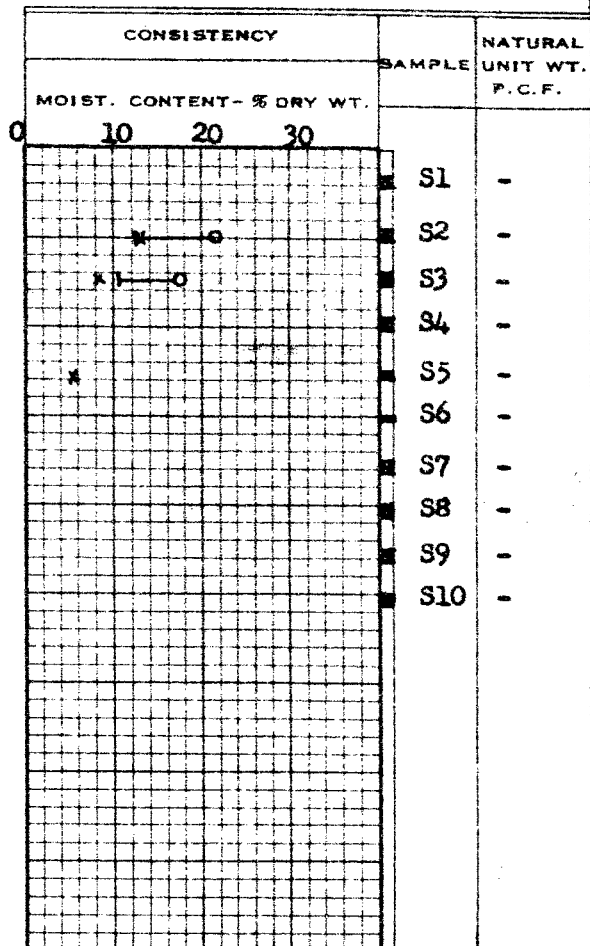
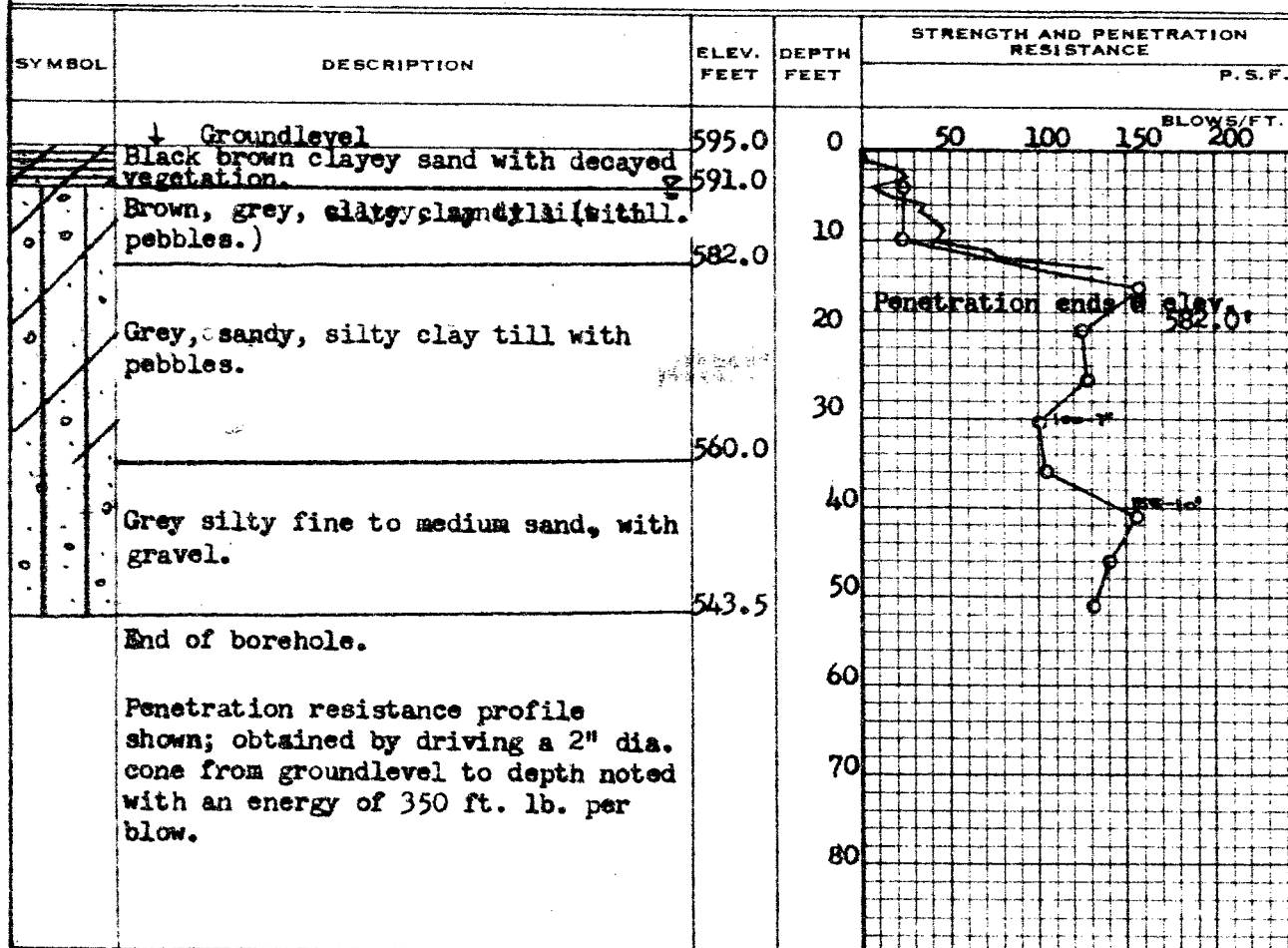
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 281-60 BORE HOLE NO. 2
JOB 61-F-46 STATION 252/31 & Line "C"
DATUM 595.0' COMPILED BY B.K.
BORING DATE June 1/61. CHECKED BY V.K.

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

LEGEND

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



DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 281-60

BORE HOLE NO. 3

JOB 61-F-46

STATION 252+74 (22' Lt) Line "C"

DATUM 593.0'

COMPILED BY B.K.

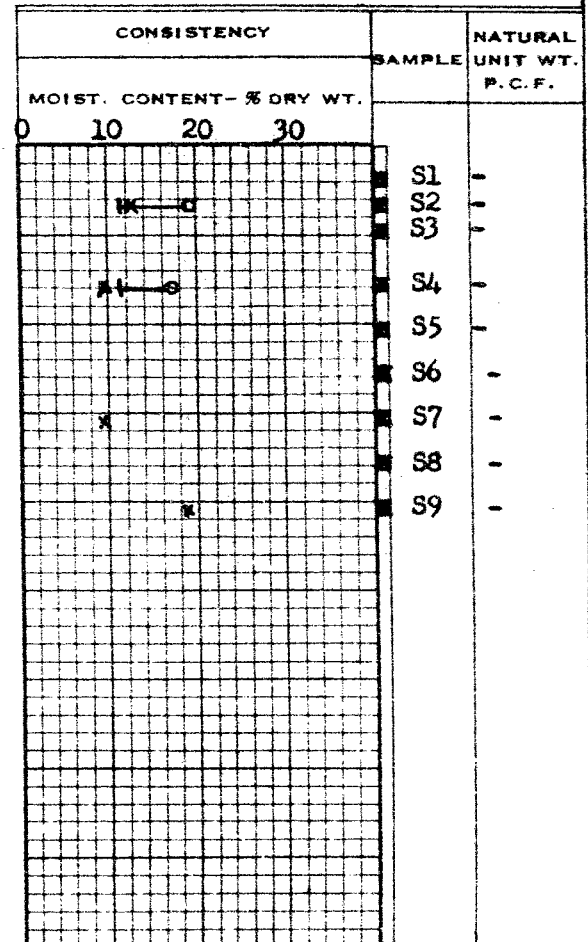
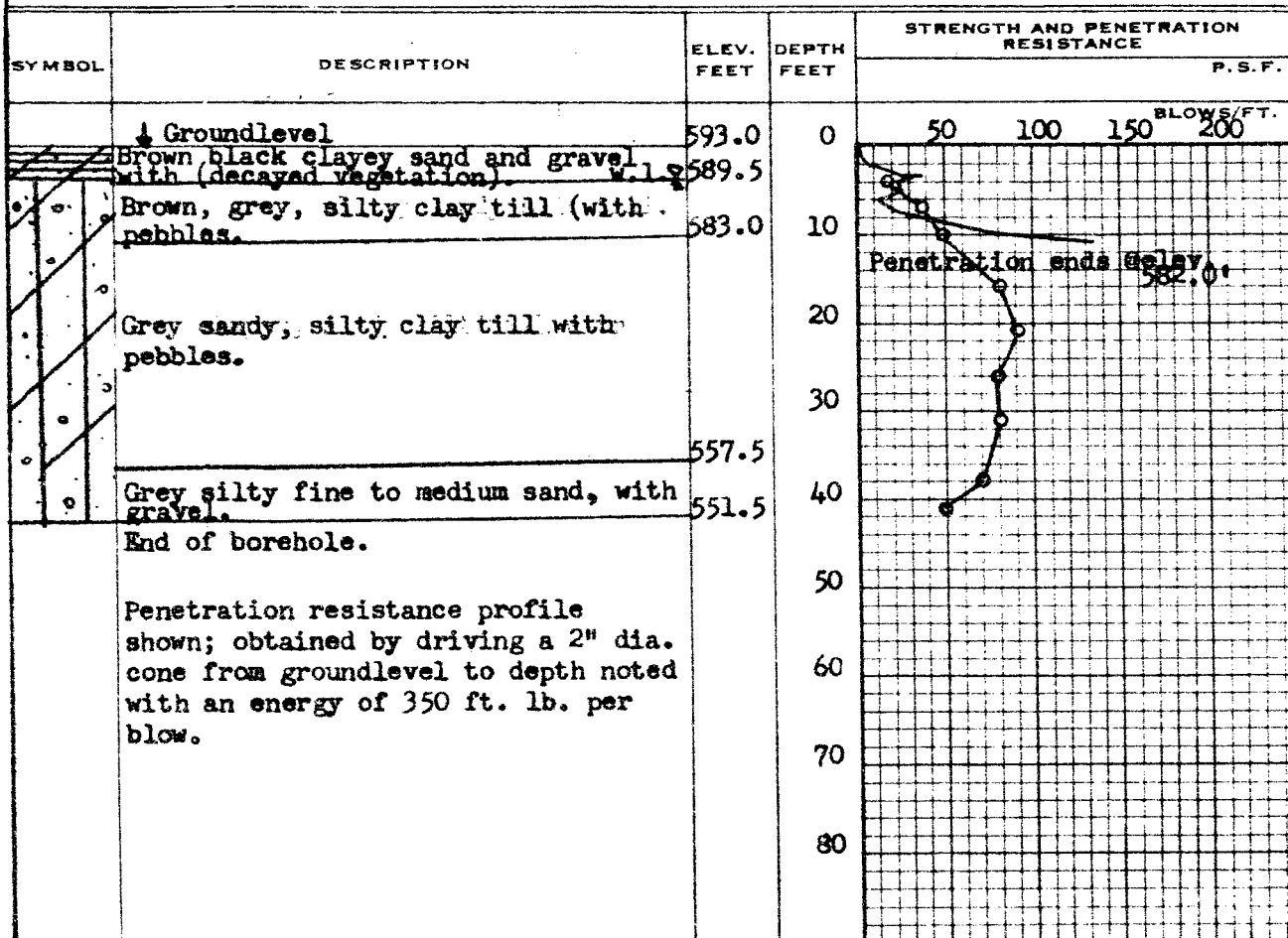
BORING DATE June 7/61.

CHECKED BY V.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. 281-60 BORE HOLE NO. 4

JOB 61-F-46 STATION 253+54 & Line "C"

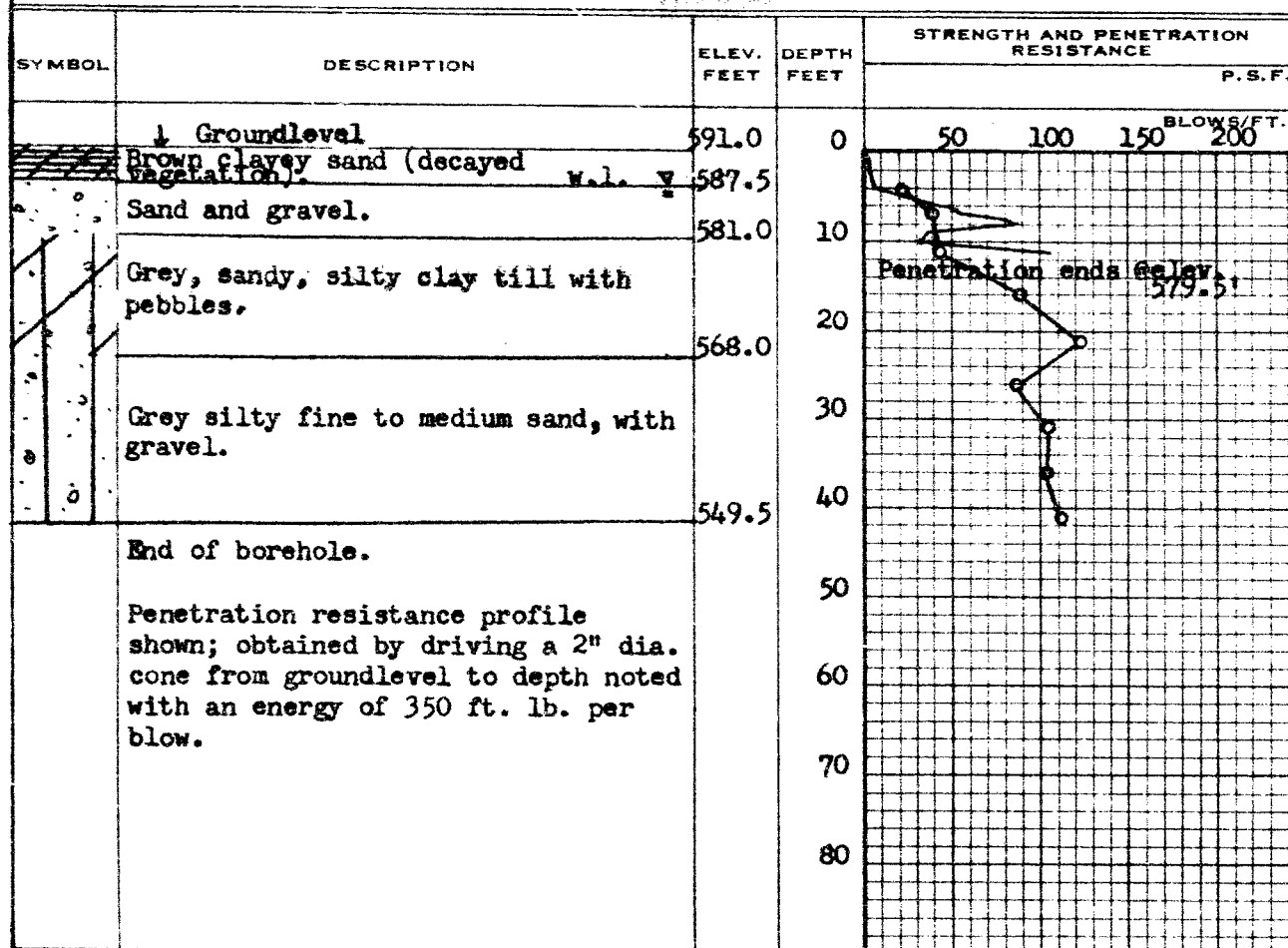
DATUM 591.0' COMPILED BY B.K.

BORING DATE June 9/61. CHECKED BY V.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



CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT- % DRY WT.		
	S1	-
	S2	-
	S3	-
	S4	-
	S5	-
	S6	-
	S7	-
	S8	-
	S9	-

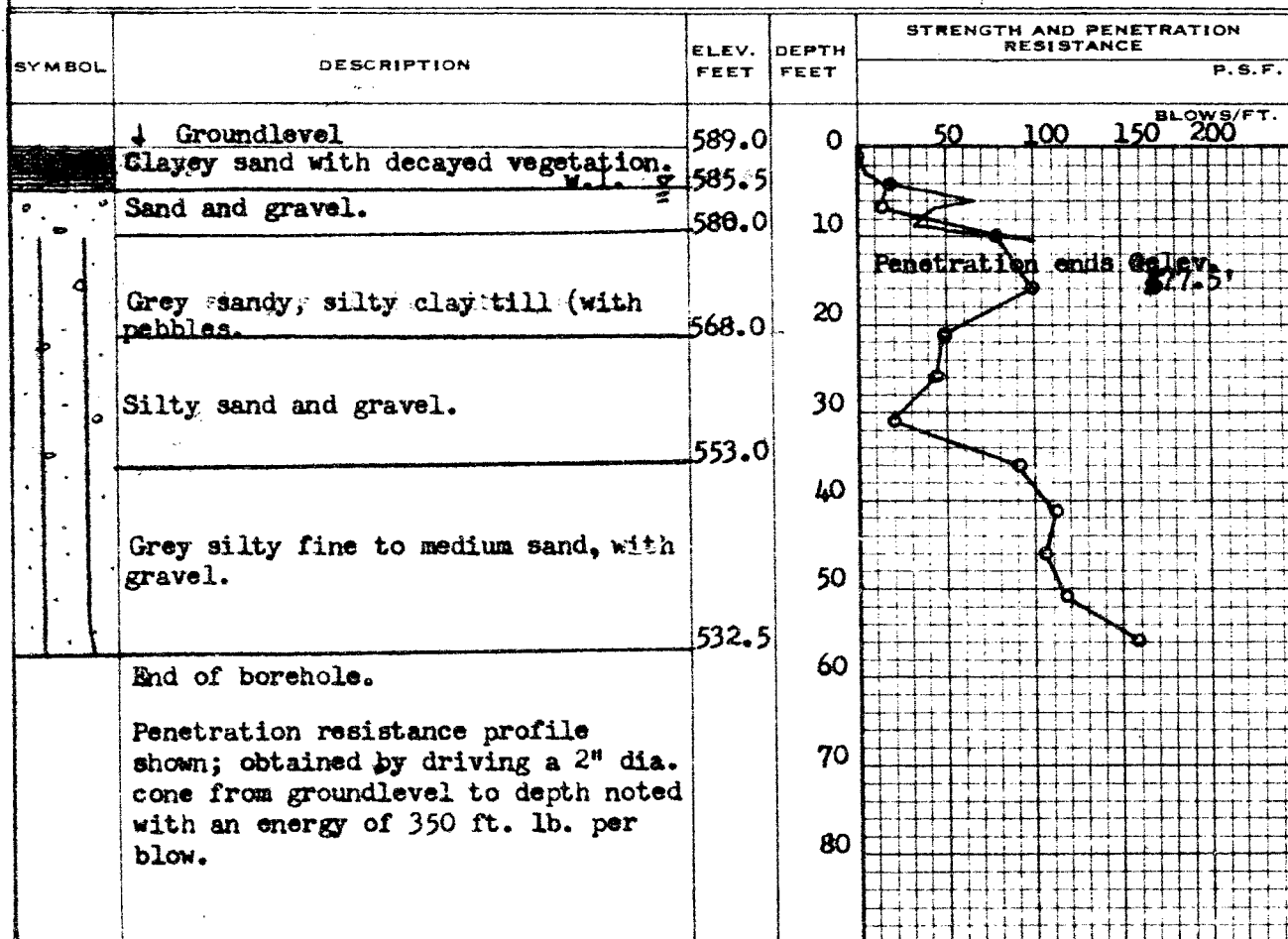
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 281-60 BORE HOLE NO. 5
JOB 61-F-46 STATION ^{253.94} (20' Lt.)
DATUM 589.0' COMPILED BY B.K.
BORING DATE June 15/61. CHECKED BY V.K.

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

LEGEND

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



CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT- % DRY WT.		
	S1	-
	S2	-
	S3	-
	S4	-
	S5	-
	S6	-
	S7	-
	S8	-
	S9	-
	S10	-
	S11	-
	S12	-

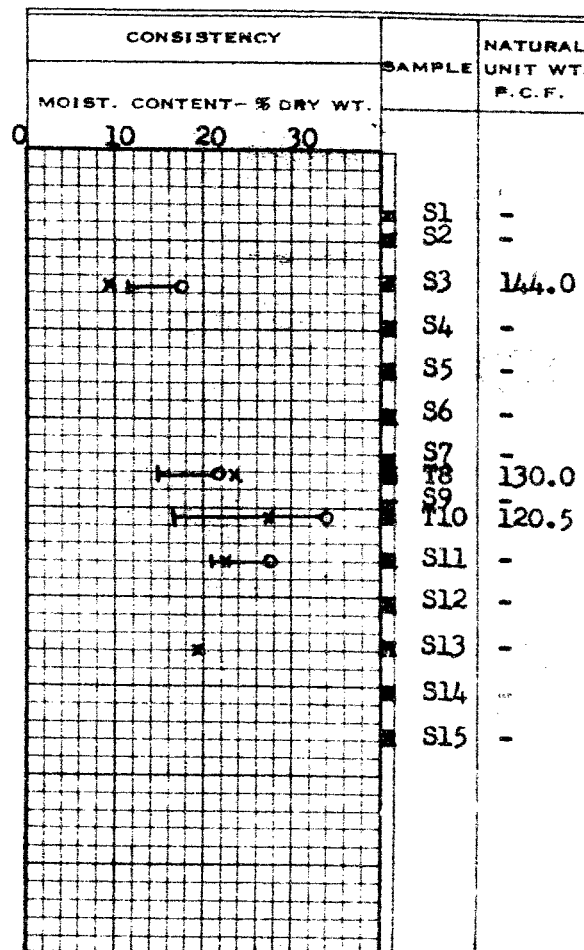
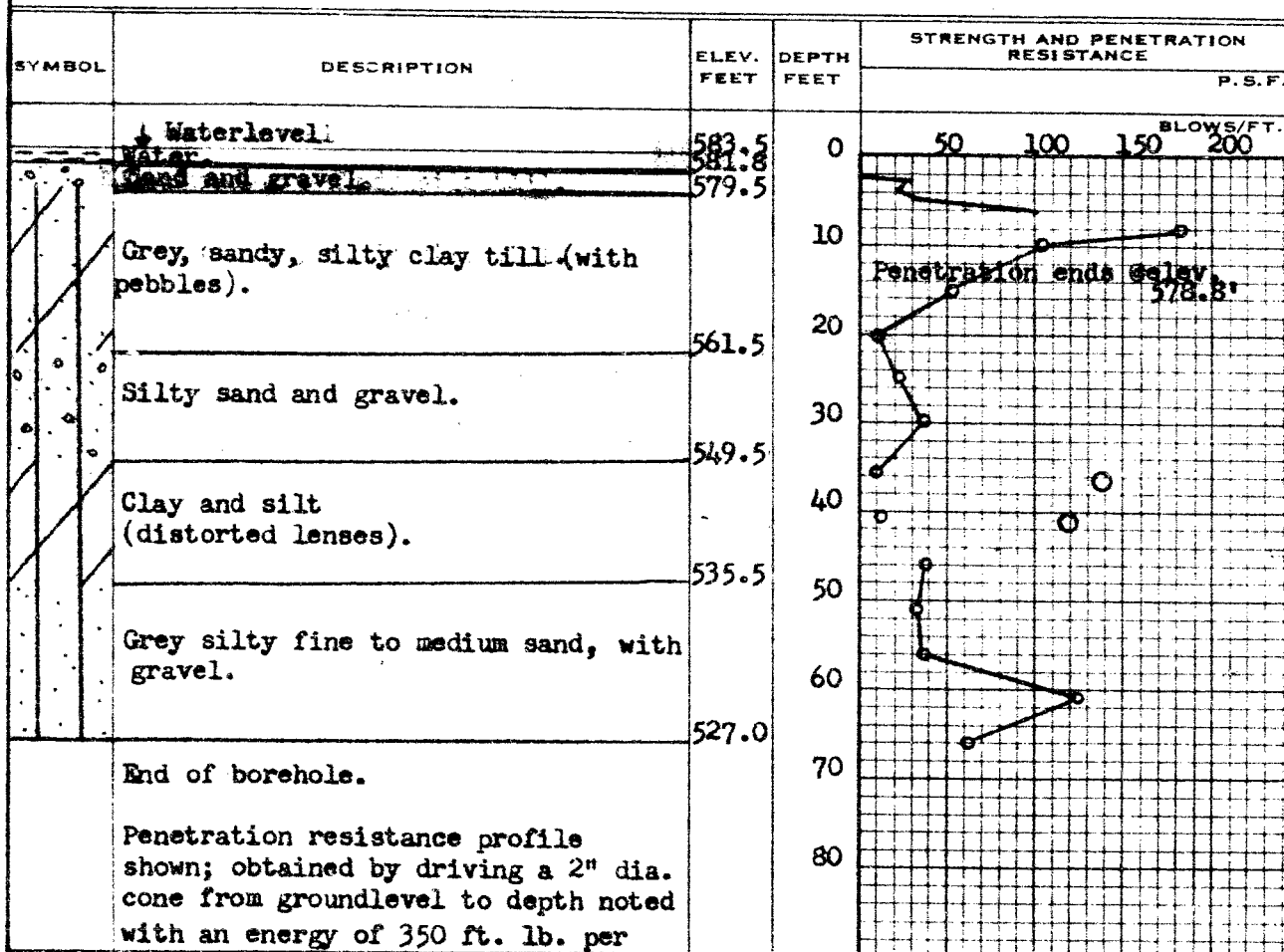
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 281-60 BORE HOLE NO. 6
 JOB 61-P-46 STATION ^{254/34} (4' Lt.)
 DATUM 583.5' COMPILED BY B.K.
 BORING DATE June 15/61. CHECKED BY V.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



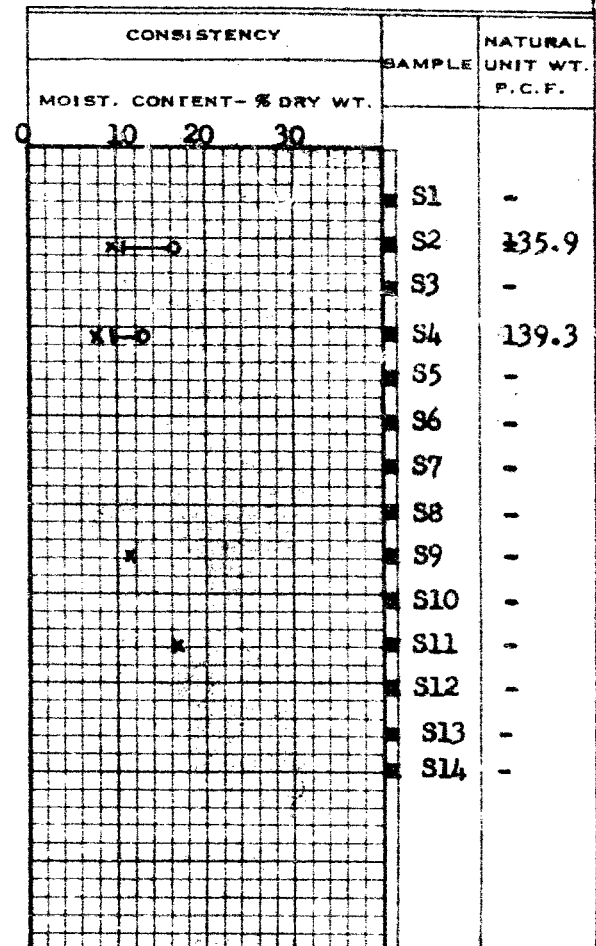
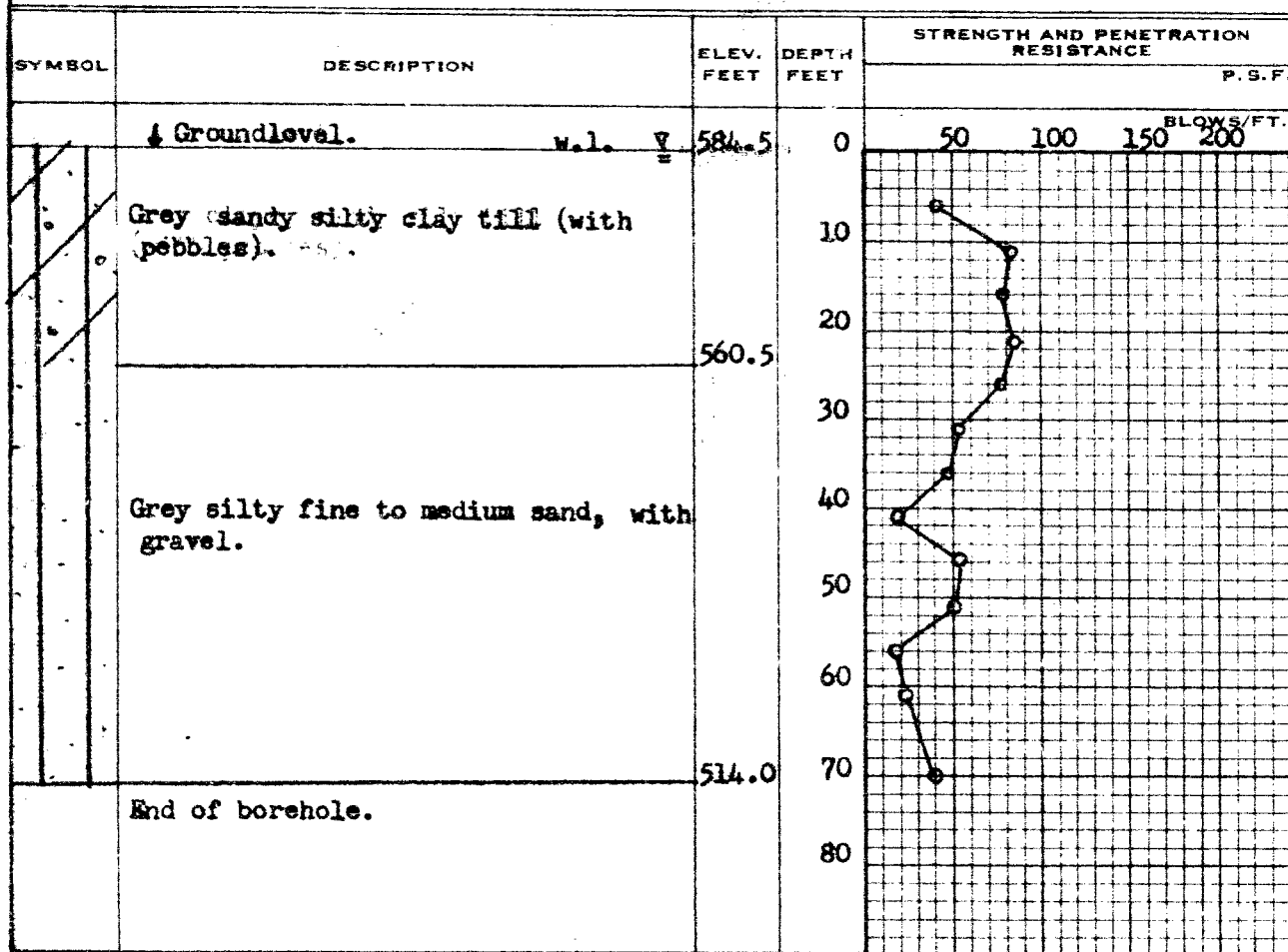
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

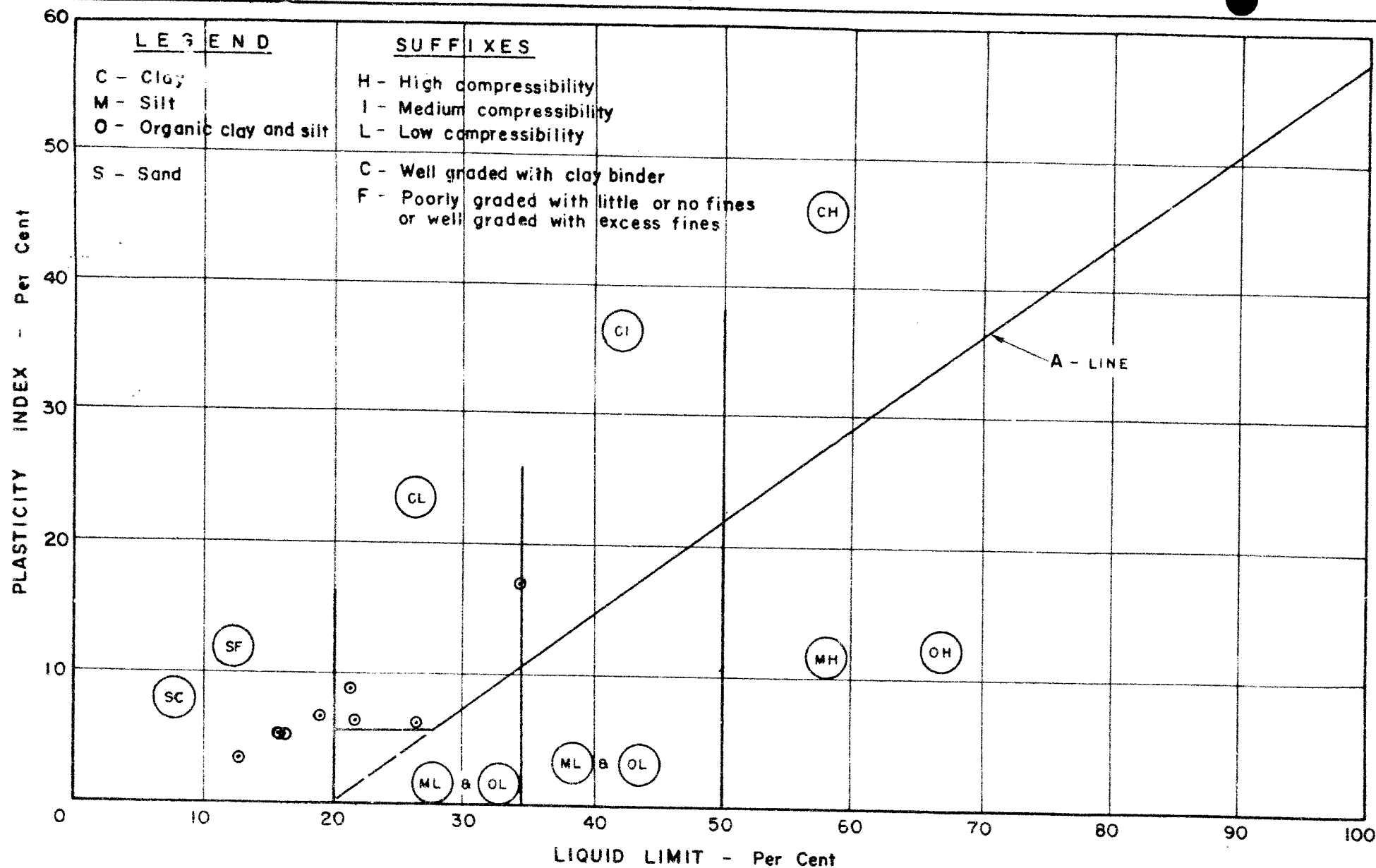
W.P. 281-60 BORE HOLE NO. 7
JOB 61-P-46 STATION Line "C"
DATUM 584.5' COMPILED BY B.K.
BORING DATE June 21/61. CHECKED BY V.K.

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

LEGEND

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





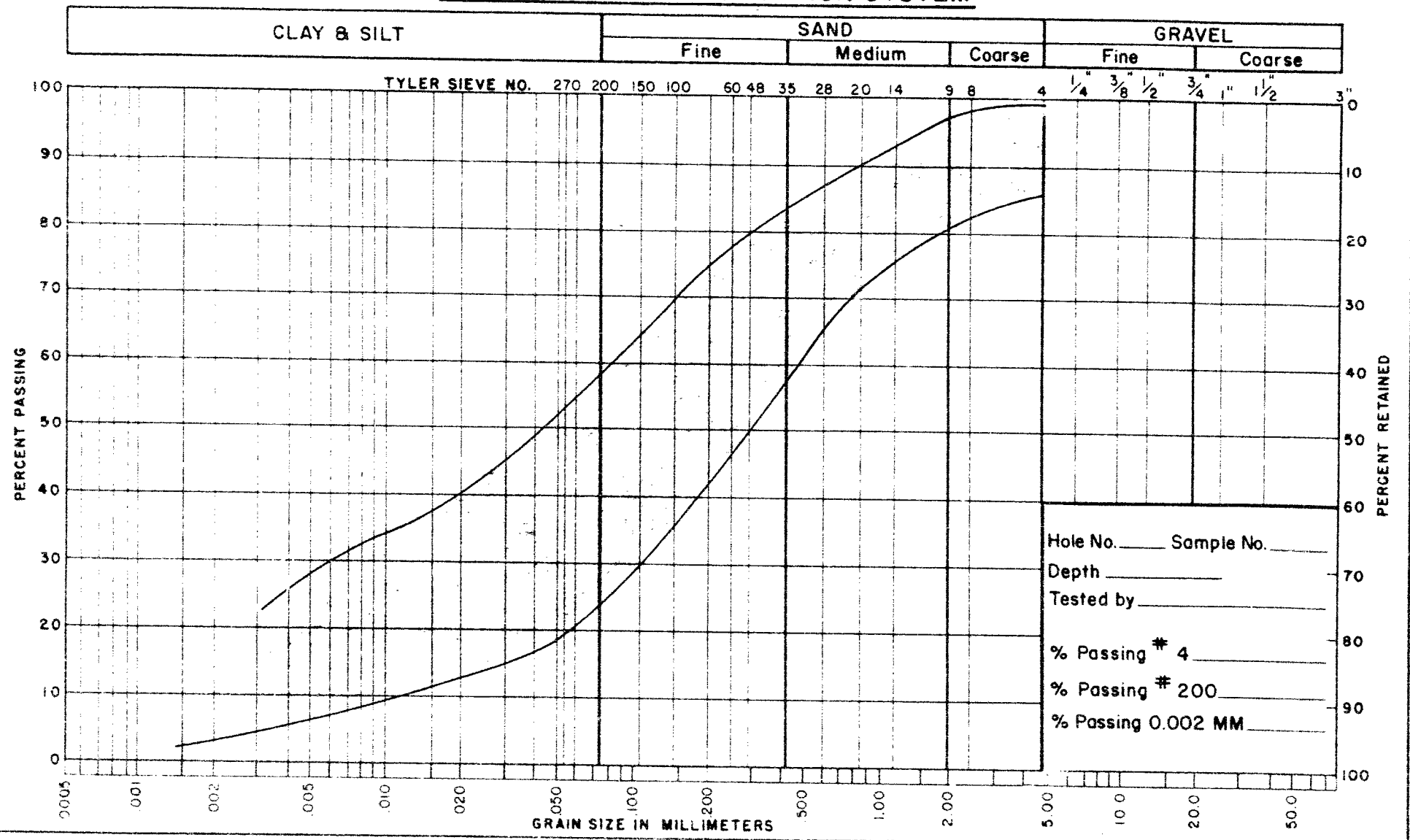
NOTES

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
PLASTICITY CHART

Job No. 61-F-46 W.P. No. 281-60

Location NOTTAWASAGA RIVER

UNIFIED SOIL CLASSIFICATION SYSTEM



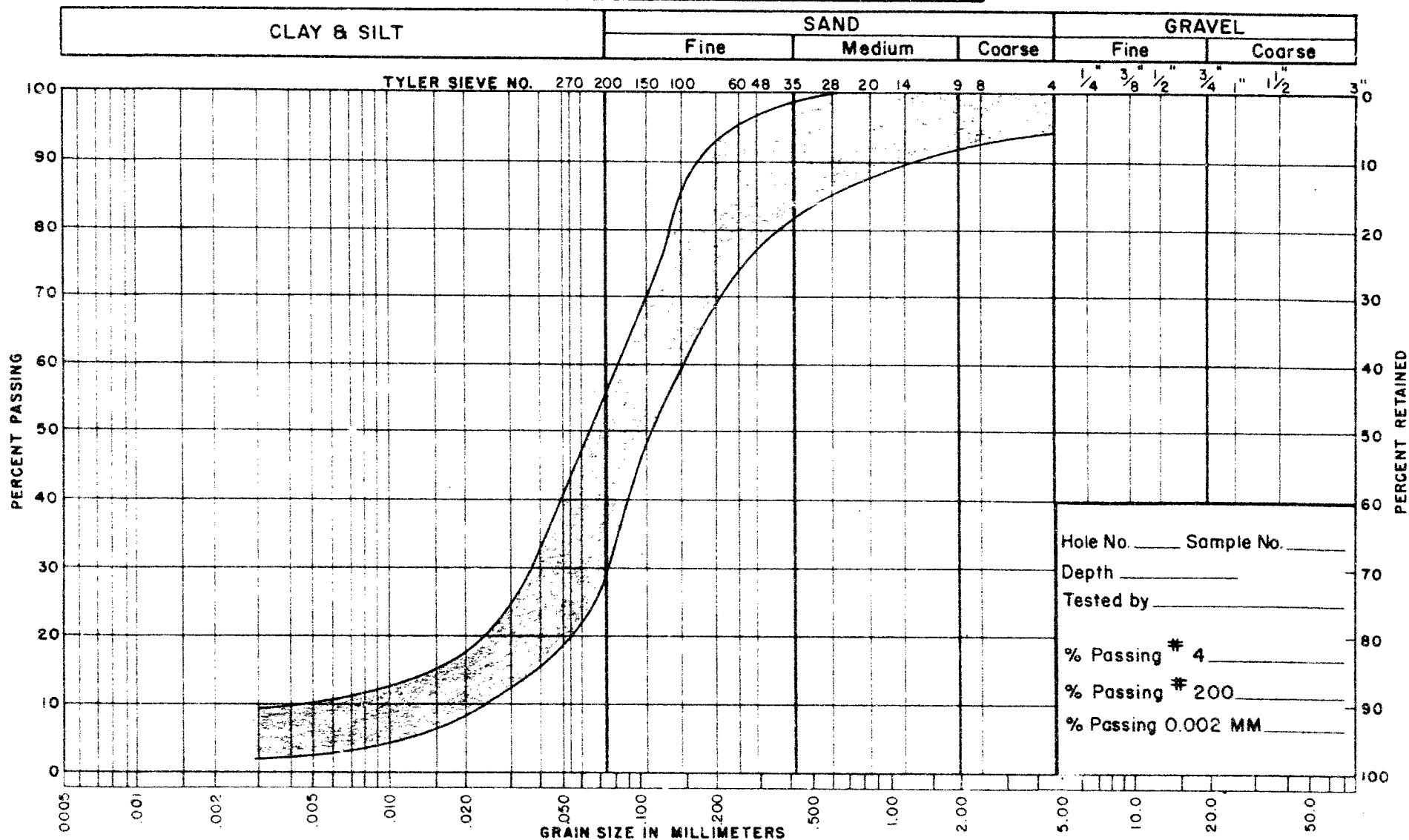
NOTES GREY SANDY SILTY CLAY TILL WITH PEBBLES

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

Job No. 61-F-46 W.P. No. 281-60

Location NOTTAWASAGA RIVER

UNIFIED SOIL CLASSIFICATION SYSTEM



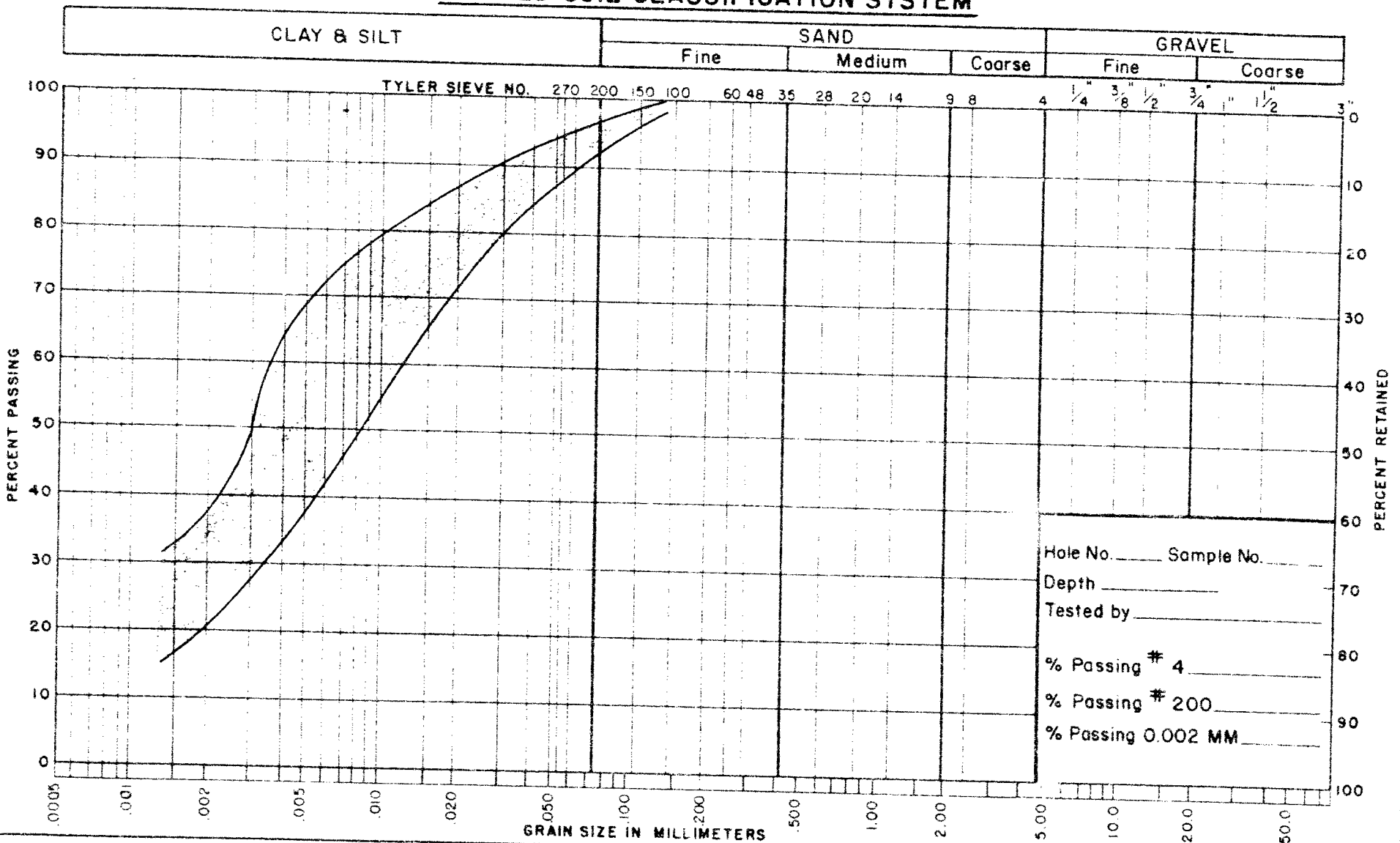
NOTES SILTY FINE TO MEDIUM SAND WITH GRAVEL

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

Job No. 61-E-46 W.P. No. 281-60

Location NOTTAWASAGA RIVER

UNIFIED SOIL CLASSIFICATION SYSTEM

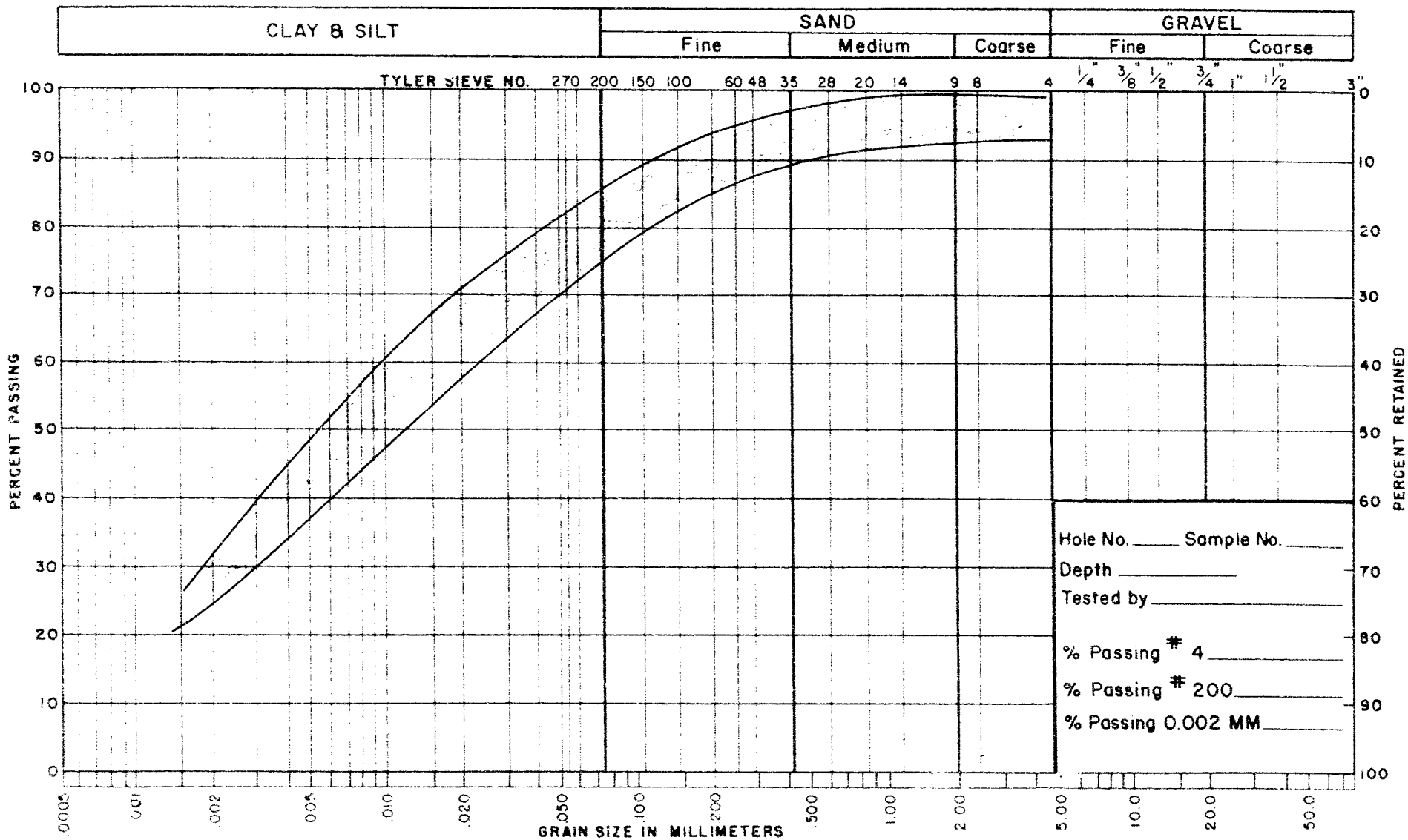


NOTES _____ CLAY AND SILT

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

Job No. 61-F-46 WP No. 281-60
Location NOTTAWASAGA RIVER

UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES BROWN GREY, SILTY CLAY TILL (WITH PEBBLES)

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

Jot. No. G1-F-46 W.P. No. 281-60

Location NOTTAWASAGA RIVER



ONTARIO

DEPARTMENT OF HIGHWAYS

Bridge Division

Memo to	Mr. A. G. Stermac	Date	June 19, 1962
	Principal Foundation Eng.		
	Room 107, Lab. Bldg.	Subject	W.P. 281-60 Nottawasaga R. Br.
From	F. DeVisser		Approx. 1 Mile S. of Wasaga
			Beach Hwy. New 92 District 5

Attached is one print of our preliminary plan D 5062-P1 for the Nottawasaga River Bridge. If you have any comments please let us know.

FDeV/et

F. DeVisser,
Bridge Location Engineer.

O.K.