

23-63-51.

Mr. A. M. Teye,
Bridge Engineer.
Materials and Research Section.

March 24, 1961.

FOUNDATION INVESTIGATION REPORT
By: D.H.O.
W.J. 61-P-4 -- W.P. 93-60.

Attention: Mr. S. McCosbie.

Re: Hwy. #73 Crossing at Catfish Creek
Port Bruce, Ontario, District #2.

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

The summary and recommendations contained in
this report are self-explanatory, and we trust they will prove
sufficient for your future design work.

Should you require any further assistance in
connection with this project, please feel free to call on
our Office.

L. G. Soderman,
PRINCIPAL FOUNDATION ENGR.

Per:

agstermac

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

ALL/MacF
Attach.

cc: Messrs. A. M. Teye (2)
H. A. Fregaskes
H. D. McMillan
A. Gaier
W. L. Fraser
J. Roy
A. Watt

Foundations Office
Gen. Files.

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FOUNDATION INVESTIGATION

For

Hwy. #73 Crossing at Catfish Creek
Port Bruce, Ontario, District #2.
W.J. 61-F-4 -- W.P.93-60

1. INTRODUCTION:

An investigation was carried out to determine the subsoil characteristics along the proposed line of the new bridge where Hwy. 73 crosses Catfish Creek in Port Bruce. The present structure is a single lane, 145.7', single span steel bridge capable of carrying a maximum live load of 5 tons. In order to avoid the risk of the formation of ice jams resulting in the flooding of adjoining private properties and households, the new bridge is to have a minimum single span of 150.0'.

From an examination of the physiography of the site, a line corresponding to an extension to the North of the centreline of Ralph St. in Port Bruce, was chosen and investigated as the best evident line. Bank erosion is at a minimum along this line and at a maximum some 200' to the East of it. The Catfish Creek is 125.0' wide at this chosen line.

The report contains borehole logs and profiles, Drawing No. 61-F-4A, field and laboratory test results along with recommendations and conclusions.

2. DESCRIPTION OF SITE AND GEOLOGY:

Port Bruce lies within the Norfolk Sand Plain, the sand, silts and clays of which were deposited as a delta in the glacial lakes of Whittlesey and Warren. The melt-water from the Grand River area flowed into these lakes passing between the ice front and the moraines to the North-west, forming the delta from West to East as the ice withdrew. The area is drained by rivers flowing into Lake Erie cutting deep valleys into the sand plain.

2. DESCRIPTION OF SITE AND GEOLOGY: (cont'd.) ...

In particular, at the bridge site, the Catfish Creek has eroded a vast flat-bottomed, steep-sided valley out of the fine silty sand. The village lies in the valley floor on both banks of the creek with the ground rising on all sides barring the shore line. The river banks are some 11.0' high and subjected in places to considerable ice and water erosion. A huge bite is being eroded out of the northern bank some 200' from the present structure and the Creek here, is some 180 - 190' wide. The height of the South bank rises quickly from Ralph Street to the West.

At the time of investigation, the water in Catfish Creek was frozen to a depth of 12", and the surrounding ground to a depth of 18".

3. DESCRIPTION OF FIELD WORK:

The field work consisted of five boreholes taken down to various depths by a diamond core drill converted for soil sampling work. 3" diameter piping used to case the boreholes in the cohesionless soils was not found to be necessary in the clay and till strata. A standard split spoon sampler was used and 'N' values and disturbed samples were obtained. Where it was possible in the cohesive material, undisturbed samples were obtained using a 2" I.D. thin-wall tube. At no stage was it possible to carry out a field vane test. All samples were visually identified in the field and preserved at their natural moisture content for further laboratory tests.

4. LABORATORY INVESTIGATION:

All samples were again visually identified and recorded in laboratory log sheets. Index property tests were performed on representative disturbed samples. In the case of the undisturbed samples, triaxial shear strength and consolidation tests were also carried out.

The results of all these tests are tabulated in Appendix I. of this report.

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5. SUBSOIL CONDITIONS:

5.1) General:

The soil at the site consists at the surface, of a layer of loose to very loose silty fine sand with organic matter varying in thickness from 15.0' on the banks, to 2.0' beneath the Creek. This is followed by a layer of coarse sand and gravel containing organic matter thinning from a thickness of 14.0' in B.H. 4, to 2.0' in B.H. 5. Beneath this is a very stiff to hard grey silty clay containing medium to coarse sand size particles. This stratum was proved to a depth of 77.0 feet. In the cases of B.H.'s 2, 3 and 4, this stratum contains a layer of clayey silt at an elevation of 550.0' and lower, varying in thickness from 10.0' in B.H. 4, to 2.0' in B.H. 3.

5.2) Fine to Medium Silty Sand with Organic Matter:

This stratum of fine to medium silty sand with organic matter is found in -

B.H. 1	between elevations	563.0'	and	566.0'
B.H. 2	"	562.8'	"	567.0'
B.H. 3	"	565.2'	"	567.2'
B.H. 4	"	569.3'	"	581.3'
B.H. 5	"	562.1'	"	578.1'

The organic matter in this sand is chiefly in the form of little pieces of wood. Grain size distribution analyses carried out on representative samples, show this to be a poorly graded fine to medium sand with little or no fines. An average 'N' value of 4 can be attributed to it, but in the case of B.H. 5 at an elevation of 568.1' or less, the 'N' value is 20 or greater.

cont'd. /4 ...

5. SUBSOIL CONDITIONS: (cont'd.) ...

5.3) Fine to Coarse Sand with Fine Gravel and Organic Matter:

This layer of fine to coarse sand with fine gravel lies directly beneath the previously described layer. It is found in -

B.H. 1	between elevations	559.0'	and	563.0'
B.H. 2	" "	558.8'	"	562.8'
B.H. 3	" "	559.7'	"	565.2'
B.H. 4	" "	558.3'	"	569.3'
B.H. 5	" "	560.6'	"	562.1'

In the case of this layer the organic matter is of the form of decayed vegetable matter and pieces of wood. Particle size distribution tests show it to be a well graded gravelly sand with little or no fines. An 'N' value of 20 can safely be allowed for calculation purposes.

5.4) Silty Clay with Dispersed Sand Size Particles:

This silty clay lies beneath the coarse sand and is found in -

B.H. 1	between elevations	493.5'	and	559.0'
B.H. 2	" "	550.3'	"	558.8' and -
		524.3'	"	545.8'.
B.H. 3	" "	559.7'	"	561.0' and -
		524.2'	"	557.7'.
B.H. 4	" "	555.8'	"	558.3' and -
		519.8'	"	545.3'.
B.H. 5	" "	536.6'	"	560.6'

The clay is uniform as the maximum ranges of the Atterberg limits show, e.g., L.L. 26.1% to 35.0%, P.L. 14.6% to 19.3%, and M/C 16.9% to 23.2%. Average values for the whole stratum are: L.L. 31%, P.L. 16.8%, and M/C 19.5%. The Liquidity index based on these values, is 0.23. The density varies between 126.1 and 138.3 p.c.f. with an average value of 131.3 p.c.f.

cont'd. /5 ...

5. SUBSOIL CONDITIONS: (cont'd.) ...

5.4) Silty Clay with Dispersed Sand Size Particles: (cont'd.) ...

Due to the very stiff to hard consistency of the clay, it was not possible at any stage to carry out a field vane test. In B.H.'s 4 and 5, only one 9" long undisturbed sample was obtained on which it was impossible to carry out a shear strength test. However, in B.H.'s 1, 2 and 3, a few undisturbed samples were obtained and shear strength tests carried out on these gave strengths varying from 1750 to 2130 p.s.f.

Based on these considerations, a shear strength of 2000 p.s.f. has been shown for calculation purposes. The result of one consolidation test carried out on the sample from B.H. 5, is shown in the Appendix. The apparent maximum consolidation to which the sample has been previously subjected, has been estimated and it would seem that most of the clay deposit is over-consolidated.

5.5) Clayey Silt:

This clayey silt is found in -

B.H. 2	between elevations	545.8'	and	550.3'
B.H. 3	" "	557.7'	"	559.7'
B.H. 4	" "	545.3'	"	555.3'

Atterberg limits are: L.L. 20.3%, P.L. 14.4%, and M/C 16.7%. An average 'N' value of 20 has been chosen for calculation purposes.

6. GROUND WATER CONDITIONS:

At the time of the field investigation, January '61, the top of the ice in the Catfish Creek had an elevation of 570.5'. In B.H.'s 4 and 5, water was found at elevations 570.3' and 570.1', respectively. At flood period when the ice breaks up and blocks the water flow at the harbour mouth, the water may overflow the banks and flood the valley floor. The maximum high water level recorded under such conditions, was 582.7' in 1929 and 1959.

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7. DISCUSSION AND RECOMMENDATIONS:

As the bridge is to be a single 150.0' span structure, the properties of the soils as found in B.H.'s 4 and 5, are considered and it is assumed that the footings will be placed in each bank some distance back from the water's edge.

The fine sand with an 'N' value of 4 is incapable of supporting spread footings. However, at an elevation of 564.0', conditions are more favourable and suitable for the consideration of spread footings. At this elevation, the fine to coarse sand and gravel of B.H. 4 and the fine to medium sand of B.H. 5, having an 'N' value of 20, are capable of supporting spread footings with a maximum safe bearing capacity of 2 T/sq.ft. Any settlement in this cohesionless material will take place during construction. The silty clay beneath is capable of carrying similar loading. The coefficient of compressibility has been calculated and settlement of the clay under this loading will be small and within allowable limits.

The minimum soffit elevation is to be 585.5' and the recommended footing elevation 564.0'. It is left to the designer to decide on the type of abutment most suitable for this condition.

Due to the high permeability of the sand and the closeness of the creek, water will seep into the excavation. This must be prevented by the driving of steel sheet piling into the relatively impervious silty clay to an elevation of 555.0' on the North, and 557.0' on the South bank. The excavation must be kept dry and in good condition by pumping.

If spread footings are found to be inconvenient, then the footings can be supported on piles. These should be displacement friction piles driven into the dense sand. On the southern bank, they should be driven to a tip elevation of 562.0' and 559.0' on the northern bank. A safe bearing load is 15 tons per pile.

cont'd. /7 ...

8. SUMMARY:

8.1) The soil at the site consists of a layer of fine to medium sand overriding a layer of fine to coarse sand with fine gravel and organic matter. Beneath this is a stratum of silty clay containing dispersed coarse sand size particles. In B.H.'s 2, 3 and 4, this stratum contains a layer of clayey silt.

8.2) Spread footings placed at an elevation of 564.0' or lower in the fine to medium sand of B.H. 5 and the fine to coarse sand of B.H. 4, with a safe bearing capacity of 2 T/sq.ft. may be used.

8.3) If this is unsuitable, displacement friction piles driven to elevations given in the report, should be used with a maximum safe load of 15 Tons per pile.

8.4) Seepage water will be a problem and must be excluded from the footing excavation by driving steel sheet piling to an elevation of 555.0' on the North bank and 557.0' on the South bank. The excavation must be kept dry and in good condition by pumping.

8.5) The consolidation of the silty clay has been studied and settlement should be small and well within allowable limits.

9. MISCELLANEOUS:

The field work was carried out by the Johnston Drilling Co., Ltd., using a diamond core drill converted for soil sampling conditions. It was commenced on Wed., January 18, 1961, and completed on Thurs., February 2nd, 1961. Supervision for the D.H.C. was carried out by T. F. Widdis, Project Foundation Engineer.

March 1961.

REPORT PREPARED BY:

Thomas A. Widdis
.....
T. F. Widdis,
PROJECT FOUNDATION ENGR.

REPORT APPROVED BY:

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.....
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APPENDIX I.

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-4

W.P. 92-60

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	7.5'-9.5'	Coarse-Fine sand with fine gravel. Loose. Grey in colour.	13	13.7	-	-	-	-	
	S2	10.5'-12.3'	Sand and gravel with 2" layers of stiff clay.	22	15.5	-	-	-	-	
	S3	13'-14.5'	Brown clay till.	21	18.0	14.6	30.5	-	-	
	W4	14.5'-15.5'	Brown clay till.	-	-	-	-	-	-	
	S5	15.5'-17.5'	Silty clay, stiff, brown.	14	18.8	15.7	27.7	-	-	
	T6	20.5'-22.5'	Silty Clay.	P	-	-	-	-	-	
	T7	25.5'-27.3'	Silty clay.	P	19.3	-	-	-	-	
	S8A B	40.5'-42'	Silty clay. Hard Brown in colour.	61	17.2	11.7	32.0	-	138.3	
	S9	45.5'-47'	Silty clay. Hard brown in colour. (clay till).	40	19.2	17.2	31.8	-	129.2	
	S10	50.5'-52'	Silty clay. Hard Brown in colour. (Clay Till).	45	16.0	15.5	30.9	-	136.2	

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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	S11	60.5'-62'	Silty clay. Hard. Brown in colour with gravel size particles.	34	18.3	-	-	-	-	
	S12	65.5'-67'	Silty clay. Hard. Brown. Grey in colour & pieces of $\frac{3}{4}$ " subrounded gravel.	55	19.3	16.2	30.4	-	-	
	S13	70.5'-72'	Silty clay. Hard. Brown-grey in colour with some pieces of sub-angular gravel.	57	18.6	-	-	-	131.1	
	S14	75.5'-77'	Same as above.	61	18.7	-	-	-	-	
2	S1	5'-6.5'	Organic matter with silty sand.	4	-	-	-	-	-	
	S2	8'-9.25'	Fine-coarse sand with fine gravel and organic matter.	12	16.9	15.4	27.0	-	-	
		9.25'-9.5'	Silty clay. Stiff. Brown.							
	S3	11'-12.0'	Clayey fine-coarse sand with fine gravel.	20	19.7	-	-	-	-	
		12.0'-12.5'	Silty clay. Very stiff. Brown in colour.							
	T4	14'-15.2'	Silty clay. Grey.	P	23.1	16.6	30.3	1520	126.1	
	T5	17'-18'	Silty clay with silt layers. Grey in colour.	P	20.7	-	-	1750	129.3	
	S6	20.5'-22'	Clayey silt grey-brown in colour.	22	20.4	-	-	-	-	

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2	T7	25'-25.6'	Silty clay grey in colour.	P	20.8	17.9	32.1	-	-	
	T8A	30'-30.5'	Silty clay. Grey in colour.	P	-	-	-	-	-	
	S8	35'-36.5'	Silty clay. Hard. Grey in colour.	36	17.7	17.5	32.5	-	-	
	S9	40'-41.5'	Silty clay. Hard. Grey in colour. with some pieces of gravel size particles.	34	20.0	-	-	-	-	
	S10	45'-46.5'	Silty clay. V. stiff. Grey in colour.	17	20.5	19.3	35.5	-	135.0	
3	S1	5'-6.5'	Fine gravel with sand and organic matter.	4	18.4	-	-	-	-	
	S2	8'-9.5'	Medium-coarse sand with fine gravel loose.	12	10.9	-	-	-	-	
	S3	11.0'-11.5' 11.5'-12.5'	Silty clay with fine gravel. Clayey silt. Grey-brown in colour.	27	19.2	-	-	-	-	
	T4	14'-15.5'	Silty clay. Grey in colour.	P	23.2	16.7	33.9	1130	127.8	
	T5	17'-18.2'	Silty clay. Grey in colour.	P	22.4	16.7	30.6	-	129.0	
	T6	20'-20.7'	Silty clay with pockets of silt.	P	21.0	17.3	30.3	1980	130.9	

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W.P. 93-60

HO'E 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	S7	25'-26.5'	Silty clay. Stiff. Grey in colour.	15	21.3	18.3	32.7	-	-	
	T8	30'-30.7'	Silty clay. Grey in colour.	P	-	-	-	-	-	
	S9	35'-36.5'	Silty clay. Hard. Grey in colour with some pieces of subangular gravel.	32	18.2	-	-	-	-	
	S10	39'-40.5'	Sample Lost.	47	-	-	-	-	-	
	S11	41.3'-43'	Silty clay. Hard. Grey in colour.	32	21.2	17.2	35.1	-	129.4	
	S12	45'-46.5'	Silty clay. Hard. Grey in colour with some pieces of subangular gravel.	40	18.6	-	-	-	-	
4	S1	3'-4.5'	Silty fine sand. Loose. Brown.	6	11.6	-	-	-	-	
	S2	6'-7.5'	Fine-medium sand. Loose. Brown.	8	5.3	-	-	-	-	
	S3	9'-10.5'	Fine-medium sand. Very loose. Grey-brown.	4	7.9	-	-	-	-	
	S4	12'-13.5'	Fine-medium sand. Very loose. Grey with some organic matter.	4	21.8	-	-	-	-	
	S5	15'-16.5'	Fine-coarse sand medium dense grey, with decayed vegetable matter.	12	21.5	-	-	-	-	

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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
4	S6	18'-19.5'	Fine-coarse sand. Dense. Grey with fine gravel.	31	10.6	-	-	-	-	
	S7	21.0'-21.5'	Washed fine-coarse sand.	23	-	-	-	-	-	
	S8	24'-25.5'	Silty clay. Very stiff. Grey. Last 1" of sample was clayey silt.	16	18.2	16.5	27.9	-	-	
	S9	27.3'-28.8'	Clayey silt with 2" layer silty clay.	23	19.3	-	-	-	-	
	S10	35'-36.0'	Clayey silt. Grey with some pieces of gravel.	19	16.7	14.4	20.3	-	-	
		36.0'-36.5'	Silty clay. Very stiff. Grey.							
	S11	40'-41.5'	Silty clay. Very stiff. Grey with some pieces of subangular gravel.	26	19.8	17.5	32.0	-	133.1	
	S12	45'-46.5'	Silty clay. Hard. Grey with some pieces of subrounded gravel.	33	-	-	-	-	-	
	S13	50'-51.5'	Silty clay. Hard. Grey with some pieces of subangular gravel.	32	19.0	17.2	32.1	-	135.0	
	S14	55'-56.5'	Same as above.	32	-	-	-	-	-	
	S15	60'-61.5'	Same as above.	39	18.7	15.1	31.9	-	128.7	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-4

W.P. 93-60

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
5	S1	3'-4.5'	Silty fine sand. Loose. Brown in colour.	6	17.6	-	-	-	-	
	S2	6'-7.5'	Silty fine sand. Loose. Brown in colour.	5	-	-	-	-	-	
	S3	9'-10.5'	Silty fine sand. Very loose. Grey with organic matter.	4	28.6	-	-	-	-	
	S4	12'-13.5'	Silty fine sand. Medium dense. Grey in colour. With little pieces of wood.	17	21.5	-	-	-	-	
	S5	15'-16.5'	Medium-fine sand. Medium dense. Grey in colour with some fine gravel.	28	16.7	-	-	-	-	
	S6	18'-19.5'	Silty clay. Hard. Grey in colour with some coarse sand.	34	17.5	17.4	33.6	-	135.0	
	S7	21'-22.5'	Silty clay. V. Stiff. Grey in colour with pieces of fine subrounded gravel.	25	17.9	16.4	28.3	-	-	
	S8	25'-26.5'	Silty clay. Very stiff. Grey. One 2" pocket of silt.	21	22.2	17.8	26.2	-	-	
	T9	30'-31'	Silty clay. Grey.	P	21.6	17.5	31.1	-	-	
	S10	32.5'-34'	Silty clay. Very stiff. Grey with some coarse sand size particles.	29	20.2	14.6	32.5	-	127.0	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 61-F-4

W.P. 93-60

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
5	S11	35'-36.5'	Silty clay. Hard. Grey with coarse sand size particles.	34	-	-	-	-	-	
	S12	40'-41.5'	Same as above.	35	18.9	14.7	33.8	-	132.9	
			<p>S denotes split spoon sample</p> <p>W " wash sample</p> <p>T " shelby tube sample</p> <p>RC " rock core</p>							

DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 93-60 BORE HOLE NO. 2

JOB 61-F-4 STATION 479+57.8' Lt.

DATUM 570.5' COMPILED BY B.K.

BORING DATE Jan. 24/61 CHECKED BY T.F.W.

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

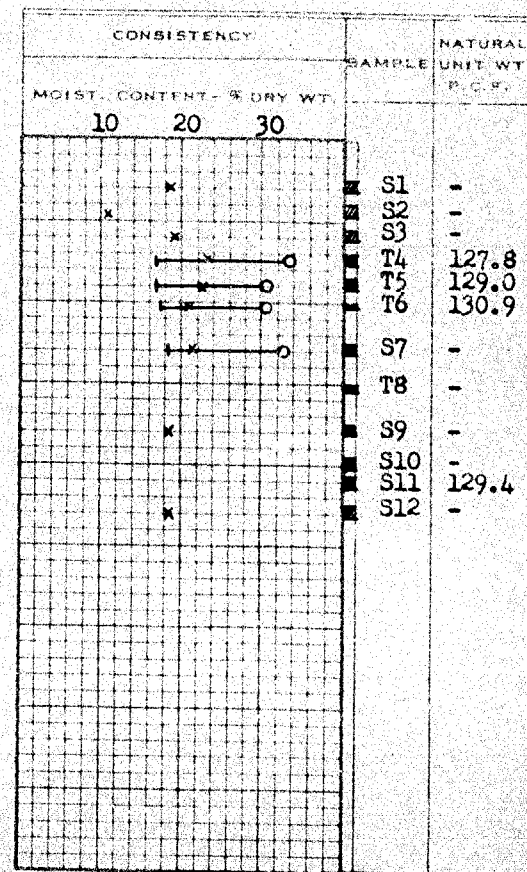
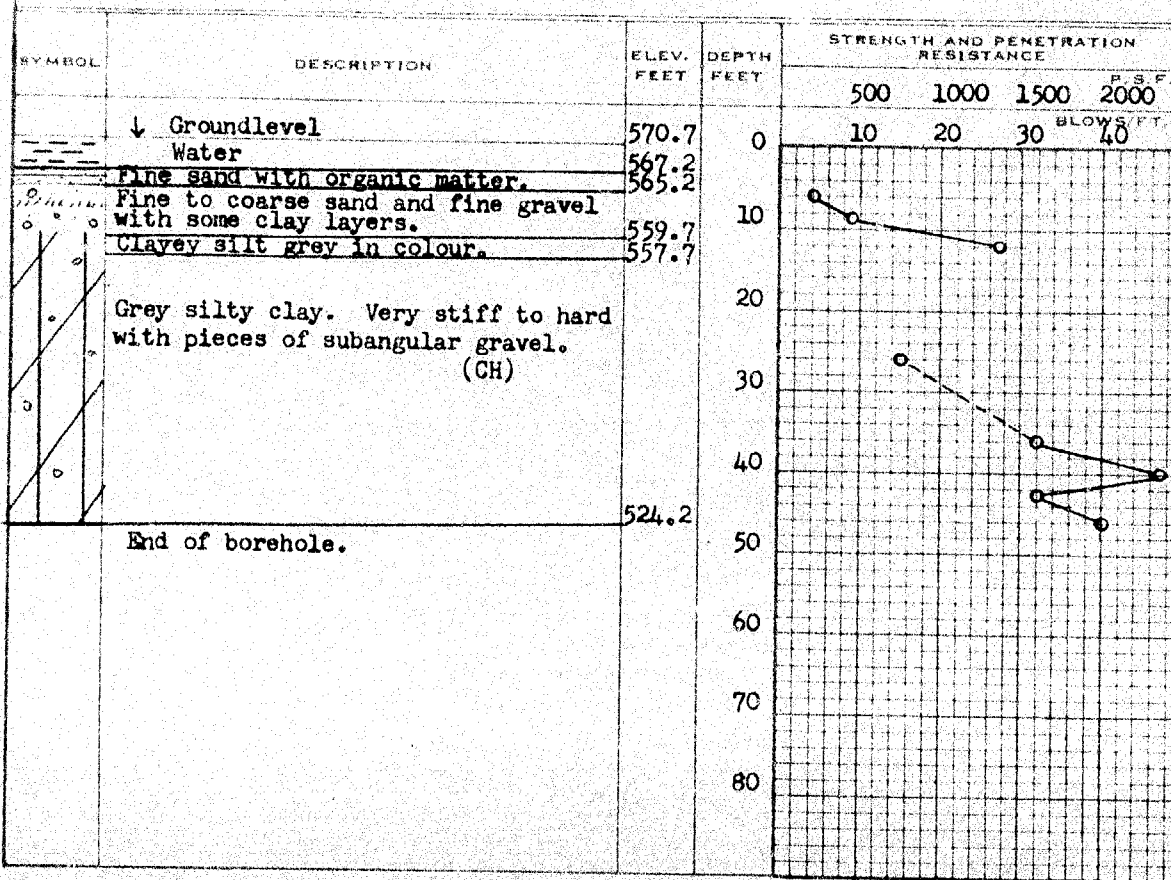
SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				500	1000	1500	2000
				P.S.F.			
				BLOWS/FT.			
	↓ Groundlevel	570.8	0	10	20	30	40
	Water	567.0					
	Fine to med. sand with organic matter	562.8	10				
	Fine to coarse sand with fine gravel & organic matter.	558.8					
	Silty clay. Very stiff. Grey in colour (ML)	550.3	20				
	Clayey silt grey in colour (ML)	545.8	30				
	Silty clay. Hard. Grey with pieces of subangular gravel. (CH)		40				
		524.3	50				
	End of borehole.		60				
			70				
			80				

CONSISTENCY			SAMPLE	NATURAL UNIT WT P.C.F.
MOIST. CONTENT - % DRY WT				
10	20	30		
			S1	-
			S2	-
			S3	-
			T4	126.1
			T5	129.3
			S6	-
			T7	-
			T8A	-
			S8	-
			S9	-
			S10	135.0

W.P. 93-60 BORE HOLE NO. 3
JOB 61-F-4 STATION 480+16.6' Lt.
DATUM 570.7' COMPILED BY B.K.
BORING DATE Jan. 25/61 CHECKED BY T.F.W.

2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA CO
2" SHELBY
AS

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



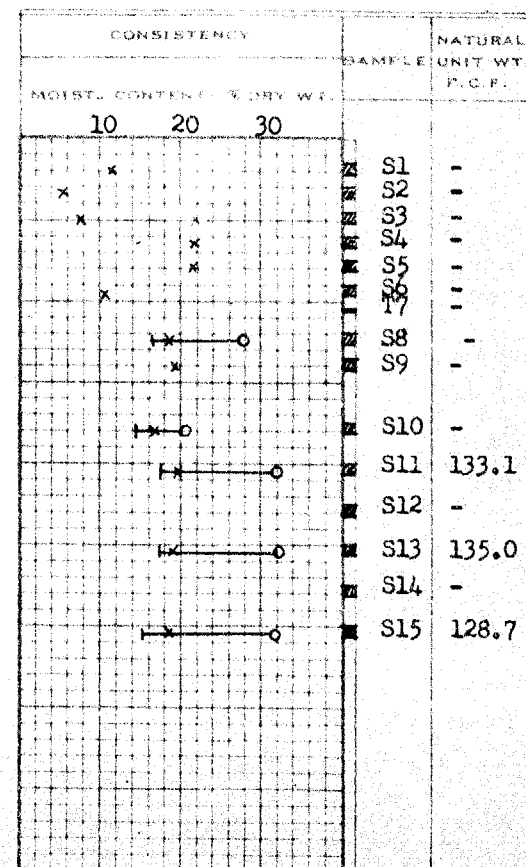
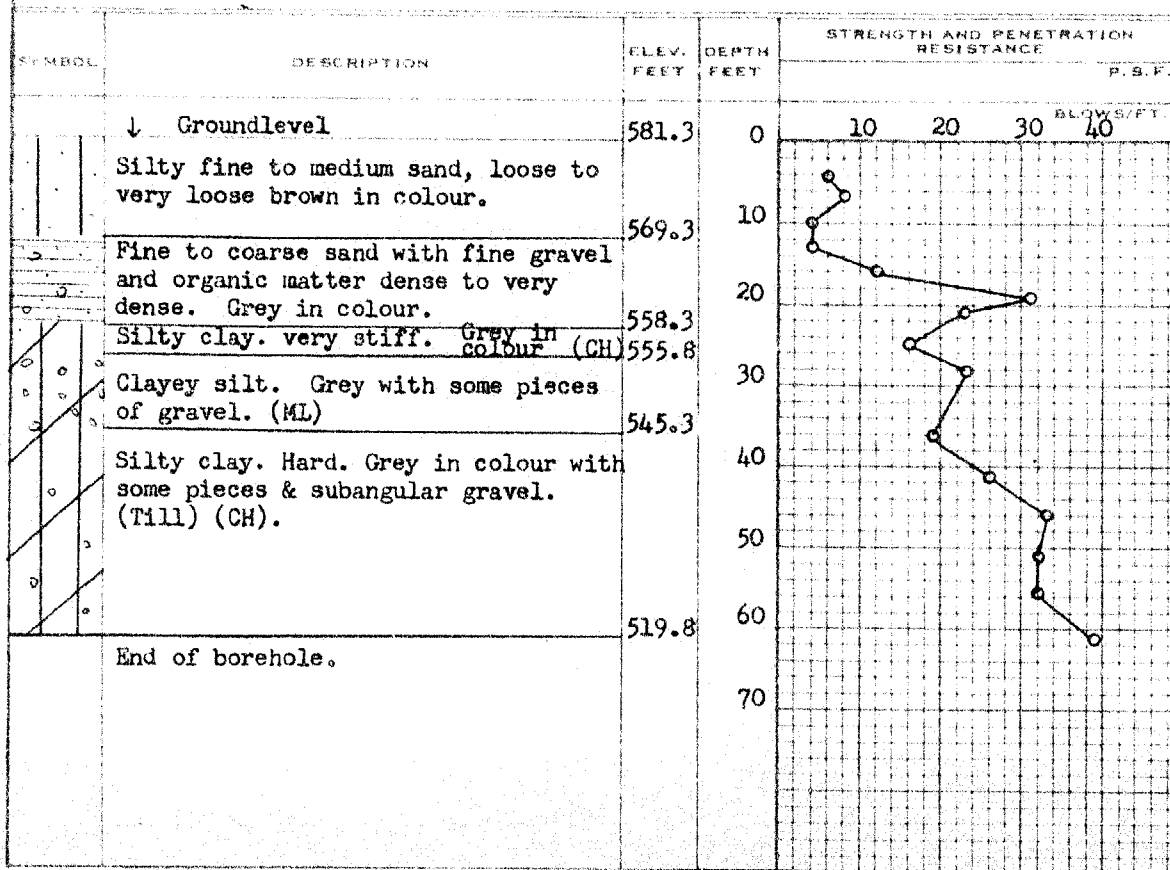
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 93-60 BORE HOLE NO. 4
JOB 61-F-4 STATION 479/16 9' Lt.
DATUM 581.3' COMPILED BY B.K.
BORING DATE Feb. 2/61 CHECKED BY T.F.W.

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



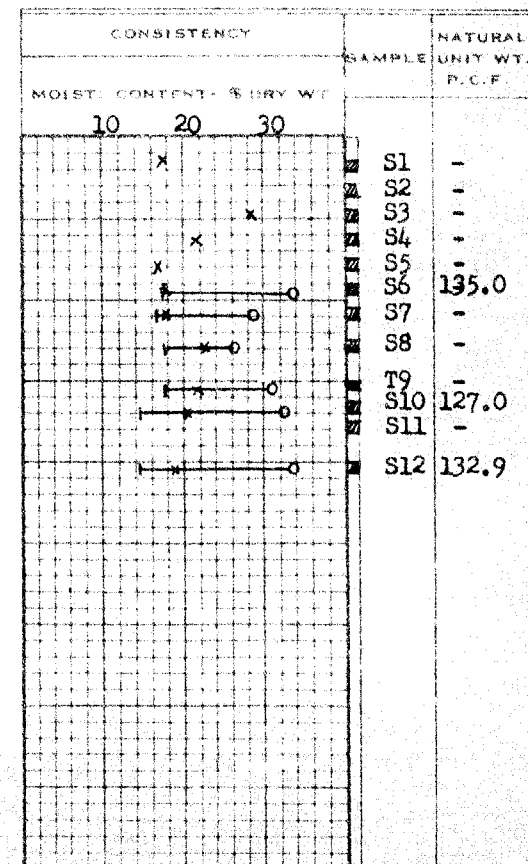
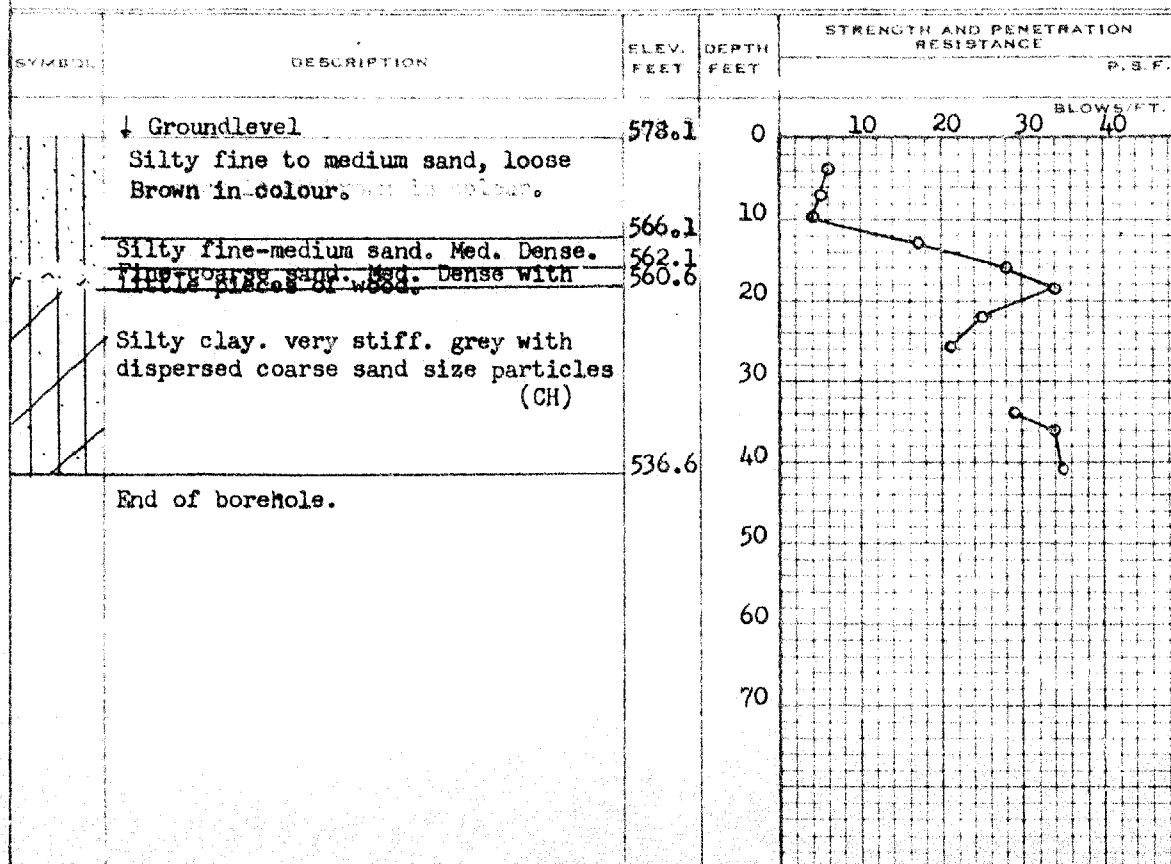
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

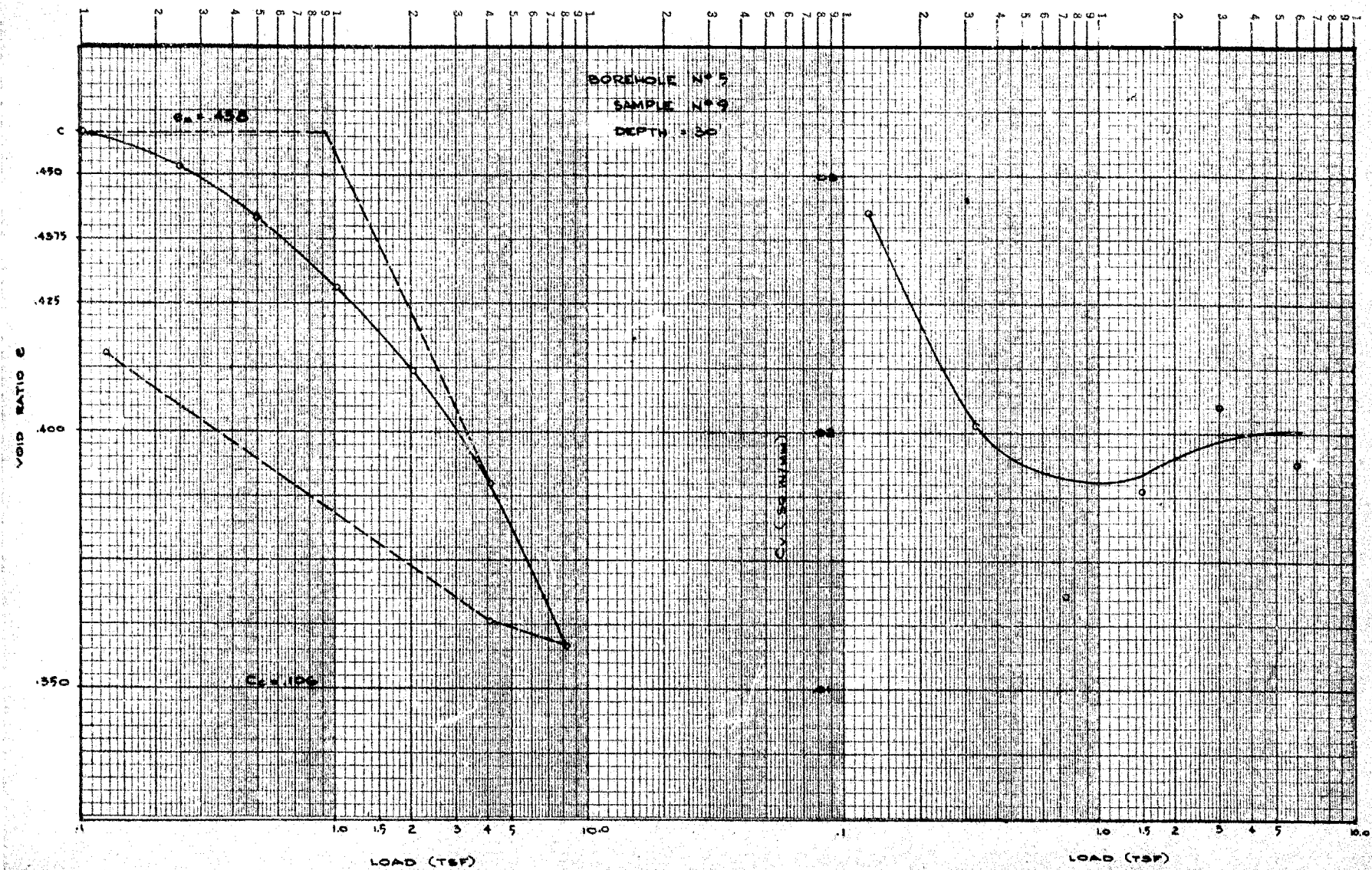
W.P. 93-60 BORE HOLE NO. 5
JOB 61-F-4 STATION 480+95 10' Lt.
DATUM 578.1' COMPILED BY B.K.
BORING DATE Jan. 31/61 CHECKED BY T.F.W.

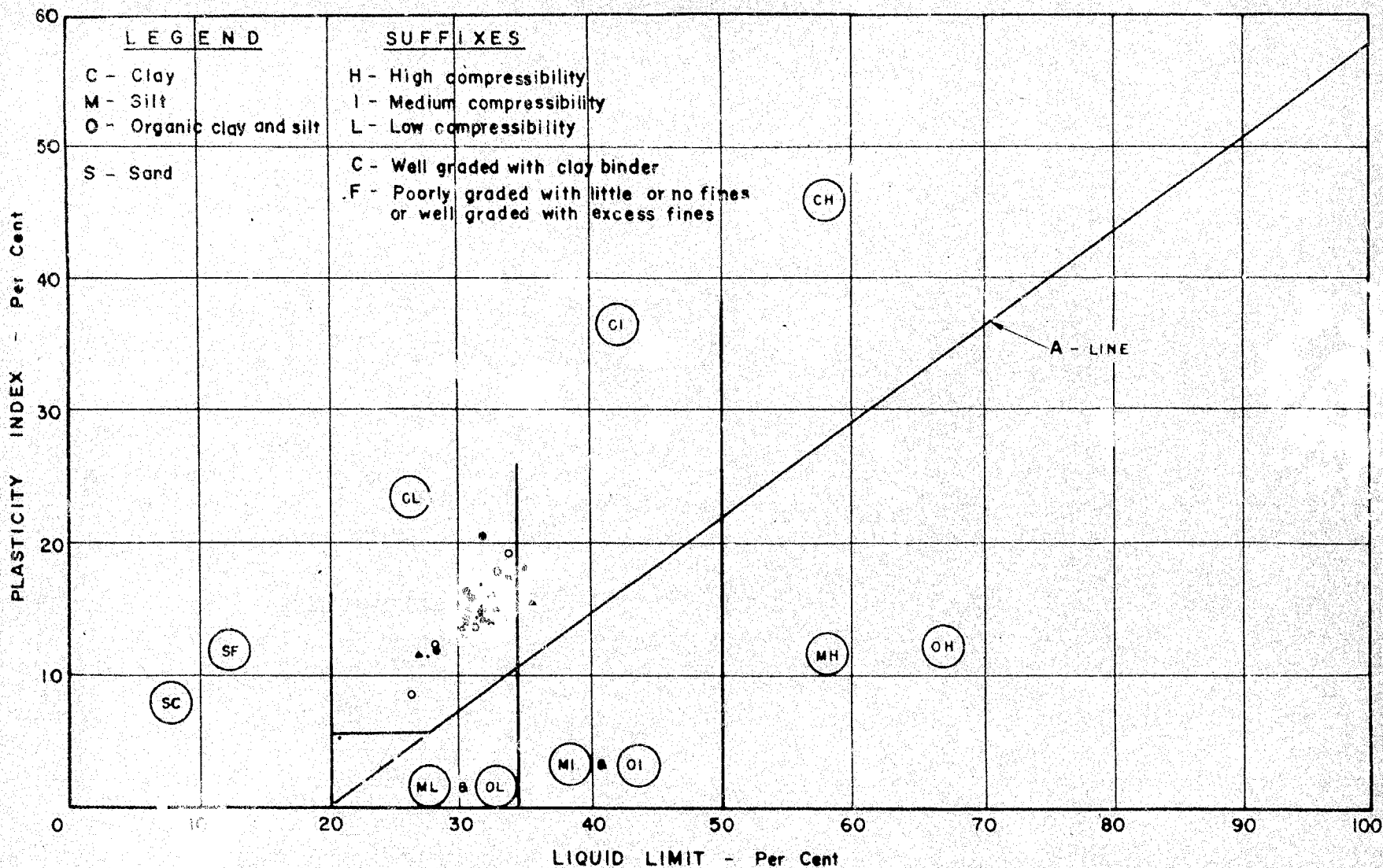
2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

LEGEND

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







NOTES

1. ●

2. ▲

3. ×

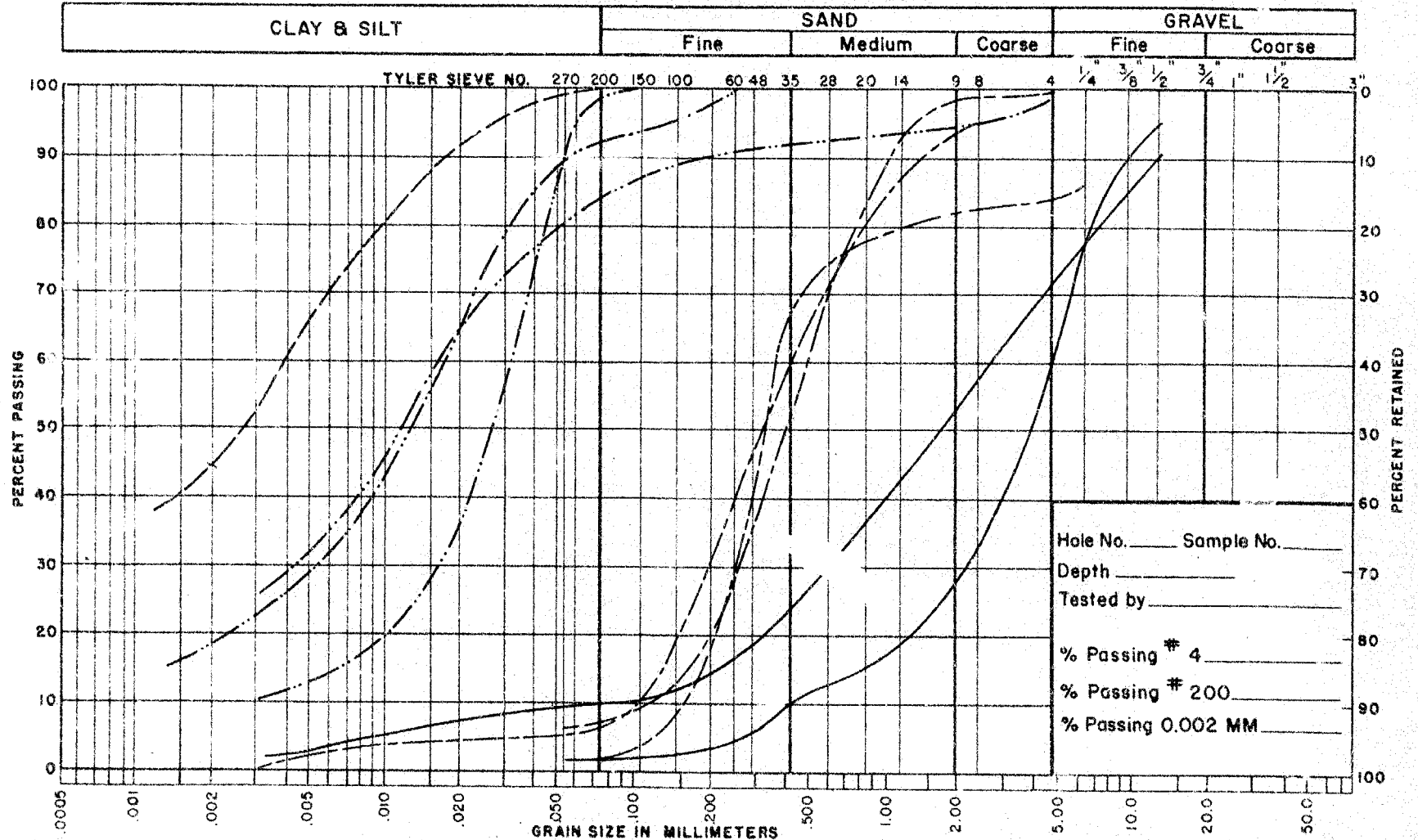
4. ·

5. ○

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
PLASTICITY CHART

Job No. 61-F-4 W.P. No. 93-60
Location CATFISH CREEK PORT BRUCE

UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES CLASSIFICATION SHOWING FOUR TYPICAL SOIL TYPES:

FINE-MEDIUM SAND (-----) CLAYEY SILT (-----)

FINE-COARSE SAND WITH FINE GRAVEL (-----)

SILTY CLAY (-----)

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

Job No. 61-F-4 W.P. No. 93-60
 Location CATFISH CREEK



ONTARIO
DEPARTMENT OF HIGHWAYS

Memo to Mr. A. Stermac Date March 2, 1962.
Principal Foundation Eng. Subject W.P. 93-60, Catfish Cr. Br.
from M. Gvildys Hwy. #73, Dist. #2.

We attach herewith a drawing D 4961-1 showing the proposed footing design for the above mentioned structure.

As the pier footings are supported by piles would you please estimate the amount of settlement for the abutment footings.

Abutment footing soil pressures at toe and heel are as follows:

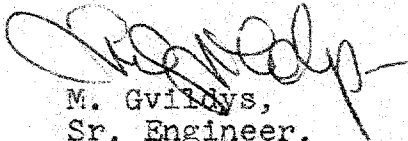
minimum 1.12 ksf and 0.06 ksf respectively
maximum 2.13 ksf and 0.80 ksf respectively

The soil pressure at footing level adjacent to abutment footings due to overburden at toe and heel are as follows:

present 1.3 ksf and 1.7 ksf respectively
future 1.3 ksf and 2.1 ksf respectively

^{0.0} Also would you please let us know if our foundations are satisfactory to you. ^{0.4}

MG:go


M. Gvildys,
Sr. Engineer.

BRIAN RICHARDSON

516

#61-F-4

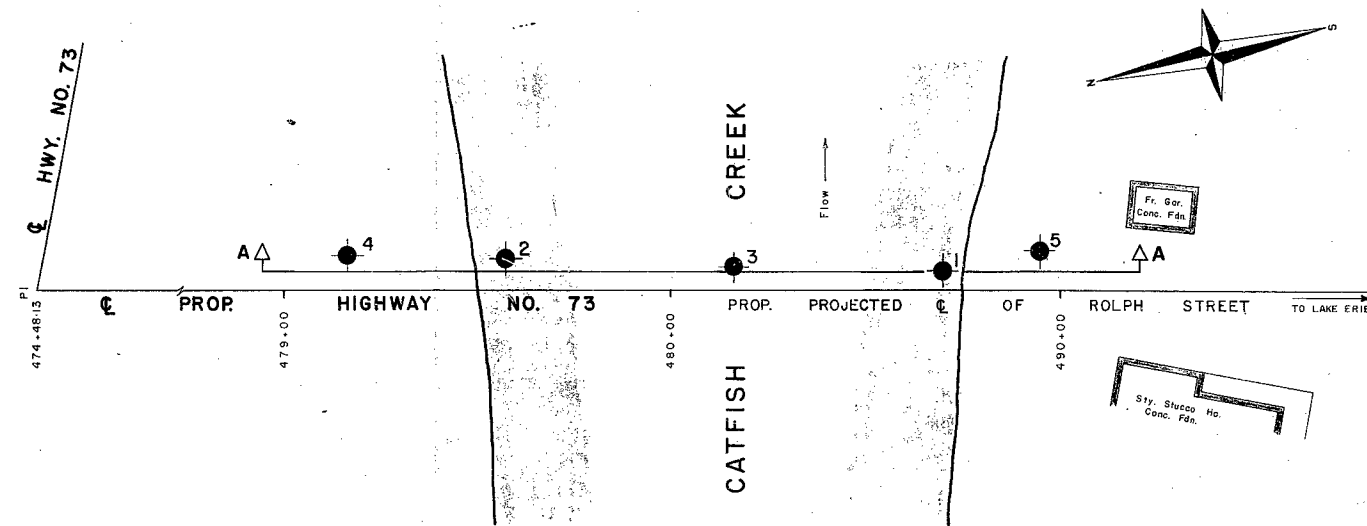
W.P. # 93-60

Hwy. # 73

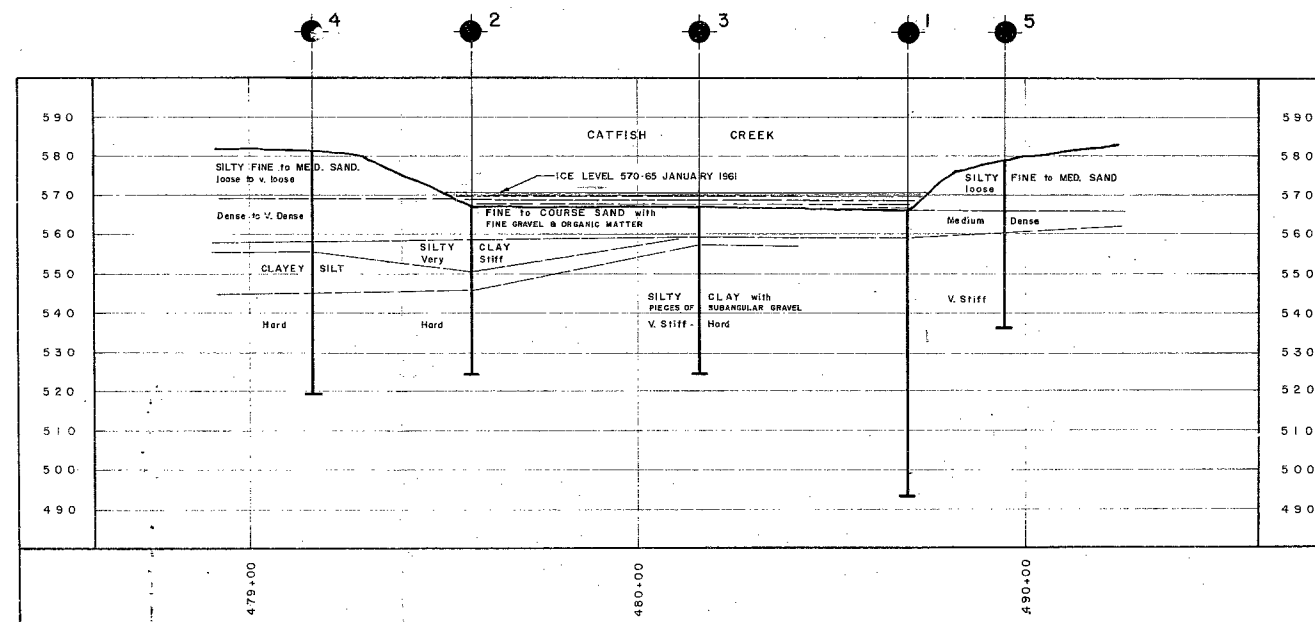
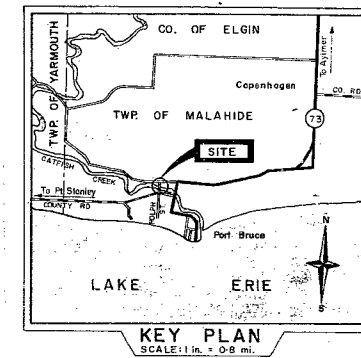
CROSSING

CATFISH CR.

PORT BRUCE



PLAN



SECTION A-A

LEGEND			
● BORE HOLE			
HOLE No.	ELEVATION	STATION	DISTANCE FROM C
1	570.5	480+70	5' LT.
2	570.8	479+57	8' LT.
3	570.7	480+16	6' LT.
4	581.3	479+16	9' LT.
5	578.1	480+95	10' LT.

DEPARTMENT OF HIGHWAYS - ONTARIO		
MATERIALS & RESEARCH SECTION		
CATFISH CREEK AND HIGHWAY NO. 73 PROPOSED REVISION		
ORIGINATED BY WIDDIS	DISTRICT NO. 2	DATE 10 MARCH 1961
DRAWN BY D. MUMFORD	W.P. NO. 93-60	JOB NO. 61-F-4
CHECKED BY [Signature]	SCALE	DRAWING NO.
APPROVED [Signature]	1 inch = 20 feet	61-F-4A

REF No. E-3929-1.

