

63-F-243 M

BLACK CREEK

18/19 SIDE ROAD OIL SPRINGS

MEMORANDUM

To: Mr. A. Stermac
Principal Foundation Eng.,
Materials & Research Section.

FROM: G.C.E. Burkhardt

DATE: January 2, 1964.

OUR FILE REF.

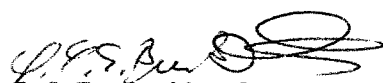
IN REPLY TO

SUBJECT: Village of Oil Springs
Bridge over Black Creek on 18th Sideroad
County of Lambton
Structure Site # 15-219
Our File No. BA 1730

Attached please find one copy of the Foundation Report by E.M. Peto Associates Ltd., and one copy of the Preliminary Plan for your comments.

We would appreciate it very much if we could have your comments on/or before January 15th, 1964.

GCEB/kd
c.c. J. Walter


G.C.E. Burkhardt
for K.L. Kleinsteinber
Mun. Bridge Liaison Engineer.

*No comment
advised by phone
KLF 2/1/64.*

BA-1730

F. M. PETC ASSOCIATES LTD.

Job No. 63153

1287 Caledonia Road,
Toronto 19, Ontario.
789-1126-7

November 15th, 1963.

The Town of Oil Springs,
c/o J. A. Monteith, Associates,
Consulting Engineers,
4238 Petrolia Street,
P.O. Box 579,
Petrolia, Ontario.

63-E-243M

Attention: Mr. G. Ingram

Re: Soil Investigation, at
18/19 Side Road Oil Springs Bridge

Gentlemen:

We have pleasure in forwarding five copies of our soil investigation report.

In the following report we have described briefly the soil conditions encountered, and have given the data pertaining to the individual soil strata.

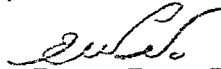
Our observations, regarding the foundations for the proposed bridge, are at the rear of this report. For your convenience we summarize below the findings of this report.

1. The soil conditions, encountered at the site will permit the bridge to be founded on a spread footing.
2. The allowable bearing value of 3.0 ton/sq. ft may be taken for all foundations of 30 feet in length and not exceeding 9 feet in width. The factor of safety for such foundations will be in most cases in excess of 3 and the consolidation settlements should not exceed 1 inch.
3. For embankments 30 feet in width and side slopes of 1 vertical to 2 horizontal the limiting height for 1 inch of consolidation settlement is 11 feet.
4. No difficulties are foreseen during the construction period and no elaborate water control measures will be required.

We trust that the information contained in this report will permit you to proceed with the foundation design. Should you, however, have some questions arising from this report, do not hesitate to call on us.

Yours very truly,

F. M. FETO ASSOCIATES LTD.,



F. M. Feto, P. Eng.

BL:st

THE TOWN OF OIL SPRINGS,
C/O J. A. MONTEITH, ASSOCIATES,
CONSULTING ENGINEERS.

SOIL INVESTIGATION
AT
18/19 SIDE ROAD OIL SPRINGS BRIDGE

E. M. PETO ASSOCIATES LTD.

1287 Caledonia Road,
Toronto 19, Ontario.

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BORHOLE LOGS

SITE PLAN

PROFILES

A. INTRODUCTION:

We were retained by Messrs. J. A. Monteith, Associates, the Consulting Engineers, on behalf of the Town of Oil Springs to carry out a soil investigation at the bridge located on 18/19 Side Road.

The investigation was called for in order to determine the subsoil stratification, and the physical characteristics of the soils, and their possible influence on the foundation of the new bridge, which will replace the existing one.

The existing bridge is of wooden construction, supported on four timber pile bents supporting 15 feet spans. At present the timber decking is in extremely bad condition.

B. GENERAL INFORMATION:

1. The location of the test holes and the inferred soil profile is shown on the attached site plan drawing.
2. The elevations of the test holes were determined by the Consulting Engineers and these elevations are incorporated in the following report and drawings.
3. The laboratory test results are given in Appendix A.
4. In Appendix B the properties of the deposits, such as natural water contents, N-values (i. e. number of blows per foot penetration as obtained during the standard penetration test), Atterberg Limits, and the undrained shear strength are plotted versus elevation.

C. SITE AND GEOLOGY:

The existing timber bridge on Side Road 18/19 crosses a very sluggish stream flowing from north-west to south-east. The stream is located in a fairly wide valley, with the banks rising at a gentle slope. The drainage of surface soils is very poor, and abundant vegetation covers the stream banks. The area around the site is covered by numerous small oil wells. The oil field in this area is known as "Oil Springs Field" and occupies lots 16 to 19, Cons. I and II. The approximate area of the oil field is about 2 square miles. First exploration of the tarry seepage occurring along Black Creek began in 1858. Wells were put down to the gravel bed which is located 40 to 60 feet below grade. This gravel bed contained heavy oil. Initial flows of 2000 to 5000 barrels per day were not uncommon.

Nearly all present wells are shallow (350 to 400 feet). The reservoir is porous limestone which is usually located 100 to 130 feet below the top of Norfolk formation which forms the upper part of the bedrock formation at this site. The thickness of the oil bearing zone is from 5 to 10 feet. The structure of the Oil Springs Field is an eccentric dome, slightly elongated in a north-west direction.

The soils as encountered at this site are of glacial origin.

D. SOIL CONDITIONS:

On the attached soil profile the stratification is given, as interpolated on the basis of two test holes. A detailed description of the soils encountered is given on the borehole logs. The following is a brief description of the main characteristics of soil deposits encountered:

1) Brown very silty sand and organic matter

This stratum was met at test hole 1 only, i. e. on the south side of the existing bridge. The depth of this layer was about 3 feet, and the soil was only moist.

2) Organic clayey silt

On the north side of the existing bridge an organic deposit was encountered extending to 4.5 feet depth. It was of soft consistency, and wetter than its Plastic Limit.

3) Grey-brown to olive-brown sandy clay with grits and pebbles

This layer was met at both test holes, thus it will exist on both sides of the bridge. At test hole 1 it was located between 3.0 and 6.3 feet and test hole 2 between 4.5 and 7.0 feet. It was of stiff consistency (N-values between 13 and 14) and just at about Plastic Limit (water content between 15 and 19%).

- 4 -

D. SOIL CONDITIONS: (Cont'd)

4) Gray to dark-gray silty clay with grits, pebbles and odd stones

At the depth investigated this stratum forms the most extensive deposit. The upper limit in both test holes was at about the same depth, between 6.3 and 7.0 feet with the lower limit at about 45 feet below grade at test hole 1, and 35 feet at test hole 2.

The stratum of silty clay was of stiff to very stiff consistency with N values ranging between 10 and 32. The average N-value was 20. The natural water contents varied between 14 and 19%. The distribution of N-values and the natural water contents with depth is given on Appendix E.

The variation in Atterberg Limits with the average values is:

Liquid Limit 31 to 36, average 33

Plastic Limit 19 to 22, average 20

Plasticity Index 11 to 14, average 13.

Comparing the natural water contents with the Atterberg limits it may be seen that the water contents are lower than the plastic limits. Thus, this deposit is pre-consolidated.

The grading analyses results are:

Sand 26 to 37%, average 32%

Silt 32 to 34%, average 36%, and

Clay 27 to 36%, average 32%

D. SOIL CONDITIONS:

4) Gray to dark-grey silty clay with grits, pebbles and odd stones (Cont'd)

Based on the average clay content and the plasticity index the average value of Activity for this deposit is 0.41, thus the silty clay belongs to an in-active group of clays.

The consolidation test confirmed the observation made previously that the stratum is pre-consolidated. The difference between the calculated effective overburden pressure and the estimated pre-consolidation pressure for the sample taken from 16.2 feet depth at test hole 1 was about 1.0 kip/sq. ft. The calculated Coefficient of Volume Change was $m_v = 0.003$ sq. ft./kip.

The results of the undrained shear strength tests are given in Appendix E, together with the estimated average curve of undrained shear strength with depth, which served as a basis in arriving at the allowable bearing values.

According to L. G. Soderman, T. C. Kenney, and A. K. Loh "Geotechnical Soil Properties of Glacial Clays in Lake St. Clair Region of Ontario", for a deposit of similar characteristic as the one encountered the following values may be assumed:

Fore pressure coefficient $A = 0.2$

Angle of internal friction $\phi = 28$ to 30°

According to the results of field and laboratory analysis the silty clay stratum is an in-active, pre-consolidated, CI-clay.

D. SOIL CONDITIONS: (Cont'd)

5) Dark-grey silty clay, grits, pebbles and stones, fragments of shale

Overlying the sand and gravel bed a thin layer of dark grey silty clay, containing grits, pebbles and stones was encountered. The transition from the overlying clay layer was obscured. The dark-grey silty clay stratum was of equal density as the overlying deposit (average N-value 19), but the natural water contents were lower (average 14%). The Atterberg limits were:

Liquid Limit	35%
Plastic Limit	22%, and
Plasticity Index	13

Thus, basically the soil is similar as the overlying clay bed.

6) Dark-grey sand with some gravel, varying clay content

Located between 47 ft 2 in. and 49 ft 0 in. at test hole 1, and 38 ft 0 in. and 45 ft 8 in. at test hole 2, there was a sand and gravel stratum. The deposit was compact to extremely dense. The natural water content of 21% indicates that this layer is saturated; as this sand and gravel bed contained oil at some time the oil (see section on geology), gas pockets were met during this investigation. In addition water was present in this stratum under pressure; at test-hole 1 the equivalent water level was 12.5 feet below grade, and at test hole 2 at 10.5 feet below grade.

D. SOIL CONDITIONS: (Cont'd)

7. Light gray clay, silt to silt

Underlying the sand and gravel bed there was a clay, silt to silt deposit, locally known as a "soap stone". It was extremely dense with a minimum recorded N value of 78. The average N-value is well over 100. The natural water contents varied between 9 and 18%, with an average value of about 13%. The mechanical analyses gave the following results:

Sand	6 to 32%
Silt	46 to 49%, and
Clay	22 to 45%

Slickensides was a peculiar characteristic of this deposit. With depth the occurrence of weathered shale was more frequent. At test hole 2 a large limestone boulder was met between 54.3 and 57.4 feet.

E. WATER CONDITIONS:

Due to relatively short period of observations no definite conclusions may be drawn regarding the position of ground water table. However, as mentioned in the soil conditions, water under pressure was met in the sand and gravel bed.

During the drilling operations no free water was present, when test holes were drilled through the gray silty clay deposit.

F. OBSERVATIONS AND CONCLUSIONS:

1. At the site the main soil deposit which was a stratum of grey silty clay with grits and pebbles was found to be preconsolidated.

2. The average undrained shear strength of this deposit is about 3.5 kip. sq. ft.

3. Based on the average undrained shear strength and the consolidation characteristic of the grey silty clay deposit, and assuming that the length of foundation does not exceed 30 feet, an allowable bearing value of 3.0 ton/sq. ft. may be assumed. The settlements, as calculated based on a paper by A. W. Skempton and L. Bjerrum "A contribution to the settlement analysis of foundation on clay", and assuming the Coefficient of pore pressure $A = 0.2$, were less than 1 inch for all footings not exceeding 9 feet in width.

4. As the minimum foundation depth, a depth of 8 feet below grade was assumed. Thus if the footings are placed at a depth of 8 feet below grade on each side, a difference in footing elevation of about 7 feet will exist. On the other hand if one elevation for the foundation is chosen then the required depth to foundation will be 7 feet larger on the south side than on the north side.

5. The factor of safety against shear failure, when using the allowable bearing value of 3.0 ton/sq. ft. will be in excess of 3.

F. OBSERVATIONS AND CONCLUSIONS: (Cont'd)

6. Excavations in the grey silty clay layer may be made in an unsupported vertical cut. Theoretically the cuts may be unsupported throughout the depth of the silty clay stratum. The organic deposits overlying the clay deposits may either be completely removed, or for the duration of construction sloped back, say at a slope of 1 vertical to 2 horizontal.

7. No mechanical excavation difficulties are foreseen in excavating to the required foundation elevation.

Only a limited water control may be necessary, due to some seepage or surface water.

8. Assuming that any proposed embankment will be 30 feet wide at the top, with side slopes of 1 vertical to 2 horizontal, and the density of the compacted fill as 130 lb/cu. ft. the maximum height of such an embankment, limiting settlements to 1 inch, is 11 feet.

9. Before any embankment is placed at the site the complete removal of the organic clayey silt is recommended.

10. As a fill material the grey silty clay with grits and pebbles may be used, provided the water content is as found in-situ. If this material will be subjected to an increase in water content, difficulties in compaction will be experienced. Ideally, granular fill material may be used.

F. OBSERVATIONS AND CONCLUSIONS: (Cont'd)

11. Piles may be used as an alternative foundation solution on the site. The piles will be mainly of end bearing type, when founded in the extremely dense silt stratum. The effect of the water under pressure in the sand and gravel bed on the piles during the construction and in the design will have to be considered. Based on the assumed undrained shear strength of at least 6000 lb/sq. ft for the silt stratum the allowable bearing value for the silt deposit is 9.0 ton/sq. ft. However, a pile loading test would be required to confirm the pile load capacity.

F. M. PETO ASSOCIATES LTD.,

C. F. Freeman

C. F. Freeman, P. Eng.
Chief Engineer.

BL:SB

Job No. 63183

November, 1963.

Report Prepared By:

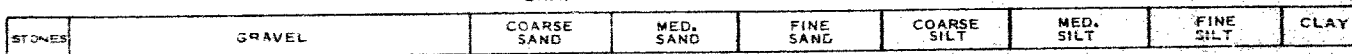
B. Lewicki

B. Lewicki, P. Eng.

APPENDIX "A"

LABORATORY TEST RESULTS

Toronto 19, Ontario



MASS. INST. OF TECH. CLASSIFICATION

JOB NAME Oil Springs Bridge JOB NO. 63183 HOLE NO. 1 SAMPLE NO. 7
DEPTH 12'-13'6" ELEVATION _____ REMARKS Silty clay

GRAIN SIZE DISTRIBUTION

Toronto 19. Ontario



100 PER CENT RETAINED

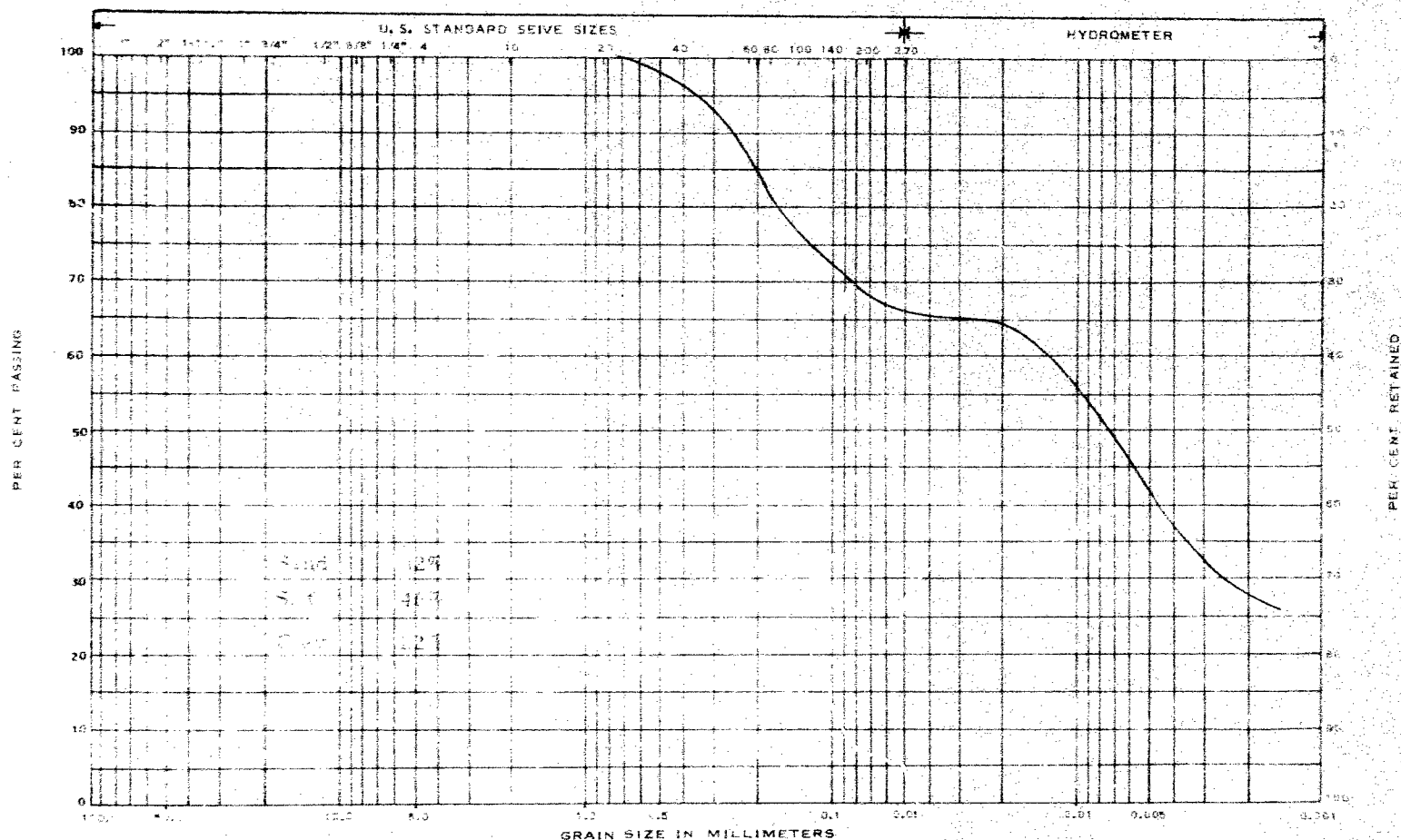
MASS. INST. OF TECH. CLASSIFICATION

DEPTH

ELEVATION

REMARKS

GRAIN SIZE DISTRIBUTION



TONES	GRAVEL	COARSE SAND	MED. SAND	FINE SAND	COARSE SILT	MED. SILT	FINE SILT	CLAY
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MASS. INST. OF TECH. CLASSIFICATION

JOB NAME Oil Springs BridgeJOB NO. 53135

HOLE NO. _____

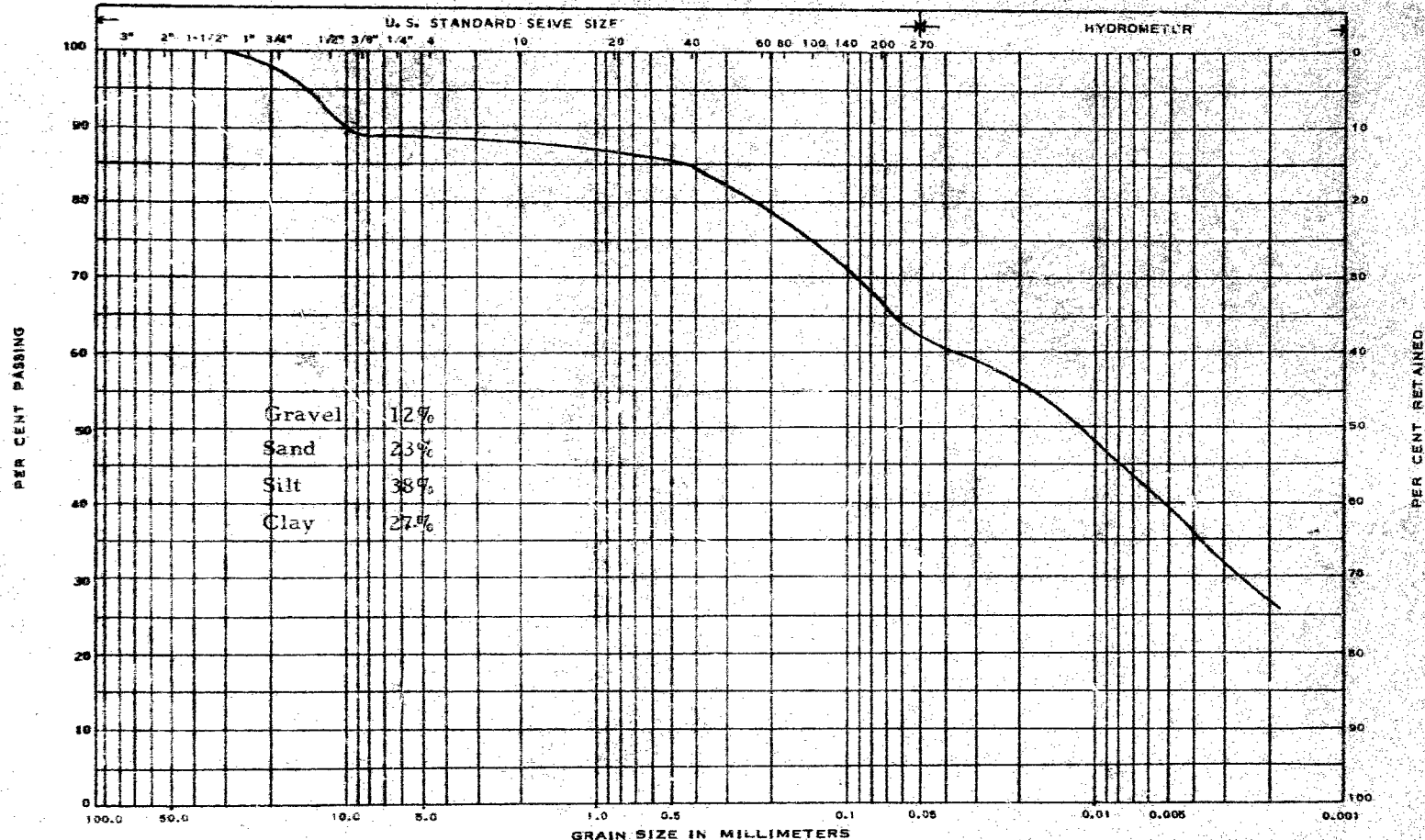
SAMPLE NO. 20DEPTH 50' 0" 51' 6"

ELEVATION _____

REMARKS _____

Clayey silt

GRAIN SIZE DISTRIBUTION



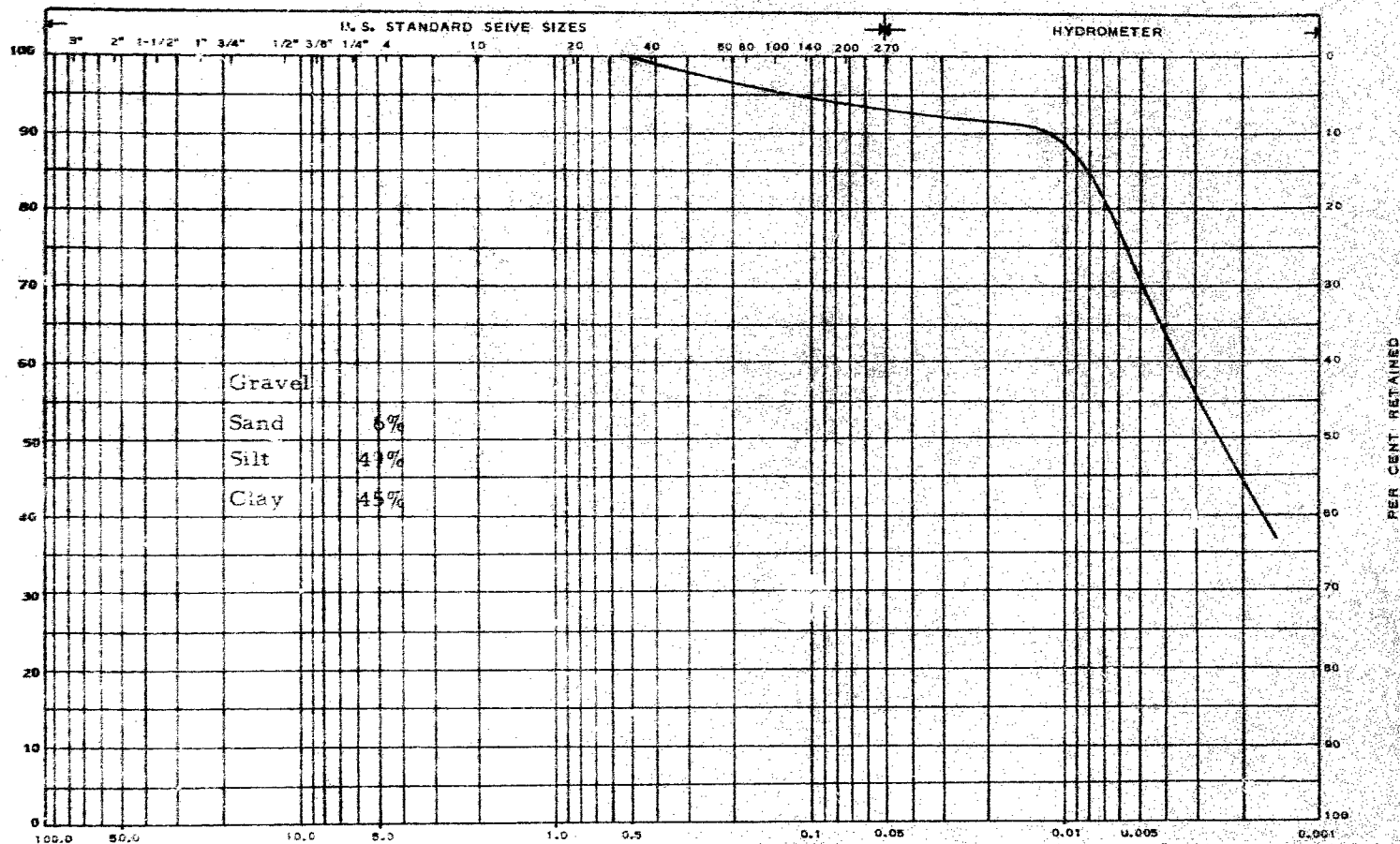
STONES	GRAVEL	COARSE SAND	MED. SAND	FINE SAND	COARSE SILT	MED. SILT	FINE SILT	CLAY
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MASS. INST. OF TECH. CLASSIFICATION

JOB NAME Oil Springs Bridge JOB NO. 63183 HOLE NO. 2 SAMPLE NO. 20

DEPTH 30'-31'6" ELEVATION _____ REMARKS Clayey silt

GRAIN SIZE DISTRIBUTION



STONES	GRAVEL	COARSE SAND	MED. SAND	FINE SAND	COARSE SILT	MED. SILT	FINE SILT	CLAY
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MASS. INST. OF TECH. CLASSIFICATION

JOB NAME Oil Springs Bridge JOB NO. 63183 HOLE NO. 2 SAMPLE NO. 28

DEPTH 60' 61'6" ELEVATION _____ REMARKS Silty clay

GRAIN SIZE DISTRIBUTION

ATTERBERG LIMITS

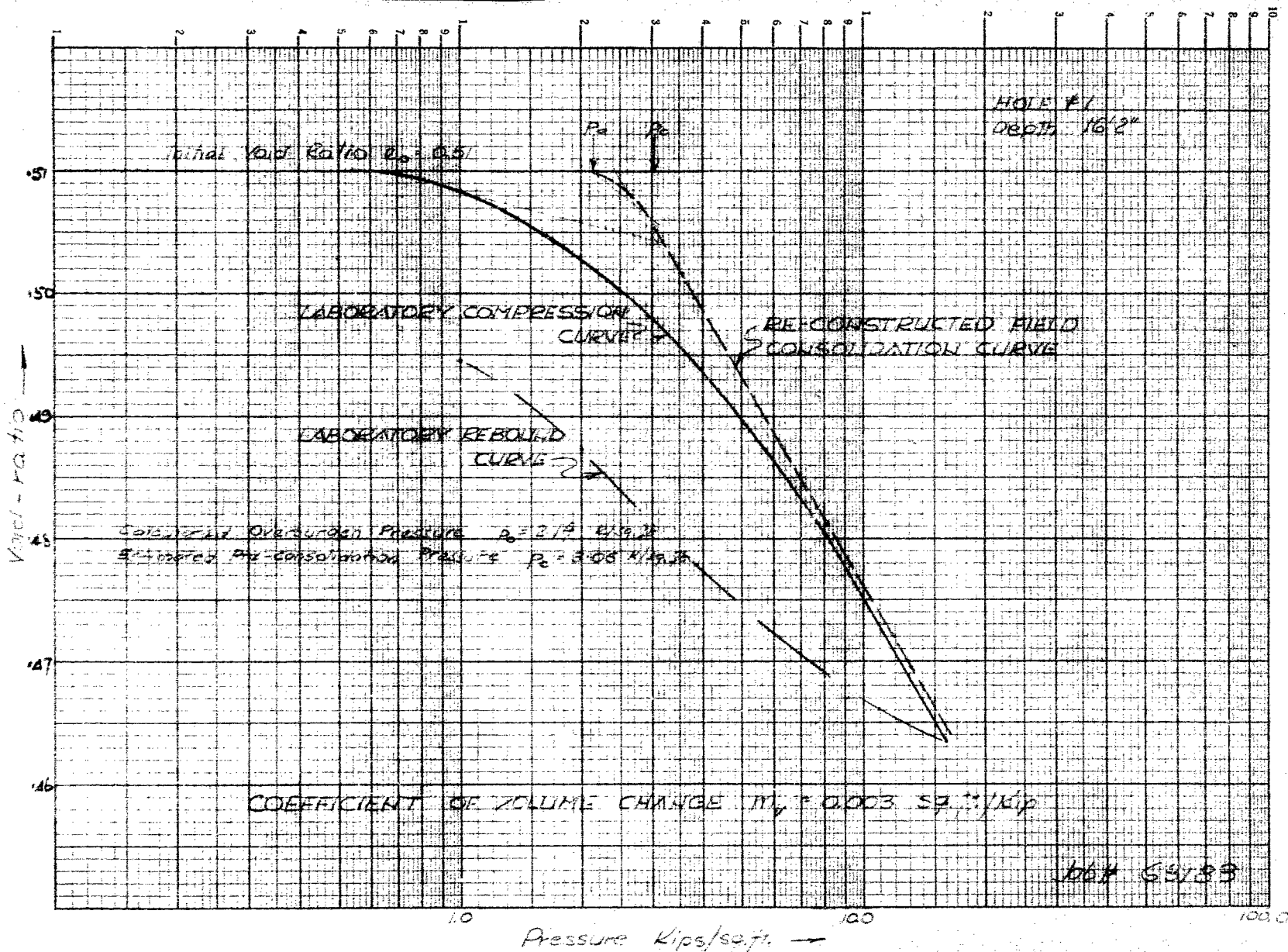
<u>Test Hole</u>	<u>Depth</u>	<u>Elevation</u>	<u>in per cent</u>		<u>Plasticity Index</u>
			<u>Liquid Limit</u>	<u>Plastic Limit</u>	
1.	30'0" - 31'6"	50.1	31.6	20.2	11.4
1	45'0" - 46'6"	35.1	32.4	19.7	12.7
2	7'0" - 8'6"	66.1	35.9	21.6	14.3
2	17'6" - 19'0"	55.6	30.8	18.8	12.0

UNCONFINED COMPRESSION TEST RESULTS

Hole No.	Sample No.	Depth	Elevation	Nat. MC. %	Densities, p.c.f.		Degree of Saturation, %	Void ratio, e	% Strain at Failure	u/c Shear Strength psf
					Wet	Dry				
2	8	11'0" - 11'6"	62.6	20.0	133.0	111.0	97.0	0.54	20	5500
2	11	15'6" - 16'0"	58.1	15.6	134.5	116.5	91.5	0.47	20	6500
2	12	16'0" - 16'6"	57.6	15.1	136.0	118.0	91.5	0.45	20	6000
2	15	20'6" - 21'0"	53.1	18.0	137.2	116.5	100.0	0.47	20	6300
2	21	32'6" - 33'0"	41.1	19.0	134.0	112.5	100.0	0.52	20	2900
2	6	10'0" - 10'6"	63.6	16.2	133.0	114.2	93.0	0.42	20	3550
1	6	10'6" - 11'0"	70.1	17.4	131.5	112.0	93.5	0.50	20	3240
2	10	15'0" - 15'6"	58.6	13.2	132.5	117.0	81.5	0.44	20	6000
1	9	11'0" - 11'6"	69.1	not determined						3240 } U (x)
1	10	11'0" - 11'6"	69.1	not determined						2800 } R (x)
2	14	20'0" - 20'6"	53.6	not determined						3900

(x) Note: U = Undisturbed

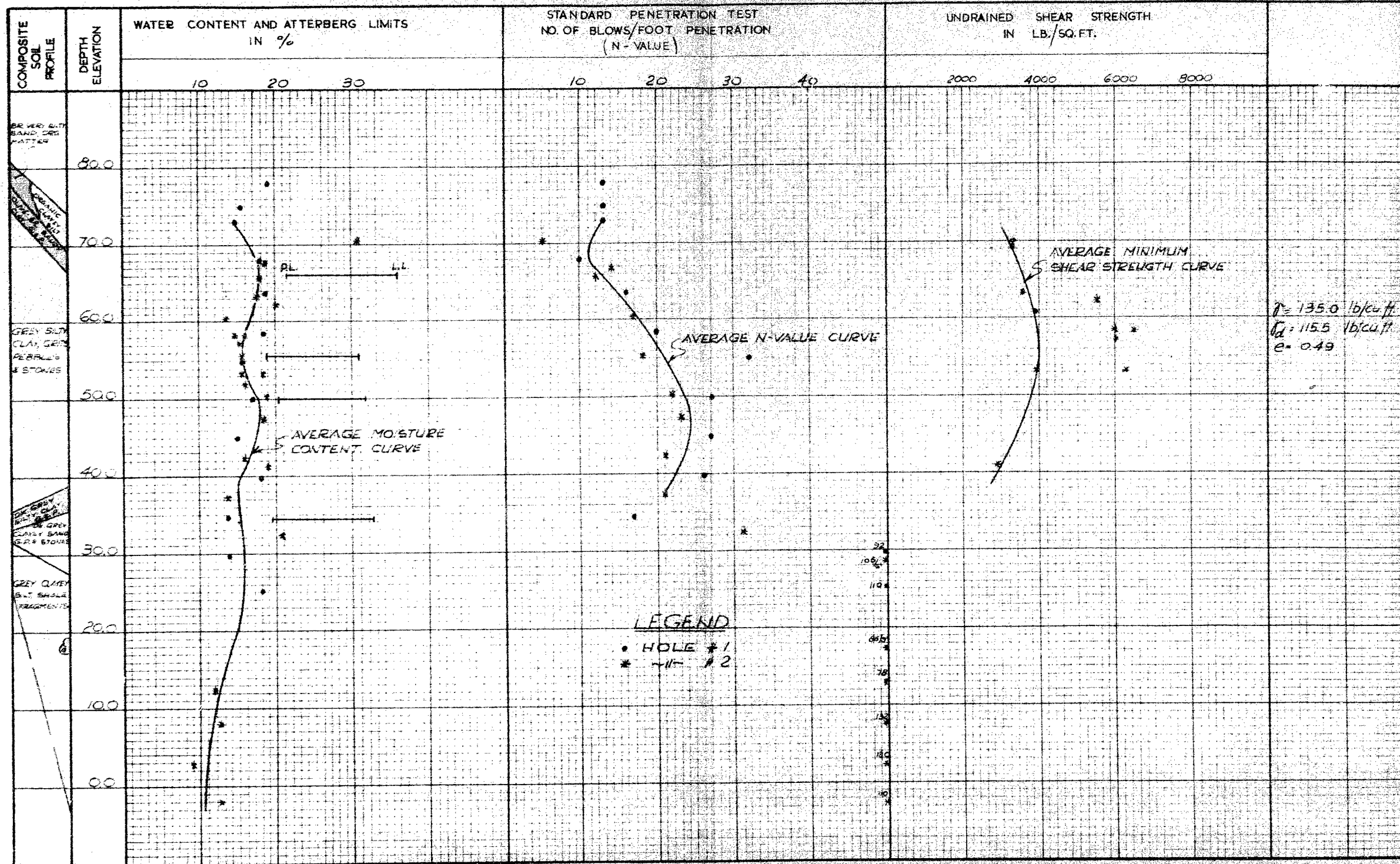
R = Remoulded



APPENDIX "B"

GEOTECHNICAL SOIL PROPERTIES

GEOTECHNICAL SOIL PROPERTIES

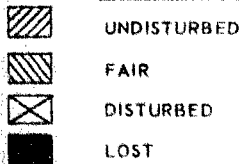


e. m. peto associates ltd.
SOIL ENGINEERING SERVICE - TORONTO, ONTARIO

BOREHOLE LOG

Job Name Side Road Oil Springs Borehole Job No. 154183 Borehole No. 1
Client Power of Oil Springs Casing 1" & 1 1/2" Boring Date Oct. 21-22, 1963.
Elevation 50.0 Compiled By P. J. Checked By S. B.

SAMPLE CONDITION



SAMPLE TYPE

A.S. AUGER SAMPLE
C.S. CASING SAMPLE
S.S. 2" STANDARD SPLIT TUBE SAMPLE
S.L. SPLIT BARREL WITH LINERS
S.T. THIN-WALLED SHELLY TUBE SAMPLE
W.S. WASH SAMPLE
R.C. ROCK CORE

ABBREVIATIONS

V.T. IN SITU VANE SHEAR TEST
M. MOIST
W.L. WATER LEVEL IN CASING
W.T. GROUND WATER TABLE IN SOIL
W.T.P.L. WETTER THAN PLASTIC LIMIT
D.T.P.L. DRIER THAN PLASTIC LIMIT
A.P.L. ABOUT PLASTIC LIMIT

SOIL DESCRIPTION	COLOUR	Consistency	Depth Elevation	Legend	Sample Type	No. of Blows per Ft	Water Level Feet	WATER LEVELS & REMARKS
Very silty sand, org. matter	Brown		2.5'	1	CS			Slightly moist
Ditto	Ditto		3.0'	2	CS			Slightly moist
Mixed silty sand & silty clay	Mixed grey-brown	Compact	3.9'	3	SS	13	17.1	Slightly moist
Sandy clay, g. & p. odd stones	Olive brown	Stiff	5.0'	4	SS	13	15.1	D.T.P.L.
Silty clay, g. p. & Stones	Grey	Stiff	6.0'	5	SS	13	14.5	About P.L.
			10.0'	6	2" SL			
Ditto	Dk. grey	Stiff	11.0'	7				
			15.0'	8	SS	10	17.7	About P.L.
			15.0'	9				
Ditto	Ditto	Stiff to very stiff	16.0'	10	3" SL			
			17.0'	11				
			18.0'	12	SS	16	18.5	About P.L.
			20.0'	13				
Ditto, increased silt content	Ditto	Very stiff	20.0'	14	3" SL			
			21.0'	15				
			25.0'	16	SS	20	18.1	D.T.P.L. Stiffens at 24 ft.
Ditto	Grey	Very stiff to hard	25.0'	17				
			30.0'	18	SS	32	15.8	About P.L.
			30.0'	19				
Ditto	Grey	Very stiff	30.0'	20	SS	27	16.7	About P.L.
			35.0'	21				
Ditto	Ditto	Ditto	35.0'	22	SS	27	14.7	W.T.P.L.
			40.0'	23				
Ditto	Ditto	Ditto	40.0'	24	SS	20	17.9	W.T.P.L.
			45.0'	25				
			45.0'	26				Softens at 44 ft.
Silty clay, g. & p. fragments of shale	Dk. grey	Stiff to very stiff	47.2'	27	SS	17	13.7	W.T.P.L.
Gravelly sand			49.0'	28				
			50.0'	29				
Clayey silt (Slickensided)	Lt. grey	Extremely dense	50.0'	30	SS	92	13.8	Slightly plastic
			50.0'	31				
Ditto, silt	Ditto	Ditto	50.0'	32	SS	110	15.0	Moist.
Test Hole Terminated at 50 ft.								DEFECTS IN NEGATIVE DUE TO





e. m. peto associates ltd.

SOIL ENGINEERING SERVICE - TORONTO, ONTARIO

BOREHOLE LOG

Job Name Side Road Oil Springs Bridge Job No. 63153 Borehole No. 1
 Client Town of Oil Springs Casing 1" Boring Date Oct 17, 21, 1968
 Elevation 72.9 Compiled By P. L. Checked By S. P.

SAMPLE CONDITION

 **UNDISTURBED**
 **FAIR**
 **DISTURBED**
 **LOST**

SAMPLE TYPE

A.S. AUGER SAMPLE
 C.S. CASING SAMPLE
 S.S. 2" STANDARD SPLIT TUBE SAMPLE
 S.L. SPLIT BARREL WITH LINERS
 S.T. THIN-WALLED SHELBY TUBE SAMPLE
 W.S. WASH SAMPLE
 R.C. ROCK CORE

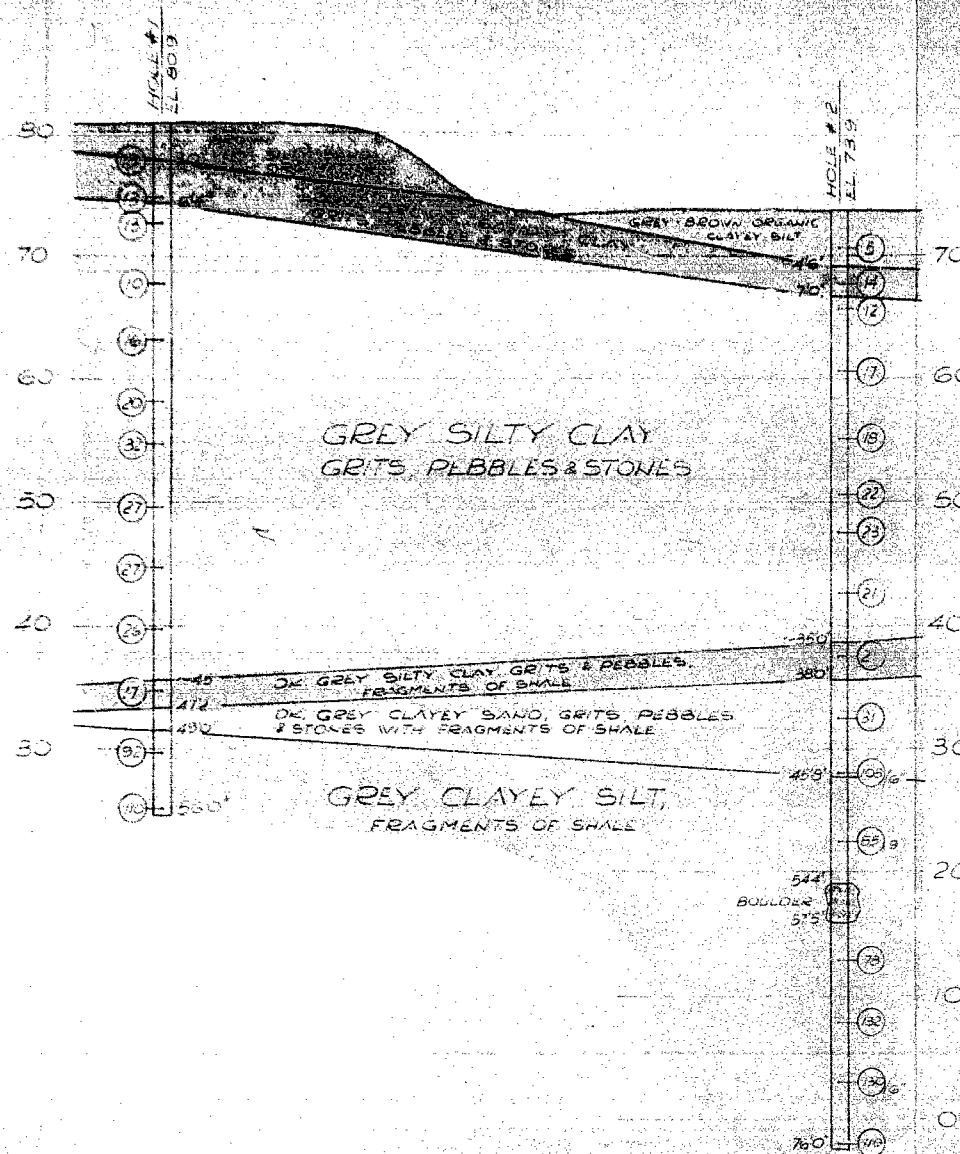
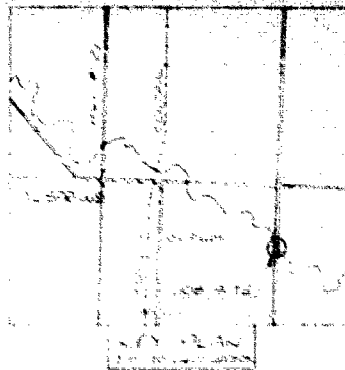
ABBREVIATIONS

V.T. IN SITU VANE SHEAR TEST
 M. MOIST
 W.L. WATER LEVEL IN CASING
 W.T. GROUND WATER TABLE IN SOIL
 W.T.P.L. WETTER THAN PLASTIC LIMIT
 D.T.P.L. DRIER THAN PLASTIC LIMIT
 A.P.L. ABOUT PLASTIC LIMIT

SOIL DESCRIPTION	COLOUR	Density or Consistency	Depth Elevation	Legend	Sample No. and Condition	Sample Type	No. of Blows per Ft.	WATER LEVELS & REMARKS
Organic clayey silt	Mixed brown				1	CS		W.T.P.L.
Ditto	Ditto				2	CS		W.T.P.L.
Ditto	Grey-brown	Soft to firm			3	SS	10.1	W.T.P.L. Petroleum
Sandy clay, g. p. & stones	Olive brown	Stiff	7'0"		4	SS	14	W.T.P.L.
Silty clay, g. p. & stones	Grey	Stiff	10'0"		5	SS	12	W.T.P.L.
					6	SL		17.2
Ditto	Dark grey	Stiff to very stiff	15'0"		7	SS	17	13.4
					8	SL		11.5
Ditto	Grey	Ditto	20'0"		9	SS	18	13.7
					10	SL		13.7
Ditto	Ditto	Very stiff	25'0"		11	SS	22	13.8
Ditto, less stones	Ditto	Ditto	30'0"		12	SS	24	13.3
					13	SL		13.7
Ditto	Ditto	Ditto	35'0"		14	SS	21	13.7
					15	SL		13.7
Silty clay, g. & p. fragments of shale	Dark grey	Ditto	40'0"		16	SS	21	13.7
					17	SL		13.7
Clayey sand, g. p. & stone fragments of shale	Dark grey	Compact to Dense	45'0"		18	SS	21	13.7
Ditto	Ditto				19	SS		13.7
Clayey fine to coarse sand, some gravel	Light grey	Extremely dense	50'0"		20	SS	17.5	13.7
					21	SL		13.7
Slightly clayey silt (Sticky sides)	Light grey	Ditto	55'0"		22	SS	35	13.7
					23	SL		13.7
Weathered shale & limestone boulder			60'0"		24	R.C.		13.7
					25	SL		13.7
Interbedded weathered shale & limestone			65'0"		26	SS	75	11.6
					27	SL		11.6
Ditto	Ditto	Extremely Dense	70'0"		28	SS	132	12.3
					29	SL		12.3
Ditto	Ditto	Ditto	75'0"		30	SS	150.6	8.0
					31	SL		8.0
Ditto	Ditto	Ditto	79'0"		32	SS	110	12.5
					33	SL		12.5

DEFECTS IN NEGATIVE DUE TO
 CONDITION OF ORIGINAL DOCUMENT

Test Hole Terminated at 79'0"



LEGEND

- BOREHOLE
- (14)— BLOWS/FOOT S.P.T.

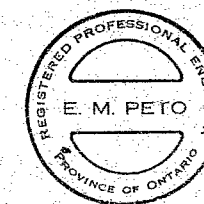
SCALES

HOR: 20' TO 1"
VERT: 10' TO 1"

NOTE

SEE BOREHOLE LOGS FOR COMPLETE SOIL DETAILS.

NOTE: The actual soil stratification has been verified from data obtained at the borehole locations only. The inferred contacts shown are based on geological evidence and these may vary from those shown between borings.



TOWN OF OIL SPRINGS
% J.A. MONTEITH ASSOCIATES

PROPOSED OIL SPRINGS BRIDGE (#5)

PREPARED BY
e.m. peto associates ltd.

JOB NO. 63493 DATE NOV 1963 DRAWN BY K.S. GILBERT

SECTION THROUGH HOLES 1 & 2