

60-F-80

W.P.#231-58-2

CHEDOKE Exwy.

CROSSING

COOTE'S PARADISE

23-61-114

Materials and Research Section.

January 12, 1961.

C. C. Varney & Parsons, Brinckerhoff, Ltd.,
Consulting Engineers,
79½ Main Street West,
Hamilton, Ontario.

Attention: Mr. J. S. Fisher.

1. Foundation Investigation Report prepared
by the Materials & Research Section of the
Department of Highways: Line 2 (Chedoke
Expressway) across Doctor's Paradise - Ia.
345-00 to 349-00 - District No. 4 -
M.J. 60-2-30 --- M.J. 211-13-2.

Dear Sir:-

Attached, we are forwarding to you four (4)
copies of the above mentioned report.

We believe the data contained in this report
will prove adequate for your future design work; however,
should there be any queries concerning this project that
you would like to discuss, please do not hesitate to contact
our office.

Yours very truly,

cc: 40001
attach.

W. C. Coleman,
District Engineer,
District No. 4,
Hamilton, Ontario.
W. C. Coleman
J. S. Fisher,
Materials & Research Section,
Department of Highways,
Hamilton, Ontario.

cc: Messrs. A. H. Ioye (2)
H. A. Tregaskes
H. D. McMillan
I. C. Campbell
J. C. Thatcher
T. J. Kovich
A. Watt
Foundations Office
Gen. Files.

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-

FOUNDATION INVESTIGATION

For

Line 2 (Chedoke Expressway across Cootes Paradise
(station 345+00 to 349+00), District No. 4.

W.J. 60-P-80 -- W.P. 231-58-2.

1. INTRODUCTION:

In the first phases of design, it was planned that the new Chedoke Expressway would cross through quite a large area of Cootes Paradise. Subsoil investigations that were carried out for this first line, have indicated very unfavourable soil conditions. The results of this investigation, carried out by E. H. Leto & Associates, are given in one of our previous reports, 59-P-128(2). On the basis of these findings, the original line has been abandoned and a new one chosen. This new line crosses only through a small stretch of Cootes Paradise, on its North-Eastern corner.

Only very limited information was available about the distribution of the soft material in this area and it was therefore decided to carry out an additional investigation. The findings and results of this investigation are contained in this report, together with the recommendations concerning the construction of the expressway in this limited area.

2. DESCRIPTION OF ITS AREAS AND SURFACE.

The adopted Line 2, of the Expressway, runs near to the eastern shore tip of Cootes Paradise. The investigated area is covered by 2 to 3 feet of water. The entire area resembles a pond of water, underlain by organic silt and peat material. At the investigated site, this material is underlain by stratified sand and silty clay containing fragments of shale. Bedrock near the edge of this part of Cootes Paradise, lies at shallow depth and deepens near the centre. The formation of the bedrock channel may be due to the erosion of shale rock by the flowing of a stream at one time in the geological history of this area.

cont'd. /2 ...

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

The Ontario ice lobe, in the course of an early advance, is credited with the deposition of silty clay and shaley material in this part of Dundas Valley. The presence of shale fragments in the till material occurring just above the shale rock, may be an indication of severe local scouring action by the glacier, as it met the resistance of the higher and harder escarpment material. The great depth of the existing bedrock elevation in greater Coates Paradise can also be attributed to glacial erosion.

3. DESCRIPTION OF FIELD AND LABORATORY WORK:

Field work consisted of eleven sampled boreholes with dynamic cone penetration tests adjacent to each borehole. In addition, three more cone penetration tests were performed. These boreholes were placed along the centre line of the Expressway and approximately 150' on either side of it.

The exploration programme was carried out by a standard core drill machine adapted for soil sampling and mounted on a 18' x 18' wooden raft. Conventional wash boring procedure was followed. Samples were recovered at required depths, by means of a 2-inch I.D. Shelby tube and by a 2-inch I.D. split-spoon sampler. The dimension of this spoon sampler and the energy used in driving it, conform to the requirements of the Standard Penetration Test. Use of the Osterburg sampler was also frequently made for obtaining undisturbed samples in very soft material.

Wherever possible, in-situ vane tests were carried out to determine the shear strength of the subsoil deposits.

Drawing No. 60-F-804 shows the borehole locations, their respective elevations and the estimated subsoil stratigraphy.

Samples were visually examined and identified in the field before being transported to the laboratory. Upon receipt in the laboratory, necessary tests were carried out on a selection

cont'd. /3 ...

3. DESCRIPTION OF FIELD AND LABORATORY WORK: (cont'd.) ...

of both disturbed and undisturbed samples for the determination of moisture content, grain size distribution curves, Atterberg limits and undrained triaxial compression tests.

Laboratory and field test results have been summarized and are included in this report under Appendix I.

4. SUBSOIL CONDITIONS:

(4.1) General:

The investigation has shown the general stratification of the subsoil to be rather irregular. The underlying soil types consist mainly of organic silt and peat material underlain by sandy till or clayey shale and shale fragments, followed by shale rock.

In the order they have been encountered, they are listed below:-

(4.2) Organic silt:

A layer of organic silt and decayed material consisting of peat, tiny wood fibers and shells was encountered in all the boreholes. Clayey silt material is found to exist in this layer with increasing depth. Silty sand, present in this layer throughout its depth, in nearly all the borehole investigated, is found to vary considerably in quantity.

The consistency of this layer where it possesses cohesive properties, is found to vary from very soft near the top surface to medium stiff at further depths. Average value of shear strength for the cohesive material is generally less than 1,000 p.s.f. In the case of the layer containing materials having cohesionless properties, its relative density varies from very loose to medium dense with increasing depths.

The depth of this layer of organic silt material is different in all the borings investigated. On the average, it is about 50' to 60' deep. Only near the southern shoreline (borings 'A' and 'C') it is approximately 3' to 14' deep.

cont'd. A ...

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

(4.3) Sandy Till:

A layer of silty sand, gravel and shale fragments is found to exist in borings 'G', 'H', and 'J' in the vicinity of chainage 340+50. The depth of this layer is 14' in borings 'G' and 'J', and 22' in boring 'H'. It exists in a dense to very dense state of packing.

In all the remaining borings, a shallow layer of clayey shale and shale fragments or reworked shale exists just below the top layer of organic silt material and above the shale rock. This portion may not be classed as a distinct layer, as it is not well defined in all the places.

(4.4) Shale Bedrock:

Shale rock was encountered in all the borings but it was not proved to a depth of more than 6" to 12", except in boring 'Y', where an AXI size core sample of red and grey shale bedrock was recovered between approximate elevations of 163' and 160'.

The elevations of the rock level vary greatly in the area and their respective values are appended in the attached bore logs.

5. WATER TABLE:

Elevation of water level in Coates Paradise was observed at 244.8' to 245.0' at the time of this investigation. The depth of water varied from 2' to 3' above the ground surface.

Artesian water was encountered in boring 'I', at a depth of 75' (approx. elevation 166.53').

6. RECOMMENDATION FOR CONSTRUCTION:

The top layer of soft, organic silt and decayed material with sand and clay is not competent to take the load of the proposed expressway.

This layer will have to be removed and replaced by shale material available nearby.

cont'd. /5 ...

6. DISCUSSION AND RECOMMENDATION: (cont'd.) ...

The depth of this layer is normally up to 50' or less, but in the vicinity of chainages 345+50 and 346+50, this depth exceeds 50' and is 62' at its deepest; (boring 'B').

For the method of removal of this layer, reference may be made to our previous report 59-F-128(2). It may be mentioned here, that the removal of this layer can be undertaken conveniently by the method of dredging using suction pumps, up to a depth of 50' or less. In places where there is soft material to a greater depth than 50', the material remaining after dredging down to 50' depth should be displaced by the weight of the placed fill material.

Reference may also be made to our previous report 59-F-128(2) where a typical cross-section of the expressway is given, along with side slopes that are expected to develop during dredging.

7. SUMMARY:

a) The subsoil at the investigated site consists of mainly organic silt and decayed material with silty sand followed by sandy till, reworked shale and shale rock.

b) The top layer of organic silt and decayed material will have to be removed to a depth of 50' or more and shale material placed instead. For the details, reference is made to our previous report 59-F-128(2).

c) The depth of water at the site, varies from 2' to 3' above the ground surface.

8. REMARKS:

Field work was commenced on Sept. 14, 1960, and was completed by Oct. 18, 1960, using E.B.C. drilling machine and raft.

Mr. M. H. Ghadiali of the Foundation Section, supervised the field work.

January, 1961.

REPORT PREPARED BY.

for

M. H. Ghadiali
Project Foundation Engr.

REPORT APPROVED BY.

A. G. Terano,
Foundation Office Engr.

APPENDIX I.

OFFICE REPORT ON SOIL EXPLORATION

 DEPARTMENT OF HIGHWAYS - ONTARIO
 MATERIALS AND RESEARCH SECTION

W.P. 231-58-2

BORE HOLE NO. A

JOB 60-P-80

STATION 24+50 S

DATUM 242.4'

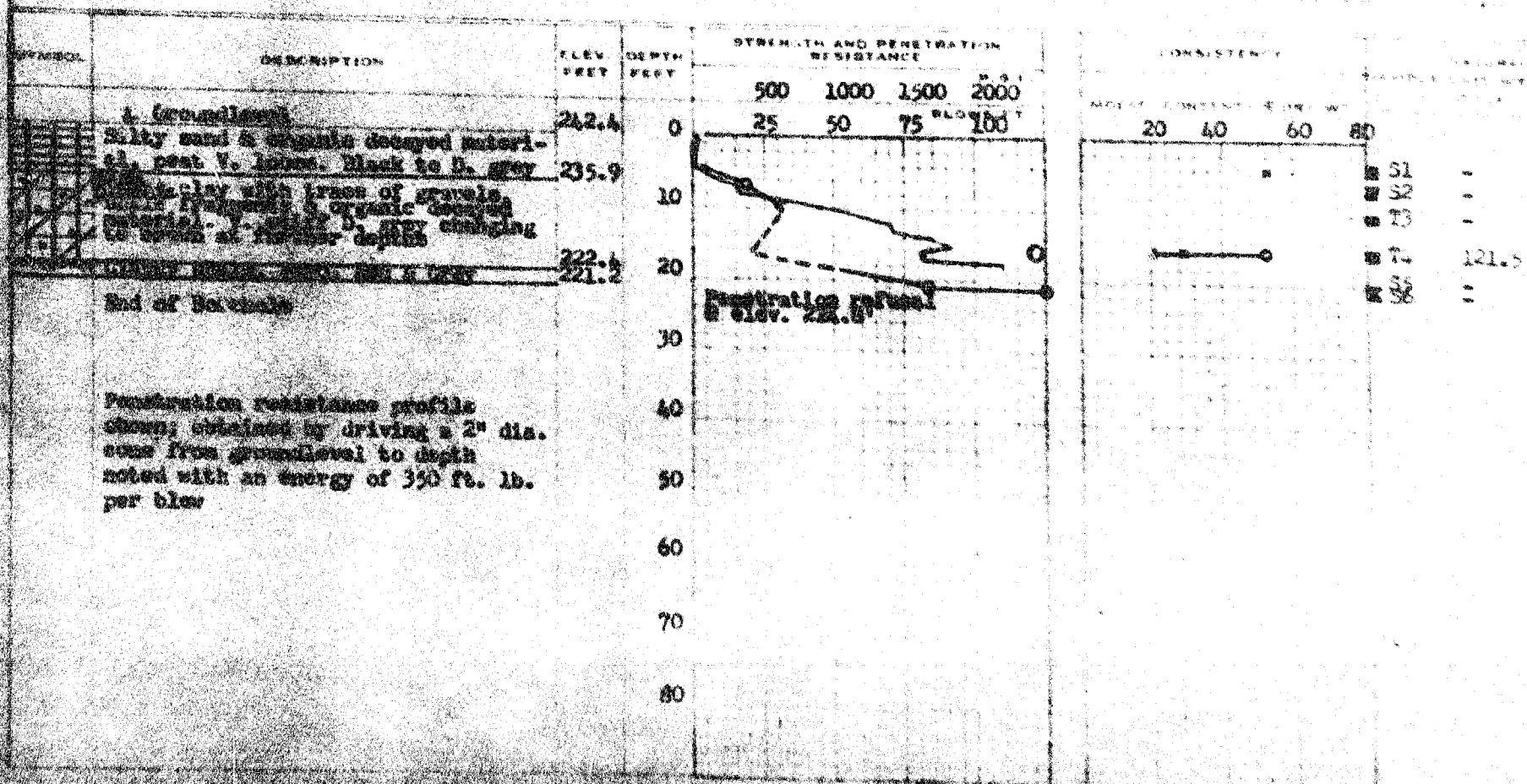
COMPILED BY B.K.

BORING DATE Sept. 15/60

CHECKED BY B.N.G.

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

LEGEND

 1/2 UNCONFINED COMPRESSION (q)
 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. 231-58-2

BORE HOLE NO. ... A-1 (cone only)

100 60-7-80

STATION 348+00 E

104700 241.90

COMPILED BY B.K.

DORING DATE Oct. 18/60

CHECKED BY B.N.C.

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

LEGEND

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

| SYMBOL | DESCRIPTION | ELEV. FEET | DEPTH FEET | STRENGTH AND PENETRATION RESISTANCE | | CONSISTENCY | MOIST. CONTENT - % DRY WT. | NATURAL SAMPLE UNIT WT P.C.F. |
|--------|-------------|---------------|---------------|--|----|-------------|----------------------------|-------------------------------------|
| | | | | P.S.F. | | | | |
| | Groundlevel | 241.9 | 0 | 25 | 50 | 75 | 100 | |
| | | | 10 | | | | | |
| | | | 20 | | | | | |
| | | | 30 | | | | | |
| | | | 40 | | | | | |
| | | | 50 | | | | | |

DEPARTMENT OF HIGHWAYS - ONTARIO

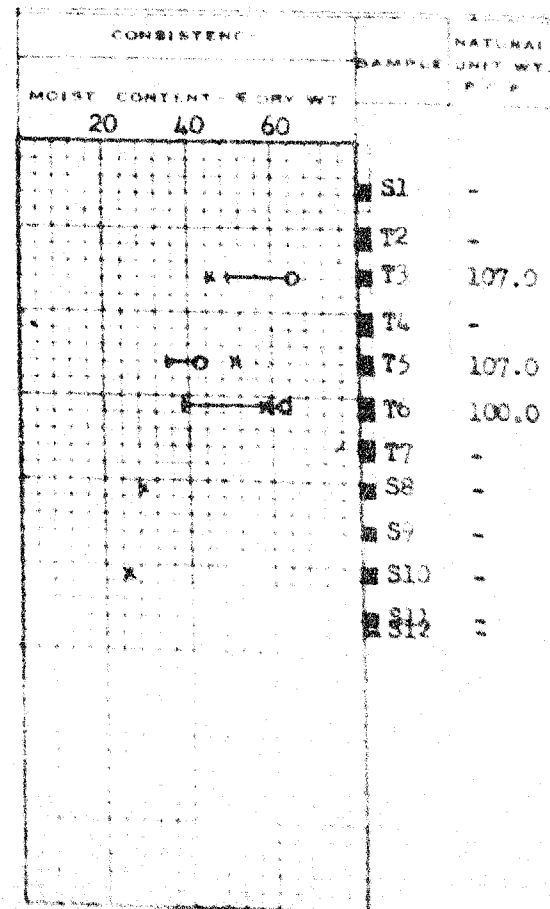
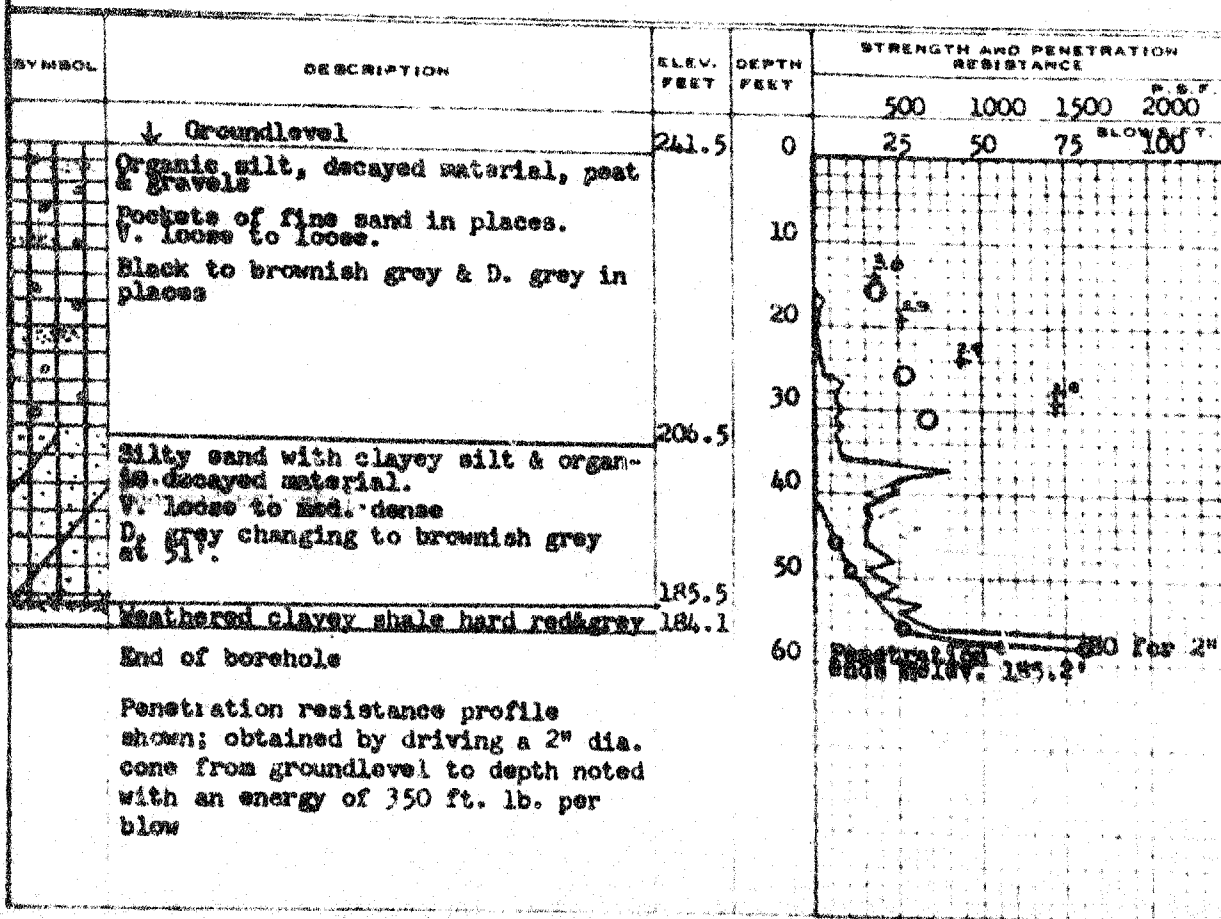
MATERIALS AND RESEARCH SECTION

W.P. 231-58-2 BORE HOLE NO. 3
 JOB 60-F-80 STATION 348+50 (150' Lt.)
 DATUM 241.5' COMPILED BY B.K.
 BORING DATE Sept. 20/60 CHECKED BY B.M.G.

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

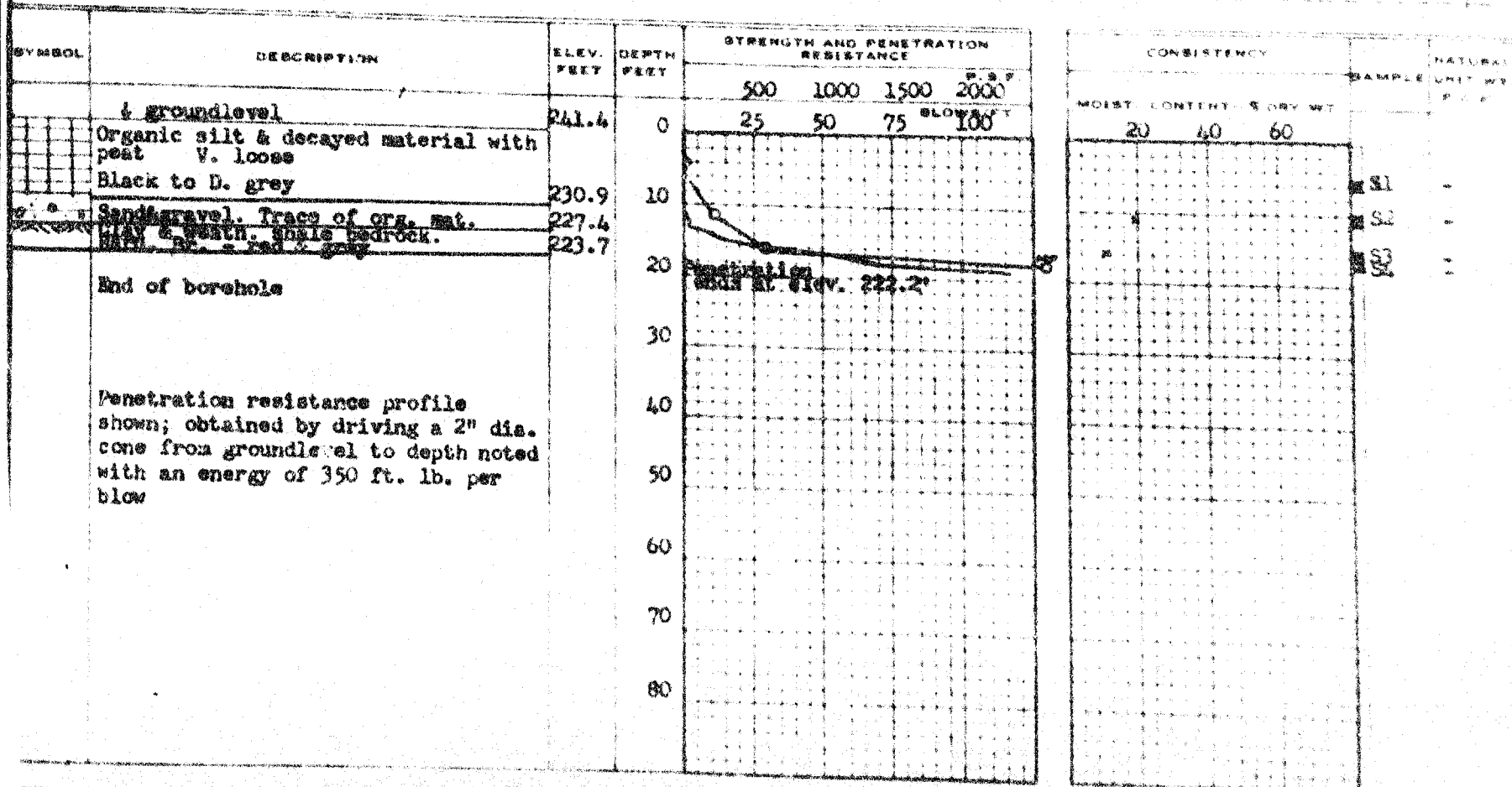


OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 231-58-2 BORE HOLE NO. C
JOB 60-P-80 STATION 348+50
DATUM 241.4' COMPILED BY B.K.
BORING DATE Sept. 22/60 CHECKED BY B.H.G.

LEGEND

1/2 UNCONFINED COMPRESSION (QU)
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. 231-58-2

BORE HOLE NO. D

JOB 60-P-80

STATION 347+50 E

DATUM 241.6'

COMPILED BY B.K.

BORING DATE Sept. 29/60

CHECKED BY B.H.G.

2" DIA. SPLIT TUBE

2" SHELBY TUBE

2" SPLIT TUBE

2" DIA. CONE

2" SHELBY

CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Q_u) \bigcirc
 VANE TEST (C) AND SENSITIVITY (S) \times
 NATURAL MOISTURE AND
 LIQUIDITY INDEX \bullet
 LIQUID LIMIT \circ
 PLASTIC LIMIT \square

| SYMBOL | DESCRIPTION | ELEV. FEET | DEPTH FEET | STRENGTH AND PENETRATION RESISTANCE | | | |
|--------|---|---------------|---------------|--|------|------|------|
| | | | | 500 | 1000 | 1500 | 2000 |
| | | | | P.S.F. | | | |
| | | | | BLOW/FT | | | |
| | Groundlevel | 241.6 | 0 | 25 | 50 | 75 | 100 |
| | Organic silt with decayed material & small amount of v. fine sand. V. loose. Black to D. grey | | 10 | | | | |
| | | 226.6 | 20 | | | | |
| | Sandy silt, silty fine sand & organic decayed material. (wood-shells-frag.) V. loose. D. grey | | 30 | | | | |
| | | 210.6 | 40 | | | | |
| | Silty sand, fine gravel with org. mat. d. to med. D. grey to bl. grey | 202.6 | 40 | | | | |
| | Shale bedrock red & grey | 200.8 | 50 | | | | |
| | 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 | | | | | | |

| CONSISTENCY | | SAMPLE | NATURAL UNIT WT P.C.P. |
|---------------------------|----|--------|------------------------------|
| MOIST. CONTENT - % DRY WT | | | |
| 20 | 40 | 60 | |
| | | 51 | - |
| | | 52 | - |
| | | 53 | - |
| | | 54 | 108.5 |
| | | 55 | - |
| | | 56 | - |
| | | 57 | 109.0 |
| | | 58 | - |

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 231-58-2

BORE HOLE NO. E

JOB 60-F-80

STATION 347+50 (150' Lt.)

DATUM 243.0'

COMPILED BY B.K.

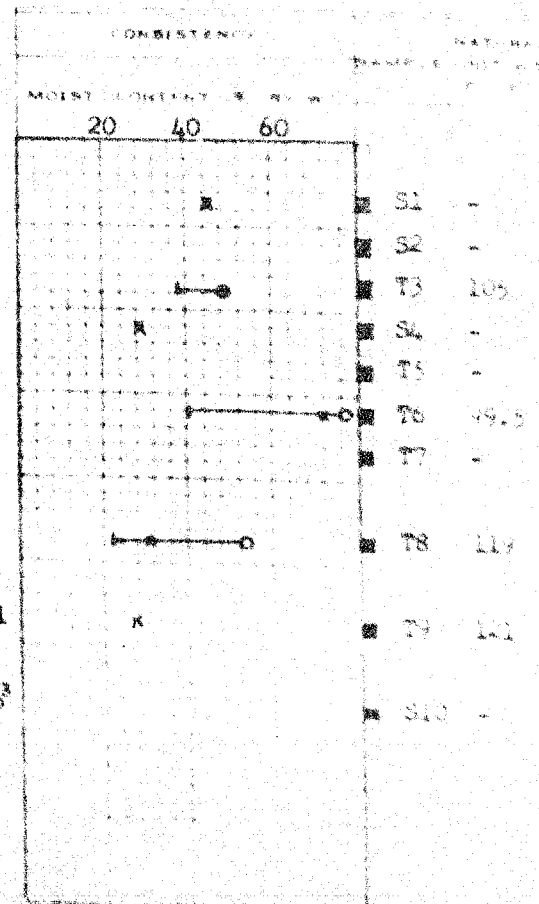
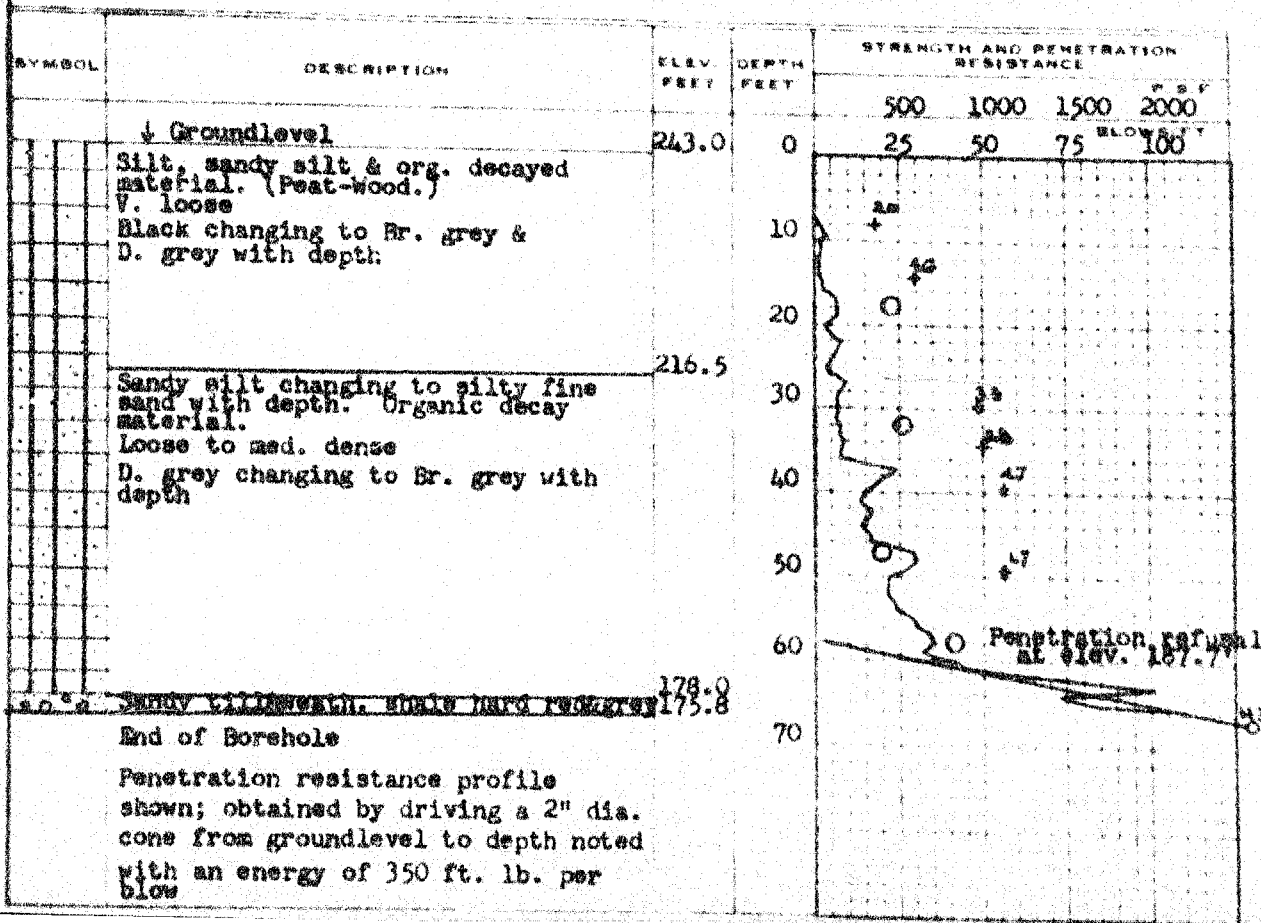
BORING DATE Oct. 17/60

CHECKED BY B.M.G.

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

LEGEND

1/2 UNCONF. WED. COMPRESSION (QU)
VANE TEST (AND SENSITIVITY)
NATURAL MOISTURE AND
LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT



231-58-2

BORE HOLE NO. 7

60-8-80

STATION 34700 (150' Rt.)

1. DATUM 241.5'

COMPILED BY B.K.

BOILING DATE Sept. 25/60

CHECKED BY B.M.G.

2" DIA. SPLIT TUBE

2" SHELBY TUBE

2" SPLIT TUBE

2° DIA CONE

2. SNEEDY

CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Q_u)

PLANE TEST (C) AND SENSITIVITY (S)

NATURAL MOISTURE AND

LIQUIDITY INDEX

LIQUID LIMIT

PLASTIC UNIT

| STATION | DESCRIPTION | ELEV. FEET | DEPTH FEET | STRENGTH AND PENETRATION RESISTANCE | | | |
|---------|---|---------------|---------------|--|------|------|----------------------------|
| | | | | 500 | 1000 | 1500 | 2000 P.S.F. BLOWS/FT |
| | 1. Groundlevel | 241.5 | 0 | 25 | 50 | 75 | 100 |
| | Silt, sandy silt & organic decayed material. (wood-peat) V loose to loose Black & Br. grey changing to D. grey with depth | | 10 | | | | |
| | | | 20 | | | | |
| | | | 30 | | | | |
| | | | 40 | | | | |
| | | | 50 | | | | |
| | | | 60 | | | | |
| | | 174.5 | 70 | | | | |
| | Sandy till & clayey shale. dense Br. red & grayish green | | 80 | | | | |
| | | 163.0 | | | | | |
| | Shale bedrock red & gray | 160.3 | | | | | |
| | End of Borehole | | | | | | |
| | Penetration resistance profile shown; obtained by driving a 2" dia. | | | | | | |

| CONSISTENCY | | NATURAL |
|---------------------------|----|-----------|
| MOIST CONTENT - % DRY WT. | | UNEQ. WT. |
| 20 | 40 | 60 |
| | | S1 - |
| | | S2 - |
| | | T3 105 |
| | | T4 - |
| | | T5 - |
| | | T6 93 |
| | | T7 - |
| | | T8 - |
| | | T9 116.5 |
| | | S10 - |
| | | S11 - |
| | | MC12 - |

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 231-58-2

BORE HOLE NO. 0

JOB 60-7-80

STATION 346+50 E

DATUM 242.7'

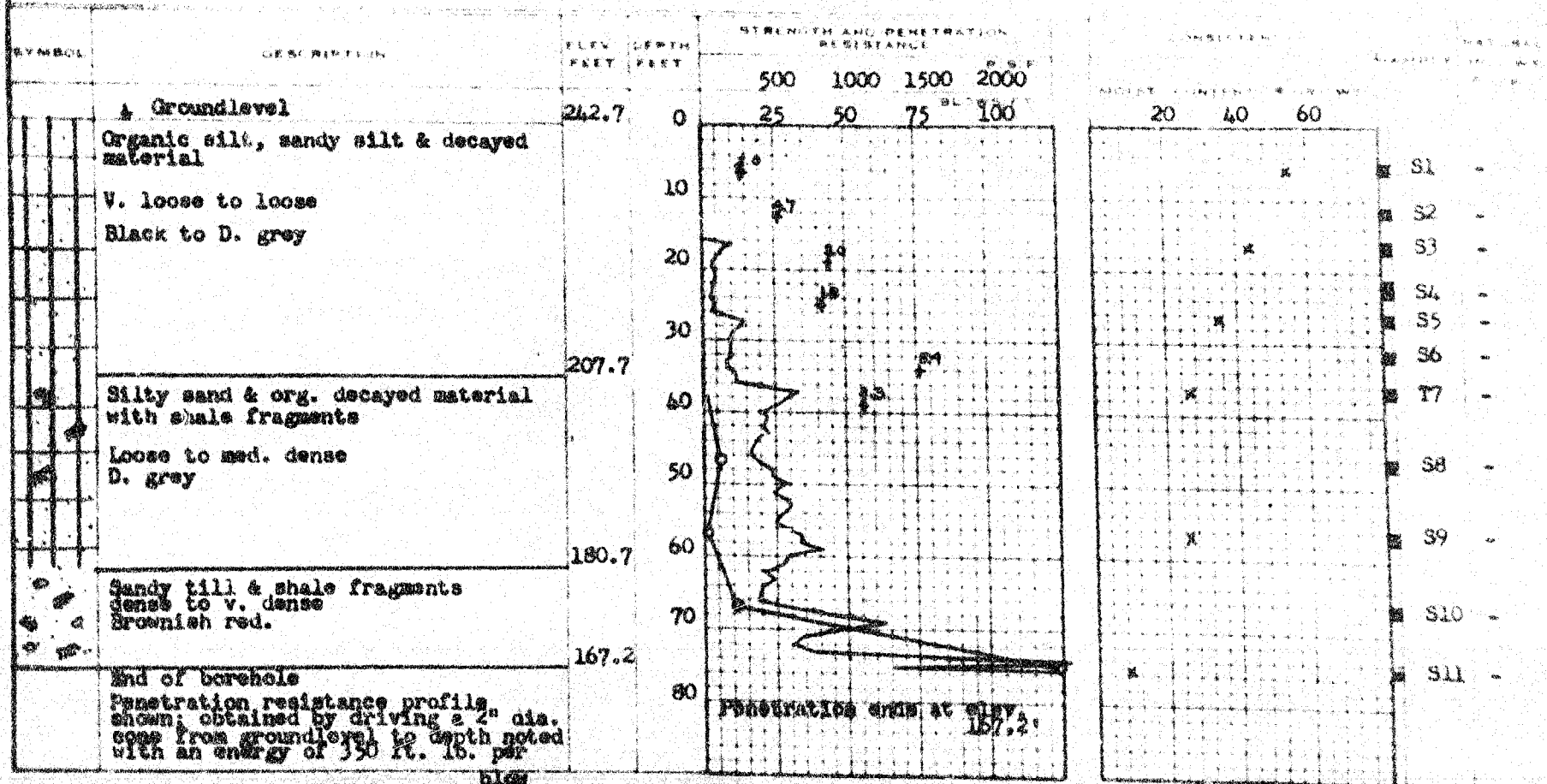
COMPILED BY B.K.

BORING DATE Oct. 3/60

CHECKED BY B.H.G.

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

LEGEND

UNCONFINED COMPRESSION (CUT)
VANE TEST (T) AND SENSITIVITY (S)
NATURAL MOISTURE AND
LIQUIDITY INDEX
PLASTIC LIMIT
PLASTIC INDEX


OFFICE REPORT ON SOIL EXPLORATION

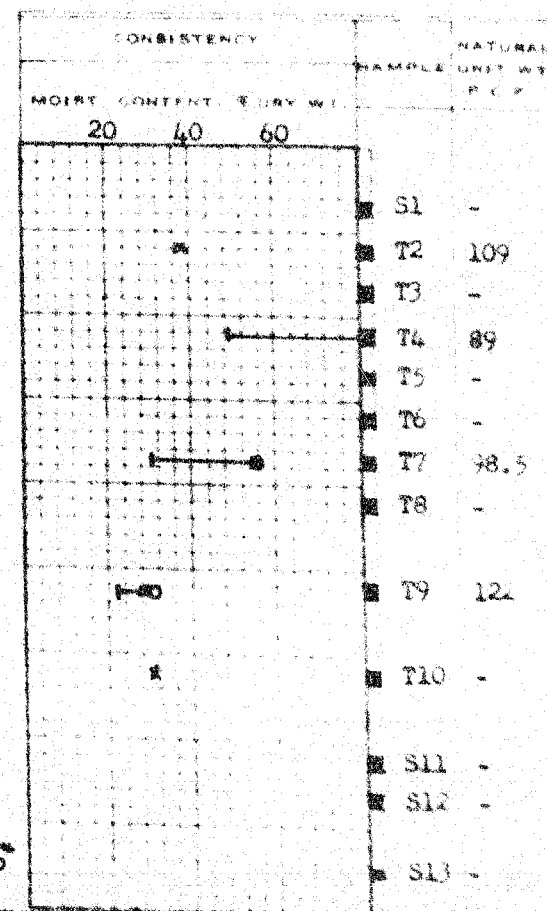
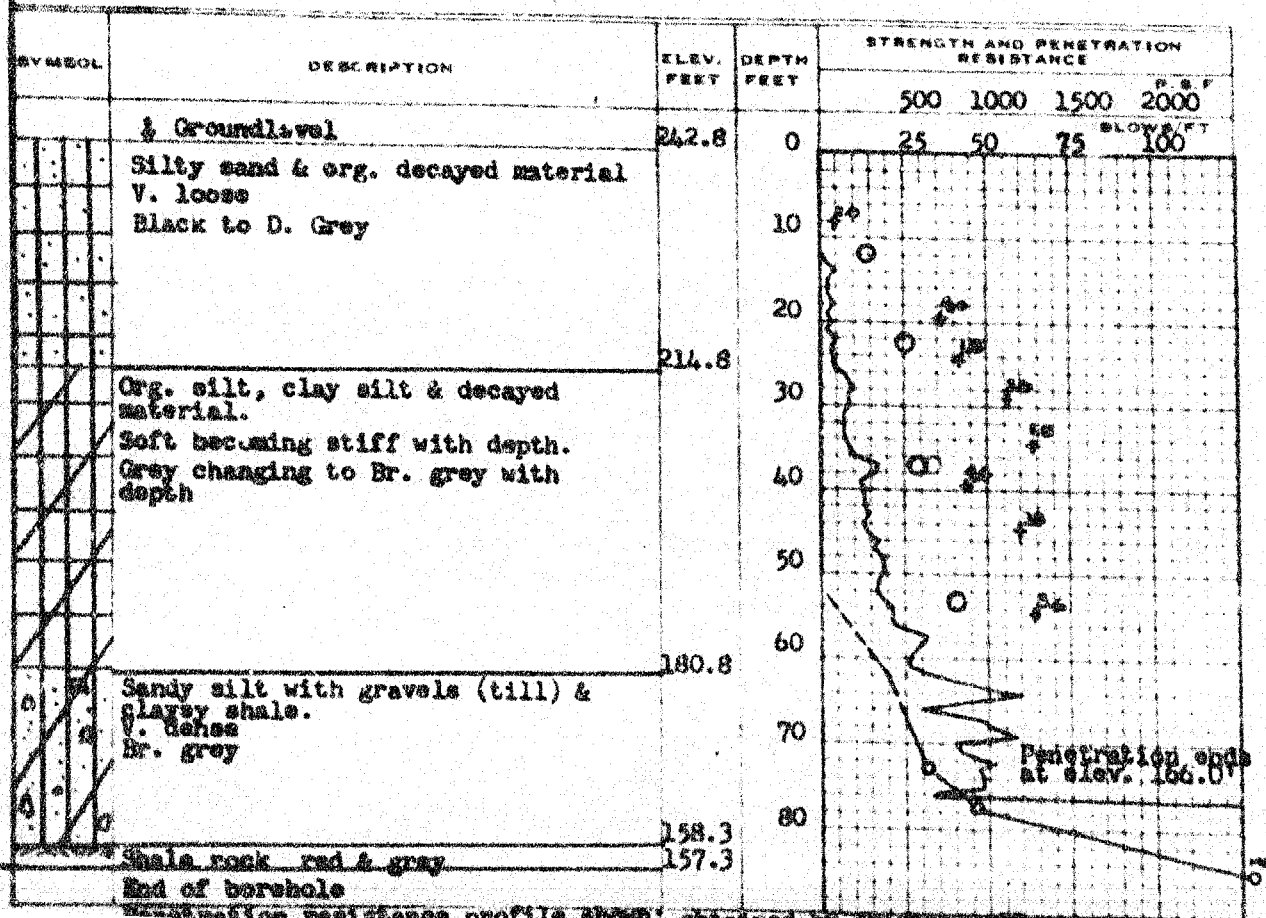
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 274-58-2 BORE HOLE NO. H
 JOB 60-7-80 STATION 346+50 (150' Lt.)
 DATUM 242.8' COMPILED BY B.K.
 BORING DATE Oct. 13/60 CHECKED BY B.H.J.

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

LEGEND

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



Penetration resistance profile shown; obtained by driving a 2" dia cone from groundlevel

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 421-58-2

BORE HOLE NO. J

JOB 60-P-80

STATION 346+50 (150' Ht.)

DATUM 242.4'

COMPILED BY B.K.

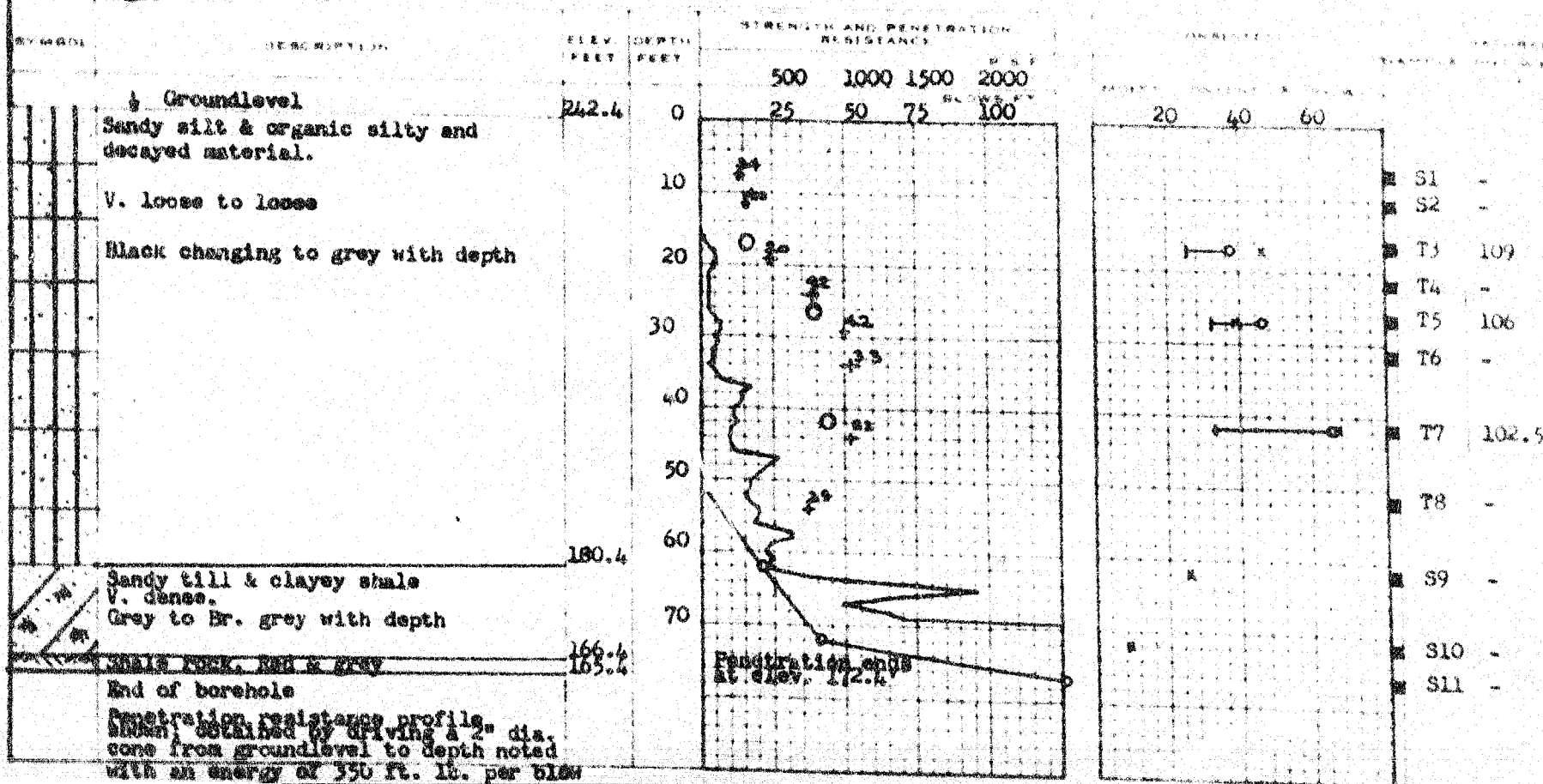
BORING DATE Oct. 5/60

CHECKED BY B.M.G.

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

LEGEND

2" SHELBY TUBE COMPRESSION EQUIP.
VANIE TESTS (AND) PENETRATION
NATURAL MOISTURE AND
LIQUID LIMIT
PLASTICITY INDEX
UNSATURATED SWELLING
SHRINKAGE



DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 231-58-2

BORE HOLE NO. K

JOB 60-P-80

STATION 345+50 R

DATUM 242.9'

COMPILED BY B.K.

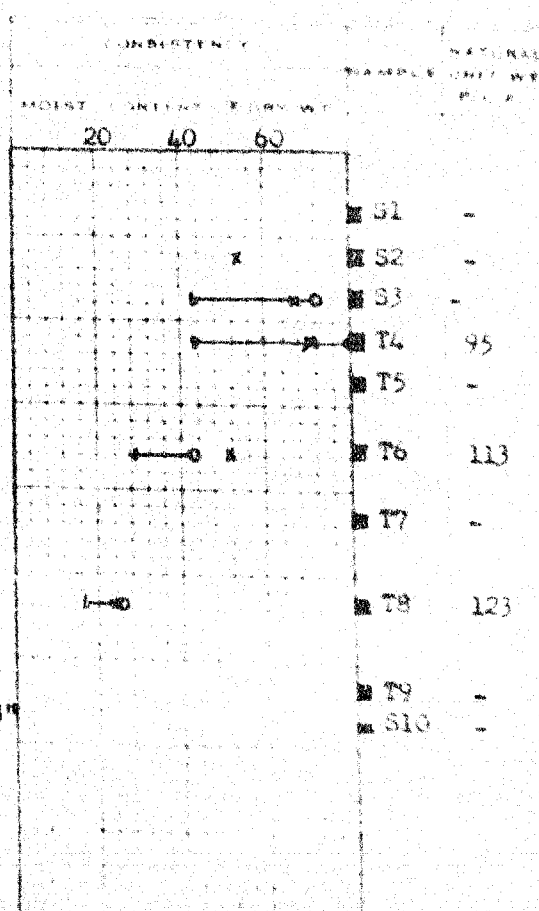
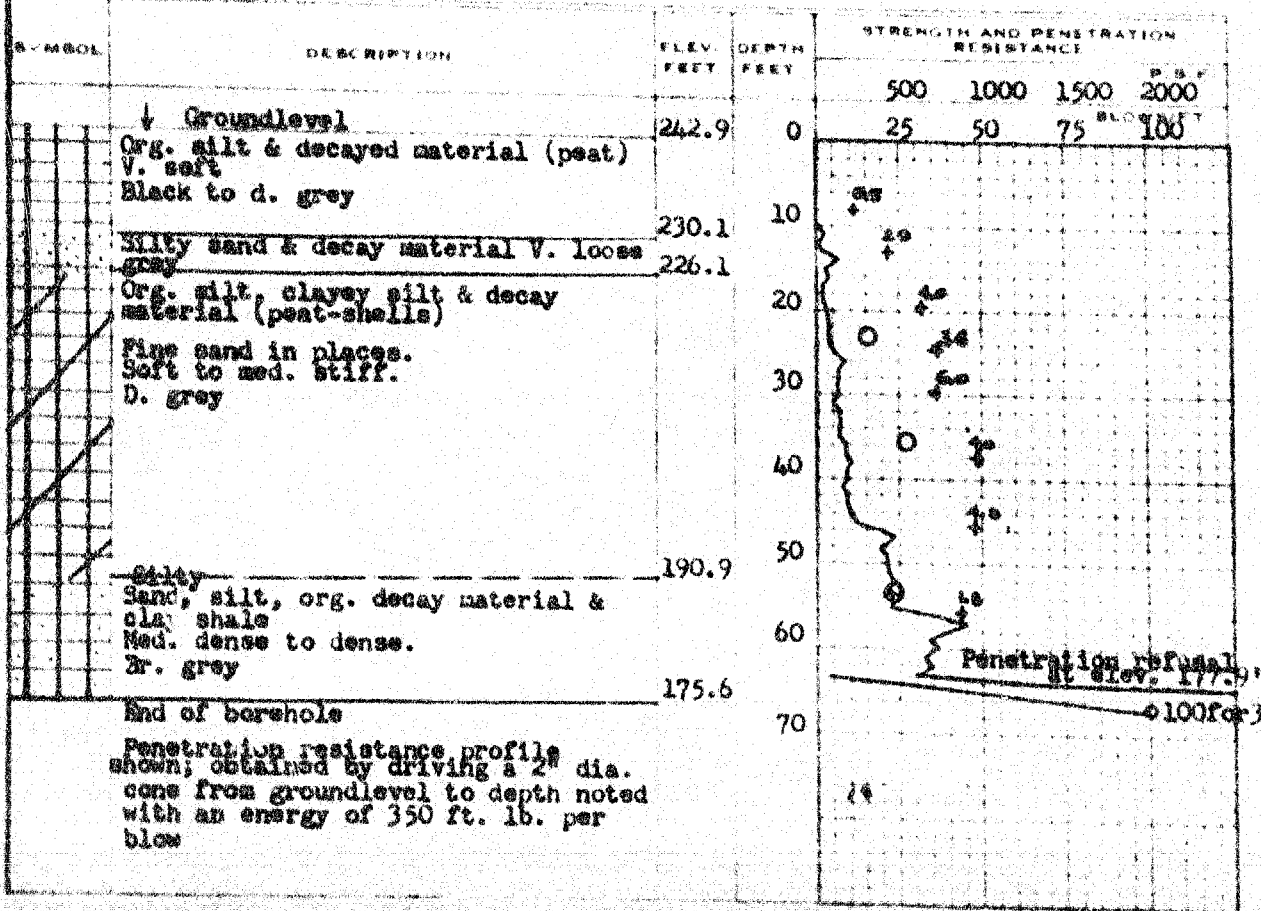
BORING DATE Oct. 7/60

CHECKED BY B.M.G.

2" DIA SPLIT TUBE
2" SHELBY TUBE
2" SPLIT CONE
2" DIA CONE
2" SHELBY
CASINGS

LEGEND

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



OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

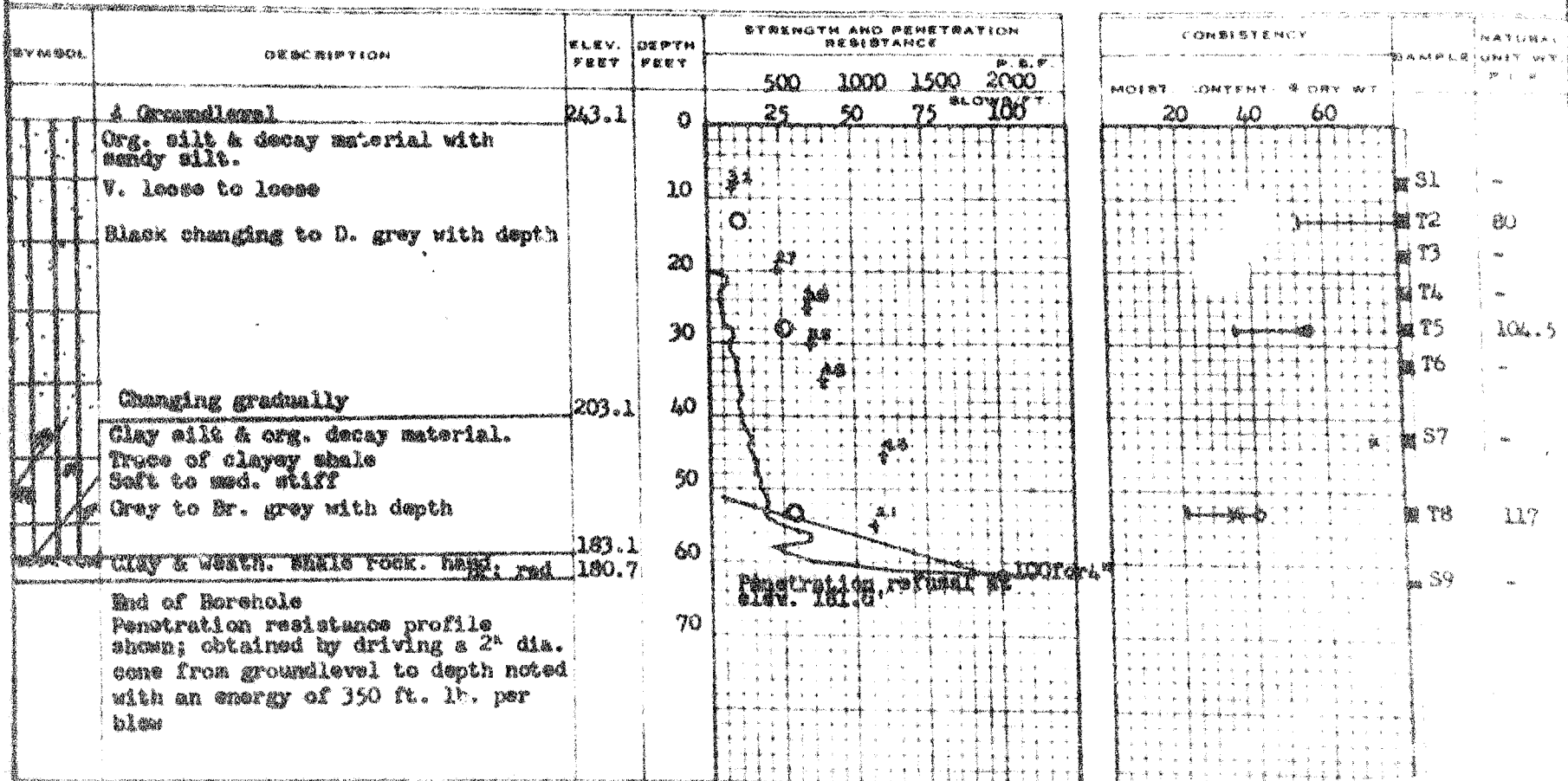
MATERIALS AND RESEARCH SECTION

W.P. 221-58-2 BORE HOLE NO. 4
 JOB 60-P-80 STATION 345/50 (150' Lt.)
 DATUM 243.1' COMPILED BY B.K.
 BORING DATE Oct. 12/60 CHECKED BY B.H.G.

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

LEGEND

1/8 UNCONFINED COMPRESSION (Qu) O
 VANE TEST (C) AND SENSITIVITY (S) S
 NATURAL MOISTURE AND LIQUIDITY INDEX I
 LIQUID LIMIT L
 PLASTIC LIMIT P



W.P. 221-58-2

BORE HOLE NO. N

100 60-7-80

STATION 345/50 (130° Rt.)

DATUM 24.3.41

COMPILED BY B.K.

BORING DATE Oct. 18/60

CHECKED BY B.H.G.

2nd DIA SPLIT TUBE

2" SHELBY TUBE

2. SPLIT TUBE

2º DIA CONE

2 SHELBY

CASING

1/2 UNCONFINED COMPRESSION (QU)

VANE TEST(C) AND SENSITIVITY(S)

NATURAL MOISTURE AND

LIQUIDITY INDEX

LIQUID UNIT

PLASTIC UNIT

[illegible][illegible]

W.P. 234-58-2 BORE HOLE NO. N
JOB 60-F-80 STATION 345+00 E
DATUM 243.4' COMPILED BY B.K.
BORING DATE Oct. 18/60 CHECKED BY B.H.G.

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

| | |
|-----------------------------------|----|
| 1/2 UNCONFINED COMPRESSION (Qu) | 0 |
| VANE TEST (C) AND SENSITIVITY (S) | +* |
| NATURAL MOISTURE AND | |
| LIQUIDITY INDEX | 7 |
| LIQUID LIMIT | |
| PLASTIC LIMIT | |

| SYMBOL | DESCRIPTION | ELEV. FEET | DEPTH FEET | STRENGTH AND PENETRATION RESISTANCE | | | |
|--------|---------------|---------------|---------------|--|----|----|-----|
| | | | | P. S. F. | | | |
| | ↓ Groundlevel | 243.4 | 0 | 25 | 50 | 75 | 100 |
| | | | 10 | | | | |
| | | | 20 | | | | |
| | | | 30 | | | | |
| | | | 40 | | | | |
| | | | 50 | | | | |
| | | | 60 | | | | |
| | | | 70 | | | | |
| | | | 80 | | | | |

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

Penetration refusal at elev. 240.8'

[illegible]

W.P. 231-58-2 BORE HOLE NO. N
JOB 60-7-80 STATION 345/00 E
DATUM 243.4' COMPILED BY B.K.
BORING DATE Oct. 18/60 CHECKED BY B.H.G.

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

| | | |
|-----------------------------------|-------|-------|
| 1/2 UNCONFINED COMPRESSION (QU) | | |
| 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 | |
|--------|----------------|---------------|---------------|--|-----------|
| | | | | P. S. F. | |
| | 1. Groundlevel | 243.4 | 0 | 25 | 50 75 100 |
| | | | 10 | | |
| | | | 20 | | |
| | | | 30 | | |
| | | | 40 | | |
| | | | 50 | | |
| | | | 60 | | |
| | | | 70 | | |
| | | | 80 | | |

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

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

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

BORE HOLE NO. _____ N

STATION 345400 E

COMPILED BY B.K.

CHECKED BY B.M.G.

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

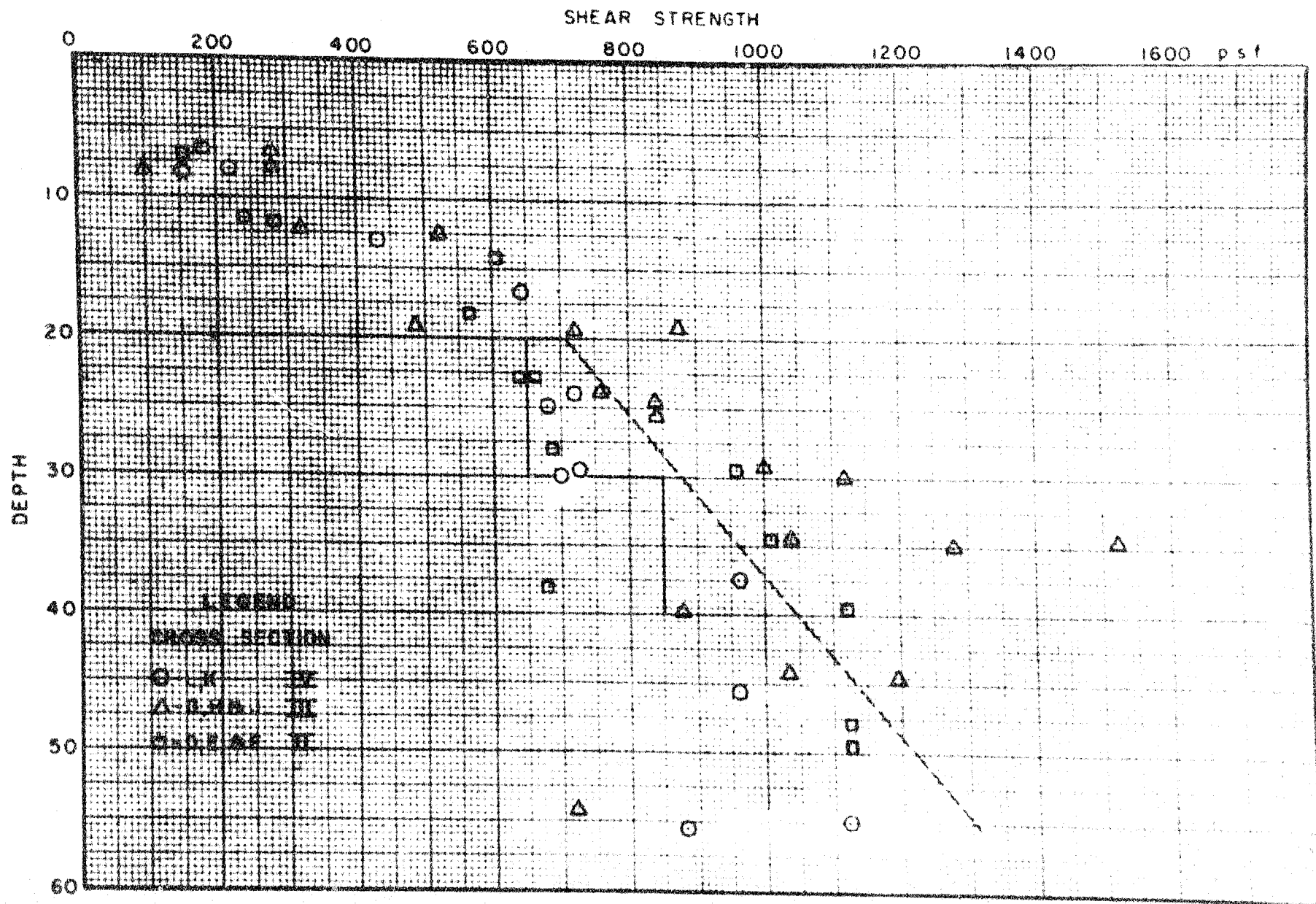
LEGEND

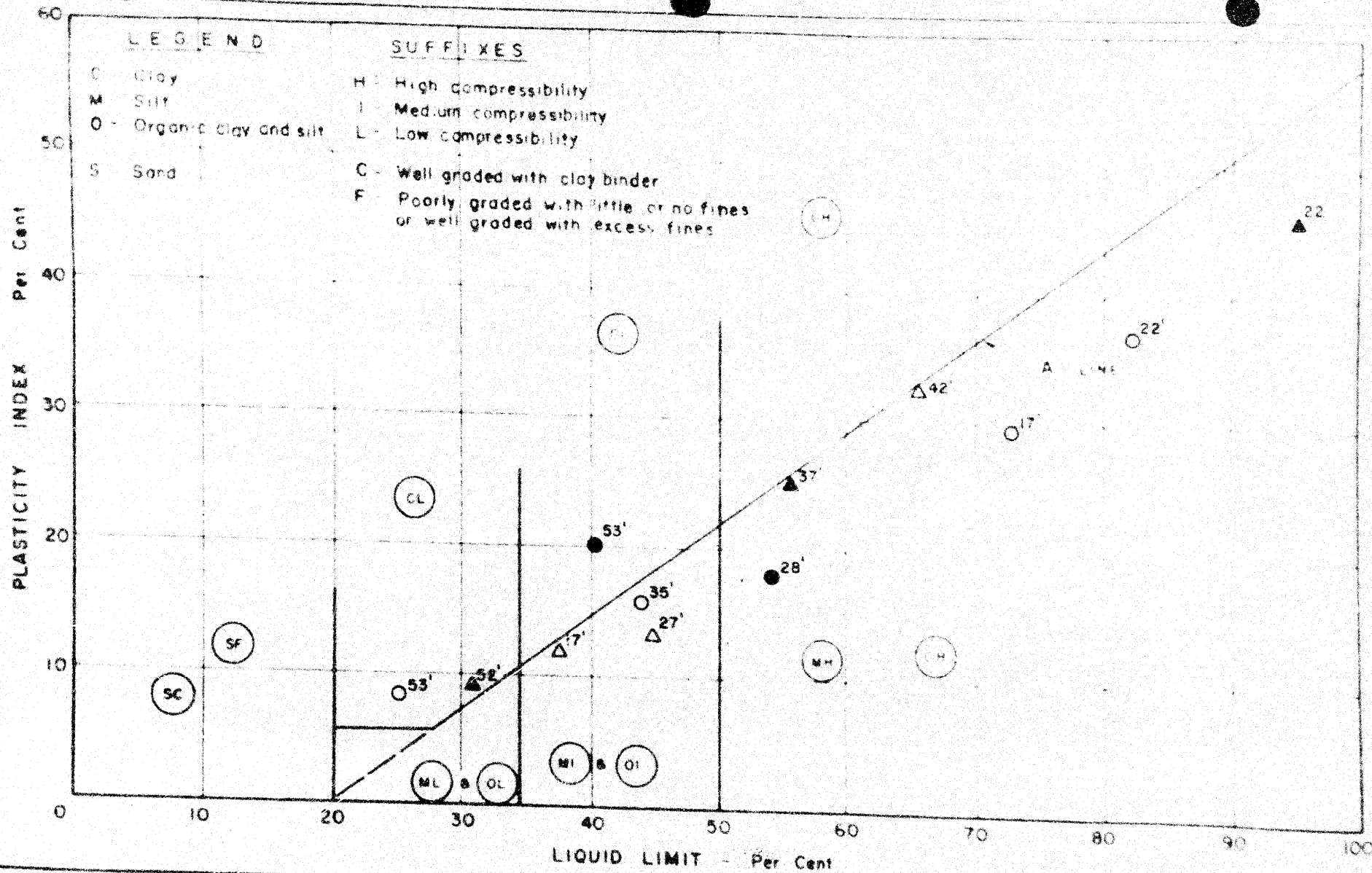
| | |
|---|---|
| 1/2 UNCONFIRMED COMPRESSION (C _u) | 0 |
| VANE TEST (C) AND SENSITIVITY (S) | 4 |
| NATURAL MOISTURE AND | |
| LIQUIDITY INDEX | 1 |
| LIQUID LIMIT | 1 |
| PLASTIC LIMIT | 1 |

| SYMBOL | DESCRIPTION | ELEV. FEET | DEPTH FEET | STRENGTH AND PENETRATION RESISTANCE | | CONSISTENCY | MOIST. CONTENT | DRY WT. | SAMPLE | NATURAL UNIT WT. P.C.F. |
|--------|-------------|---------------|---------------|--|----|-------------|----------------|---------|--------|-------------------------------|
| | | | | P.S.F. | | | | | | |
| | Groundlevel | 243.4 | 0 | 25 | 50 | 75 | 100 | | | |
| | | | 10 | | | | | | | |
| | | | 20 | | | | | | | |
| | | | 30 | | | | | | | |
| | | | 40 | | | | | | | |
| | | | 50 | | | | | | | |
| | | | 60 | | | | | | | |
| | | | 70 | | | | | | | |
| | | | 80 | | | | | | | |

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

Penetration refused at 41 ft. 25.8'





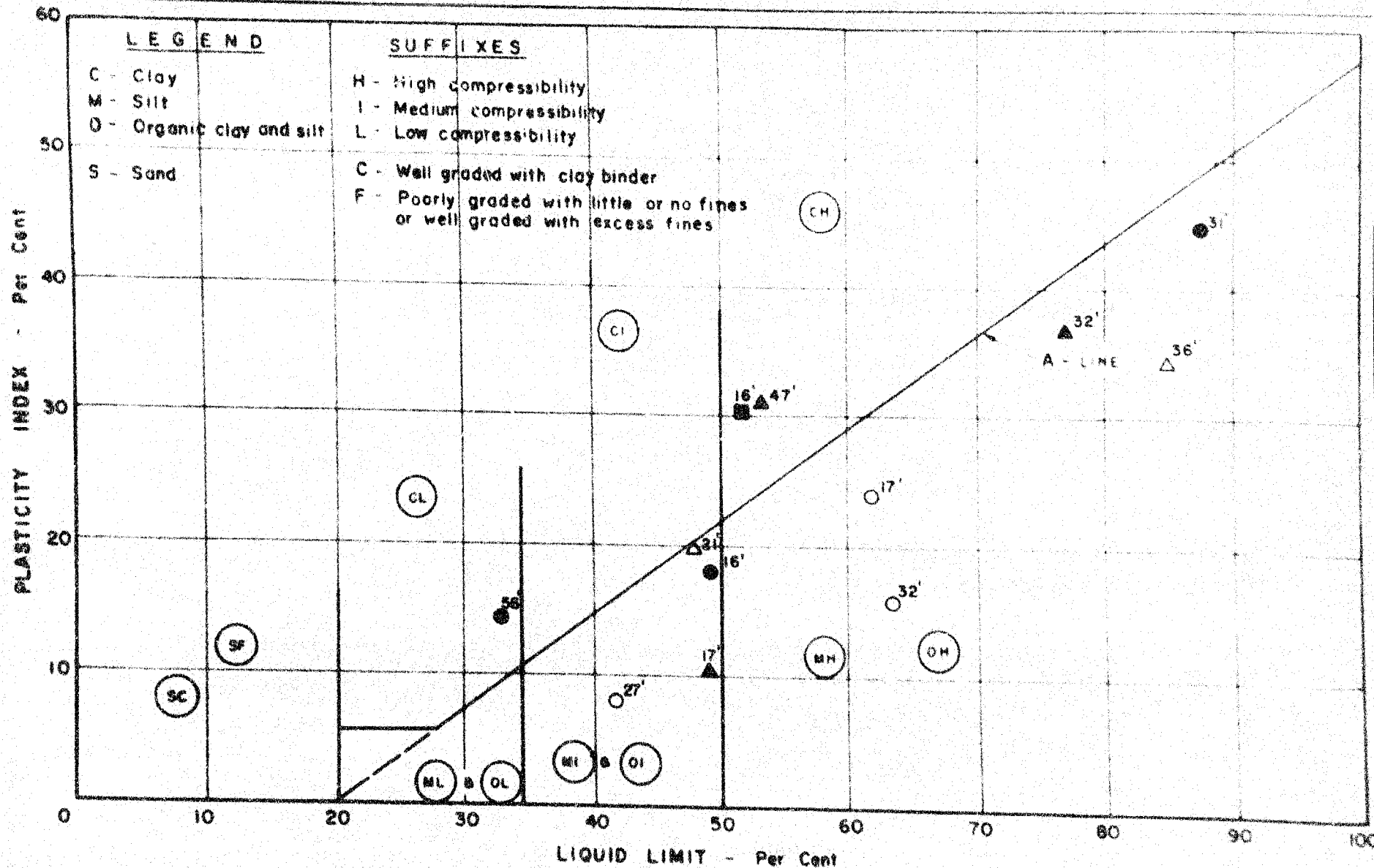
NOTES

- B.H. No. H - ▲ Depth at 22', 37', 52'
- B.H. No. J - Δ Depth at 17', 27', 42'
- B.H. No. K - O Depth at 17', 22', 35', 53'
- B.H. No. L - ● Depth at 28', 53'

DEPARTMENT OF HIGHWAYS - ILLINOIS
MATERIALS & RESEARCH SECTION
PLASTICITY CHART

Job No. 60-F-80
Location

W.P. No. — 231-58 (2)



NOTES

B.H. No. A - ■ Depth at 16'

B.H. No. B - ○ Depth at 17', 27', 32'

B.H. No. D - △ Depth at 21', 36'

B.H. No. E - ▲ Depth at 17', 32', 47'

B.H. No. F - ● Depth at 16', 31', 56'

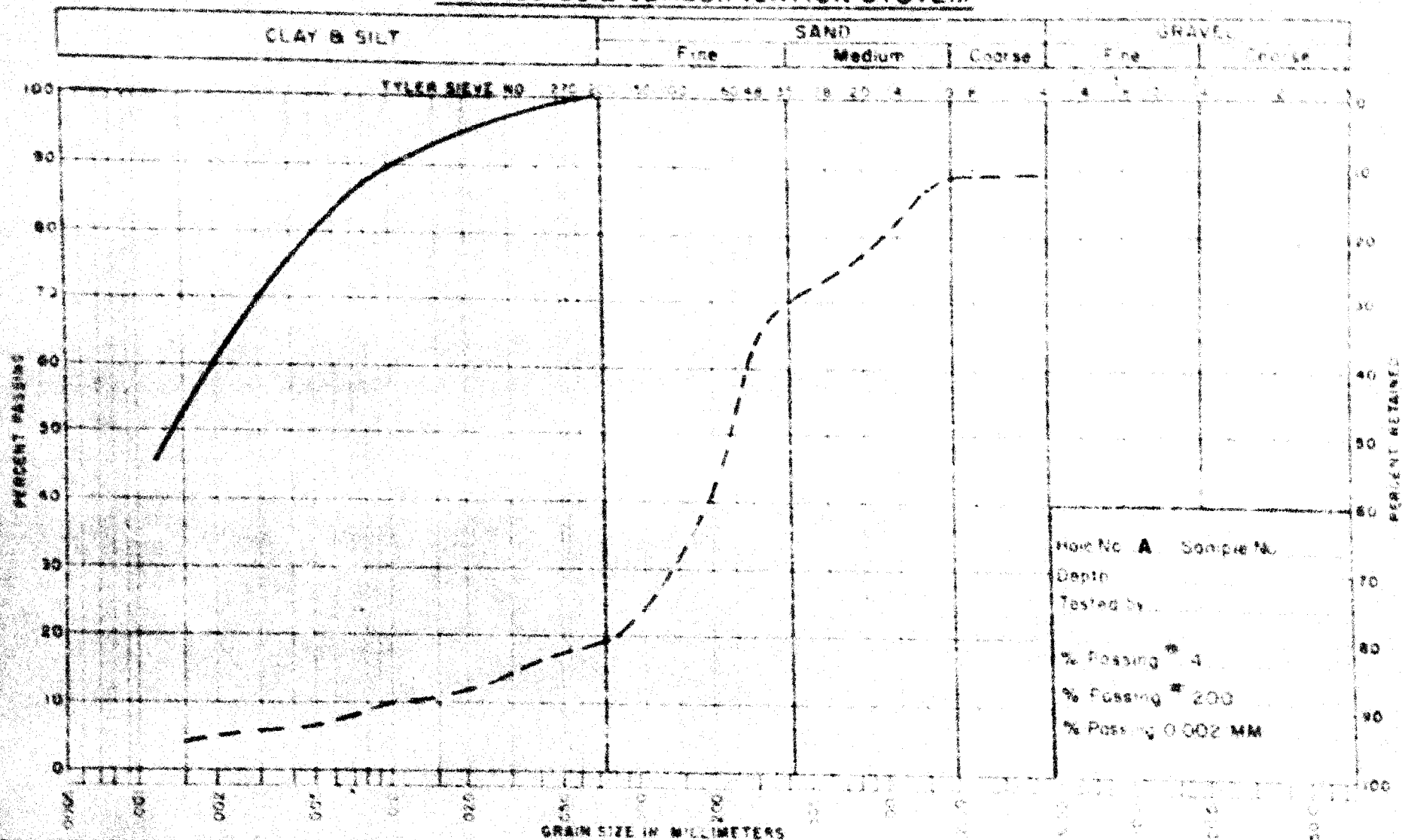
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
PLASTICITY CHART

Job No. 60-F-80

W.P. No. 231-58-2

Location

UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES Sample No. 1 Depth 3' ———
Sample No. 4 Depth 15' ———

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

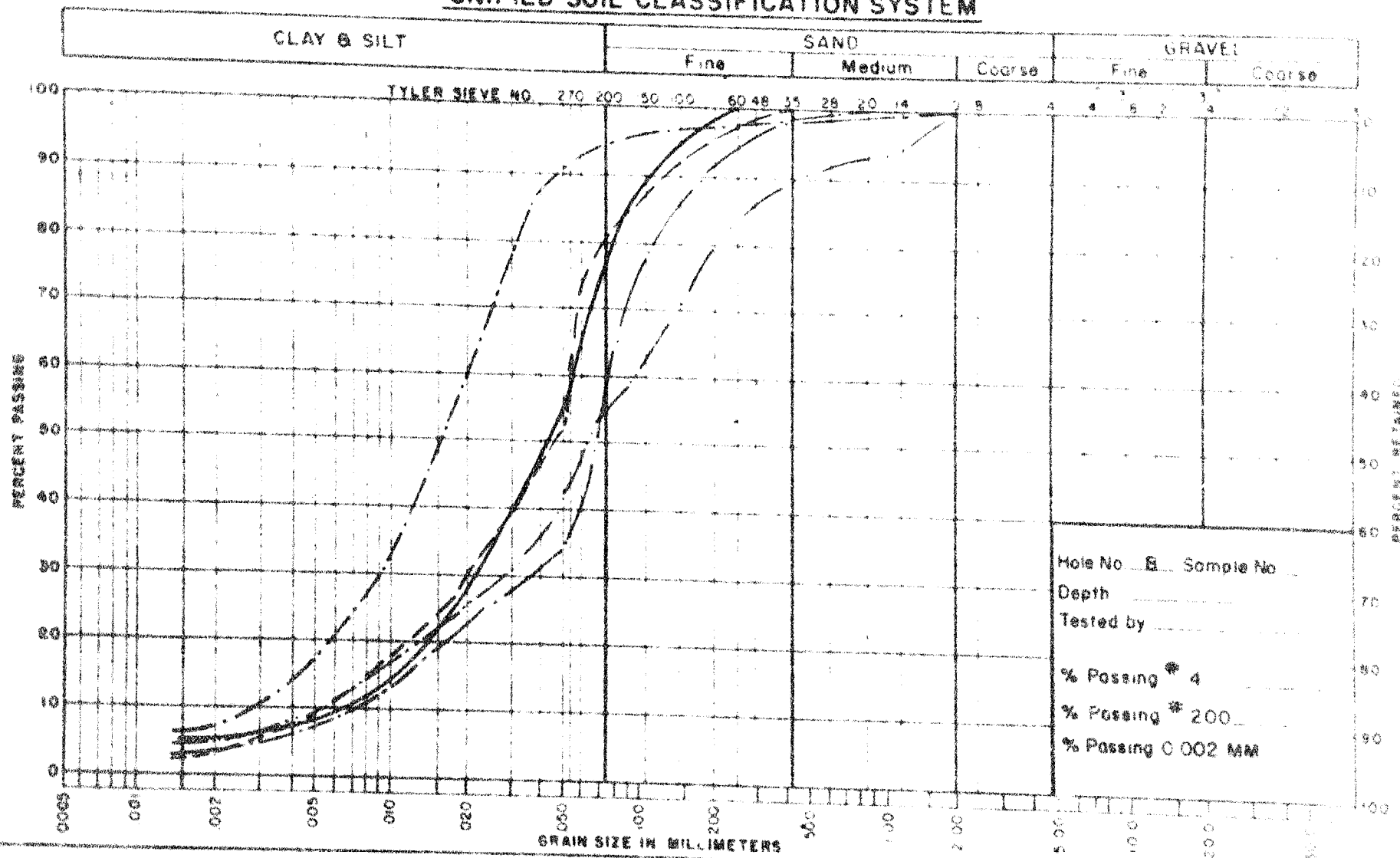
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
GRAIN SIZE DISTRIBUTION

Job No. 60-F-80

WP No. 231-58-2

Location

UNIFIED SOIL CLASSIFICATION SYSTEM

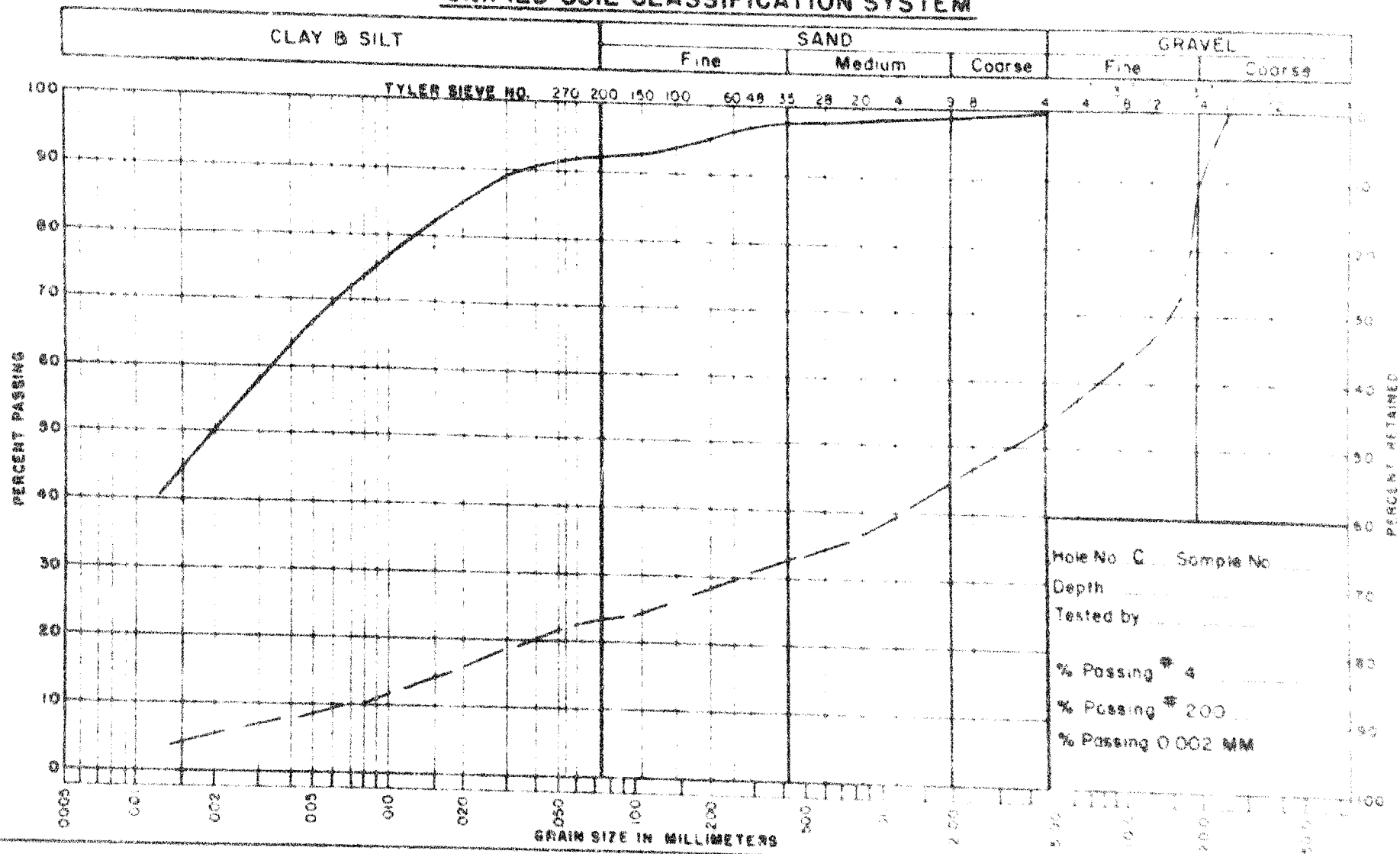


NOTES Sample No. 3 Depth 15'
Sample No. 5 Depth 25'
Sample No. 6 Depth 30'
Sample No. 8 Depth 40'

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

Job No. 60 - F - 80 WF No. 231-58-2
Location _____

UNIFIED SOIL CLASSIFICATION SYSTEM

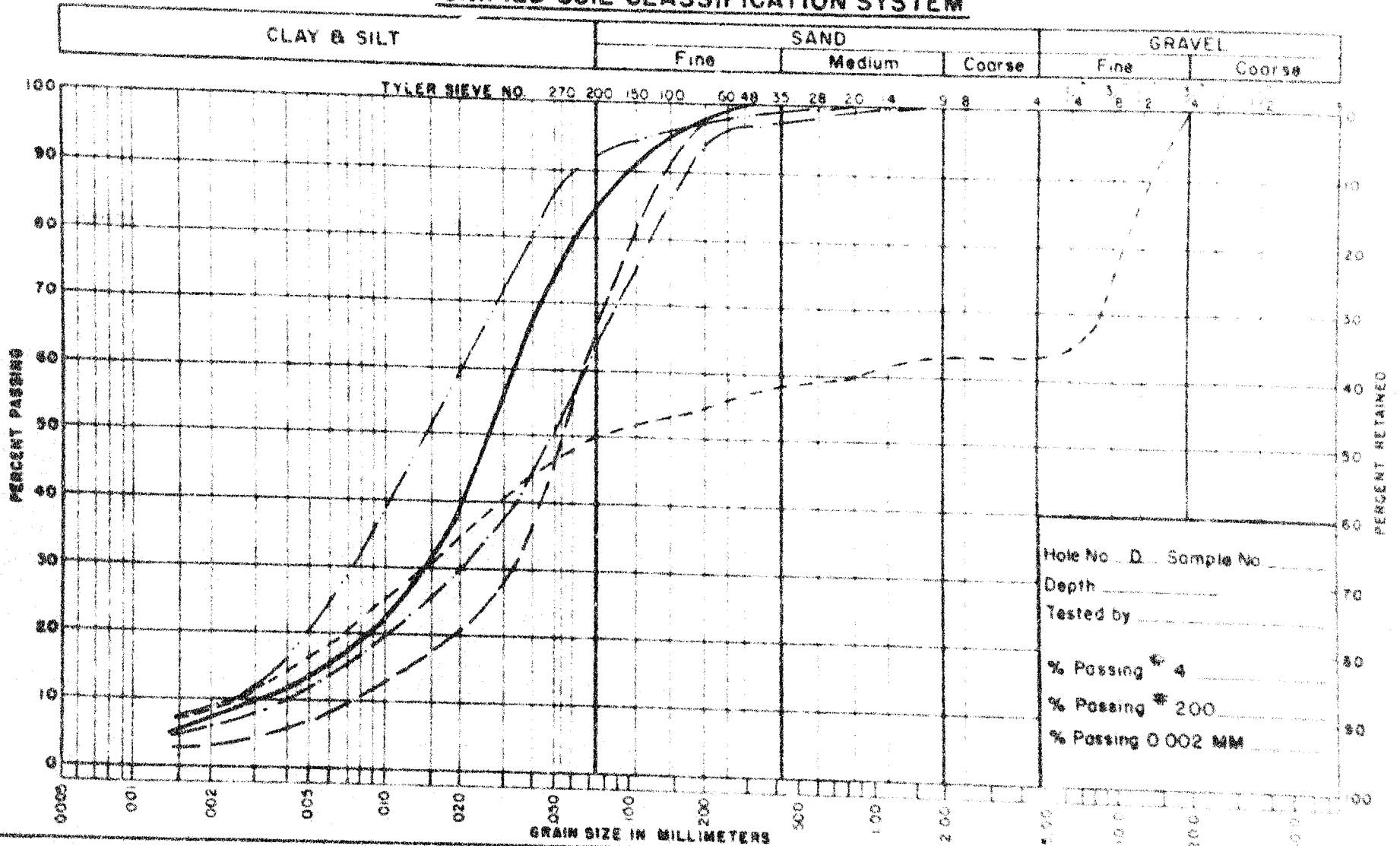


NOTES Sample No. 2 Depth 12' _____
Sample No. 3 Depth 17' _____

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

Job No. 60 - E - 80 WP No. 231-58-2
Location

UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES Sample No. 1 Depth 5' to 6'-6" -----

Sample No. 3 Depth 5' to 16'-6" -----

Sample No. 4 Depth 20' to 21'-6" -----

Sample No. 6 Depth 30' to 31'-6" -----

Sample No. 7 Depth 32' to 33'-6" -----

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

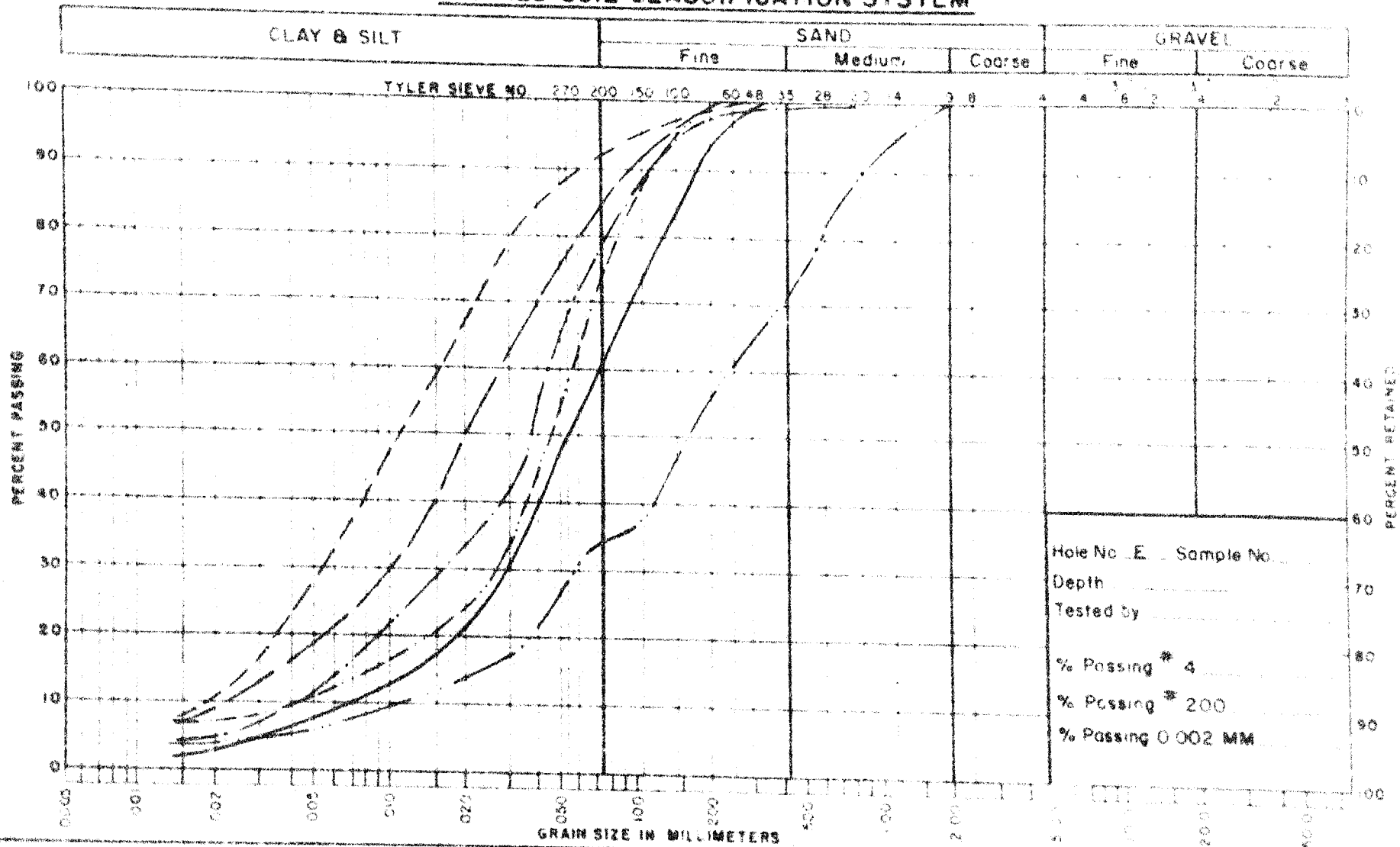
Job No. 60-F-80

WP No.

231-28-2

Location

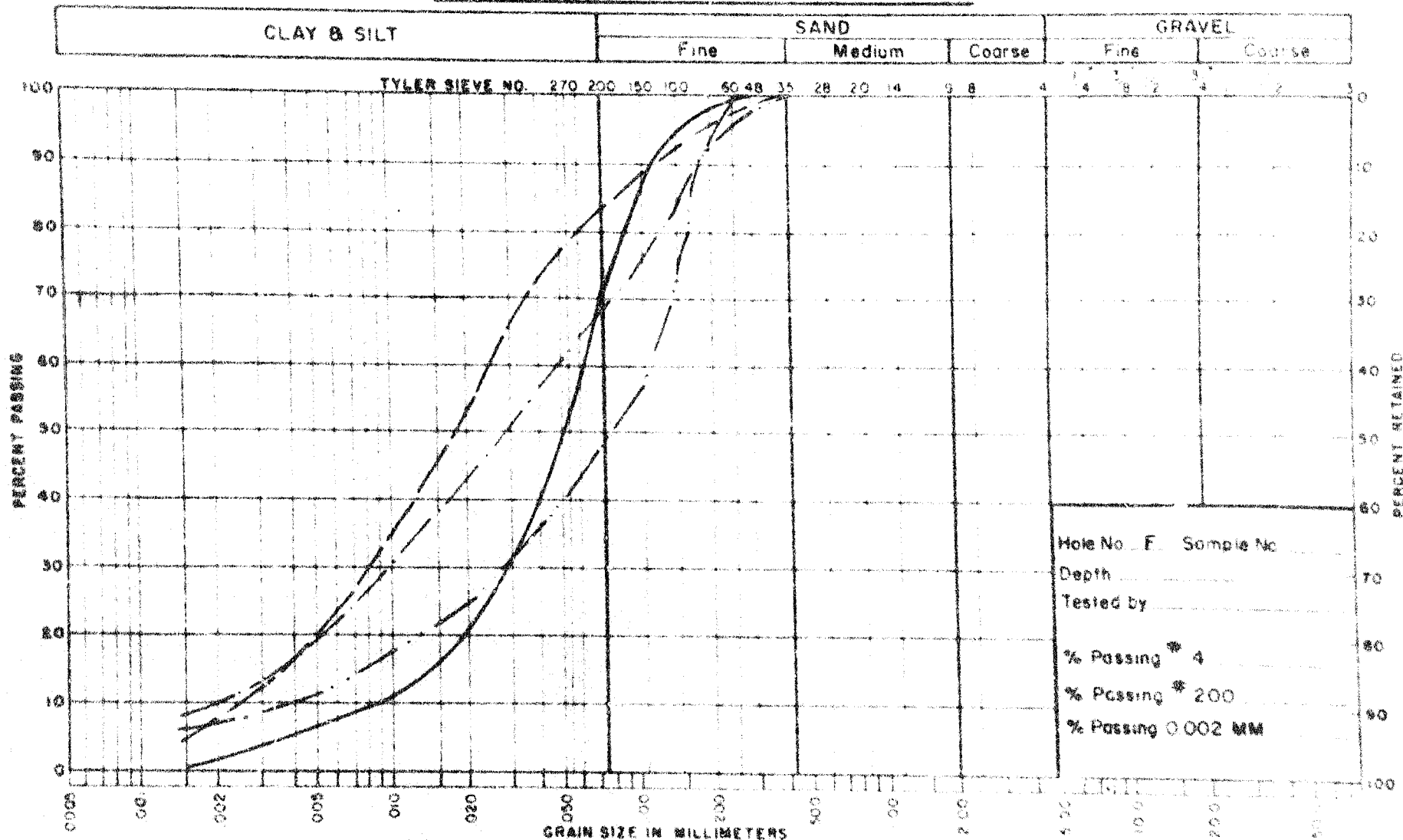
UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES Sample No. 1 Depth 7' ————— Sample No. 8 Depth 47' —————
 Sample No. 3 Depth 17' ————— Sample No. 9 Depth 57' —————
 Sample No. 4 Depth 22' —————
 Sample No. 6 Depth 32' —————

DEPARTMENT OF HIGHWAYS - ONTARIO
 MATERIALS & RESEARCH SECTION
GRAIN SIZE DISTRIBUTION
 Job No 60 - E - 80 WP No 231-58-2
 Location

UNIFIED SOIL CLASSIFICATION SYSTEM

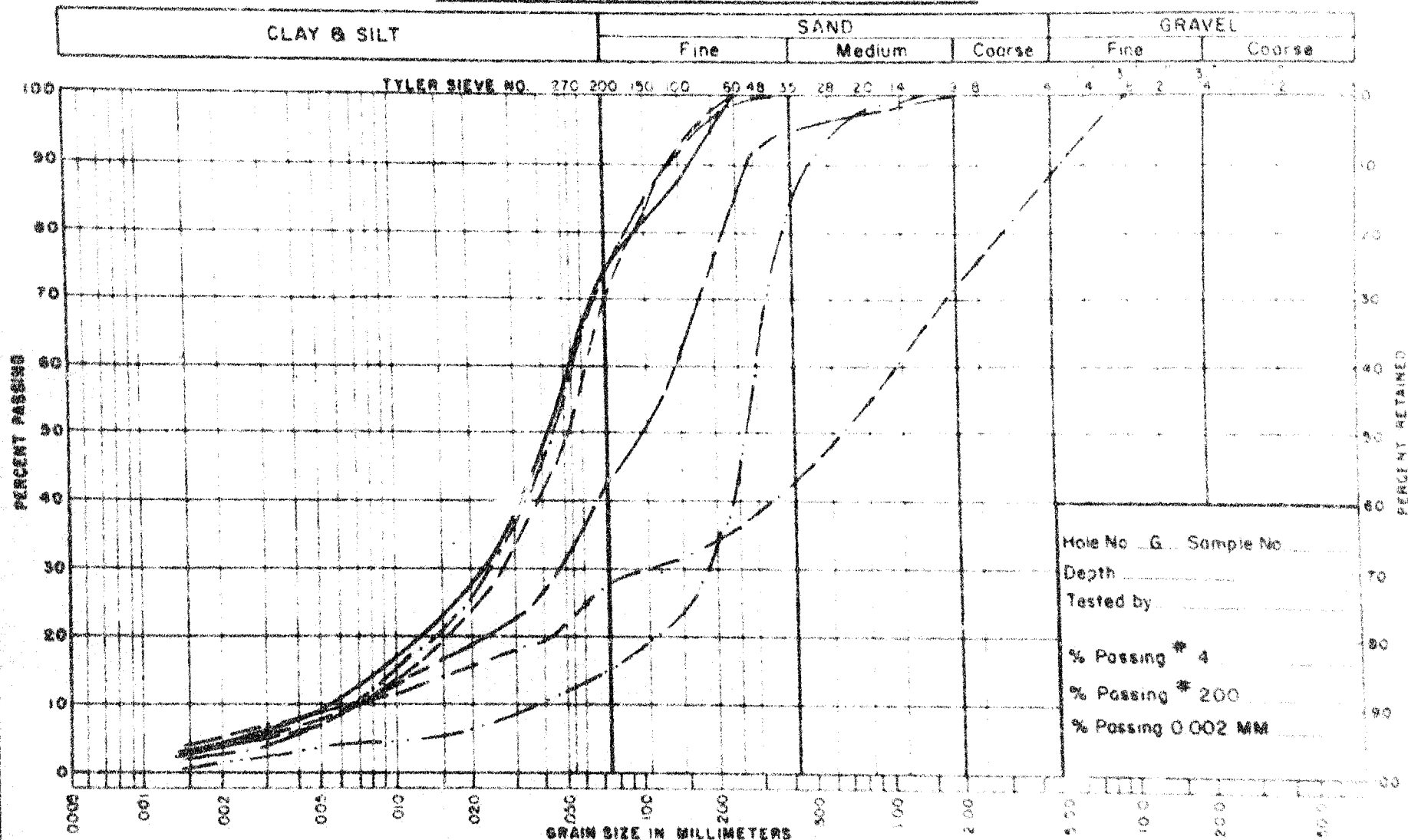


NOTES: Sample No. 3 Depth 17' _____
 Sample No. 6 Depth 32' _____
 Sample No. 9 Depth 57' _____
 Sample No. 10 Depth 67' _____

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

Job No. 60 - F - 80 WP No. 231-28-2
 Location

UNIFIED SOIL CLASSIFICATION SYSTEM

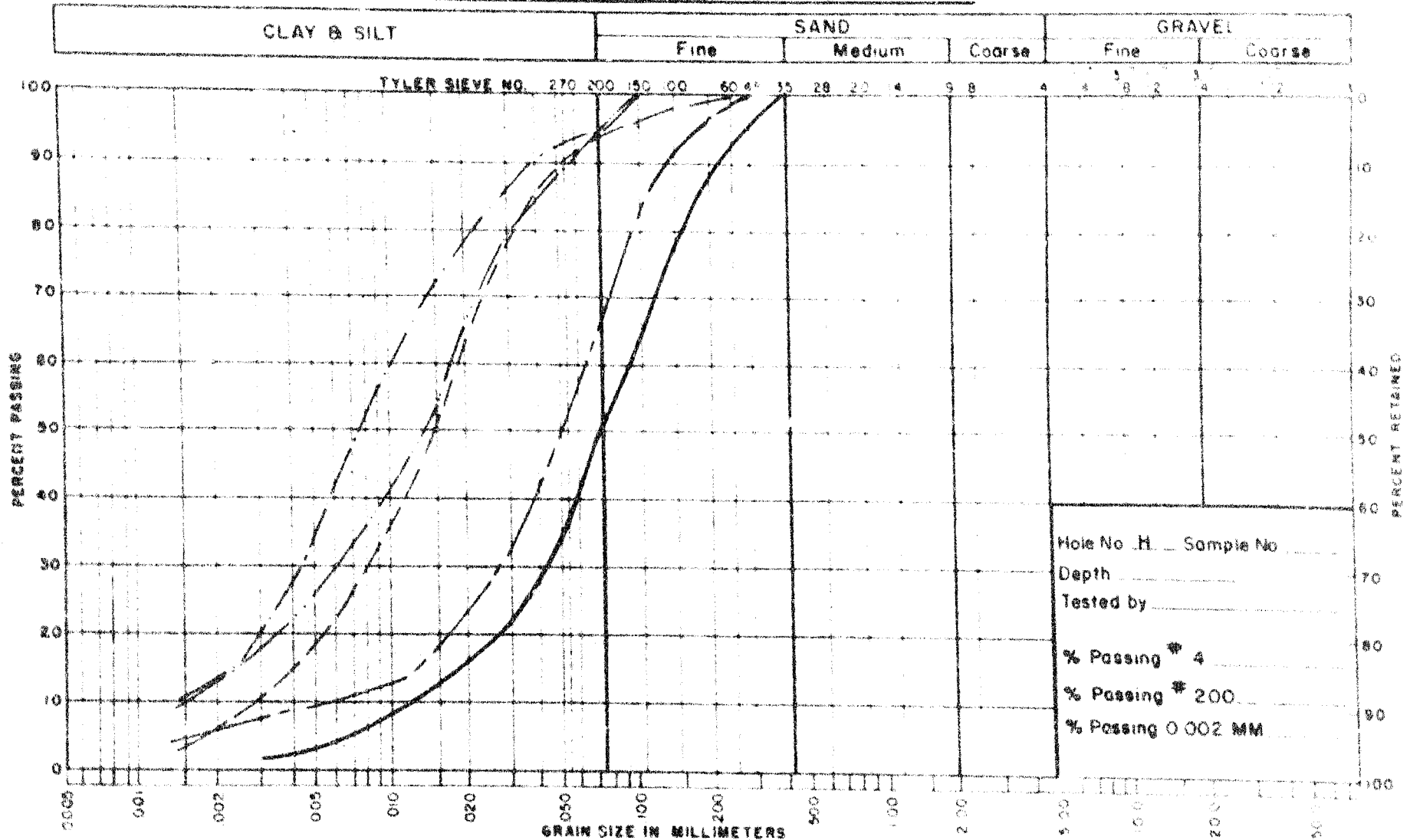


NOTES Sample No. 1 Depth 5' ————— Sample No. 9 Depth 56' —————
 Sample No. 3 Depth 16' ————— Sample No. 11 Depth 74.5' —————
 Sample No. 5 Depth 26' —————
 Sample No. 7 Depth 36' —————

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

Job No. 60-F-80 WP No. 231-58-2
 Location _____

UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES Sample No. 2 Depth 11'

Sample No. 4 Depth 21'

Sample No. 7 Depth 36'

Sample No. 9 Depth 51'

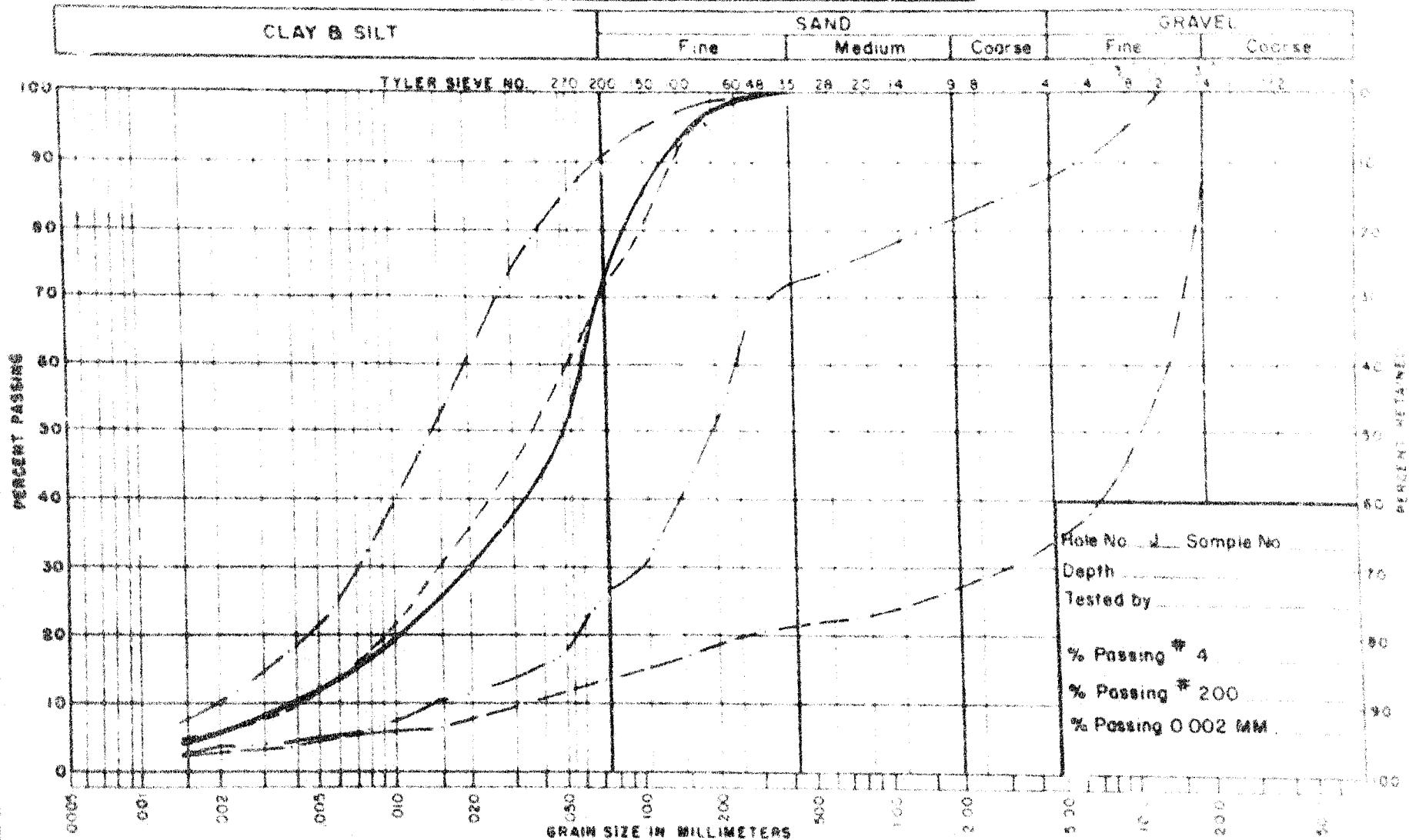
Sample No. 10 Depth 61'

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

Job No. 60-F-80 WP No. 231-58-2

Location

UNIFIED SOIL CLASSIFICATION SYSTEM

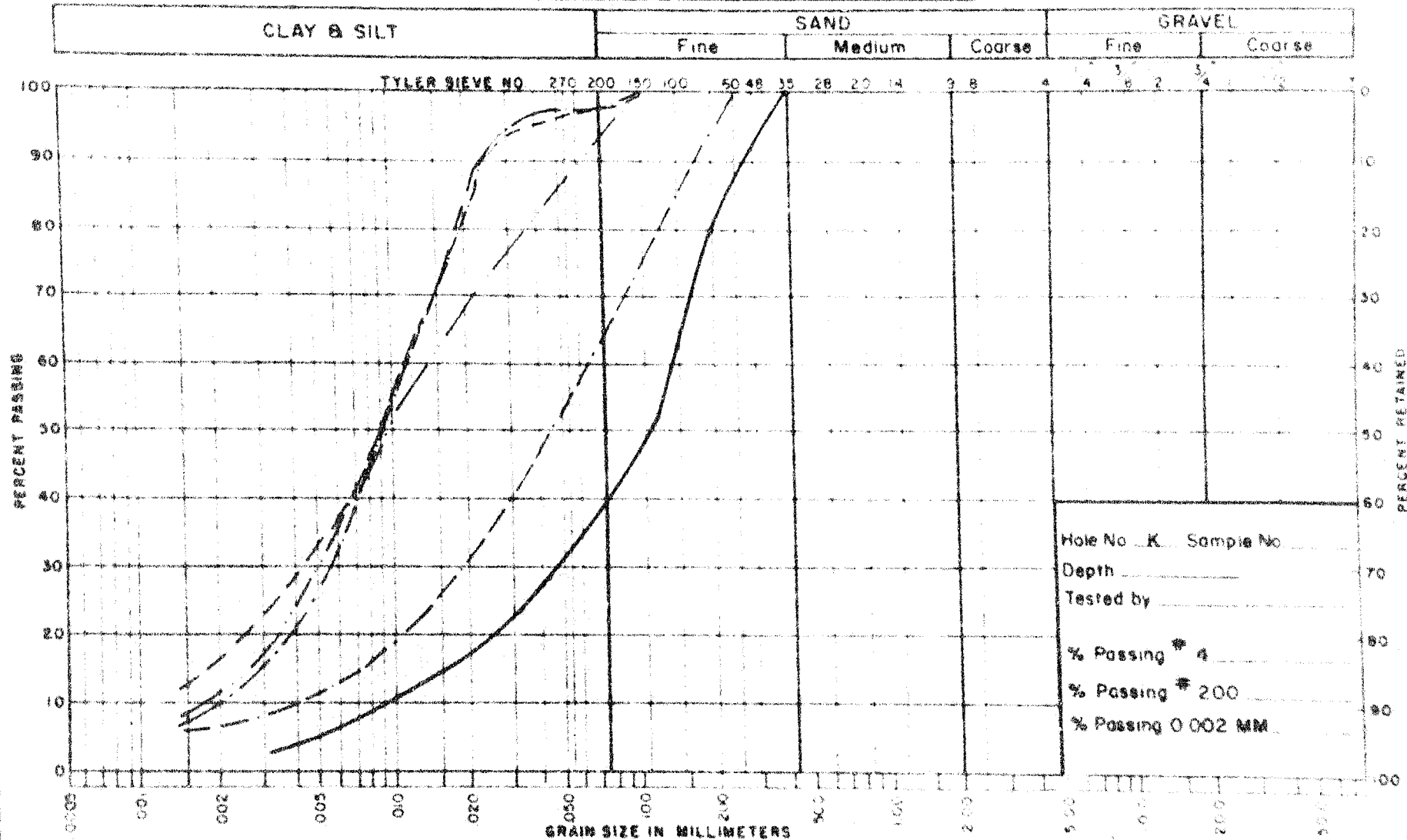


NOTES Sample No. 3 Depth 16' _____
 Sample No. 5 Depth 26' _____
 Sample No. 7 Depth 41' _____
 Sample No. 9 Depth 61' _____
 Sample No. 10 Depth 71' _____

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

Job No. 60-F-80 WP No. 231-58-2
 Location _____

UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES Sample No. 2 Depth 13' _____

Sample No. 3 Depth 18' _____

Sample No. 4 Depth 23' _____

Sample No. 6 Depth 36' _____

Sample No. 8 Depth 54' _____

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

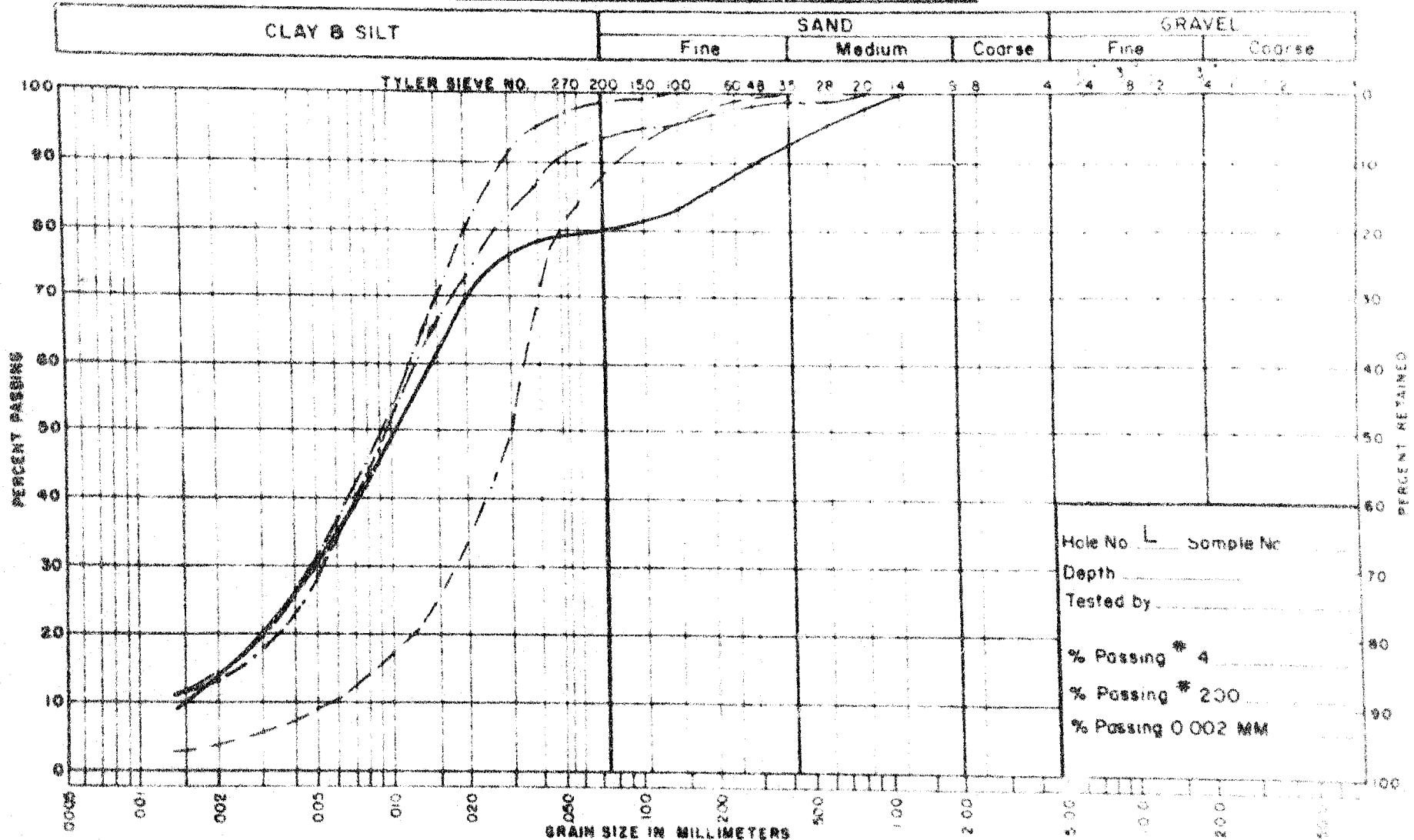
Job No. 60-F-80

WP No. _____

231-58-2

Location _____

UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES Sample No. 2 Depth 12' _____
 Sample No. 5 Depth 27' _____
 Sample No. 7 Depth 42' _____
 Sample No. 8 Depth 52' _____

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

Job No. 60-F-80 WP No. _____ 231-58-2
 Location _____

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-80

W.P. 231-58-2

| HOLE NO. | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENETN RESIST. BLOWS/FT | MOIST. CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|----------|-----------|---------------------|--|-------------------------|----------------|-----------------|----------------|--------------------|-----------------|-----------|
| A | S1 | 3'-4.5' | Silty sand & organic decayed material peat v. loose, black to dark grey. | P | 52.9 | - | - | - | - | |
| | S2 | 6'-7.5' | Silty clay with trace of gravels, shale fragments & organic decayed material v. stiff, d. grey changing to brown at further depth | 19 | - | - | - | - | - | |
| | T3 | 10'-11' | " | 31 | - | - | - | - | - | |
| | T4 | 15'-16.5' | " | 21 | 29.7 | 21.4 | 52.3 | 2430 | 121.5 | |
| | S5 | 20'-21' | " | 83 | - | - | - | - | - | |
| | S6 | 21'-21.3' | Clayey shale, hard, red & grey | 60-3" | - | - | - | - | - | |
| A1 | cone only | | | | | | | | | |
| B | S1 | 5'-6.5' | Organic silt, decayed material peat & gravels, pockets of fine sand in places v. loose to loose black to brownish grey & d. grey in places | P | - | - | - | - | - | |
| | T2 | 10'-12.5' | " | P | - | - | - | - | - | |
| | WANE | 14' | | - | - | - | - | 360 | - | Sens: 3.0 |
| | T3 | 15'-17.5' | " | P | 45.0 | 48.9 | 64.8 | 355 | 107.0 | |
| | WANE | 19' | | - | - | - | - | 520 | - | Sens: 2.9 |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-80

W P 231-58-2

| HOLE NO | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENET N RESIST BLOWS FT | MOIST CONT % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|---------|----------|---------------------|--|-------------------------|--------------|-----------------|----------------|--------------------|-----------------|-----------|
| B | T4 | 20'-22.5' | Organic silt, decayed material peat & gravels, pockets of fine sand in places v. loose to loose black to brownish grey & d. grey in places | P | - | - | - | - | - | |
| | VANE | 24' | | - | - | - | - | 880 | - | Sens: 2.4 |
| | T5 | 25'-27' | " | P | 51.0 | 34.4 | 42.6 | 535 | 107.0 | |
| | VANE | 29' | | - | - | - | - | 1440 | - | Sens: 2.8 |
| | T6 | 30'-32.5' | " | P | 57.6 | 39.1 | 62.9 | 670 | 100.0 | |
| | T7 | 35'-37.5' | Silty sand with clayey silt & org. decayed material v. loose to med. dense d. grey changing to brownish grey at 5'. | P | - | - | - | - | - | |
| | S8 | 40'-41.5' | " | P | 29.7 | - | - | - | - | |
| | S9 | 45'-46.5' | " | 6 | - | - | - | - | - | |
| | S10 | 50'-51.5' | " | 10 | 25.6 | - | - | - | - | |
| | S11 | 55'-56.5' | Weathered clayey shale, hard red & grey | 26 | - | - | - | - | - | |
| | S12 | 57.2'-57.3' | " | 80-2" | - | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-80

W P 231-58-2

| HOLE NO. | SAMP NO | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENET'N RESIST. BLOWS FT | MOIST CONT % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|----------|---------|---------------------|--|--------------------------|--------------|-----------------|----------------|--------------------|-----------------|---------|
| C | S1 | 5'-6.5' | Organic silt & decayed material with peat V. loose, black to D. grey | P | - | - | - | - | - | |
| | S2 | 10'-11.5' | Sand & gravel, trace of org. mat. | 11 | 19.8 | - | - | - | - | |
| | S3 | 15'-16.5' | Clayey & weathered shale, bedrock hard brownish red & grey | 29 | 10.5 | - | - | - | - | |
| | S4 | 17'-17.6' | " | 140-7" | - | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-60

W P 231-58-(2)

| OLE NO | SAMP NO | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENET N RESIST. BLOWS FT | MOIST CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SKEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|--------|---------|---------------------|--|--------------------------|---------------|-----------------|----------------|--------------------|-----------------|-----------|
| D | VANE | 6'-6" | | - | - | - | - | 180 | - | Sens: 3.0 |
| | S1 | 5'-6'6" | Organic silty and decayed material Fine sandy silt. V. loose. Black | P | 68.5 | - | - | - | - | |
| | VANE | 11'-6" | | - | - | - | - | 240 | - | Sens: 3.0 |
| | S2 | 10'-11'6" | " " " " | P | - | - | - | - | - | |
| | S3 | 15'-16'6" | Sandy silt, silty fine sand and organic material V. loose Black to D. grey | P | 31.6 | - | - | - | - | |
| | T4 | 20'-21'6" | " " " " | P | 39.4 | 28.7 | 48.5 | 535 | 108.5 | |
| | VANE | 23' | | - | - | - | - | 640 | - | Sens: 2.5 |
| | T5 | 25'-26'6" | " " " " | P | - | - | - | - | - | |
| | S6 | 30'-31'6" | " " " " | I | 42.5 | - | - | - | - | |
| | VANE | 33' | | - | - | - | - | 1680 | - | Sens: 5.3 |
| | T7 | 35'-36'6" | Sandy silt, gravels, clayey silt and organic material. Mod. dense Br. grey | 6 | 39.4 | 52.2 | 85.1 | 675 | 109.0 | |
| | S8 | 40'7"-40'10" | Shale rock. Red and grey | >100 | - | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-80

W.P. 231-58-(2)

| HOLE NO | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENET N RESIST. BLOWS FT | MOIST CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|---------|----------|---------------------|---|--------------------------|---------------|-----------------|----------------|--------------------|-----------------|---|
| E | VANE | 8' | | - | - | - | - | 360 | - | Sens: 2.0 |
| | S1 | 6'6"-8'0" | Organic silt, silty sand and organic decayed material | P | 45.0 | - | - | - | - | |
| | S2 | 11'6"-13'0" | " " " | P | - | - | - | - | - | |
| | VANE | 13'0"-14'6" | | - | - | - | - | 600 | - | Sens: 4.6 |
| | T3 | 16'6"-18'0" | " " " | P | 49.9 | 38.3 | 49.0 | 450 | 105 | |
| | T4 | 21'6"-23'0" | Silty sand, sandy silt and organic material | P | 28.8 | - | - | - | - | Shelby tube was pushed, but as soil type is cohesionless it was collected in a jar. |
| | S3 | 26'6"-28'0" | Sandy silt, clayey silt and organic material | P | - | - | - | - | - | |
| | VANE | | | - | - | - | - | 960 | - | Sens: 3.3 |
| | T6 | 31'6"-33'0" | Silt, clayey silt, sand and organic material Soft. Grey | P | 72.0 | 40.3 | 77.0 | 523 | 99.5 | |
| | VANE | | | - | - | - | - | 1000 | - | Sens: 2.3 |
| | T7 | 36'6"-38'0" | " " " " | P | - | - | - | - | - | |
| | VANE | 39'6" | | - | - | - | - | 1120 | - | Sens: 4.7 |
| | T8 | 46'6"-48'0" | Silt, sandy silt and organic material | P | 30.3 | 22.0 | 53.9 | 390 | 119 | |
| | VANE | 49'6" | | - | - | - | - | 1120 | - | Sens: 1.7 |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-80

W.P. 231-58-(2)

| HOLE NO. | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENETN RESIST. BLOWS FT | MOIST CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|----------|----------|---------------------|--|-------------------------|---------------|-----------------|----------------|--------------------|-----------------|---------|
| E | T9 | 56'6"-58'0" | Sandy silt, silty sand and clayey silt med-dense | P | 27.6 | - | - | 830 | 121 | |
| | 310 | 66'6"-67'3" | Sandy till, weathered shale rock. Red and grey. V. dense | >100 | - | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-1-80

W P 231-58-2

| SOLE NO | SAMP NO | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENET N RESIST BLOWS FT | MOIST CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH (PSF) | UNIT WEIGHT (PCF) | REMARKS |
|---------|---------|---------------------|--|-------------------------|---------------|-----------------|----------------|----------------------|-------------------|-----------|
| P | VANE | 6.5' | | - | - | - | - | 150 | - | Sens: 2.5 |
| | S1 | 5'-6.5' | Silt, sandy & org. decayed material (wood-peat) v. loose to loose black & brownish grey changing to dark grey with depth | P | 59.6 | - | - | - | - | |
| | VANE | 11.5' | | - | - | - | - | 280 | - | Sens: 2.3 |
| | S2 | 10'-11.5' | " | P | - | - | - | - | - | |
| | T3 | 15'-16.5' | " | P | 43.2 | 31.9 | 49.0 | 270 | 105 | |
| | VANE | 18' | | - | - | - | - | 560 | - | Sens: 3.7 |
| | T4 | 20'-21.5' | " | P | - | - | - | - | - | |
| | VANE | 23' | | - | - | - | - | 640 | - | Sens: 4.0 |
| | T5 | 25'-26.5' | " | P | - | - | - | - | - | |
| | VANE | 28' | | - | - | - | - | 680 | - | Sens: 4.3 |
| | T6 | 30'-31.5' | " | P | 80.2 | 43.2 | 87.2 | 600 | 93 | |
| | VANE | 33' | | - | - | - | - | 920 | - | Sens: 3.3 |
| | T7 | 35'-36.5' | " | P | - | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 69-F-80

WP 231-58-2

| HOLE NO. | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENET N RESIST BLOWS/FT | MOIST CONT % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH P.S.I. | UNIT WEIGHT P.C.F. | REMARKS |
|----------|----------|---------------------|--|-------------------------|--------------|-----------------|----------------|-----------------------|--------------------|-----------|
| F | WANE | 38' | | - | - | - | - | 680 | - | Sens: 2.8 |
| | T8 | 45'-46.5' | Silt, sandy & org. decayed material (wood-pent) v. loose to loose black & brownish grey changing to dark grey with depth | P | - | - | - | - | - | |
| | WANE | 48' | | - | - | - | - | 1120 | - | Sens: 4.7 |
| | T9 | 55'-56.5' | " | P | 26.2 | 19.0 | 32.3 | 655 | 116.5 | |
| | S10 | 65'-66.5' | " | 1 | 26.3 | - | - | - | - | |
| | S11 | 72.7'-74.2' | Sandy till & clayey shale v. dense, brownish red & greyish green | 65 | - | - | - | - | - | |
| | W12 | 77'-81.3' | Red & grey shale bedrock | - | - | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-80

W P 231-58-(2)

| OLE NO | SAMP NO | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENETR RESIST BLOW/FT | MOIST CONT % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|--------|---------|---------------------|--|-----------------------|--------------|-----------------|----------------|--------------------|-----------------|---|
| 3 | VANE | 6.5' | | - | - | - | - | 280 | - | Sens: 2.0 |
| | S1 | 5'-6'6" | Organic silt, sandy silt & decayed material V. loose. Black to dark grey | P | 54.3 | - | - | - | - | |
| | VANE | 12.5' | | - | - | - | - | 520 | - | Sens: 4.7 |
| | S2 | 11'-12'6" | " " " " | P | - | - | - | - | - | |
| | T3 | 16'-17'6" | " " " " | P | 43.1 | - | - | - | - | Sample collected in a jar from Shelby tube. |
| | VANE | 19' | | - | - | - | - | 880 | - | Sens: 2.0 |
| | S4 | 21'-23'6" | " " " " | P | - | - | - | - | - | Shelby sample was tried first |
| | VANE | 25' | | - | - | - | - | 840 | - | Sens: 1.8 |
| | T5 | 25'-27'6" | Silt, silty sand & organic material. Loose to Med. dense. D. Grey | P | 35.5 | - | - | - | - | Osterberg sample, collected in a jar. |
| | S6 | 31'-32'6" | Silty fine sand, clayey silt and decayed material. Loose to Med. dense. | | | | | | | |
| | VANE | 34' | | - | - | - | - | 1520 | - | Sens: 5.4 |
| | T7 | 36'-37'6" | Silty sand and organic decayed material. Loose to Med. dense | P | 26.6 | - | - | - | - | |
| | VANE | 39' | | - | - | - | - | 1120 | - | Sens: 2.3 |
| | S8 | 46'-47'6" | " " " " | 6 | - | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 10-P-80

W P 231-58-(2)

| SOLE 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 |
|---------|---------|---------------------|--|--------------------------|--------------|-----------------|----------------|-----------------------|--------------------|---------|
| G | S9 | 56'-57'6" | Silty sand and organic decayed material. Loose to med. dense | 1 | 26.2 | - | - | - | - | |
| | S10 | 66'-67'6" | Sandy till. Shale fragments. Med. dense to dense | 12 | - | - | - | - | - | |
| | S11 | 74'6"-75'6" | Sandy till. Shale fragments. V. dense. Br. Grey | >100 | 8.4 | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-80

W.P. 231-58-(2)

| HOLE NO | SAMP NO | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENETN RESIST. BLOWS FT | MOIST. CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|---------|------------|---------------------|---|-------------------------|----------------|-----------------|----------------|--------------------|-----------------|-----------|
| H | VANE 8' | | | - | - | - | - | 100 | - | Sens: 2.0 |
| | S1 | 0'6"-8'0" | Organic silty and decayed material V. loose. Black and Br. Grey | P | - | - | - | - | - | |
| | T2 | 11'6"-13'0" | Silt, silty sand & clayey silt with decayed material. V. loose to loose D. grey | P | 38.0 | - | - | 283 | 109 | |
| | T3 | 16'6"-18'0" | " " " " " | P | - | - | - | - | - | |
| | VANE 19'5" | | | - | - | - | - | 720 | - | Sens: 4.0 |
| | T4 | 21'6"-23'0" | " " " " " | P | - | - | - | - | - | |
| | VANE 24'6" | | | - | - | - | - | 840 | - | Sens: 1.8 |
| | T5 | 26'6"-28' | " " " " " | - | - | - | - | - | - | |
| | VANE 29'6" | | | - | - | - | - | 1120 | - | Sens: 2.6 |
| | T6 | 31'6"-33'0" | Organic silt, clayey silt and decayed material in excess. Soft D. Grey | P | - | - | - | - | - | |
| | VANE 34'6" | | | - | - | - | - | 1280 | - | Sens: 4.9 |
| | T7 | 36'6"-38'0" | " " " " " | P | 55.3 | 30.8 | 55.7 | 565 | 985 | |
| | VANE 39'6" | | | - | - | - | - | 880 | - | Sens: 4.4 |
| | T8 | 41'6"-43'0" | Organic silt, clayey silt, some sand and decayed material. Med. stiff. Grey | P | - | - | - | - | - | |
| | VANE 44'6" | | | - | - | - | - | 1200 | - | Sens: 3.8 |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-80

W.P. 231-58-(2)

| WELL 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 |
|----------|----------|---------------------|---|-------------------------|----------------|-----------------|----------------|-----------------------|--------------------|-----------|
| H | T9 | 51'6"-53'0" | Silt, clayey silt, trace of sand and decayed material. Med. stiff. Grey to Br. Grey | P | 28.0 | 22.3 | 31.3 | 800 | 122 | |
| | VANE | 54'6" | | - | - | - | - | 1280 | - | Sens: 3.6 |
| | T10 | 61'6"-63'0" | Sandy silt, clayey silt, gravels and shale fragments. (Till material) Dense. Grey | 20 | 30.4 | - | - | - | - | |
| | S11 | 71'6"-73'0" | " " " " (Boulder stone) | 32 | - | - | - | - | - | |
| | S12 | 76'1"-77'6" | " " " " " | 47 | - | - | - | - | - | |
| | S13 | 84'6"-85'6" | Shale Rock. Red and Grey | >100 | - | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-80

W.P. 231-58-2

| HOLE NO | SAMP NO | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENET N RESIST BLOWS/FT | MOIST CONT % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|---------|---------|---------------------|--|-------------------------|--------------|-----------------|----------------|--------------------|-----------------|-----------|
| J | VANE | 7.5' | Sandy silt & organic silty & decayed material v. loose to loose, black changing to grey with depth | - | - | - | - | 280 | - | Sens: 3.4 |
| | S1 | 6'-7.5' | | P | - | - | - | - | - | |
| | VANE | 11.5' | | - | - | - | - | 320 | - | Sens: 4.0 |
| | S2 | 10'-11.5' | | P | - | - | - | - | - | |
| | T3 | 16'-17.5' | | P | 46.2 | 25.4 | 37.2 | 312 | 109 | |
| | VANE | 19' | | - | - | - | - | 480 | - | Sens: 2.0 |
| | T4 | 21'-22.5' | | P | - | - | - | - | - | |
| | VANE | 24' | | - | - | - | - | 760 | - | Sens: 4.2 |
| | T5 | 26'-27.5' | | P | 39.4 | 32.0 | 45.2 | 760 | 106 | |
| | VANE | 29' | | - | - | - | - | 1000 | - | Sens: 4.2 |
| | T6 | 31'-32.5' | | P | - | - | - | - | - | |
| | VANE | 34' | | - | - | - | - | 1040 | - | Sens: 3.3 |
| | T7 | 41'-42.5' | | P | 67.8 | 32.8 | 65.7 | 870 | 102.5 | |

W.P. 231-58-2

[illegible]

SUMMARY OF FIELD & LABORATORY TESTS

JOB 00-F-80

W.P. 231-58-(2)

| HOLE NO. | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENETN RESIST. BLOWS/FT | MOIST. CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|----------|----------|---------------------|---|-------------------------|----------------|-----------------|----------------|--------------------|-----------------|-----------|
| K | VANE | 8'0" | | - | - | - | - | 220 | - | Sens: 5.5 |
| | S1 | 6'6"-8'0" | Organic silt and decayed material. (Peat). V. soft. Black to D. grey | P | - | - | - | - | - | |
| | VANE | 13'0" | | - | - | - | - | 440 | - | Sens: 2.9 |
| | S2 | 11'6"-13'0" | Organic silt, clayey silt, silty sand and decayed material. V. loose Grey | P | 52.9 | - | - | - | - | |
| | S3 | 16'6"-18'0" | Organic silt, clayey silt and decayed material. Trace of fine sand Soft. Grey | P | 67.6 | 43.1 | 72.5 | - | - | |
| | VANE | 19'6" | | - | - | - | - | 640 | - | Sens: 4.0 |
| | T4 | 21'6"-23'0" | " " " " | P | 70.4 | 43.4 | 81.2 | 300 | 95 | |
| | VANE | 24'6" | | - | - | - | - | - | - | Sens: 3.6 |
| | T5 | 26'6"-28'0" | " " " " | P | - | - | - | - | - | |
| | VANE | | | - | - | - | - | 720 | - | Sens: 6.0 |
| | T6 | 34'6"-36'0" | " " " " | P | 51.6 | 28.3 | 43.9 | 510 | 113 | |
| | VANE | 37'6" | | - | - | - | - | 960 | - | Sens: 4.0 |
| | T7 | 42'6"-44'0" | " " " " | P | - | - | - | - | - | |
| | VANE | 45'6" | | - | - | - | - | 960 | - | Sens: 4.0 |
| | T8 | 52'6"-54'0" | Org. silt, silty sand, clayey silt and decayed material. Med. dense Grey | P | 24.0 | 16.8 | 25.1 | 465 | 123 | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 00-T-80

W P 231-SH-(2)

| HOLE NO. | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENET N RESIST BLOWS FT | MOIST CONT % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH LBS | UNIT WEIGHT LBS | REMARKS |
|----------|----------|---------------------|---|-------------------------|--------------|-----------------|----------------|--------------------|-----------------|-----------|
| R | VANE | 55'6" | | - | - | - | - | 880 | - | Seve: 1.8 |
| | T9 | 62'6"-64'0" | Org. silt, silty sand, clayey silt and decayed material Red. dense Grey | P | - | - | - | - | - | |
| | S10 | 67'0"-67'3" | Shale rock. Red & grey. Trace of sand. | >100 | - | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-80

W.P. 31-58-(2)

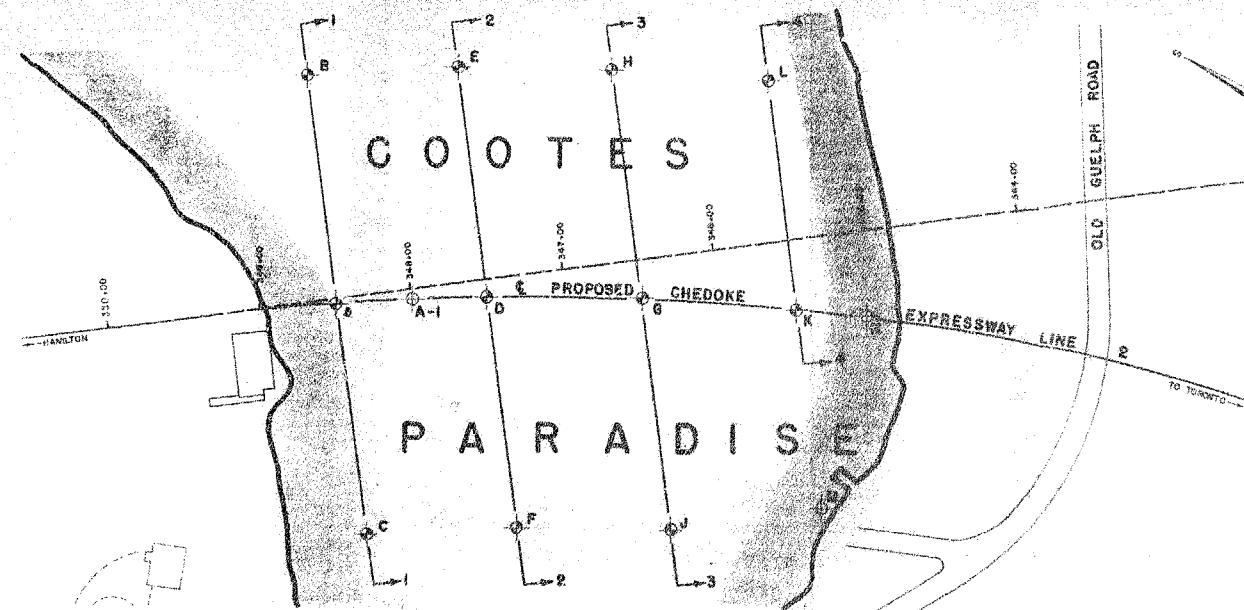
| SOLE NO. | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENETN RESIST BLOW/FT | MOIST CONY % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH PSI | UNIT WEIGHT PCF | REMARKS |
|----------|----------|---------------------|---|-----------------------|--------------|-----------------|----------------|--------------------|-----------------|--|
| L | VANE | 8'6" | | - | - | - | - | 160 | - | Sens: 3.2 |
| | S1 | 7'0"-8'6" | Organic silt and decayed material V. soft. Black to D. Grey | P | - | - | - | - | - | |
| | T2 | 12'0"-13'6" | Organic silt, sandy silt, clayey silt and decayed material. V. loose. D. Grey | P | 159.8 | 52.6 | 132.0 | 210 | 80 | |
| | T3 | 17'0"-18'6" | " " " " | P | - | - | - | - | - | |
| | VANE | 20' | | - | - | - | - | 480 | - | Sens: 2.7 |
| | T4 | 22'-23'6" | " " " " | P | - | - | - | - | - | |
| | VANE | 25' | | - | - | - | - | 680 | - | Sens: 3.8 |
| | T5 | 27'-28'6" | " " " " | P | 53.6 | 35.5 | 54.0 | 515 | 104.5 | |
| | VANE | 30' | | - | - | - | - | 700 | - | Sens: 3.5 |
| | T6 | 32'0"-33'6" | " " " " | P | - | - | - | - | - | |
| | VANE | 35' | | - | - | - | - | 760 | - | Sens: 4.8 |
| | S7 | 42'-43'6" | Silt, clayey silt and decayed material. Soft. Grey | P | 72.1 | - | - | - | - | (Split spoon used, after losing sample in Shelby tube) |
| | VANE | 45' | | - | - | - | - | 1250 | - | Sens: 4.3 |
| | T8 | 52'-53'6" | Med. stiff.-Br. Grey | P | 34.5 | 20.6 | 40.7 | 560 | 117 | |
| | VANE | 55' | | - | - | - | - | 1120 | - | Sens: 2.1 |
| | S9 | 62'-62'4" | Shale rock. Red and grey. | >200 | - | - | - | - | - | |

SUMMARY OF FIELD & LABORATORY TESTS

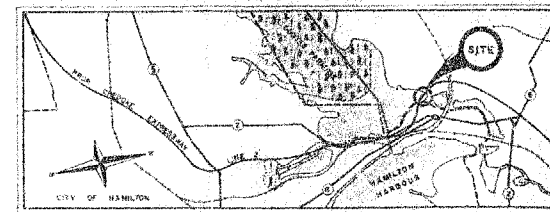
JOB 60-F-30

WP 231-98-2

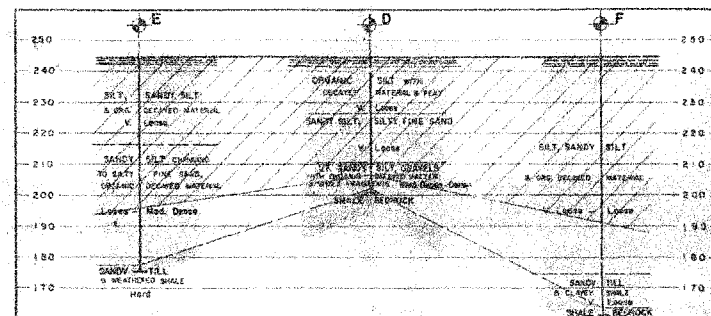
| SOLE NO. | SAMP NO. | SAMPLE DEPTH (FEET) | MATERIAL DESCRIPTION | PENETN RESIST. BLOWS/FT | MOIST. CONT. % | PLASTIC LIMIT % | LIQUID LIMIT % | SHEAR STRENGTH (PSI) | UNIT WEIGHT (PCF) | REMARKS |
|----------|----------|---------------------|-----------------------|-------------------------|----------------|-----------------|----------------|----------------------|-------------------|---------|
| 1 | cone | only | | | | | | | | |
| 2 | | " | | | | | | | | |
| | | | S denotes split spoon | | | | | | | |
| | | | T " shelby tube | | | | | | | |
| | | | RC " rock core | | | | | | | |



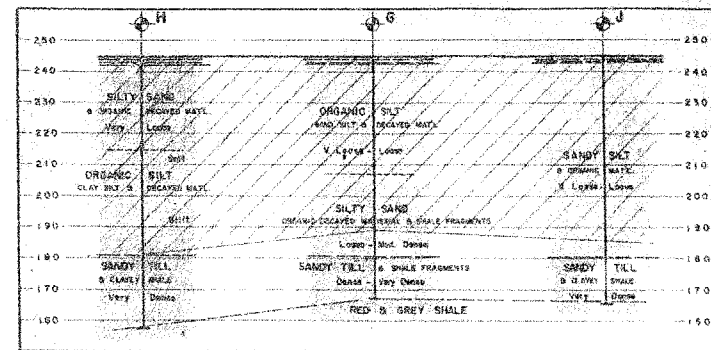
PLAN
SCALE: 1 inch = 40 feet (for borehole and center line)



KEY PLAN

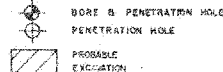


2-2 SCALE, VERT. 1"=20'
HORIZ. 1"=40' 23-61-174-G



3-3 SCALE, VERT. 1"=20'
HORIZ. 1"=40'

LEGEND



DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS & RESEARCH SECTION

PROPOSED CROSSING COOTES PARADISE AND CHEDOK EXPRESSWAY

| | | |
|--------------------------|-----------------------|-----------------------|
| DESIGNED BY: S. CHADWICK | DRAWN BY: S. CHADWICK | DATE: 2 NOVEMBER 1960 |
| SUPERVISOR: D. HAMILTON | SCALE: 1"=40' | FOR NO. 80-F-80 |
| CHECKED BY: S. CHADWICK | SCALE: 1"=40' | (DRAWING NO.) |
| APPROVED BY: S. CHADWICK | SCALE: 1"=40' | 80-F-80A |

4-4 SCALE, VERT. 1"=20'
HORIZ. 1"=40'