

54-F-19

Hwy. # 87

MAITLAND RIVER

FL 129
54-90

MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG #2 (1090)
CASING 3" (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT. 250 * DROP INCHES
JOB F54-19
DATUM STA 71+04.4, 30.4' RT, ELEV 1233.0
BORING NO. 1
DATE REPORT Dec. 4th 1954
BORING DATE Nov. 19, 20th 22nd 1954
COMPILED BY S.T.B. CHECKED BY S.T.B.

SAMPLE CONDITION



SAMPLE TYPES

C.S. - CHUNK
D.O. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE
T.O. - THIN WALLED OPEN

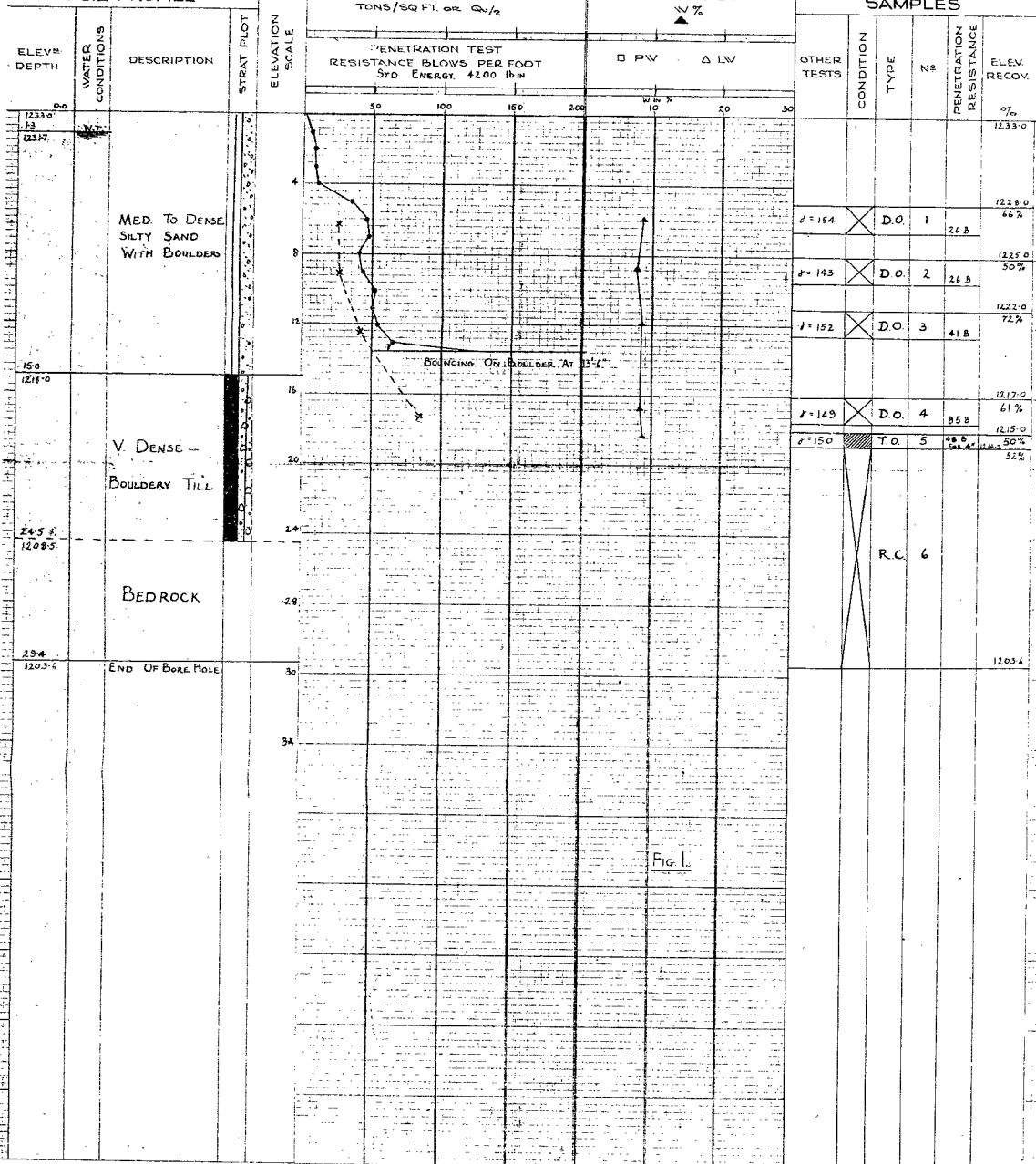
SAMPLE TYPES

W.S. - WASHED SAMPLE
R.C. - ROCK CORE

ABBREVIATIONS

V - INSITU VANE SHEAR TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Qc - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
γ - UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION
CA - CASING
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

SOIL PROFILE



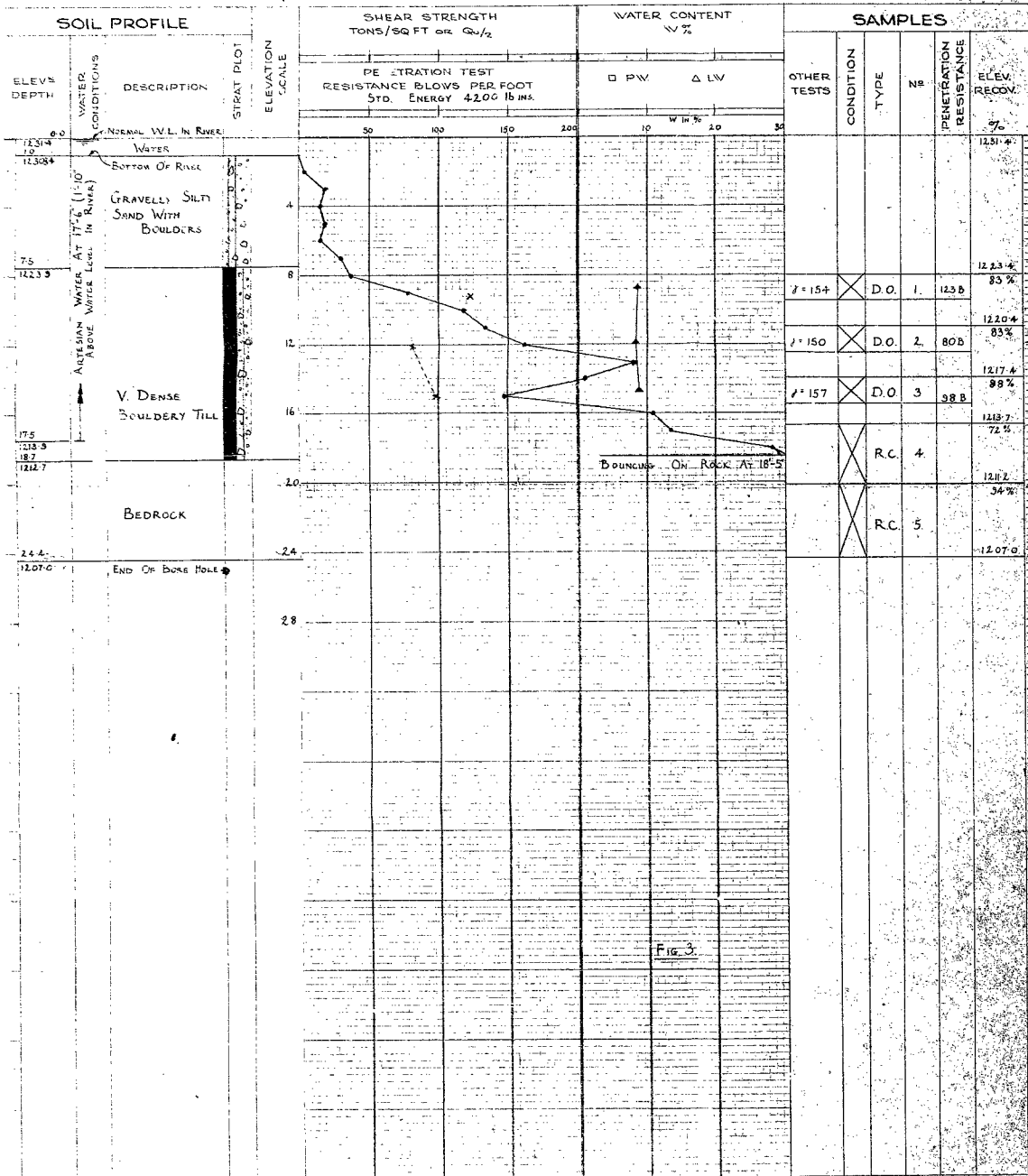
54.90
MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 1090
CASING 3" Bx (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT 250 # DROP INCHES
JOB F-54-19
DATUM Sta 70+25.4 (15' RT. ELEV 1231.4)
COMPILED BY S.T.B. CHECKED BY S.T.B. BORING DATE Nov 26, 1954
BORING No 30
DATE REPORT Dec 5, 1954

SAMPLE CONDITION
DISTURBED
GOOD
LOST

SAMPLE TYPES
CS - CHUNK
DO - DRIVE OPEN
DF - DRIVE FOOT VALVE
VS - WASHED SAMPLE
TO - THIN WALLED OPEN
RC - ROCK CORE

ABBREVIATIONS
V - INSITU VANE SHEAR TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Q - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
γ - UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION
CA - CASING
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL



— M/C IN % — CONE. PEN. TEST
X - - - - - STD. PEN. TEST

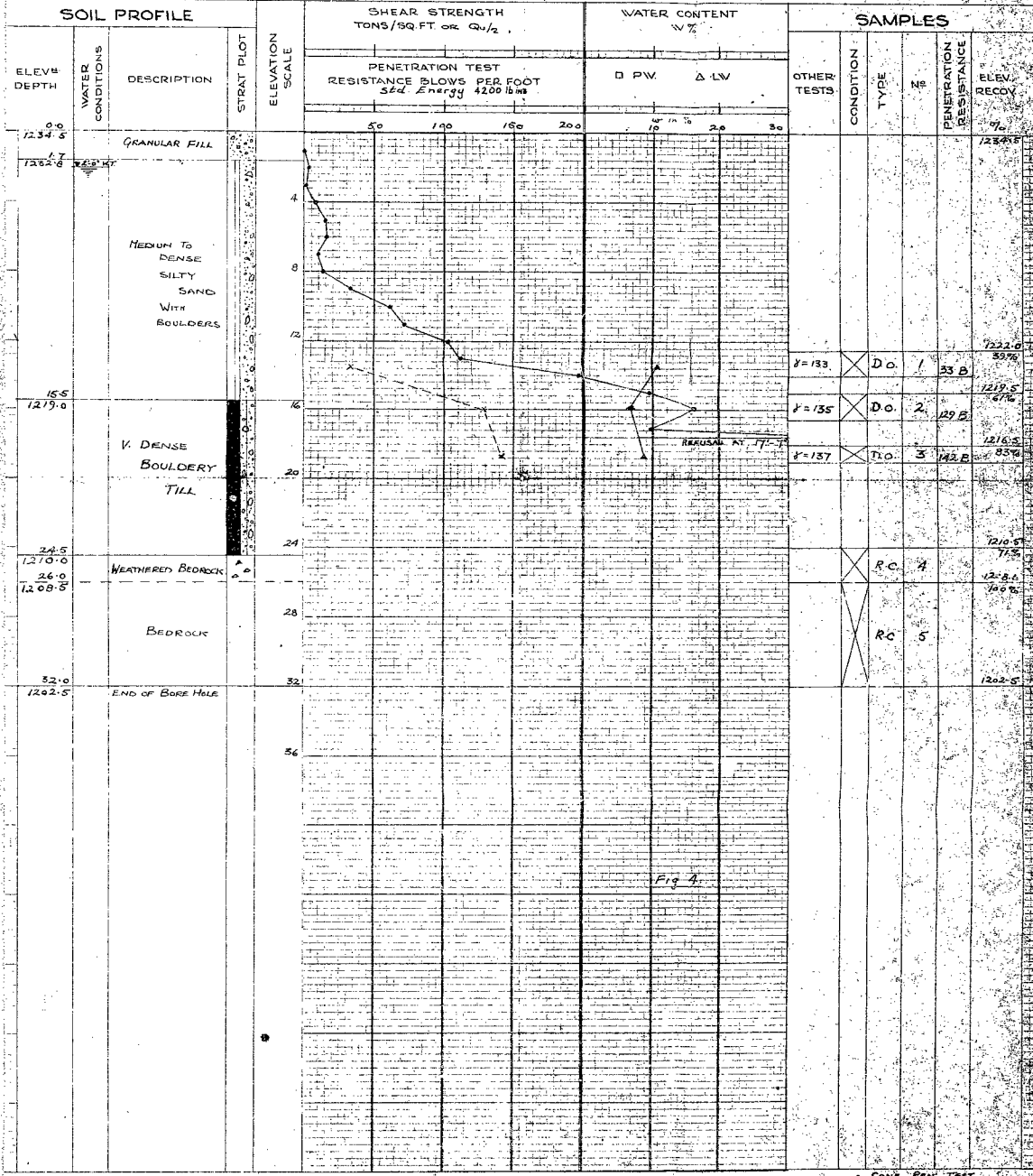
54.90
MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 1090
CASING 3" Bx (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT 250 # DROP INCHES
JOB F-54-19
DATUM Sta 70+25.4 (15' RT. ELEV 1231.4)
COMPILED BY S.T.B. CHECKED BY S.T.B. BORING DATE Nov 26, 1954
BORING No 4
DATE REPORT Dec 5, 1954

SAMPLE CONDITION
DISTURBED
GOOD
LOST

SAMPLE TYPES
CS - CHUNK
DO - DRIVE OPEN
DF - DRIVE FOOT VALVE
VS - WASHED SAMPLE
TO - THIN WALLED OPEN
RC - ROCK CORE

ABBREVIATIONS
V - INSITU VANE SHEAR TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Q - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
γ - UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION
CA - CASING
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL



— M/C IN % — CONE. PEN. TEST
X - - - - - STD. PEN. TEST

34-90

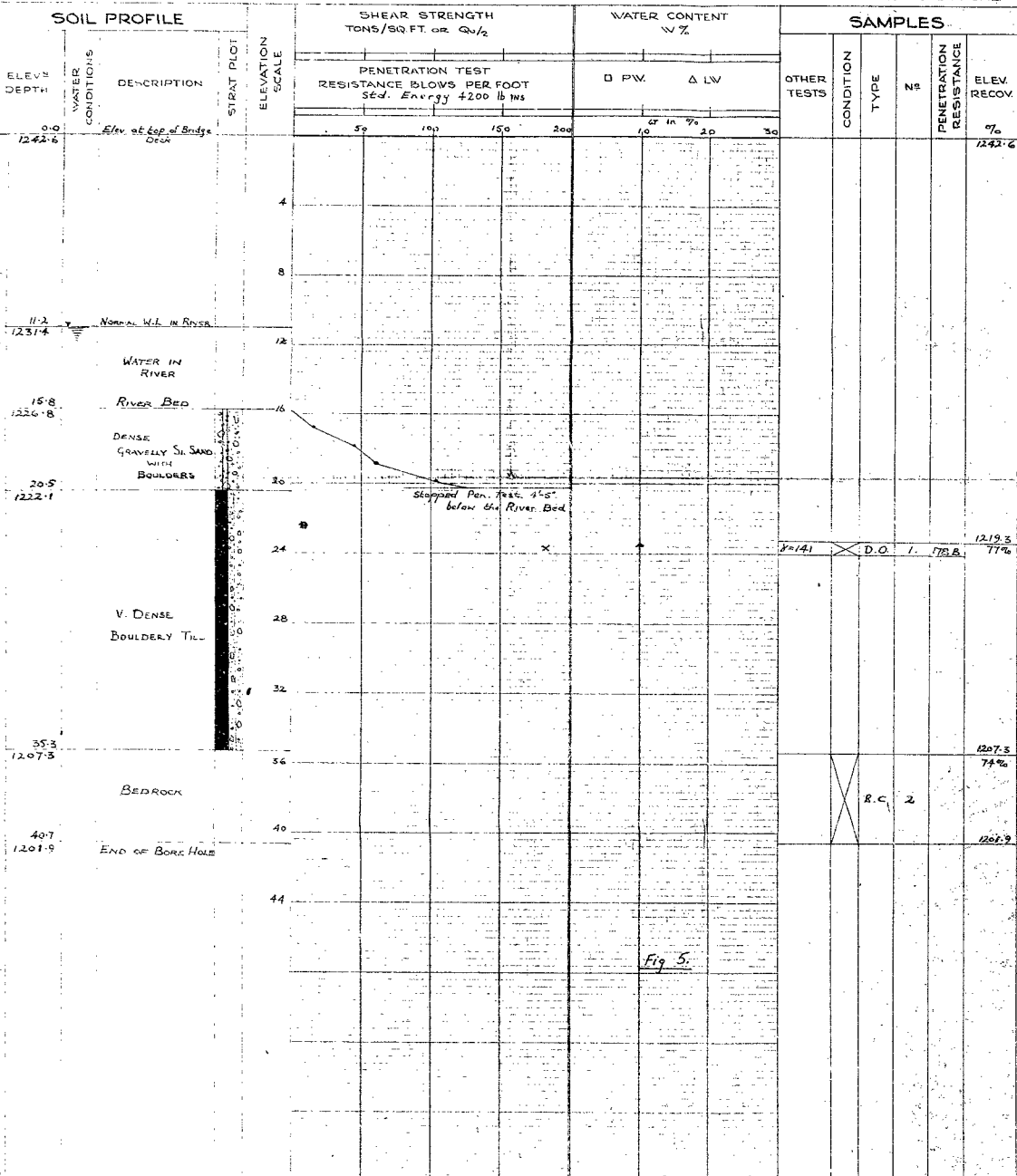
MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS - ONTARIO OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG #2 (1090) JOB F54-19 BORING NO. 5
CASING 3" BX (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM 71+13.5 (B.T. 100) Elev. 1242.6 DATE REPORT Dec 19, 1954
SAMPLER HAMMER WT 250 # DROP INCHES COMPILED BY S.T.B. CHECKED BY S.T.B. BORING DATE Dec 2nd 1954

SAMPLE CONDITION
DISTURBED
GOOD
LOST

SAMPLE TYPES
CS - CHUNK
DO - DRIVE OPEN
DF - DRIVE FOOT VALVE
TO - THIN WALLED OPEN
WS - WASHED SAMPLE
KC - ROCK CORE

ABBREVIATIONS
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C - CONSOLIDATION
CA - CASING
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL



CONC. PEN. TEST
X STD. PEN. TEST
A 1/2 IN. TO

34-90

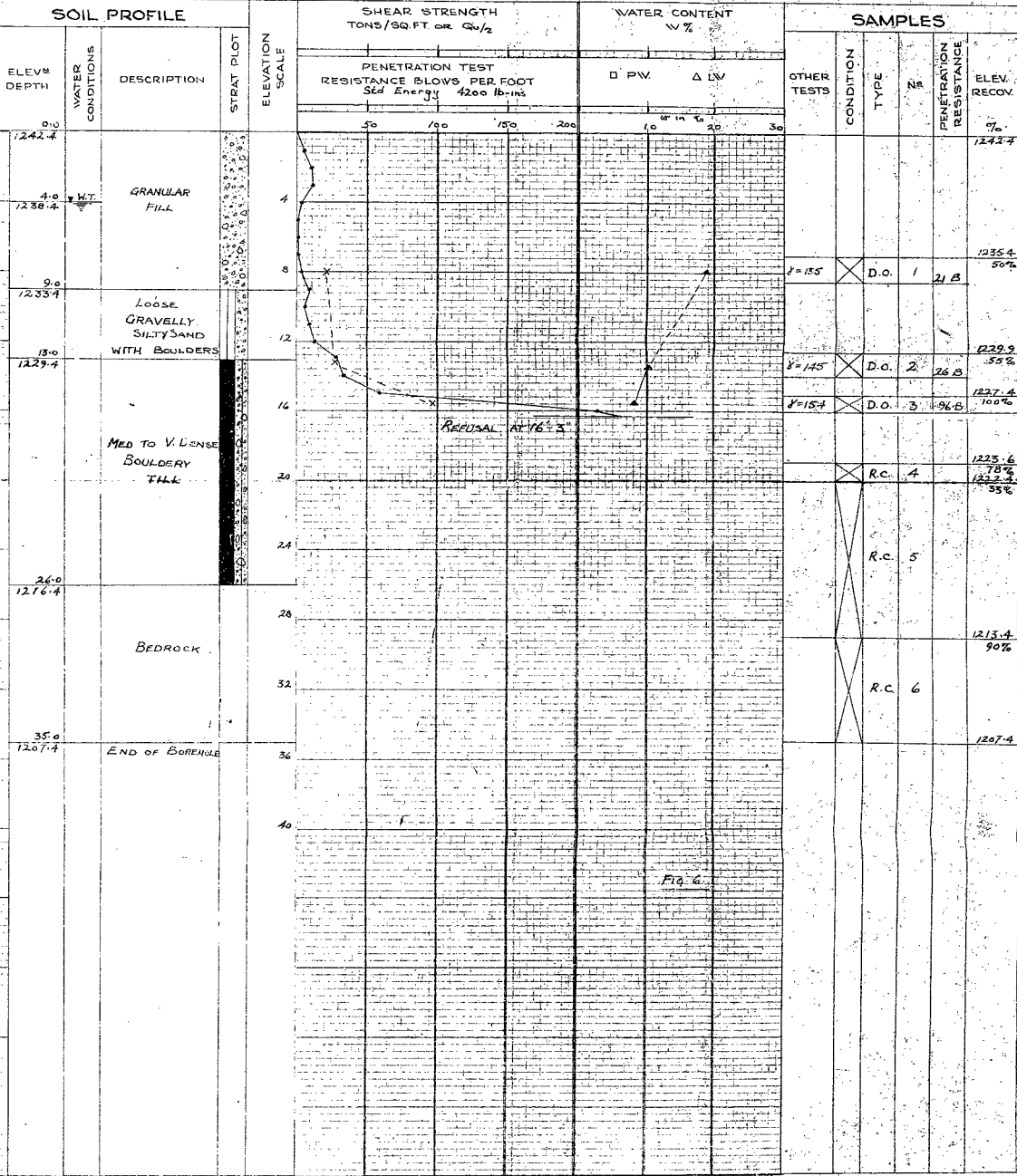
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DRILL RIG #2 (1090) JOB F54-19 BORING NO. 6
CASING 3" BX (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM 70+63.2 (B.T. 100) Elev. 1242.4 DATE REPORT Dec 5, 1954
SAMPLER HAMMER WT 250 # DROP INCHES COMPILED BY S.T.B. CHECKED BY S.T.B. BORING DATE Nov 18, 1954

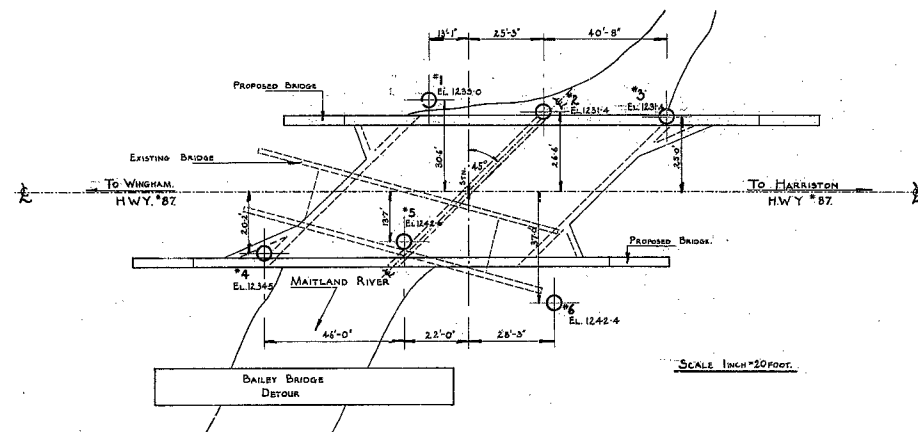
SAMPLE CONDITION
DISTURBED
GOOD
LOST

SAMPLE TYPES
CS - CHUNK
DO - DRIVE OPEN
DF - DRIVE FOOT VALVE
TO - THIN WALLED OPEN
WS - WASHED SAMPLE
KC - ROCK CORE

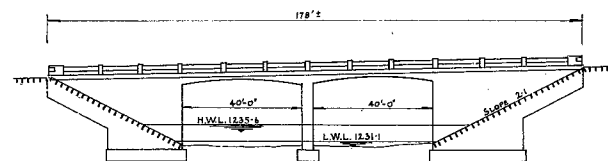
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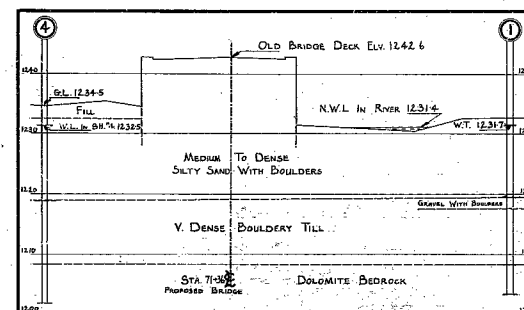
CONC. PEN. TEST
X STD. PEN. TEST
A 1/2 IN. TO



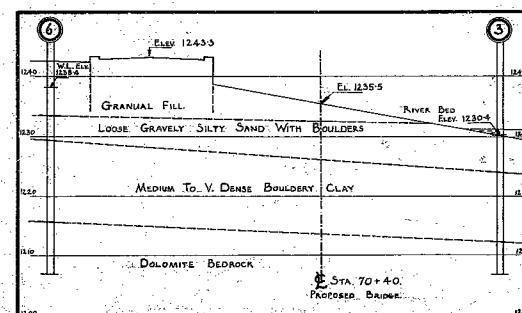
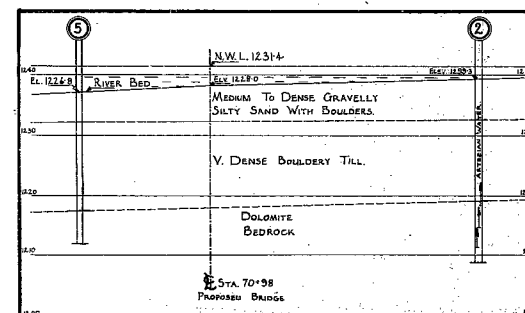
PLAN



ELEVATION



LEGEND
○ PEN. & BORE HOLE



CROSS-SECTIONS THROUGH BORE HOLES

SCALE: 1 INCH = 10 FEET

DEPARTMENT OF HIGHWAYS, ONTARIO

MAITLAND RIVER BRIDGE

THE KING'S HIGHWAY NO. 87 DIV. NO. 3
CO. WELLINGTON SCALE: AS SHOWN
TWP. MINTO LOT 29 EON IX

PLAN & SECTIONS THROUGH BOR. & PEN. HOLES

DRAWING NO. F-54-19A JOB NO. F-54-19
PLAN NO. 1 DATE: 12th JANUARY 1954
DRAWN BY: M.L.F. CHECKED BY:

40P15-1
GEORES No.



ONTARIO

DEPARTMENT OF HIGHWAYS

F 54-19

Memo to **Mr. H. Lament**

Date **February 4, 1935.**

Bridge Engineer.

Subject **Re: Foundation Investigation**

From **F. C. Brownridge, Mat. Laboratory, Toronto.**

Highway #87 at Matland River.

Attached is one copy of our report on the foundation investigation for the proposed bridge structure at the above location. One copy of this report has already been given to Mr. L. Lock for design purposes.

The following points covered in the report should be noted:

- (1) Protection should be provided for possible damage from scour.
- (2) Single span is recommended with spread footings and sheet pile protection on stream face.
- (3) If centre pier is necessary it should be founded on piles driven to bedrock.

FOR:HA

ATT:


F. C. Brownridge

Materials & Research Engineer.

Copies to: **Mr. John Walter,**
Mr. B. R. Heavyside,
Mr. C. Varentos. ✓

Report on
Investigation of Bridge Site
on
Highways #87 over Maitland River

Copies to: Mr. H. Lamont
Bridge Engineer (2)

Mr. J. Walter
Construction Engineer (1)

Project F-54-19

Mr. B. R. Heavysege
Division Engineer, Stratford (1)

Mr. G. Farantatos (1)

File (1)

INDEX

	<u>Page</u>
Introduction	1
Procedure	1
Soil Condition and Testing	1
Water Conditions	2
Analysis of Results and Recommendations	2
Conclusion	3
Appendix I	

Introduction

It is intended to construct a new bridge over the Maitland River on Highway #87 about 1.5 miles West of Harriston.

A subsurface investigation has therefore been carried out to determine the nature of the subsurface soil so that the most suitable footing method for the bridge might be determined.

Procedure

The subsurface investigation lasted from November 15th to December 3rd, 1954.

Six dynamic core penetration tests and six boreholes were done during the above time interval.

The location and log data of each borehole are shown on Plans F-54-19A and Appendix I respectively.

Soil Condition and Testing

Borehole #1 and #4 (West Abutment)

A layer of dense silty sand approximately 15 feet thick overlies a bed of very dense till with a variable thickness of 9-10 feet.

Standard penetration run on the silty sand and till gave a minimum number of blows for each of 25 and 80 respectively.

Below the above layers lies dolomite bedrock.

Borehole #2 and #5 (Center Pier)

A layer of medium to dense silty sand, approximately 6 feet thick, overlies a layer of bouldery till that is about 15 feet thick.

Standard penetration tests run on the sand and till indicate a number of blows for the sand and till of 25 and 60 respectively.

Borehole #2 and #5 (Center Pier)
(Cont.)

Below the above layer lies dolomite bedrock.

Boreholes #3 and #6

At Borehole #6 there is a 9 foot granular fill above silty sand 4.75 feet thick. Below this is a layer of very dense till of variable thickness, from 12 to 17 feet.

Standard penetration tests on the till gave a minimum number of blows per foot of 75.

Below the above layers is dolomite bedrock.

Water Conditions

(a) West Approach

The water table was observed in borehole 1 and 4 at elevation 1231.7 and 1232.5 respectively.

(b) Center Pier

Both boreholes 2 and 5 were drilled in the river. The normal water level at the time of exploration was 1231.4.

(c) East Approach

In borehole 6 the ground water was observed at elevation 1238.4.

Borehole number 3 was drilled in the river. Artesian water was observed in the borehole at elevation 1214.0.

High and low water, as given by the Department of Highways Survey Branch, was at elevation 1235.6 and 1231.0 respectively.

Analysis of Results and Recommendations

Classification tests of the material overlying the bedrock showed that the content of silt and sand is very high. As a result, heavy scouring should be expected on this area.

Analysis of Results and Recommendations (Cont.)

Standard penetration tests, used in accordance with the Terzaghi theory, indicate an allowable load of 2.5 tons on the very dense till.

It is suggested that west and east approaches be founded on spread footings brought at minimum elevations of 1218.0' and 1221.0' respectively.

An allowable load of 2.5 tons per square foot could be used. Steel sheet piling driven into the bedrock should be provided on the part of the footing, facing the river for protection against scouring.

If a better bearing load is desired the footings should be brought to rock, which lies at a depth of about 9 feet below the proposed footing level. The rock could be subjected to a load as high as 15 tons per square foot.

If the footings are founded on rock they should be dowelled there; no sheet piling is then necessary.

It is suggested that the center pier be taken off and a single span bridge be constructed instead. This will save excessive foundation costs for the bridge.

If a center pier must be used it should be supported on piles driven into the bedrock.

Conclusion

A single span bridge is suggested. Spread footings may be used for the ~~east~~^{west} and ~~west~~^{east} approach at minimum elevations of 1218.0' and 1221.0' respectively.

Conclusion (Cont.)

An allowable load of 2.5 tons per square foot for the till may be used.

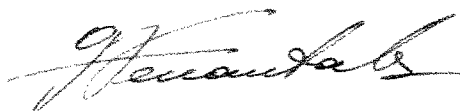
Steel sheet piling should be driven in front of the footings.

If, instead of using steel sheet piling facing spread footings, the bridge is founded directly on rocks, the permissible bearing load is about 15 tons per square foot.

If, for any reason of structure design or availability of material, a center pier must be constructed, it must be founded on short H-piles driven into the bedrock.

F. C. Brownridge
Materials & Research Engineer

Per:



(G. Parantatos)

DF:mr

APPENDIX I