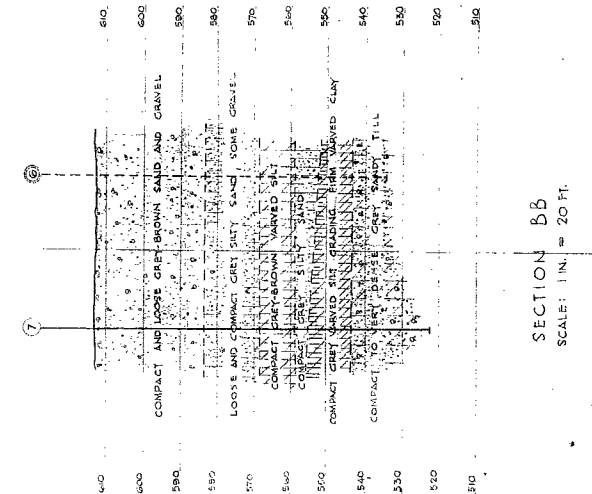
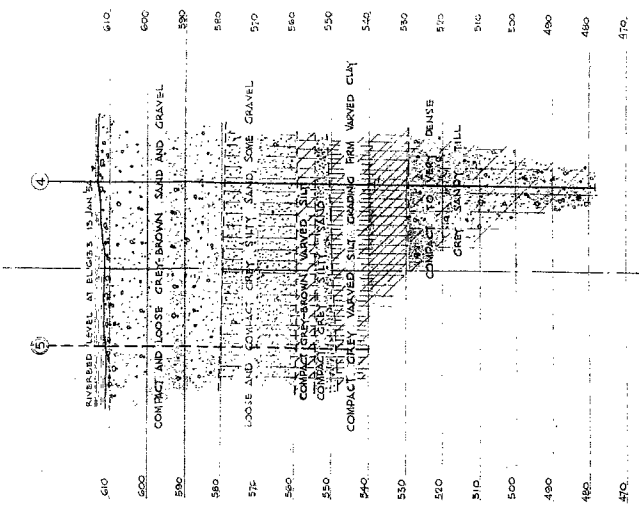
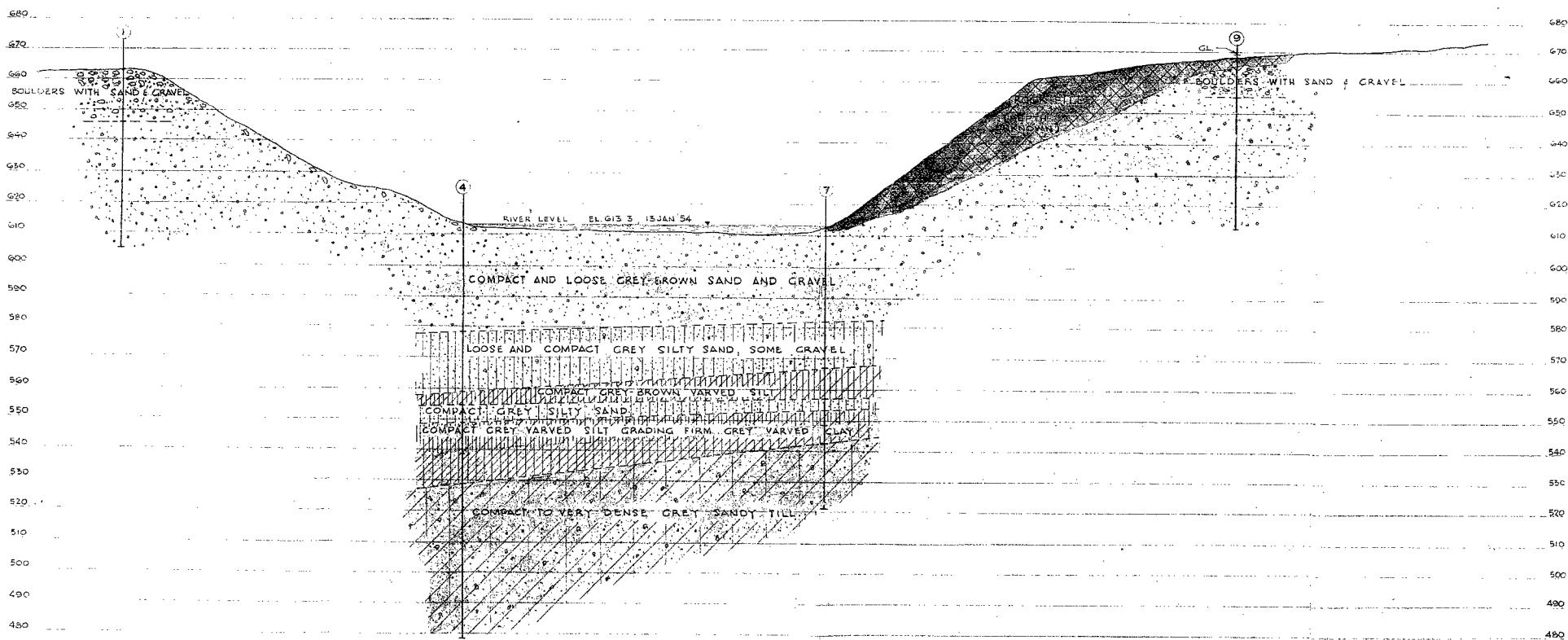
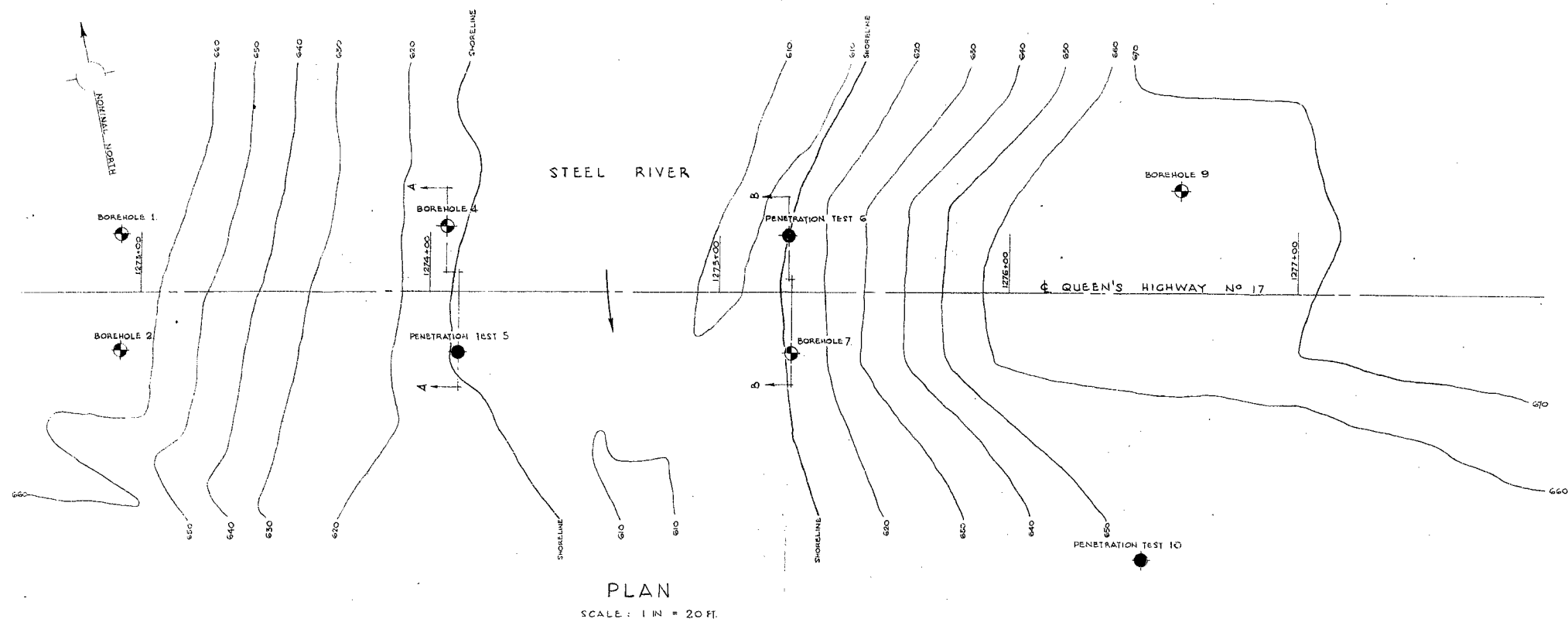


54-F-225C.

Hwy. #17

STEEL RIVER



- LEGEND:
- BOREHOLE IN PLAN
  - PENETRATION TEST IN PLAN
  - BOREHOLE IN ELEVATION
  - PENETRATION TEST IN ELEVATION

SPECIAL NOTE: THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE LOCATIONS. BETWEEN BOREHOLES THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE AND MAY BE SUBJECT TO QUOTE CONSIDERABLE ERROR.

REVISIONS			REVISIONS			REVISIONS			REFERENCE		SCALE AS SHOWN DATE MARCH 2 <sup>ND</sup> '54 MADE J.A. / M.A.M. CHKD. B.D.B. APPD. G.M.	ONTARIO DEPARTMENT OF HIGHWAYS TERRACE BAY ONTARIO STEEL RIVER BRIDGE HIGHWAY N <sup>O</sup> 17 PLOT PLAN AND SOIL STRATIGRAPHY	FOUNDATION COMPANIES CANADA <i>Engineering - Construction</i> No. T1012-C-1
MARK	DATE	DESCRIPTION	MARK	DATE	DESCRIPTION	MARK	DATE	DESCRIPTION	DWG. NO.	DESCRIPTION			
									E2725-1	ONTARIO DEPT. OF HIGHWAYS SITE PLAN / PROFILE			

54 F 225C

1012

REPORT

TO

ONTARIO DEPARTMENT OF HIGHWAYS

ON

SOIL CONDITIONS

STEEL RIVER BRIDGE

TERRACE BAY, ONTARIO

**Distribution -**

2 copies	Ontario Department of Highways, Toronto, Ontario.
2 copies	The Foundation of Canada Engineering Corporation, Limited.
2 copies	Geotechnical Services.

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Appendix II     Photographs

Drawing in Pocket at rear -

T1012-C-1   Plot Plan and Soil Stratigraphy

## INTRODUCTION

The Foundation of Canada Engineering Corporation, Limited has been retained (proposal dated January 11th, 1954, and accepted on January 14th, 1954) by the Ontario Department of Highways to investigate the soil conditions at the site of the proposed new bridge, which is to carry King's Highway #17 across the Steel River.

The purpose of the investigation was to obtain all the information on the soil conditions, required for safe and economical design of the proposed bridge foundations. This factual information is here reported in detail.

## SITE AND GEOLOGY

The site is located on the north shore of Lake Superior, about 17 miles east of Terrace Bay, Ontario, where King's Highway #17 crosses the Steel River. It is part of a small fan-shaped "sand plain" which at the bridge site has an approximate width of 1100 feet and a surface elevation of about 662. On each side, the plain is bounded by irregular rock outcrops. The Steel River lies at the bottom of a small gorge cut into this sand plain, with the existing river bed at about elevation 610.

From the general geological knowledge of the area, it is known that this area was formerly part of the lake bed of the glacial Lake Algonquin. The sand plains left by the receding waters consist predominately of bedded varved silts, sands and gravels. It is also known that the elevation of the bedrock surface is very irregular.

The upper coarse grained materials encountered by the borings are all substantially rounded, (see Photo #1 of Appendix II), which indicates that these deposits are of fluvio-glacial origin and were probably laid down as a delta of a glacial stream or river flowing into Lake Algonquin.

## FIGURE

Three test pits, four borsholes with penetration tests, and four separate penetration tests were made at the locations of the proposed piers and abutments. The locations of the borings and the inferred soil stratigraphy are shown on Drawing No. T1012-C-1 in pocket at rear.

## PROCEDURE (Continued)

The samples taken were sent to the Soils Laboratory for testing and identification. The boring logs and test results are shown on the Office Reports on Soil Exploration in Appendix I.

## SOIL CONDITIONS

The soil stratigraphy inferred from the borings is shown on Drawing No. T112-C-1. The principal soil strata encountered are as follows -

### Boulders, Sand and Gravel

The uppermost stratum on the west bank consists predominately of well rounded boulders with the interstices filled with dense brown sand and gravel. The boulder sizes are in general between 6" and 12" in diameter. To penetrate and sample this material, test pits of up to 7 feet in depth had to be made. The thickness of the stratum varies between 12 and 16 feet, with a decrease of boulder content with depth.

On the east bank, this stratum is about 14 feet thick, and fewer boulders were encountered by the boring. Overlying the natural ground on the east bank for the approximate width of the roadway is a rock fill. This fill was made in 1935 and its thickness is not known.

Photo #1 of Appendix II shows a section through this deposit at a borrow pit a short distance east of the bridge site.

### Loose and Compact Sand and Gravel

Underlying the boulder stratum is a grey-brown sand and gravel, containing sand lenses and occasional boulders. The density of the stratum is somewhat erratic, with "N" values ranging from 3 to 30. The boring records also indicate that the gravel and boulder content decreases with depth until the bottom of the deposit is composed entirely of sand. The variations in the density are probably due to both the stratifications and boulder content.

Boreholes #2 and #9 were stopped at elevations 606 and 612 respectively and were still in this stratum. Boreholes #4 and #7 were located at the bottom of the river banks and were carried below this stratum, which extended to about elevation 580.

**Loose and Compact Sar-1 and Gravel (Continued)**

From elevations 513 to 584 in both Boreholes #4 and #7 traces of organic matter were found mixed with the sand and gravel. Between elevations 590 and 583 in Borehole #7, a considerable amount of organic matter consisting of rotting roots, vegetation, and twigs was found. This may be due to the scouring action of the river.

**Compact Silty Sand**

The sand and gravel stratum is underlain by a compact grey silty fine and medium sand containing layers of silt and occasional gravel pieces. The layer has an "N" value, generally between 10 and 16, with the exception of a small pocket of loose material with a value of 3 at about elevation 578 in #7. The sand becomes considerably siltier with depth and in places is horizontally stratified with 1/4" layers of silt alternating with 1" layers of silty, fine sand. The thickness of the stratum varies between 15 and 20 feet.

**Compact Varved Silt**

Underlying the silty sand is a stratum of compact grey to grey-brown varved silt with firm grey-brown silty clay varves varying between 1/8" and 5" in thickness. The total thickness of the layer is about 4-1/2 feet at Borehole #4 and 10 feet at Borehole #7. Owing to the limited thickness of the stratum only a few standard penetration results were obtained. They indicate an "N" value of not less than about 10.

**Compact Silty Sand**

The varved silt is underlain by a grey silty fine and medium sand with occasional pieces of gravel. The density is generally compact with an "N" value of about 12. The stratum is generally horizontally stratified with layers of fine and medium silty sand containing occasional thin seams of silt, and has a total thickness of about 4 feet.

## SOIL CONDITIONS (Continued)

4.

### Varved Silt and Clay

Underlying the silty sand is a stratum of grey-brown varved silt and clayey silt which grades with depth to a grey varved silty clay. The former layer comprises the upper 6 to 12 feet of this stratum and is compact with an average "N" value of about 15. A 14" layer of firm grey clay with thin (1/16") seams of fine and medium sand was encountered within the above stratum at about elevation 547.

The lower part of this stratum is a firm to stiff grey varved silty clay with a trace of sand. It varies in thickness between 5 and 9 feet at Boreholes #7 and #4 respectively.

### Dense Sandy Till

A compact to very dense grey sandy till lies beneath the varved silt and clay. In Boreholes #4 and #7, the top of this stratum was at elevations 529 and 544, and was penetrated for 50 and 24 feet respectively. The gravel and boulder content and the density of the till increases with depth. In Borehole #4, it was necessary to resort to diamond drilling to advance the hole below elevation 494.

## WATER CONDITIONS

At the start of operations, ice level was at about elevation 614.5 with an approximate ice thickness of 9". Subsequently, the water level fell to about elevation 611.

Information taken from Department of Highways drawing E-2725 indicates that normal water level is about elevation 612. Local evidence confirmed by long-term residents indicates a probable extreme high water stage of about elevation 620. This gives a maximum rise of water level during flood stages of 8 feet.

## LABORATORY TESTS

Owing to the limited thickness of the cohesive strata encountered by the borings, only a few laboratory tests were carried out on the samples from Borehole #4 for the purposes of identification and description. The results for these tests are plotted on the Office Report given in Appendix I.



**LABORATORY TESTS (Continued)**

All these tests were carried out on samples of the varved silt and clay and indicate liquid and plastic limits of 42% and 16% respectively; unconfined compressive strengths of 0.5 and 1.2 tons per square foot; unit weights of 115 and 124 lbs. per cubic foot; and water contents varying between 20% and 35%.

**PERSONNEL**

The site work was carried out by the Geotechnical Services Division of Geocon Limited under the direction of Dr. G. G. Meyerhof of Foundation of Canada Engineering Corporation, Limited.

The field work was supervised by Mr. M. A. J. Matich, with driller foreman M. R. Lipsett. The report was written by Mr. M. A. J. Matich and checked by Mr. B. D. Benedict and Mr. J. Morgan.

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FO

*Burn D. Benedict*  
BURN D. BENEDICT,  
P. Eng.

**APPENDIX I**

**OFFICE REPORTS ON SOIL EXPLORATION**

## **EXPLANATION OF THE FORM "OFFICE REPORT ON SOIL EXPLORATION"**

It is the practice of The Foundation Company of Canada Limited to report boring results on Form C-149, entitled "Office Report on Soil Exploration". The object of this form of record is to combine all of the information which is gathered through the boring on one sheet of paper so that it will be possible, by reference to this sheet, to make a careful and complete study of the soil as disclosed by that particular boring. An explanation of the various columns of the report follows. They will be referred to as Columns 1 to 12. Note that Columns 1 to 4 inclusive are entitled "Soil Profile", Column 5 is entitled "Elevation Scale", Column 6 is the main body of the form in which results are presented in graphical form and Columns 7 to 12 have the caption "Samples".

### **COLUMN 1 — ELEVATION AND DEPTH OF BOUNDARIES**

In this column are shown the elevation and the depth of important boundaries between the various soil strata. The elevation is shown above the line and the depth below the floor of the drilling platform is shown below the line. The datum to which the elevation refers is shown in the general heading of the form.

### **COLUMN 2 — WATER CONDITIONS**

In this column the water level or water table is indicated to scale by a horizontal line in the appropriate location with the symbol W.L. or W.T. above the line. A distinction is made between water level and water table. The water level merely refers to the level of the water standing in the boring or standpipe. If there is no indication of the date on the form, then it will be the date on which the boring is made. The depth of the porous stone, or perforated section of the observation well, or the depth of the boring and casing at the time of water level observation, whichever applies, is also shown. The water table refers to what is believed to be the true water table in the soil on the date shown, based on results of a series of water level observations. Where there are complicated groundwater conditions, some notation on this will also be made in this Water Conditions column.

### **COLUMN 3 — DESCRIPTION**

In the third column is shown a description of the soil. This description follows the standard terminology laid down in The Foundation Company of Canada Limited Circular No. 1102. Some of the most significant points of this terminology are as follows: "Clay" is always used to refer to material which displays an appreciable amount of plasticity. "Silt" is used to characterize a material finer than fine sand which shows very little or no plasticity but which shows a rapid response to the shaking test. "Till" is used to refer to a material which includes all grain sizes from clay size to boulder size. The term "Clay Till" is used when a till has considerable cohesion and "Sandy Till" or "Silty Till" when the till as a mass displays the properties of a sand or silt. Colours are referred to the colour standards of the U.S. Department of Agriculture.

Terms describing the consistency of cohesive soils are related to unconfined compressive strength in tons per square foot as follows:

Semi-liquid	— below 0.03
Very soft	— 0.03 to 0.25
Soft	— 0.25 to 0.5
Firm	— 0.5 to 1.0
Stiff	— 1.0 to 2.0
Very stiff	— 2.0 to 4.0
Hard	— over 4.0

Terms describing the relative density of non-cohesive soils are related to the penetration resistance of the 2" drive sampler as follows:

Very loose	— 0 to 4
Loose	— 4 to 10
Compact	— 10 to 30
Dense	— 30 to 50
Very dense	— over 50.

#### **COLUMN 4 — STRATIGRAPHIC PLOT**

The stratigraphic plot, Column 4, follows the standard symbols of the National Research Council, Canada.

#### **COLUMN 5 — ELEVATION SCALE**

The information in all columns is plotted to a true scale of elevation which is shown in this Column (No. 5). It is usually made so that one small square of Column 6 represents either a foot or half a foot.

#### **COLUMN 6 — GRAPHS**

The main body of the report forms a graph which is used to plot to correct depth scale the important soil properties which are obtained through field and laboratory tests. The scales and symbols for the plotting are shown at the head of the column.

The first scale shown there is not filled in on the printed form but is usually used for the strength of the soil as determined either through unconfined compression, vane, or other strength tests.

The next scale is water content which is given in percent by weight of the dry solids in the soil. Using different symbols, there is shown on the graph the natural moisture content by an open circle, the liquid limit by an open square and the plastic limit by an open triangle. A line is drawn between the liquid and the plastic limits, as the length of this line represents the plasticity index.

The lowest scale is the penetration test resistance in blows-per-foot. The penetration test is performed using a conical point of 2" diameter with a sixty degree cone. The point

is fastened to a diamond-drill rod and driven into the ground several feet from the location of the boring. The blows-per-foot are recorded and each record is shown on the plot by a cross. A dotted line is drawn between these crosses. The hammer used for this test may weigh either 50, 140, 380 or 520 pounds. Nevertheless, whatever the weight of the hammer, the number of blows per foot is converted to an equivalent number of blows of 4200 inch-pounds of energy. It is this equivalent number of blows which is plotted on the graph. It has been our experience that, except for soft or very loose soils, the weight of the hammer used influences the results obtained only to a minor extent.

#### **COLUMN 7 — OTHER TESTS**

In this column are shown, by symbol, the other field or laboratory tests which have been performed on the soil and for which the results have not been plotted graphically in Column 6. The symbols used for this column are shown at the head of the form under the abbreviations.

#### **COLUMNS 8, 9 AND 10 — SAMPLES**

These columns describe the samples obtained from the boring. Column 10 gives the number of the sample, Column 9 the type and Column 8 the condition. The meaning of the symbols used for type and condition is shown at the head of the report. The symbols for condition of sample are made to correspond in a vertical scale with the location of the sample.

#### **COLUMN 11 — PENETRATION RESISTANCE**

In Column 11 is shown the penetration resistance in blows of 4200 inch-pounds required to drive one foot of the sampler into the ground. These blows-per-foot have been converted in the same way as those of the penetration test.

In the field, the penetration resistance is recorded for every 6 inches on the 2-inch Drive Sampler. The figure which is recorded in Column 11 is usually the sum of the resistances for driving the second and third increments of the sampler into the ground. For the thin-walled sampler, the penetration resistance is recorded in the field for each foot. Thus a single figure shown in Column 11 is usually an average.

When greatly different results are obtained for driving different increments of the same sample, then two or more figures are shown in Column 11. Such a series of figures does not necessarily represent the blows for successive feet but it does indicate the variation in penetration resistance measured as a rate of number of blows per foot.

The symbol "R" for refusal means that under 20 or more blows the advance was less than  $\frac{1}{8}$  inch.

#### **COLUMN 12 — ELEVATION AND RECOVERY**

In this column is shown for each sample the elevation of the top of the sample and the percentage recovery.

## OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG. MACHINE JOB T 012 BORING # 1  
 CASING BX (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM GROUND SURFACE DATE REPORT 25 FEB '54  
 SAMPLER HAMMER WT. 380 DROP 15 INCHES COMPILED BY J.A. CHECKED BY M.A.M. BORING DATE 16 FEB '54

## SAMPLE CONDITION



DISTURBED  
 FAIR  
 GOOD  
 LOST

## SAMPLE TYPES

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

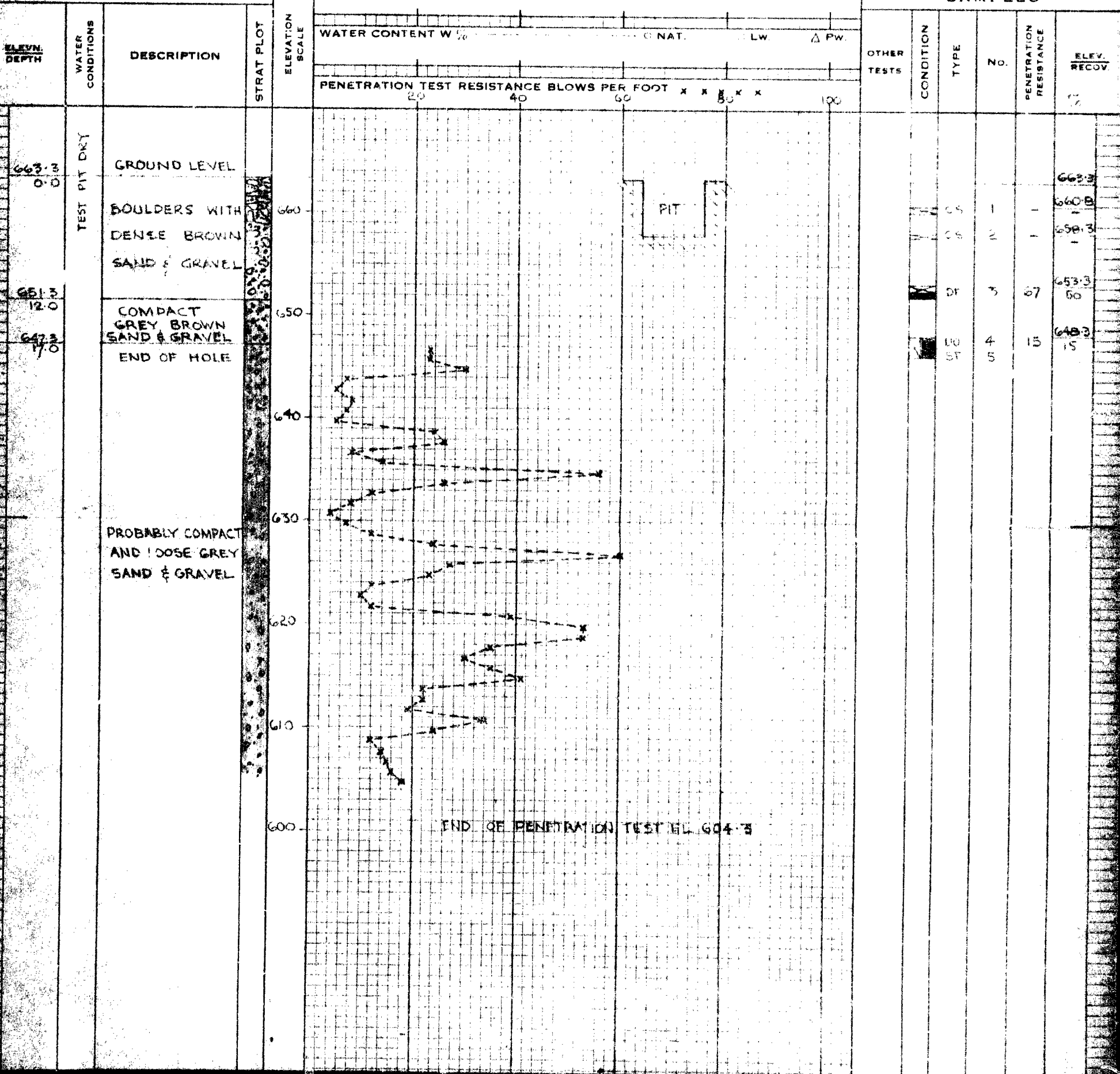
F.S. - FOIL SAMPLE  
 B.A. - BARREL AUGER  
 S.A. - SPIRAL AUGER  
 W.S. - WASHED SAMPLE  
 R.C. - ROCK CORE

## ABBREVIATIONS

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

## SOIL PROFILE

## SAMPLES



## OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG. MACHINE JOB T 1012 BORING # 2  
 CASING BX (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM GEODETIC DATE REPORT 25 FEB '54  
 SAMPLER HAMMER. WT. 380 DROP 15 INCHES COMPILED BY JA CHECKED BY MAJW BORING DATE 15 FEB '54

## SAMPLE CONDITION



DISTURBED  
 FAIR  
 GOOD  
 LOST

## SAMPLE TYPES

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

F.S. - FOIL SAMPLE  
 B.A. - BARREL AUGER  
 S.A. - SPIRAL AUGER  
 W.S. - WASHED SAMPLE  
 R.C. - ROCK CORE

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 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

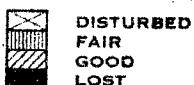
## SAMPLES

ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	WATER CONTENT $W_{\%}$			PENETRATION TEST RESISTANCE BLOWS PER FOOT			OTHER TESTS	CONDITION	TYPE	No.	PENETRATION RESISTANCE	ELEV. RECOV.
					NAT.	LW.	Δ PW.	20	40	60	80	100				
661.6 0.0	TEST PIT DRY.	GROUND LEVEL		660												661.6
		BOULDERS WITH DENSE BROWN SAND & GRAVEL		650									CS	1	-	658.6
													CS	2	-	656.6
645.6 16.0				640									DF	3	78	646.6 20
				630									DF	4	22	641.6 35
				620									DF	5	10	636.6 25
		COMPACT & LOOSE GREY BROWN SAND & GRAVEL		610									DF DO	6 7	3	631.1 0
													DF ST	8 9	7	626.6
				600									DF ST	10 11	16	621.6 0
604.6 57.0		END OF HOLE											DF	12	20	611.6 35
													DF	13	17	606.6 65

## OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG \_\_\_\_\_ MACHINE \_\_\_\_\_ JOB \_\_\_\_\_ T 1012 BORING / 4  
 CASING 4" & BX (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM GEODETIC DATE REPORT 25 FEB 1964  
 SAMPLER HAMMER WT. 380 f DROP 16 INCHES COMPILED BY JA CHECKED BY M.A.J.M. BORING DATE JAN 22 1964

## SAMPLE CONDITION



## SAMPLE TYPES

C.S. - CHUNK  
 D.O. - DRIVE-OPEN  
 D.F. - DRIVE-FOOT VALVE  
 D.P. - DRIVE PISTON  
 T.O. - THIN WALLED OPEN  
 T.P. - THIN WALLED PISTON  
 F.S. - FOIL SAMPLE  
 B.A. - BARREL AUGER  
 S.A. - SPIRAL AUGER  
 W.S. - WASHED SAMPLE  
 R.C. - ROCK CORE

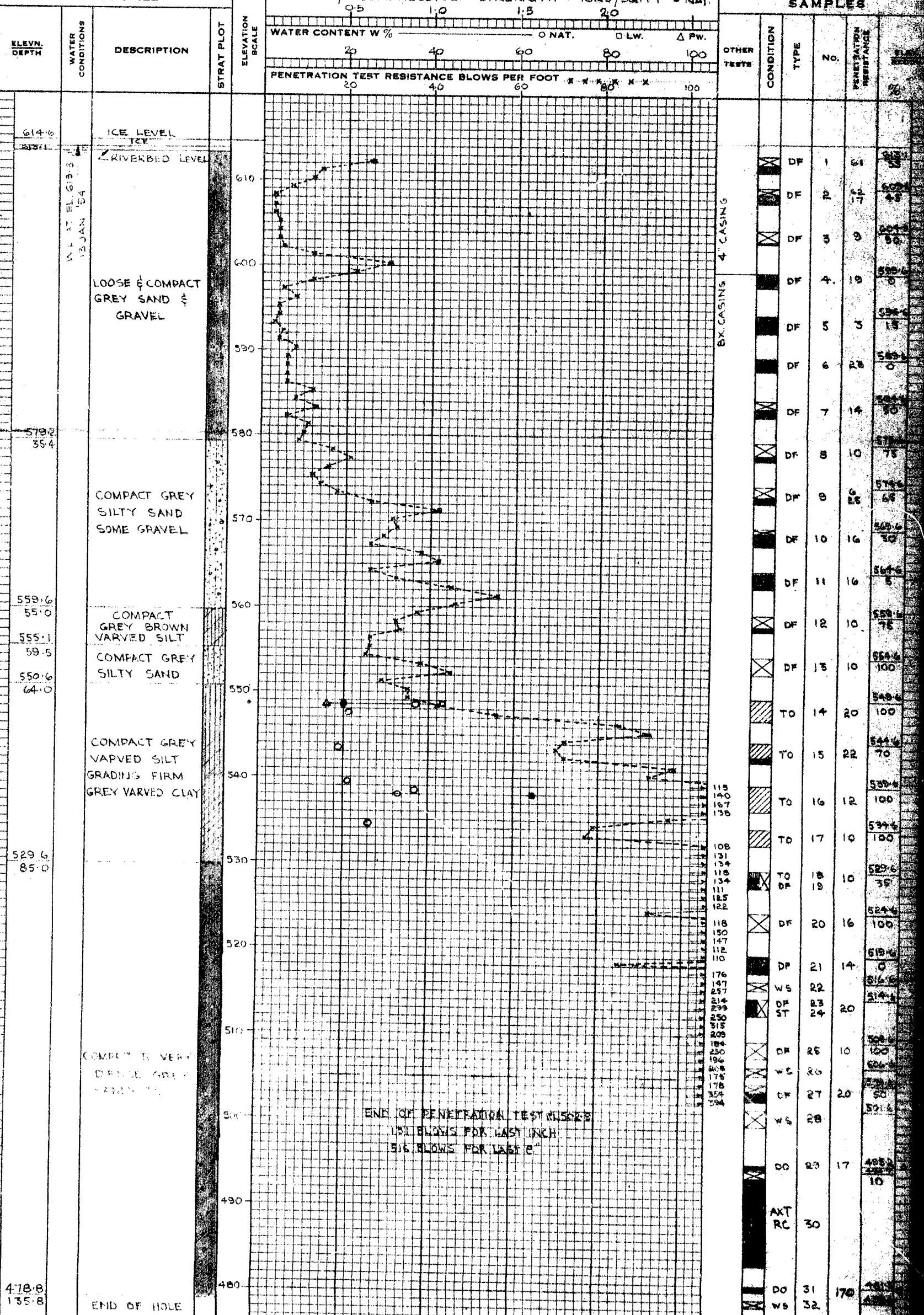
## ABBREVIATIONS

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

## SOIL PROFILE

U-TEST, COMPRESSIVE STRENGTH TONS/SQ. FT. • NAT.





## SAMPLES

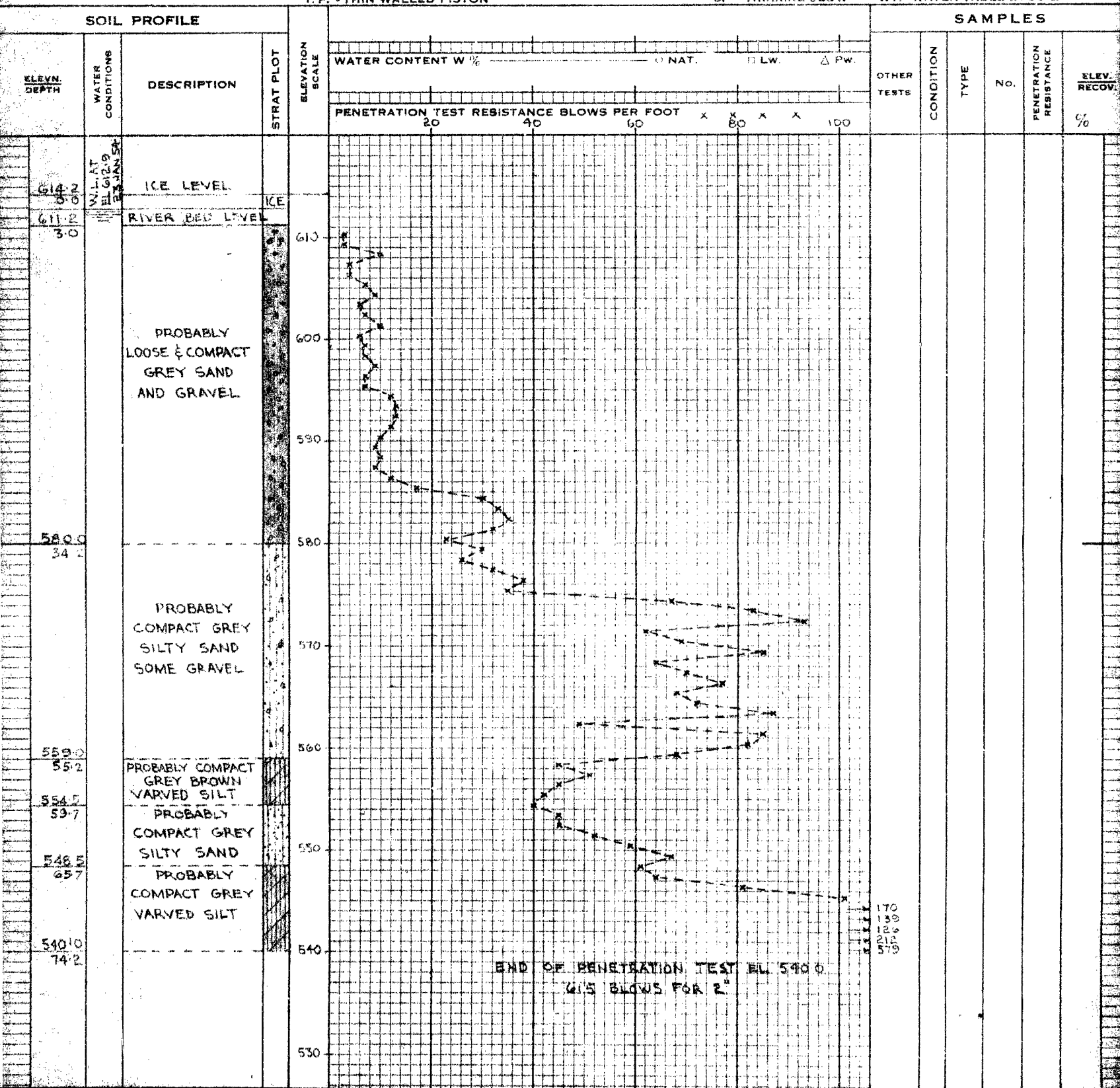




## OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG. \_\_\_\_\_ MACHINE \_\_\_\_\_ JOB \_\_\_\_\_ T 1012  
 CASING \_\_\_\_\_ (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM \_\_\_\_\_ GEODETIC \_\_\_\_\_ DATE REPORT 25 FEB '54  
 SAMPLER HAMMER WT. 350 DROP 16 INCHES COMPILED BY J.A. CHECKED BY M.A.J.M. BORING DATE 23 JAN 54

SAMPLE CONDITION		SAMPLE TYPES		ABBREVIATIONS	
	DISTURBED	C.S. - CHUNK	F.S. - FOIL SAMPLE	V. - IN-SITU VANE SHEAR TEST	γ. - UNIT WEIGHT
	FAIR	D.O. - DRIVE-OPEN	B.A. - BARREL AUGER	M. - MECHANICAL ANALYSIS	K. - PERMEABILITY
	GOOD	D.F. - DRIVE-FOOT VALVE	S.A. - SPIRAL AUGER	U. - UNCONFINED COMPRESSION	C. - CONSOLIDATION
	LOST	D.P. - DRIVE PISTON	W.S. - WASHED SAMPLE	QC. - TRIAXIAL CONSOLIDATED QUICK	CA. - CASING
		T.O. - THIN WALLED OPEN	R.C. - ROCK CORE	Q. - TRIAXIAL QUICK	WL. - WATER LEVEL IN CASING
		T.P. - THIN WALLED PISTON		S. - TRIAXIAL SLOW	WT. - WATER TABLE IN SOIL



## OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG. MACHINE JOB T 1012 PENETRATION 6  
 CASING - (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM GEODETIC DATE REPORT 25 FEB 54  
 SAMPLER HAMMER WT. 380 DROP 16 INCHES COMPILED BY JA CHECKED BY MA BORING DATE 29 JAN 54

## SAMPLE CONDITION



DISTURBED  
 FAIR  
 GOOD  
 LOST

## SAMPLE TYPES

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

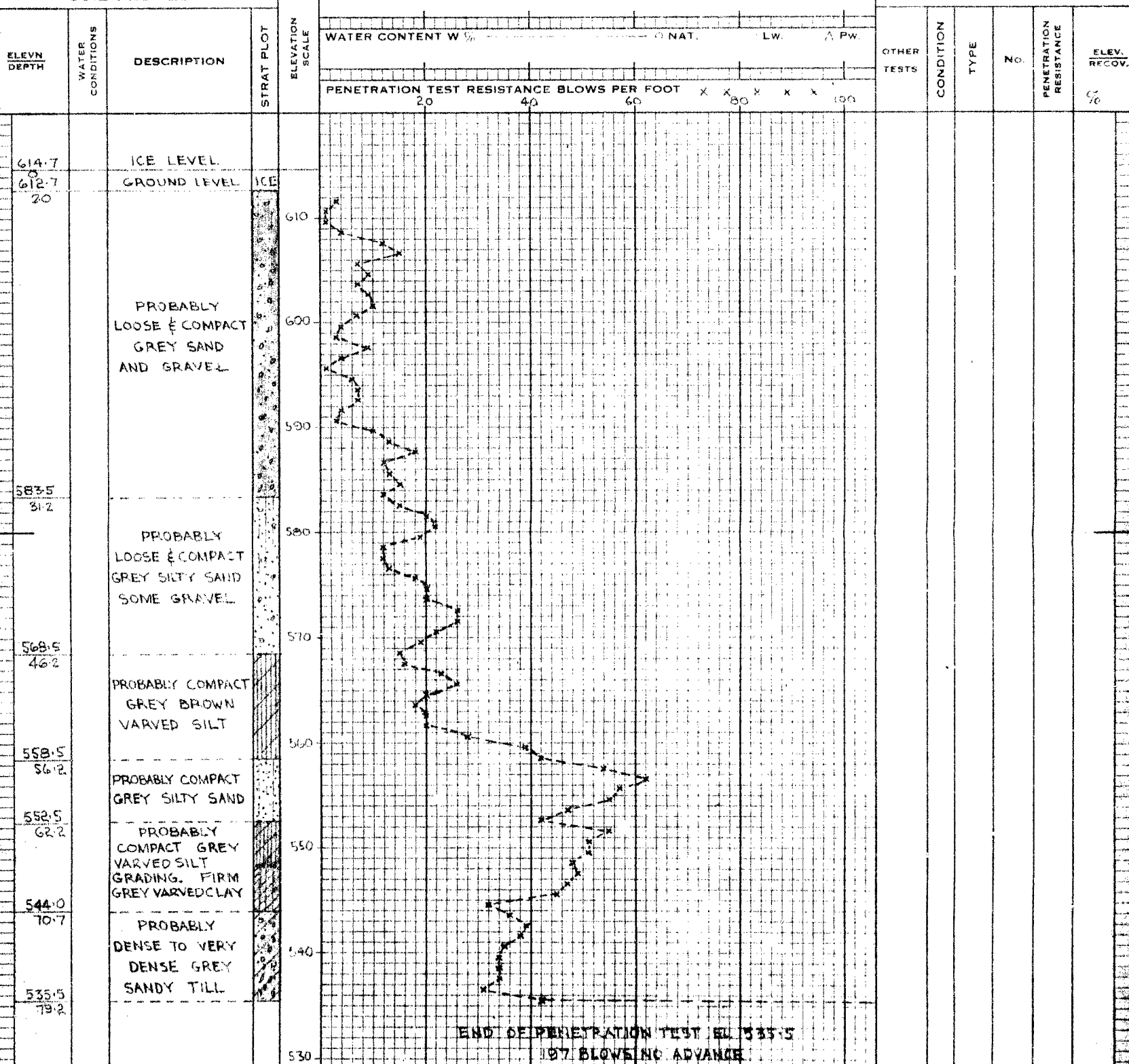
F.S. - FOIL SAMPLE  
 B.A. - BARREL AUGER  
 S.A. - SPIRAL AUGER  
 W.S. - WASHED SAMPLE  
 R.C. - ROCK CORE

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 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

## SAMPLES



## OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG \_\_\_\_\_ MACHINE \_\_\_\_\_ JOB \_\_\_\_\_ T. 1012 BORING # 7  
 CASING \_\_\_\_\_ BX (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM \_\_\_\_\_ GEODETIC DATE REPORT 25 FEB '54  
 SAMPLER HAMMER WT. 380 # DROP 16 INCHES COMPILED BY J.A. CHECKED BY M.A.J.N. BORING DATE 2 FEB '54



## SAMPLE CONDITION

DISTURBED  
FAIR  
GOOD  
LOST

## SAMPLE TYPES

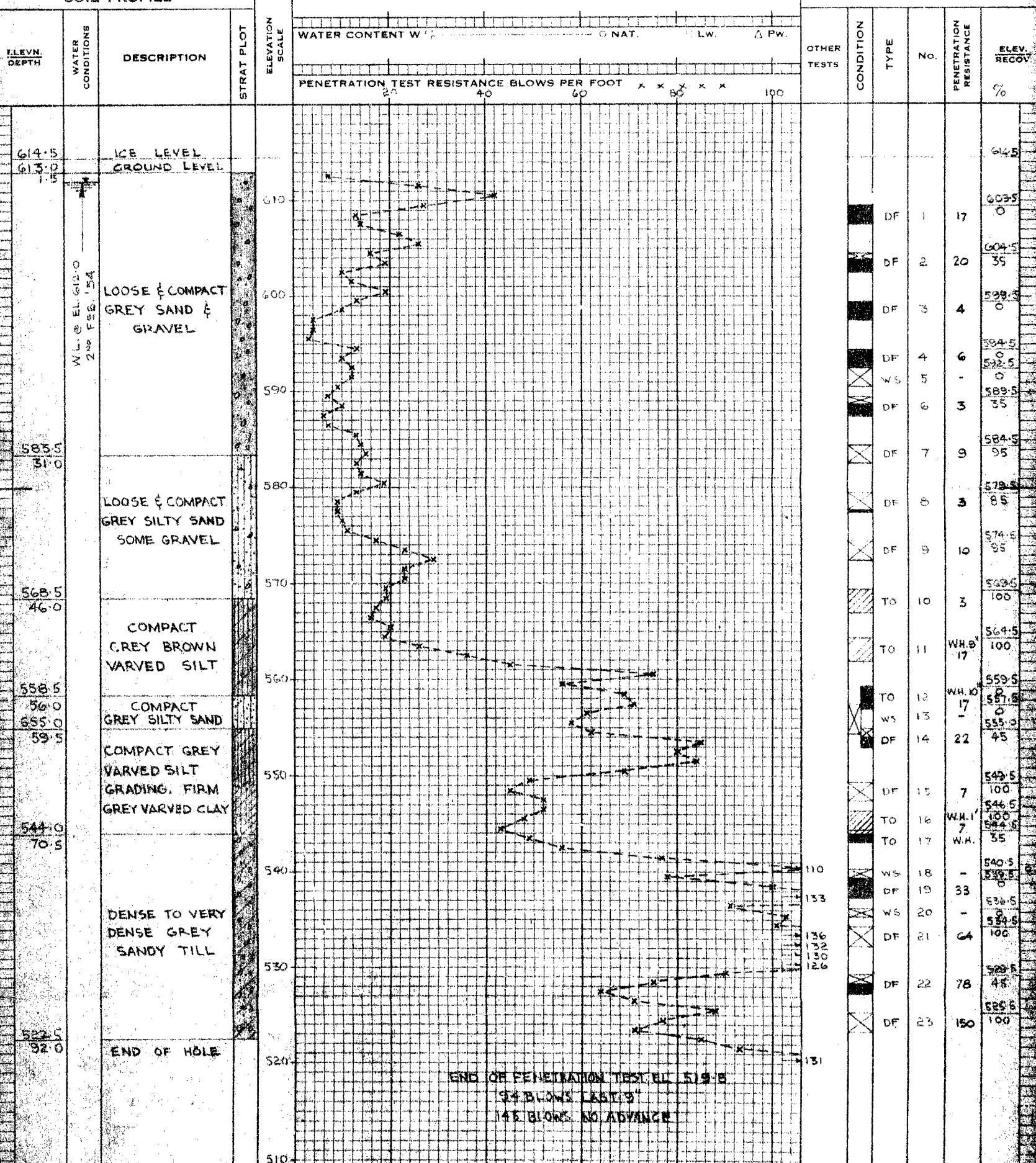
C.S. - CHUNK  
D.O. - DRIVE-OPEN  
D.F. - DRIVE-FOOT VALVE  
D.P. - DRIVE PISTON  
T.O. - THIN WALLED OPEN  
T.P. - THIN WALLED PISTON  
F.S. - FOIL SAMPLE  
B.A. - BARREL AUGER  
S.A. - SPIRAL AUGER  
W.S. - WASHED SAMPLE  
R.C. - ROCK CORE

## ABBREVIATIONS

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





## SOIL PROFILE

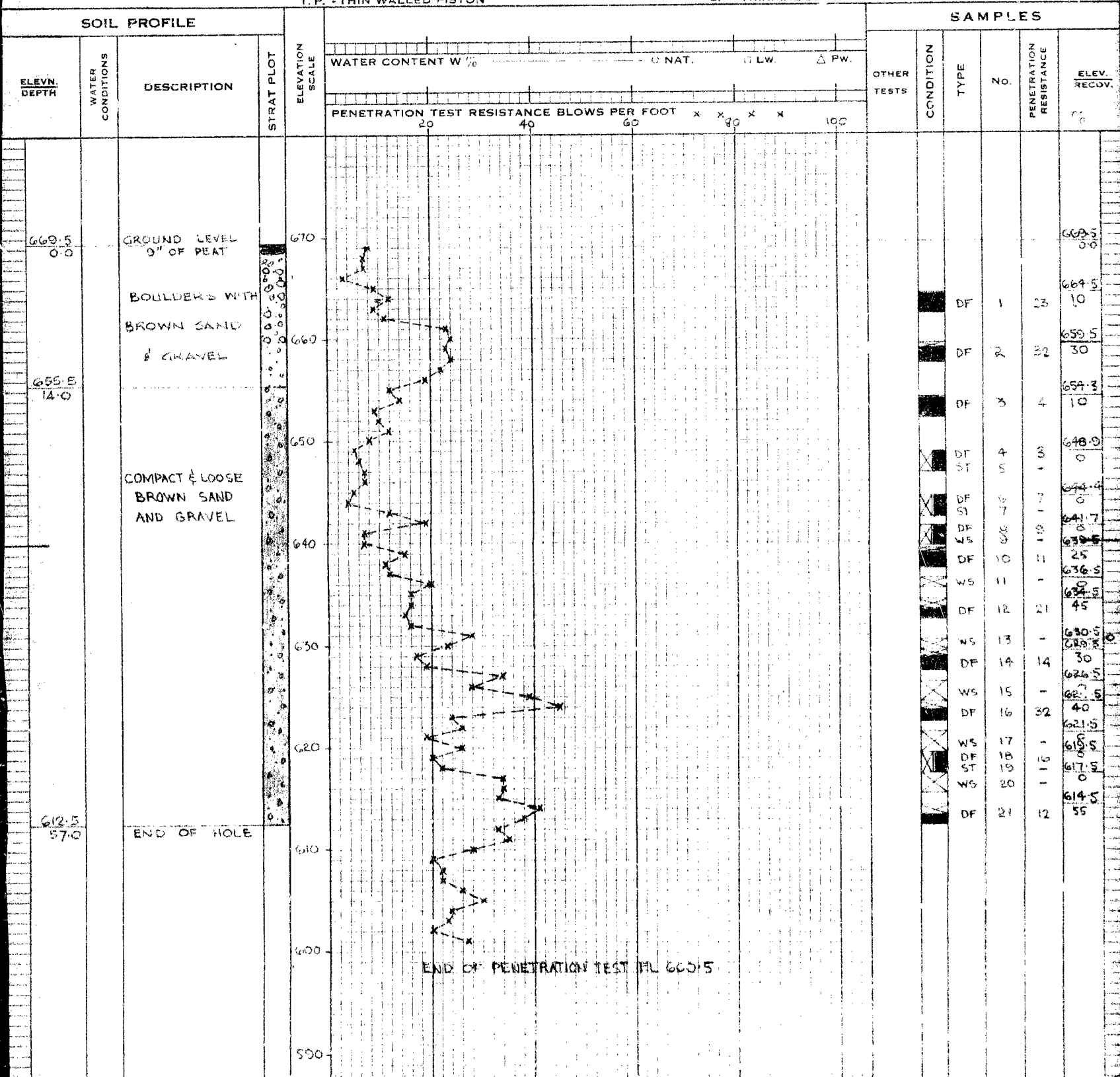
## SAMPLES



## OFFICE REPORT ON SOIL EXPLORATION





DRILL RIG MACHULP JOB TIDE BORING 3  
 CASING BX (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM GEODETIC DATE REPORT 23 FEB 54  
 SAMPLER HAMMER WT. 380 DROP 15 INCHES COMPILED BY JA CHECKED BY MA-M BORING DATE 18 FEB 54

SAMPLE CONDITION		SAMPLE TYPES			ABBREVIATIONS	
	DISTURBED	C.S. - CHUNK	F.S. - FOIL SAMPLE	V. - IN-SITU VANE SHEAR TEST	γ. - UNIT WEIGHT	
	FAIR	D.O. - DRIVE-OPEN	B.A. - BARREL AUGER	M. - MECHANICAL ANALYSIS	K. - PERMEABILITY	
	GOOD	D.F. - DRIVE-FOOT VALVE	S.A. - SPIRAL AUGER	U. - UNCONFINED COMPRESSION	C. - CONSOLIDATION	
	LOST	D.P. - DRIVE PISTON	W.S. - WASHED SAMPLE	QC. - TRIAXIAL CONSOLIDATED QUICK	CA. - CASING	
		T.O. - THIN WALLED OPEN	R.C. - ROCK CORE	Q. - TRIAXIAL QUICK	WL. - WATER LEVEL IN CASING	
		T.P. - THIN WALLED PISTON		S. - TRIAXIAL SLOW	WT. - WATER TABLE IN SOIL	



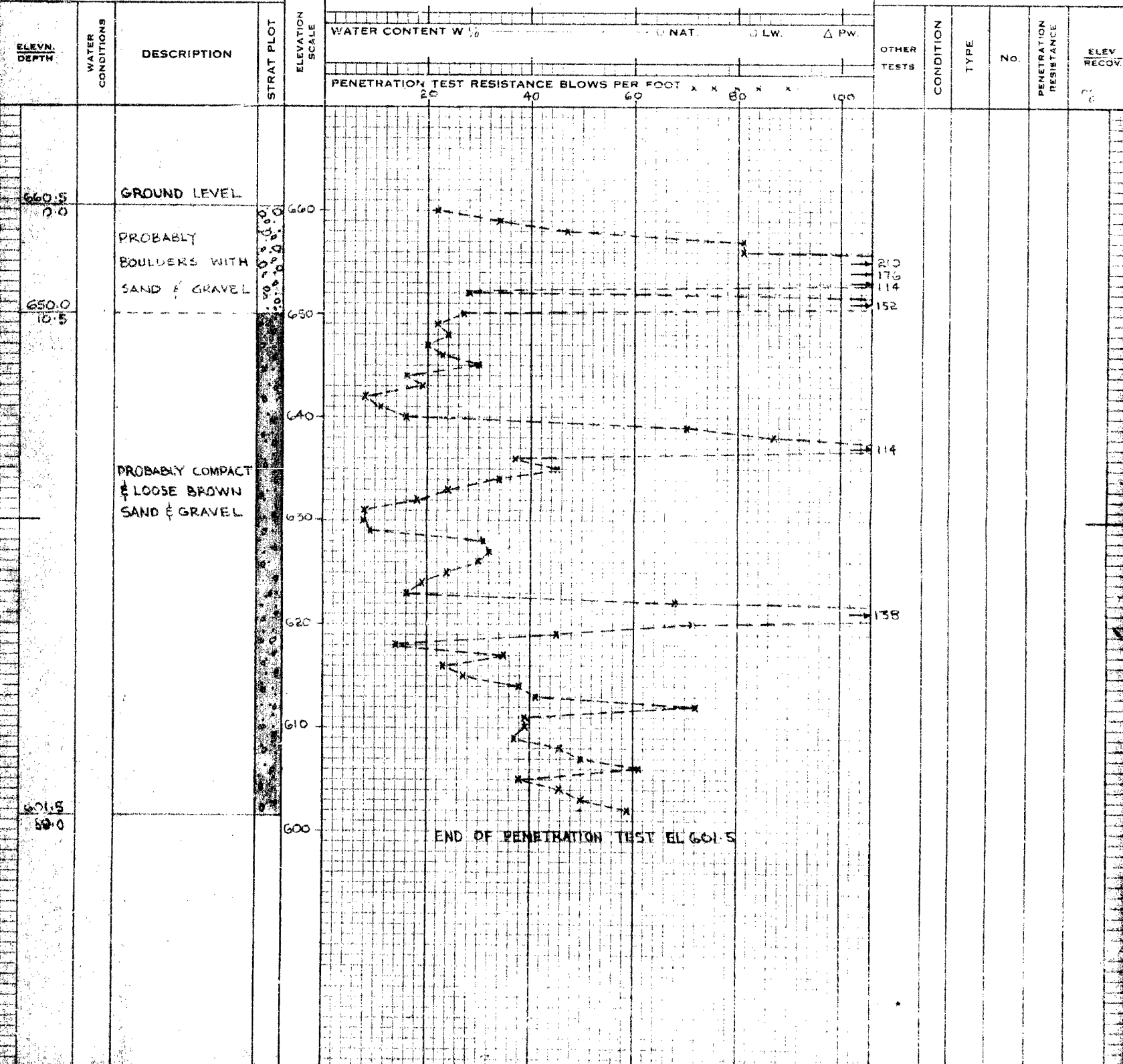
## OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG. MACHINE JOB T.1012 PENETRATION BORING 10  
 CASING (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM GEOMETRIC DATE REPORT 25 FEB '54  
 SAMPLER HAMMER WT. 380 DROP 15 INCHES COMPILED BY JA CHECKED BY M.A. BORING DATE 20 FEB '54

SAMPLE CONDITION		SAMPLE TYPES		ABBREVIATIONS	
	DISTURBED	C.S. - CHUNK	F.S. - FOIL SAMPLE	V. - IN-SITU VANE SHEAR TEST	γ. - UNIT WEIGHT
	FAIR	D.O. - DRIVE OPEN	B.A. - BARREL AUGER	M. - MECHANICAL ANALYSIS	K. - PERMEABILITY
	GOOD	D.F. - DRIVE-FOOT VALVE	S.A. - SPIRAL AUGER	U. - UNCONFINED COMPRESSION	C. - CONSOLIDATION
	LOST	D.P. - DRIVE PISTON	W.S. - WASHED SAMPLE	QC. - TRIAXIAL CONSOLIDATED QUICK	CA. - CASING
		T.O. - THIN WALLED OPEN	R.C. - ROCK CORE	Q. - TRIAXIAL QUICK	WL. - WATER LEVEL IN CASING
		T.P. - THIN WALLED PISTON		S. - TRIAXIAL SLOW	WT. - WATER TABLE IN SOIL

## SOIL PROFILE

## SAMPLES



**APPENDIX II**

**PHOTOGRAPHS**

Appendix II  
Plate 1  
T1012



PHOTO #1

Layer of Boulders with Sand and Gravel  
at Borrow Pit East of Site.



PHOTO #1

Layer of Boulders with Sand and Gravel  
at Borrow Pit East of Site.