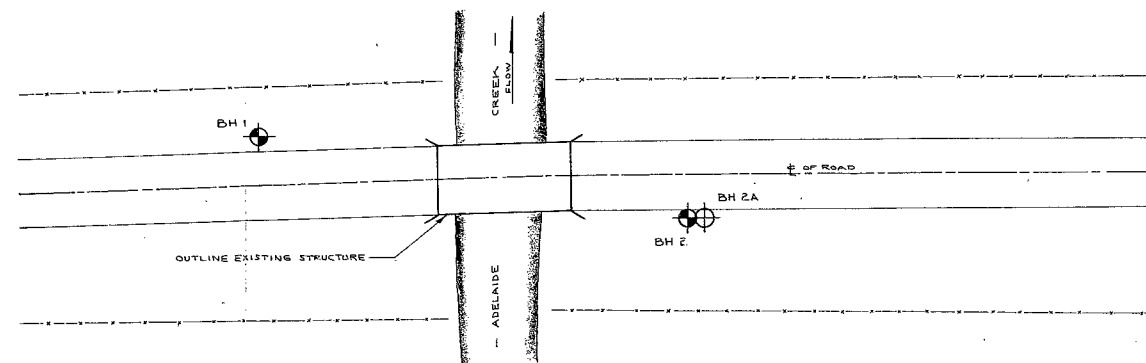


60-F-310M

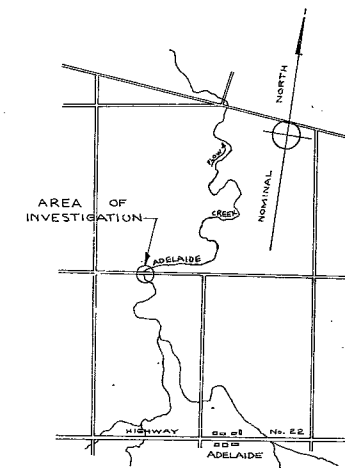
LOT 8. CON II+III

ADELAIDE TOWNSHIP

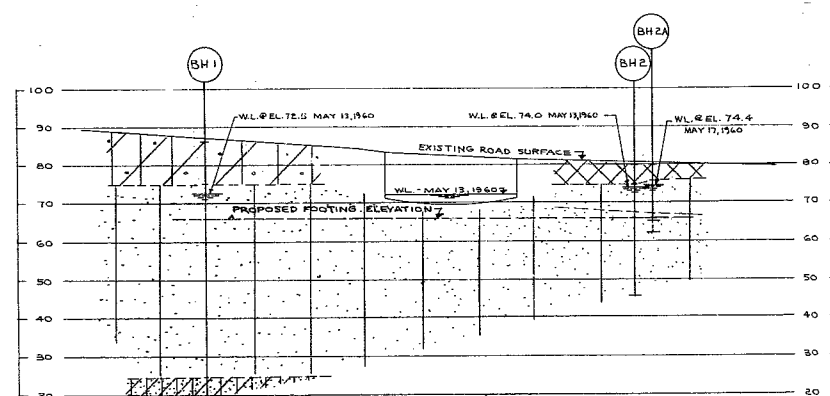
BRIDGE



PLAN
SCALE 1" = 20'-0"



KEY PLAN
SCALE 1" = 1500' (APPROX)



SCHEMATIC SECTION ALONG CENTRELINE OF ROAD
SCALE 1" = 20'-0"

LEGEND

- BOREHOLE IN PLAN
- BOREHOLE WITH PENETRATION TEST IN PLAN
- BOREHOLE IN ELEVATION
- BOREHOLE WITH PENETRATION TEST IN ELEVATION
- END OF BOREHOLE
- END OF PENETRATION TEST

STRATIGRAPHY

- HARD MOTTLED GREY-BROWN CLAYEY SILT
- VERY LOOSE TO LOOSE MOTTLED BROWN SILTY FILL
- VERY LOOSE TO COMPACT GREY-BROWN SANDY SILT
- VERY DENSE GREY-BROWN SANDY SILT
- STIFF TO VERY STIFF GREY-BROWN SILTY CLAY TO SANDY SILT

SPECIAL NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT BOREHOLE LOGS. ONLY THE SOIL STRATIGRAPHY BETWEEN BOREHOLES HAS BEEN INFERRED FROM GEOLOGICAL EVIDENCE AND SO MAY VARY FROM THAT SHOWN.

REVISIONS			REFERENCE		REFERENCE		R.C. DUNN AND ASSOCIATES LIMITED LONDON ONTARIO DATE MAY 27, 1960 SCALE AS SHOWN	GEOCON LTD DATE MAY 27, 1960 SCALE AS SHOWN
MARK	DATE	DESCRIPTION	DWG. NO.	DESCRIPTION	DWG. NO.	DESCRIPTION		
					59-106	R.C. DUNN AND ASSOCIATES DRAWING OF PROPOSED BRIDGE TWP. OF ADELAIDE SHOWING PLAN & PROFILE - DATED MAY 1960		
							MADE M.W. 4/18/60	APPROVED J.S. 4/18/60 No. 57081-1

60-F-310M

PLANS

Mr. A. M. Toye,
Bridge Engineer.
Materials & Research Section.

June 30, 1960.

CONSULTANTS REPORT.

Attention: Mr. S. McCombie.

Re: Report #8 7081 by Geocom, Limited to
K. C. Dunn and Associates, Limited on
Soil Investigation - Proposed Adelaide
Township Bridge Near London, Ontario.
District No. 2.

Attached hereto, is the above mentioned foundation
report, which you will find self-explanatory.

For your information and files.

/s/def
Attach.

L. G. Soderman
L. G. Soderman,
PRINCIPAL FOUNDATIONS ENGR.

cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
D. G. Ramsay
A. Gater
W. L. Fraser
J. Roy
A. Watt

Foundations Office ✓
Gen. Files.

S7081
REPORT
TO
R. C. DUNN AND ASSOCIATES LTD.
ON
SOIL INVESTIGATION
PROPOSED ADELAIDE TOWNSHIP BRIDGE
NEAR LONDON ONTARIO

Distribution:

- 5 copies - R. C. Dunn and Associates Ltd.,
London, Ontario.
- 10 copies - Department of Highways, Ontario,
Downsview, Ontario.
- 2 copies - Geocon Ltd,
Rexdale, Ontario.

June 14th, 1960

GEOCON

GEOCON LTD

HEAD OFFICE

180 VALLÉE ST., MONTREAL 18, QUEBEC
TELEPHONE UN. 6-7632

DISTRICT OFFICES

14 HAAS ROAD
REXDALE, TORONTO, ONT.
TEL. CH. 4-8641

1425 WEST PENDER ST.
VANCOUVER 5, B.C.
TEL. MU. 1-8926

Rexdale, Ontario,
June 14th, 1960.

R. C. Dunn and Associates Ltd.,
Consulting Engineers,
410 Third Street,
London, Ontario.

Attention: Mr. N. M. Warner, P. Eng.

Re: Soil Investigation,
Proposed Adelaide Township Bridge,
Near London, Ontario

Dear Sirs:

This letter reports the results of the above investigation carried out in accordance with your letter of authorization dated May 4th, 1960. The object of the investigation was to determine and interpret the subsoil conditions at the above site, as they affect the design of foundations for the proposed bridge structure.

PROCEDURE

The field work was commenced on May 12th, 1960 and completed on May 17th, 1960. A total of 3 boreholes, one with an accompanying dynamic penetration test, was put down using a mobile power auger. The locations of the boreholes together with the inferred soil stratigraphy are shown on Drawing S7081-1 attached to this report. A detailed log of each boring is shown on the Office Reports on Soil Exploration in Appendix I.

The testing of the soil samples was carried out in the Toronto Soil Mechanics Laboratory of Geocon Ltd and the results are

PROCEDURE (continued)

plotted on the Office Reports and on the Figure in Appendix II. The soil samples remaining after testing will be stored until December 1st, 1960, at which time you will be contacted for instructions regarding their disposal.

The elevations at the site are referred to a nail in a tree located approximately 285 feet east of the existing bridge. This bench mark, which was established by R. C. Dunn and Associates Ltd., is reported to have an elevation of 77.52.

SOIL CONDITIONS

The principal soil strata encountered by the borings are as follows:

Hard Mottled Grey-Brown Clayey Silt

A stratum of mottled grey-brown clayey silt, about 11 feet in thickness, was encountered at ground surface in borehole 1. The stratum contains scattered subangular to subrounded pebble gravel and some thin lenses of fine sand throughout its depth. The mottled colour is a result of desiccation and subsequent oxidation of the stratum following lowering of the ground water level.

The moisture content of the clayey silt is generally low and at or below the plastic limit.

"N" values, obtained from standard penetration tests carried out in the stratum, gave values of 57 and 83 blows per foot indicating that the consistency of the clayey silt is generally hard.

SOIL CONDITIONS (continued)

Very Loose to Loose Mottled Brown Silty Fill

A layer of mottled brown sandy silt with some gravel sizes scattered throughout was encountered at ground surface in boreholes 2 and 2A. The thickness of the sandy silt at the boring locations is between about 4 and 6 feet. Some organic matter, generally in the form of roots and wood fragments, was encountered throughout. The sandy silt layer is part of the roadway fill forming the east approach to the existing bridge.

One standard penetration test carried out in the fill gave an "N" value of 4 blows per foot indicating that the relative density is generally very loose to loose.

Very Loose to Very Dense Grey-Brown Sandy Silt

Underlying the clayey silt in borehole 1 and the silty fill in boreholes 2 and 2A a stratum of grey-brown sandy silt was encountered. The thickness of the stratum is about 50 feet in borehole 1. In boreholes 2 and 2A, it was penetrated to a maximum depth of about 28 feet. The relative percentage of sand and silt sizes varies slightly throughout the stratum. An 18 inch layer of grey silty clay with some small gravel was encountered within the sandy silt in borehole 2, at about elevation 68. This layer was not encountered in the adjacent borehole 2A and hence it is considered that it is an isolated pocket or lense. From resistance to auger penetration, it is estimated that the consistency of the silty clay layer is firm.

SOIL CONDITIONS (continued)

Very Loose to Very Dense Grey-Brown Sandy Silt (continued)

Three grain size distribution curves obtained from typical samples of the sandy silt are shown on Figure 1 of Appendix II. These indicate that the stratum is comprised of silt sizes with about 10 to 50 per cent sand sizes.

Moisture content determinations gave values ranging from about 14 to 20 per cent with an average of about 16 per cent.

Standard penetration tests carried out in the stratum gave "N" values which ranged from 3 blows per foot to greater than 100 blows per foot, indicating that the relative density of the silty sand is very loose to very dense with depth. In general, the relative density of the stratum is very dense below about elevation 67 in boreholes 2 and 2A and throughout in borehole 1.

Stiff to Very Stiff Grey-Brown Silty Clay to Sandy Silt

Below the grey-brown sandy silt in borehole 1 a stratum of grey-brown silty clay to sandy silt, which was penetrated for about 5 feet, was encountered. From resistance to auger penetration, it is estimated that the consistency of the stratum is stiff to very stiff.

WATER CONDITIONS

During the period of the investigation, the ground water level in the boreholes was up to 2 feet above creek level. The creek water level was at about elevation 72.

DISCUSSION

General

The site of the investigation was at the existing bridge over Adelaide Creek on the County Road between Concession II and Concession III in the Township of Adelaide, opposite Lot 8.

It is proposed to replace the existing County Bridge at this location by a single span structure. No specific details of the proposed structure are available at this time, but it is known that it will probably be of the rigid frame type.

Foundations - Proposed Structure

It is understood that it is proposed to found the structure on spread or strip footings at about 4 feet below river bottom at elevation 66.

A stratum of grey-brown sandy silt was encountered in boreholes 1, 2, and 2A at about elevation 75. In borehole 1 this stratum has a very dense relative density throughout, while in boreholes 2 and 2A, it is very loose to compact above about elevation 67 and very dense below this depth. It is considered that spread or strip footings founded at elevation 66 in the grey-brown sandy silt would form suitable abutment foundations for the proposed bridge structure. At this elevation, an allowable net bearing pressure of 2.0 tons per square foot may be used in design. This is based on the results of the standard and dynamic penetration tests carried out in the stratum at this depth.

DISCUSSION (continued)

Foundations - Proposed Structure (continued)

Under the allowable load of 2.0 tons per square foot and assuming the footings to have a width of approximately 5 feet, the total consolidation settlement of the structure is estimated to be negligible and will take place largely during construction.

Should any lenses or layers of grey silty clay, such as that encountered in borehole 2 at about elevation 68, be met at footing elevation they should be excavated and replaced with well-compacted granular material or lean concrete.

Due to the fact that the grey-brown sandy silt is susceptible to piping and the proposed footing elevation is below the ground water level, it will be necessary to use an excavation method which will prevent boiling at the base. It is therefore recommended that the excavation for the footings be sheeted and that this sheeting be carried down not less than 5 feet below the footing elevation.

A thin layer of lean concrete should be laid down immediately the excavation is down to grade to prevent softening of the sandy silt.

As an alternate scheme, it is suggested that stepped footings be utilized for the abutments. In this case, the east abutment should be founded at elevation 66, as recommended above, but the west abutment may be founded in the grey-brown clayey silt stratum at about elevation 80. This has the economic and constructional advantage of not having to found the west abutment below the ground water table. However, in this case, sheeting should be provided to prevent possible scour beneath the west footing. The tip of the sheeting should be taken at least 4 feet below river bed level.

R. C. Dunn and Associates Ltd.,
June 14th, 1960,
Page 7.

DISCUSSION (continued)

Foundations - Proposed Structure (continued)

An allowable net bearing pressure of 2.0 tons per square foot may be used, as before, for both abutment footings. Consolidation settlement will again be negligible and will take place largely during construction.

We believe that this letter report, which was written by N. R. McCammon and checked by J. L. Seychuk, contains the necessary information for the foundation design of the proposed bridge. Should you have any further questions, please do not hesitate to contact us.

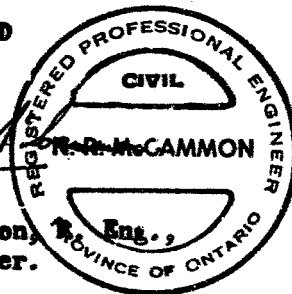
Yours very truly,

GEOCON LTD

N. R.

NRMCC/dw
S7081

N. R. McCammon,
Soils Engineer.



GEOCON

APPENDIX I

OFFICE REPORTS ON SOIL EXPLORATION

GEOCON

EXPLANATION OF THE FORM "OFFICE REPORT ON SOIL EXPLORATION"

The object of this form is to enable a comprehensive study of the soil to be made by combining on one sheet all of the information obtained from the boring. An explanation of the various columns of the report follows.

ELEVATION AND DEPTH

This column gives the elevation and depth of boundaries between the various soil strata. The elevation is referred to the datum shown in the general heading.

WATER CONDITIONS

In this column the water level in the casing at the time of boring or the water table in the ground, determined by a series of observations in a piezometer or standpipe, is indicated to scale by a horizontal line with the symbol W.L. or W.T. above the line. A notation of any complicated groundwater conditions will be made in this column.

DESCRIPTION

A description of the soil, using standard terminology, is contained in this column. The consistency of cohesive soils and the relative density of non-cohesive soils are described by the following terms:

<u>Consistency</u>	<u>U-Strength Tons/sq. ft.</u>	<u>Relative Density</u>	<u>Standard Penetration Resistance, Blows/ft.</u>
Very soft	0.03 to 0.25	Very loose	0 to 4
Soft	0.25 to 0.5	Loose	4 to 10
Firm	0.5 to 1.0	Compact	10 to 30
Stiff	1.0 to 2.0	Dense	30 to 50
Very stiff	2.0 to 4.0	Very dense	over 50
Hard	over 4.0		

STRATIGRAPHIC PLOT

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

ELEVATION SCALE

The information in all columns is plotted to a true elevation scale which is shown in this column.

GRAPHS

The main body of the report forms a graph which is used to plot to correct elevation 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.

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 on the above graph.

SAMPLES

The first three columns describe the condition, type and number of each sample obtained from the boring. The location and extent of each sample is plotted to scale.

In the last column is shown the penetration resistance in blows of 4200 inch-pounds required to drive one foot of the sampler into the ground. When a 2 inch Drive Sampler is used the result obtained is termed the "Standard Penetration Resistance".

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OFFICE REPORT ON SOIL EXPLORATION

APPENDIX I

CONTRACT S7081 BORING # 1 DATUM LOCAL CASING
 BORING DATE MAY 12, 1960 REPORT DATE MAY 26, 1960 COMPILED BY MAY. CHECKED BY H. W. L.
 SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. LBS. ENERGY)

SAMPLE CONDITION

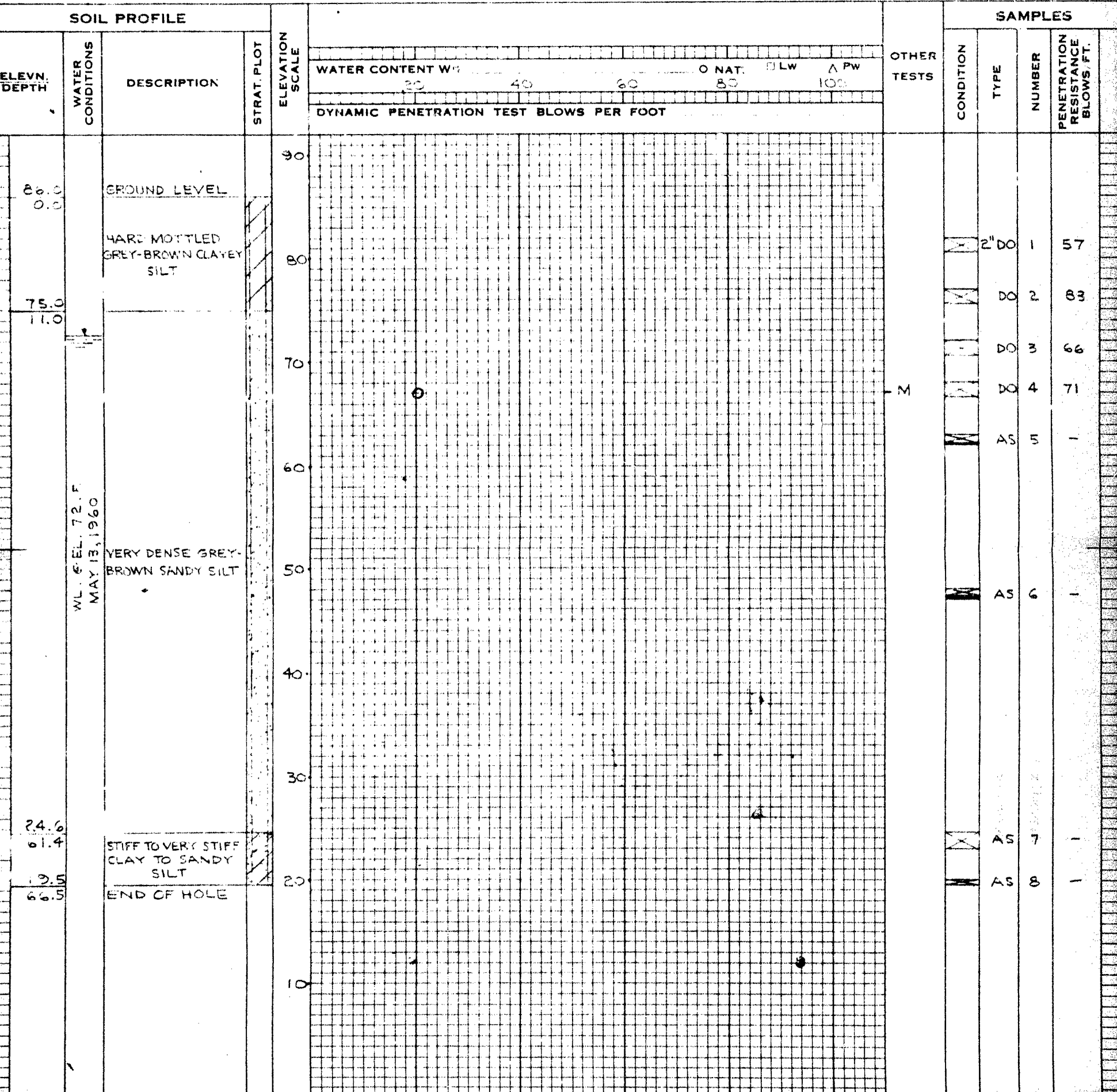
☐ DISTURBED
☐ FAIR
☐ GOOD
☐ LOST

SAMPLE TYPES

A.S. - AUGER SAMPLE
 S.T. - SLOTTED TUBE
 W.S. - WASHED SAMPLE
 D.O. - DRIVE-OPEN
 D.F. - DRIVE-FOOT VALVE
 C.S. - CHUNK SAMPLE
 F.S. - FOIL SAMPLE
 S.O. - SLEEVE-OPEN
 S.F. - SLEEVE-FOOT VALVE
 T.O. - THIN WALLED OPEN
 R.C. - ROCK CORE

ABBREVIATIONS

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



OFFICE REPORT ON SOIL EXPLORATION

CONTRACT S7081 BORING # 2 F 2A DATUM LOCAL CASING
BORING DATE MAY 13, 1960 REPORT DATE MAY 26, 1960 COMPILED BY M.W. CHECKED BY A MCB
SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

ABBREVIATIONS

γ - WET UNIT WEIGHT
 K - PERMEABILITY
 C - CONSOLIDATION
 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 _r					OTHER TESTS	CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS/FT.
					20	40	60	80	100					
					DYNAMIC PENETRATION TEST BLOWS PER FOOT									
					20	40	60	80	100					
79.9 0.0		GROUND LEVEL		80										
74.4 5.5		VERY LOOSE TO LOOSE MOTTLED BROWN SILTY FILL												
68.9 11.0		LOOSE GREY- BROWN SANDY SILT		70										
62.2 17.7		VERY DENSE GREY- BROWN SANDY SILT		60										
45.9 34.0		END OF HOLE		50										
79.9 0.0		GROUND LEVEL		80										
75.6 4.3		VERY LOOSE TO LOOSE MOTTLED BROWN SILTY FILL												
67.0 12.0		VERY LOOSE TO COMPACT GREY- BROWN SANDY SILT		70										
62.2 17.7		VERY DENSE GREY- BROWN SANDY SILT		60										
62.2 17.7		END OF HOLE												
62.2 17.7		END OF PEN. TEST												

APPENDIX II

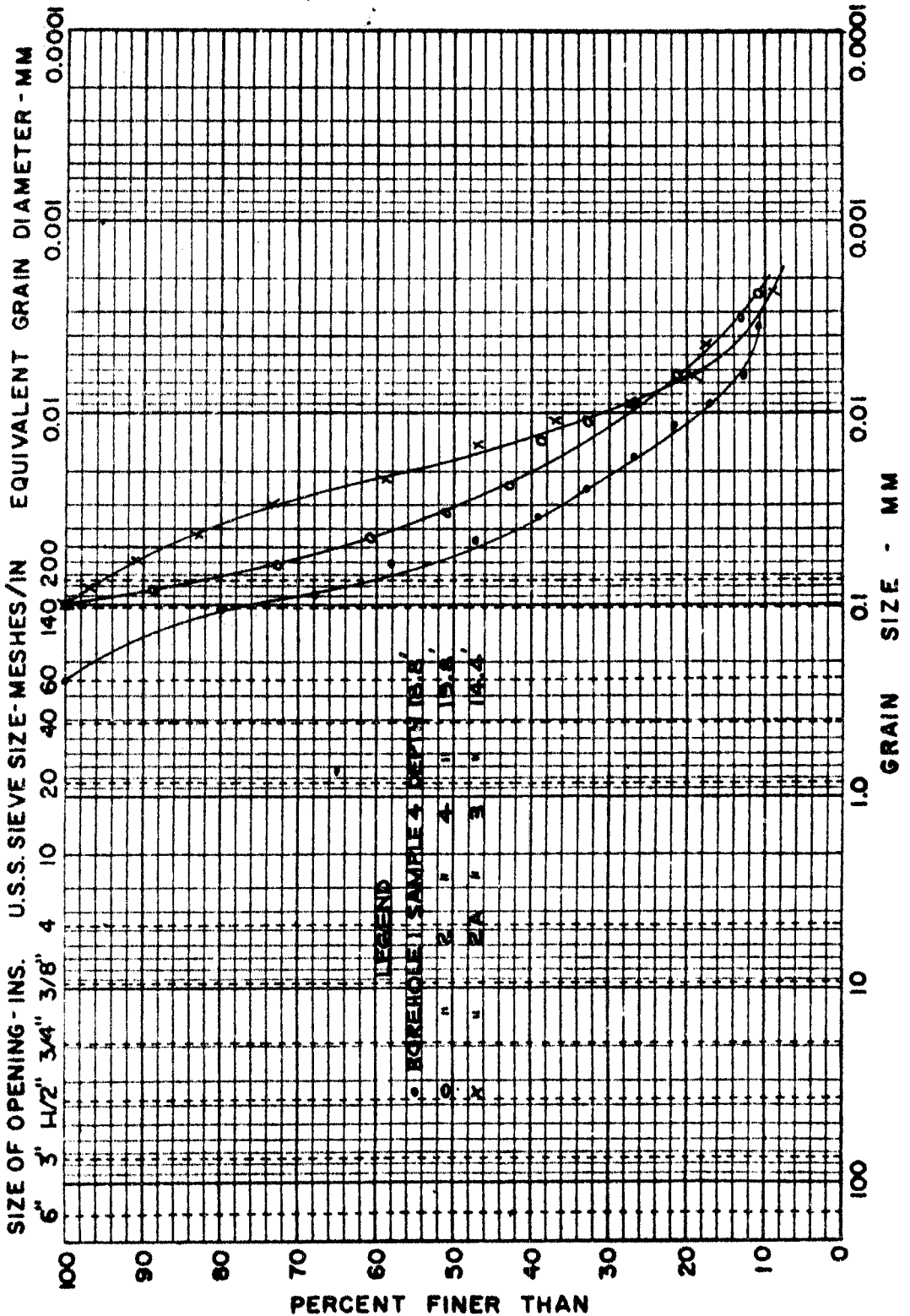
FIGURE

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GRAIN SIZE DISTRIBUTION

APPENDIX II
FIGURE I
PROJECT S7081

COBBLE SIZE	GRAVEL SIZE		SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	CLAY SIZE



GEOCON

M.I.T. GRAIN SIZE SCALE