62-F-208
W.P.# 252-61-01
HWY. 401 & HOGGS HOLLOW RET. WALL

28-5-137

ONTARIO

DEPARTMENT OF HIGHWAYS

MATERIALS AND RESEARCH SECTION

RETAINING WALL IN HOGGS HOLLOW

(W.P. ~~38-203~~)

SUBSOIL CONDITIONS

~~W.P. 193-58~~

W.P. 252-61-1

Submitted by

DOMINION SOIL INVESTIGATION LIMITED
77 Crockford Boulevard
SCARBOROUGH - ONTARIO

OUR REFERENCE: 2-11-14

NOVEMBER 1962

CONTENTS

ENCLOSURES

INTRODUCTION

Verbal authorization was received from Mr. Kenneth Selby, Senior Foundation Engineer, Materials and Research Section, Ontario Department of Highways, to conduct a subsoil investigation at the site of a proposed retaining wall in Hoggs Hollow.

The wall will be constructed in connection with the general extension of the viaduct carrying Highway #401 over the valley.

The number and location of the boreholes were determined by the Client.

The purpose of the investigation was to reveal the subsurface conditions.

..... 2

I. DESCRIPTION OF SITE AND GEOLOGY

Hoggs Hollow is a deep, wide valley located west of the intersection of Highway #401 and Yonge Street in the Township of North York. The walls of the ravine are generally very steep and already slides are observable at several spots. The proposed retaining wall is to prevent further sliding at a vitally important location.

The bottom of the valley, being gently rolling, is presently used as a golf course. The deposits are of recent, alluvial origin: sand, cohesionless silt and any mixture of these components.

II. FIELD AND LABORATORY WORK

Field work was carried out during the period November 15th to 17th, 1962 and comprised two boreholes and two dynamic cone penetration tests at the locations shown on Enclosure #2. The positions of the test holes were set out on the site with the assistance of a drawing (No. E-3463-2) provided to us. Elevations were obtained with the aid of the contour lines as indicated on the aforementioned plan.

The boreholes were of 2 7/8 diameter. They were lined or partly lined with Bx casing advanced to the required sampling depths by the repetitious procedure of alternately driving and washing.

Standard penetration tests were made at frequent intervals using a 2 in. outside diameter split spoon driven into the bottom of the clean borehole by a constant driving energy (140 pound hammer dropping 30 ins.). The dynamic cone penetration test is one type of deep sounding in which the Bx rods with a 2 in. diameter 60 degree apex cone driving point are driven into the subsoil without casing and applying the same driving energy as above. The former test provided disturbed samples of the substrata indicating their relative density and consistency and the latter a continuous record of soil density.

..... 3

The samples were shipped to our laboratory where they were thoroughly examined and classified. The results of this analysis and the observations made and findings obtained in the field comprise the basis on which the geotechnical properties of the substrata are being evaluated.

The stratification of the subsoil, sampling depths and the results of the penetration tests are recorded on geotechnical data sheets comprising Enclosures #3 to #4 inclusive.

III. SUBSURFACE CONDITIONS

Sodding for the golf course was penetrated first. Under this, a shallow fill extending to a depth of one to two ft. was encountered. This fill was placed directly above the original topsoil below which in Borehole #1, greyish brown, sandy, clayey silt was encountered. Traces of roots, mottled spots and the generally weathered appearance of the stratum indicate the porous nature of the subsoil. This layer was found in Borehole #2 also but its thickness was negligibly small.

The good natural substrata are of granular nature: sand, silty sand, sandy silt and silt. Layered structure was observable in some of the samples which can be explained by the alluvial origin of the deposit.

The ground water level was found around elevation 445 ft. in both boreholes.

.... 4

CONCLUSIONS

It is suggested that the foundations of the proposed retaining wall should be carried down to the dense, granular substrata.

DOMINION SOIL INVESTIGATION LIMITED

L. S. Rolko

L. S. Rolko, P.Eng.,
Senior Soils Engineer.

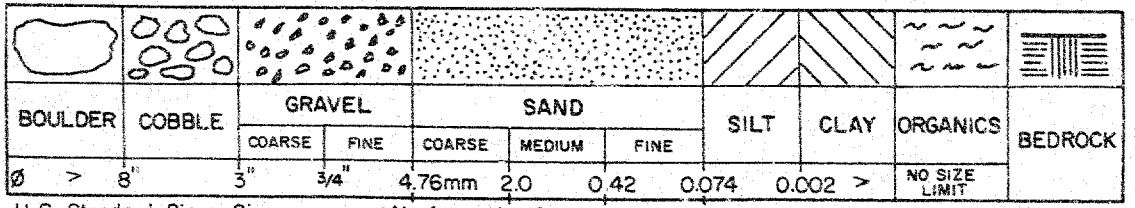
LSR/oed

Encls.

Enclosures

LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE.

SOIL COMPONENTS AND GROUND WATER CONDITIONS.



SAMPLE TYPES.

AS	Auger sample	RC	Rock core	TP	Piston, thin walled tube sample
CS	Sample from casing	%	Recovery	TW	Open, thin walled tube sample
ChS	Chunk sample	SS	Split spoon sample	WS	Wash sample

SAMPLER ADVANCED BY static weight : w
" pressure : p
" tapping : t

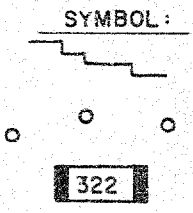
OBSERVATIONS MADE WHILE CORING: Steady pressure; No pressure; Intermittent pressure; Washwater returns; Washwater lost

PENETRATION RESISTANCES.

DYNAMIC PENETRATION RESISTANCE : to drive a 2"ø, 60° cone attached to the end of the drilling rods into the ground, expressed in blows per foot.

STANDARD PENETRATION RESISTANCE, -N- : to drive a 2" outside dia, split spoon sampler 1 foot into the ground, expressed in blows per foot.

SYMBOL :



EXTRAPOLATED -N- VALUE

The energy for the penetration resistances is supplied by a 140 lb. hammer falling 30 inches

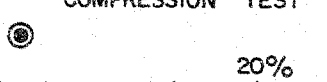
SOIL PROPERTIES.

W %	Water content	γ	Natural bulk density (unit weight)	k	Coeff. of permeability
LL %	Liquid limit	e	Void ratio	C	Shear strength — in terms of total stress
PL %	Plastic limit	RD	Relative density	ϕ	Angle of int. friction — in terms of total stress
PI %	Plasticity index	C_v	Coeff. of consolidation	C'	Cohesion — in terms of effective stress
LI	Liquidity index	m_v	Coeff. of volume compressibility	ϕ'	Angle of int. friction — in terms of effective stress

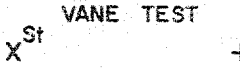
UNDRAINED SHEAR STRENGTH.

— DERIVED FROM —

TRIAXIAL COMPRESSION TEST — UNCONFINED

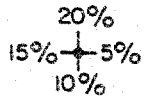


LABORATORY VANE TEST — FIELD



POCKET PENETROMETER TEST

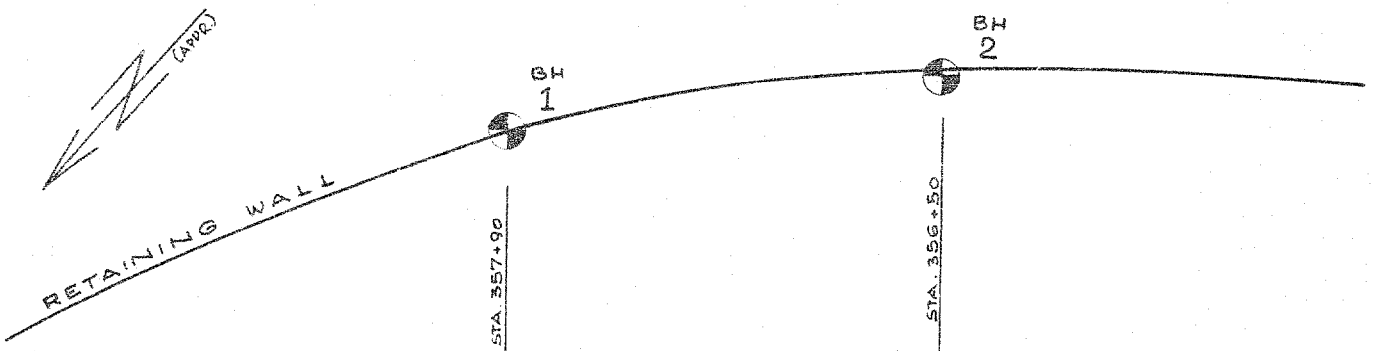
Strain at failure is represented by direction of stem



St : sensitivity = $\frac{\text{shear strength in undisturbed state}}{\text{shear strength in remoulded state}}$

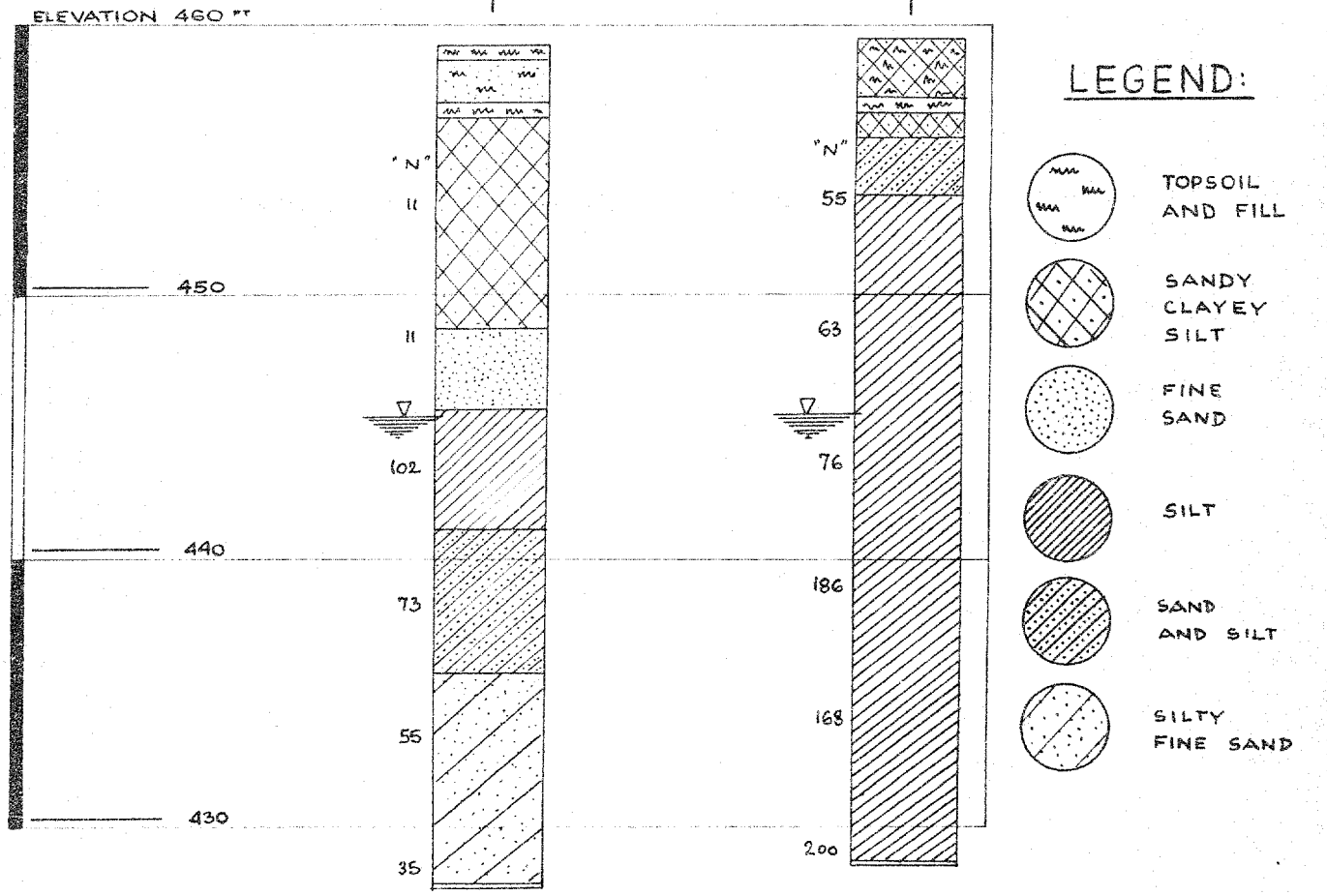
SOIL DESCRIPTION.

COHESIONLESS SOILS :	RD :	COHESIVE SOILS :	C lbs/sq.ft.
Very loose	0 – 15 %	Very soft	less than 250
Loose	15 – 35 %	Soft	250 – 500
Compact	35 – 65 %	Firm	500 – 1000
Dense	65 – 85 %	Stiff	1000 – 2000
Very dense	85 – 100 %	Very stiff	2000 – 4000
		Hard	over 4000



LOCATION OF BOREHOLES

SCALE : 1" TO 50'



LEGEND:

- TOPSOIL AND FILL
- SANDY CLAYEY SILT
- FINE SAND
- SILT
- SAND AND SILT
- SILTY FINE SAND

SUBSURFACE PROFILE

SCALE : 1" TO 5'

OUR REFERENCE NO. 2-11-14

GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 1 . . .

CLIENT: ONTARIO DEPARTMENT OF HIGHWAYS
PROJECT: HOGGS HOLLOW RETAINING WALL
LOCATION: SEE ENCL. 2.
DATUM ELEVATION: 459.2

METHODE OF BORING: WASHBORING
DIAMETER OF BOREHOLE: 2 7/8"
DATE: NOVEMBER 15-16, 1962.

ENCLOSURE NO. 3

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES No. of Blows per Foot of Sampler	PENETRATION RESISTANCE blows per foot (0 20 40 60 80 100) / SHEAR STRENGTH lbs/sq ft	CONSISTENCY water content % (PL W LL)	REMARKS
459.2	0	TOPSOIL							
		BROWN SANDY SILT FILL							
		OLD TOPSOIL							
455	5	GREYISH BROWN SANDY CLAYEY SILT (traces of roots, org.)		1	SS	11			
450	10	BROWN COMPACT DAMP FINE SAND		2	SS	11			
445	15	BROWN DAMP VERY DENSE SILT		3	SS	102			
440	20	GREYISH BROWN MOIST VERY DENSE SANDY SILT		4	SS	73			
435	25	GREY MOIST VERY DENSE SILTY FINE SAND		5	SS	55			
430	30			6	SS	35			
425									

DETAILS OF EXTRAPOLATED PENETRATION RESISTANCES:

SA #:	BLOWS:
3	42/6"
	42/6"
	20/2"

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: MB CH'D:

OUR REFERENCE NO. 2-11-14

GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 2 . . .

CLIENT: ONTARIO DEPARTMENT OF HIGHWAYS
PROJECT: HOGGS HOLLOW RETAINING WALL
LOCATION: SEE ENGL. 2.
DATUM ELEVATION: 459.5

METHODE OF BORING: WASHBORING
DIAMETER OF BOREHOLE: 2 7/8"
DATE: NOV. 16-17. 1962.

ENCLOSURE NO. 4.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES N - or Advancement of Sampler	PENETRATION RESISTANCE Blows per foot 0 20 40 60 80 100 / SHEAR STRENGTH lbs/sq ft	CONSISTENCY Water content % PL W LL	REMARKS
459.5	0	BROWN SANDY CLAYEY SILT (fill)							
		OLD TOPSOIL							
		BROWN SANDY CLAYEY SILT							
455	5	BROWN DAMP DENSE SAND AND SILT		1	SS	55			
450	10	damp brown grey wet		2	SS	63			
445	15	VERY DENSE SILT fine sand layer		3	SS	76			
440	20	fine sand layer		4	SS	186			
435	25	fine sand layer		5	SS	168			
430	30			6	SS	200			
425									

DETAILS OF EXTRAPOLATED PENETRATION RESISTANCES:

SA#:	BLOWS:
4	38/6"
	62/4"
5	30/6"
	70/5"
6	50/6"
	50/3"

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: MB CHD: Rec

Mr. A. M. Toye,
Bridge Engineer,
Bridge Division.

Attn: Mr. S. McCombie.

Mr. A. G. Stermac,
Principal Foundation Engineer,
Foundation Section,
Materials & Research Division.
December 20, 1962.

Re: Golf Course Retaining Wall at N. W. corner of Hogg's Hollow Bridge on Hwy. #401. WP252-61-1
Foundation Report by Dominion Soil Investigations Ltd. Ref. 2-11-14. District #6, Toronto.

Attached we are sending you the above-mentioned foundation report which contains factual data only concerning subsoil conditions.

The subsoil consists of compact to dense stratified deposits of clayey silt, silt and fine sand. The two borings indicate a marked difference in relative density above elevation 446.0. If the footings are founded above this elevation differential settlements of 1" to 2" magnitude should be allowed for in the design for loadings between 1 and 2 tons per sq. ft. It is understood that the proposed loadings will be in this range.

If you have any queries in connection with this matter please contact this office.

K. G. Selby

KGS/tt
Attach.
cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMillan
G. K. Hunter
C. Fraser
T. J. Kovich
J. Roy
J. E. Gruspier
E. R. Saint
F. Norman
A. Watt
Foundations Office
Gen. Files

K. G. Selby,
Senior Foundation Engr.
For:

A. G. Stermac
Principal Foundation Engr.

cc: Mr. S. McCombie

BA 1119
30M11-77
GEOCRES NO.

Mr. D. G. Ramsay,
Road Design Engineer.
Materials & Research Section.

September 15, 1960.
SOIL INVESTIGATION REPORT - by:
Geocon, Limited.

Attention: Mr. H. D. McMillan.

Re: Proposed Retaining Walls,
Hogg's Hollow - Dist. #6.

Enclosed, are two copies of the foundation investigation required in connection with the design of the retaining walls. We have reviewed, and concur with the recommended footing elevations and the earth pressure coefficients to be used in the design of the walls.

If you have any questions concerning the contents of the attached report, please do not hesitate to contact the Foundations Office.

for L. G. Soderman,
PRINCIPAL FOUNDATION ENGINEER

LGS/MdeF
Attach.

cc: H. A. Tregaskes
I. C. Campbell
S. McCombie
C. Fraser
T. J. Kovich

Foundations Office
Gen. Files.

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,
September 7th, 1960.

Department of Highways, Ontario,
Materials and Research Section,
Downsview, Ontario.

Attention: Mr. L. G. Soderman, P. Eng.,
Principal Foundation Engineer.

Re: Soil Investigation,
Proposed Retaining Walls,
Hogg's Hollow,
Toronto, Ontario.

Dear Sirs:

This letter reports the results of the above soil investigation carried out in accordance with verbal instructions given us by your Mr. A. Stermac on July 28th, 1960. The object of the investigation was to determine and interpret the soil conditions as they affect the design of foundations for the proposed retaining walls.

PROCEDURE

The field work was commenced on August 4th, 1960, and completed on August 9th, 1960. A total of three boreholes, each with an accompanying dynamic penetration test, was put down using a mobile power auger. The locations of the borings, together with the inferred soil stratigraphy are shown on Drawing S7129-1. Three typical cross-sections at the borehole locations are shown on Drawing S7129-2. Both these drawings are attached to this report. A detailed log of each boring is given on the Office Reports on Soil Exploration in Appendix I.

PROCEDURE (continued)

The testing of the soil samples was carried out in the Toronto Soil Mechanics Laboratory of Geocon Ltd and the results are plotted on the Office Reports in Appendix I and on the Figures in Appendix II. The soil samples remaining after testing will be stored until March 1st, 1961, at which time you will be contacted for instructions regarding their disposal.

The elevations of the boreholes are referred to a bench mark which was established in the area by the Department of Highways, Ontario. The elevation of this bench mark was given as 506.67 and the datum is Geodetic. The boreholes were located by the Department of Highways, Ontario.

The site is located approximately 160 feet north of Highway 401 chainage 356+00, near Hogg's Hollow, Toronto, Ontario.

From previous work carried out in the area, it is known that the principal stratum in this locality is glacial till. The till stratum at the site is probably overlain by fill deposits resulting from the construction of the adjacent sewerage treatment plant, the gas pipe line and Highway 401.

SOIL CONDITIONS

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

SOIL CONDITIONS (continued)

Loose Fill

A stratum of mottled brown and yellow silty and sandy fill was encountered at surface in all three boreholes and varied in depth between about 5 feet in borehole 3 and about 9 feet in borehole 2. The relative percentages of sand and silt sizes vary throughout the stratum. Some small gravel sizes are also present within the stratum.

One grain size distribution curve, obtained for a sample from borehole 1, is plotted on Figure 1 in Appendix II. It shows that this portion of the stratum contains about 70 per cent sand sizes and about 30 per cent silt sizes.

Atterberg limits carried out on a sample of the fill obtained from borehole 2, gave a value for the liquid limit of about 20 and a plasticity index of about 5.

Two moisture contents obtained on samples from the stratum gave values of about 15 and 18 per cent.

Standard penetration tests carried out in the stratum gave "N" values ranging from about 4 to 11 blows per foot with an average value of about 7 blows per foot. Based on these values, it is estimated that the relative density of the fill is generally loose.

It is considered that this fill material is principally derived from the underlying till stratum.

SOIL CONDITIONS (continued)

Compact to Very Dense Grey Silt Till

Underlying the loose fill in all boreholes a stratum of grey silt till was encountered. The stratum was found to be about 23 feet in thickness in borehole 1 and was penetrated for depths of about 17 feet and about 21 feet in boreholes 2 and 3 respectively.

The till is essentially composed of a few scattered subrounded sand and gravel sizes in a grey silt matrix.

A 3 foot thick layer of grey silt of very dense relative density was encountered below about elevation 499 in borehole 2.

Three grain size distribution curves obtained from typical samples of the till stratum are plotted on Figure 2 in Appendix II.

Atterberg limit tests carried out on typical samples of the till gave liquid limits ranging generally from about 21 to about 34 with an average value of about 25. The plasticity index ranged generally from about 6 to about 15 with an average value of about 8.

The average wet unit weight of the stratum was found to about 133 pounds per cubic foot and the average moisture content about 13 per cent. Wet and submerged unit weights of 135 and 75 pounds per cubic foot may be used for design purposes.

Standard penetration tests carried out in the stratum gave "N" values which ranged generally from about 11 to greater than 100 blows per foot. The lower "N" values were recorded near the top of the till stratum. Based on the "N" values, it is estimated that the relative density of the till ranges from compact to very dense with

SOIL CONDITIONS (continued)

Compact to Very Dense Grey Silt Till (continued)

depth and is generally dense to very dense.

The shear strength as determined by unconfined compression tests, ranged generally from about 2000 to about 12000 pounds per square foot. One shear strength value of about 900 pounds per square foot was obtained at a depth of about 2 feet below the top of the till in borehole 2. The results of the compression tests generally confirm the relative density estimated on the basis of the "N" values.

Dense to Very Dense Grey Silt

A stratum of grey silt was found to underlie the silt till in borehole 1 and was penetrated for a depth of about 12 feet. A similar material was encountered in a 3 foot thick layer in the silt till in borehole 2, below about elevation 499.

Atterberg limit tests carried out on three typical samples obtained from the stratum gave an average value for the liquid limit of about 27 and an average value for the plasticity index of about 7.

The average wet unit weight of the stratum was found to be about 131 pounds per cubic foot at an average moisture content of about 21 per cent.

Standard penetration tests carried out in the stratum gave "N" values ranging from about 39 blows per foot to greater than 100

SOIL CONDITIONS (continued)

Dense to Very Dense Grey Silt (continued)

blows per foot indicating that the relative density is dense to very dense.

The shear strength, as determined by unconfined compression tests, ranged generally from about 2300 to about 7400 pounds per square foot. These values confirm the relative density of the silt estimated from the results of the standard penetration tests.

WATER CONDITIONS

Groundwater level observations were carried out for a period of 2 weeks following completion of the field work. The stabilized groundwater level is given on the Office Reports on Soil Exploration in Appendix I.

DISCUSSION

General:

It is understood that it is proposed to construct two retaining walls in connection with the relocation of Highway 401 just west of the Yonge Street interchange. The approximate locations of these structures are shown on Drawing S7129-1, at the rear of this report. It is further understood that the purpose of the most southerly of the walls, which is about 175 feet long, is to retain a section of additional soil mass necessary for the relocation of Highway 401 from spilling onto an existing gravel access road. As the grade of this gravel access road is

DISCUSSION (continued)

General: (continued)

to be raised at the same time as this work is proceeding, it is considered necessary to provide the most northerly wall, which is about 150 feet long, to prevent the gravel road encroaching on the adjacent existing sewerage treatment plant.

The subsoil at the site consists of up to about 9 feet of loose silty and sandy fill which overlies a compact to very dense grey silt till with interbedded layers of dense to very dense grey silt to the depth explored.

Foundations - Proposed Retaining Walls:

Due to its generally loose relative density the silty and sandy fill is not a suitable foundation stratum. It is recommended that the footing for the proposed retaining walls be founded within the underlying silt till stratum. The silt till is generally of dense to very dense relative density; however, the upper several feet have been somewhat softened probably as a result of surface water run-off and are generally of compact relative density. It is further recommended that the footing be founded below this upper weathered portion of the till. This will also provide adequate frost protection. With these recommendations the foundation elevation should be at or below about elevations 494, 505 and 505 in boreholes 1, 2 and 3, respectively. Based on the "N" values and the measured shear strength at and below the above recommended elevations an allowable net bearing pressure of 2.0 tons per square foot may be used in design. Under this allowable net bearing pressure the total settlement should not exceed 3/4 inches.

DISCUSSION (continued)

Foundations - Proposed Retaining Walls: (continued)

At the recommended depths of excavation of between 7 and 13 feet the dense to very dense portion of the silt till will normally be exposed. However, it is recommended that a careful inspection of the base of the excavation be made for signs of weathering and local deep fill deposits. If any such deposits are encountered they should be excavated and replaced by lean concrete or well-compacted granular fill.

It is recommended that a thin layer of lean concrete be put down immediately the excavation is down to grade to prevent softening of the till stratum.

Due to the generally low permeability of the till stratum no major difficulty with groundwater is anticipated during excavation. However, due to the sloping nature of the site there may be considerable surface water run-off after rain, both on the surface and at the interface of the till and the overlying fill.

It is recommended that the material immediately behind the retaining walls consist of a clean granular backfill lightly compacted in 12 inch lifts. Provision should further be made to ensure drainage of the fill at the footing elevations. Excavation will be required for both the footings and to provide sufficient area to place the backfills. Suggested outlines for excavation and backfill material are given on the attached drawing S7129-2. For design of the structure it is suggested that the value of the coefficient of earth pressure, k_o, of 0.5 be used. Allowance should be made for the surcharge effect for both the backfill and the cut slope behind the wall.

We believe that this letter report, which was written by Mr. N. R. McCammon and checked by Mr. J. L. Seychuk contains all the information necessary for the foundation design of the proposed retaining walls. However, if we can be of any further assistance, please do not hesitate to call us.

Yours very truly,

GEOCON LTD

N. R. McCammon

NRMcC/dw
S7129

N. R. McCammon, P. Eng.,
Soils Engineer.

APPENDIX I

OFFICE REPORTS ON SOIL EXPLORATION

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:

Consistency	U-Strength Tons/sq. ft.
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

Relative Density	Standard Penetration Resistance. Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

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".

GEOCON

GEOCON

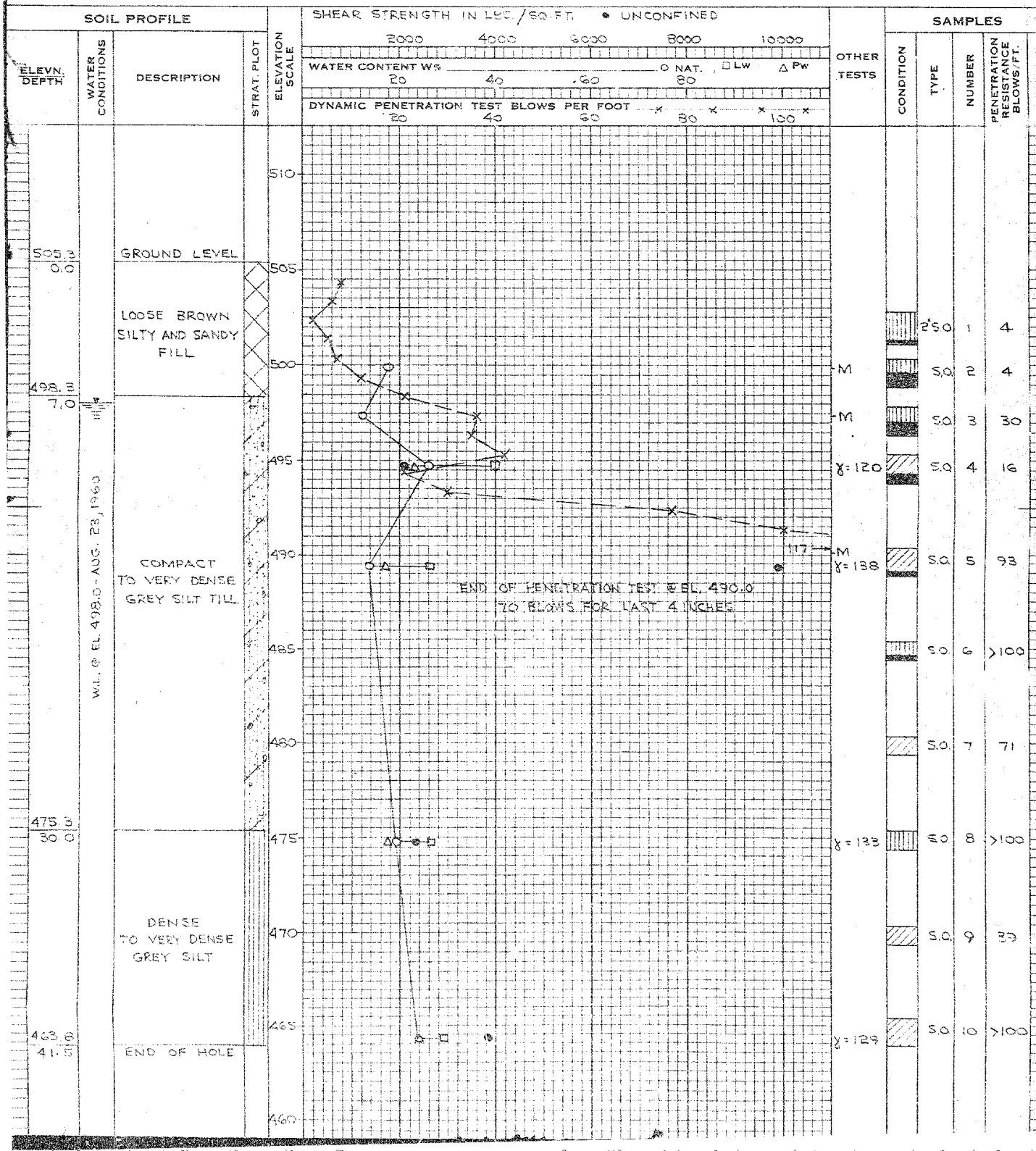
OFFICE REPORT ON SOIL EXPLORATION

CONTRACT S7129 BORING # 1 DATUM GEODETIC CASING —
BORING DATE AUGUST 4, 1960 REPORT DATE AUGUST 16, 1960 COMPILED BY J.A. CHECKED BY JH
SAMPLER HAMMER WT. 140 LBS. DROP 28 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
QS - 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



GEOCON

OFFICE REPORT ON SOIL EXPLORATION

CONTRACT S7129 BORING # 2 DATUM GEODETIC CASING

BORING DATE AUGUST 8, 1960 REPORT DATE AUGUST 16, 1960 COMPILED BY J.A. CHECKED BY

SAMPLER HAMMER WT. 140 LBS. DROP 28 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

SHEAR STRENGTH IN LBS/SQ.FT. ● UNCONFINED
2000 4000 6000 8000 10000

WATER CONTENT W% ○ NAT. □ Lw △ Pw
20 40 60 80

DYNAMIC PENETRATION TEST BLOWS PER FOOT
20 40 60 80 100

ELEVN. / DEPTH	DESCRIPTION	ELEVATION SCALE	OTHER TESTS	SAMPLES: CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS/FT.
518.1 / 0.0	GROUND LEVEL	520					
	LOOSE BROWN SILTY AND SANDY FILL	515			2"D.O.	1	7
					D.O.	2	11
509.1 / 9.0		510			D.O.	3	7
	COMPACT TO VERY DENSE GREY SILT TILL	505	γ = 135		S.O.	4	11
			γ = 144		S.O.	5	89
499.1 / 19.0	VERY DENSE GREY SILT	500	γ = 131		S.O.	6	64
496.1 / 22.0	VERY DENSE GREY SILT TILL	495	γ = 144		S.O.	7	75
491.8 / 26.3	END OF HOLE	490					

W.L. @ EL. 510.3 - AUG. 23, 1960

END OF PENETRATION TEST @ EL. 502.4
181 BLOWS FOR LAST 12 INCHES

GEOCON

OFFICE REPORT ON SOIL EXPLORATION

CONTRACT S7129 BORING # 3 DATUM GEODETIC CASING —

BORING DATE AUGUST 9, 1960 REPORT DATE AUGUST 16, 1960 COMPILED BY J.A. CHECKED BY [illegible]

SAMPLER HAMMER WT. 140 LBS. DROP 28 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

SAMPLE CONDITION

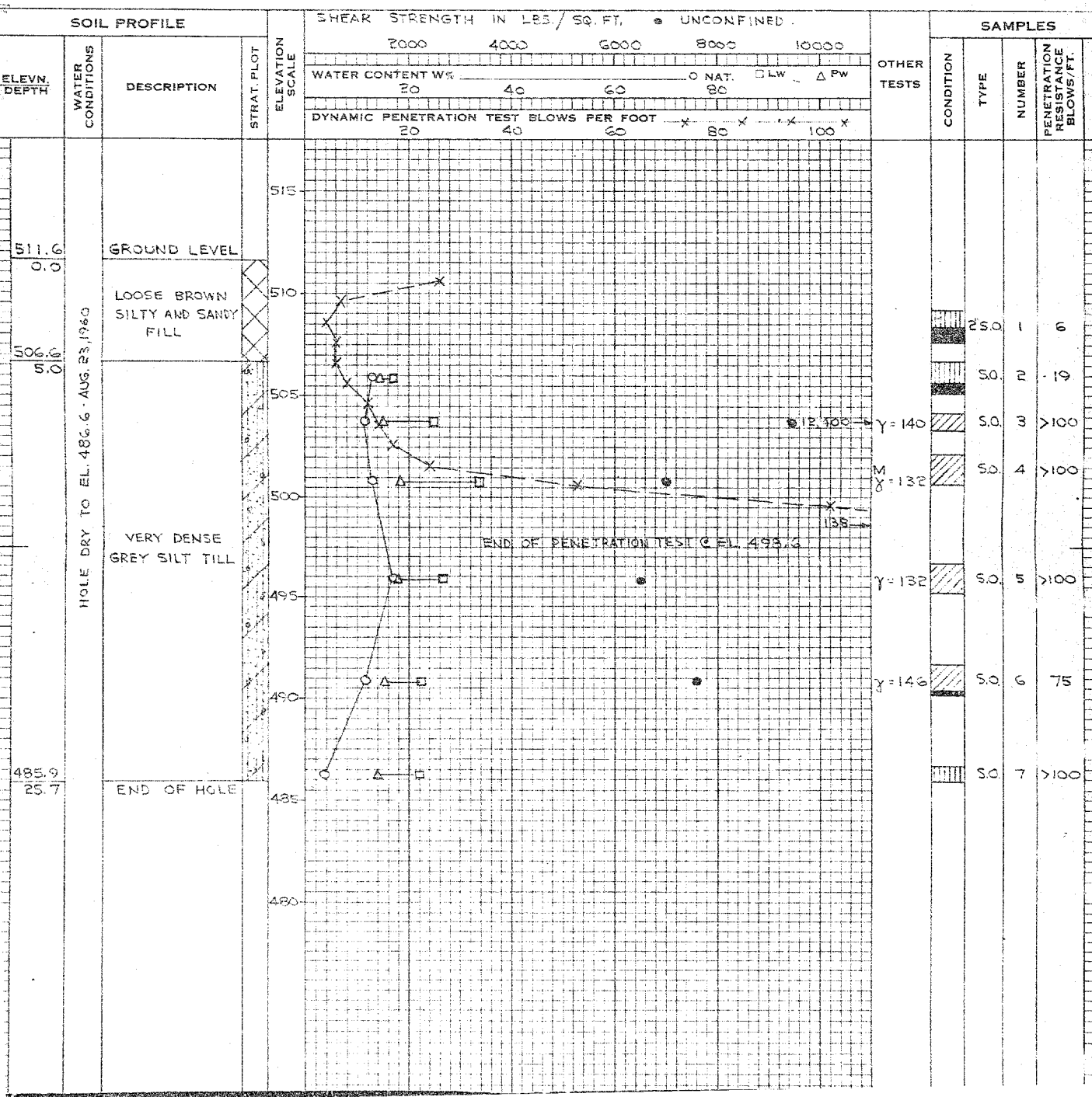
DISTURBED
FAIR
GOOD
LOST

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



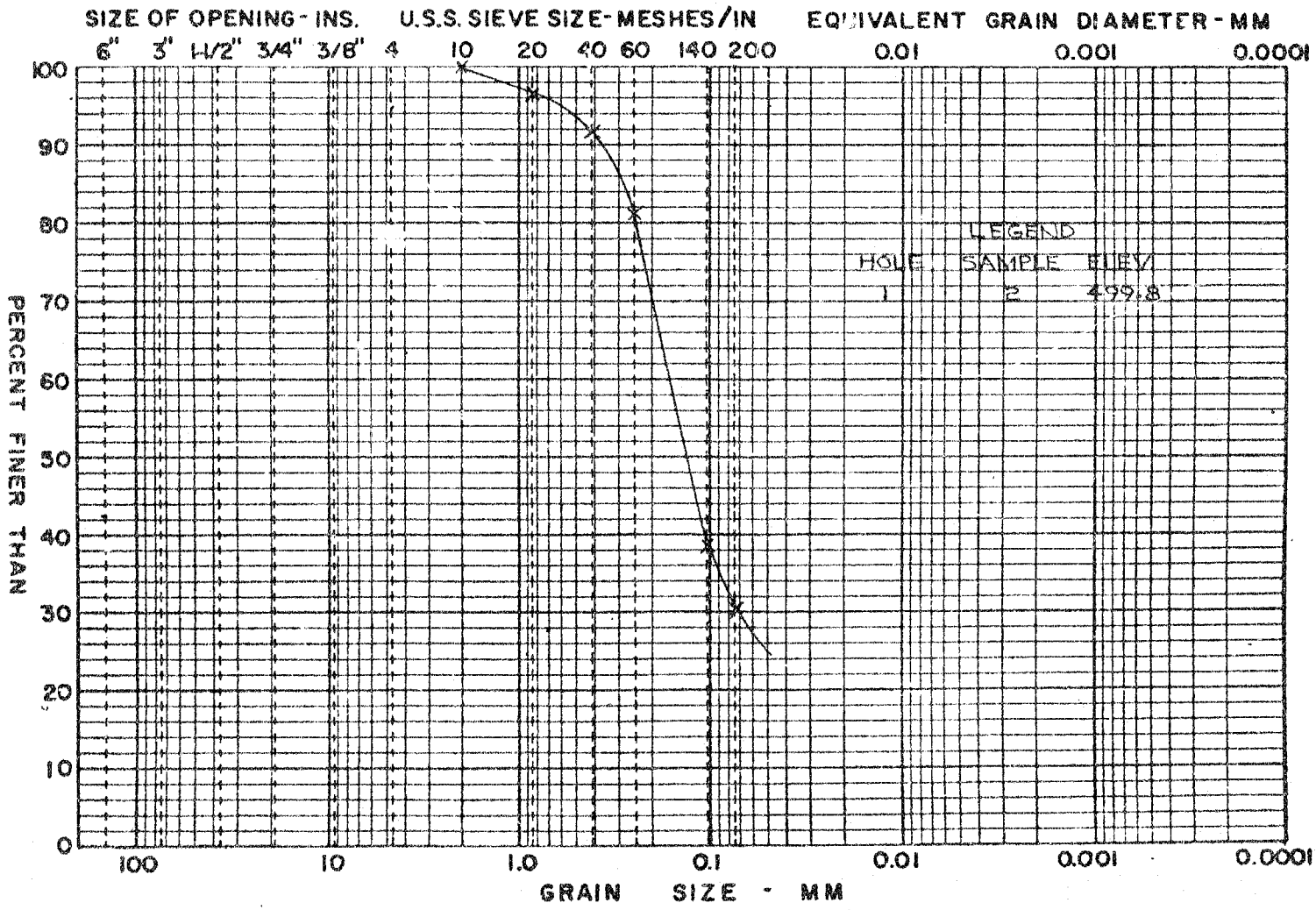
APPENDIX II

FIGURES - LABORATORY TESTING

GRAIN SIZE DISTRIBUTION

SILTY AND SANDY FILL

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



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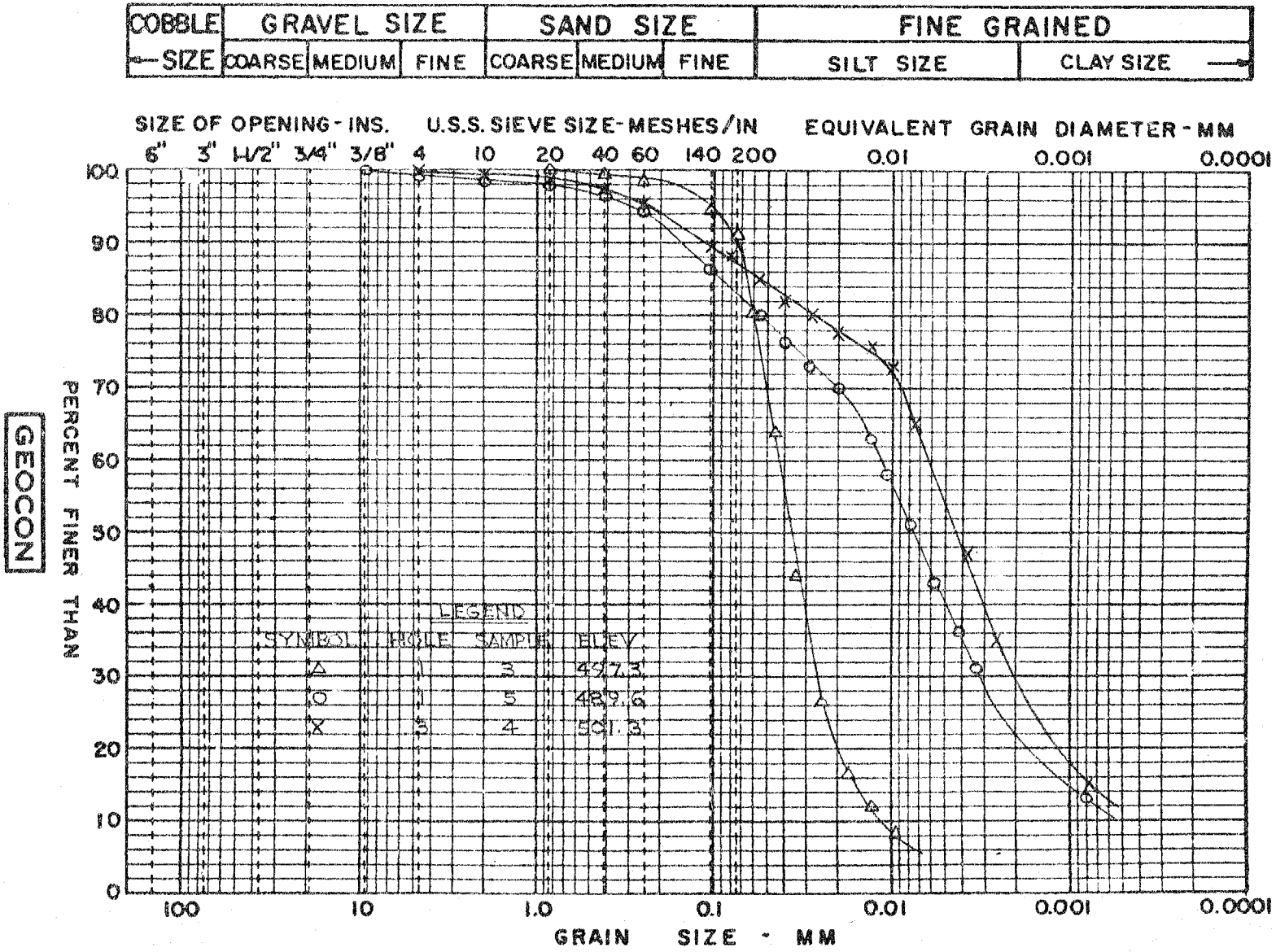
M.I.T. GRAIN SIZE SCALE

APPENDIX II
FIGURE 1
PROJECT S7129

GRAIN SIZE DISTRIBUTION

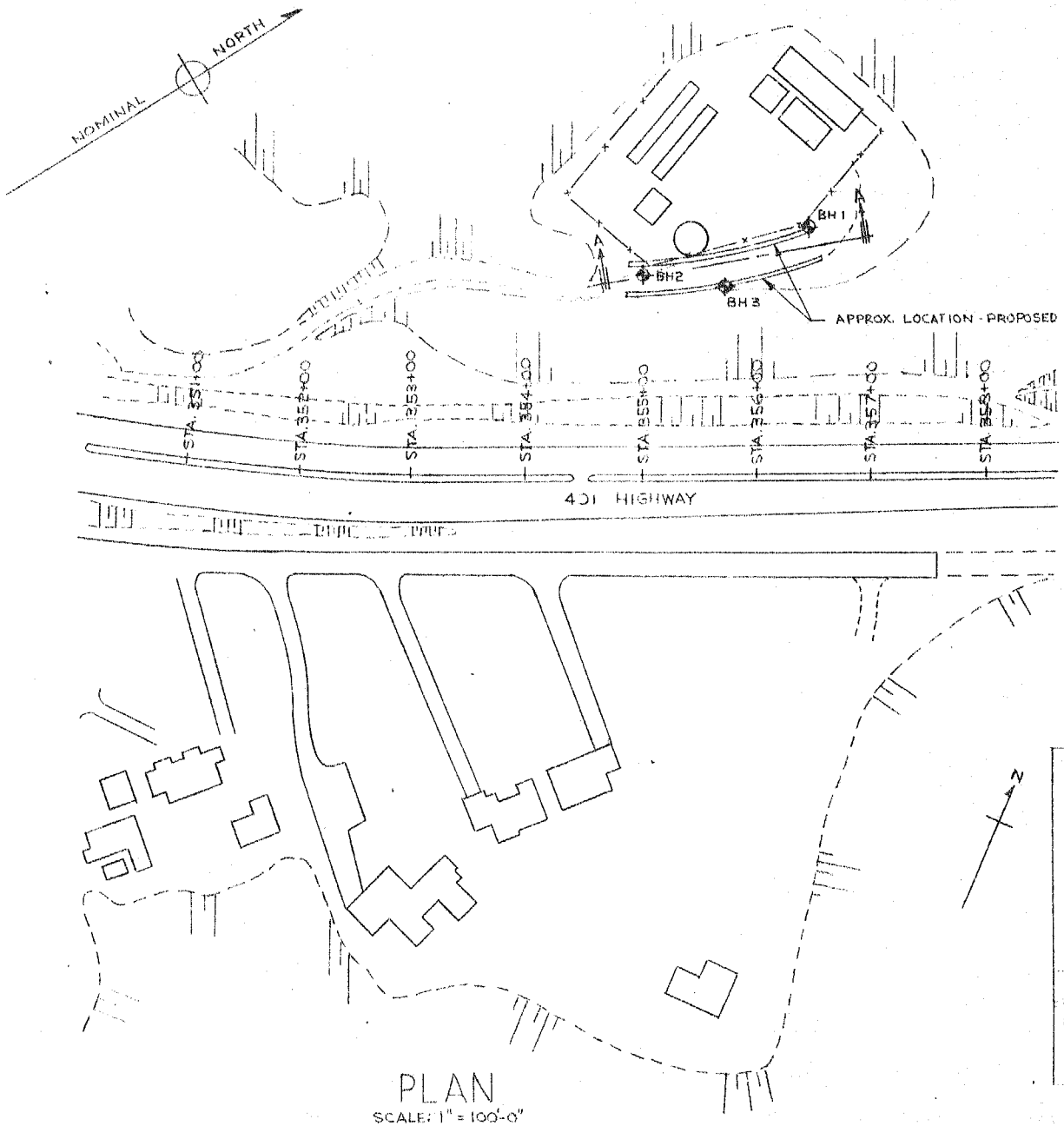
SILT TILL



GEOCON

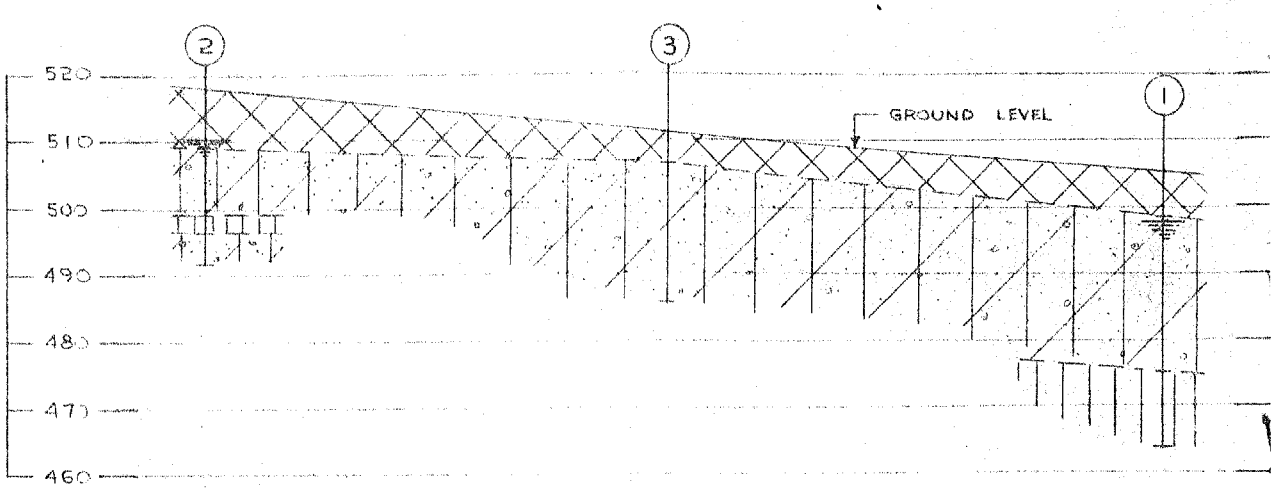
M.I.T. GRAIN SIZE SCALE

APPENDIX II
FIGURE 2
PROJECT S-7129



PLAN

SCALE: 1" = 100'-0"



SECTION A-A
SCALE: 1" = 20'-0"

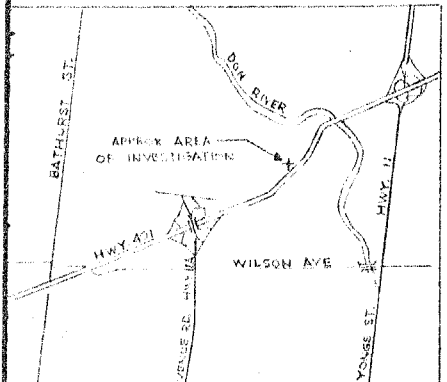
LEGEND

- BOREHOLE WITH PENETRATION TEST IN PLAN
- (1) BOREHOLE IN ELEVATION
- WATER LEVEL IN HOLE - AUGUST 23, 1960

STRATIGR

- LOOSE BROWN SILT
- COMPACT TO VERY
- DENSE TO VERY DE

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



KEY PLAN
SCALE 1" = 0.6 MILES (APPROX)

DEPARTMENT OF HIGHWAYS, ONTARIO
TORONTO ONTARIO

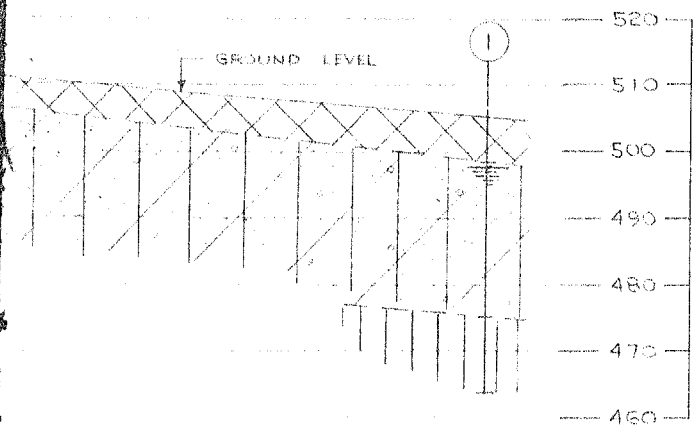
PROPOSED RETAINING WALLS
HOGG'S HOLLOW
TORONTO ONTARIO

BORING PLAN AND SOIL STRATIGRAPHY

GEO

DATE AUG

MADE	CHKD.
J.A.	JZS



ION A-A
: 1" = 20'-0"

STRATIGRAPHY

OR TEST IN PLAN

LOOSE BROWN SILTY AND SANDY FILL

COMPACT TO VERY DENSE GREY SILT TILL

DENSE TO VERY DENSE GREY SILT

AUGUST 23, 1960

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

30 M 11-77

OF HIGHWAYS, ONTARIO

ONTARIO

RETAINING WALLS

HOGG'S HOLLOW

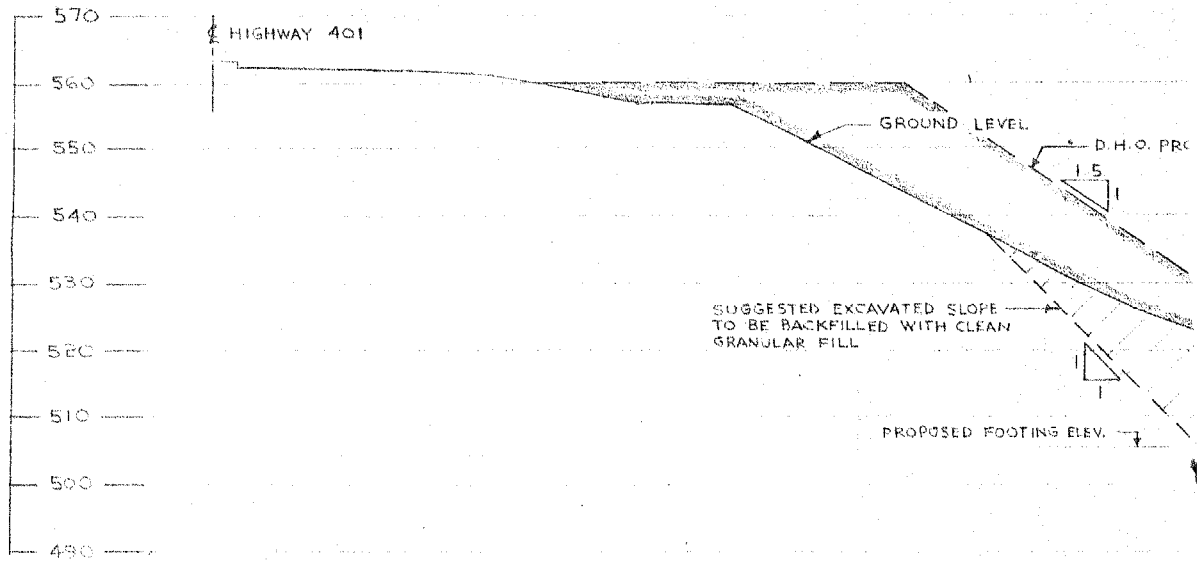
ONTARIO

AND SOIL STRATIGRAPHY

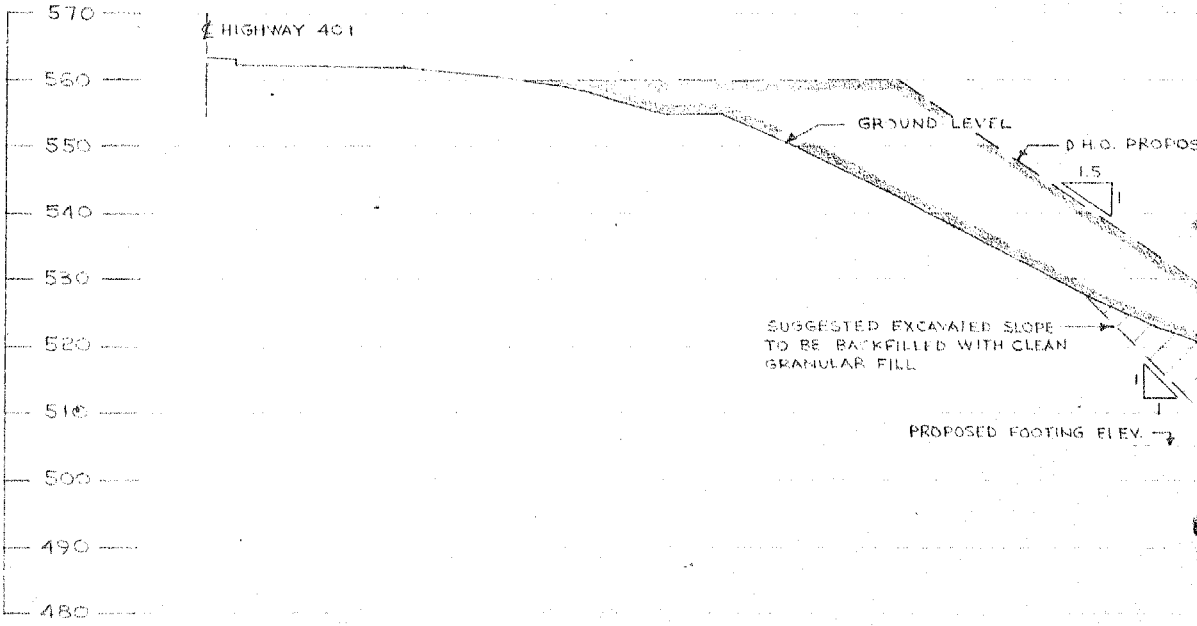
GEOCON LTD

DATE AUG 23, 1960 SCALE AS SHOWN

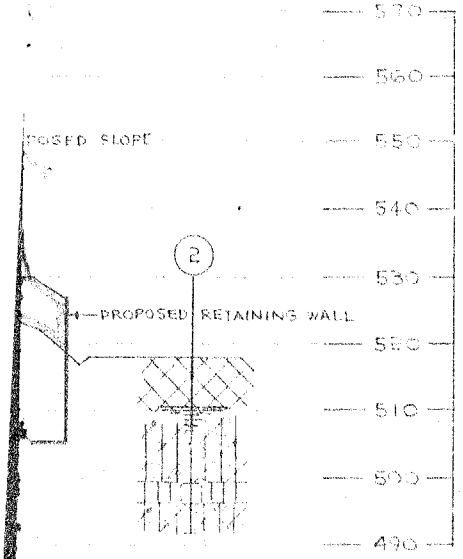
MADE	CHKD.	APPD.	No.
J.A.	JJS	WH	S 7129-1

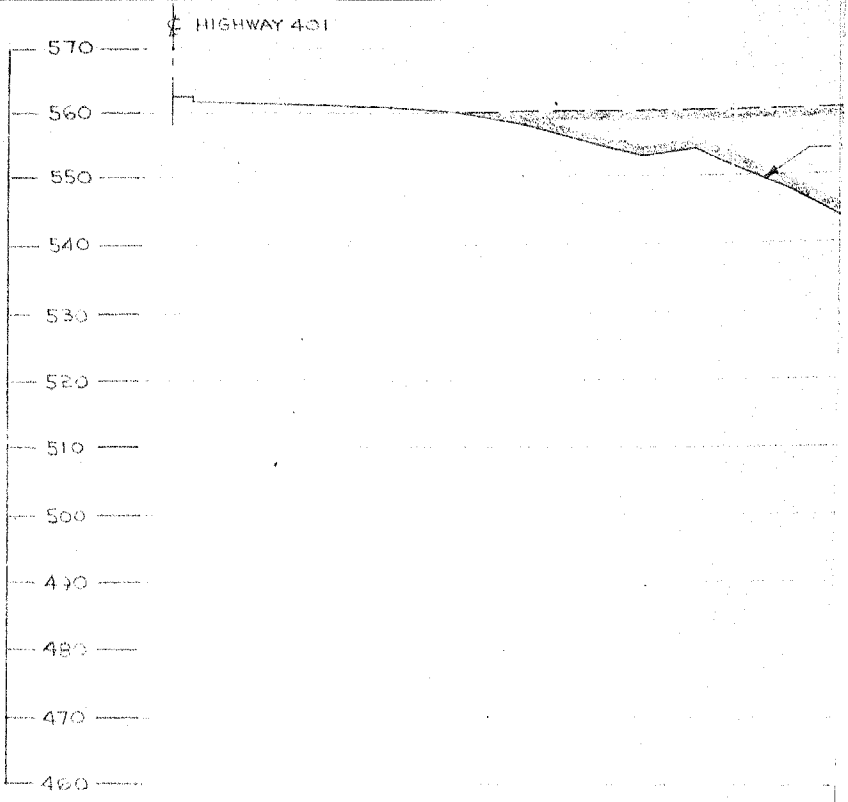


SECTION AT STA. 355+00

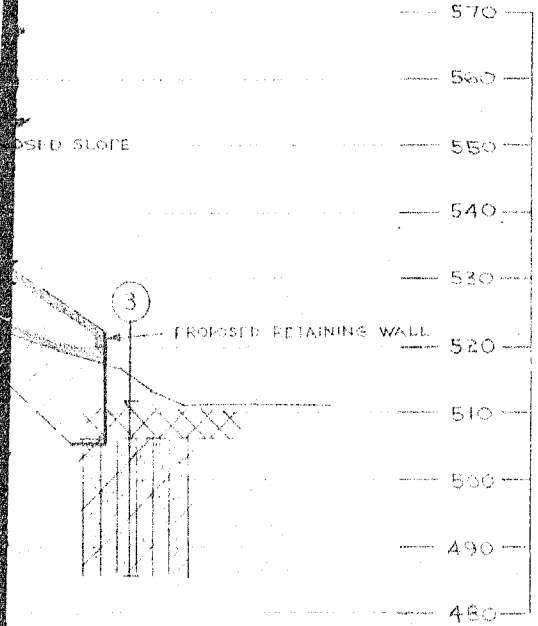


SECTION AT STA. 355+71





SECTION



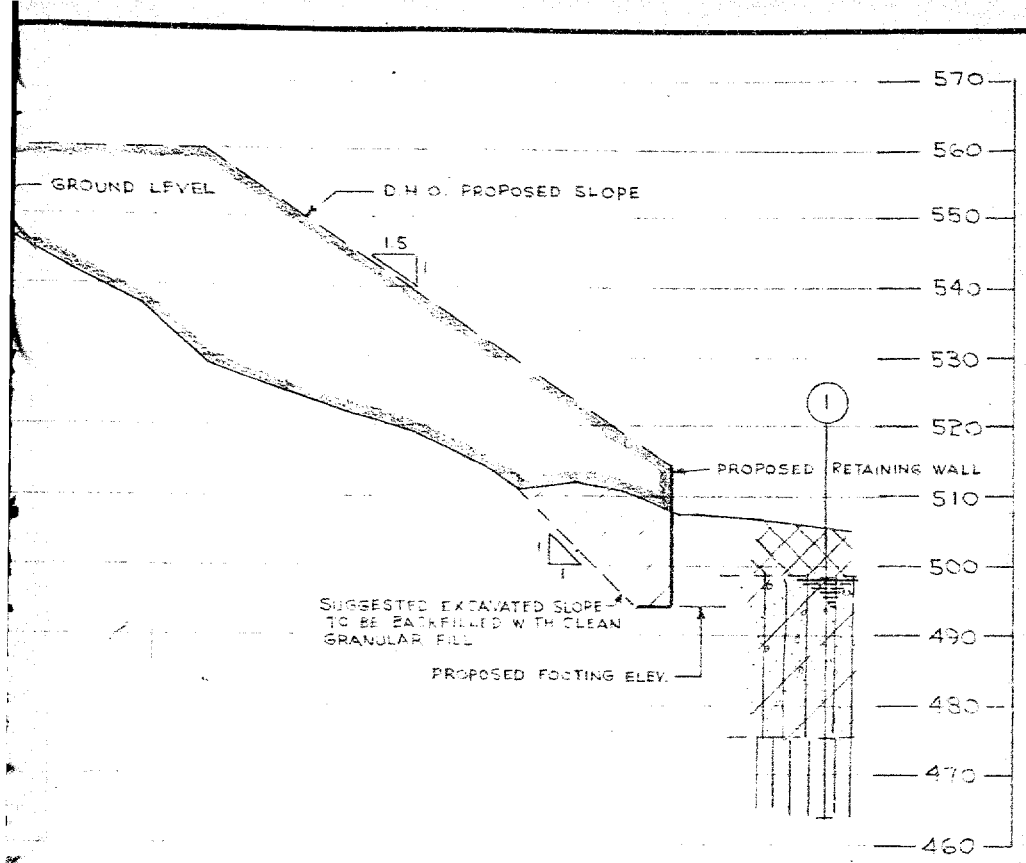
STRATIGRAPHY

LOOSE BROWN SILTY AND SANDY FILL

COMPACT TO VERY DENSE GREY SILT TILL

DENSE TO VERY DENSE GREY SILT

DEPARTM
TORONTO
PROPO
HOGG'S HOLLOW
SUGGES



ON AT STA 356+47

LEGEND

BOREHOLE IN ELEVATION

WATER LEVEL IN HOLE AUGUST 28, 1960

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

30M11-77
GEOCRES No.

MENT OF HIGHWAYS, ONTARIO
ONTARIO
OSED RETAINING WALLS
TORONTO, ONTARIO
STED EXCAVATION LIMITS

GEOCON LTD

DATE: SEPT. 12, 1960 SCALE: 1" = 20'-0"

MADE	CHKD.	APPD.	No.
J.A.			S 7129-2