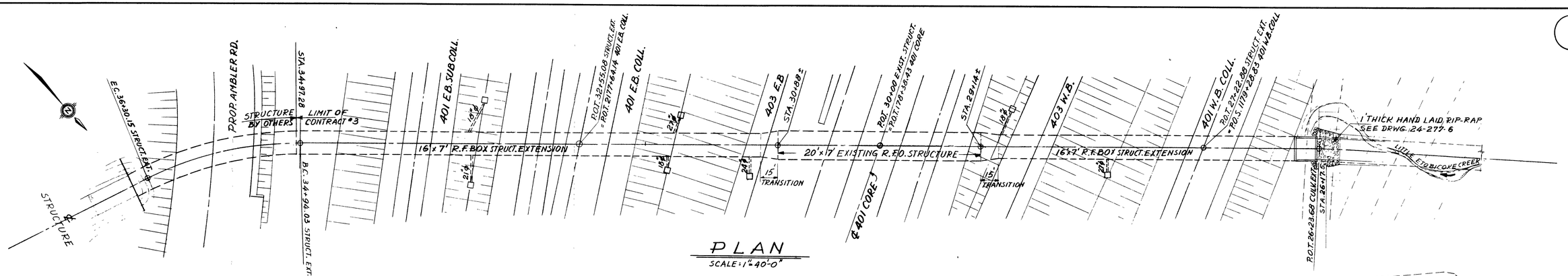
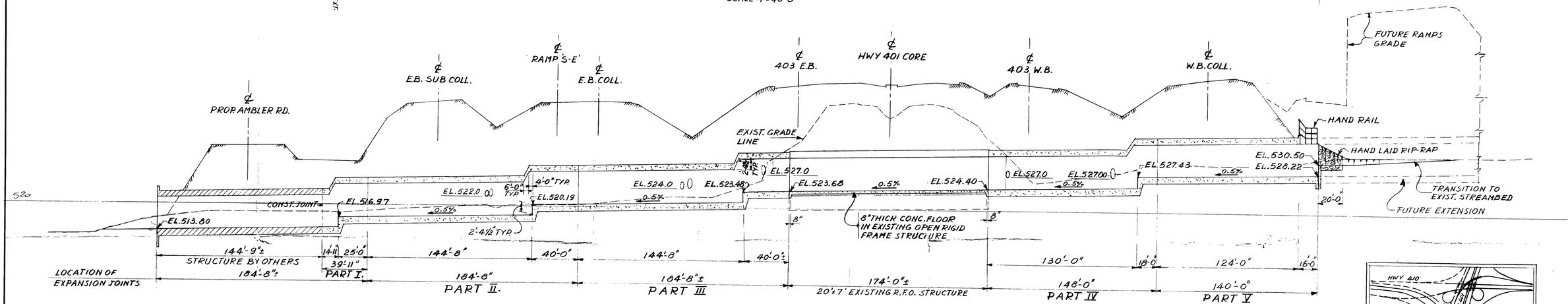
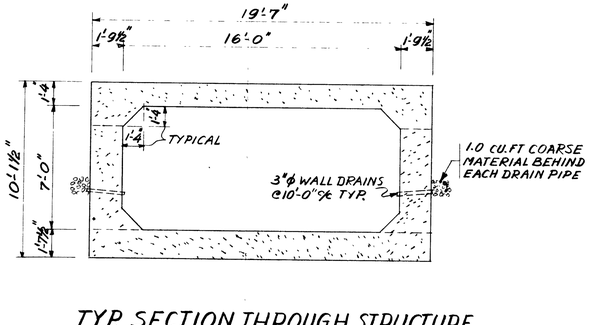
DB-BR-13 REV



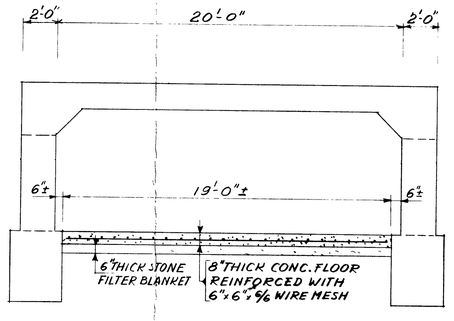
PLAN
SCALE: 1" = 40'-0"



DEVELOPED SECTION ALONG ℄ OF STRUCTURE
SCALE: HORIZ. 1" = 40'-0"
VERT. 1" = 10'-0"



TYP. SECTION THROUGH STRUCTURE
SCALE: - ¼" = 1'-0"



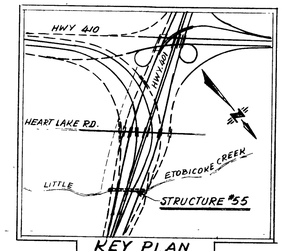
SECTION THROUGH EXIST. STRUCTURE
SCALE: - ¼" = 1'-0"

GENERAL NOTES

CLASS OF CONCRETE 3000 P.S.I.
CLEAR COVER ON REINFORCING STEEL 3" EXCEPT AS NOTED
ALL EXPOSED CORNERS TO BE CHAMFERED ¾"
FILL SHALL BE PLACED AT BOTH SIDES OF STRUCTURE SIMULTANEOUSLY
STRUCTURE SHALL BE BUILT IN ACCORDANCE WITH M.T.C FORM 9
REINFORCING STEEL SHALL BE HARD GRADE
WALL DRAINS SHALL BE BITUMINIZED FIBRE PIPE. VERTICAL LOCATION OF WALL DRAINS SHALL BE DETERMINED IN FIELD BY THE ENGINEER
FOR GRANULAR BACKFILL REQUIREMENTS SEE DWG. 24-277-7

LIST OF DRAWINGS

FOR REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN



KEY PLAN
N.T.S.

FINALIZED FEB. 12/75 lb

PRINT RECORD		
No	FOR	DATE

REVISIONS		
DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

LITTLE ETOBICOKE CREEK
STRUCTURE #55

KING'S HIGHWAY No. 401 — DIST. No. 6
CO. PEEL
TWP. TOWN OF MISSISSAUGA — LOT — CON.

GENERAL LAYOUT

APPROVED — STRUCTURAL ENGINEER

DESIGN	J.Sz	CHECK	A.K.
DRAWING	J.Sz	CHECK	G.F.M.S
DATE	MAR. 1974	LOADING	H520-44

CONTRACT No.
W.P. No. 127-66-46
SITE No. 24-277 SHEET 1

Final

NU TRANSLAR 2M-7-72

23+90
23+90
23+90

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

GEOCRES No: 30M12-72

MEMORANDUM

TO: Mr. G.C.E. Burkhardt, (3)
Regional Structural Planning Eng.,
Central Region,
3501 Dufferin St., Downsview.

FROM: Foundations Office,
Design Services Branch,
West Bldg., Downsview.

ATTENTION:

DATE: December 17, 1973.

OUR FILE REF.

IN REPLY TO DEC 19 1973

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
The Proposed Structure at the
Crossing of Hwy. 403 Extension and
Little Etobicoke Creek (Bridge #56)
Town of Mississauga
County of Peel
Site 24-335, District #6, Toronto
W.O. 73-11091 -- W.P. 127-66-~~25~~ 47

Attached we are forwarding to you our detailed foundation investigation report on the subsoil conditions existing at the above-mentioned site.

We believe that the factual data and recommendations contained therein will prove adequate for your design requirements. Should additional information be required, please do not hesitate to contact our Office.

A. G. Stermac,
PRINCIPAL FOUNDATIONS ENGINEER.

AGS/ao
Attch.
c.c. E. J. Orr
B. R. Davis
A. Rutka
R. S. Pillar
H. Greenland
B. J. Giroux
C. Mirza
G. A. Wrong
B. A. Singh

Foundations Files
Documents

TABLE OF CONTENTS

FOUNDATION INVESTIGATION REPORT
For
The Proposed Structure at the
Crossing of Hwy. 403 Extension and
Little Etobicoke Creek (Bridge #56)
Town of Mississauga
County of Peel
Site 24-335 District #6 Toronto
W.O. 73-11091 -- W.P. 127-66-~~25~~ 47

1. *INTRODUCTION:*

The Foundations Office was requested to carry out a subsurface investigation at the site of the proposed Bridge #56 (Hwy. 403 extension over Little Etobicoke Creek) in the town of Mississauga, County of Peel. The request was contained in a memo from Mr. G.C.E. Burkhardt, Regional Structural Planning Engineer, Central Region, dated November 5th, 1973. Subsequently, an investigation was carried out by this office to determine the subsoil and groundwater conditions in this area.

This report presents the factual information obtained from this investigation together with recommendations pertaining to the foundation design of the proposed structure and stability of the approach embankments.

2. *DESCRIPTION OF SITE AND GEOLOGY:*

The site is located about 3/4 of a mile south of the intersection of Eglinton Avenue and Tomken Road, in the Town of Mississauga, County of Peel. The land is flat to gently undulating between elevations 438 and 440. In this area, the land is primarily developed for farming purposes.

The site is located in the physiographic region known as the "Peel Plain". The characteristic deposit in the

....2

vicinity of the area under investigation, is composed of a cohesive glacial till whose thickness is quite variable and underlain by shale bedrock.

3. *FIELD AND LABORATORY WORK:*

Four sampled boreholes, each accompanied with a dynamic cone penetration test, were put down during the course of the field investigation. The borings were advanced by means of a continuous flight auger machine adapted for soil sampling purposes.

Samples of the overburden were obtained by means of a 2" OD split spoon sampler which was driven into the soil in accordance with the specifications for the Standard Penetration Test. The same method was used to advance the dynamic cone penetration testing.

Groundwater level observations were carried out during the period of investigation, in the open boreholes.

The soil and groundwater conditions encountered at the boring locations are presented in the Record of Borehole sheets. The location and ground elevation of the various boreholes were surveyed in the field by construction personnel from District 6 (Toronto). The elevations in this report are referenced to a Geodetic datum. The borehole locations, referenced to a co-ordinate system and elevations, together with estimated stratigraphical sections, are shown on Drawing No. 73-11091A.

All the samples were subjected to a careful visual examination in the field and subsequently in the laboratory. Following this examination, laboratory testing was carried out on selected representative samples to determine the various physical properties of the over burden, namely:

Natural Water Contents
Atterberg Limits
Grain-Size Distribution

....3

The results of the laboratory testing were presented on the Record of Borehole sheets as well as summarized on Figures #1, #2 and #3 inclusive, all of which are contained in the Appendix of this report.

4. *SUBSOIL CONDITIONS:*

4.1) *General:*

Under a 3.5 to 5.5 ft. thick surficial deposit is the predominant stratum across the site which is composed of a heterogeneous mixture of hard clayey silt, sand and gravel (glacial till). The glacial till is underlain by a dense deposit of silty sand and gravel.

The boundaries of the various deposits, as determined in the boreholes, are shown on the accompanying Record of Borehole sheets. The stratigraphical sections shown on Drawing No. 73-11091A have been inferred from this data. From ground surface downward, the various soil types encountered are as follows:

4.2) *Surficial deposit - Clayey Silt with Sand and Gravel and Organics:*

The surficial deposit consists of clayey silt, sand and few gravel and traces of organics. The thickness of this stratum ranges from 3.5 to 5.5 feet. It is estimated that the consistency of this deposit ranges from firm to stiff. The grain-size distribution curves for this deposit are shown on Figure 1 in the Appendix.

4.3) *Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till):*

This is the predominant stratum across the site which underlies the surficial deposit. It is composed of a heterogeneous mixture of clayey silt, sand and gravel (Glacial till). At Borehole #1 only, occasional limestone cobbles exist below elevation 430. The thickness of this stratum

....4

was found to be 22 feet at Borehole #1. Elsewhere, the lower boundary of the glacial deposit was not established.

Grain-size distribution curves for samples of this cohesive deposit, are shown on Figure 2 in the Appendix. Atterberg limit tests were also performed on samples of the glacial till. The results, which are shown on the Record of Borehole sheets and on the Plasticity Chart (Figure 3), are tabulated below:

	Range	Average
Liquid Limit (W_L) %	18 - 31	25
Plastic Limit (W_p) %	13 - 20	17
Natural Moisture Content (W) %	7 - 13.5	10

Based on the above values, it may be concluded that the glacial till has a matrix, which is inorganic and of low plasticity.

The results of Standard Penetration tests, carried out within the glacial till, are plotted on the Record of Borehole sheets and Drawing No. 73-11091A. The testing gave 'N' values generally ranging from 19 to over 100 blows/ft. It is estimated that the consistency of the glacial till varies from very stiff to hard.

4.4) Silty Sand with Gravel:

This granular deposit was intersected only in Borehole 1 underlying the glacial till stratum. Elsewhere, the borings were terminated within the glacial deposit. It consists of silty sand with gravel. Due to the existence of limestone cobbles in the overlying glacial till deposit, only BXL size core samples may readily be obtained in this stratum. As a result of this, no Standard Penetration testing was carried out within this deposit. However, it is estimated that the relative density of this granular deposit is from dense to very dense.

5. *GROUNDWATER CONDITIONS:*

Groundwater level observations were carried out

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during the period of the field work. The observed water levels are presented on the individual Record of Borehole sheets as well as on Drawing No. 73-11091A. The results indicate that the groundwater level varies between elevations 436.6 and 441.2.

6. *DISCUSSION AND RECOMMENDATIONS:*

6.1) *General:*

The proposed Hwy. 403 extension east of Tomken Road will cross the relocated Little Etobicoke Creek at Station 304 + 15. The available information indicates that an 106-foot wide single span (50 feet) structure (Bridge #56) is required at this crossing. The proposed profile grade of Hwy. 403 extension at the crossing will be such that the maximum height of embankment is about 12 feet above the existing ground level.

The subsoil consists of a 3.5 to 5.5 ft. thick firm to stiff surficial cohesive deposit underlain by glacial till, which in turn is followed by silty sand and gravel deposit (Borehole 1).

6.2) *Foundations:*

The glacial till deposit is competent, therefore, spread footing type of foundations may be used to support the closed type abutments. It is recommended to place the footings at or below elevation 432, in order to provide sufficient protection against frost action.

An allowable bearing pressure of up to 3.5 tsf may be used in designing the footings, founded as recommended. In computing the lateral resistance of the footings, an adhesion value of 2,000 psf may be used between the rough concrete surface and glacial till.

If the structure is designed as a rigid frame, a coefficient of earth pressure at rest (K_o) of 0.5 should

....6

be assumed for the granular backfill behind the abutment walls, when designing the wall sections. However, if some movement at the top of the abutment walls is permitted, then a coefficient of active earth pressure(K_a) of 0.33 may be used.

The excavations for the footings will be carried out within the cohesive glacial till. In view of the relatively impervious nature of the glacial till, no major dewatering problems are anticipated. It is assumed that the eastern footing will be constructed after the proposed stream diversion is completed. Any groundwater seepage or uncontrolled surface runoff into the excavations could be handled by employing ordinary pumping methods.

The foundation subsoil will settle due to the imposed foundation loading. The subsoil is composed of a competent cohesive glacial till, thus the settlement will be of a recompression nature. For a spread footing foundation imposing the afore mentioned pressure, it is estimated that the settlement should not exceed one half of an inch, provided the subsoil is not softened by groundwater seepage or uncontrolled surface runoff.

6.3) Approach Embankments:

The maximum height of the proposed approaches to the new structure will be about 12 feet. Subsoil conditions are favourable and no stability problems are anticipated provided:

1. The topsoil within the plan limits of the proposed embankments for a minimum distance of 50 feet behind the abutments be removed prior to the construction of the embankment fills.
2. The approach fills are constructed with 2:1 side slopes.

7. MISCELLANEOUS:

The field work was carried out between November 16th and November 22nd, 1973, under the supervision of Mr. V. Korlu, Project Foundations Engineer, who also prepared this report.

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The drilling equipment used was owned and operated by P.V.K. & Sons of Brantford.

This report was reviewed by Mr. M. Devata, Supervising Foundation Engineer.

V. Korlu, P. Eng.,

M. Devata, P. Eng.,

VK/ji
Nov. 10, 1973.

APPENDIX I

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS–ONTARIO

DESIGN SERVICES BRANCH FOUNDATIONS OFFICE

RECORD OF BOREHOLE № 1

JOB 73-11091 LOCATION Co.Ord's 15,850,807 N; 967,953 E ORIGINATED BY VK

W.P. 127-66-47 BORING DATE November 16th, 1973 COMPILED BY VK

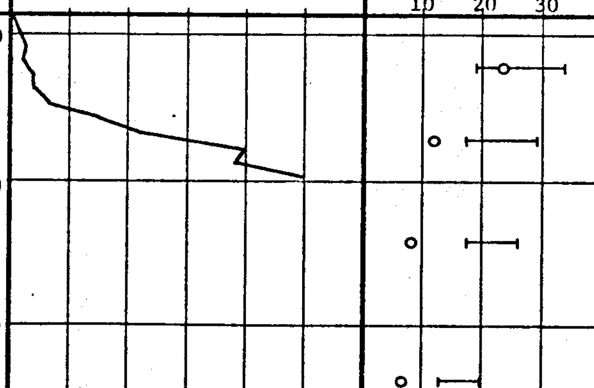
DATUM Geodetic BOREHOLE TYPE Auger and Core with C.M.E.-55 CHECKED BY SR

ELEV. / DEPTH	DESCRIPTION	SAMPLE NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	WATER CONTENT % (10 20 30)	BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
441.2	Ground Level							⊥ 0.0
0.0	Clayey silt with sand &few gravel&organics stiff				440			
437.7 / 3.5		1	SS	13			org. 0.94%	0 18 56 26
	Brown	2	SS	19				
	Grey	3	SS	100				6 24 52 18
	Het.Mix of clayey silt, sand and few gravel(glacial till) (with limestone cobbles below elevation 430) Hard	4	SS	100/1"	430			
		5	BXL	-				7 27 50 16
					420			
415.7 / 25.5	Silty sand with gravel and trace of clay. Very dense	6	BXL	-				46 21 23 10
					410			
		7	BXL	-				
					400			
		8	BXL	-				
393.2 / 48.0	End of Borehole				390			

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100

SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE

LIQUID LIMIT — W_L PLASTIC LIMIT — W_P WATER CONTENT — W



$15 \diamond 5$ (20 / 10) % STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE No 2

JOB 73-11091 LOCATION Co.Ord's 15,850,722 N; 968,033 E ORIGINATED BY VK

W.P. 127-66-47 BORING DATE November 22nd, 1973 COMPILED BY VK

DATUM Geodetic BOREHOLE TYPE Auger and Core with C.M.E.-55 CHECKED BY CP

SOIL PROFILE ELEV./DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (20 40 60 80 100) SHEAR STRENGTH P.S.F. ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	LIQUID LIMIT w_L PLASTIC LIMIT w_P WATER CONTENT w WATER CONTENT % (10 20 30)	BULK DENSITY γ P.C.F.	REMARKS GR.SA.SI.CL.
440.0	Ground Level									
0.0	Clayey silt with sand and few gravel and some organics		1	SS	10				org. 2.3%	▼ 438.0
434.5	Stiff									0 30 54 16
5.5	Brown / Grey Het.Mix. of clayey silt, sand and gravel (Glacial Till)		2	SS	26					
			3	SS	111	430				6 25 49 20
			4	SS	129					
			5	SS	175					
	Hard		6	SS	81	420				
			7	SS	129					8 31 43 18
411.0			8	SS	99					
29.0	End of Borehole					410				

20
15 ◇ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE No 3

JOB 73-11091 LOCATION Co.Ord's.15,850,853 N; 967,986E ORIGINATED BY VK

W.P. 127-66-47 BORING DATE November 20th, 1973 COMPILED BY VK

DATUM Geodetic BOREHOLE TYPE Auger and Core with C.M.E.-55 CHECKED BY SP

ELEV./DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80 100) SHEAR STRENGTH P.S.F. (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W WATER CONTENT % (10 20 30)	BULK DENSITY γ P.C.F.	REMARKS GR.SA.SI.CL
440.4	Ground Level									
0.0	Clayey silt with sand &few gravel&traces of organics. Firm		1	SS	5	440				▼438.6
435.4										
5.0	Brown Grey Het.Mix. of clayey silt, sand and gravel (Glacial Till) Hard		2	SS	67					8 23 47 22
			3	SS	135					
			4	SS	151/11"	430				
			5	SS	130/10"					14 26 42 18
			6	SS	98					
						420				
			7	SS	79					
412.4			8	SS	100/1"					
28.0	End of Borehole					410				

OFFICE REPORT ON SOIL EXPLORATION

20
15 ◇ 5 % STRAIN AT FAILURE
10

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE Nº 4

JOB 73-11091 LOCATION Co.Ord's 15,850,770 N; 968,064 E ORIGINATED BY VK

W.P. 127-66-47 BORING DATE November 20th, 1973 COMPILED BY VK

DATUM Geodetic BOREHOLE TYPE Auger and Core with C.M.E.-55 CHECKED BY SR

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT
438.9	Ground Level				
0.0	Clayey silt with sand &few gravel&traces of organics.		1	SS	7
433.4	Firm		2	SS	51
5.5			3	SS	158
	Brown Grey		4	SS	183/11"
	Het.Mix. of clayey silt,sand and gravel (Glacial till)		5	SS	180
	Hard		6	SS	124
			7	SS	127
409.9			8	SS	142
29.0	End of Borehole				

ELEV. SCALE: 430, 420, 410, 400

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT — 20 40 60 80 100

SHEAR STRENGTH P.S.F. — ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE

LIQUID LIMIT w_L — PLASTIC LIMIT w_P — WATER CONTENT w

WATER CONTENT % — 10 20 30

BULK DENSITY γ P.C.F.

REMARKS — GR. SA. SI. CL.

▼ 436.6

1 40 45 14

16 28 45 11

20
15 ◇ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

GRAIN SIZE DISTRIBUTION

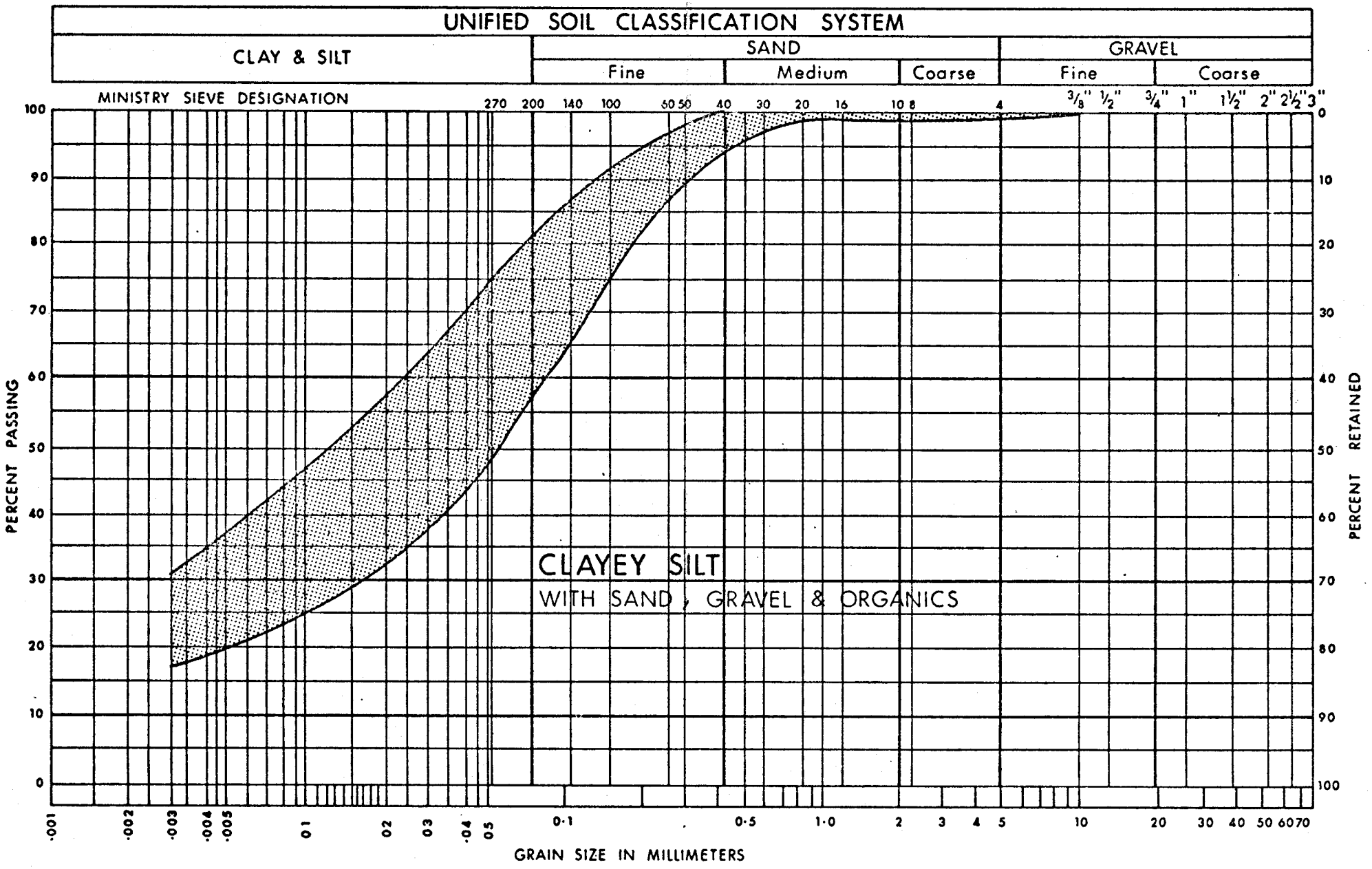


FIG. 1

W.O. 73-11091

GRAIN SIZE DISTRIBUTION

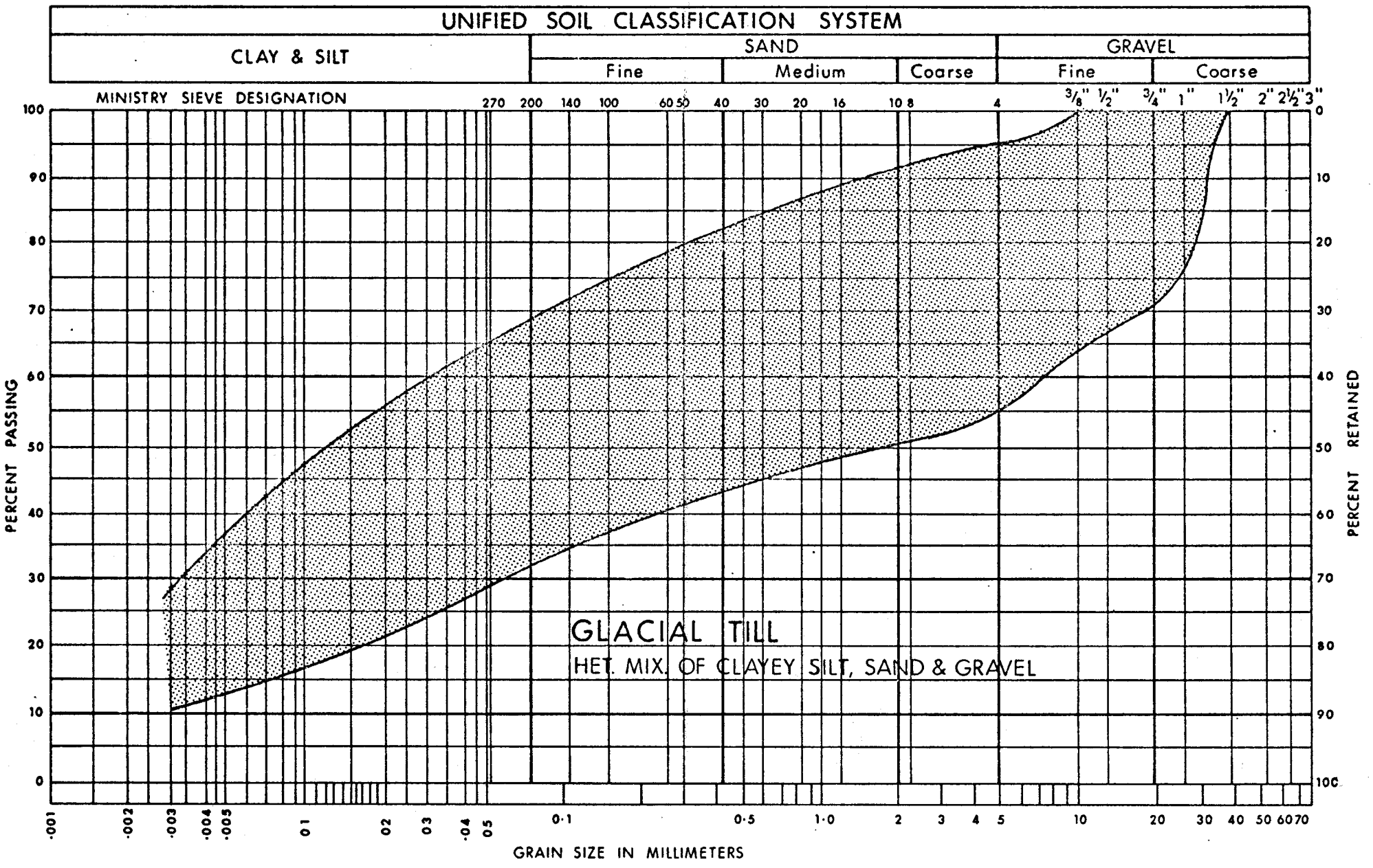


FIG. 2

W.O. 73-11091

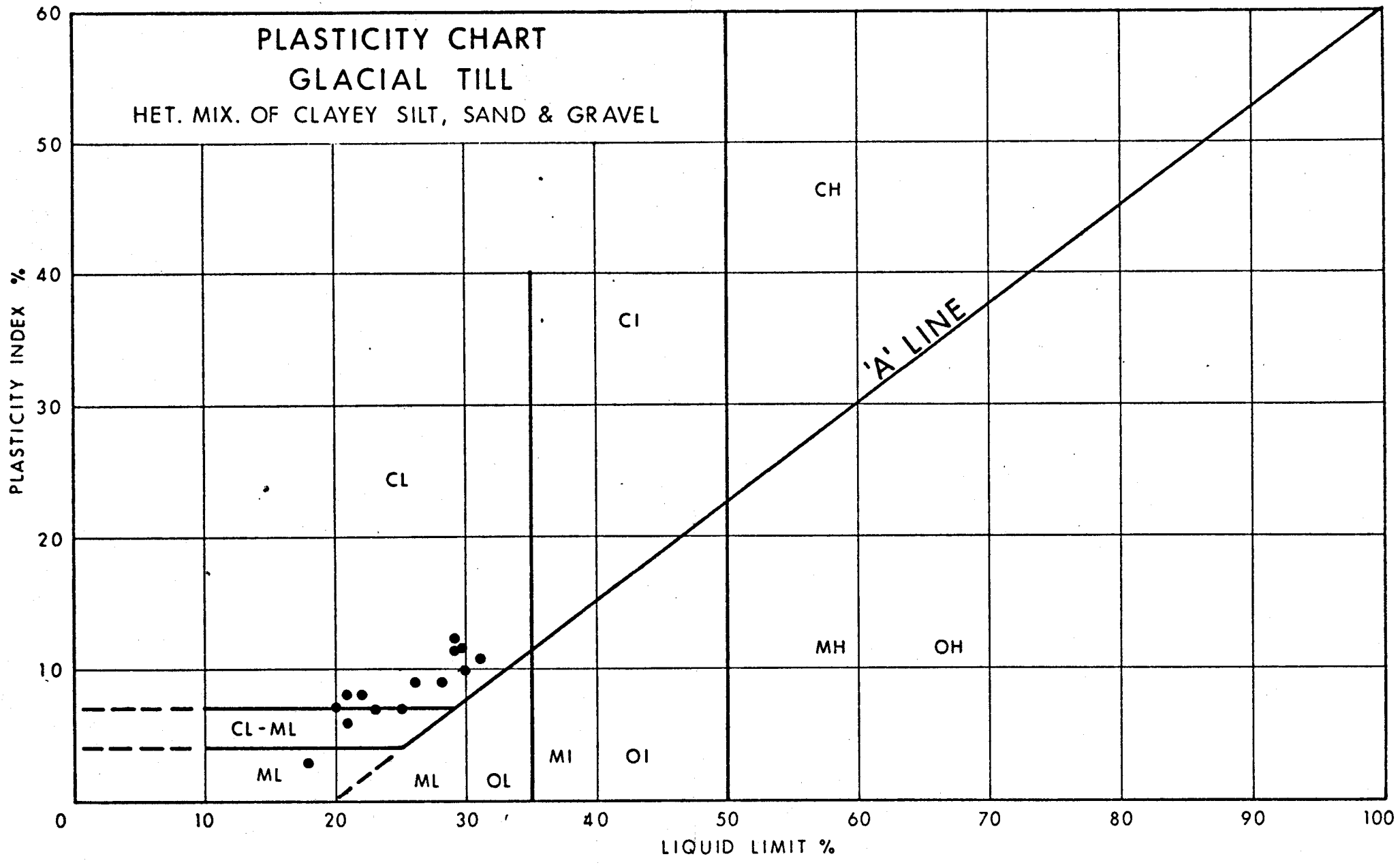


FIG. 3

W.O. 73-11091

FD-9a (Rev. Jan. 73)

ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

PENETRATION RESISTANCE

'N'- STANDARD PENETRATION RESISTANCE : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS : -

CONSISTENCY	c LB./SQ.FT.
VERY SOFT	0 - 250
SOFT	250 - 500
FIRM	500 - 1000
STIFF	1000 - 2000
VERY STIFF	2000 - 4000
HARD	> 4000

DENSENESS	'N' BLOWS / FT.
VERY LOOSE	0 - 4
LOOSE	4 - 10
COMPACT	10 - 30
DENSE	30 - 50
VERY DENSE	> 50

TERMS TO BE USED IN DESCRIBING SOILS:-

TRACE < 10 % , SOME 10-25 % , WITH 25-40 % , > 40 % SILTY, SANDY, GRAVELLY, CLAYEY ETC.

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.T.	SLOTTED TUBE SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE

P.H. SAMPLE ADVANCED HYDRAULICALLY

P.M. SAMPLE ADVANCED MANUALLY

SOIL TESTS

U	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
UU	UNCONSOLIDATED UNDRAINED TRIAXIAL	F.V.	FIELD VANE
CIU	CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL	C	CONSOLIDATION
CID	" " DRAINED "	S	SENSITIVITY
CAU	" ANISOTROPIC UNDRAINED "		
CAD	" " DRAINED "		

FD-9b (Rev. Jan. 73)

ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_P	PLASTIC LIMIT
I_P	PLASTICITY INDEX
w_S	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX $= \frac{w - w_P}{I_P}$
I_C	CONSISTENCY INDEX $= \frac{w_L - w}{I_P}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX $= \frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE $= \frac{-\Delta e}{(1+e)\Delta \sigma'}$
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX $= \frac{\Delta e}{\Delta \log_{10} \sigma'}$
T_v	TIME FACTOR $= \frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF EFFECTIVE STRESS $\tau_f = c' + \sigma' \tan \phi'$
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF TOTAL STRESS $\tau_f = c_u + \sigma \tan \phi$
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	= 3·1416
e	BASE OF NATURAL LOGARITHMS 2·7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ε	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNGS MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

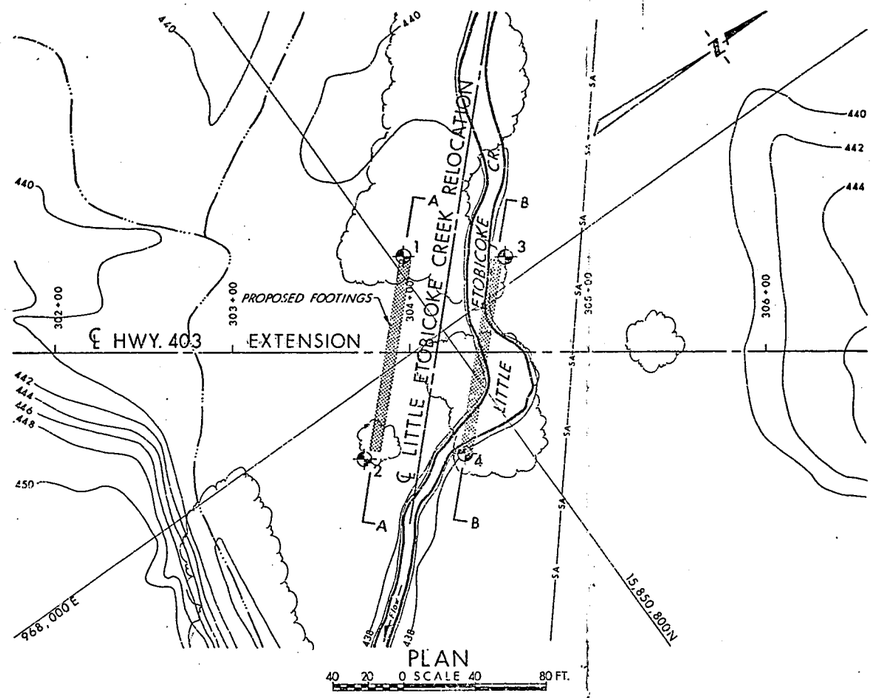
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_o	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY. DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

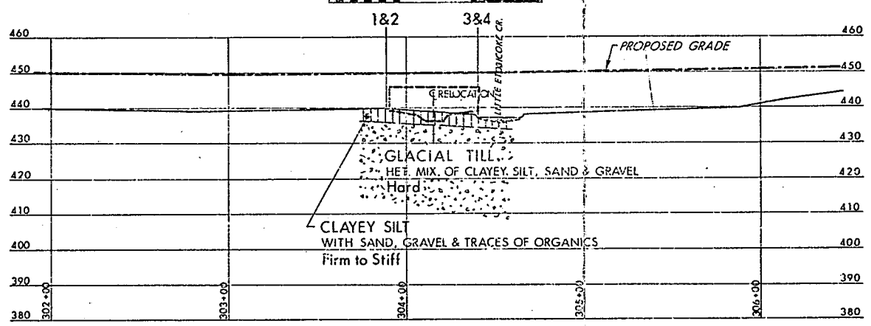
SLOPES

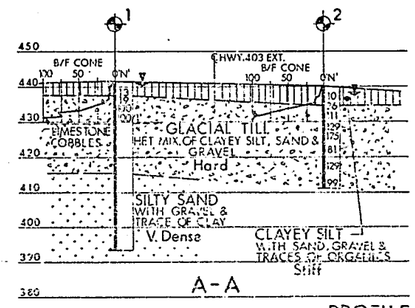
H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



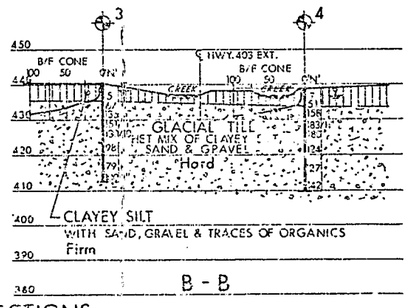
PLAN

40 20 0 SCALE 40 80 FT.





A-A



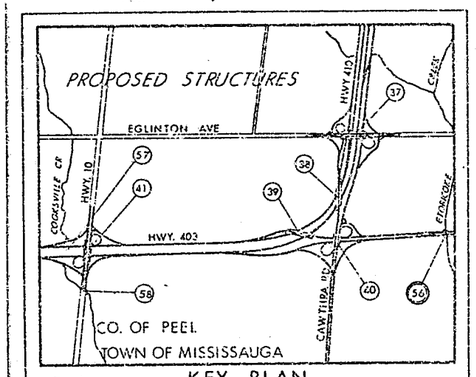
B - B

PROFILE & SECTIONS

HORIZ. 40 20 0 SCALE 40 80 FT.

VERT. 20 10 0 20 40 FT.

REF. No. B 31-116



KEY PLAN

LEGEND

- Bore Hole
- Cone Penetration Test
- Bore Hole & Cone Test
- Water Levels established at time of field investigation, Nov. 1973.

NO.	ELEVATION	CO-ORDINATES	
		NORTH	EAST
1	441.2	15,850,807	967,953
2	440.6	15,850,722	968,033
3	440.4	15,850,853	967,986
4	438.9	15,850,770	968,064

NOTE FOR CONTRACT DOCUMENT:
The complete foundation investigation report for this structure may be examined at the Structural Office and Foundations Office, Downsview, and at the TORONTO District Office.

— NOTE —
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS			
DATE	BY	DESCRIPTION	

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO
DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

LITTLE ETOBICOKE CREEK

HIGHWAY NO. 403 DIST. NO 6
CO. PEEL
TOWN OF MISSISSAUGA LOT CON

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD V.K.	CHECKED A.J.	W.P. NO 127-66-47	DRAWING NO. 73-11091 A
DRAWN S.R.	CHECKED	W.O. NO 73-11091	
DATE DEC 5, 1973		SITE NO	BRIDGE DRAWING NO
APPROVED		CONT. NO	

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. A. G. Stermac,
Principal Foundation Engineer,
West Building.

FROM: G. C. E. Burkhardt,
Structural Planning Office,
3501 Dufferin Street.

ATTENTION: M. Devata

DATE: November 5, 1973.

OUR FILE REF.

IN REPLY TO

W.O. 73-11091

SUBJECT: Little Etobicoke Creek at
Proposed Hwy. 430 Extension (Bridge #56),
W.P. 127-66-47, Site 24-~~336~~ 335
Hwy. 403 Extension, District 6.

When Hwy. 403 Extension is constructed as part of Contract 8 in the 403-410 Project, a bridge structure will be required to carry traffic over the Little Etobicoke Creek. This crossing will be approx. 1,000 ft. East of Tomken Road.

Could you please arrange to have a Foundation Investigation Report prepared for the area of the proposed structure.

I have enclosed the following plans for your information and use. The approximate location of the footings for the proposed structure have been indicated in red on the 1" = 40' general alignment plan.

General Alignment Plan 1" = 40' (1 copy)	B81-116
General Alignment Plan 1" = 100' (2 copies)	3983-4A-1
Profile Hwy. 403 Extension (2 copies)	3983-4B-4
Alignment Sketch with co-ordinates (2 copies)	

Please note that the profile of Hwy. 403 Extension in the area of the proposed structure has been raised by approx. 3'-0" to provide the required opening. The proposed revision to the profile has been indicated on the profile drawing in red.

D H Bye

DHB:lm
Encl.

D. H. Bye,
STRUCTURAL PLANNING SUPERVISOR,
for:
G. C. E. Burkhardt,
REG. STRUCTURAL PLANNING ENG.

c.c. R. Fitzgibbon
J. Anderson
W. Roters
J. Barclay

ACCORDING TO PROGRAMME IT SHOULD HAVE BEEN REQUESTED SEP 5/73.

MDD DEC 26/73.

IP011-ET.0.M