

MEMORANDUM

To: Mr. B. R. Davis,  
Bridge Engineer,  
Bridge Division.  
  
Attention: Mr. S. McCombie

FROM: Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

DATE: January 5, 1967

OUR FILE REF.

IN REPLY TO:

JAN 23 1967

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
The Stability of Slopes of the  
Proposed Mimico Creek Realignment,  
Hwy. #401, Hwy. #27 and Richview  
Expressway Interchange  
District #6 (Toronto)  
W.J. 66-F-112 -- W.P. 201-62-1

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

We believe that you will find the factual data and recommendations contained therein, adequate for your design requirements. Should additional information be required, please feel free to contact our Office.

AGS/MdeF  
Attach.

cc: Messrs. B. R. Davis (2)  
H. A. Tregaskes  
D. W. Farren  
G. K. Hunter (2)  
F. Allen  
T. J. Kovich  
W. S. Melinyshyn  
B. A. Singh

Foundations Office  
Gen. Files

*A. G. Sternac*  
A. G. Sternac  
PRINCIPAL FOUNDATION ENGINEER

## TABLE OF CONTENTS

1. INTRODUCTION.
  2. FIELD AND LABORATORY INVESTIGATION.
  3. SOIL AND GROUNDWATER CONDITIONS:
    - 3.1) General.
    - 3.2) Clayey Silts.
    - 3.3) Sands and Silts.
    - 3.4) Groundwater Conditions.
  4. DISCUSSION AND RECOMMENDATIONS.
  5. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT  
For  
The Stability of Slopes of the  
Proposed Mimico Creek Realignment,  
Hwy. #401, Hwy. #27 and Richview  
Expressway Interchange  
District #6 (Toronto)  
W.J. 66-F-112 -- W.P. 201-62-1

1. INTRODUCTION:

A memo, dated November 24, 1966, was received from the Regional Bridge Location Engineer, requesting a foundation investigation at the proposed site of the Mimico Creek realignment. The creek diversion is necessitated by the proposed interchange of Hwy. #401, Hwy. #27 and Richview expressway.

The investigation was carried out in order to analyze the stability of the slopes of the new creek, at those locations, where the creek will cut into the existing hill. Due to the propinquity of houses upon the hill, it was felt that the possibility of a future slip failure cannot be tolerated.

Accordingly, three cross sections were chosen by this Section, for analyses.

The field investigation, together with the laboratory tests and the compilation of the geophysical data sheets, were carried out by Dominion Soil Investigation Ltd. The survey of the boreholes and the cross sections was performed by F. J. of Canada Ltd.

This report contains the results of the field and laboratory studies, together with recommendations pertaining to the stability and protection of the slopes.

cont'd. /2 ...

## 2. FIELD AND LABORATORY INVESTIGATION:

The section of the creek realignment is situated between the existing Richview side road and the ramp of Hwy. #27 North to Hwy. #401 East. The portion of the diversion south of the existing Richview side road had also been considered for investigation, but was believed to have no stability problems of the proposed slopes.

The field investigation was carried out by a conventional diamond drill rig, adapted for soil sampling purposes, and by a continuous flight auger. Soil samples were recovered by means of 2-in. O.D. split-spoon samplers, which were driven by means of a 140-lb. hammer, utilizing an energy of 350 ft.-lbs. per blow.

The samples were visually examined and classified upon recovery and again in the laboratory. Laboratory tests of moisture content, Atterberg limits, and grain-size distribution, were performed on representative samples. The results of laboratory and field tests are compiled on the geotechnical data sheets, accompanying this report.

Altogether, six boreholes and six dynamic penetration tests were lowered at three different cross sections. The boreholes were numbered: 35, 36, 37, 38, 39, and 40. The locations and elevations of the boreholes, together with the stratigraphical profile, projected to the centre-line of the proposed creek diversion, are shown on Drawing #66-F-112A.

## 3. SOIL AND GROUNDWATER CONDITIONS:

### 3.1) General:

The terrain under consideration, is a glacial till belt forming ground moraines with irregular knolls and hollows.

The till is very heterogeneous, containing various amounts of gravel, sand, silt and clay. Depending upon the

cont'd. /3 ...

3. SOIL AND GROUNDWATER CONDITIONS: (cont'd.) ...

3.1) General: (cont'd.) ...

percentage amount of coarse and fine grains within the mixture, two major strata may be differentiated, as discussed below:

3.2) Clayey Silts:

This is the fine or cohesive portion of the till and may be classified as clayey silt with layers and seams of cobbles and gravel, and also, clayey silt with sand. The laboratory grain-size analyses indicated 3 - 5% gravel, 30 - 40% sand, 40 - 50% silt, and 15 - 20% clay particles within the samples. The stratum exhibits slight plasticity, the plastic limits being between 12 and 17%, and those of liquid limits, between 20 and 30%. The relatively low natural moisture contents ( $W = 7 - 12\%$ ), suggest an overconsolidated soil which is further evidenced by the extremely high densities. The overall consistency of the cohesive material is hard, the standard penetration "N" values ranging from 38 blows/ft. to much above 100 blows/ft.

3.3) Sands and Silts:

The granular portion of the glacial till was subdivided into layers of sandy silts, gravelly sands, and silty sands with gravel. The stratigraphy is further complicated by the occasional appearance of cohesive seams within the coarse layers. Grain-size distribution tests showed great variation in the constituent particles, the samples having 0 - 29% gravel, 35 - 75% sand, 25 - 60% silt, and 0 - 8% clay. The relative density of the granular deposit was found to be very dense, corresponding to "N" values ranging from 50 blows/ft. to much above 100 blows/ft. Very high values of bulk density and relatively low, natural moisture contents were observed in this stratum as well.

cont'd. /4 ...

3. SOIL AND GROUNDWATER CONDITIONS: (cont'd.) ...

3.4) Groundwater Conditions:

The groundwater level was established at each borehole location at various elevations, as tabulated below:

No. of Borehole	Elevation of Groundwater (Ft.)
35	454.0
36	456.2
37	457.1
38	457.6
39	474.6
40	464.1

As it may be seen, the elevations of groundwater levels are higher than the invert elevations of the proposed creek diversion. It is believed, however, that the excavations will cause depressions in the water levels to such a degree that no major dewatering scheme will be necessary. Any seepage or sloughing occurring along the slopes can be eliminated by conventional methods.

4. DISCUSSION AND RECOMMENDATIONS:

It is proposed to relocate Mimico Creek in the vicinity of the future Hwy. #401, Hwy. #27 and Richview expressway interchange. The investigated length of the diversion lies between the existing Richview side road and the ramp of Hwy. #27 North to Hwy. #401 East. The area in question, forms part of the slopes of the existing hill, the height of which is approximately 45 - 50 ft. The relocated creek between Sta. 28+00 and 30+00 will cut into the existing slope and will come somewhat closer to the houses along Clarion Rd. Between Sta. 30+00 and 36+00, the diversion will be

cont'd. /5 ...

4. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

farther from the slope than the existing creek, which flows right at the toe of the slope. At this section the existing slope is steeper than 1 horizontal to 1 vertical. Between Sta. 36+00 and 41+00, the proposed realignment will again intercept the hill, which along this length, has gentle slopes. During a visit at the site, three cross sections were chosen for investigation by the Foundation Section, at the approx. chainage of 28+00, 36+50, and 38+50. On the attached Drawing #66-F-112B, these cross sections are plotted, together with the soil stratigraphy and the proposed excavations for the creek.

After examination of the geometry of the proposed slopes, it was felt that no stability problems exist, due to the favourable soil conditions. Cuts of approximately 50 ft. depth with slopes of 2 horizontal to 1 vertical will be stable, provided that the slopes are protected against surface erosion by conventional means of sodding or the like.

5. MISCELLANEOUS:

The field work, performed during the period of November 30-Dec. 15, 1966, was supervised by Dominion Soil Investigation Ltd., who owned and operated the equipment as well.

This report was prepared by Mr. A. K. Barsvary, Senior Foundation Engineer, and reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

January 4, 1967

APPENDIX I



# GEOTECHNICAL DATA SHEET FOR BOREHOLE 35

OUR REFERENCE NO. 6-11-11  
YOUR REF. No. W.J. 66-F-112

CLIENT: D. H. O.  
PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE  
LOCATION: STA. 36+85, 120' LEFT - MIMCO CREEK DIVERSION  
DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING  
DIAMETER OF BOREHOLE: 3 1/2"  
DATE: Nov 30 - Dec. 7, 1966.  
W. P. 201-62-1

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY		REMARKS
				NUMBER	TYPE	N <sub>60</sub> or Equivalent of Sampler	blows per foot	SHEAR STRENGTH lbs./sq. ft.	Pl	W	
500.0	0	GROUND SURFACE									
		TOPSOIL									
495.0	5			1	SS	66					GR: 0% SA: 42% SI: 39% CL: 19%
490.0	10			2	SS	86					
485.0	15	cobbles		3	SS	100/1"					
				4	SS	140					GR: 5% SA: 37% SI: 41% CL: 17%
480.0	20	CLAYEY SILT with SAND brown grey		5	SS	81					
475.0	25			6	SS	59					
		(glacial till)									
470.0	30	Hard		7	SS	58					GR: 5% SA: 35% SI: 39% CL: 21%
465.0	35			8	SS	123/10"					$\gamma = 149.0$ pcf.
		cobbles									
460.0	40			9	SS	80/6"					$\gamma = 152.8$ pcf
455.0	45	Very Dense		10	SS	55/6"					
		SANDY -- SILT									
450.0	50			11	SS	60/6"					
		gravelly									
445.0	55			12	SS	55/6"					
440.0	56.0	END OF BOREHOLE									CAVE - IN Dec. 9, 1966. EL. 454.0'

VERTICAL SCALE: 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE: V. G. H. CHD. *Roller*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 36...

OUR REFERENCE NO. 6-11-11  
YOUR REF. No. W. J. 66-F-112

CLIENT: D. H. O.  
PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY INTERCHANGE  
LOCATION: STA. 36 + 56, 4' RIGHT, MIMICO CREEK DIVERSION  
DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING  
DIAMETER OF BOREHOLE: 2 7/8"  
DATE: Dec. 5-7, 1966.  
W. P. 201-62-1

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES		PENETRATION RESISTANCE		CONSISTENCY		REMARKS
				NUMBER	TYPE	blows per foot	SHEAR STRENGTH lbs./sq. ft.	water content %		
4582	0	GROUND SURFACE								
		TOP SOIL								
455	5	CLAYEY SILT with SAND brown grey (glacial till) firm to hard		1a	CS					
				1	SS	99				
450	8-10	GRAVELLY SAND with silt (glacial till) very dense grey		2	SS	125/4"				
				3	RC	9%				
445	15	CLAYEY SILT with SAND (glacial till) hard		4	SS	90/6"				
440	20			5	SS	100/5"				
435	20-25	layers of CLAYEY SILT with SAND and weathered SHALE		6	RC	16%				
				7	RC	0%				
26.2	26.2	END OF BOREHOLE		8	SS	75/2"				

WL. El. 456.2'  
Dec. 9, 1966

GR. 29% ; SA 42%  
SI. ~24% ; CL. ~5%

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: V. G. H. CHD. *Rolo*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 37..

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-112

CLIENT: D.H.O.

PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION: STA. 38+90, 105' LEFT, MIMICO CREEK DIVERSION

DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 3 1/2"

ENCLOSURE NO.

DATE: DEC. 8, 1966

W.R. 201-62-1

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N- or Advance of Sampler	20	40	60	80	100	PL	W	LI		
500.1	0	GROUND SURFACE														
		TOPSOIL														
495	5			1	S.S.	45										$\gamma = 143 \text{ p.c.f.}$
490	10	CLAYEY SILT		2	S.S.	78										$\gamma = 144.8 \text{ p.c.f.}$
485	15	with		3	S.S.	67/6"										
480	20	SAND <span style="margin-left: 20px;">brown grey</span>		4	S.S.	63										GR. 3% ; SA. 31% SI. 49% ; CL. 17%
475	25	(glacial till) hard		5	S.S.	64/6"										
470	30			6	S.S.	78										$\gamma = 147.4 \text{ p.c.f.}$
465	35			7	S.S.	67/6"										
460	40			8	S.S.	65/5"										
455	45	SILTY FINE to MEDIUM SAND		9	S.S.	100/3"										<div style="border: 1px solid black; padding: 2px; width: fit-content;"> C.I. EL. 457.1' Dec. 16, 1966 </div> GR. 5% ; SA. 70% SI. 25% ; CL. 0%
450	50	to SANDY SILT with a trace of CLAY very dense - grey		10	S.S.	100/5"										<div style="border: 1px solid black; padding: 2px; width: fit-content;"> C.I. EL. 453.7' Dec. 9, 1966 </div> GR. 0% ; SA. 35% SI. 57% ; CL. 8%
50.5	50.5	END OF BOREHOLE														

VERTICAL SCALE: 1 IN TO 5 FT.

**DOMINION SOIL INVESTIGATION LIMITED**

MADE: D. A. M. CHD: *Polko*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 38..

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-112

CLIENT: D. H. O.

PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION: STA. 38 + 15, 105' RIGHT, MIMCO CREEK DIVERSION

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE 2 7/8"

DATE DEC. 8, 1966

W.P. 201-62-1

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %					REMARKS
				NUMBER	TYPE	HL or Ad placement of Sampler	20	40	60	80	100	PL	W	LL			
461.2	0	GROUND SURFACE															
460		TOP SOIL															
455	5	SILTY SAND & GRAVEL  brown grey  with thin layers of fine sand and silt. very dense		1	S.S.	87										W.L. El. 457.6' Dec. 16, 1966  GR. 32% ; SA. 36% SI. 28% ; CL. 4%	
450	10			2	S.S.	155										W.L. El. 453.5' Dec. 9, 1966	
445	15	SAND & SILT with a trace of gravel  (glacial till)  very dense		3	S.S.	97										GR. 7% ; SA. 45% SI. 40% ; CL. 8%	
440	20			4	S.S.	63											
				4 A	W.S.	—											
435	25	CLAYEY SILT hard-dry- transition to shale		5	S.S.	165/9"											
26.3	28.3	END OF BOREHOLE															
	30																

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CHO: *Vallo*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 39 .

OUR REFERENCE NO. 6 - 11 - 11  
Your Ref. No. 66-F-112

CLIENT: D. H. O.

PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION: STA. 28+90, 100' LEFT MIMICO CREEK DIVERSION

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASH BORING

DIAMETER OF BOREHOLE: 2 7/8"

DATE: DEC. 14 - 15, 1966

W.P. 201-62-1

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N Advance of Sampler	2.0	4.0	6.0	8.0	10.0	PL	W	LI	
494.8	0	GROUND SURFACE													
490	5	CLAYEY SILT firm to stiff hard		1A	C.S.	—									
				1	S.S.	32									
485	10	SAND with (glacial till) brown		2	S.S.	114								GR. 6% ; SA. 35% SI. 45% ; CL. 14%	
480	15			3	S.S.	66									
475	20	SAND with SILT very dense dark brown		4	S.S.	47								W.L. EL. 474.6 Dec. 16, 1966 1:30 P.M. GR. 0% ; SA. 75% SI. ~25% ; CL. ~0%	
470	25	CLAYEY SILT with SAND (glacial till) hard, grey		5	S.S.	149/11"									
465	30	END OF BOREHOLE													
460	35														

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE D. A. M. CHD. 92.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 40..

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-112

CLIENT: D.H.O.

PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY INTERCHANGE

LOCATION: STA. 28+90, 16' LEFT MIMICO CREEK DIVERSION

DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 7/8"

DATE: DEC. 11-13, 1966

W.P. 201-62-1

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE				CONSISTENCY				REMARKS
				NUMBER	TYPE	N <sub>60</sub> or Advancement of Sampler	blows per foot				water content %				
							20	40	60	80	100	PL      W      LI			
							SHEAR STRENGTH				lbs / sq ft				
							2.0				4.0    6.0    8.0				
479.7	0	GROUND SURFACE													
		TOP SOIL													
475	5	CLAYEY SILT with SAND		1	SS	38									
470	10	(glacial till)  hard		2	S.S.	75								GR. 7% ; SA. 39 % SI. 42% ; CL. 12 % γ = 142.0 p.c.f.	
465	15	brown grey		3	SS	134								W.L. El. 464.1' Dec. 16, 1966	
460	20	1/2" to 1" thick layers of SANDY SILT and CLAYEY SILT (varved structure) hard		4	SS	42								W.L. El. 460.0' Dec. 13, 1966	
455	25			5	S.S.	54								GR. 0% ; SA. 12% SI. 55% ; CL. 33 %	
450	30	SILTY SAND with a trace of GRAVEL very dense grey		6	S.S.	161/11"								GR. 15 % ; SA. 58% SI. ~25% ; CL. ~2 %	
445	35			7	S.S.	109/6"									
440	40	CLAYEY SILT hard  layered structure		8	SS	70									
435	45	with fragments of shale hard		9	SS	100/4"									
431	45.1	END OF BOREHOLE		10	S.S.	110/1"									

VERTICAL SCALE: 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

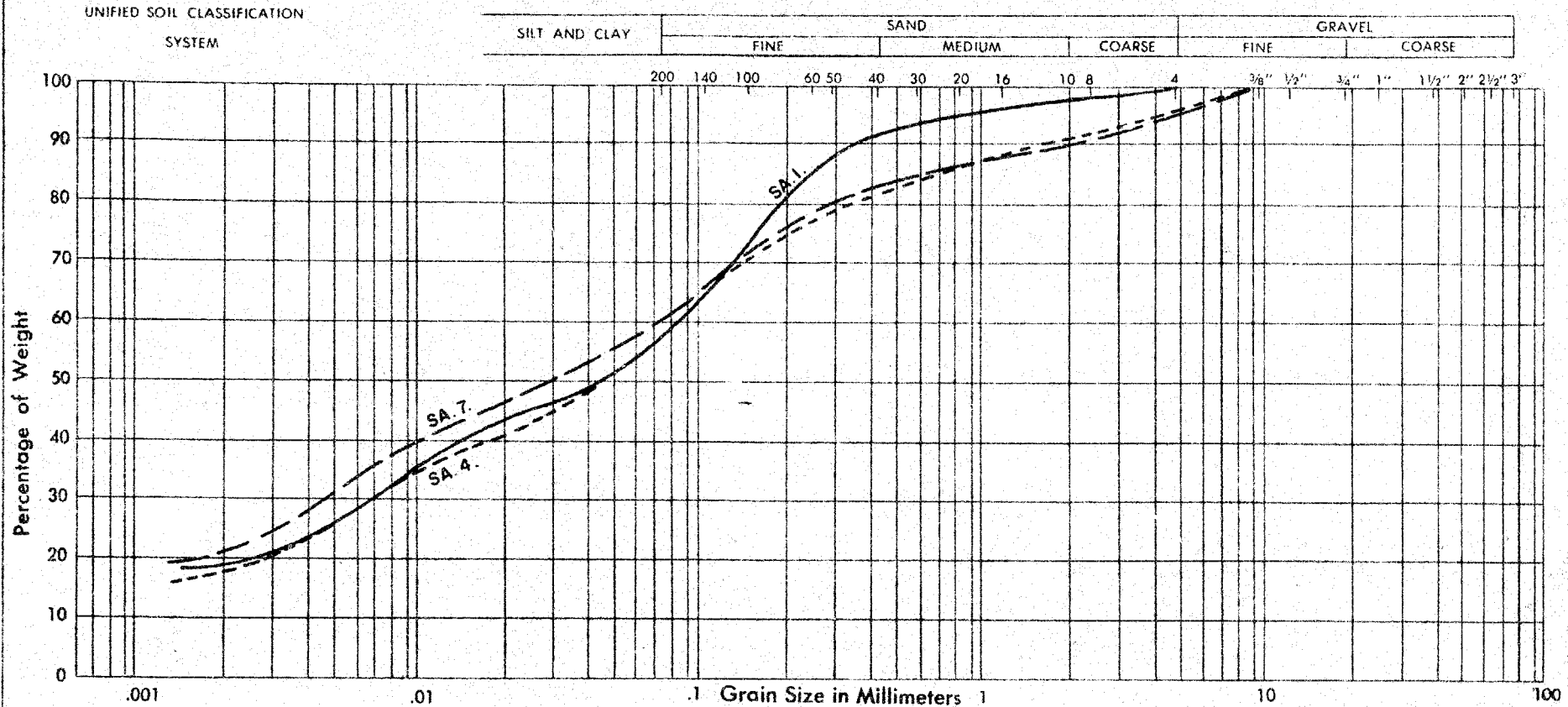
MADE: D.A.M.

CHD

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO 6-11-11



PROJECT: W.J. 66-F-112  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 35  
 SAMPLE NO.: 1 4 7  
 DEPTH OF SAMPLE: 5' 16' 30'  
 ELEVATION OF SAMPLE: 495' 484' 470'

COEFFICIENT OF UNIFORMITY  
 COEFFICIENT OF CURVATURE

NON APPLICABLE

Classification of Sample and Group Symbol:  
 CLAYEY SILT with SAND  
 CL - ML

PLASTIC PROPERTIES: (average)

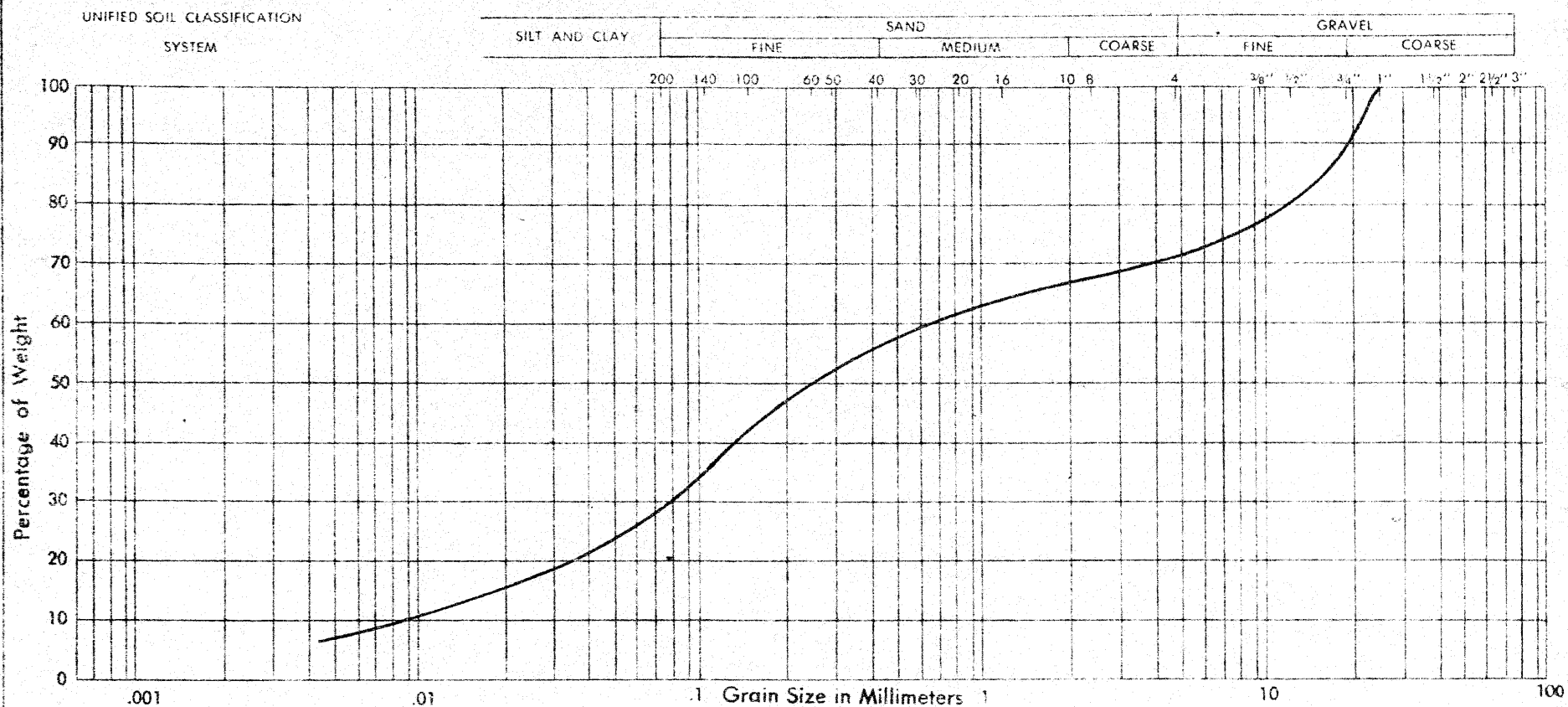
LIQUID LIMIT	%	=	20
PLASTIC LIMIT	%	=	13.9
PLASTICITY INDEX	%	=	6.1
MOISTURE CONTENT	%	=	10.2
ACTIVITY	=		0.3

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11



PROJECT: W. J. 66 - F - 112  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 36  
 SAMPLE NO.: 2  
 DEPTH OF SAMPLE: 10'  
 ELEVATION OF SAMPLE: 448.2'

COEFFICIENT OF UNIFORMITY 77  
 COEFFICIENT OF CURVATURE 1.2

**Classification of Sample and Group Symbol:**  
 GRAVELLY SAND and SILT

**SW-SM**

PLASTIC PROPERTIES:

LIQUID LIMITED	% =
PLASTIC LIMIT	% = NON
PLASTICITY INDEX	% = APPLICABLE
MOISTURE CONTENT	% =
ACTIVITY	=

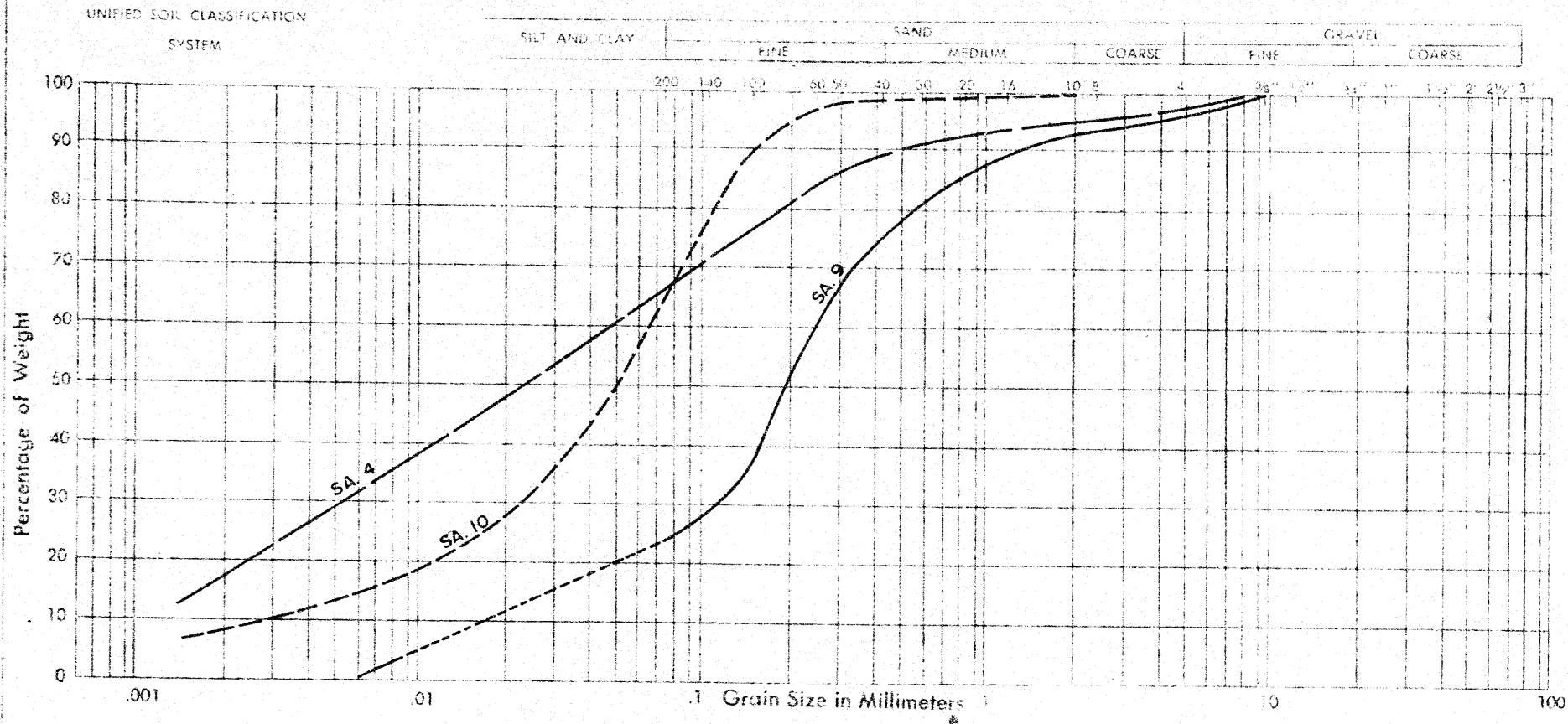
Enclosure No.



# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

COR. REFERENCE NO. 6-11-11



PROJECT: W.J. 66-F-112  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 37  
 SAMPLE NO.: 4 9 10  
 DEPTH OF SAMPLE: 20' 45' 50'  
 ELEVATION OF SAMPLE: 480.1' 455.1' 450.1'

COEFFICIENT OF UNIFORMITY SA. № 9 ~ 17  
 COEFFICIENT OF CURVATURE ~ 4.2

**Classification of Sample and Group Symbol:**

CLAYEY SILT with SAND	SILTY FINE to MEDIUM SAND	SANDY SILT with a trace of CLAY
CL-ML	SP-SM	ML

(4)

(9)

(10)

(CL - ML)  
average

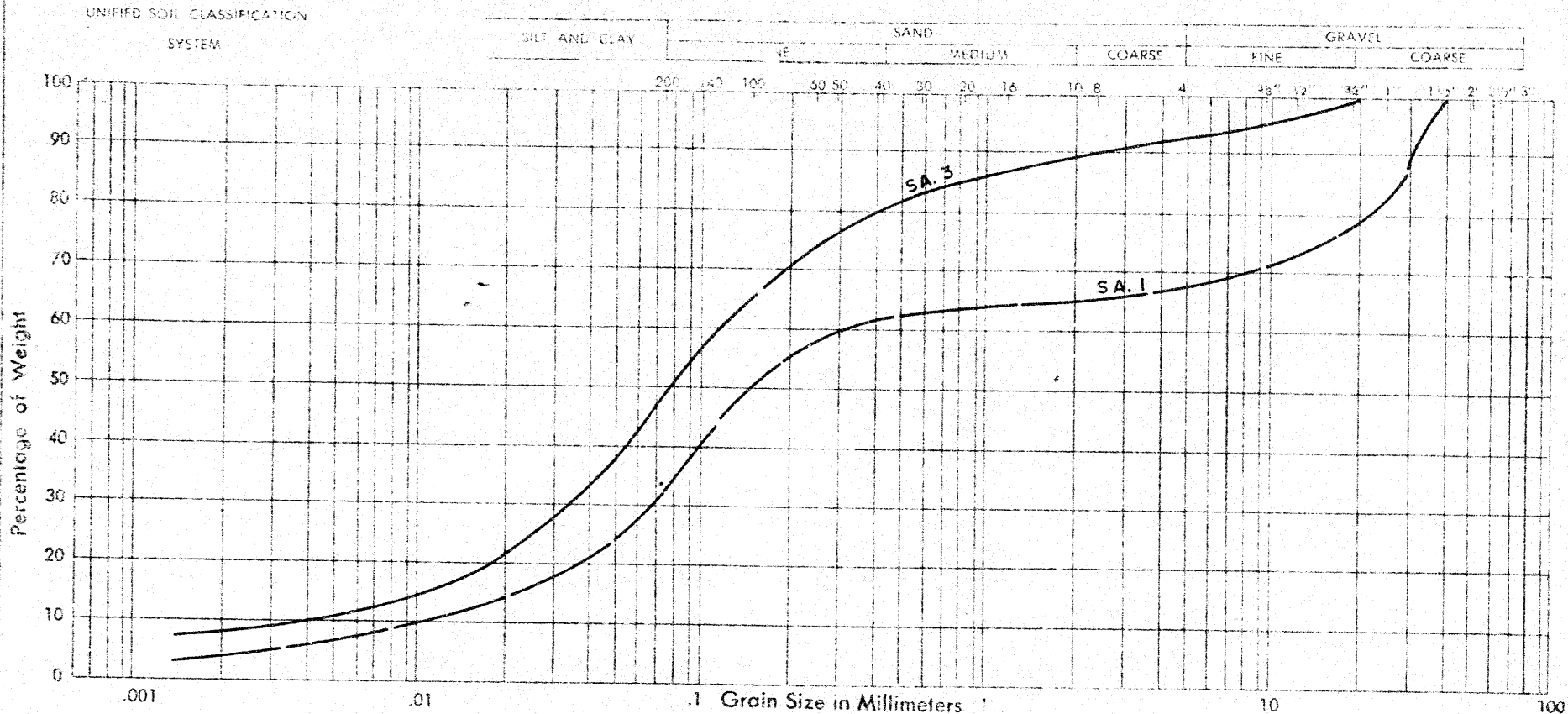
PLASTIC PROPERTIES:	
LIQUID LIMIT	% = 21.1
PLASTIC LIMIT	% = 14.4
PLASTICITY INDEX	% = 6.7
MOISTURE CONTENT	% = 10.8
ACTIVITY	% = 0.4

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11



PROJECT: W.J. 66 - F - 112  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 38  
 SAMPLE NO.: 1 3  
 DEPTH OF SAMPLE: 5' 15'  
 ELEVATION OF SAMPLE: 456.2' 446.2'

COEFFICIENT OF UNIFORMITY	SA. 1	SA. 3
	31	28
COEFFICIENT OF CURVATURE	1.6	2.0

**Classification of Sample and Group Symbol:**

SILTY SAND & GRAVEL	SAND & SILT with a trace of GRAVEL
GS-SM	SW-ML

PLASTIC PROPERTIES:

LIQUID LIMIT	%	==
PLASTIC LIMIT	%	==
PLASTICITY INDEX	%	==
MOISTURE CONTENT	%	==
ACTIVITY		==

(1)

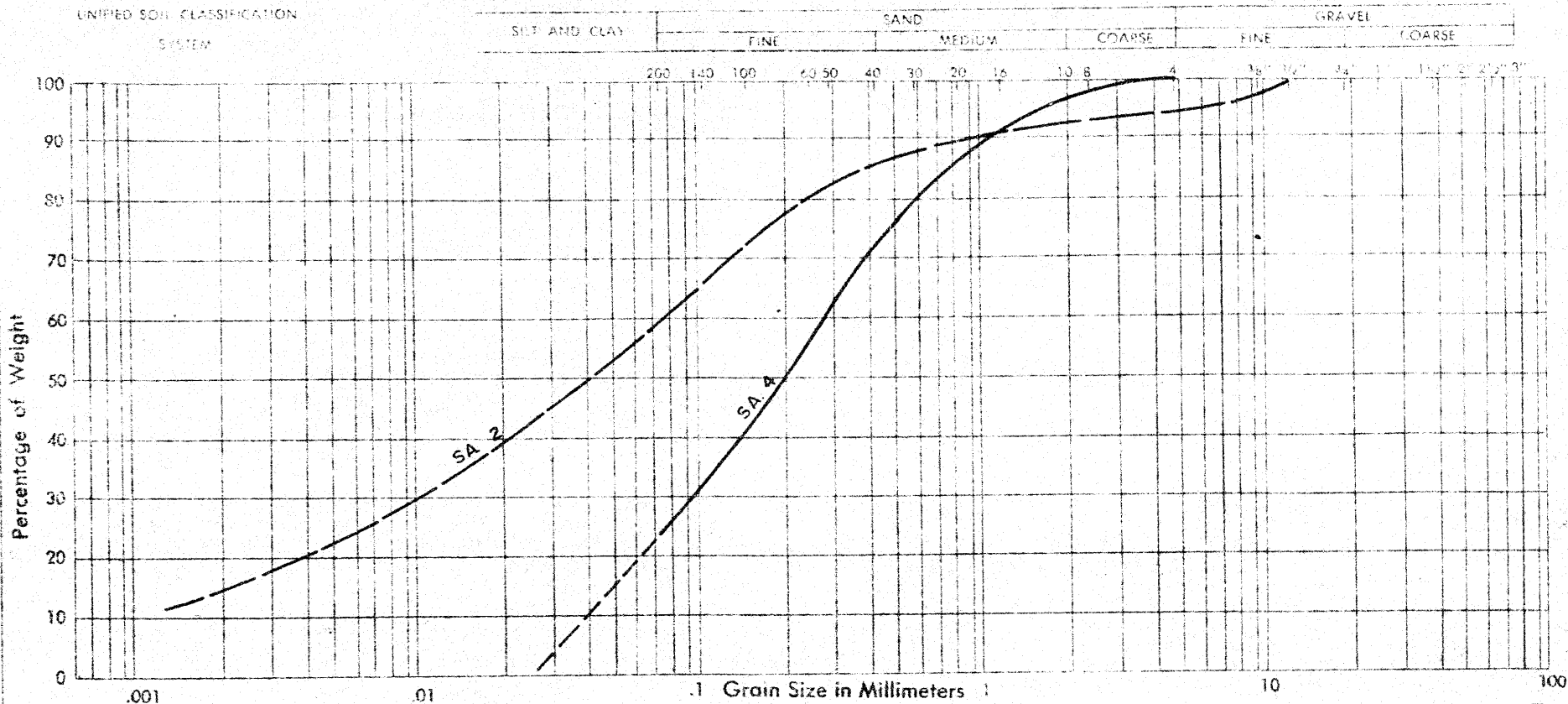
(3)

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11



PROJECT: W. J. 66-F-112  
 LOCATION: HWY. No 27 @ RICHVIEW  
 BOREHOLE NO.: 39  
 SAMPLE NO.: 2 4  
 DEPTH OF SAMPLE: 10' 20'  
 ELEVATION OF SAMPLE: 484.8' 474.8'

COEFFICIENT OF UNIFORMITY SA. No 4 : 7  
 COEFFICIENT OF CURVATURE 0.9

Classification of Sample and Group Symbol:

CLAYEY SILT with SAND

SAND with SILT

CL - ML

SP

(SA. 2)

(SA. 4)

### PLASTIC PROPERTIES

LIQUID LIMIT	%	=	20.5
PLASTIC LIMIT	%	=	13.9
PLASTICITY INDEX	%	=	6.6
MOISTURE CONTENT	%	=	7.8
ACTIVITY			0.47

CL - ML

Enclosure No.

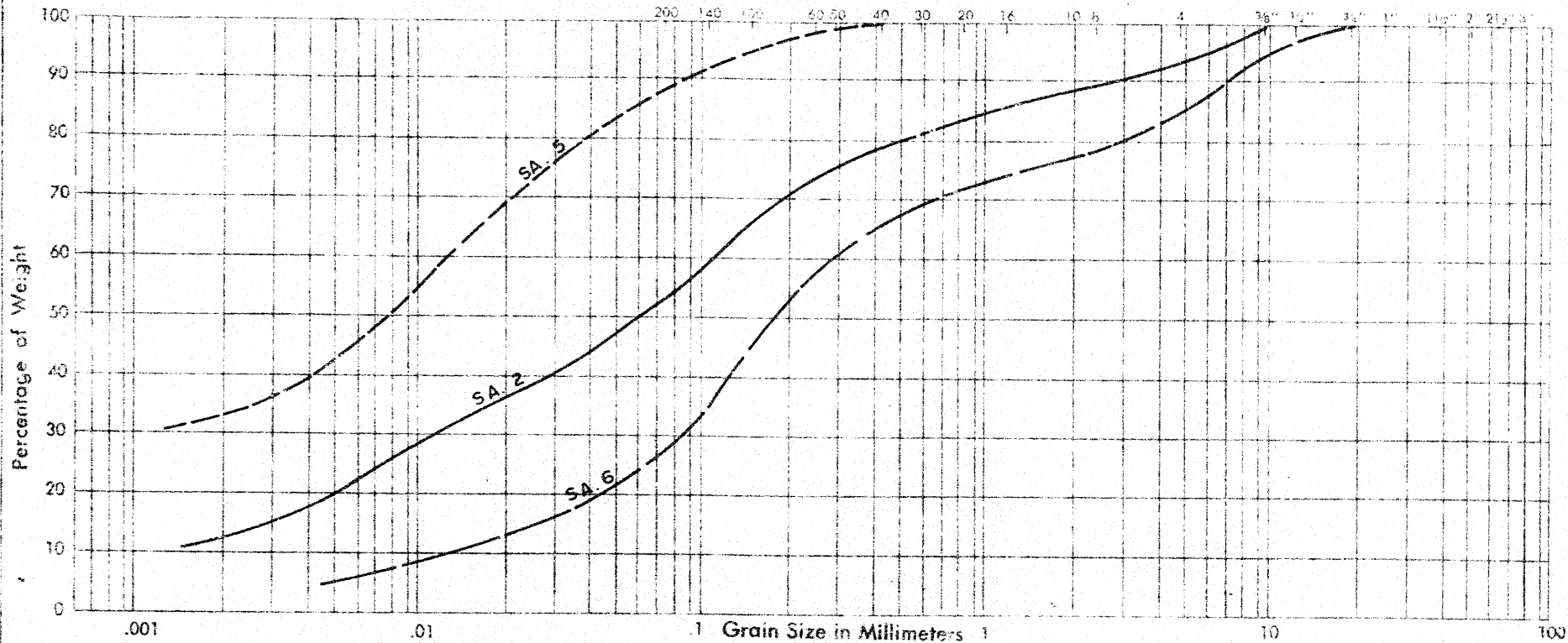
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO.

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W.J. 66-F-112

LOCATION: HWY. 27 @ RICHVIEW

BOREHOLE NO.: 40

SAMPLE NO.: 2 5 6

DEPTH OF SAMPLE: 10' 25' 30'

ELEVATION OF SAMPLE: 469.7' 454.7' 449.7'

COEFFICIENT OF UNIFORMITY  
COEFFICIENT OF CURVATURE

CA. No 6 : 23.3

2.1

PLASTIC PROPERTIES:

	CL-ML	CL
LIQUID LIMIT	21.0	31.0
PLASTIC LIMIT	14.3	19.9
PLASTICITY INDEX	6.7	11.1
MOISTURE CONTENT	11.8	23.9
ACTIVITY	0.55	0.34

### Classification of Sample and Group Symbol:

CLAYEY SILT  
with SAND

CLAYEY SILT

SILTY SAND  
with trace of GRAVEL

CL-ML

CL

SW

(SA. 2)

(SA. 5)

(SA. 6)

Enclosure No.

## ABBREVIATIONS USED IN THIS REPORT

### PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - 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:-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

### TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

### SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

# ABBREVIATIONS USED IN THIS REPORT

## SOIL PROPERTIES

$\gamma$	UNIT WEIGHT OF SOIL (BULK DENSITY)
$\gamma_s$	UNIT WEIGHT OF SOLID PARTICLES
$\gamma_w$	UNIT WEIGHT OF WATER
$\gamma_d$	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
$\gamma'$	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
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
$\tau_f$	SHEAR STRENGTH
$c'$	EFFECTIVE COHESION INTERCEPT
$\phi'$	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
$\mu$	COEFFICIENT OF FRICTION
$S_i$	SENSITIVITY

## GENERAL

$\pi$	= 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
$\sigma$	NORMAL STRESS
$\sigma'$	NORMAL EFFECTIVE STRESS ( $\bar{\sigma}$ IS ALSO USED)
$\tau$	SHEAR STRESS
$\epsilon$	LINEAR STRAIN
$\gamma$	SHEAR STRAIN
$\nu$	POISSON'S RATIO ( $\mu$ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
$\eta$	COEFFICIENT OF VISCOSITY

## EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
$\delta$	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
$K_0$	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
$\beta$	ANGLE OF SLOPE TO HORIZONTAL

DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 751-6565

BRANCH  
869 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3831



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

January 9th, 1967.

Our Ref: 6-11-11

Department of Highways, Ontario,  
Materials & Research Section,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. A. G. Stermac, P. Eng.,  
Principal Foundation Engineer

Re: Mimico Creek Diversion  
W.P. No. 201-62-1  
W.J. 66-F-112

Dear Sirs:

Enclosed please find fourteen (14) sets of:

Geotechnical Data Sheets and Grain Size Distribution  
Sheets for Boreholes 35, 36, 37, 38, 39, 40.

We trust that the above are to your satisfaction.  
However, should you have any further queries, please contact  
us at your convenience.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

L. S. Rolko, P.Eng., A.M. ASCE

LSR/jvm

Tel: 248-3282

December 15, 1966

Mr. H. Michaud  
123 Inverdon Rd.  
Etobicoke, Ontario

Dear Mr. Michaud:

As you know the Department of Highways is doing some Soil Testing in your area, and one of the boreholes is located on your property.

We again respectfully request your permission to allow our drilling crew on your property.

Department personnel have explicit instructions to exercise extreme care when working on private property. If any damage is done you may be assured that full compensation will be paid.

Your co-operation will be much appreciated.

Very truly yours,

A - 7

A. Barsvary  
Senior Foundation Engineer  
Materials & Testing Division



December 13, 1966

Mr. R. Simpson  
170 Rangoon Rd.  
Etobicoke, Ontario

Dear Sir:

Further to our telephone conversation, we thank you for your permission to let the soil crew enter your property in connection with the present soils investigations for the Department of Highways of Ontario.

Department personnel have explicit instructions to exercise extreme care when working on private property. If any damage is done, you may be assured that full compensation will be paid.

We thank you again for your co-operation, and remain,

Yours truly,

  
A. Barsvary  
Senior Foundation Engineer

December 12, 1966

Mr. D. Joyce  
164 Rangoon Rd.  
Etobicoke, Ontario

Dear Sir:

Further to our telephone conversation, we thank you for your permission to let the soil crew enter your property in connection with the present soils investigations for the Department of Highways of Ontario.

Department personnel have explicit instructions to exercise extreme care when working on private property. If any damage is done, you may be assured that full compensation will be paid.

We thank you for your co-operation again, and remain,

Yours truly,



A. Barsvary  
Senior Foundation Engineer

December 9, 1966

Dominion Soils Investigation Ltd.  
Scarborough, Ontario

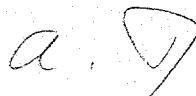
Attn: Mr. Leslie Rolko

Dear Mr. Rolko:

Further to our telephone conversation, I am sending to you the following drawings:

1. One Plan showing existing utilities at the site of Contract #7(Yellow) to be used as a general guide only, scale 1:200.
  2. One 1:100 scale plan of the Dundas Contract with the proposed bridges and the boreholes already completed by the D.H.O.
  3. One 1:200 scale plan of Highway 401 & 27 Interchange with existing and proposed structures.
  4. One Plan 1:200 and 3 cross sections of the Mimico Creek Diversion with the locations and elevations of our boreholes.
- I trust you will find these in order.

Yours sincerely



A. Barszvary  
Senior Foundation Engineer

Department of Highways Ontario

Copy for the information of

A. Stermac, Principal Foundation Engineer, Room 101, Lab. Bldg.

Bridge Division,  
Downsview, Ontario,  
November 28th, 1966.

Foundation of Canada Engineering  
Corporation Limited,  
2200 Yonge Street,  
TORONTO 12, Ontario.

Attention: Mr. R. S. Adachi.

RE: W.P. 201-62-1, Hwy. #401, - Hwy. #27,  
Interchange,  
District #6.

Dear Sir:

The Bridge Design Section have been working on an abutment and column layout for the structures in the above interchange.

We would like to point out, that the lane added to Hwy. 27 W.B. in the area of Richview Expressway forces us into a span of 180' ± on Br. #23 and thus a very deep section. Therefore we would like to have the geometrics adjusted to allow for the pier arrangement shown on the attached sketch.

We have had enquiries from the Foundation Section regarding Bridge #68 (temporary structure for temporary W.B. Hwy. #401 to S.E. Hwy. #27) which is on Contract #7. As you know the schedule for this contract is very tight. The Foundation Section intend to carry out only a preliminary soil investigation for this contract and would like to have some idea of the location of Bridge #68 within the next two weeks.

JCMcA/cew  
cc N.A. Coy  
A. Stermac  
E. G. McCabe

J. C. McAllister,  
for W. S. Melnychyn,  
Regional Bridge Location Engineer.

#66-F-112

W.P. # 201-62-1

HWY # 401 & 27

INTERCHANGE

MIMICO CREEK

DIVERSION



